Proceedings of Two-Day National Seminar on "ICT-Enabled User Driven Library Services: Issues and Challenges"

Editor

Dr. Atashi Karpha

Raja Rammohun Roy Library Foundation

Proceedings of Two-Day National Seminar on
"ICT-Enabled User Driven Library Services:
Issues and Challenges"
Editor: Dr. Atashi Karpha

Published by Gokhale Memorial Girls' College
1/1 Harish Mukherjee Road
Kolkata 700 020, W.B.
on 23/12/2022

ISBN : 978-93-5768-438-5

Type Setting & Printing by Microprint Graphics
1A, Raja Lane, Kolkata 700 009, W.B.

CONTENTS

Mode of Formation of Ornithology: A Linguistic Analysis

Sri Debabrata Maity

Librarian, Khejuri College, Baratala, Khejuri, West Bengal-721431

Email: maitydebabrata6@gmail.com

Abstract:

Ornithology is one of the important branches of modern-day biology and deals with the methodologies and aspects related to the study of birds. Same as other fields of knowledge, it is also necessary for LIS professionals to know about the mode of growth of ornithology, its position in the universe of subjects, and its disciplinary nature. A total number of 2699 keywords extracted from the titles, abstracts, and objects' captions of 50 top-cited articles from the domain of Ornithology have been linguistically analyzed for this purpose. A total number of 938 subject-specific root words have been obtained from the analysis and also found that they are borrowed from 88 different subjects. Considering the existing theories of mode of formation of subjects in LIS field and viewing the results of the data analysis tables, it is interpreted that ornithology is multidisciplinary in nature and its mode of formation is distillation of Kind-2.

Keywords: *Ornithology; Ornithology-mode of formation; Ornithology-linguistic analysis; Modes of formation of subjects; Modes of formation of subjects-linguistic analysis; Object analysis; Multidisciplinary field*

1. Introduction :

Knowledge organization (KO) processis necessary in any library or documentation center like institutions to serve the knowledge seeker rightly. This process works as base for smooth running of any library. Main objective of developing any KO system is to build the bridge between what people want and what the library has. Classifying document according to its subject content is necessary in KO process. Classifiers use DDC, LC, or UDC like subject classification schemes to execute the purpose. For developing classification scheme, classificationists must have knowledge about "the mode of formation and the structure of the subjects in the universe of subjects and of the isolate ideas in the universe of isolate ideas" (Ranganathan, 1967,p.351). When a subject is analyzed, it results into a set of components. Variety of relations can be drawn between any two components of a subject. Mode of formation of a subject is identified by what type of relationship its components have (Kumar, 1988, p. 202). There are several modes of formation of subjects

in LIS classification theory, but they are not interpreted linguistically. In the present study an attempt has made to identify mode of formation of ornithology through linguistic analysis.

2. Literature Review :

The credit of starting the concept of mode of formation of subjects goes to S R Ranganathan, as in 1950 he pointed out that "subjects in the universe of knowledge can be formed by means of four modes of formation; these are loose assemblage, lamination, dissection and denudation" (Kumar, 1988, p. 202). Neelameghan (1973)worked onfission, distillation, clustering modes of formation of primary basic subjects; agglomerate basic subject; and the arrangement of basic subjects. Gopinath and Seetharama (1979) discussed about seven modes of formation of subjects, which are loose assemblage, lamination, fission, fusion, distillation, agglomeration, and cluster. McGarry introduced procreation, and annexation modes of formation of subjects in 1993.Satija, Madalli and Dutta (2014) introduced analogical mode, and instrumental-based subject formation mode.

All the modes of subject formation mentioned above are not established via linguistic analysis. Secondly nowhere in the said literature ornithology is drawn as example of a particular mode of formation of subject. Present study attempts to bridge the gaps.

3. Objectives of the Study :

The chief objectives of the present study are:

- To observe the semantic classification of the compound words used in ornithology;
- To know about the structure (i.e., the subject combination pattern and the subject occurrence pattern) of the compound words used in ornithology;
- To see the nature of the root words used in the focal terms of ornithology;
- To find out the core root words used in ornithology;
- To identify the disciplines/subjects from which root words are borrowed to ornithology;
- To find out the core disciplines involved in the growth of ornithology;
- To identify the mode of formation and disciplinary nature of ornithology.

4. Methodology :

The methodology used in the study was borrowed from the author's two previous works (Maity & Dutta, 2022; Maity & Dutta, 2021).Fifty top-cited

original research articles (i.e.,except review article, report, commentary and etc.) in the field of ornithology were taken from Web of Science database to form the sample size of the study. During the database searching the term ornithology was used as search term and the time span was fixes as 1980-2014. Article must had at least one object (mayinclude any of the one non-textual element like table, diagram, figure, chart, photograph, map, and etc.) with proper caption was considered as sample. Titles, abstracts, and objects' captions of the sampled articles were analyzed to cull out keywords and in total 2699 keywords were obtained. Acronymsused in the keywords were expanded (e.g., Coordinated Universal Time for UTC). Common words (including and, of, for, in and etc.) were also removed from the keywords to obtainfocal terms/words. For example, from the keyword "scientific information on birds," three focal words were obtained-scientific, information, and birds. Focal words of the keywords were listed with its frequency and they were analyzed further to obtain root words.Viewing the number of root word and other morpheme associatedwith each focal word, nature of the focal wordswere identified-simple, complex, or compound. With the help of some tertiary sources of information, subject-specific meaning of each root word was identified and they were distributed under the subjectto which their meaning match contextually.

As root words of an exocentric compound word cannot reflect in general the subject-specific contextual meaning for which the compound word is used, so each of the exocentric compound words is treated as single root word and kept in the root word list in place of the root words by which the exocentric compound words are formed. As example, the exocentric compound word "take-off" has subject-specific meaning related to the subject aeronautics, but the root words "take," and "off" cannot reflect it even with small percentage; so "take-off" was counted as root word. Here in total 1836 root words were obtained.The contextual meaning of a root word may match to more than one subject, but emphasis was given to that subject only, which is old by origin.

5. Analysis and Interpretation :

5.1 Semantic Classification of Compound Words :

Total numbers of compound words are presented in Table 1. Though compound words are semantically divided into four common types in linguistics, but here no appositional compound word is found. Endocentric type occurs in large number with 78.79% of frequency; whereas, exocentric with 14.28%; copulative with 6.93%.

Table 1 : Semantic Classification of Compound Words

Sl. No.	Semantic Type	Frequency	Percentage
1	Endocentric	182	78.79
2	Exocentric	33	14.28
3	Copulative	16	6.93
Total		231	100.00

5.2 Structure of Compound Words :

To understand the structures of the compound words, subject combination pattern and subject occurrence pattern in the compound words have been analyzed in Table 2 and Table3. Here only endocentric and copulative compound words, figuring a total of 198 are analyzed for the purpose. Exocentric compound words are omitted because the root words of any individual exocentric compound word cannot reflect the subject-specific contextual meaning for which the compound word is used. From the study though 64 types of subject combination pattern have been found but only top fifteen patterns are demonstrated in Table 2.These top fifteen patterns cover 67.68% of total compound words; whereas remaining 32.32% compound words are formed by 49 distinct subject combination patterns.

From Table 3 it is found that root wordsfrom 34 distinct subject categories (including the common root word and not found cases) occur 408 times in totalto form 198 endocentric and copulative compound words.The time of occurrence for common root word is 61.27%; whereas 7.35% for zoology; 4.90% for general biology; 2.94 for physical geography; 2.70 for general physics; and so on.

Table 2 : Top Fifteen Subject Combination Patterns in the Compound Words

Sl. No.	Subject Combination Pattern	Frequency	Percentage
1	Common Root Word-Common Root Word	72	36.36
2	Zoology- Common Root Word	9	4.54
3	Common Root Word-Zoology	8	4.04
4	Common Root Word-Agriculture	5	2.52
5	Common Root Word-Physical Geography	5	2.52
6	General Physics-Common Root Word	5	2.52
7	Sociology-Common Root Word	5	2.52
8	General Biology-Common Root Word	4	2.02
9	Common Root Word-Aeronautics	3	1.52

10	Common Root Word-General Physics	3	1.52
11	Common Root Word-Genetics	3	1.52
12	Common Root Word-Geometry	3	1.52
13	Common Root Word-Linguistics	3	1.52
14	Ecology-Common Root Word	3	1.52
15	General Biology-General Biology	3	1.52
16	Others (= 49)	64	32.32
	Total Subject Combination Pattern = 64	198	100.00

Table 3 : Subject Occurrence Pattern in the Compound Words

Sl. No	**Subjects**	**Times of Occurrence**	**Percentage**
1	Common Root Word	250	61.27
2	Zoology	30	7.35
3	General Biology	20	4.90
4	Physical Geography	12	2.94
5	General Physics	11	2.70
6	Agriculture	8	1.96
7	General Chemistry	7	1.72
8	Anatomy	6	1.47
9	Genetics	6	1.47
10	Not Found	6	1.47
11	Sociology	5	1.23
12	Linguistics	4	0.98
13	Aeronautics	3	0.73
14	Biochemistry	3	0.73
15	Botany	3	0.73
16	Ecology	3	0.73
17	Geography	3	0.73
18	Geometry	3	0.73
19	Organic Chemistry	3	0.73
20	Archaeology	2	0.49
21	Astronomy	2	0.49
22	Computer Science	2	0.49
23	Forestry	2	0.49
24	History	2	0.49

25	Mathematics	2	0.49
26	Ornithology	2	0.49
27	Art	1	0.25
28	Cookery	1	0.25
29	Ethnography	1	0.25
30	General Science	1	0.25
31	Hunting	1	0.25
32	Medicine	1	0.25
33	Music	1	0.25
34	Pathology	1	0.25
	Total = 34	408	100.00

5.3 Nature of Root Words :

As mentioned earlier in the methodology section that 1836 root words were found during root word analysis. Here all the root words are broadly divided into two categories-subject-specific root word (938), and common root word (898). In the focal terms of ornithology, it is found that 51.09% root word is taken from different disciplines or subjects; whereas there is also 48.91% common root word exists.

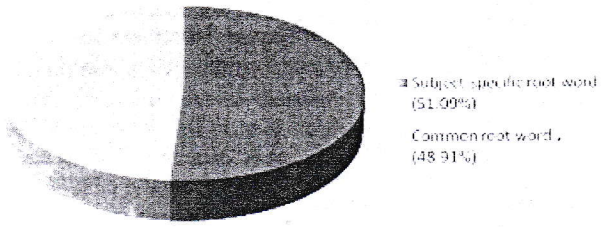

Figure 1. Broad division of root words of focal terms used in ornithology

5.4 Core Root Words :

It is already mentioned above that there are 938 subject-specific root words (SRWs), and 898 common root words (CRWs) figuring a number of 1836 root words in total. Now considering the frequency of occurrence, both top fifteen SRWs and CRWs are listed in Table 4. These root words may be considered as core root words used in ornithology.

Table 4

Top Fifteen Core SRWs and Core CRWs Used in Ornithology

Sl. No.	Core SRWs	Frequency of Occurrence	Core CRWs	Frequency of Occurrence
1	Bird	164	Logos	128
2	Species	112	Populus	58
3	Ornis	84	Model	44
4	Mean	42	Field	43
5	Breed	40	Land	42
6	Bio	34	Migrate	36
7	Avis	32	Nature	34
8	Egg	29	Forage	32
9	Radar	25	Data	31
10	History	25	Dense	31
11	Culture	23	Size	29
12	Corn	22	Type	29
13	Fish	21	Behave	27
14	Wild	21	Time	27
15	Grass	20	Specimen	24

5.5 Root Word Distribution in Different Discipline

Table 5 shows distribution of SRWs in different subjects from which they are borrowed to ornithology. Important to mention here that the terms "discipline," and "subject" have been used in this paper inthe same sense. Figure 2 graphically represents the same data of subject-wise frequency distribution of SRWs as presented in Table 5.From the table it is found that root words are borrowed from 88 different disciplines including ornithology and not found cases. With care to the concept of "core journals" given by S. C. Bradford in 1934, depending on the frequency of scattering of SRWs, all the subject fields found in the study can be grouped into three that is, core subject fields, allied subject fields, and alien subject fields. Though it is a little harder here to draw a clear boundary between core and allied, and allied and alien subjects, but it is important to mention that 76.55% of total SRWs has source of origin only in 15 subject fields; whereas only 23.45% SRWs are distributed in 73 subject fields including not found category. An amount of 42.75% of total SRWs is borrowed from zoology, following 4.69% from general biology, 3.84% from physical geography, 3.52% from anatomy, 3.41%

from mathematics, 2.99% from botany, and so on. Almost 61% SRWs are borrowed from these six disciplines. So it can be easily said that these six disciplines are among the core disciplines responsible for the growth of ornithology.

It is also found from the table that only 0.85% of SRWs have their origin within the ornithology itself and the meaning of same amount of root wordsare not available in any general or subject-specific dictionaries as available to author1. The root words with not found cases may be associated with new born technical or subject-specific terms (Maity & Dutta, 2021).

From the existing literature it is found that there are two types of distillation mode of subject formation in LIS field, which are distillation of Kind-1, and distillation of Kind-2. When theories, ideas, practicing tools distilled out from diverse basic subjects to form new primary basic subject, it is known as distillation of Kind-1 (Neelameghan, 1973). Distillation of Kind-2 happens when idea(s) distilled out from the "subjects going with a particular basic subject only . . ." (p. 168) to form new basic subject. Research methodology, management science, conference technique are some of the examples of distillation of Kind-1; whereas Statistical calculus, library service, operation research are examples of distillation ofKind-2 (Kumar, 1988). Though the SRWs used in ornithology are scattered in 88 different subjects, but large number of SRWs (42.75%) borrowed from only one discipline that is zoology. There is a huge gap of SRWs distribution between zoology and the 2nd ranked discipline-general biology (only with 4.69%). So it can be easily interpreted that the mode of formation of ornithology is distillation of Kind-2, and it is multidisciplinary in nature.

Table 5

Subject-Wise Distribution of SRWs Used in Ornithology

Sl. No.	Rank No.	Subject	Distribution	% of	Cumulative	% of Cumulative
1	1	Zoology	401	42.75	401	42.75
2	2	General Biology	44	4.69	445	47.44
3	3	Physical Geography	36	3.84	481	51.28
4	4	Anatomy	33	3.52	514	54.80
5	5	Mathematics	32	3.41	546	58.21
6	6	Botany	28	2.99	574	61.19
7	7	Statistics	25	2.67	599	63.86
8	8	Anthropology & Ethnology	19	2.03	618	65.88

Sl. No.	Rank No.	Subject	Distribution	% of	Cumulative	% of Cumulative
9	9	Agriculture	18	1.92	636	67.80
10	9	General Physics	18	1.92	654	69.72
11	10	Biochemistry	16	1.71	670	71.43
12	11	Genetics	14	1.49	684	72.92
13	12	General Chemistry	13	1.39	697	74.31
14	13	Computer Science & Related Technology	11	1.17	708	75.48
15	14	Government, Politics & Diplomacy	10	1.07	718	76.55
16	15	Aeronautics	8	0.85	726	77.40
17	15	Education	8	0.85	734	78.25
18	15	Linguistics	8	0.85	742	79.10
19	15	Not Found	8	0.85	750	79.96
20	15	Ornithology	8	0.85	758	80.81
21	15	Physiology	8	0.85	766	81.66
22	16	Arts	7	0.75	773	82.41
23	16	Electronics	7	0.75	780	83.16
24	16	History	7	0.75	787	83.90
25	16	Sociology	7	0.75	794	84.65
26	17	Environmental Science	6	0.64	800	85.29
27	17	Geology	6	0.64	806	85.93
28	17	Law	6	0.64	812	86.57
29	17	Telecommunications	6	0.64	818	87.21
30	18	Commerce	5	0.53	823	87.74
31	18	General Science	5	0.53	828	88.27
32	18	Journalism & Publishing	5	0.53	833	88.81
33	18	Mechanical Engineering	5	0.53	838	89.34
34	19	Economics	4	0.43	842	89.77
35	19	Forestry	4	0.43	846	90.19
36	19	Geography	4	0.43	859	90.62
37	19	Medicine	4	0.43	854	91.04
38	19	Music	4	0.43	858	91.47
39	19	Pathology	4	0.43	862	91.90
40	19	Surveying	4	0.43	866	92.32

Sl. No.	Rank No.	Subject	Distribution	% of	Cumulative	% of Cumulative
41	19	Taxonomy	4	0.43	870	92.75
42	20	Ecology	3	0.32	873	93.07
43	20	Literature	3	0.32	876	93.39
44	20	Organic Chemistry	3	0.32	879	93.71
45	20	Philosophy	3	0.32	882	94.03
46	20	Printing, Lithography & Bookbinding	3	0.32	885	94.35
47	20	Psychology	3	0.32	888	94.67
48	21	Architecture	2	0.21	890	94.88
49	21	Broadcasting	2	0.21	892	95.10
50	21	Cookery	2	0.21	894	95.31
51	21	Hunting	2	0.21	896	95.52
52	21	Nautical Terms	2	0.21	898	95.74
53	21	Pharmacology	2	0.21	900	95.95
54	21	Phonetics & Phonology	2	0.21	902	96.16
55	21	Sports	2	0.21	904	96.38
56	21	Typography	2	0.21	906	96.59
57	22	Accountancy	1	0.11	907	96.70
58	22	Accounting & Book-Keeping	1	0.11	908	96.80
59	22	Archaeology	1	0.11	909	96.91
60	22	Astronomy	1	0.11	910	97.01
61	22	Atomic Physics	1	0.11	911	97.12
62	22	Automotive Engineering	1	0.11	912	97.23
63	22	Banking & Finance	1	0.11	913	97.33
64	22	Cartography	1	0.11	914	97.44
65	22	Civil Engineering	1	0.11	915	97.55
66	22	Clothing & Fashion	1	0.11	916	97.65
67	22	Communication & Information	1	0.11	917	97.76
68	22	Ecclesiastical Terms	1	0.11	918	97.87
69	22	Ethnography	1	0.11	919	97.97
70	22	Fishing	1	0.11	920	98.08
71	22	General Engineering	1	0.11	921	98.19
72	22	General Medicine	1	0.11	922	98.29

Sl. No.	Rank No.	Subject	Distribution	% of	Cumulative	% of Cumulative
73	22	Human Geography	1	0.11	923	98.40
74	22	Inorganic Chemistry	1	0.11	924	98.51
75	22	Jewellery	1	0.11	925	98.61
76	22	Library science & Bibliography	1	0.11	926	98.72
77	22	Marketing	1	0.11	927	98.83
78	22	Meteorology	1	0.11	928	98.93
79	22	Metallurgy	1	0.11	929	99.04
80	22	Palaeontology	1	0.11	930	99.15
81	22	Phenology	1	0.11	931	99.25
82	22	Phylogeny	1	0.11	932	99.36
83	22	Religion	1	0.11	933	99.47
84	22	Space Science	1	0.11	934	99.57
85	22	Taxidermy	1	0.11	935	99.68
86	22	Textile	1	0.11	936	99.79
87	22	Theatre	1	0.11	937	99.89
88	22	Veterinary Science	1	0.11	938	100.00

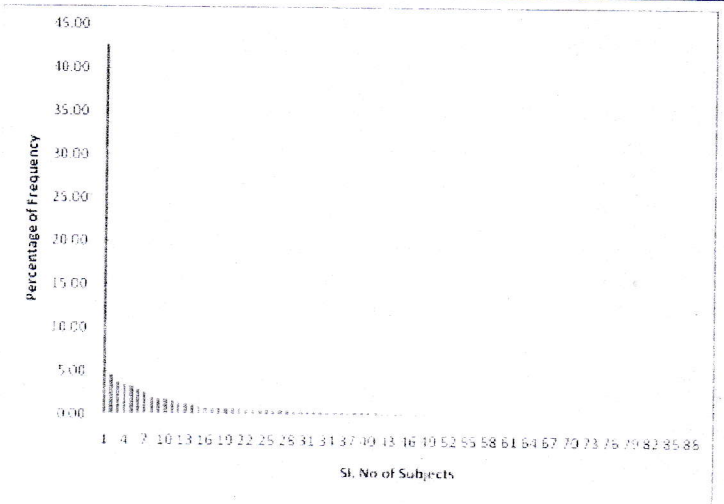

Figure 2. Subject-Wise Distribution of SRWs Used in Ornithology

6. Major Findings

Following are the major findings of the study:

- Compound words are semantically divided into three types-Endocentric with 78.79%, exocentric with 14.28%, and copulative with 6.93% frequency of appearance.
- Endocentric and copulative compound words are formed by 64 types of subject combination patterns. Top three subject combination pattern are common root word-common root word (36.36%), zoology-common root word (4.54%), and common root word-zoology (4.04). Root words from 34 distinct subject categories occur 408 times in total to form the endocentric and copulative compound words.
- The focal terms used in the domain of ornithology are formed by 51.09% SRWs and 48.91% CRWs.
- Top fifteen core SRWs are bird, species, ornis, mean, breed, bio, avis, egg, radar, history, culture, corn, fish, wild, and grass. Top fifteen core CRWs are logos, populous, model, field, land, migrate, nature, forage, data, dense, size, type, behave, time, and specimen.
- SRWs used in the focal terms of ornithology are distributed in 88 different disciplines by origin.
- The top six core disciplines involved in the growth of ornithology are zoology, general biology, physical geography, anatomy, mathematics, and botany.
- The mode of formation of ornithology is distillation of Kind-2 and it is multidisciplinary in nature.

7. Conclusion :

From the study it is clear that ornithology is multidisciplinary in nature and the subjects to which it is interlinkedare not only from biosciences but from several distinct fields of knowledge like pure sciences including physics, chemistry, mathematics, statistics; applied sciences including agriculture, computer science; geography; social sciences including anthropology & ethnology,government, politics & diplomacy; arts; and others. It is also notable thatcomparing individually to the other fields of study,a field of biosciences,that is zoology is the one from which most of the SRWs (42.75%) are borrowed to ornithology. These borrowed SRWs are mainly related to a particular type of facet that is, the name of species and sub-species of birds and the rest of the SRWs from distinct disciplines are clustered mainly around the bird species at the central.So it is clear here that the features of the formation of the subject field ornithology mainly match with the features of distillation type, especially distillation of Kind-2 type of modes of formation of subjects.

Notes :

1. Following websites are visited during root word identification and their subject-wise distribution:

https://www.etymonline.com/

https://www.thefreedictionary.com/dictionary.htm

https://medical-dictionary.thefreedictionary.com/

https://en.wiktionary.org/wiki/

https://www.merriam-webster.com/

References :

Gopinath, M. A., & Seetharama, S. (1979). Interdisciplinary subjects and their classification.Ordering Systems for Global Information Networks: Proceedings, edited by ArashanipalaiNeelameghan, FID/CR, 121-135.

Kumar, K. (1988). Theory of classification (4th rev. ed.). New Delhi: Vikas Publishing House.

Maity, D., & Dutta, B. (2021).Mode of formation of cell biology: A linguistic analysis. Article submitted for publication, Department of Library, Khejuri College and Department of Library and Information Science, Vidyasagar University.

Maity, D., & Dutta, B. (2022). In search of domain specific standard categories: A case study from cell biology. Journal of Indian Library Association, 58(1), 29-43.

McGarry, K. (1993). The Changing Context of Information (2nd ed.). London: LA Publishing.

Neelameghan, A. (1973). Library Science with a Slant to Documentation, 10(2), 149-221.

Neelameghan, A. (1973). Primary basic subject by distillation.Library Science with a Slant to Documentation, 10(2), 166-172.

Ranganathan, S. R. (1967). Prolegomena to Library Classification (3rd. Ed.). Bombay: Asia Publishing House.

Satija, M. P., Madalli, D. P., & Dutta, B. (2014). Modes of growth of subjects.Knowledge Organization, 41(3), 195-204. doi: 10.5771/0943-7444-2014-3-195