APPENDIX C


Since the publication of the Association’s 1964 Cumulative Index to the American Political Science Review, the first since 1926, development of new techniques of information exchange have significantly affected our expectations about handling such problems in the future. Much of the credit for this goes to political scientists like Dr. Kenneth Janda of Northwestern University, who prepared the 1964 Cumulative Index and whose written work, Data Processing: Applications to Political Research and Information Retrieval: Applications to Political Science, have been of considerable significance in our field.

Forward steps taken by the Association have included the indexing of Annual Meeting papers for 1968, and also for the years from 1956 forward in cooperation with University Microfilms; cooperation with organizations producing periodical contents bibliographies in political science and citation indexes; formation of a Committee on Scientific Information Exchange; and making Association publications and papers available in microform.

Five years of articles in the Review have appeared since the last Cumulative Index, and as it went out of print in 1968, 1969 became the natural year in which to cumulate again.

Professor Janda’s new program is designed to improve the utility of the index, and his introduction explains how the index was constructed and how to use it.

Researchers and students again will find the Cumulative Index a valuable tool, and I am sure I express their gratitude as well as the Association’s, to Kenneth Janda and his assistants Donald Dillaman, Richard R. Greenfield, and Jeffrey Krend, as well as to Xerox/University Microfilms and its representative Thomas Harvey for cooperating with the Association in publication.

Evron M. Kirkpatrick
Executive Director
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Serious scholars in all fields must bear the same cross: the responsibility of catching up and keeping up with the literature. This responsibility has begun to weigh ever more heavily upon the political scientist within recent years. Employing traditional methods of reviewing the literature, the individual scholar seems to have little chance of gaining control of the situation as new publications mushroom. In the absence of any concerted, collective effort to catalogue the existing and forthcoming literature, the stream of publications threatens to engulf the hapless researcher.

Other disciplines have been confronted with the threatening consequences of an unmanageable literature long before now. Early responses to the problem resulted in involving professional organizations in the traditional tasks of preparing bibliographies and abstracts of relevant literature. Examples of such professionally supported projects, and their initial publication dates, include the American Chemical Society's Chemical Abstracts (1907), the Union of American Biological Societies' Biological Abstracts (1926), the American Psychological Association's Psychological Abstracts (1927), the American Bar Foundation's Index to Legal Theses and Research Projects (1952), and the American Sociological Association's Sociological Abstracts (1953). While the American Political Science Association has not sponsored a separate publication for the purpose, extensive bibliographical sections on different fields in political science had been included as regular features of the Review from 1906 through December, 1966.

Professionally sponsored attempts at cataloguing the literature generally employed the traditional procedures of listing references alphabetically by author under subject-headings. The job of formulating subject-heading classifications was tedious and expensive, and the utility of any given classification scheme was open to question. Cross-filing entries imposed added burdens and expenses in compilation. As the number of references under any particular subject grew, the author-alphabetization listing tended to obstruct quick retrieval of specific references, for dissimilar articles by men with similar names were grouped together under such headings as "American Government." Furthermore, the high costs of compilation and reproduction discouraged attempts at cumulation of references. Problems of searching the literature were replaced with problems of searching bibliographies.

Some professional organizations have recently adopted a new approach to these problems. Traditional methods of constructing subject-heading bibliographies have been replaced with mechanical procedures for producing "indexes" to literature. The mechanically-produced Chemical Titles appeared in 1960; Biological Abstracts

mechanized its listing of titles in 1961; and The Index to Legal Theses and Research Projects followed suit in 1962. The technique adopted in these cases was that of indexing titles by means of permuting the keywords they contain. The program utilized for this purpose was the IBM developed KWIC Index. 1

In 1964, the American Political Science Association underwrote an exploration of the possibilities in this approach to mechanized documentation by sponsoring the preparation of the KWIC-styled Cumulative Index to all 2,611 articles that appeared in the first 57 volumes of the American Political Science Review, 1906 through 1963. Based on the favorable reception given the first KWIC index to the APSR, the Association has underwritten this updated edition of the Cumulative Index, which covers the publication of the Review through 1968.

THE NATURE OF A KWIC INDEX

A total of 2,822 articles appeared in the Review since its first issue in 1906 through its 62nd volume in 1968. These articles were recorded on punchcards according to the format shown in Figure 1, where different “classes” of cards are used for different types of information: author, title, and facts of publication. A Control Data Corporation computer, operating under control of the TRIAL information retrieval system, 2 read and processed thousands of these cards. The computer was instructed to prepare two types of output: (1) a “keyword-in-context” (KWIC) index to the “keywords” contained in all titles, and (2) a “keyword-out-of-context” (KWOC) index to all senior and junior authors of these articles.

The heart of the Cumulative Index is the keyword index to the titles. The keywords themselves are arranged vertically in alphabetical order to the immediate right of the blank column. A keyword is identified by the computer in one of two ways. The computer can be instructed to refer to a previously prepared table of keywords or to a table of non-keywords. In the first case, the computer looks at every word in the title of the publication and compares it with its own table of keywords stored in memory. Words in the titles which are found on the list in memory are then selected for indexing. When a non-keyword list is used, the


2 The TRIAL system, which was originally programmed for the IBM 709 by William Tetzloff, has been extensively revised by Donald Dillaman, who has written the system in FORTRAN, the Control Data Corporation 6400 computer. The TRIAL system now includes a keyword index program that searches for logical relationships among keywords. These two standard techniques in information retrieval are discussed in Kenneth Janda, Information Retrieval: Applications to Political Science (Indianapolis: Bobbs-Merrill, 1968), Chapters 1 and 2. Mr. Dillaman kindly modified the output in several respects to improve its published appearance.
computer will include in the index only those words that are not stored in its memory. Errors of omission in preparing a keyword list will cause important terms to be excluded from the index; however, errors of omission in a non-keyword list will only produce some unhelpful entries, or “noise,” in the index. The Cumulative Index to the Review was prepared with the use of a 464 item non-keyword list, consisting of words like “of,” “for,” “some,” “which,” and “political.”

After identifying the keywords through this process of comparison, the computer sorted all the keywords in alphabetical order and printed them out with a substantial portion of the context in which they were embedded (hence the name “Key-Word-In-Context”). To use the index scan the vertical volume of keywords to select a term of interest. Then read the context of the title printed on the same line as the keyword. There is room provided on the line for only 80 character-spaces. A title with no more than 80 characters and spaces prints out in full, although a portion of the title may be wrapped around and printed before or after the keyword, depending on where it appears in the title. Some of the words in longer titles do not print out, again depending on the position of the keyword. In order to provide a clear indication of the first and last words when a title has been wrapped around, every title is ended with a period and equal sign.

Once an interesting title has been located in the keyword listing, the user of the Index should look at the reference code given on the same line in the right-hand column. This code allots eight spaces for the first eight characters of the senior author’s last name (if the name is short, the extra spaces are used for his initials); the name is followed by the number of the volume in which the article was published; the volume number is separated by a dash from the first three letters of the month of publication; and the month is followed by the last two digits of the year of publication. This reference code should suffice in order to locate the article among the volumes of the Review in a library. The complete citation, including all authors and exact pagination, can be obtained by consulting the author cross-reference section of the Index, which follows the keyword listing of titles.

This type of index is known as a “permuted” keyword index because an article will appear as many times as the number of keywords it contains. The first title listed, for example, (“Greece Abandons Proportional Representation”) will be found in three other places in addition to “Abandons,” “Greece,” “Proportional,” and “Representation.” A total of 11,524 keyword lines were generated for the 2,822 articles from the Review. Therefore, each title appears in the Index an average of 4.1 times.

PERMUTATION INDEXING IN THE SOCIAL SCIENCES

Obviously the major limitation of permutation or KWIC indexing lies in the lack of descriptiveness of the titles fed into the computer. The longer and more
INTRODUCTION

descriptive article titles in the physical and biological sciences seem to be better suited for this technique than titles in the social sciences. But this does not mean that social science titles are not amenable to permutation indexing; it merely means that the retrieval process may be somewhat less effective.

Some encouraging evidence concerning the utility of KWIC indexing social science literature is given in a study by Donald Kraft. Kraft examined 3,428 entries in an issue of The Index to Legal Periodicals and an issue of The Index to Legal Theses and Research Projects and disclosed that 89.5% had titles judged suitable for keyword indexing. Another study by Fels and Jacobs reported similar findings for the titles of state statutes. Furthermore, the recent publication of the Kansas Index to Transferred Titles from original Russian literary and social science journals would seem to demonstrate the wide applicability of the KWIC technique.

Exclusive reliance on title descriptive power constitutes both the primary advantage and the major limitation of KWIC indexing. Because the input to the computer consists merely of punchcards bearing the author, title, and source of the reference, the job of preparing the input can be given to keypunch operators working directly from the contents pages of publications. The computer itself prepares and prints the keyword index, the alphabetized bibliography, and the author cross-reference. The computer output can then be photographed and published by offset printing. The whole operation can be done quickly, at low cost, and with a small expenditure of manpower. Kraft reports that in 1961 Chemical Titles "indexed 6,000 articles in the chemistry literature, 147,000 authors, produced approximately 410,000 index entries and a million printed lines" with a staff consisting of "an editor, two girls for keypunching and verifying, and one clerical assistant."

The major limitation of keyword indexing can be reduced considerably by exercising some editorial supervision over titles and examining the texts of articles whose titles seem unclear or are literary in nature. Scanning the text will usually disclose some terms or phrases which might be enclosed in parentheses and added to the title. Keywords added in this manner will be indexed as if they had been in the title. This procedure was followed in the American Bar Foundation's Index to Legal Indexes, as indicated in the 9th and 10th titles listed, where the word "legislation" was added to supplement the titles "Absent Voters" and "Absent Voting."

HISTORY OF THE APSR INDEXING PROJECT

One of the earliest, if not the first, applications of KWIC indexing to literature with political science relevance was in Julian Feldman's bibliography of "Selected Articles and Documents on Methodology and Research in the Social Sciences" for the September 1960 issue of the Review. Through correspondence, Mr. Feldman told me that he had discontinued using the KWIC technique to prepare this bibliography largely because he was unable to obtain financial support to reproduce the index once it was processed. He indicated, however, that he believed the method still had definite use for political science literature.

In order to explore further the uses of KWIC indexing, I conducted a pilot study in August 1962, indexing the articles published in the three most recent volumes of the Review and the last two volumes of the Public Opinion Quarterly. The result encouraged me to undertake a project to produce an index which might be published, and then evaluated by a diversified audience of political scientists. The obvious choice was a cumulative index to the American Political Science Review. As the official journal of the Association, the Review would certainly contain a wide variety of titles to test the effectiveness of keyword indexing within political science. Moreover, a cumulative index to this important journal would seem to have considerable value in its own right. The Review had not been indexed since 1926, and its Managing Editor had only recently observed that "References and citations in current literature to issues of the Review that antedate the end of World War II are quite uncommon." 9

PREPARING THE COMPUTER INPUT

Work was begun on the first Index in July, 1963. The first of many decisions made in preparing the Index came during the punching of the initial issue. The early volumes of the Review contained sections on "Legislative Notes," "Current Municipal Affairs," and "Judicial Decisions," among other topics. These sections contained many entries ranging in length from one to two paragraphs to several

7Mr. Arthur Stickgold, an undergraduate major in political science, did the keypunching for this pilot study and also helped immeasurably in the actual processing of the index, as did Stuart Kennedy, Miss Louise Cowen, Supervisor of the Computing Center, and Albert Morris, Senior Programmer of the Northwestern University Computing Center. I wish to thank Miss Louise Cowen, Supervisor of the Computing Center, for granting free computing time for the pilot study and her many kindnesses extended during both the unsponsored and sponsored phases of the project.

8The computer tape from the original pilot study was borrowed with my permission by IBM's Midwestern Regional Office, which prepared an erroneously titled paper, "Keyword-In-Context (KWIC) Index of 236 Recent Political Science Doctoral Dissertations," for distribution at the annual meeting of the American Historical Association, December, 1962.


10Virtually all the initial keypunching was done by Miss Rudy Bratman. Mr. Hal Brown helped at every stage of the project. Mr. Al Wyner helped Mr. Brown in making some final corrections in the input cards. Miss Dana Whalen keypunched the new citations for this updated edition.
INTRODUCTION

\[\text{pages. Some of the entries seemed patently trivial, while others appeared informative. To include all the items contained in these sections would have added literally hundreds of "articles" to the Index and, I felt, would have been a disservice to its users. Realizing that one man's chaff is another man's wheat, I excluded none on the basis of subject matter but many on the basis of length. For better or worse, no item was included unless it was more than one page in length. For reasons of cost, book reviews were also excluded, as were titles to symposia and the special sections mentioned above.}

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\[\text{Virtually all the keypunching was done directly from the tables of contents, but it was first necessary to prepare each volume for the keypuncher by penciling in corrections, notations, and keyword additions. Although I had hoped to have an advanced undergraduate major in political science enter additional keywords while he verified the accuracy and completeness of the table of contents, I soon found I had to do this myself. Skillful addition of keywords requires a greater knowledge of developments in the discipline than any undergraduate can possess, and I regret that someone more knowledgeable than I did not perform this job. On 604 occasions I found it desirable, although not always necessary, to add one or more keywords to the titles — meaning that I considered the original titles suitably "indexable" in about 77% of the cases. This figure is considerably lower than Kraft's estimate of 89.5% descriptiveness in the legal titles he examined, but I frequently added keywords to identify the nature of suitably titled articles appearing in special sections, such as one on "Conference Reports."}

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\[\text{Wherever possible, I tried to add the keyword at the end of the title, in order to avoid interrupting the title itself. Every addition to a title is enclosed within parentheses in this manner: left parenthesis, space, keyword, space, right parenthesis. The spaces before and after the keyword were entered for two reasons: (1) to avoid obliterating the blank column which sets off the keyword column from the rest of the listing, and (2) to identify a keyword addition from a word which happens to occur only once or twice in all the articles examined.}

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\[\text{On many occasions I found it desirable to separate hyphenated words by spaces before and after the hyphen, for the computer considers hyphenated words as one. I always did this, for example, to form "Two-Party" instead of "Two-Party." The non-keyword "Two" is not indexed, and the article appears under "Party." The same was done in the case of "Legislative-Executive," with both terms indexed. I was far more cautious in using the hyphen to join two ordinarly separate words. The words "Latin America" invited the introduction of a hyphen to form one keywrod, and I did join these words when they were separated in the original because they are often joined in practice. Although it would have been good KWIC-indexing practice to join "International Relations" in order to prevent the computer from treating them as separate, I did not do this hoping to save some computer time.}

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\[\text{Krend calculates that it took him a total of 40 hours to prepare the input for keypunching, edit and correct the punchcards, and organize for computer processing. Keypunching the new input took only about 10 hours, which means that the cumulative input was ready for computer processing in less than 50 working hours. Mr. Richard R. Greenfield, then manager of our CDC remote terminal installation, invested several additional hours of his time supervising the computer processing in order to get a fussy system to operate properly.}

\]

\[\text{Once success was achieved, the CDC 6400 computer consumed less than 10 minutes of central processor time to read 2,822 article titles, search a 464-item index under "Relations" as well as "International." I did not take this liberty with the original text. I tried to preserve the exacting wording of the original so that the user of the Index can be confident that he has an unadulterated title to cite. The only exceptions to this policy I can recall (in addition to the hyphenation of "Latin America") came when I spelled out "18th," "66th," and "67th" instead of punching them as given. This was done to conform with the practice followed by other authors.}

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\[\text{The three undergraduate students who were employed to punch and edit the computer input for the first edition of the Index in 1964 completed the entire job, involving 2,611 articles, in less than 200 working hours. I find it impossible to estimate the number of hours I invested in supervisory activities, but most of my time was consumed in making decisions arising from the novelty of the enterprise. A more concrete estimate can be made of the time I spent examining titles and articles for keyword additions; this took approximately half an hour per volume, or about 30 hours.}

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\[\text{Considerably less supervision was needed in preparing this updated edition of the Index. Having the initial Index as an example of what was wanted, I was able to turn over most of the responsibilities for producing the Index to Mr. Jeffrey Krend, then a graduate student in Northwestern's Political Science Department. The original cards were available for the first 57 volumes of the Review, and Mr. Krend needed only to prepare punchcard entries for the 211 articles published in volumes 58 through 62.}

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\[\text{Krend began his work by pencilling in keyword additions to the tables of contents for all 20 issues of the Review in the five new volumes. While I made few changes or additions to his keyword supplements, considerably more editing was done on the titles published since 1964 than on those published in the earlier period. On 98 occasions we found it desirable to add one or more keywords to the titles, which means that we considered the original titles suitably "indexable" in about 54% of the cases (compared to about 77% for the first edition of the KWIC Index). This might suggest that article titles in political science are becoming more ambiguous and therefore less suitable to keyword indexing, but our impression is exactly the opposite: the titles are becoming longer and more focused. The discrepancy is probably due to our tendency to take greater liberties in adding keywords to supplement the recent titles than I took in preparing the input for the first Index.}

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non-keyword list for each word in every title, prepare 11,524 KWIC index lines, produce a cross-reference KWOC listing for all senior and junior authors, and sort both the KWIC and KWOC listings in alphabetical order.

FUTURE APPLICATIONS OF KWIC INDEXING TO POLITICAL SCIENCE LITERATURE

KWIC Indexing is certainly not the ultimate answer to the problem of catching up and keeping up with the literature. It is basically suited for only one job: providing an inexpensive, quickly prepared guide to literature whose titles are relevant to a researcher's interests. That is all it can do; but it is actually a great deal. At Northwestern University we are extending the application of the technique to the preparation of indexes in specialized sub-fields in political science such as comparative government and international relations. It would be worthwhile to apply the technique to other bodies of literature, such as political science doctoral dissertations — ordinarily a world of lost literature. Those who plan to prepare KWIC indexes should certainly try to communicate with one another and share cards to avoid duplication of effort.

This assumes, of course, that KWIC indexes to political science literature will prove to be useful for the discipline. Suggestions and criticisms are earnestly requested from the users of the KWIC Cumulative Index to the Review. Improvements in the product prompted by users' reactions may make the difference between an index of marginal value and one of clear-cut utility. Moreover, the very use of KWIC indexing may increase its utility for the literature of the future, as prospective authors try to improve the descriptiveness of their titles. In his forecast of developments in computer-produced indexes, Youden predicted, "As more and more keyword indexes are published the author's choice of title words will improve, which will lead to both more and better keyword indexes." 12

Some guides for preparing informative titles for technical articles are contained in a recent paper by Kennedy. 13 Simply put, the title should tell what the article is about. Many titles contained in the Review and in other journals in the profession do not do this. Kennedy makes several suggestions for constructing good titles, some of which are particularly relevant for improving the indexability of political science literature:

Content of Title Consider the title as a one-sentence abstract. Without attempting to summarize the content of your paper, make the title reflect the subject as

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CUMULATIVE INDEX
TO THE AMERICAN POLITICAL SCIENCE REVIEW