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## Evidence Synthesis as New Age Library Services: A Conceptual Introduction

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### Abstract

The academic landscape and research publications have undergone an unprecedented shift transitioning from an era of information scarcity to one of information overload. In this environment, the ability to systematically identify, appraise and synthesize existing knowledge has become a fundamental need as well as a competency. This chapter provides an exhaustive analysis of Evidence Synthesis - a suite of methodologies designed to integrate results from multiple studies to answer specific research questions and its incorporation into the service model of modern academic libraries. Drawing up on seminal typologies by Grant and both (2009) and Sutton et. al. (2019); this chapter explores the nuances of over 48 review types ranging from the rigorous “Gold Standard” Systematic Review to the emerging, time-sensitive “Rapid Review”. It evaluates the tangible and intangible value of Library professionals' involvement qualified through Grants Success Rates, Search Reproducibility and Return on Investment (ROI) Matrix. Finally the chapter addresses the disruptive potential of Artificial Intelligence (AI) and the necessary ethical framework such as RAISE, required to govern its use in Evidence Synthesis.

**Keyword** Evidence Synthesis (ES), Systematic Review (SR), Meta Analysis, Systematic Literature Review (SLR), Modern Library Services.

### Introduction

#### What is Evidence Synthesis?

Evidence Synthesis is a collective of terms for a family of research methodologies that rigorously identify, select, appraise and synthesize results from multiple studies to provide answers to a specific research question. Unlike a traditional narrative review, which may be a subject to the author bias, evidence

synthesis uses explicit reproducible protocols to minimise bias and provide a reliable summary of existing knowledge (Gough et. al., 2012).

In the context of modern library services Sutton et. al. (2019) categorizes Evidence Synthesis into distinct “families” of review types, ranging from Systematic review (aims to aggregate evidence for decision making) to scoping review (aims to map the concepts and gaps in a research field). This classification would help library professionals in determining the appropriate methodology based on the researchers’ specific needs (Sutton et. al., 2019).

As the production of scientific information gained momentum from ‘Renaissance Era’ to ‘The Enlightenment Era’ through industrial revolution and end into ‘Information Age’, a critical question of reliable, reproducible and dependable information management and synthesis arose. The production of large amounts of data does not automatically lead to Knowledge or Wisdom. The discipline of Evidence Synthesis has arose to bridge this gap by transforming scattered data into a single, coherent, structured body of knowledge. Evidence Synthesis is thus “*A systematic process of identifying, selecting, appraising and summarizing primary research to answer a specific question*”. It is a methodological measure to ‘Information Overload’ and the ‘Play of Chances’. Evidence Synthesis encompasses more than 1000 different terminologies; categorised into 16 core categories or types based on their methodology and purpose. A recent scoping review of evidence synthesis grouped 74 unique terminologies into 16 distinct categories including specialised types like integrative reviews and reviews of methodology. The Joanna Briggs Institute (JBI) identifies 8 major types of systematic reviews in their methodology guide.

## **A Comprehensive History of Evidence Synthesis**

### **James Lind and the Removal of Rubbish 1753**

The origin of evidence synthesis is often credited to the 18th navy surgeon ‘James Lind’. James Lind is also recognised as to carry out the first controlled trial on scurvy disease. In 1753, James published his highly recognized work “A Treatise of scurvy”. In his work he not only published the results of his clinical trials on scurvy but also presented ‘Critical and Chronological View’ of “What has been published on the subject till-a-date”. The medical literature in the 18th century was cluttered with biases and unverifiable claims, untested theories, sometimes with superstitions and anecdotes. To correct this he critically examined the literature through pure scientific investigative and logical lenses. He wrote that

*“Before the subject could be set in a clear and proper light,  
It was necessary to remove a great deal of rubbish”*

This exactly captures the essence of the systematic review “the exclusion of unreliable evidence to prevent the contamination of valid conclusions”.

He systematically pulled down the prevailing prejudice of that time by conducting a thorough and unbiased and absolutely scientific examination of existing Publications. Lind's attempt to filter out rubbish, organize the knowledge chronologically and critically foreshadowed the modern requirement for explicit inclusion and exclusion criteria, ensuring that the synthesis was not just a collection of beliefs but distillation of verifiable observations.

### **19th Century Data Overload**

As the 19th century progressed, the amount of scientific publications, critique and newsletters expanded multi-fold. In 1885, Lord Rayleigh argued that “*science will be crushed .....under its own weight*” if it continued to only accumulate new information without organizing the old one. He debated that the digestion and assimilation of existing material was as vital as the discovery of the new material - a sentiment that serves as a core justification for modern evidence synthesis.

In 1898, George Gould envisioned a system for organizing medical literary records that would allow a researcher to access Global Knowledge on a subject “*within an hour*”.

He and other Scholars identified the logistical problem: the sheer scale of information was outpacing the human capacity to process it. However, at that time they were also lacking the statistical tools and techniques to normally combine the results of disparate studies.

### **Application of statistics and the first meta-analysis (1904)**

The year 1904 is particularly a critical turning point for Evidence Synthesis as it fundamentally changed the directions of developments in Evidence Synthesis. Following the Boer War (II) concluded 1902 the then British Empire was struck with a ravage of enteric fever - typhoid among its soldiers in those days treatment for typhoid was uncertain and its efficiency was under a fierce debate. Thus, Karl Pearson, the then director of the biometric laboratory at University College, London who was also a pioneer statistician was entrusted with reviewing the evidence on the treatment of Typhoid.

Karl Pearson systematically reviewed all the available published literature on typhoid and treatment. He gathered data from 11 separate studies after carefully selecting them based on scientific principles, experimental outcome and reproducibility of results. His application of statistical tools to the evidence were published in the British Medical Journal as “*A Report on enteric fever inoculation statistics*” which is considered to be the first formal application of Meta-Analytical technique to the Evidence Synthesis. Karl Pearson's approach

introduced several Concepts that remained Central to the modern day Meta-Analysis

- **Quantitative integration:** He calculated a correlation coefficient for each of the 11 studies and sought a mathematical relationship between the variables. A method called the “*Tetrachoric Correlation*” assuming that the data came from a bivariate normal distribution
- **Addressing heterogeneity:** He observed “Extreme irregularity” in the correlation values across the different studies known as “Statistical Heterogeneity” in now-a-day statistics. He did not ignore the heterogeneities but actively pursued them to provide the explanation of variance in the outcome. The principle central to the Meta analyses - exploring the inconsistencies
- **Critique of Bias and Selection:** He was strongly aware of the limitations of observational data. He noted that the soldiers volunteering for experiments were more cautious and careful than those who did not volunteer. This is a form of confounding self-selection bias that led him to doubt the observed benefits, that they might be unreliable and misleading.
- **The call for Randomization:** He then changed the strategy on selecting soldiers for experiments by randomizing. He experimented on every alternate soldier who participated, achieving proto- randomization by the logic of “Randomized Controlled Trial” - a concept formalized by R. A. Fisher, much later after Karl Pearson.

### **The Birth of Meta-Analysis (1976)**

For most of the mid-20<sup>th</sup> Century period after Karl Pearson's efforts, research on evidence synthesis remained largely and informal practice

- **The Psychotherapy debate**

In the 1950s and 1960s, the field of psychology was immersed in a fierce and intense debate over the efficiency of psychotherapy. To prove its efficiency it was required at that time to establish a way to aggregate the hundreds of small studies that had been conducted, each of which lacked the statistical power to convince critics on its own.

- **Gene V. Glass and 1976 AERA presidential address**

Gene V. Glass, an educational psychologist, was overwhelmed with studies and needed a method to make sense of the “Barrages of Findings”. In his address as a president of American Educational Research Association (AERA) he coined the term “Meta-Analysis”. Glass formally defined a taxonomy of research analysis in his seminal paper “Primary, Secondary and Meta-Analysis of Research” in 1976 as, a Primary analysis (The original analysis of data in

research study); Secondary analysis (The analysis of data for the purpose of answering the original question with better statistical techniques are answering new questions) and a Meta-Analysis (The analysis of analysis).

The statistical analysis of a large collection of analysis results from Individual studies for the purpose of integrating the findings

Glass's innovative technical application of statistical proved a turning point in the evidence synthesis methodology, as it processed data from each study in a new and higher order of analysis. Collectively, it helped in synthesizing the result from 375 psychotherapy studies to prove that the 'Psychotherapy' was actually an effective method in education.

Glass also argued that one cannot know if study quality matters until one empirically tests whether "Good Studies" produce different results than "Bad Studies". This debate laid the foundation for modern sensitivity analysis; where reviewers explicitly check if their results hold up when low quality studies are excluded.

### **Archibald 'Archie' Cochrane and 'The Cochrane Collaboration'**

Glass's innovative and fascinating work was quickly adapted by the many researchers from the medical field which was an epicentre of ethical and practical concerns during that point of time. Archibald 'Archie' Cochrane was a British epidemiologist who was a very prominent figure adapting Glass's Meta-Analysis in medicine. In 1972, Cochrane published his monograph "Effectiveness and Efficiency: Random Reflections on Health Services". Cochrane expressed his opinion that "It was a great failure of the profession (medicine) that, it had not organized a systematic summary of randomized control trials (RCTs) updated periodically and by respective specialty". Cochran's opinions and solutions were inspired by his learnings during World War II when he served as medical officer in a war camp where resources were non-existence and thus he had to rely only on the use of treatment that was perfectly known at that time and were resulting into the effectiveness. He insisted that, "Healthcare should be based on "Fair Tests" of treatments. He practiced and advocated the RCTs as the "Gold Standard", arguing that without randomization bias was inevitable.

- **The Oxford database of Perinatal trials**

Cochrane's work inspired many medicine professionals during 1970s and 1980s professionals from obstetrics were particularly on the forefront of it. Iain Chalmer led an effort to systematically review all RCTs in perinatal medicine. This work culminated in the publication of "*Effectiveness care in pregnancy and childbirth*" in 1989 - a massive systematic review that transformed the field. This publication validated Cochrane's vision

- **Cochrane Collaboration 1993**

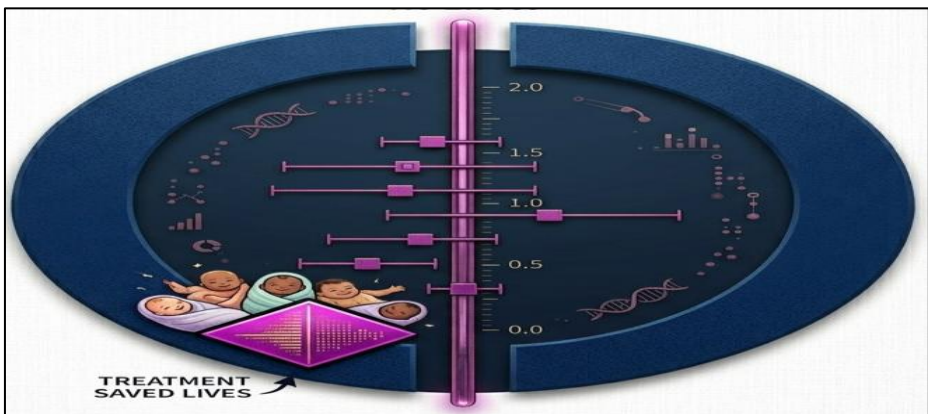
Archibald 'Archie' Cochrane died in 1988. In 1993 a group of international researchers met in Oxford to honor and cement the legacy of Cochrane. They collectively established the "The Cochrane Collaboration" with a vision to prepare, to maintain and to disseminate a systematic reviews of the effects on healthcare intervention. The Cochrane Collaboration brought an industrial scale to evidence synthesis. It established:

- **The Cochrane Library:** Acting as a central repository for systematic reviews.
- **Methodological Standards:** Rigorous and handbooks for conducting reviews emphasizing the search for all evidence (Both published and unpublished) to avoid any of the publication bias.
- **Logo:** The Cochrane logo itself depicts a forest plot of a systematic review of Corticosteroids for women at risk of a premature birth. The diamond at the bottom shows that the treatment saved the lives of those babies from the risk of premature birth.



**Figure 1: Original Cochrane Logo**

(Source: [www.cochrane.org/about-us/our-story/our-name-and-logo](http://www.cochrane.org/about-us/our-story/our-name-and-logo))



**Figure 2: AI generated illustrative explanation of Cochrane Logo**

(Source: Google Gemini (Pro)'s Nano Banana Image Generation tool)

## **Beyond Medicine: the Campbell Collaboration (2000)**

The effectiveness of Cochrane Collaboration prompted many social scientists to wonder if this can be implemented for the decision making process in education criminal justice and social sciences as fees and alike were arguably equally or even more susceptible to the ideology and a night as medicine

- **Donald D Campbell and the experimenting Society:**

Donald Campbell was an American social scientist and an advocate of the “experimental Society” where social reforms would be treated as experiments to be evaluated scientifically. He argued that we must be willing to discard reforms that fail and persist with those that work - a philosophy resonated deeply with Cochrane.

- **The birth of a sibling:**

In 1999 a gathering of leading social scientists of the world recognized the need of a similar/sibling organization dedicated to social interventions the Gatherings was also attended by the members of the Cochrane collaboration. Owing to this “The Campbell Collaboration” was founded in Philadelphia in 2000.

The Campbell Collaboration adopted the rigorous methodology of Cochrane.

- Transparent for protocol
- Comprehensive searching
- Statistical synthesis
- Application of statistical tools to Fields like education criminology and Justice and International Development

- **The Science of reviewing: Standardization and Reporting guidelines**

With the growing popularity over an effectiveness and quality number of Meta-analysis literally exploded during the 1990s. This led to an emergence of a new challenge to the quality of the reviews themselves. In 1987, Mulrow examined 50 review articles in a leading medical journal and found that very few to none met all the eight basic scientific criteria's'. Similar deficiencies and inaccuracies were also reported by Sacks et. al. (1987). These shocking discoveries made scholars and regulators to come up with a reporting guidelines to ensure the transparency and reproducibility and remove bias, leading to the “Science of Reviewing”

- **QUOROM Statement**

To address the inequalities, inadequacies, inconsistencies and use of suboptimal standards, an International Group developed the QUOROM statement (**Q**uality **O**f **R**eporting of **M**eta-analysis) in 1996. QUOROM focused specifically on Meta-analysis of RCTs, mandating that authors report details like

search strategy, search strings, methods of synthesis and the assessment of heterogeneity. As the field of systematic reviews was evolving with the advent of ICT, observational studies were increasingly included in it the conceptual framework distinction between a “systematic review” (a qualitative process) and a Meta-analysis (a statistical process) was becoming clearer. In 2009, QUOROM was updated and adapted and renamed as PRISMA, 2009 (**P**referred **R**eporting **I**tems for **S**ystematic reviews And **M**eta-**A**nalysis)

### **The PRISMA 2020 and Modern Standard**

PRISMA 2009 soon became popular and became a Global Standard. Thousands of international and reputed journals adopted it. By 2017, advancement in Computing, advances in research methodology and availability of new tools for assessing risk of bias (ROBIS), new statistical methods and the rise of automation necessitated another update in PRISMA 2009 guidelines. By 2020, updated PRISMA guidelines were published to reflect the robust changes incorporated to address the growing need of adoption of newer tools and methods.

Key evolutions in these guidelines included:

- Transparency in searching requiring full search strings to allow replication
- Bias Assessment moving from simple quality scores to domain-based risk of bias assessment
- Abstract Screening explicit reporting of how many studies were screened and excluded often visualized in the PRISMA flow diagram which is now and iconic visual of the systematic review process
- **The Automation Era: Text Mining and Living Reviews**

Upon the arrival of the 21st century the challenge shifted to sustaining the method from establishing it. The exponential growth of scientific literature is estimated at over 114 million scholarly documents in 2014 (Hong et. al., 2018) created a crisis.

“India's research output has increased almost six-fold over the last decade and a half rising from 34,000 articles in 2010 to 1,95,000 in 2024. India is second fastest growing Nation by total article count”

A manual Systematic Review could take years to complete by which time the evidence might be outdated and irrelevant.

- **The Rise of Text Mining**

To deal with the flash flood of scholarly literature, researchers began turning to ICT, text mining and even AI tools. The first papers exploring Automation and Systematic Reviews appeared during 2006. These early studies used machine-learning classifiers to rank citations by relevance. The objective

was to reduce the “screening burden”. In a typical review, one might screen 10,000 titles to find 100 relevant studies. Text mining tools provided to strategies:

- **Prioritization:** Ranking the list so that most relevant studies appear first, allowing the reviewer to start sooner.
- **Binary Classification:** Automatically excluding clearly irrelevant studies.

By 2015, Text Mining became mainstream. Tools like Rayyan, Covidence and EPPI-Reviewer integrated machine learning to act as a “second screener” identifying potential conflicts or speeding up the execute exclusion process. The Cochrane’s “Transform” project began implementing these technologies and tools to maintain the central repository of controlled trials in Medicine.

- **Living Systematic Reviews:**

Automation enabled a new format - The Living Systematic Review (LSR). Unlike traditional static reviews, which are “Frozen” at the time of publication, LSRs are updated continuously as new evidence emerges. This is only possible through the semi-automatic system of continuous monitoring of literature, enabling a real-time Evidence Synthesis during need. This proved to be critical during a COVID-19 pandemic.

**Table 1: Key Historical Milestones in Evidence Synthesis**

| Sr. No. | Year | Event                        | Key Figure(s)        | Significance  |
|---------|------|------------------------------|----------------------|---|
| 1       | 1753 | A Treatise of the Scurvy     | James Lind           | First critical, chronological review; concept of removing "rubbish" (bias).                     |
| 2       | 1904 | Typhoid Inoculation Report   | Karl Pearson         | First proto-meta-analysis; quantitative pooling of 11 studies; identification of heterogeneity. |
| 3       | 1972 | Effectiveness and Efficiency | Archie Cochrane      | Ethical argument for RCTs; critique of medicine's lack of systematic summaries.                 |
| 4       | 1976 | "Meta-analysis" coined       | Gene V. Glass        | Formal definition of meta-analysis; integration of effect sizes in psychology.                  |
| 5       | 1987 | Méta-analyse en médecine     | Milos Jenicek        | First published book on systematic reviews in medicine (French).                                |
| 6       | 1989 | Effective Care in Pregnancy  | Iain Chalmers et al. | Landmark systematic review validating Cochrane's vision.  |
| 7       | 1993 | Cochrane Collaboration       | Founders             | Establishment of global infrastructure for medical reviews.                                     |
| 8       | 1999 | QUOROM Statement             | International Group  | First reporting guidelines for meta-analyses of RCTs.   |

|    |      |                             |                                     |   |
|----|------|-----------------------------|-------------------------------------|---|
| 9  | 2000 | Campbell Collaboration      | Boruch, Soydan, et al.              | Expansion of synthesis to social sciences (education, justice).   |
| 10 | 2009 | PRISMA                      | Moher et al.                        | Modern standard for reporting systematic reviews.   |
| 11 | 2006 | Text Mining                 | Various                             | Application of AI to screen literature and manage information overload.   |
| 12 | 2015 | Emergence of Software Tools | Rayyan, Covidence and EPPI-Reviewer | Process Automation, Large Scale Reviews and Analysis, More Systematic, Unbiased and Efficient Processes.                      |
| 13 | 2020 | PRISMA 2020                 | Various                             | Introduced critical sub-items and sections to enhance transparency, accuracy, and reproducibility in evidence-based research. |

## The Evolution of Evidence Synthesis from Medicine to the Academia

- **The Roots of the “Evidence-Based Medicine (EBM)”**

The concept of Evidence Synthesis is originated in the clinical epidemiology of the late 20th century. The formalization of Evidence-Based Medicine (EBM) sought to replace “Eminence-Based” practice - reliance on the authority of senior clinician - with practice grounded in systematic summation of the available research. The Cochrane collaboration, founded in 1993, institutionalized the “Systematic Review” as the primary instrument for this purpose. These reviews were distinguished by their explicit protocol exhaustive search strategies and statistical synthesis (Meta-analysis) of “Randomized Control Trials (RCTs)”.

- **The Expansion into Social Sciences and Beyond**

While Evidence-Based Medicine (EBM) provided the initial template, the logic of systematic synthesis has permeated virtually every academic discipline. The Campbell collaboration was established to apply similar principles to Social Policy, Education and Criminal Justice. in software engineering Systematic Literature Reviews (SLRs) analyses coding practices. in environment science the Collaboration for Environmental Evidence (CEE) synthesizes data on conservation interventions. This cross disciplinary expansion has profound implications for academic libraries. The ‘literature search’ , once a transactional service performed by librarians at a reference section, now has evolved into the ‘search strategy design’ a methodologic contribution requiring a deep expertise in database syntax, controlled vocabularies and bias minimization. The librarians are no longer email gatekeepers of access but guarantors of methodological validity.

- **The Librarians Evolving Role**

The transformation of the subject liaison librarian is Central to the Evidence Synthesis (Systematic Review and Meta-analysis). Traditionally liaisons focused on collection development and bibliographic instruction. Today they are increasingly expected to function as “Information Specialist” or “Methodologist” within research teams. This shift requires a move from ‘support’ to ‘partnership’ where the librarian is often a co-author and responsible for the specific methodology of data identification. This evolution is driven by the increasing complexity of the information landscape and the rising standards of grant funding bodies, which now frequently mandate rigorous evidence synthesis as a prerequisite for funding a new research.

### **Typologies of Evidence Synthesis Navigating the Methodology**

A primary challenge in providing Evidence Synthesis Services is the “Tower of Babel” effect - inconsistent terminologies across disciplines. A Researcher in Psychology might request a ‘matter analysis’ when they actually require a ‘narrative synthesis’ while a nursing student might confuse a ‘scoping review’ with a ‘literature review’. To navigate this, Librarians rely on robust typologies to diagnose the researcher’s need and prescribe the appropriate methodology.

- **The Grant and Booth (2009) Framework**

Grant and Booth’s seminal analysis “A Typology of reviews” remains the foundational work for categorizing Evidence Synthesis. They identified 14 distinct review types analysing them through the SALSA framework (**S**earch, **A**ppraisal, **L** Synthesis and **A**nalysis) to highlight their methodological differences.

- **The Systematic Review**

The Systematic Review is a foremost and basic type of Evidence Synthesis. It is defined by its rigorous adherence to a pre-specified protocol to minimize bias. The search in the systematic review is exhaustive and comprehensive; as it is expected to use multiple databases for literature search and review. Grey literature sources are also used to avoid publication biases. Every included study is assessed for risk of bias using validated tools for mandatory appraisal. The synthesis can be narrative or can be statistical (Meta-analysis). A complex Boolean search string applicable across interfaces needs to be devised by the library professionals.

- **The Meta-Analysis**

Often mistaken with Systematic Review, a Meta-Analysis is specifically a statistical technique for combining quantitative data from multiple studies to estimate and overall effect size. A Systematic Review may or may not include a meta-analysis but a meta-analysis is always based on a systematic review of

evidence. Librarians rarely perform statistical calculations. Our role in retrieving the data is crucial, missing out on a single data set can significantly impact on the process and are the end results, leading to invalidate the conclusions.

- **The Scoping Review**

The Scoping reviews have gained enormous popularity in recent times particularly in Health Sciences. The purpose of scoping review is to “map” the literature rather than answer a specific question about the effectiveness. The objectives of the scoping reviews is to identify the types of evidence available, clarify the key concepts and identify gaps in the research. Unlike systematic reviews, scoping reviews generally do not assess the quality of included studies. This is a crucial distinction for researchers who may lack the expertise to perform critical appraisal. It requires a systematic and transparent search strategy often as broad as a systematic review but with broader inclusion criteria

- **The Rapid Review**

Driven by the needs of policy makers who cannot wait 12 to 14 months for systematic review rapid reviews streamline the process these kinds of reviews applies shortcuts such as limiting to a language filter searching selected databases limiting to fewer numbers of screening process either separately or in combination with each other these shortcuts could introduce bias such as biases needs to be reported for transparency and clarity as a Librarians we must negotiate with the researchers to determine which shortcuts are acceptable given the timeline and the state of the decisions

- **The Umbrella Review (Review of Reviews)**

As the number of Systematic Reviews has grown, the need to synthesize them has emerged. Umbrella reviews summarizes evidence from multiple systematic reviews. These reviews study “systematic reviews” and not primary articles. These are useful for broad questions wherein a considerable number of reviews already exist.

- **Sutton et. al. (2019) “Review Family Taxonomy”**

Expanding on Grant and Booth, Sutton et. al. (2019) identified 48 distinct review types and grouped them into seven families. This arrangement is called “Review Family Taxonomy” and it reflects the nuances required in modern research support services.

- **The Qualitative and mixed method challenge**

The “Qualitative Family” presents unique challenges. Unlike the linear search process of a systematic review (Search ---->Screen), qualitative synthesis (e.g. Realist Review, Meta-ethnography) offers an iterative approach.

- **Berry Picking:** Researchers may follow citations, look for theoretical concepts rather than keywords and stop searching when “Saturation” is

reached rather than when all articles are found. Librarians working on these reviews must be able to deal with the comfortness with ambiguity and should be able to search with non-traditional methods like citation chaining and cluster searching.

**Table 2: The Seven Review Families (Sutton et al., 2019)**

| Sr. No. | Review Family     | Core Characteristic  | Methodological Focus Type             | Typical Library Support  |
|---------|-------------------|----------------------|---------------------------------------|--|
| 1       | Traditional       | Purposive Sampling   | Narrative, Critical, State-of-the-art | Reference consultation; suggesting key databases.                            |
| 2       | Systematic        | Comprehensive Search | Bias minimization, Reproducibility    | High Intensity: Protocol review, comprehensive search design, deduplication. |
| 3       | Rapid             | Streamlined Process  | Speed, Policy relevance               | Negotiated search scope; "Quick and dirty" searching.                        |
| 4       | Qualitative       | Iterative Search     | Thematic synthesis, Meta-ethnography  | Complex: "Berry-picking" searches, tracking theoretical saturation.          |
| 5       | Mixed Methods     | Integrated Data      | Convergent, Sequential designs        | Supporting searches for diverse data types (Quantitative and Qualitative).   |
| 6       | Review of Reviews | Tertiary Synthesis   | Umbrella reviews                      | Searching for "reviews" filters in databases.                                |
| 7       | Purpose-Specific  | Pragmatic            | Health Technology Assessment (HTA)    | Highly specialized searches for regulatory bodies.                           |

### Diagnostic Framework for Librarians

When a researcher approaches the library, the librarian must have an attitude like a medical diagnostic practitioner. We must strive to understand the structure of the research. The reference interview should evolve into a methodological consultation. For example:

**Q: I want to do a systematic review**

Librarian's diagnosis:

- Is there a protocol? (if no then it's not a systematic review)
- Is there a team? (if solo then it cannot be a systematic review due to bias)

- Is the question broad or narrow? (If Broad then scoping review; If Narrow then systematic review)
- What is the timeline? (if Under 6 month then a rapid review or narrow review)

This diagnostic phase is critical to prevent “Methodological drift”, where a project claims to be a “Systematic Review” but fails to meet the criteria ultimately leading to the rejection by journals.

- **The Value Proposition: Quality, Funding and ROI**

Evidence synthesis by library and Library professionals will not merely be a service enhancement but it will be a critical determinant of research quality. The effect of “Library” can be measured across multiple dimensions.

- **Impact on Research Quality and Reproducibility**

The authenticity of a Systematic Review rests entirely on the quality of its research; if the search is flawed, the synthesis is of no use.

- **Search Reproducibility:** A study of 913 reviews found that librarian co-authorship was associated with a significantly higher search reproducibility. Reviews with Librarians were more likely to report the full strategy - a requirement for PRISMA 2020 compliances.
- **Search Comprehensiveness:** Librarians’ involvement correlates with searching a greater number of databases and including grey literature.
- Lackey et. al. (2019) found that reviews without librarians often searched only a single database, a fatal methodological flaw that introduces selection bias.
- **Reducing Waste:** By identifying existing reviews early in the process librarians prevent “Research Waste” - the conducting of redundant studies. This is a crucial ethical and economic contribution.

- **Impact on Grant Funding**

In the competitive landscape of academic research funding, the methodology section of a grand proposal is always evaluated meticulously. Funding bodies like NIH (US), NIHR (UK), ICSSR (India) etc. increasingly view the inclusion of a Library and Information Specialist as a matter of comprehensiveness. A librarian on the team signals to reviewers that the literature review component will be rigorous.

- **Economic Returns on Investment**

Libraries have successfully quantified their value through RoI studies moving beyond ‘Metrics’ like satisfaction to ‘Hard’ economic indicators.

- **Time Savings:** The primary economic driver is the value of time saved. If a faculty member spends 50 hours struggling with a search strategy for a research project (article or chapter) that a librarian could do in 20 hours, the institution saves money. A study found that for every \$ 1 invested in library staff the institution received \$ 1.9 to \$ 5.40 in benefits.
- **Clinical Impact:** In Medical and Health Science settings, librarian assisted searches have been shown to save health professionals' time per week, translating to direct cost savings for the healthcare system and improved patient care.
- **Co-authorship:** Despite these contributions, a gap remains between contribution and credit. 44% of reviews in high impact journals acknowledge librarians' involvement, only about 2.5% to 3% list the librarian as co-author. The International Committee of Medical Journal Editors (ICMJE) criteria states that, the authorship is based on a "substantial contribution to the conception or design of the work". Designing the search strategy is like designing the data collection instrument for a systematic review. Many libraries now mandate co-authorship for certain services in MOUs to address equity.

## Conclusion

Evidence synthesis has matured from a specialized methodology in medicine to a fundamental pillar of the academic research enterprise. For the modern academic library, this represents a profound opportunity to redefine its value proposition by transitioning from "service providers" to "methodological partners", librarians are placed at the very heart of knowledge creation. However, realizing this potential requires a sophisticated approach. It demands a mastery of complex typologies from the 14 types of Grant and Booth's to the 48 of Sutton et. al. the implementation of disciplined field service models and the courageous integration of AI technologies. As the "Evidence Explosion" continues to accelerate the library's role in synthesizing that evidence will only become more critical, ensuring that the academic research produces not just more research but better, more reproducible and more impactful reliable research.

Historically, the Librarians role in literature searching was transactional - retrieving known items or providing bibliographic instruction. The digital age is characterized by an information explosion. The growth of scholarly publishing is unprecedented. This has rendered traditional and simple information retrieval ineffective and insufficient. this transformation of academic and research libraries in the 21st century known as "*Infodemics*" necessitates rigorous methods to collate, appraise and synthesize vast amount of data evidence synthesis,

encompassing systematic reviews, scoping reviews and meta-analysis represents Pinnacle of this bibliographic rigor.

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