

An overview of knowledge syntheses methods

November 19, 2021

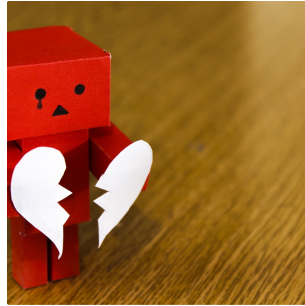
So, you
wanna know
what about
knowledge
syntheses?



They can make you



Smile



Cry



Rage



Scared



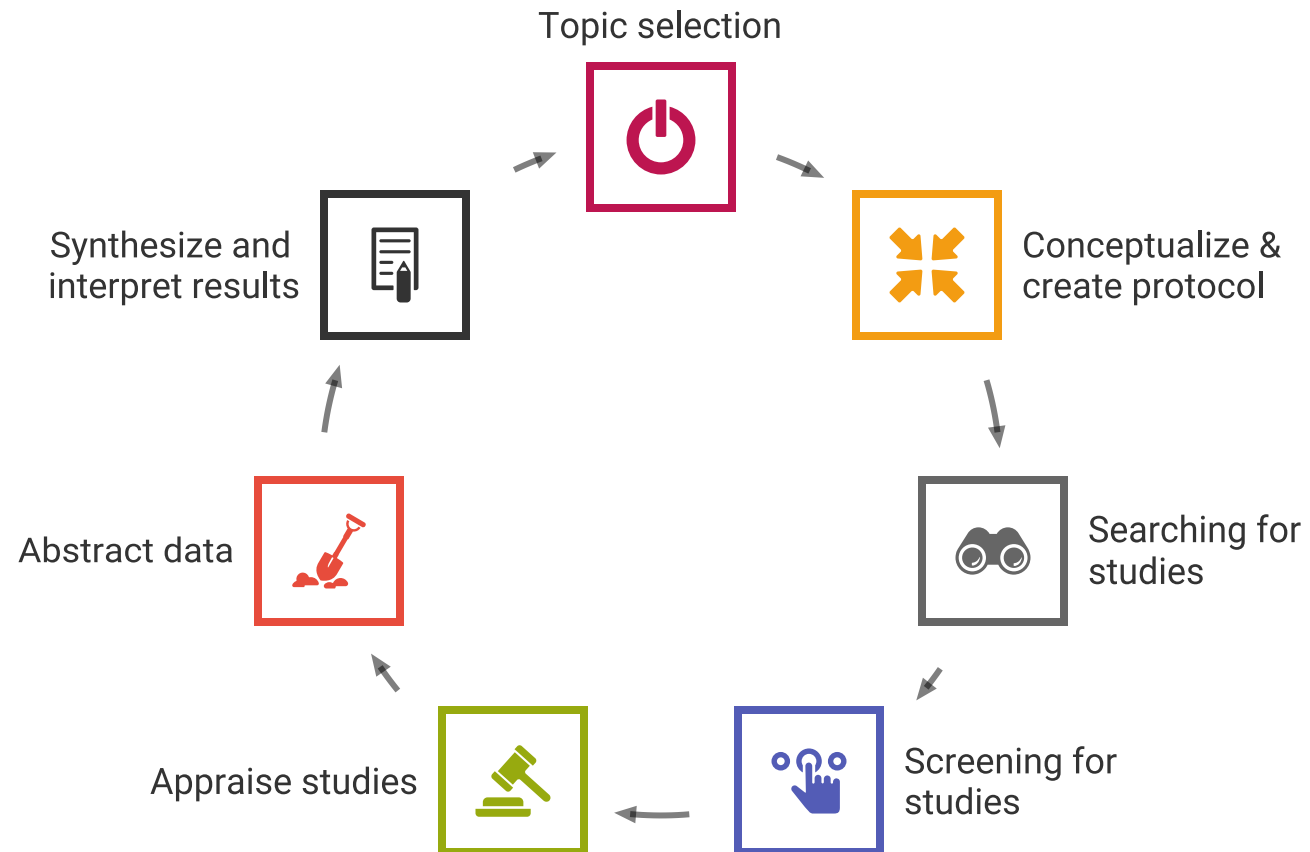
All of these

Knowledge syntheses in a nutshell

- CIHR defines synthesis as 'the contextualization and integration of research findings of individual research studies within the larger body of knowledge on the topic. A synthesis must be reproducible and transparent in its methods, using quantitative and/or qualitative methods.
- It could take the form of a systematic review; follow the methods developed by The Cochrane Collaboration; result from a consensus conference or expert panel and may synthesize qualitative or quantitative results. Realist syntheses, narrative syntheses, meta-analyses, meta-syntheses and practice guidelines are all forms of synthesis.' [1]

Knowledge syntheses cycle

Applies to most methods driven reviews



Different types of knowledge syntheses

- Systematic reviews
- Meta-analyses
- Scoping reviews
- Rapid reviews
- Realist reviews
- Overview of reviews (also called Review of reviews)
- Mapping reviews
- and the methods keep evolving and new ones being developed!

Different types of knowledge syntheses

- Systematic reviews & meta-analysis

- Protocol
- Comprehensive searches
- 2 levels of screening

- Scoping reviews

- Protocol
- Comprehensive searches
- 2 levels of screening

- Rapid reviews

- Protocol
- May include comprehensive searches
- May implement 2 levels of screening

- Umbrella reviews

- Protocol
- Comprehensive searches
- 2 levels of screening

- Realist reviews

- Protocol
- Comprehensive searches
- 2 levels of screening

- Let's take a look at this [nice table for more information!](#)

Methods

- Each review type adheres to a different methodology, e.g.
 1. Cochrane, CRD York, JBI for Systematic Reviews
 2. Arksey & O'Malley, JBI, Levac & Colquhoun for Scoping reviews
 3. WHO, NCCMR, for Rapid reviews
 4. RAMESES for Realist reviews
- The most common variant among each method(s) are 2 aspects:
 1. Critical appraisal
 2. Type of synthesis
- Steps shared among most review types are:
 1. Protocol
 2. Eligibility criteria
 3. Comprehensive searches
 4. Independent reviewer pairs for first and second level of screening
 5. Data abstraction
 6. Synthesis
- Regardless of the method, you must adhere to it!

Why do knowledge syntheses require a team?



The aim of knowledge syntheses is to find, select, and synthesise the available evidence in one topic in an **unbiased way**



Built into their methods are tasks **that can't be performed by a single reviewer**, e.g. first level of screening, second level of screening, and data abstraction



These tasks are performed by **individually by reviewer pairs**. This is done to **mitigate the bias that can be introduced into the review if done by a single reviewer**

What is a protocol?

- It's the pre-defined plan you must adhere to in order to conduct your knowledge syntheses, in a transparent, and reproducible way.
- It should outline and describe how the authors will manage the review process.
 - The research question
 - The criteria against which studies will be assessed for inclusion
 - How studies will be selected
 - How data will be abstracted
 - How studies will be assessed
 - How studies will be synthesized
 - For more information, look at this page
- When registered, it allows for others to see what type of research you are doing and prevents duplicate research from being created.

Some protocol registries include:
PROSPERO, JBI, OSF, Campbell, etc.
- Differences between protocol (what you said you were going to do) and the final manuscript (what you actually did) must be justified and accounted for



Developing your protocol



THE most important step
in the process



Your protocol is where
you and your team must
achieve absolute clarity
on your topic, and the
steps to follow

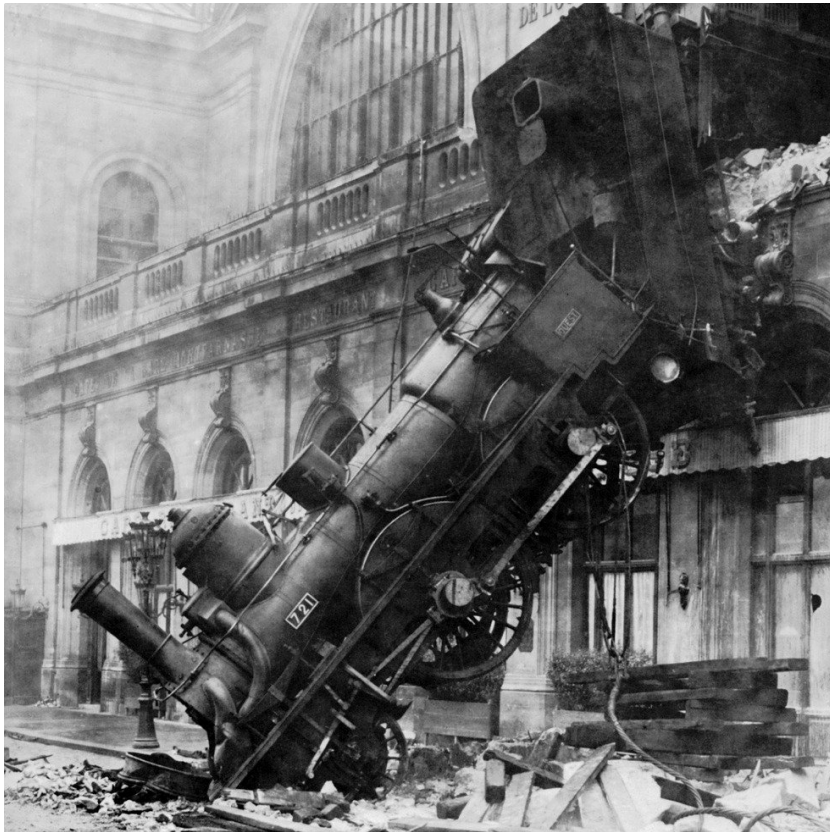


Don't resist taking the
time to develop it; you're
essentially writing your
manuscript and saving
time at the end!



Your protocol is the road
map for your review,
without it you're lost

An incomplete, unclear, and underdeveloped protocol will result in



A disaster, as well as:

- **Delays at all stages.** Searching, screening at both levels, data abstraction, synthesis will suffer delays.
- **Confusion among all team members.**
- **Introduce bias in your review.**
- **Decreased chances of being published.** Can you expect a journal to publish your final manuscript if you deviated from your protocol extensively?
- **Lack of trust and confidence from your readers.** If you couldn't come up with a detailed plan, and follow it through, why should you expect your readers to trust you?

Eligibility criteria

- It's the criteria, determine during the development of your protocol, and before your search strategies, that you'll use to include and exclude studies during 2 levels of screening
- It is applied consistently through the review process
- All team members must be on the same page on what each criteria means
- **Examples of eligibility criteria**



Searching for studies



Searching for studies

- Involves creating a search strategy that is applied to thousands of studies at once
- Must be comprehensive
- Think abstractly, and often higher level
- Operationalization of concepts, particularly fuzzy or vague concepts, e.g. complex patient
- Searching for minimum concepts
- Searching for key words and phrases
- Searching for subject headings
- **BUT - none of these provide the detailed context and definition necessary to select studies via screening!**

Screening

- First level of screening

- Individual reviewer pairs take a look at the **title and abstract** of each study
- Each reviewer makes a decision, **based on the eligibility criteria**, to include or exclude each article screened
- Articles where both reviewers have decided to include, move to the second level of screening
- Articles where both reviewers have decided to exclude, get excluded at this stage
- Articles where reviewers have voted differently, get resolved by a third reviewer or via discussion
- Pilot testing recommended

- Second level of screening

- Individual reviewer pairs take a look at the **full text** of each study
- Each reviewer makes a decision, based on the eligibility criteria, to include or exclude each article screened
- Articles where both reviewers have decided to include, move to the second level of screening
- Articles where both reviewers have decided to exclude, get excluded at this stage
- Articles where reviewers have voted differently, get resolved by a third reviewer or via discussion
- Pilot testing recommended
- **Reasons for exclusion must be recorded**

Data abstraction

- Data is abstracted for each study that made it to this stage (so, past the second level of screening)
- Also done by independent reviewer pairs
- Pilot testing recommended
- The data abstracted must support the main objectives and outcomes of the review
- As in screening, the question reviewers must keep in mind is: What is necessary to answer the research question of this study?

Critical appraisal

- Not necessary for every study type, for others strongly recommended
- Tools available to conduct this
- Also done by independent reviewer pairs
- Some tools assess the risk of bias of each study, the quality of the information, etc.

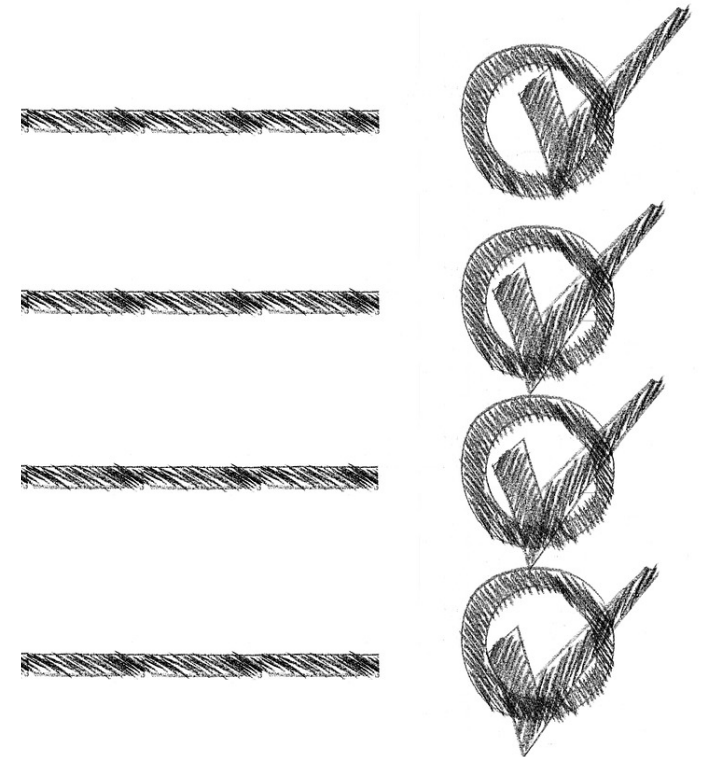


Synthesis

- Differs for each review type, for some reviews the synthesis can be narrative, for others it must be quantitative
- Some reviews have more wiggle room, e.g. can have mixed methods
- How to synthesize studies is also determined during the protocol stage, reviewers need to determine a priori what study type(s) they will include, e.g. Randomized control trials (RCTs), cohort studies, case reports, white papers, grey literature.
- They all have very different purposes, content, and structure that impact the synthesis of the review

Reporting guidelines

- A checklist, flow diagram, or structured text to guide authors in reporting a specific type of research, developed using explicit methodology adding that
- A reporting guideline presents a clear list of reporting items that should appear in a paper and explains how the list was developed.
- Different review types, have different reporting guidelines
 - PRISMA - Systematic reviews
 - PRISMA-Scr - Scoping reviews
 - PRISMA-P - Protocols
- There are some currently being developed, e.g. PRISMA-R for Rapid Reviews
- There's even a reporting guideline for searching, **PRISMA-S !**



Systematic reviews

The hyper-specific

- A systematic review attempts to identify, appraise and synthesize all the empirical evidence that meets pre-specified eligibility criteria to answer a given research question. It uses explicit methods aimed at minimizing bias, in order to produce more reliable findings that can be used to inform decision making.



When to conduct a systematic review?

- Answering a specific question(s) that is related to an intervention, diagnostic test, prognostic factor or other health or healthcare topic
- Summarizing the most reliable information on a specific topic, and do so using rigorous, unbiased methods

Systematic review question:

Sign Language and Spoken Language for Children With Hearing Loss: A Systematic Review

Characteristics systematic reviews

- **Characteristics**

- One of the most prominent types of reviews
- The goal of a systematic review is to systematically search for, appraise and synthesis research evidence.
- A key feature involves the **reporting of clear, transparent, and reproducible methods used to achieve the systematic review**
- The end goal is to produce a synthesized review that limits bias

- **Strengths:**

- The point of a systematic review is to gather all relevant knowledge on a specific topic
- Can involve a mix of study designs including quantitative, qualitative and mixed methods

- **Challenges:**

- Limiting inclusion criteria for singly study design restricts the insights one can gain from information
- Time-consuming

Scoping reviews

The Wild West



- A form of knowledge synthesis, which incorporate a range of study designs to comprehensively summarize and synthesize evidence with the aim of informing practice, programs, and policy and providing direction to future research priorities

Scoping review question, e.g. **Prevention and management of unprofessional behaviour among adults in the workplace: A scoping review**

When to conduct a Scoping review?

- Examining the extent, range and nature of research activity
- Determining the value of undertaking a full systematic review (e.g. Do any studies exist? Have systematic reviews already been conducted?)
- Summarizing and disseminating research findings
- Identifying gaps in an existing body of literature

Characteristics of Scoping reviews

- **Characteristics**

- Similar to systematic reviews, scoping reviews follow a step-by-step process and aim to be transparent and replicable in its methods
- Scoping reviews serve the purpose of identifying the scope and extent of existing research on a topic

- **Challenges**

- Establishing boundaries may be difficult
- They usually lack quality assessment, thus bias and low quality information may be introduced

- **Strengths**

- Identifies gaps in existing literature/research
- Allows you to “map a body of literature with relevance to time, location (e.g. country or context), source (e.g. peer-reviewed or grey literature), and origin (e.g. healthcare discipline or academic field)”
- Scoping reviews are typically used to clarify working definitions and conceptual boundaries of a topic or field
- Scoping reviews can be useful when reviewing topics that aren't conducive to systematic reviews such as when the literature on a topic is complex or heterogeneous

Narrative reviews or simply literature reviews

Anything goes?

- A narrative review is the type first-year college students often learn as a general approach. Its purpose is to identify a few studies that describe a problem of interest.
- No standards or protocols guide the review. Reviewers will learn about the problem, they will not arrive at a comprehensive understanding of the state of the science related to the problem.
- They may or may not:
 - Involve a comprehensive, reproducible, transparently reported search strategy
 - Be systematic
 - Have a pre-determine protocol
 - Involve 2 levels of independent reviewer screening, data abstraction. **They're not required to**
 - **The synthesis is always narrative**
- High potential for bias, lack of transparency in their methods, reporting, and confidence in their findings
- Not methods, and protocol driven, so not a knowledge synthesis

Do the majority of researchers know the differences among review types, their methods or know what they're doing?





No.

Why is this happening?

- **Conflicting system of rewards and incentives**
 - Academics want tenure, to generate/concretise knowledge, and fuel new ideas
 - Publishers want \$
 - Universities value rankings and undervalue transparency and rigour
- **Current tenure and promotion practices**
 - Universities value IF, number of publications, value of grants
 - **Faculty struggle to make these ends meet, and are pressured into conducting research they're ill prepared to do in order to get job security**
- **The peer review system is broken**
 - Journals are likely to publish garbage (**AND THEY DO**) just to get \$
 - Peer review is unpaid and an untrained endeavor.
- **Blind leading the blind effect.**

The cohort of poorly trained researchers is perpetuated as early career researchers (students, post-docs, fellows, junior researchers) are trained by them.
- **Why else do you think this happens?**

Research waste

- Duplicate research
 - This is why the first step in the process of any knowledge syntheses is to check if there's already a review on the topic.
 - Why do another review when there's 1 that already answers that specific question? There are exceptions to this of course!
- Poorly conducted research.
 - Millions of \$ a year are given out to researchers all over the world.
 - A lot of \$ wasted when the research is: poorly conducted, incomplete, fabricated, never shared
- Research that is not addressing a gap in knowledge.
 - What is the purpose of the research?
 - To get a publication should never be the answer
 - Research is meant to address a gap in knowledge and practice
- A good series to read

[Research: Increasing value, reducing waste. The Lancet](#)

Who's responsible?

- Funding agencies?
- Universities?
- Publishers?
- Researchers?
- Regulatory bodies?
- Government?
- Everyone?

advice for the public |



Search for 'service for the public' and check the WHO website for information.

Knowledge syntheses outside of health sciences

- Knowledge syntheses are becoming more and more common in the social sciences, humanities, natural sciences and engineering (Psychology, social work, education, business, engineering, music, information studies)

Challenges

- The proliferation of KS in these disciplines is met with increased challenges as researchers, librarians, and students haven't traditionally been exposed to these methods during their career, unless they have a background in epidemiology methods
- Journals in these areas, editors, and peer reviewers are also not prepared or knowledgeable which results in a lot of methodologically broken studies being published
- This cascades into authors believing their manner of conducting these studies is fit for publication
- Over time, capacity is starting to grow, and so are training opportunities. The challenge remains that sometimes training is also taught by individuals who are not experts on these methods.
- Topics tend to be more complex, and often databases are not tailored to perform and report structured transparent searches

Opportunities

- There's an opportunity to collaborate with faculty, students, and the University in partnering to develop courses and training that do adhere to these rigorous methodologies
- We can partner with each other, and benefit by sharing lessons learned from all disciplines
- Peer mentorship, collaboration, and training can be snowballed...and that's why I'm around! :)
- Research is becoming increasingly multidisciplinary, there's also a chance to harness the knowledge of both researchers and librarians who have expertise from all disciplines

Authorship

- The International Committee of Medical Journal Editors (ICMJE) has criteria on why authorship matters, who is an author, and non-author contributions.
- Why authorship matters?
“Authorship confers credit and has important academic, social, and financial implications. Authorship also implies responsibility and accountability for published work.”

Who is an author? (ICMJE Criteria for authorship)

- 1 Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
- 2 Drafting the work or revising it critically for important intellectual content; AND
- 3 Final approval of the version to be published; AND
- 4 Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Have you ever read, seen, or given
any thought to what defines
authorship before?

Remember the 4 G's of authorship



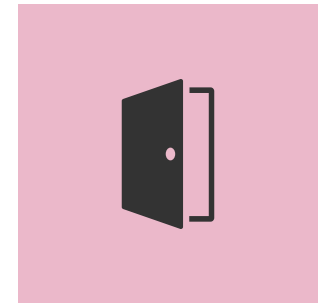
No Ghosts



No Guessing



No Gifts

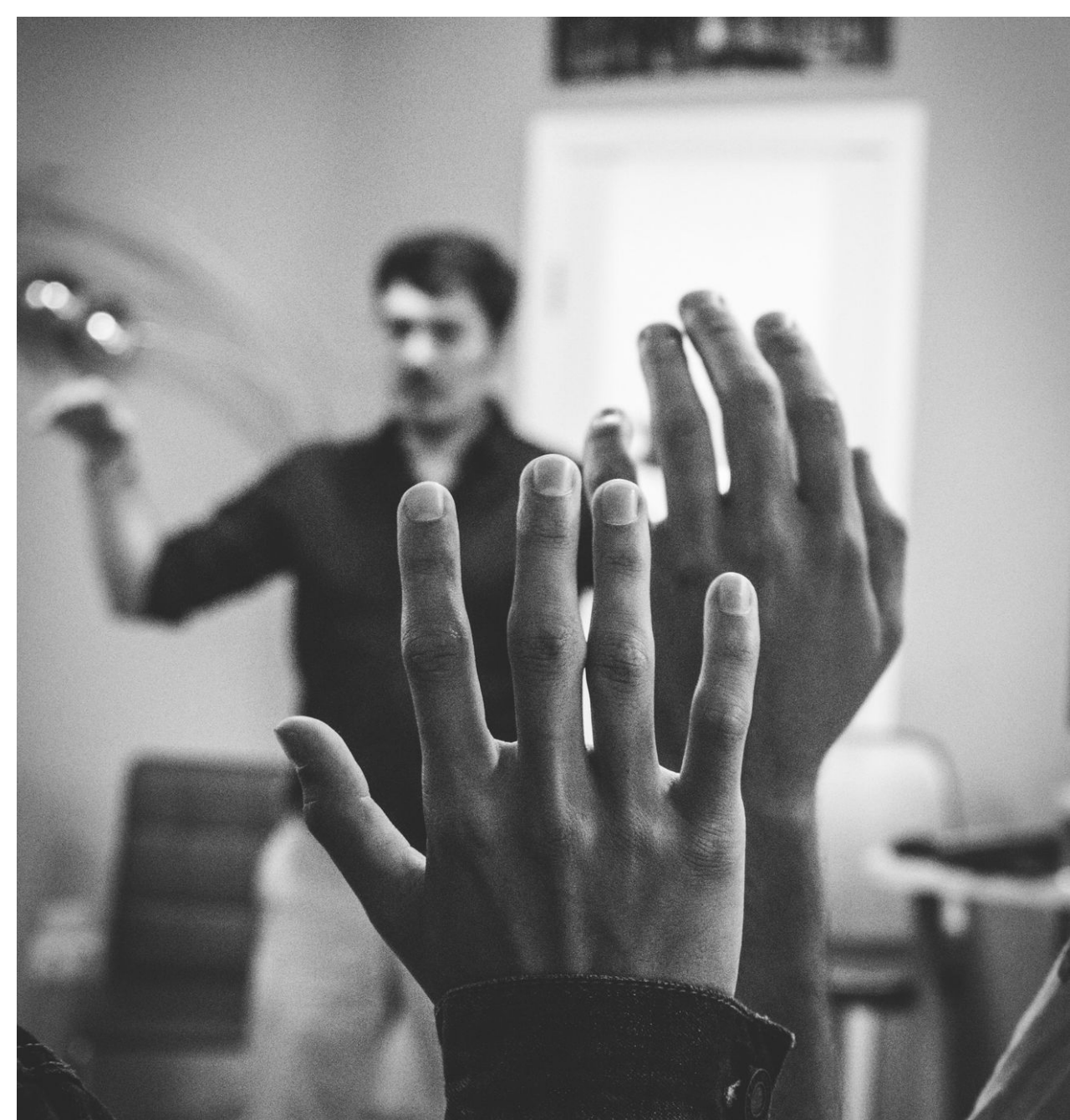


No Guests



“Readers should not have to infer what was probably done, they should be told explicitly”.

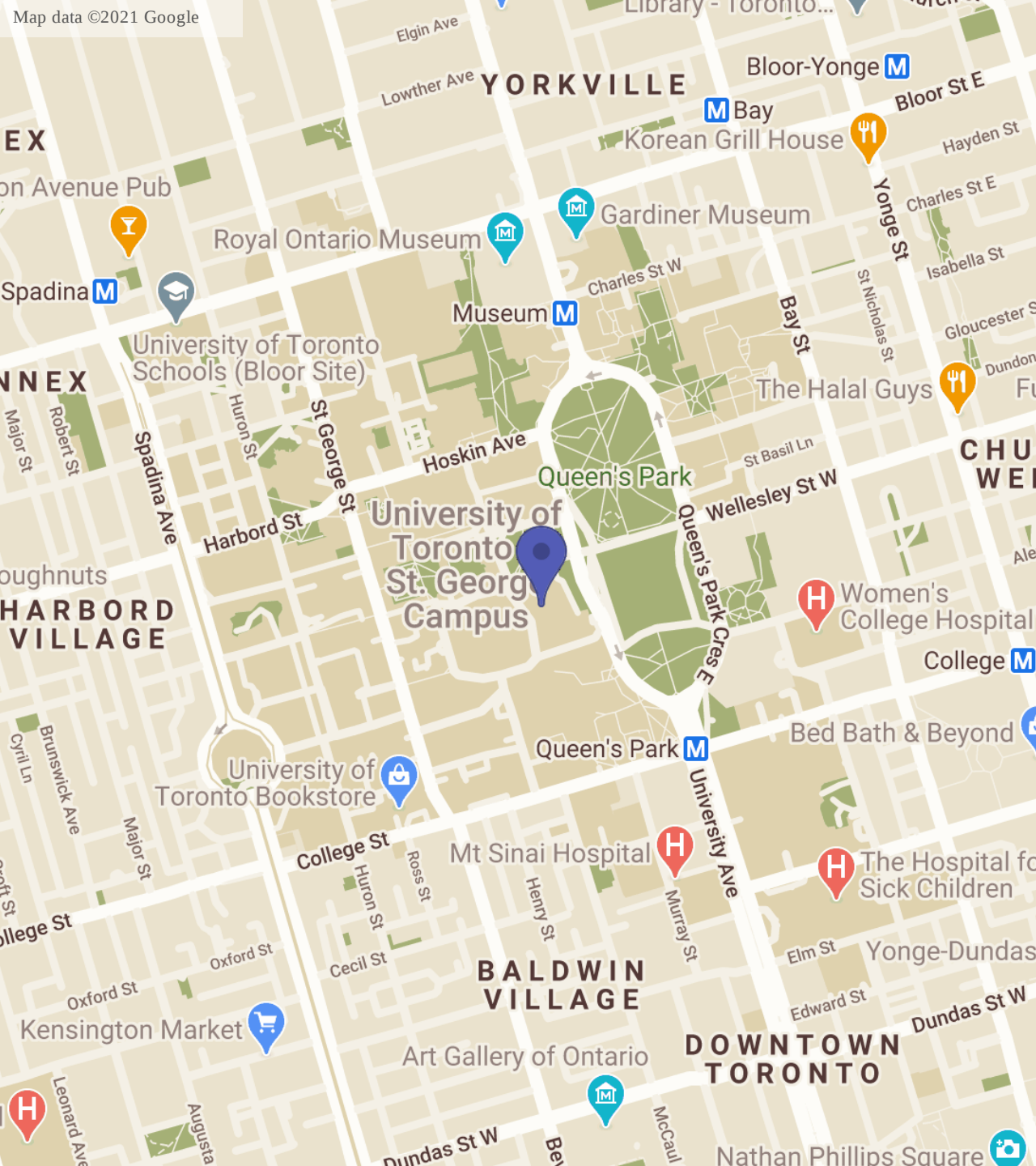
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Questions?

A rustic wooden sign with the words "THANK YOU." painted in bright yellow on a weathered wooden wall. The sign is made of two horizontal wooden planks. The background wall is made of vertical wooden planks, some of which are missing or damaged, revealing a lighter wood underneath. The sign is positioned in the lower middle of the frame, above a concrete surface. The overall scene is outdoors, with some grass visible at the bottom.

THANK YOU.



Patricia Ayala

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apayala

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