



The Campbell Collaboration

Information Retrieval Policy Brief

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## Executive Summary

This brief addresses the following fundamental question for Campbell Collaboration (C2) reviewers: What is C2 policy concerning the information retrieval phase of a systematic review?

The Brief:

1. Identifies the key issues that are confronted by C2 systematic reviewers attempting to gather information relevant to the questions posed by their review;
2. Proposes policies to direct the activities of C2 reviewers during the various stages within the information retrieval phase of their review;
3. Provides exemplars to demonstrate the implementation of these policies; and
4. Describes the ways in which the reviewers contribute to the goals of C2.

The core of the Brief is a set of seven key issues, along with proposals for C2 policies for each. A summary of the issues and proposals is as follows:

### ***1. What information retrieval activities need to be performed by a C2 reviewer?***

**Proposal:** Reviewers are required to use a variety of strategies and sources to identify studies, and have a systematic approach to selecting studies for inclusion in the reviews. Identification and retrieval of studies, for a C2 review, must extend beyond electronic searches of bibliographic databases. In doing so, there is an increased cost in terms of time and resources; therefore, search and retrieval activities must be budgeted for and documented.

### ***2. What sources of information need to be searched?***

**Proposal:** Reviewers must attempt to include unpublished as well as published studies in their reviews. In addition to a search of C2's own database (C2-SPECTR), reviewers will consult other general and specialized databases, journal articles,

reference lists, the internet, conference proceedings, government documents, and other sources as appropriate.

**3. *What substantive search terms and methodological search filters should a C2 reviewer use in an electronic search during the information retrieval stage of the review process?***

**Proposal:** The reviewer will collaborate with an information specialist or librarian to generate the substantive search terms. C2's Scientific Research Project Director will provide to the review groups a set of methodological search filters to find trials, possible trials and other studies. However, the groups must work to refine these and develop modifications to maximize use of the indexing features of various databases. Review groups will keep IRMG apprised of their activities in this area so that duplication of effort will be minimized and the collaborative nature of C2 maintained.

**4. *When is hand searching of the literature required, and how is it to be conducted?***

**Proposal:** The review group editorial team will decide when to include hand searching as part of a review, and will ensure that handsearchers are trained before they begin their handsearches. Procedures to guide handsearching, contained in the C2 Hand Search Manual, will be made available on the C2 website.

**5. *What role do reviewers play in the development of C2's Trials Registers (C2-SPECTR, the Campbell Collaboration's Sociological, Psychological, Educational, and Criminological Trials Register; and C2-PROT, the Campbell Collaboration's Prospective Trials register)?***

**Proposal:** Each C2 review group will designate one of its members as a liaison to IRMG. If a review group has its own specialized register of research reports, the liaison will be responsible for forwarding (additions to) the contents of this register to the Scientific Research Project Director on a quarterly basis for review and possible

entry into C2-SPECTR. If such a register does not yet exist, C2 reviewers will provide their liaison with an annotated bibliography from their systematic review, which denotes randomized trials (RCTs), possibly randomized trials (CCTs), or other suitable research designs, and whether these studies were included in the review; the liaison will then forward this annotated bibliography to the Scientific Research Project Director.

**Proposal:** Reviewers will also forward to their group's liaison studies they come across that are not relevant to their review, but which are relevant to C2-SPECTR. The liaison will forward bibliographies and other reports of potentially relevant studies to the C2 Scientific Research Project Director on a quarterly basis.

**6. *How will reviewers be apprised of updates to the contents of the trials registers?***

**Proposal:** C2-SPECTR will be updated on a monthly basis; C2-PROT will be updated every six months. Brief reports on changes to the register (such as the increase in the number of included citations) will be posted semi-annually on the C2 website.

**7. *What role can C2 play with outside organizations to assist in the development of effective reporting in order to improve the effectiveness of information retrieval for systematic reviews?***

**Proposal:** C2 will attempt to initiate working relationships with outside parties, such as journal editors and publishers, to encourage them to adopt policies and practices that facilitate information retrieval by systematic reviewers. This will include improving database indexing, and developing and adopting standards for the reporting of published studies.

Additional aspects regarding these matters, including more detailed proposals, are described in the body of this Brief.

## Campbell Collaboration Information Retrieval Policy Brief

### Introduction

A thorough, unbiased compilation of potentially relevant studies is one of the key characteristics of a systematic review. If the literature located by the reviewer is unrepresentative of the population of completed studies, the remainder of the review process will be compromised (Hopewell, McDonald, Clarke, and Egger, 2003). Given the diverse nature of the issues addressed by the Campbell Collaboration (C2), potentially relevant studies are likely to be widely distributed and unreliably categorized. While retrieval of information from the literature is a critical concern for any systematic reviewer, retrieval of information about complex social, behavioral, and educational interventions is likely to be particularly challenging.

“Naïve” information retrieval strategies are vulnerable to bias from many sources. Some are biases which may be introduced by the systematic reviewer including:

- language bias—a tendency to include only those studies published in English (Egger et al., 1997)
- availability bias—a tendency to include only those studies that are easily accessible
- cost bias—a tendency to include only those studies that are available free or at low cost
- database bias—a tendency to selectively search databases based on ease of access or familiarity
- familiarity bias—a tendency to include those studies only from one’s own discipline, and
- reference bias—a tendency to preferentially cite studies supporting one’s own views (Gotzsche, 1987; Ravnskov, 1992).

Others are biases over which the systematic reviewer has less control, including:

- outcome bias –selective reporting by the author of a primary study of some outcomes but not others depending on the direction and statistical significance of the results (Hutton & Williamson, 2000; Egger et al., 2003; Sutton & Pigott, 2004)
- citation bias – selective citing of studies of articles by other authors depending on the direction and statistical significance of the results (Egger, et al., 2003)
- publication bias – publication or non-publication of studies depending on the direction and statistical significance of the results (Song et al., 2000)
- multiple publication bias – multiple publication of the same study without identification as such (Egger et al., 2003),

In addition, for many of the sources that the C2 reviewer would wish to search, a “traditional” search strategy using keywords and thesaurus terms is neither a very efficient, nor effective way to identify pertinent information (reasons to be elaborated upon below). Furthermore, even when a search strategy based on keywords and thesaurus terms is constructed well, it remains less accurate than a manual search of the same primary sources. (Hopewell & Clarke, 2001; Turner et al., 2003)

C2 systematic reviewers are likely to confront a variety of information retrieval issues in conducting reviews. Therefore, this policy brief attempts to:

1. Identifies the key issues that are confronted by C2 systematic reviewers attempting to gather information relevant to the question posed by their review;
2. Proposes policies to direct the activities of C2 reviewers during the information retrieval phase of their review;
3. Provides exemplars to demonstrate the implementation of these policies; and
4. Describes the ways in which reviewers contribute to goals of C2

The purpose of this Policy Brief, then, is to address information retrieval concerns that will arise in systematic reviews submitted as Campbell Collaboration (C2) reviews. This document does not provide exhaustive consideration of all the information retrieval issues that may arise in the context of systematic reviewing, nor does it give detailed

direction in all aspects of the information retrieval process. Rather, it is meant to provide general guidance to review groups and reviewers and establish minimum standards for key information retrieval tasks at this point in time. Additionally, it is intended to distribute responsibilities among C2 central staff, IRMG, coordinating review groups and reviewers. Information retrieval policy is expected to change as C2 itself, the coordinating review groups, and C2-SPECTR grow and evolve. We therefore intend that this policy brief serve as interim policy, with modifications occurring as C2 evolves.

## **Process**

Development of this brief has been a process of systematically discovering what is known about information retrieval and applying this knowledge to the creation of guidelines for information retrieval tasks pertinent to the production of C2 reviews. The history of this process is as follows:

The Information Retrieval Policy Brief was initiated by the Campbell Collaboration Methods Group, which assigned the task of developing the Brief to Hannah Rothstein and Herb Turner. Rothstein, the Information Retrieval Methods Group (IRMG) convener, first drafted the questions and circulated them within the IRMG group for feedback and approval. The approved version was then forwarded to the C2 steering group, and two external reviewers (Julia Glanville, Information Manager at the NHS Centre for Reviews and Dissemination, University of York and Carol Lefebvre, Information Specialist at the UK Cochrane Center) for feedback. The combined feedback was used to develop the final set of questions addressed in this policy brief

Rothstein and Turner developed an initial draft of this brief in May 2003. This draft was circulated internally to two reviewers (Alan Gomersall, Associate Director for Information and Dissemination at the ESRC UK Centre for Evidence Based Policy and Practice, and Julia Lavenberg, doctoral student at the University of Pennsylvania) within IRMG. Modifications were made on the basis of their feedback. To ensure that answers were informed by Cochrane's experience and expertise in information retrieval, the authors

reviewed a number of Cochrane's documents available via the web site at [www.cochrane.org](http://www.cochrane.org). For a list of these documents, see Appendix A.

In addition, Rothstein and Turner reviewed several articles authored by Cochrane experts and others on information retrieval and reporting biases (Dickersin et al., 1994; Lefebvre and Clark, 2001; Hopewell et al., 2002; Dickersin et al., 2002; and Hopewell et al., 2003). The purpose of this review was to understand recent advancements in information retrieval methodologies pertinent to the systematic review process.

Furthermore, Rothstein and Turner interviewed and corresponded with these experts. With these activities providing an informed background, the authors proceeded to develop the policies contained in this Brief, within the context of Campbell's current organizational structure and information retrieval needs. Though initially an internal reviewer, Julia Lavenberg was added as a co-author of this Brief as a result of her substantive contributions and interest in the topic.

In June 2003, this Brief was circulated externally to Kay Dickersin (Director of the US Cochrane Center), Sally Hopewell (Research Associate, UK Cochrane Center), and Carol Lefebvre (Information Specialist at the UK Cochrane Center, who, as noted, participated in the development of the core questions) for comments. Comments were also solicited and received from the Nordic Campbell Center's steering group. The current version of the brief incorporates many of the comments and suggestions offered by these reviewers. Where reviewers' recommendations were not adopted, we provide our reasons for not doing so.

## Questions

**1. Given C2's commitment to producing reviews based on a thorough, unbiased search for trials, possible trials, or other suitable study designs, what information retrieval activities need to be performed by reviewers for their systematic review to be considered a C2 review?**

- a. How is a thorough and unbiased search defined?**
- b. What other activities is part of the information retrieval process?**
- c. How should the search and other information retrieval activities be documented?**
- d. How frequently should a search be updated?**

Successful information retrieval depends upon the existence of a well-defined and clearly articulated review question. The more clearly the question is formulated, the easier it will be to specify the criteria that will be used to select studies. In this brief we assume that the question has already been defined in terms of the types of participants, interventions, outcomes and study designs of interest.

Information retrieval is a multi-faceted activity, for which sufficient resources, both human and financial, must be allocated. Assuring the adequate funding of information retrieval often receives insufficient attention, potentially compromising the quality of the entire review.

**Proposal:** The resources required in terms of costs and time for information retrieval should be estimated before a review is initiated. Adequate resources should be allocated for this activity.

**Comment:** Shoestring-budget information retrieval is likely to introduce bias, and should be avoided. In one of the few studies on this topic, Petrosino (1999) provides approximations of the costs of reviews. From a survey of the contact authors of 21 Cochrane reviews, Petrosino found the following: "For the nine reviews in which cost estimate data were provided by the authors, the average cost was \$28,497. These

estimates ranged from \$313 to \$78,155, but seven were between \$7,000 - \$54,709.” However, discussions with seasoned investigators who conduct systematic reviews and manage systematic reviewers in the social and biomedical sciences revealed that the average costs of producing systematic reviews are much higher than these results suggest. It appears, then, that cost of reviews may vary widely depending on a number of factors including discipline, topic, and number of studies included in the review (Davies and Sowden, personal communication, February, 2004).

**1a. How is a thorough and unbiased search defined?**

A thorough and unbiased search for studies is one of the differentiating factors between traditional and systematic reviews. In order to avoid the information retrieval pitfalls that can threaten the validity of a C2 review, C2 reviewers are expected to consciously and systematically take steps to minimize bias and maximize coverage in their search for pertinent studies.

**Proposal:** Without exception, reviewers should use a variety of methods and sources to identify studies, and have a systematic approach to selecting studies for inclusion in the review. C2 reviewers are required to expand their search beyond studies that are relatively easy to retrieve and make every effort to locate potentially relevant studies beyond those indexed in bibliographic databases and easily accessible periodicals.

**Comment:** In no case is identification and retrieval of studies only through electronic searching of bibliographic databases sufficient for a C2 Review. Furthermore, a C2 Review should not be limited to a search of sources that are free or low cost, easily accessible, or only in English. C2 Reviewers must make an honest attempt to identify and search all major sources of potentially relevant information to their review. This is necessary both to reduce the likelihood of bias and to increase the likelihood that most of the extant relevant data, both published and unpublished, is included in a review.

The collaboration realizes there are diminishing returns for search efforts, and there comes a point where the rewards of further searching may not be worth the effort required. The decision as to how much to invest in the search process depends on the question a review addresses as well as the resources that are available. Ideally, this decision should be made by the editorial team responsible for a review, in consultation with the review group's search coordinator. Since most review groups do not yet have a search coordinator, the editorial team should consult with a competent information specialist or with IRMG.

**1b. *What activities, in addition to conducting a search for relevant studies, are part of the information retrieval process?***

When undertaking a C2 review, reviewers will take a systematic, transparent approach to the following information retrieval tasks:

1. Developing procedures for:
  - a) Electronic searches and
  - b) "Hand" searches
2. Identifying and selecting potentially relevant studies,
3. Contributing to C2's trials registers.

**1b1. Developing a search procedure**

Reviewers should be aware that effective electronic searches of bibliographic databases and effective hand searches of primary sources require thoughtful planning up front. Each type of search must be approached using different strategies because the format and availability of information retrieved will differ. As C2 evolves, training materials on conducting effective electronic and hand searches will be made available through C2's website. Until then, reviewers are encouraged to visit the US Cochrane Center's website ([www.cochrane.us](http://www.cochrane.us)) and the International Cochrane Collaboration's website ([www.cochrane.org](http://www.cochrane.org)) for online training materials, and announcements of training workshops offered in the US and in other countries.

### **1b1a. Electronic Searches**

Developing an electronic search strategy is an iterative process in which the terms that are used are modified, based on what has already been retrieved. It is hoped that in the future, resources will be sufficient to allow each review group to appoint a Trial Search Coordinator who will be responsible for coordinating this activity. Until this occurs, however, it is important for the editorial team within the review group to work closely with a librarian, or other information retrieval specialist, in deciding which sources to search and what search terms to use. It is strongly recommended that, reviewers be present when the search is designed and conducted due to potential costs associated with each database searched and each record downloaded. Judgments about what to download will likely need to be made while the search is being performed. For a list of databases likely to be of interest to C2 reviewers, see Appendix B.

A comprehensive search strategy will involve searching for multiple terms that describe the condition, intervention, and target population of interest. Since many, if not most, of the databases containing studies of interest to Campbell reviewers do not index by study design, it is generally recommended to avoid searching with methodological terms (e.g., randomized controlled trial) at this point in the search. Language and other potentially biasing limitations should, so far as possible, be avoided.

Once a substantive search strategy has been refined to the satisfaction of both the search coordinator or librarian and the reviewers, it should be executed, and the retrieved records downloaded into bibliographic management software such as ProCite, Reference Manager, Endnote, or Refworks.<sup>1</sup> Only after the reviewers are certain that the topic-based search strategy has yielded an appropriately high number of relevant

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<sup>1</sup> Herb Turner's content analysis of ProCite listserv discussions found that ISI ResearchSoft invests significantly more resources in Reference Manager than in ProCite. The former has progressed to version 10 whereas the latter has remained at version 5 for a number of years. Reviewers interested in a web-based alternative to ProCite or Reference Manager which offers comparable functionality should consider RefWorks ([www.refworks.com](http://www.refworks.com)).

studies should methodological search filters be applied. The filters currently recommended by IRMG are database and search engine specific (see Appendix C).<sup>2</sup>

**Proposal:** Reviewers, in collaboration with a librarian, or a Trial Search Coordinator, should develop a comprehensive search strategy, through an iterative process, to identify studies within the relevant substantive area(s). As part of the development process, reviewers should check with IRMG to determine whether there are existing search strategies that can be used or modified for their review. In addition, the topic-based search strategy should be modified, based on what has already been retrieved, until the most comprehensive search strategy (i.e., one that yields the highest number of relevant studies) is achieved. Only at this point should the methodological search filter recommended by IRMG be applied to filter the retrieved studies according to study design.

**Comment:** The Campbell and Cochrane Collaborations have developed methodological search filters (search strategies applied to a set of studies retrieved through topic based search procedures) for identifying randomized controlled trials (RCTs) and possibly randomized controlled trials (CCTs).<sup>3</sup> Currently, there are no methodological filters to identify other research designs that C2 reviewers may wish to include in their reviews.

The development of topic-based electronic search strategies cannot currently be performed centrally by IRMG, due to the diversity of topics within C2's domains of inquiry. These are part of the responsibility of the review groups. As C2 develops, however, IRMG will attempt to develop a clearinghouse of topic-based search strategies

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<sup>2</sup> A search filter is defined as a standardized set of methodological search terms used to filter randomized controlled trial (RCTs), possibly randomized trial (CCTs), cluster randomized trial (CRTs) and other suitably designed studies from all studies retrieved earlier in the search process. These filters should be used cautiously because few, if any, electronic databases in the social sciences are indexed by research design terms.

<sup>3</sup> The classifications are defined as follows: RCT is a randomized controlled trial in which it clearly states that individuals were randomly assigned to condition and CCT is a randomized controlled trial in which it appears that random assignment to condition was employed, but the author does not clearly state it.

that have been used by reviewers. The topic based search strategies are to be published in full in the relevant C2 review as specified by the Campbell Collaboration Steering Group in “Steps in Proposing, Preparing, Submitting, and Editing of Campbell Collaboration Systematic Reviews”. To access this publication through the C2 Methods’ Group web site go to: [www.duke.edu/web/c2method/Stepsinproposing.htm](http://www.duke.edu/web/c2method/Stepsinproposing.htm).

**1b1b.** “Hand” Searches.

Page by page *handsearches* of the entire text of journals and other literature are an integral part of locating as many trials as possible for inclusion in systematic reviews. Although visual inspection of hardcopy text is the most common interpretation of what is meant by performing a *handsearch*, recent technological advances permit visual inspection of full-text articles available in many online journals. By today’s standards, systematic examination of these online journals is also considered a *handsearch*. Care must be taken, however, to verify the completeness of the online version: editorials, letters to the editor, and conference notices ought to be available as full-text searchable items, in addition to the main articles. This aspect of information retrieval is quite labor-intensive and time-consuming.

Execution of a hand search also requires training and support of research personnel. Based on their years of experience in this area, the Cochrane Collaboration developed a Training Manual for Handsearchers (Brodney & Wieland, 2002). A similar manual is currently being developed for the Campbell Collaboration. This manual will contain an overview of the development of the trials registers (C2-SPECTR and C2-PROT), as well as specific procedural information, training materials, and guidelines for centralized record-keeping which will help to prevent costly duplication of effort.

**Proposal 1:** Until a librarian or information specialist is hired, a Hand Search Coordinator will be appointed centrally to develop and maintain a Master List of Journals that have been, or are currently in the process of being, searched; this list will be posted on the C2 website and updated every six months.

**Proposal 2:** Reviewers, a Trial Search Coordinator, or both, should identify and prioritize key journals relevant to their reviews and consult the master list prior to beginning a hand search.

**Comment:** In addition to the master list maintained by the Campbell Collaboration, the Cochrane Collaboration maintains a Master List of Journals Being Searched for randomized and possibly randomized trials in the area of health care that can be accessed at [www.cochrane.us/cochranemainpage.asp](http://www.cochrane.us/cochranemainpage.asp). Both lists should be checked prior to initiating a handsearch.<sup>4</sup>

**1b2.** Identifying and selecting potentially relevant studies.

In order to conform to the principles of transparency and reliability that govern C2 reviews, decisions about which studies to include in a review cannot be made mechanistically. While the number of decisions can be expected to vary from review to review, several decision points commonly require judgment calls on the part of the reviewers. Reviewers, therefore, are asked to provide explanations and documentation.

**Proposal:** Reviewers must provide a rationale for each of the following decisions:

1. The number of reviewers who will assess the relevance of each study report (review by more than one person is expected in most cases);
2. Who will make decisions concerning relevance (e.g., content area experts, non-experts, or both) and how these decisions will be made;
3. How disagreements will be handled, if more than one reviewer applies the decision criteria to each study (reaching consensus is encouraged);  
and
4. Inclusion and exclusion criteria.

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<sup>4</sup> IRMG plans to work with Cochrane to coordinate documentation for the C2 and Cochrane lists of journals that have been hand searched.

**Comment:** It is not C2 policy to require that inclusion or exclusion decisions be made by people who are “blind” to the journal from which the article comes, or to the authors, or the institution, or to the magnitude and direction of the results.

**1b3.** Contributing to the register of trials.

C2 reviewers and review groups are expected to contribute to C2-SPECTR as part of the collaborative process that underlies the Campbell Collaboration.

**Proposal:** All citations of studies identified during the information retrieval phase of a C2 review that meet the general criteria for inclusion in C2-SPECTR (i.e., the study is an RCT, CRT, CCT, or systematic review [WPH]) should be denoted as such in an annotated bibliography, or when resources permit, in a specialized register maintained by the relevant review group’s administrative core.<sup>5</sup> These studies should be forwarded—through the Review Group liaison—to the C2 Scientific Research Project Director for entry into C2-SPECTR. Abstracts should be forwarded when doing so does not violate copyright policies.

**Comment:** This proposal includes studies that were relevant to the specific review and those that were not. Studies not relevant to a specific review might be relevant to other C2 reviews. As such, these studies are relevant for inclusion in C2-SPECTR. This proposal also includes articles that are ancillary to studies relevant for inclusion in C2-SPECTR such as reanalysis, editorials, letters to the editors, and the like.

**1c.** How should reviewers document the search and other information retrieval activities for a C2 review?

The general principle is that information retrieval activities should be described in sufficient detail in a review so that the process can be replicated. Documentation for

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<sup>5</sup> The classifications are defined as follows: RCT is a randomized controlled trial in which it clearly states that individuals were randomly assigned to condition; CRT is a randomized controlled trial in which the unit of randomization is greater than the individual (e.g., a classroom, school, or village); CCT is a randomized controlled trial in which it appears that random assignment to condition was employed, but the author does not clearly state it; WPH is a systematic review containing at least one randomized controlled trial in the review.

electronic searches and for hand searches is somewhat different. Required documentation for each is described below.

### 1c1. Electronic Searches.

**Proposal:** Documentation of electronic search strategies to locate studies should include

- search engines used (e.g., Ovid),
- the main sources used (e.g., PsycINFO),
- time period searched (e.g., 1966 to 2003), and
- other notable features, such as language.

The search strategy should be saved and then “copied and pasted” into the review to avoid editing errors.

**Comment:** Reviewers are responsible for forwarding the substantive search strategy used in their review to their review group liaison, who will forward it to the Scientific Research Project Director. As resources permit, IRMG will endeavor to conduct empirical methodological research on the sensitivity and precision of these search strategies. An example of documenting electronic search strategies is presented in Appendix D.

### 1c2. Hand Searches.

As noted earlier, *handsearch* is the term used for a page-by-page search of the entire text of a journal or other document as performed by a manual search of the hardcopy or by a visual search of a full-text electronic version. Complete hand search documentation requirements, including formal registration procedures prior to beginning the handsearch, will be outlined in the C2 Handsearch Manual (Lavenberg & Turner, expected 2004).

**Proposal:** For journals, a copy of the Table of Contents of each issue will be used as the primary hand search documentation. On the Table of Contents, handsearchers should classify each article in the issue with regard to its study design (i.e., RCT, CRT, CCT, WPH, or N/A).<sup>6</sup> For each randomized or possibly randomized trial identified, a photocopy of the title, abstract, and text (usually in the methods section) upon which the study classification is based should be attached to the Table of Contents page. This documentation should be submitted by reviewers to their Review Group liaison, who will forward it to the C2 Handsearch coordinator

**Comment:** While it is anticipated that most handsearches will be initiated for a specific review, IRMG encourages review groups to initiate handsearches (as resources permit) of important journals within their areas independent of a specific review for the purpose of promoting the growth and evolution of C2-SPECTR as a high-quality central database. Documentation of handsearches for specific reviews and independent of reviews is identical. The documentation resulting from a handsearch for a systematic review, however, is not required as part of the systematic review report itself. An example of handsearch documentation for a single journal issue is presented in Appendix E.

### 1c3. Selection of Studies.

**Proposal:** Reviewers are expected to document their inclusion and exclusion criteria, and the rationale for these criteria (as proposed in 1b2), for all studies retrieved. This documentation will include a list of retrieved studies that were excluded from their reviews.

**Comment:** It is suggested that the excluded studies list contain any studies about which it is plausible to expect that a reader would question why the study was excluded. In

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<sup>6</sup> The definitions for the study-design classification categories are identical to those presented in footnote 5 on page 20, with one addition: N/A are those studies that do not fall into any of the study-design classification categories (i.e., the study is not a randomized or possibly randomized trial or systematic review).

addition, reviewers are encouraged to list all studies for which full text has been retrieved, and to indicate (when relevant) that “upon review of the full text, the study was not found to meet the inclusion criteria.” Reviewers are also encouraged to list the reasons for exclusion for each excluded study, if doing so does not create an undue burden.

**1d.** How often should a review be updated?

C2 is committed to maintaining and updating its reviews so that they provide the best available evidence. Currently, however, there is little empirical evidence on the optimal frequency for updating reviews and this likely varies from topic to topic. If reviews are updated too soon, valuable effort and resources are being wasted. On the other hand, failure to update reviews in a timely manner can lead policy makers to base decisions on outdated information.

**Proposal:** A review should be examined for potential update every three years. Reviewers should provide brief documentation of the steps taken to assess the need for an update at the end of each three year period. This document should be forwarded to their Review Group Coordinator. If reviewers become aware of studies that affect the conclusions of their reviews, they should conduct a search to update completed reviews sooner.

**Comment:** The current recommendation for Cochrane Collaboration reviews is that a review should be updated at least every two years. If an update has not been done within this time period, authors are required to add commentary to explain why it has not been done. Given C2’s stage of development and the broad range of topics covered, however, updating reviews every two years is not feasible at this point in time.

**2. Given C2's goal of building a register that is the primary source of randomized controlled trials or possible trials in sociology, psychology, education, and criminology (C2-SPECTR), can or should a C2 review be conducted based exclusively on the trials in C2-SPECTR?**

Since fall 2000, the Campbell Collaboration has been developing a central register that includes studies for possible inclusion in Campbell Reviews (Turner et al., 2003). Originally established and populated by the UK Cochrane Center, this register is called C2-SPECTR (Petrosino et al, 2000). As of this writing, the C2-SPECTR database consists of more than 12,000 reports of randomized and possibly randomized studies in social, psychological, educational and criminological research. As C2-SPECTR grows, it is expected to become a primary source of studies for Campbell Reviews. However, no one repository of studies is sufficient as a source of information for a Campbell Review. Furthermore, since C2-SPECTR is a database of randomized and possibly randomized trials, it does not provide information about nonrandomized studies whose design may be acceptable for a specific Campbell review

**Proposal:** A C2 Review should begin with a search of C2-SPECTR for relevant studies. The search should then be expanded to include other databases.

**Comment:** Before embarking on a new search, C2 reviewers should consult their Review Group's Coordinator to determine whether the same, or a similar search, has already been conducted.

**2a. What other databases should be searched in preparation for a C2 review?**

In addition to a search of C2-SPECTR, the information retrieval phase of a C2 review should include electronic searches of the review group's specialized register (when one exists), general bibliographic databases, and specialized bibliographic databases.

### *Review Groups' Specialized Registers.*

Each review group should have internal mechanisms and procedures designed to identify studies within its scope. While it is by and large up to each review group to decide upon and implement such procedures, review groups are expected to develop and maintain their own registers of appropriately designed studies within their scope.

**Proposal:** Existing Review Groups shall, within one year of the adoption of this Policy Brief, initiate development of a specialized register of appropriately designed studies within their scope. For Review Groups that become registered C2 entities after the adoption of this Brief, development of a specialized register shall commence within six months of the Review Group's registration with C2.

**Comment:** To ensure thoroughness, protect against bias, and minimize needless duplication of effort, development and maintenance of specialized registers should be coordinated across review groups and with C2-SPECTR through consultation with the C2 Scientific Research Project Director. Additionally, Review Groups are encouraged to obtain copies of articles cited in their register so that these can be made available to reviewers to whom the articles might be relevant.

### *General Bibliographic Databases.*

As noted in Question 1, it is extremely important to work closely with the review group's Trial Search Coordinator, or with an information specialist such as a librarian, in deciding which databases to search and what search terms to use in each of these.

**Proposal:** Reviewers will attempt to search both large, well-known databases as well as smaller, lesser-known databases.

**Comment:** While the relevance of a particular database is dependent on the subject of the review, the databases listed in Appendix B are likely to be relevant to many C2 reviews, and should generally be searched as part of a Campbell Review. Alternatively, reviewers may offer a reason why a particular database was not searched.

*Specialized bibliographic databases.*

Depending on the subject of the review, there are often specialized bibliographic databases that may provide additional means of identifying trials and other suitable studies for a specific review.

**Proposal:** IRMG will develop and maintain a list of specialized databases that are potentially useful for reviews. This list will be made available upon request.

**2b. *What sources of information should be explored in addition to databases?***

In addition to C2-SPECTR, and other bibliographic databases, the following sources are likely to yield potentially relevant studies:

- reference lists,
- personal communication,
- handsearches of journals,
- internet, and
- other potential sources

*Reference lists.*

It is advisable that reviewers check the reference lists of all relevant articles that are obtained, including those from previously published reviews. Potentially relevant articles that are identified should be retrieved and assessed for possible inclusion in the review. Bibliographic databases can also be used to identify review articles to be used in this way.

*Personal communication.*

Colleagues are an important source of information on recent trials that have not yet been published as well as on older trials that were never published. Face-to-face discussions at meetings, emails, requests on list-servs, and formal letters of request for

information can all be used to locate studies. A useful format for locating additional studies relevant to a review is to send a list of the inclusion criteria for the review, along with a sample of relevant articles—to each of the first authors of studies on this list, asking if they know of any additional studies that might be relevant. It may also be desirable to send the same list—accompanied by a cover letter—to other experts and organizations with a professional interest in the review topic.

### *Handsearches of journals.*

The manual examination of issues of a journal is a time consuming process, but one that may well yield relevant studies that are missed during an electronic search. Reviewers are best positioned to determine whether their review group has the resources to initiate a handsearch as part of the information retrieval phase of a specific review.

**Comment.** Preliminary results from an on-going study by Turner, Lavenberg, Boruch, Schoeneberger, and De Moya (in progress) show that less than one-third of randomized controlled trials identified in a handsearch of an education-related journal were identified by an electronic search of the same journal, indexed in a database. This search used the complex and comprehensive methodological filter used by Petrosino et al., to initially populate C2-SPECTR with trials or possible trials. Content analysis of the studies retrieved by the electronic search revealed that the inability of this filter to detect the remaining two-thirds of randomized controlled trials (identified by the handsearch) was due to the lack of a *research design term* (e.g., randomized controlled trial) in the fields searched (e.g., title, abstract, and keyword). Potential implications for C2 reviews are that: electronic search strategies alone are inadequate for identifying randomized controlled trials and that more labor-intensive and time-consuming hand searches are necessary to identify the complete set of randomized controlled trials in the published literature on a review topic.

### *Internet.*

Entering terms of interest into a reputable internet search engine such as Google ([www.google.com](http://www.google.com)) or Yahoo ([www.yahoo.com](http://www.yahoo.com)) can sometimes yield studies relevant to a particular review that may not be accessible through academic peer-reviewed journals. These search engines, and others like them, provide options to conduct simple and advanced searches in a variety of languages. Such searches are not difficult to conduct because of the user-friendly menus for the simple and advanced search engines. Depending on the topic, these searches can be relatively easy to initiate. However, the quality of the information retrieved can vary widely. With this in mind, reputable internet search engines can be an important source of grey literature.

### *Other Potential Sources of Studies.*

For the purposes of this brief, studies that are published informally, distributed through limited channels, or difficult to retrieve through conventional channels (such as a library) are defined as grey literature. Locating and searching this literature is an important step in producing a systematic review.

Previous research in the social sciences (Glass et al., 1981) and more recent research in the health sciences (Hopewell, McDonald, Clarke, and Egger, 2002) have shown that including grey literature in a meta-analysis may reduce bias. The amount of bias reduction will vary according to the amount and quality of the grey literature excluded from the review, and domain in which the review was conducted (Egger et al., 2003).

### *Conference Proceedings.*

A recent study by Rothstein et al., (in progress) suggests that less than half of studies reported at conferences are eventually published in peer-reviewed journals. Moreover, an earlier study by Hopewell and Clarke (2001) on the peer-review journal publication rates of systematic reviews in the health sciences initially presented at conferences

reported similar findings. Conference proceedings, then, are an important source of studies—especially those more likely to be published in informal sources such as research reports.

Although some conference proceedings are available electronically, not all of them are electronically searchable. Additional relevant proceedings may be available only in hard copy. Reviewers are encouraged to give high priority to searching conference proceedings, including handsearching when required.

### *Government Reports.*

Federal agencies provide a major source of funding for social science research in the U.S. The results of this federally sponsored research are typically disseminated through Government reports ([www.gpoaccess.gov](http://www.gpoaccess.gov)) rather than through peer-review academic journals. To ensure that the highest possible number of such reports are identified during the information retrieval phase of a C2 review, sources other than large, well-known bibliographic databases (which index primarily peer-reviewed academic journals) must be searched.

The Catalog of U.S. Government Publications is the primary source of Government documents. It provides an index to print and electronic publications created by Federal agencies from January 1994 onward. This catalog is searchable without charge at [www.gpoaccess.gov/cgp](http://www.gpoaccess.gov/cgp). Records are added daily. Where available, links are provided to the full-text of these publications. Further, the “locate libraries” feature enables users to find libraries—by state or area code—that can make print publications available for their use. Additionally, the catalog can be searched by various fields including title, agency name, and report number. For those with access to telnet only, an online version of the catalog containing records dating back to 1974 can be accessed at <telnet://csi.carl.org>, using telnet software.

**Proposal 1:** C2 Reviewers are expected, in consultation with the relevant Review Group, to systematically search the following sources of grey literature:

- Conference Proceedings
- Research Reports
- Government Reports
- Book Chapters
- Dissertations
- Policy Documents
- Personal Networks
- Research Organizations' Web Sites

**Proposal 2:** Reviewers should devise a search protocol to uncover and target grey literature sources most likely to yield the highest number of studies to include in a review. For electronic sources, reviewers should follow the procedures specified in proposal 1c1 of this policy brief. Upon completion of the review, this documentation should be submitted to the relevant Review Group liaison, who will forward the documentation to the C2 Scientific Research Project Director.

**Comment:** The IRMG will provide Coordinating Review Groups with examples of search protocols for grey literature. Rosenthal (1994) provides a comprehensive list of sources of the grey literature in the social sciences, though to the best of our knowledge it has not been updated since 1994. More recently, Anne Eisinga, of the UK Cochrane Center, has compiled a comprehensive annotated bibliography of sources of grey literature in the health sciences. A subset of these sources is relevant to the social sciences in general and C2 reviews in particular. Additionally, Herb Turner and Bob Boruch maintain a list of organizations that are, potentially, a rich source of unpublished studies for C2 reviews. From Hopewell's bibliography and Turner & Boruch's list, the IRMG compiled a list of grey literature sources in the social sciences which can be found in Appendix F.

**3. Is there an official list of substantive search terms and methodological search filters that must be used for a review to be considered a C2 review?**

As previously noted, there is a great diversity of topics addressed by C2; therefore, an official list of substantive search terms is impractical. On the other hand, C2 maintains a list of methodological search filters for reviewers to use to filter trials or possible trials from the universe of studies retrieved, as discussed in Question 1 of this Brief. Further development of search filters and strategies is a C2 Review Group activity. However, until these groups mature, C2 reviewers are strongly encouraged to work closely with a librarian or other information retrieval specialist to refine existing search filters and develop new search strategies.

**3a. Who in C2 is responsible for establishing standards for substantive search strategies and methodological filters and assessing their quality?**

At this time, information retrieval is a decentralized activity, even within the review group itself. As C2 grows and Trial Search Coordinators are hired, they will be expected to develop high quality search strategies and filters through testing, modification, and refinement.

**Proposal:** The IRMG will develop a clearinghouse for search strategies in which the search strategies used within C2 review groups are catalogued, analyzed, and assessed for quality. Based on this analysis and assessment, the IRMG will establish standards for search strategies within C2.

**3b. How can the sensitivity and specificity of an electronic search strategy be assessed?**

Sensitivity is defined as the number of reports retrieved from all known reports on a review topic. Specificity is defined as the number of retrieved reports that are *actually*

relevant to the review topic. To assess sensitivity and specificity, the results of an electronic search are compared with the results of a hand search.

**Proposal:** As future resources permit, IRMG will conduct research on specificity and sensitivity of search strategies

#### **4. When should a C2 review include a hand search?**

There are a number of circumstances that determine whether a C2 review should include a hand search including the review topic and available resources (time and money). When an electronic search of bibliographic databases retrieves only a fraction of the studies that one expects to retrieve using both a hand and electronic search, reviewers should undertake a hand search to reduce *search bias*. It is the responsibility of the individuals undertaking the review to use their collective expertise and professional judgment, to decide whether to undertake a hand search.

**Proposal:** When deciding whether to include a hand search as part of the information retrieval strategy for a review, C2 reviewers will search or consult the following sources:

- C2-SPECTR,
- Other relevant databases,
- C2 master list of hand searched journals, and
- The Cochrane master list of hand searched journals.

**Comment:** To inform the decision about whether to conduct a hand search, the results of this process (of searching or consulting the above sources) should be discussed among the individuals conducting the review and with the Review Group Coordinator. Should the decision be made to conduct a hand search, selected journals should be reported to the C2 Hand Search Coordinator for registration on the master list of hand searched journals.

**4a.** What procedures does C2 recommend for hand searching?

As noted previously, IRMG is currently in the process of developing a hand search manual (Lavenberg & Turner, expected 2004). Once completed, reviewers can access this guide through the C2 web site.

**Proposal:** Prior to beginning a hand search, a reviewer will register with the Hand Search Coordinator and undergo Hand Search Training. Randomized or possibly randomized trials identified through the hand search will be stored in the Review Group's Specialized Registers, or in a separate register if no group specializdd register exists, until the completion of the hand search. At the completion of the hand search, an electronic file containing full American Psychological Association (APA) citation and any other non-copyrighted information, along with the hand search documentation should be sent to the Hand Search Coordinator.

**4b.** How is hand searching of journals, conference proceedings, and the like coordinated?

**Proposal:** The IRMG will designate one of its members to serve as a liaison with the Coordinators of C2 review groups, to coordinate hand searching of journals, conference proceedings and the like. As Trial Search Coordinators emerge within these groups, IRMG will coordinate their work. Once further funding becomes available, it is anticipated that the IRMG liaison will be replaced by a paid professional within the Campbell Secretariat.

**Comment:** The IRMG liaison is expected to work closely with C2's Scientific Research Project Director and the current Handsearch Coordinator.

**4c.** What documentation of hand searching is required?

Documentation for a handsearch of a journal, as noted earlier in 1c2, and depicted in Appendix E, includes:

- A photocopy of each journal issue's table of contents,
- Trial designation notation in the left hand margin of the Table of Contents beside each study (RCT, CRT, CCT, WPH, or N/A if it is not a randomized or possibly randomized trial), and
- A photocopy of title page, abstract and portion of the article that contains the description of the randomization process (in most cases, the methods section).

For a hand search of conference proceedings, documentation is only required for presentations that represent randomized or possibly randomized trials, systematic reviews or meta-analyses. Documentation submitted to the Hand Search Coordinator includes:

- The name, date, and location of the conference
- The presenter or author's name, affiliation, and contact information
- A photocopy or downloaded printout of the title and abstract, with trial designation clearly noted in the left-hand margin (i.e., RCT, CRT, CCT, WPH)
- The URL for the conference or presentation posting, if applicable

**Proposal:** C2 reviewers will use the C2 Hand Search Manual's guidelines to perform, document and submit their hand search results to the Handsearch Coordinator.

**Comment:** The results of hand searches will be stored in a central location.

**5. What is the role of C2 reviewers in increasing C2-SPECTR and C2-PROT trial coverage?<sup>7</sup>**

C2 is an evolving organization. Thus, the role of C2 reviewers will evolve along with it. As discussed in section 1c, C2 reviewers are expected to thoroughly document the results of their electronic and hand searches of the published and unpublished literature such that their Review Group's IRMG liaison can forward all possibly relevant studies to the Scientific Research Project Director for inclusion, if appropriate, in C2-SPECTR. Additionally, reviewers are expected to share information about trials that are funded but not yet underway, as well as those that are underway but not published, with other interested researchers and reviewers by informing C2 central staff about the trial.

**Proposal:** Reviewers will uphold the C2 goal of collaboration by forwarding an annotated bibliography from their systematic reviews to their review group's information retrieval liaison. The liaison will then forward these bibliographies to the C2 Scientific Research Project Director. The annotations will clearly denote trials or possible trials among the studies (that were included and excluded from the review), and distinguish those identified through a hand search from those identified through an electronic one.<sup>8</sup>

**Proposal:** Reviewers will notify C2's Scientific Research Project Director of randomized or possibly randomized trials that are funded but not yet underway and trials that are underway but not yet published.

**Comment:** The C2 Scientific Research Project Director and Hand Search Coordinator will jointly review each identified trial and enter appropriate trials and possible trials into

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<sup>7</sup> C2-PROT is The Campbell Collaboration's prospective trials register which catalogs citations to trials that are funded, planned or underway.

<sup>8</sup> When a trial or possible trial is entered into C2-SPECTR, an acronym denoting whether the trial was obtained through a hand search, electronic search, or referral is entered with it. This way, for research purposes, C2 central staff can track the sources from which the trials or possible trials were identified.

C2-SPECTR. The Scientific Research Project Director will enter the information about these funded trials (planned or underway) into C2-PROT on a quarterly basis.

**5a. What are the formal procedures for building C2-SPECTR and C2-PROT?**

At present, only informal procedures exist for populating C2-SPECTR or C2-PROT. Formal procedures will be developed, however, based on a written strategic plan (Turner et al., 2003). For example, to populate C2-SPECTR with entries on completed RCTs, the C2 staff is updating the hand search of peer-reviewed journals and the electronic search of bibliographic databases initially done by the UK Cochrane Centre. In addition, the C2 staff is expanding their electronic search to include eleven electronic databases recommended by Petrosino et al., (2000), and partnering with the US What Works Clearinghouse (WWC) to devise procedures for linking C2-SPECTR with the clearinghouse's RCT database.

To populate C2-PROT with trials that are in planning, newly initiated, or underway, C2 relies on the C2-Secretariat, the invisible college, and trialists (e.g., people who mount randomized controlled trials) for spontaneous referrals. As these procedures are developed, they will be disseminated to C2 review groups through updates of this Policy Brief.

**Proposal 1:** To build C2-SPECTR and C2-PROT centrally, as resources permit, C2 should implement the plans for populating these registers as discussed in Turner et al., 2003 including updating and expanding hand searches of peer reviewed journals and electronic searches of databases initially done by the UK Cochrane Centre to populate C2-SPECTR. Procedures for linking C2-SPECTR with the WWC's proposed RCT database should also be developed.

**Proposal 2:** To build C2-SPECTR through review groups, review groups should develop specialized registers such that the contents can be forwarded quarterly

to the C2 Scientific Research Project Director for review and possible entry into C2-SPECTR.

**Comment:** Populating C2-SPECTR and C2-PROT will allow researchers to more easily locate or follow up on any trials of interest to them. The framework for building C2-PROT is being further developed and refined. Currently, C2-PROT is populated primarily through the efforts of members of the Campbell node at the University of Pennsylvania as they become aware of trials.

**5b.** Who is responsible for coordinating hand and electronic searches to identify trials or possible trials for entry into C2-SPECTR?

At present, the C2 Hand Search Coordinator and C2 Director for Research Projects are responsible for coordinating the hand and electronic searches, respectively. As C2 evolves, it is anticipated that these responsibilities will be transferred to review groups and their Trial Search Coordinators, with training and support provided by C2 Central Staff.

**Proposal:** C2 reviewers should coordinate their hand searches with the C2 Hand Search Coordinator and their electronic searches with the C2 Scientific Research Project Director.

**Comment:** It is important that C2 reviewers coordinate their searches with the respective hand and electronic search coordinators to avoid duplicating previous searches.

**5c.** Who is responsible for maintaining and documenting C2-SPECTR's content?

Currently, these responsibilities are shared by C2's Hand Search Coordinator and Scientific Research Project Director. The Hand Search Coordinator (a) documents journals that have been hand searched, (b) maintains the stockpile of candidate entries

identified from hand and electronic searches, and (c) deposits these entries into C2-SPECTR. The C2 Scientific Research Project Director documents and catalogs electronic search strategies of published and unpublished literature, and develops reports on C2-SPECTR's contents.

**5d. Who is responsible for quality control of C2-SPECTR's content?**

C2's Scientific Research Project Director and Hand Search Coordinator are responsible for quality control of C2-SPECTR's content. Once Review Groups hire a Trial Search Coordinator, it is expected that the individual will share the responsibility with the Scientific Research Project Director and the Hand Search Coordinator.

**Proposal:** The Scientific Research Project Director and the Hand Search Coordinator will examine each citation listed in the bibliographies and specialized register contents submitted by the review group's liaison or Trial Search Coordinator to determine whether it meets the eligibility criteria for entry into C2-SPECTR.

**Comment:** It is important to note that the Scientific Research Project Director and Hand Search Coordinator do not judge the quality of studies that are deposited in C2-SPECTR. Rather, they decide whether studies are randomized trials or possibly randomized trials based on what is written by the authors about the assignment methods used in the study.

***6. How can C2 reviewers keep track of the growing number of citations in C2 – SPECTR and C2-PROT?***

The more trials or possible trials that C2 reviewers can locate through C2-SPECTR and C2-PROT, the more efficient their search will become. Ultimately, C2's trials registers should be the primary, but certainly not the only, source of identifying such studies. Both

C2-SPECTR and C2-PROT are web-accessible through the Campbell Library on the C2 Home page

**Proposal:** C2-SPECTR will be updated monthly; C2-PROT will be updated quarterly. Brief summary reports on changes to the registers will be posted semi-annually on the C2 website.

**Comment:** The update summary reports will provide more detailed information about C2-SPECTR's contents, such as the number of studies by research design (RCTs, CRTs, and CCTS), publication year, journal, and so on. Dickersin, et al. (2002; p. 57) presents examples of the format and contents of these types of reports.

***7. For C2 reviews, what role should C2 and IRMG play in improving the comprehensive, systematic, efficient, and reliable retrieval of studies from various sources of the social sciences literature?***

Establishing standards is crucial for reducing potential information retrieval bias in the production of C2 reviews.

**Proposal:** C2 and IRMG should take a leadership role in negotiating with various parties on standards for reporting studies in academic peer-reviewed journals and indexing them in electronic databases. As C2 evolves, this leadership role should expand to include studies in the unpublished literature.

**Comment:** It is in the best interest of C2, as well as the audience C2 serves, to become actively involved in this issue.

**7a.** How should C2 or IRMG be involved in lobbying publishers and other stakeholders to create policies that would facilitate information retrieval? This would include lobbying for:

- Structured abstracts

- Methodological index terms
- Reporting standards for journal articles

**Proposal:** C2 staff or IRMG will attempt to initiate professional relationships with publishers and journal editors for the purpose of working with them to develop more informative abstracts, such as structured abstracts for journal articles, and to adopt reporting standards for journal articles that will facilitate systematic reviewing. C2 staff or IRMG will also attempt to persuade database publishers to introduce and consistently apply methodological (study design) index terms and to apply these terms retrospectively to existing records.

**Comment:** Carol Lefebvre of the UK Cochrane Center and her colleagues have been highly successful, over a period of several years, in persuading the US National Library of Medicine to introduce methodological index terms for MEDLINE, and to re-index existing MEDLINE records as RCTs and CCTs. Cochrane Collaboration members have also been involved in successful attempts to improve the standards for reporting of information in highly regarded medical journals, e.g., the CONSORT statement (Begg et al., 1996).

**7b.** How should C2 or IRMG become involved in seeking permission from database producers and publishers to include their copyrighted materials in C2? This may include permissions for:

- Citations
- Abstracts
- Thesaurus terms or keywords

Some databases such as ERIC for the education sciences and PubMed for the health sciences provide free use of all information contained in an entry. That is, one may download and use the title, journal name and issue, abstract, and keywords without charge. Others, such as PsycINFO for the psychological sciences require a contract

and payment for use of information obtained through an electronic search of their database. The number of citations and completeness of the information determines the cost, with the cost of a complete record (i.e., with an abstract) varying by the date of publication). For records without abstracts, there is a lower per record fee. (M. Farrell, personal communication, December 31, 2003). This makes the development of Campbell's comprehensive data registers quite costly, as well as labor intensive and time consuming.

**Proposal:** The IRMG in partnership with other C2 entities, and with other interested parties, such as the Cochrane Collaboration, will work to influence publishers and editors to create policies that would facilitate information retrieval for C2 reviews. This work will include the development of strategies for negotiating the use of copyrighted abstracts in databases of interest to C2.

**Comment:** A key goal of the Campbell Collaboration is to develop a central register with the highest possible coverage of randomized or possibly randomized trials so that researchers and reviewers may locate quality trials to create a solid foundation on which to build an unbiased, reliable, and comprehensive review.

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## **Appendix A. The List of Cochrane Documents Consulted**

- The Cochrane Brochure, 2002
- Cochrane Hand Search Manual, Part 1: Overview of Searching Activities, 2002
- Cochrane Collaboration Open Learning Material for Cochrane Reviewers, 2002
- The Cochrane Manual, Issue 1, 2003
- The Trial Search Coordinator Beginners Guide, 2003
- The Cochrane Reviewers' Handbook, Version 4.1.6, January 2003.

## Appendix B: Databases that may be of Interest to C2 reviewers

### 1. Arts and Humanities Search (AHSSearch)

Description from ISI: The ISI Citation Indexes includes the *Science Citation Index*, the *Social Science Citation Index*, and the *Arts & Humanities Citation Index*. Search for specific articles by subject, author, journal, and/or author address, as well as for articles that cite a known author or work.

Sources: Covers 5,300 science, 1,700 social science, and 1,140 arts & humanities journals.

### 2. Bibliography of Nordic Criminology

Description from SCRCC: Bibliographic citations to the criminological and criminal justice literature from Denmark, Finland, Norway, and Sweden. Indexing is done through NCJRS Thesaurus.

Sources: Covers books and book chapters, journal articles, research reports, and other research materials. Citations derive from *BNC database* (Scandinavian Research Council for Criminology) and *Criminal justice in Denmark* database.

### 3. Campbell Collaboration's Social, Psychological, Educational, and Criminological Trials Register (C2-SPECTR)

Description: C2-SPECTR is a central register of over 12,000 randomized and possibly randomized trials in education, social work and welfare, and criminal justice. Search for specific articles by author, journal, and keywords (when available).

Sources: Directed hand searches of full-text journals, electronic searches of bibliographic databases, and referrals from members of the invisible college.

#### 4. Cochrane Controlled Trials Register

Description by OVID: CCTR is a bibliographic database of definitive controlled trials. These controlled trials have been identified by the distinguished contributors to the Cochrane Collaboration. They and others, as part of an international effort to systematically search the world's health care journals (and other sources of information), have combined results to create an unbiased source of data for systematic reviews. Because it has been shown that existing bibliographic databases are inadequate for the identification of all relevant studies, the Cochrane Collaboration embarked upon this formidable task in co-operation with the National Library of Medicine (NLM) in Washington, DC (USA) who produce MEDLINE and Reed Elsevier of Amsterdam (the Netherlands) who produce EMBASE.

Sources: CCTR contains over 300,000 bibliographic references to controlled trials in health care. Cochrane groups and other organizations contribute their specialized registers; and these registers together with references to clinical trials identified in MEDLINE and EMBASE form the CCTR database.

#### 5. Cochrane Database of Systematic Reviews

Description: Includes the full text of the regularly updated systematic reviews of the effects of healthcare prepared by reviewers in the Cochrane Collaboration. The reviews are presented in two formats: 1. Complete reviews, which are regularly updated Cochrane Reviews, prepared and maintained by Collaborative Review Groups, and 2. Protocols for reviews currently being prepared. All protocols include an expected date of completion, and provide the background, objectives and methods of reviews in preparation.

## 6. National Clearinghouse on Child Abuse and Neglect Information Documents

Description by PENN library staff: Indexing with abstracts for scholarly, professional, and technical books, journal articles, and other documents related to child maltreatment, child abuse and child neglect, adoption, and related child welfare issues. NCCANCH's other databases, including an Organizations Directory, are also hyperlinked from this web site.

Sources: Materials processed by the National Clearinghouse on Child Abuse and Neglect Information, The Children's Bureau, The Administration for Children and Families, US Department of Health and Human Services.

## 7. Chinese ERIC (C-ERIC)

Description: Describes English and Chinese articles in leading academic educational journals published in China, Hong Kong, and Taiwan. Also covers dissertations. At this stage in its development, the database contains approximately 8,000 entries (including author, titles and date) on the Internet. More than 2,700 of these entries are accompanied by article abstracts. The C-ERIC collects English and Chinese articles published in 18 leading educational journals in Hong Kong, the Chinese Mainland and Taiwan, dating back to 1990. The database can be accessed free of charge at: <http://www.fed.cuhk.edu.hk/ceric/index.htm>.

## 8. Crime and Justice Abstracts

Description: Comprehensive indexing with abstracts of the scholarly and applied literatures on criminology and related disciplines.

Sources: More than 540 journals, of which 54 titles are comprehensively indexed, dissertations, books, government and non-governmental organization reports, and unpublished papers. Reflects materials received at the National Council on Crime and Delinquency Library, Rutgers University Library, Newark, New Jersey.

## 9. Cumulative Index to Nursing & Allied Health (CINAHL)

Description: The Cumulative Index to Nursing & Allied Health (CINAHL) database provides authoritative coverage of the literature related to nursing, including surgery, surgical technology, allied health, health education, consumer health, social science, and health sciences librarianship .

Sources: Material from over 950 journals is included in CINAHL; online abstracts are available for more than 150 of these titles. Additionally, publications from the American Nurses Association and the National League for Nursing are indexed.

## 10. Current Controlled Trials:

Description: A metaRegister of Controlled Trials to registers of *ongoing* randomized controlled trials in all areas of health care including registers of the:

- Medical Research Council (UK),
- National Institutes of Health (NIH) [Clinical Trials.gov,
- National Research Register (UK)
- GlaxoSmithKline,
- Schering Health Care Limited,
- UK Co-ordinating Committee on Cancer Research

Note. Records of trials assigned with an International Standard Randomized Controlled Trial Number (ISRCTN) can be viewed through this register.

## 11. Dissertation Abstracts

Description by UMI: Indexing (since 1861) and abstracting (since 1980) for over 1.5 million doctoral-level dissertations completed at North American universities. Dissertations from selected European universities are also I

isted. Selected master's theses are included since 1988.

Sources: Abstracts are author-produced.

## 12. EconLit

Description by AEA: Covers accounting, consumer economics, monetary policy, labor, marketing, demographics, modeling, economic theory, and planning. Primarily English language, some foreign language publications included.

Sources: Articles from over 550 international economic journals, as well as books, dissertations, full-text book reviews from the *Journal of Economic Literature*, essays in collective volumes, and abstracts of working papers in economics.

## 13. EMBASE

Description: The EMBASE journal collection is international with over 4,000 biomedical journals from 70 countries. EMBASE features comprehensive coverage of a wide variety of topic including: Drug Research, Pharmacology, Pharmacy, Pharmacoeconomics, Pharmaceutics and Toxicology, Human Medicine (Clinical and Experimental), Basic Biological Research, Health Policy and Management, Public, Occupational and Environmental Health, Substance Dependence and Abuse, Psychiatry, Forensic Science, and Biomedical Engineering and Instrumentation.

## 14. ERIC (*Education Resources Information Center*):

Description: Includes dissertations, conference proceedings, report literature, research analyses, and translations of research reports relevant to education and sociology since 1966.

Sources: Peer-reviewed academic Journals and ERIC Documents.

## 15. Housing and Urban Development User Database

Description: Contains more than 10,000 full-abstract citations to research reports, articles, books, monographs, and data sources in housing policy, building technology, economic development, urban planning, and a host of other relevant fields.

## 16. International Bibliography of the Social Sciences

Description by PENN library staff: Bibliographic citations and subject indexing for the international journal article and book literature in anthropology, economics, political science, and sociology. Produced by British Library of Political and Economic Science, London School of Economics and Political Science, with the support and assistance of International Committee for Social Science Information and Documentation and UNESCO.

Sources: Articles from approximately 3700 journals are described, 2300 journals on a regular basis; more than 120,000 books and journal special-issue collections; book chapters and book reviews. Roughly one-third of covered journals are from outside North America and western Europe, drawing upon publications from over 105 countries and 95 different languages. Materials are mostly reflective of the holdings of the British Library of Political and Economic Science, and other University of London and London-based specialist libraries, including Institute of Commonwealth Studies, School of Oriental and African Studies.

Print Counterparts: International Bibliography of Social and Cultural Anthropology.

## 17. ISI Citation Indexes

Description: The ISI Citation Indexes includes the *Science Citation Index*, the *Social Science Citation Index*, and the *Arts & Humanities Citation Index*.

Search for specific articles by subject, author, journal, and/or author address, as well as for articles that cite a known author or work.

Sources: Covers 5,300 science, 1,700 social science, and 1,140 arts & humanities journals.

Print Counterparts: Arts & Humanities Citation Index and Science Citation Index

## 18. Latin American and Caribbean Center on Health Sciences Information (LILACS)

Description: Bibliographic citations indexed and abstracted from the health literature published in Latin America and the Caribbean, especially focusing on Argentina, Brazil, Colombia, Cuba, Honduras, and Mexico.

## 19. MEDLINE

Description: The premier source for bibliographic coverage of biomedical literature. MEDLINE encompasses information from Index Medicus, Index to Dental Literature, and International Nursing Index, as well as other sources of coverage in the areas of allied health, biological and physical sciences, humanities and information science as they relate to medicine and health care, communication disorders, population biology, and reproductive biology. Resources in all languages are represented.

## 20. National Criminal Justice Reference Services (NCJRS)

Description: Includes abstracts of over 140,000 research reports, journal articles, and government documents relating to crime, law enforcement, and the justice system.

## 21. PolicyFile

Description by ProQuest: Includes data from world- renowned public policy think tanks including the American Enterprise Institute, Brookings Institution, Cato Institute, Center for Strategic and International Studies, Economic Strategy Institute, Heritage Foundation, Hoover Institute, Hudson Institute, International Monetary Fund, RAND Corporation, Urban Institute and the World Bank; university research program and publishers. These sources are combined to provide a database of thousands of abstracts linked via the World Wide Web, and fully searchable with a subscription.

## 22. POPLINE

Description by PENN library staff: Includes citations and abstracts to scholarly literature in population studies, family planning, and related subjects. Topics include family planning programs and technology, fertility, population law and policy, demography, maternal and child health, AIDS and other sexually transmitted diseases, reproductive health programs, women in development, primary health care communication, and population and the environment.

Sources: Materials indexed include journal articles, books and book chapters, technical reports, laws, bills, and court decisions, conference papers, theses and dissertations, grey literature, newspaper articles, and training manuals produced by population and family planning organizations, governments and international agencies, and scholarly researchers. The database is updated every two weeks, with 10,000 records added annually.

## 23. Population Index

Description by PENN library staff: Covers fields of interest to demographers, including fertility, mortality, population size and growth, migration, nuptiality and the family, research methodology, projections and predictions, historical demography, and demographic and economic interrelations.

Sources: Monographs, journal articles, other serial publications, working papers, doctoral dissertations, machine-readable data files, and relevant acquisitions lists and bibliographies.

## 24. PsycINFO

Description by PENN library staff: The American Psychological Association's comprehensive indexing and abstracting service for the professional and scholarly literature in psychology and related fields. Coverage is worldwide. Sources are in English and over thirty languages.

Sources: Articles in over 1400 journals; books (from 1927) and book chapters; and dissertations (citations only, beginning in 1966 unless published as journal articles or books).

Print Counterpart: Psychological Abstracts.

## 25. Public Affairs Information Service (PAIS)

Description: Covers public affairs and policy issues related to a wide range of topics: agriculture, banking, finance, business, demographics, education, health, environment, planning, public administration, law and legislation, and international relations.

## 26. UK Centre for Reviews and Dissemination Databases

Description: The UK National Health Service Centre for Reviews and Dissemination (NHS CRD) provides web access to the following databases:

1. DARE (Database of Abstracts of Reviews of Effects): Includes quality assessments of systematic reviews in the form of structured abstracts,
2. NHS EED (Economic Evaluation Database): Includes quality assessments of economic studies in the form of structured abstracts,
3. HTA (Health Technology Assessment Database): Includes report literature and lists ongoing research.

URL: <http://www.york.ac.uk/inst/crd/>

## 27. Worldwide Political Science Abstracts

Description by CSA: CSA is building this database on the merged back files of Political Science Abstracts. The database provides citations, abstracts, and indexing of the international serials literature in political science and its complementary fields, including international relations, law, and public administration / policy. The serials list of the new database is actively under construction, with a focus on expanding international coverage. As of February 2003 approximately 1,304 titles are being monitored for coverage. This list will continue to grow throughout 2003 and beyond.

## 28. Sage Family Abstracts

Description by OCLC First Search: Bibliographic citations with abstracts for literature on policy, theory, and research relating to the family, traditional and alternative lifestyles, therapy, and counseling. Subjects covered include adolescent development, adolescent pregnancy and parenthood, aging, child abuse, child custody, child physical disorders, child psychological problems, dating, bereavement, divorce, domestic abuse and violence, family economics,

employment, fertility and birth control, gender relations, health problems, homosexuality, marriage and marital relations, and sexual attitudes.

## 29. Social Sciences Research Network

Description by PENN library staff: Recent research results through abstracts and full-text working papers and journal articles in economics, finance, law (especially business and economic aspects), accounting, and Latin American economics and business. Professional job openings and announcements, including conference announcements, are also available. Access is provided through searchable databases and through several dozen subject-specific or source-institution e-mail notification services.

Sources: Abstracts for accepted journal articles from more than 230 scholarly journals. Working paper abstracts from more than 120 academic schools, institutions, and departments and independent research centers. SSRN Electronic Library includes more than 58,000 abstracts and more than 36,000 full-text working papers in Adobe Acrobat PDF format. The library is searchable by title or abstract keyword, author, and JEL (Journal of Economic Literature / EconLit) classification.

## 30. Social Service Abstracts

Description by PENN library staff: Indexing with abstracts for scholarly and professional journal literature in social work, human services, social welfare, social policy, and community development. Major areas of coverage include: crisis intervention, evaluation research, family welfare, gerontology, policy, planning, and forecasting, poverty and homelessness, social development, support groups and support networks, violence, abuse, and neglect, and welfare services, as well as professional issues and education in social work. Includes: Social Planning/Policy & Development Abstracts, SOPODA.

Sources: 1585 serials are monitored for inclusion.

Print Counterparts: Includes Social Planning/Policy & Development Abstracts.

### 31. Sociological Abstracts

Description: Covers sociology, case work, demographics, policy studies, political science, family studies, feminist studies, and social security programs.

Sources: Includes citations and abstracts from Sociological Abstracts and Social Planning/Policy & Development Abstracts. The database is Indexed to over 2000 journals from 35 countries, plus relevant dissertations, national and international conference papers, selected books and book chapters, book and other media reviews.

## Appendix C: Methodological Search Filters to identify reports of controlled trials, with OVID search-engine syntax

### ERIC Database:

- #1 RANDOM\$.TI, AB
- #2 (RANDOM\$ adj (ALLOCAT\$ or ALLOT\$ or ASSIGN\$ or BASIS or DIVID\$ or ORDER\$)).TI,AB
- #3 (RANDOM\$.TI,AB. ) not (1 or 2)
- #4 ((SINGL\$ or DOUBL\$ or TREBL\$ or TRIPL\$) adj (BLIND\$ or MASK\$)).TI,AB
- #5 ((COMPAR\$ or CONTROL\$ or EXPERIMENT\$ or INTERVENT\$ or THERAP\$ or TREATMENT\$) adj (GROUP\$ or CLASS\$)).TI,AB
- #6 ((ALLOCAT\$ or ALLOT\$ or ASSIGN\$ or DIVID\$ or ORDER\$) adj(5)).TI,AB
- #7 ((CROSS?OVER) or (CROSS adj1 OVER)).TI,AB
- #8 (LATIN adj SQUARE).TI,AB
- #9 ((CLINIC\$ or CONTROL\$) adj (TRIAL\$ or STUDY\$ or STUDIES\$)).TI,AB
- #10 PLACEBO\$
- #11 1 or 2 or 3 or 4 or 6 or 7 or 8 or 9 or 10

### Sociological Abstracts (Sociofile):

- #1 RANDOMI\* in TI,AB
- #2 (RANDOM\* adj (ALLOCAT\* or ASSIGN\* or DIVID\*)) in TI,AB
- #3 (RANDOM\* adj (TRIAL\* or STUDY or STUDIES)) in TI,AB
- #4 ((CONTROL\* or CLINIC\* or PROSPECTIV\*) adj5 (TRIAL\* or STUDY or STUDIES)) in TI,AB
- #5 ((ALLOCAT\* or ASSIGN\* or DIVID\*) adj5 (CONDITION\* or EXPERIMENT\* or TREATMENT\* or CONTROL\* or GROUP\*)) in TI,AB
- #6 ((SINGL\* or DOUBL\*) adj (BLIND\* or MASK\*)) in TI,AB
- #7 CROSS?OVER in TI,AB
- #8 PLACEBO\*
- #9 (COMPAR\* adj5 (TRIAL\* or STUDY or STUDIES)) in TI,AB
- #10 (HEALTH or MEDICINE or ILLNESS) in SH
- #11 #9 and #10
- #12 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #11

### Criminal Justice Abstracts:

- #1 RANDOMI\* in TI,AB
- #2 (RANDOM\* adj (ALLOCAT\* or ASSIGN\* or DIVID\*)) in TI,AB
- #3 (RANDOM\* adj (TRIAL\* or STUDY or STUDIES)) in TI,AB
- #4 ((ALLOCAT\* or ASSIGN\* or DIVID\*) adj5 (CONDITION\* or EXPERIMENT\* or TREATMENT\* or CONTROL\* or GROUP\*)) in TI,AB
- #5 ((SINGL\* or DOUBL\*) adj (BLIND\* or MASK\*)) in TI,AB
- #6 (CROSS?OVER or LATIN SQUARE) in TI,AB
- #7 PLACEBO\*
- #8 (COMPAR\* adj5 (TRIAL\* or STUDY or STUDIES)) in TI,AB
- #9 EVALUATIVE STUDIES in DE
- #10 #8 and #9
- #11 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #10

## Appendix D: Documenting Electronic Search Strategies for a C2 Review.

The example presented below shows how electronic search strategies should be documented for a C2 review. First, the search engine and version, database, time period delimiter, and language are listed. Second, each term or set of terms—denoted by lines #1 through #11—along with the search syntax (i.e., “\$” for wildcard and “adj” for adjacent) are documented. Note that in the example below, the documented terms are methodological. For a substantive search strategy, the documented terms would be review-topic relevant (i.e., intervention, target population, and time period).

If both a substantive search strategy and methodological search filter were used during the information retrieval phase of a C2 review, the documentation for the substantive search strategy should come *first*. Of course, the syntax provided in the documentation [e.g., line number (#1), wildcards (\$), and fields (“.TI,AB”)] will vary depending on the search engine used (e.g., WebSPIRS 5.0 versus OVID). Whatever search engine is used, it is important to document the electronic search strategy (or strategies) systematically and logically such that the search can be easily replicated.

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Database = ERIC, Search Engine = WebSPIRS 5.0, Time Period = 1983 to 2003, Language = English

#1 RANDOM\$.TI, AB  
#2 ((RANDOM\$ adj (ALLOCAT\$ or ALLOT\$ or ASSIGN\$ or BASIS or DIVID\$ or ORDER\$)).TI,AB  
#3 (RANDOM\$.TI,AB.) not (1 or 2)  
#4 ((SINGL\$ or DOUBL\$ or TREBL\$ or TRIPL\$) adj (BLIND\$ or MASK\$)).TI,AB  
#5 ((COMPAR\$ or CONTROL\$ or EXPERIMENT\$ or INTERVENT\$ or THERAP\$ or TREATMENT\$) adj (GROUP\$ or CLASS\$)).TI,AB  
#6 ((ALLOCAT\$ or ALLOT\$ or ASSIGN\$ or DIVID\$ or ORDER\$) adj(5)).TI,AB  
#7 ((CROSS?OVER) or (CROSS adj1 OVER)).TI,AB  
#8 (LATIN adj SQUARE).TI,AB  
#9 ((CLINIC\$ or CONTROL\$) adj (TRIAL\$ or STUDY\$ or STUDIES\$)).TI,AB  
#10 PLACEBO\$  
#11 1 or 2 or 3 or 4 or 6 or 7 or 8 or 9 or 1

---

## Appendix E: An Example of Handsearch Documentation

### Journal of Educational Psychology - December 1994

- N/A 1. **What is fair? Children's critiques of practices that influence motivation.** (475-486)  
By Thorkildsen, Theresa A.; Nolen, Susan B.; Fournier, Janice  
Abstract | Full Text (HTML) | Full Text (PDF)
- RCT ② **Determinants of learning and performance in an associative memory/substitution task: Task constraints, individual differences, volition, and motivation.** (487-515)  
By Ackerman, Phillip L.; Woltz, Dan J.  
Abstract | Full Text (HTML) | Full Text (PDF)
- N/A 3. **Personality and cognitive ability predictors of performance in graduate business school.** (516-530)  
By Rothstein, Mitchell G.; Paunonen, Sampo V.; Rush, James C.; King, Gillian A.  
Abstract | Full Text (HTML) | Full Text (PDF)
- RCT ④ **Impact of the Infant Health and Development Program (IHDP) on the home environments of infants born prematurely and with low birthweight.** (531-541)  
By Bradley, Robert H.; Whiteside, Leanne; Mundfrom, Daniel J.; Casey, Patrick H.; et al  
Abstract | Full Text (HTML) | Full Text (PDF)
- CRT ⑤ **Outcomes of an emergent literacy intervention in Head Start.** (542-555)  
By Whitehurst, Grover J.; Epstein, Jeffrey N.; Angel, A. L.; Payne, A. C.; et al  
Abstract | Full Text (HTML) | Full Text (PDF)
- N/A 6. **Extended text and the writing proficiency of students in urban elementary schools.** (556-566)  
By Davis, Alan; Clarke, Mark A.; Rhodes, Lynn K.  
Abstract | Full Text (HTML) | Full Text (PDF)
- RCT ⑦ **Student study techniques and the generation effect.** (567-576)  
By Foos, Paul W.; Mora, Joseph J.; Tkacz, Sharon  
Abstract | Full Text (HTML) | Full Text (PDF)
- CCT ⑧ **Strategic processing of text.** (577-588)  
By Mannes, Suzanne  
Abstract | Full Text (HTML) | Full Text (PDF)
- RCT ⑨ **Systematic analysis of variables that contribute to the formation of analogical misconceptions.** (589-600)  
By Zook, Kevin B.; Maier, Jean M.  
Abstract | Full Text (HTML) | Full Text (PDF)
- 
- N/A 10. **Structural representations in knowledge acquisition.** (601-616)  
By Gonzalvo, Pilar; Canas, Jose J.; Bajo, Maria-Teresa  
Abstract | Full Text (HTML) | Full Text (PDF)
- N/A 11. **Locus of the predictive advantage in Pathfinder-based representations of classroom knowledge.** (617-626)  
By Johnson, Peder J.; Goldsmith, Timothy E.; Teague, Kathleen W.  
Abstract | Full Text (HTML) | Full Text (PDF)
- N/A 12. **Student evaluations of college instructors: Effects of type of course taught, instructor gender and gender role, and student gender.** (627-630)  
By Freeman, Harvey R.  
Abstract | Full Text (HTML) | Full Text (PDF)
- N/A 13. **Weighting for the right criteria in the Instructional Development and Effectiveness Assessment (IDEA) system: Global and specific ratings of teaching effectiveness and their relation to course objectives.** (631-648)  
By Marsh, Herbert W.  
Abstract | Full Text (HTML) | Full Text (PDF)
- N/A 14. **Global and specific ratings of teaching effectiveness and their relation to course objectives: Reply to Marsh (1994).** (649-657)  
By Cashing, William E.; Downey, Ronald G.; Sixbury, Glenn R.  
Abstract | Full Text (HTML) | Full Text (PDF)

The following pages contain the required documentation for the articles identified as RCT, CRT, and CCT on the preceding Table of Contents page. Included are the title, abstract, and section of each article identifying the randomization procedure. The text upon which the study classification was made is underlined.

Determinants of Learning and Performance in an Associative Memory/Substitution Task  
Task Constraints, Individual Differences, Volition, and Motivation

**Phillip L. Ackerman**

Department of Psychology University of Minnesota

**Dan J. Woltz**

Department of Educational Psychology University of Utah

**ABSTRACT**

The way that cognitive abilities, learning task characteristics, and motivational and volitional processes combine to explain individual differences in performance and learning was investigated. A substitution task was studied over practice, and it was discovered that students used two different strategies; a learning strategy focused on memorization and a performance strategy in which students persisted in scanning items. Five experiments investigated strategy differences and the ability and motivational correlates of task performance. First, ability correlates of performance and strategy use were demonstrated. Next, reducing task difficulty increased use of the learning strategy. With periodic memory tests, effective reliance on the learning strategy was increased, and task performance correlations with reasoning ability were lowered. Finally, a combination of self-focus and goal-setting interventions increased both general performance levels and use of the learning strategy. Results are discussed in terms of the goal of developing a more comprehensive understanding of learner differences.

....

**Method Participants.**

Ninety-six students at the University of Minnesota participated in this experiment. The students were recruited with flyers and posted sign-up sheets around the campus, and the students were paid about \$5.00 per hour for their participation.

**Apparatus.**

For the noun-pair task, instructions, stimulus presentation, and response collection were performed with IBM PS/2 and Compaq 386/S20 computers. For pencil and paper tests and tasks, instructions (and timed start—stop directions) were presented over a public address system, using prerecorded tapes. Students were tested in groups of up to 14 at a time, in individual carrels (for the computer-based tasks) and at separate tables (for the pencil and paper tests).

**Task procedure.**

...[E]ach block of 18 trials was constrained so that half of the trials were positive trials (probe items matched), and each top-row item was presented exactly twice. Otherwise, the items were paired and presented according to a random order. To discourage development of a

strategy that depended only on the location of the word pairs (as a memory aid), we permuted the order of the items on the top rows of words at the beginning of each trial block. (In the CM condition, the permuted ordering was pairwise dependent, so that word pairs remained consistent).

### **Consistent mapping trials.**

For the CM condition, the word pairs, once established at the beginning of the task, stayed constant throughout practice. For example, if *Rock—Door* were paired together on Trial 1, these same items would continue to be paired together on subsequent trials. However, each item in the upper row could be paired with the remaining eight lower row items as foils in negative trials. (Top row items never occurred as foils.) However, even though the pairs stayed consistent, the ordering of the pairs was randomized at the beginning of each block of trials. Students were instructed that the word pairs were consistent and that their task was to learn the word pairs, and students were alerted to the fact that they would complete a memory test at the end of practice.

### **Varied mapping trials.**

For the VM condition, new word pairings (and thus word orders) were established on each trial, in a randomized fashion. As in the CM condition, half of the VM trials were positive (match). Students were instructed that the word pairs were inconsistent and that their task was to look up the word pairs and respond quickly (while maintaining a 90% accuracy level).

Impact of the Infant Health and Development Program (IHDP) on the Home Environments of  
Infants Born Prematurely and With Low Birthweight

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**Leanne Whiteside**

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**Daniel J. Mundfrom**

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**Patrick H. Casey**

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**Betty M. Caldwell**

Department of Pediatrics University of Arkansas for Medical Sciences

**Kathleen Barrett**

Department of Pediatrics University of Arkansas for Medical Sciences

**ABSTRACT**

The Infant Health and Development Program (IHDP) was designed to improve the development of infants born prematurely and at low birthweight with a combination of (a) education and support services for mothers, and (b) educational day care and health services for children. A randomized clinical trial procedure was used at 8 program sites to examine the impact of the IHDP on the quality of stimulation and support available to children in the home, as measured by the Home Observation for Measurement of the Environment (HOME) Inventory. There were no effects on HOME scores at 1 year, but differences favoring the intervention group were noted on 5 of 8 HOME subscales at 3 years. Separate factor analyses of the HOME Inventory revealed that intervention and follow-up groups had similar underlying structures at both time points. The effects of the intervention on child outcomes may be mediated through the home environment.

....

Method

**Sample**

The sample and the design for IHDP have been described in previous publications ( Gross et al., 1992 ; Infant Health and Development Program, 1990 ; Kraemer & Fendt, 1990 ; Ramey et al., 1990 ). What follows is a brief overview.

The Infant Health and Development Program is an eight-site randomized clinical trial that was designed for researchers to determine the efficacy of a comprehensive early intervention program for infants born preterm and of LBW and for their mothers. A total of 985 infants with LBW ( $\leq 2,500$  g) who were born prematurely ( $\leq 37$  weeks gestational age) were recruited for the study between January, 1985 and October, 1985 at eight data collection sites: Little Rock, Arkansas; New York, New York; Boston, Massachusetts; Miami, Florida; Philadelphia, Pennsylvania; Dallas, Texas; Seattle, Washington; and New Haven, Connecticut. Two-thirds of the infants were born  $\leq 2,000$  g; the remaining one-third were between 2,001 g and 2,500 g. The research design entailed stratification by site and weight group. Within each weight group at each site, children were randomly assigned by the national study office to intervention and to follow-up control groups (at a ratio of 1 to the intervention group for each 2 to the follow-up group) with a computer-based procedure ( Kraemer & Fendt, 1990 ). To reduce the probability of initial bias in group assignment, the national study office monitored

five additional variables: gender, maternal education, race, primary language spoken in the home, and infant participation in any other program. A comparison of intervention and follow-up groups on these initial status variables revealed no differences. As a result of these assignments 235 children whose birthweights were less than 2,001 g were in the intervention group, and 388 were in the follow-up group; of the children born between 2,001 g and 2,500 g, 142 were in the intervention group, and 220 were in the follow-up group. The mean birthweight of the intervention group was 1,819.4 g, and the mean birthweight for the follow-up group was 1,781.3 g. Fifty percent of the children in the intervention group were male, 49% of children in the follow-up group were male. Mean maternal age in the intervention groups was 24.6 years; mean maternal age in the follow-up group was 24.9 years. Forty-three percent of the mothers in the intervention group had less than a high school education, as did 38% of follow-up mothers. English was the primary language spoken in the homes of 95% of the intervention group members and in 94% of the control group members' homes.

Thirty-three percent of the mothers were White; 53% were Black; 10% were Hispanic, and 4% were from other sociocultural groups. Forty-six percent of the mothers were married at the birth of the target child. Forty-seven percent of the families reported yearly incomes of less than \$15,000. Table 1 displays the demographic characteristics of the participating families for each site.

Infants in both intervention and follow-up groups received basic pediatric services (including periodic medical, developmental, and familial assessments) from 40 weeks corrected age (corrected for prematurity) to 36 months corrected age. The intervention program, lasting from the time of hospital discharge to age 3 years, consisted of weekly home visits through age 1 year and biweekly thereafter. Children in the intervention group also attended a child development center beginning at age 1 year (at least 4 hr a day for 5 days a week) and terminating at age 3 years. The home visit component included a problem-solving curriculum ( Wasik, 1984 ). A coordinated educational curriculum of learning games and activities was used for both the home visit component and the child development center component ( Sparling & Lewis, 1985 ). Although the curricula were individualized for both parents and children at all sites, the IHDP staff made every effort (including extensive training and monitoring) to ensure that both the assessments and the program were implemented in the same way at all sites.

Outcomes of an Emergent Literacy Intervention in Head Start

**G. J. Whitehurst**

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**J. N. Epstein**

Department of Psychology State University of New York at Stony Brook

**A. L. Angell**

Department of Psychology State University of New York at Stony Brook

**A. C. Payne**

Department of Psychology State University of New York at Stony Brook

**D. A. Crone**

Department of Psychology State University of New York at Stony Brook

**J. E. Fischel**

Department of Pediatrics State University of New York at Stony Brook

**ABSTRACT**

Classrooms of 4-year-olds attending Head Start were randomly assigned to an intervention condition, involving an add-on emergent literacy curriculum, or a control condition, involving the regular Head Start curriculum. Children in the intervention condition experienced interactive book reading at home and in the classroom as well as a classroom-based sound and letter awareness program. Children were pretested and posttested on standardized tests of language, writing, linguistic awareness, and print concepts. Effects of the intervention were significant across all children in the domains of writing and print concepts. Effects on language were large but only for those children whose primary caregivers had been actively involved in the at-home component of the program. One linguistic awareness subtest, involving the ability to identify the first letter and first sound of words, showed significant effects.

....

**Procedure Design.**

Four Head Start centers were selected to participate in the study on the basis of their geographical proximity to Stony Brook University. Three of these centers were large, long-standing operations that included multiple classrooms of 3- and 4-year-olds. The fourth center consisted of two geographically separated single classrooms that were new branches of existing centers. For purposes of research design and data analysis, the two outlying classrooms were combined into one center unit. Within each center, all classrooms that included a majority of 4-year-olds participated in the study.

Classrooms were randomly assigned to intervention and control conditions. We used a pairing procedure to ensure that the number of classrooms in each condition was as equivalent as possible, to ensure that each center had both intervention and control classrooms, and to ensure balance across conditions in classrooms in which students attended for half of the day versus classrooms in which students attended for a full day. Within each center, pairs of teachers of full-day classrooms were formed randomly, and then one member of each pair was assigned randomly to the intervention condition. Teachers of full-day classrooms that remained after this procedure because of an odd number of such classrooms at a given center were paired randomly with the remaining teachers of full-day classrooms from other centers, and then one member of each of those pairs was assigned randomly to the intervention

condition. There were not enough teachers of half-day classrooms to pair within centers, so pairs of such teachers were formed randomly across centers and then one member of each of those pairs was assigned randomly to the intervention condition. Because there was an odd number of half-day classrooms in all, one teacher remained after all pairs were formed; this teacher was assigned randomly to the control condition. These procedures resulted in seven classrooms (four full-day, three half-day) in the intervention condition, and eight classrooms (four full-day, three half-day) in the control condition. At initial assignment, there were 110 children in the intervention condition and 97 in the control condition. Because of the higher frequency of dropout from the control classrooms, the final  $N$ s were more disparate (intervention  $N = 94$ ; control  $N = 73$ ). To the extent that classroom size should be negatively correlated with children's learning, this should represent a conservative bias with respect to the intervention.

Student Study Techniques and the Generation Effect

**Paul W. Foos**

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**Joseph J. Mora**

Department of Psychology Florida International University

**Sharon Tkacz**

Department of Psychology Kent State University at Geauga

**ABSTRACT**

In 2 experiments, the generation effect, which occurs when individuals remember materials they have generated (and, thus, targeted) better than materials generated (and targeted) by others, was investigated. The effect has not generally been found in natural settings when total test performance was examined. The examination of total performance rather than just targeted items may mask the effect because items not studied (nontargets) are included. In Experiment 1, groups were compared that generated their own outlines or study questions with groups that received experimenter-generated materials. Test scores showed generation effects for target items. In Experiment 2, students who generated questions were compared with yoked students who used those student-generated questions. Results were again significant, indicating that the generation effect and not potential confounding variables produced the results. The effect does occur in a natural setting, but only for test items targeted by generating students.

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**Method Participants.**

Participants were 210 students from the pool of students taking introductory psychology at Florida International University who elected an experimental participation option. Thirty were randomly assigned to each of seven groups: control, given an outline, given study questions, given study questions with answers, told to generate an outline, told to generate study questions, or told to generate study questions with answers.

## Strategic Processing of Text

**Suzanne Mannes**

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### **ABSTRACT**

Schemas for a subject domain can make reading new information about that domain easier. It was hypothesized that when students read about familiar topics, they use a reinstatement-and-integration strategy in which the familiar knowledge they encounter is retrieved from long-term memory, along with some information about the original context in which those facts were learned. Two experiments that focused on the integration of knowledge from different sources were conducted to investigate whether readers use such a strategy when reading expository text about recently learned topics. The proposed strategy is consistent with much of the observed data.

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#### **Method Participants.**

Forty-five male and female students from an introductory psychology class at the University of Delaware participated in the study in partial fulfillment of their course obligations. The student participated individually and were arbitrarily assigned to one of three outline conditions, SAME , DIFFERENT , or NONE , on their arrival.

## Systematic Analysis of Variables That Contribute to the Formation of Analogical

### Misconceptions

**Kevin B. Zook**

Department of Education Bucknell University

**Jean M. Maier**

Central Columbia School District

### **ABSTRACT**

In 2 experiments, middle school students processed an analogy and responded to factual and inferential target-domain questions. In Experiment 1, responses were analyzed to determine the effects of 1 instructional variable (context specificity) and 3 learner variables (age, verbal aptitude, gender) on the mapping of extraneous base features. Fewer inappropriate inferences were generated by students who had high verbal aptitude scores, were female, and processed the analogy with a specific context. Verbal aptitude interacted with both context specificity and age to influence target inferences. In Experiment 2, the number of incorrect inferences decreased when students either induced an appropriate schema or processed the analogy containing information that conflicted with preexisting gender roles. Results of both experiments support a 6-variable model of analogical misconception formation.

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### **Method**

To detect potential interactions suggested by the six-variable model, we crossed four variables to create a  $2 \times 2 \times 2 \times 2$  factorial design (see Table 2). Between-subjects variables were context specificity (specific context vs. no context), age (Grade 5 vs. Grade 8), verbal aptitude (low aptitude vs. high aptitude), and gender (male vs. female).

Public school students (  $N = 261$  ) were randomly assigned to one of the two context specificity conditions, which resulted in unequal cell sizes (see Table 2 ). All students were reading at, or above, grade level. Prior to the experiment, age-appropriate versions of the Cognitive Abilities Test ( Thorndike & Hagen, 1986 ; verbal aptitude section) was administered to students. Level C was administered to the fifth-graders; Level F was administered to the eighth-graders. Students responded to three types of questions in the three subtests of the verbal-aptitude section. First, students induced a superordinate classification for a set of given words (e.g., *rose, daisy, tulip* ) and applied the concept to select another appropriate instance from a set of choices (e.g., *garden, sweet, grow, pretty, lily* ). For the second subtest, students completed sentences (e.g., I got \_\_\_\_\_ in the rain) by selecting words that conveyed the appropriate meaning (e.g., *wet, dry, warm, well, tall* ). The third subtest presented students with verbal analogies (e.g., *big:large::little: \_\_\_\_\_?* ) to complete by selecting the appropriate fourth term from a set of provided words (e.g., *girl, small, late, some, more* ). Students achieving stanine scores of 5 or lower were classified as having low-verbal aptitude (  $N = 132$  ); those with stanines of 6 or higher were classified as having high-verbal aptitude (  $N = 129$  ). We dichotomized verbal aptitude at the fifth and sixth stanines to compare students with superior verbal reasoning abilities to those with low or average verbal reasoning abilities. Thus, the classification procedure was consistent with that used by Zook (1993) .

## Appendix F: Sources of Social Science Grey Literature

### Databases

#### Available Free of Charge

- *ERIC (Education Resources Information Center)*: Includes dissertations, conference proceedings, report literature, research analyses, and translations of research reports relevant to education and sociology from 1966 onwards. Accessible at "<http://www.askeric.org/ERIC/>".
- Current Controlled Trials. See database description in Appendix B.
- GrayLit Network – Enables searches across multiple grey literature resources that contain full-text technical research reports from US federal agencies including the:
  - Department of Defense (Defense Technical Information Center),
  - Environmental Protection Agency,
  - National Aeronautics and Space Administration
- *TESEO: Doctoral Theses of the Spanish Universities*.
- *UK National Health Service Centre for Reviews and Dissemination (NHS CRD)* Website accessible at "<http://www.york.ac.uk/inst/crd/>". A brief description of the three databases accessible through this site was provided in Appendix B. This site includes up to 3 months of unpublished material.
- *Read Directory Database of Research and Development Activities (Japan)*: An online database of contact details for research activities in Japan.

#### Available by Subscription

##### General

- *British Library's Inside Web*: Includes references to papers presented at over 100,000 conference proceedings.
- *CRIB (Current Research in Britain)*: Includes succinct details of 57,000 research projects being undertaken in British universities and colleges,
- *Dissertation Abstracts Online*: Includes US Dissertations since 1861, US Masters Theses since 1962 and dissertations from 50 British universities since 1988. Also from 1988 Worldwide Dissertations (formerly European Dissertations) have been included. Abstracts available for records indexed since 1980.

- *Index to Theses*: Provides a comprehensive listing of these with abstracts accepted for advanced degrees by universities in Great Britain and Ireland since 1970.
- *SIGLE (System for Information on Grey Literature in Europe)*: Includes research and technical reports, preprints, working papers, conference papers, dissertations, government reports and research in progress from 15 European member countries of the European Association for Grey Literature Exploitation (EAGLE) from 1980 onwards. Includes the contents of the British Library's British National Bibliography
- *UKOP- Catalogue of UK Official Publications*: Contains all British Official government publication and some key internal report literature from 1980 onwards.

### **Subject Specific**

- *EUDISED (European Documentation and Information System for Education)*: Includes ongoing and completed projects in education since 1975.
- *Federal Research in Progress*: An online database that contains US federally funded government research projects in progress.
- *JGRIP (Japanese Government and Public Research in Progress)*: Contains English citations and abstracts covering current and recently completed research including medical research by public research organizations in Japan.
- *CINAHL*: Includes some nursing theses (7000), full text of government reports (over 1,000), guidelines, newsletters, and research instruments relevant to nursing and allied health.
- *NOD (Nederlandse Onderzoek Databank)*: Includes succinct details of 20,000 research projects being undertaken in universities in the Netherlands.
- *PsycINFO*: Includes a subset of Dissertation Abstracts related to psychosocial interventions (12%), book chapters (7%), and academic and government reports relevant to psychology and sociology (1%) since 1887.

## Government Agencies

**Australia:** Commonwealth Scientific and Industrial Research Organization

### **Canada**

- Office of Policy Research Initiatives (PRI)
- Canada Institute for Scientific & Technical Information (CISTI)
- National Research Council (NRC-CNRC)

**Denmark:** Danish Ministry for Social Affairs

**France:** L'Institut de L'Information Scientifique et Technique (INIST)

**Russia:** The Scientific and Technical Information Centre of Russia

**Spain:** CSIC

### **Sweden**

- Swedish Council for Social Research
- Center for Evaluation of Social Services, National Board of Health and Social Services

### **United Kingdom**

- UK Home Office (Delinquency and Crime)
- UK Department for Employment and Education (DFEE)
- UK Cabinet Office, Evaluation Unit
- Economic and Social Research Council (ESRC)

### **United States**

- U.S. Education Department (USED), especially the Institute of Education Sciences
- U.S. Department of Justice (DOJ), especially the National Institute of Justice (NIJ)
- U.S. Department of Labor (DOL), especially Employment and Training Administration (ETA)
- U.S. Department of Health and Human Services (DHHS), especially the Social Security Administration (SSA), Office of the Assistant secretary for planning an devaluation (ASPE), National Institute of Mental Health (NIMH), National Institute of Drug Abuse (NIDA)
- U.S. Department of Housing and Urban Development (HUD)
- U.S. Department of Agriculture, especially Food and Nutrition Service.

**Norway:** Norwegian Academy of Sciences

**Finland:** Ministry of Social Affairs

### **Multi-national Organizations**

- World Bank (WB), especially Office of Evaluation and Development (OED)
- World Health Organization (WHO)
- Pan American Health Organization (PAHO)
- European Union (EU)
- Nordic Council of Ministers

### **Private United States Foundations**

- Hewlett Foundation
- Knight Foundation
- Packard Foundation
- Pew Foundation
- Robert wood Johnson foundation
- Rockefeller foundation
- Smith Richardson Foundation
- Volkswagen Foundation
- William T. Grant Foundation

### **Research Organizations**

- Abt Associates
- American Institutes for Research
- Manpower Demonstration Research Corporation
- Mathematica Policy Research
- Max Planck Institute, Berlin, Germany
- New England Research Institute (NERI)
- Research Triangle Institute (RTI)

- Stanford University, School of Education
- University of Bremen, Germany
- University of California, Los Angeles (UCLA) Department of sociology, School of Education
- University of Florida, Central Florida and South Florida: School of Education, School of Social Work
- University of Geneva, Switzerland
- University of Michigan: School of Social Work, School of Education, Institute for Social Research
- University of Pennsylvania, especially Graduate School of Education, School of Social Work, School of Arts and Sciences, Department of Economics, Sociology, and Psychology, Annenberg School of Communications, Fels Center for Government
- University of Tennessee
- University of Memphis
- Urban Institute
- Vanderbilt University, School of Public Policy, Peabody College
- Vera Institute for Justice
- Family Health International
- Northwestern University
- Prevention Trials Network