

CHAT-GPT &
SEARCH
STRATEGY
DEVELOPMENT

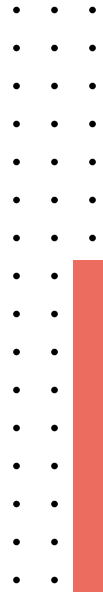
KAITLIN FULLER &
ERICA NEKOLAICHUK

Slides Available From
<https://osf.io/d26b4/>





WHERE WE TEACH



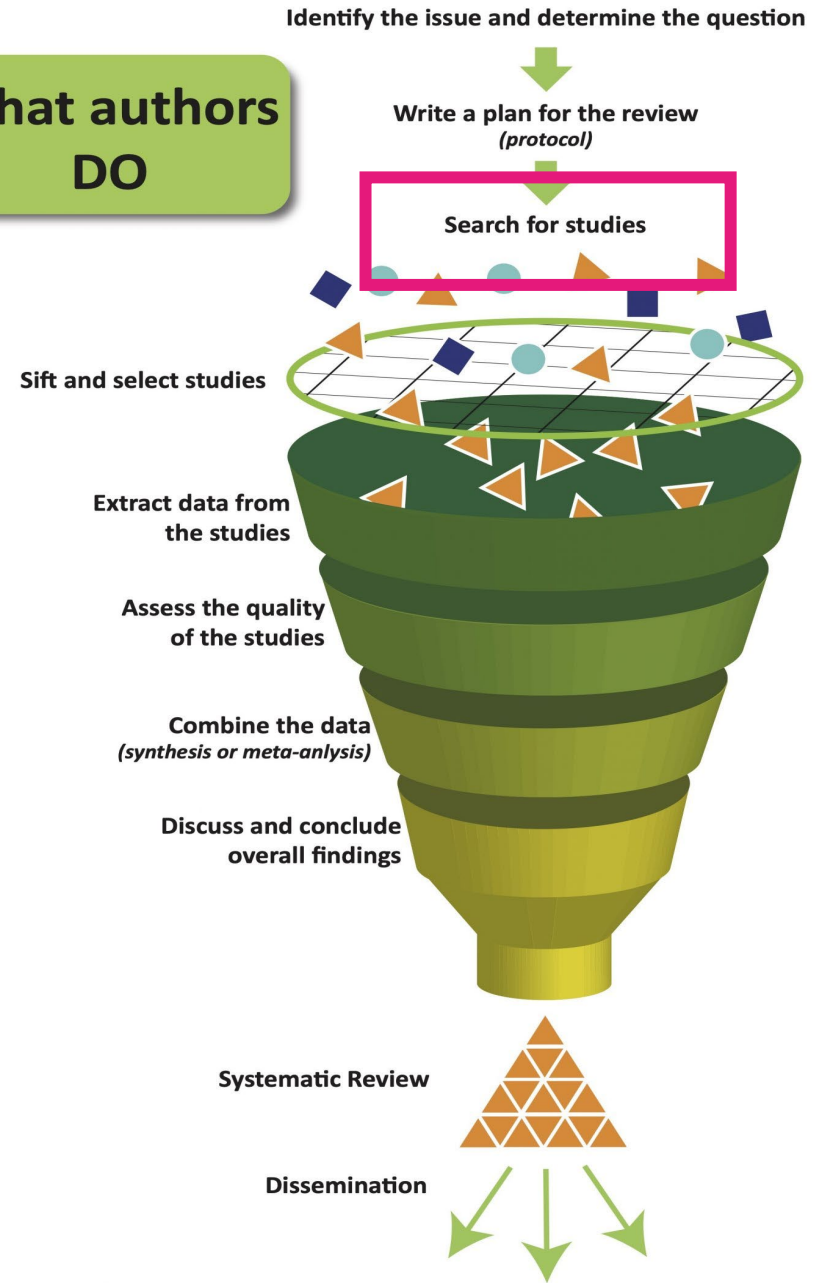


KNOWLEDGE SYNTHESIS (KS)

"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"

- Canadian Institutes of Health Research

What authors DO



Explaining the Method Behind Our Madness: 3-part Series on Comprehensive Searches for Knowledge Syntheses

Erica Lenton¹ and Kaitlin Fuller

Introduction










The production of knowledge syntheses (KS), including systematic and scoping reviews, has been steadily increasing over the last twenty years. Recent estimates indicate a three-fold increase in the number of published systematic reviews over the last decade [1], and that nearly half of all published scoping reviews have been published within the last six years alone [2]. This trend is evident at the University of Toronto, where graduate students are being

systematic review courses, there are few examples in the published literature of distinct KS searching workshops. While there has been recent discussion on how instruction is incorporated into KS service models [8]; we remain unaware of other existing librarian-led KS searching workshops for graduate students that deliver advanced content as a three-part series.

Lenton, E., & Fuller, K. (2019). Explaining the method behind our madness: 3-part series on comprehensive searches for knowledge syntheses. *Journal of the Canadian Health Libraries Association/Journal de l'Association des bibliothèques de la santé du Canada*, 40(1).

Methodology: KS, Scoping, Systematic, Scoping, or Other Comprehensive

STEPS TO SEARCHING THE LITERATURE

	Formulate your search question
	Determine whether to search precisely or sensitively
	Gather synonyms for your search concepts
	Combine your search terms logically using AND/OR (Boolean Operators)
	Find database-specific subject heading(s) and create textword queries for each search concept
	Select appropriate database(s)
	Use a structured, methodologically rigorous approach to conduct your search
	Supplement your search with pearl-growing, handsearching, and grey literature
	Manage your results

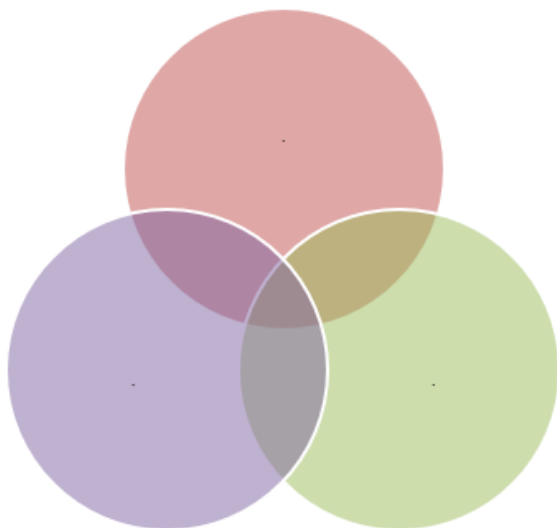
Series Day 1 - Worksheet

PREPARE SEARCH QUESTION

RESEARCH QUESTION:

Does interacting with therapy animals reduce stress and improve quality of life of people living in nursing home facilities?

TASK 1: What are the minimum, searchable concepts in the question? **Maximum** 3 concepts. What would the inclusion/exclusion criteria be?



INCLUSION CRITERIA:

EXCLUSION CRITERIA:

TASK 2: Identify synonyms for the concepts identified above

Concept 1	AND	Concept 2	AND	Concept 3 (Optional)	
OR				OR	OR
OR				OR	OR

PREPARE SEARCH STRATEGY

We just went through how to identify a subject heading and create textword queries, using the first concept in our example question.

IDENTIFY 1 or more SUBJECT HEADING(s) in MEDLINE and WRITE 1 or more TEXTWORD QUER(ies) for each of the synonyms you identified in section 1 for the concept of Nursing Homes.

TASK 3: SUBJECT HEADINGS (/- subject heading code in MEDLINE; exp to explode) ex. Hypertension/	Concept 1: Therapy Animals	AND	Concept 2: Nursing Homes
	exp Animal Assisted Therapy/		
	OR		OR
	Pets/		
	OR		OR
	Horses/		
TASK 4: TEXTWORDS (Use truncations, adjacency operators, brackets, as appropriate). ex. <u>hypertens*.tw,kf</u>	((therapy or psychotherapy) adj3 (animal* or dog or dogs or pet or pets or cat or cats or dolphin* or equine or horse* <u>).tw,kf</u>)		
	OR		OR
	Animal* <u>assist*.tw,kf</u>		
	OR		OR

SEARCH!

We just went through how to input our search strategy for concept 1 into the MEDLINE database.

STEP 5: Try inputting your strategy for the concept of Nursing Homes into MEDLINE.

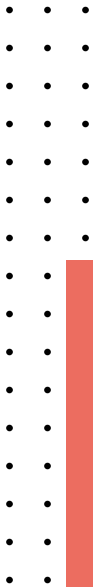
Log into MEDLINE from the Gerstein homepage <http://gerstein.library.utoronto.ca/> under MAJOR RESOURCES.

Start by searching your subject heading(s) then add the textword queries. Remember syntax counts!

SAVE SEARCH SO YOU CAN ACCESS FROM HOME



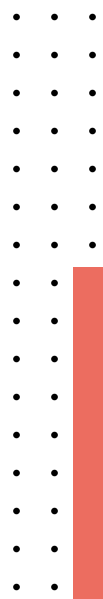
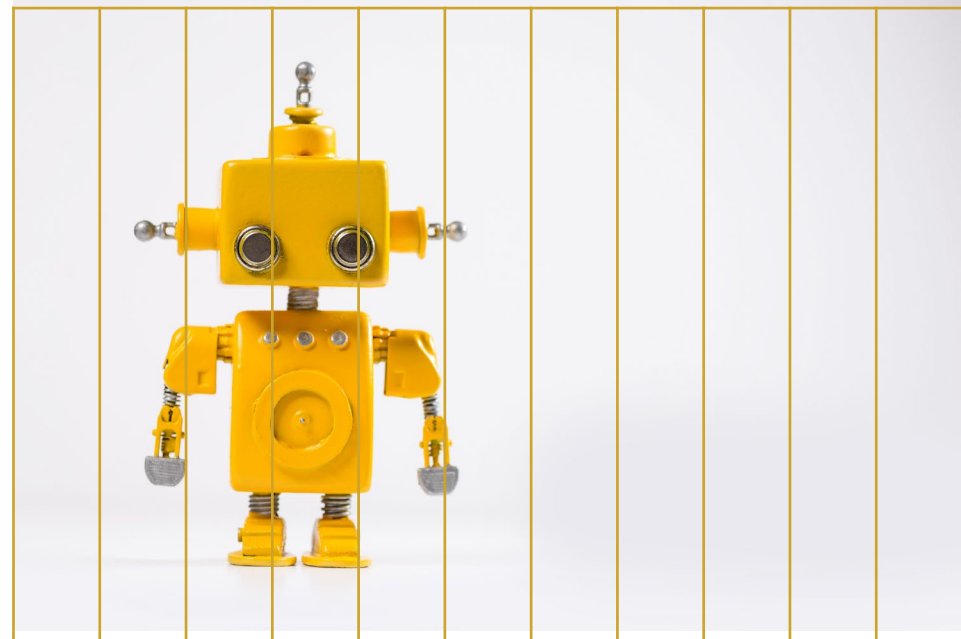
CAN AI HELP CREATE SEARCH STRATEGIES FOR KS?





SO CAN THE NEW GEN-AI ENHANCED DISCOVERY TOOLS (E.G. ELICIT) JUST DO THIS STEP?

- Cannot replace the structured search.
 - No reproducibility
 - No transparency in process
 - Functionality - eg. exports
- Concerns about the dataset searching on semantic scholar (what's included and also what's missing)
....still must do this manually.



4-STEP PROMPTING PROCESS

- Needs a seed article
- Requires understanding of PICO / minimum searchable concepts
- Requires understanding of concepts enough to accept/reject synonyms generated by ChatGPT
- Requires understanding of Boolean Logic to identify errors
- Requires ability to identify false / missing MeSH

Table 3: Example designed guided prompt for query formulation.

Step	Prompt	Example Answer
Step 1	Follow my instructions precisely to develop a highly effective Boolean query for a medical systematic review literature search. Do not explain or elaborate. Only respond with exactly what I request. First, Given the following statement and text from a relevant study, please identify 50 terms or phrases that are relevant. The terms you identify should be used to retrieve more relevant studies, so be careful that the terms you choose are not too broad. You are not allowed to have duplicates in your list. statement: "Prevalence of Differentiated Thyroid Cancer in Autopsy Studies Over Six Decades: A Meta-Analysis" Text: Ten occult carcinomas of the thyroid gland were found in 274 unselected autopsies at the Pathology Service, Hospital José Joaquín Aguirre, between December 1980 and March 1983. This is the lowest incidence among the most recent published series. The smallest papillary microcarcinomas presented most frequently as nonencapsulated nonsclerosing tumors without inflammatory infiltrate or fibrosis, suggesting that they may represent the early stages of development. Our data show a relatively high and similar frequency of papillary microcarcinomas in surgical and autopsy series, but do not demonstrate risk factors for clinical evolution.	1. Differentiated thyroid cancer 2. Prevalence 3. Autopsy studies 4. Meta-analysis 5. Occult carcinomas 6. Thyroid gland 7. Incidence 8. Environmental factors 9. Etiology 10. Low risk ... 50. Parameters.
Step 2	For each item in the list you created in Step 1, classify it into three categories: terms relating to health conditions (A), terms relating to a treatment (B), terms relating to types of study design (C). When an item does not fit one of these categories, mark it as (N/A). Each item needs to be categorised into (A), (B), (C), or (N/A).	1. (A) Differentiated thyroid cancer 2. (N/A) Prevalence 3. (C) Autopsy studies 4. (C) Meta-analysis 5. (A) Occult carcinomas 6. (A) Thyroid gland 7. (N/A) Incidence 8. (N/A) Environmental factors 9. (N/A) Etiology 10. (N/A) Low risk ... 50. (N/A) Parameters.
Step 3	Using the categorised list you created in step 2, create a Boolean query that can be submitted to PubMed which groups together items from each category. For example: ((itemA1[Title/Abstract] OR itemA2[Title/Abstract] OR itemA3[Title/Abstract]) AND (itemB1[Title/Abstract] OR itemB2[Title/Abstract] OR itemB3[Title/Abstract]) AND (itemC1[Title/Abstract] OR itemC2[Title/Abstract] OR itemC3[Title/Abstract]))	((differentiated[Title/Abstract] OR thyroid[Title/Abstract] OR carcinoma[Title/Abstract] OR papillary[Title/Abstract] OR microcarcinoma[Title/Abstract]) AND (cancer[Title/Abstract] OR incidence[Title/Abstract] OR etiology[Title/Abstract] OR risk[Title/Abstract] OR gender[Title/Abstract] OR hormonal[Title/Abstract] OR nodular[Title/Abstract] OR goiter[Title/Abstract] OR Hashimoto's[Title/Abstract] OR malignancy[Title/Abstract] OR concomitant[Title/Abstract] OR tumor[Title/Abstract] OR infiltrate[Title/Abstract] OR fibrosis[Title/Abstract] OR development[Title/Abstract] OR frequency[Title/Abstract])) AND (autopsy[Title/Abstract] OR surgical[Title/Abstract] OR material[Title/Abstract] OR series[Title/Abstract] OR specimens[Title/Abstract] OR cases[Title/Abstract]).
Step 4	Use your expert knowledge to refine the query, making it retrieve as many relevant documents as possible while minimising the total number of documents retrieved. Also add relevant MeSH terms into the query where necessary, e.g., MeSHTerm[MeSH]. Retain the general structure of the query, however, with each main clause of the query corresponding to a PICO element. The final query still needs to be executable on PubMed, so it should be a valid query.	((differentiated thyroid cancer[MeSH] OR "differentiated thyroid"[All Fields] OR "thyroid carcinoma"[All Fields] OR "papillary microcarcinoma"[All Fields]) AND (prevalence[All Fields] OR incidence[MeSH] OR "etiology of"[All Fields] OR "risk factors"[All Fields] OR gender[All Fields] OR hormonal[All Fields] OR "nodular goiter"[All Fields] OR "Hashimoto's thyroiditis"[MeSH] OR malignancy[MeSH] OR "concomitant lesion"[All Fields] OR tumor[All Fields] OR infiltrate[All Fields] OR fibrosis[All Fields] OR "early stages of development"[All Fields] OR frequency[All Fields])) AND (autopsy[MeSH] OR surgical[All Fields] OR material[All Fields] OR series[All Fields] OR specimens[All Fields] OR cases[All Fields]))



TEACHING
CHATGPT FOR
SEARCH
STRATEGY
DEVELOPMENT

EXAMPLES



STEPS TO SEARCHING THE LITERATURE



Formulate your search question



Determine whether to search precisely or sensitively



Gather synonyms for your search concepts



Combine your search terms logically using AND/OR (Boolean Operators)



Find database-specific subject heading(s) and create textword queries for each search concept



Select appropriate database(s)



Use a structured, methodologically rigorous approach to conduct your search



Supplement your search with pearl-growing, handsearching, and grey literature



Manage your results

You
You are an experienced medical librarian. Can you suggest a minimum of three bibliographic databases to search for the question: What is the association between physical activity, sport, and body image?

ChatGPT
Certainly! Here are three bibliographic databases that would be useful for researching the association between physical activity, sport, and body image:

1. PubMed: This is a free search engine accessing primarily the MEDLINE database of references and abstracts on life sciences and biomedical topics. It's a great resource for finding scholarly articles related to health, medicine, and related fields.
2. PsycINFO: This database, maintained by the American Psychological Association, covers literature in psychology and related disciplines such as psychiatry, sociology, education, and more. It includes scholarly articles, books, chapters, and dissertations, making it a valuable resource for researching topics related to body image and psychological aspects of physical activity and sport.
3. SPORTDiscus: SPORTDiscus is a comprehensive database covering literature on sports, physical fitness, exercise, sports medicine, and related disciplines. It includes scholarly articles, conference proceedings, dissertations, and other types of publications, making it a valuable resource for investigating the relationship between physical activity, sport, and body image from a sports science perspective.

By searching these databases, you should be able to find a wide range of research articles and studies related to the association between physical activity, sport, and body image.

PROMPTING TIPS:

- Give the chatbot an identity (e.g. medical librarian, information specialist, etc)
- 'bibliographic database' better than other vague terms for 'places to search'

This librarian would suggest:
Ovid Medline
Ovid Embase
Ovid PsycINFO
Ebsco CINAHL
Ebsco SportDiscus

Lecture: ChatGPT can help identify databases to search but it's not exhaustive

Tools to locate seed articles

Free-option

- ConnectedPapers
- Elicit
- ResearchRabbit
- SemanticScholar
- Google Scholar

Subscription

- ScopusAI
- AI/text mining tools are excellent sources to use to generate a seed article set BECAUSE they are not bibliographic databases (ie. what you put in *isn't* necessarily what you get out)
- They are not acceptable tools to search for SRs yet as they are unable to produce consistently reproducible results
- Semantic Scholar data... beware!

Lecture: introduces AI discovery tools in context of doing a KS and quickly identifies caveat of using them



Using Generative AI to suggest MeSH

Lecture: show how ChatGPT does not correctly identify MeSH and is aware of it

You
hi! how successful are you at finding MeSH for search terms?

ChatGPT
As an AI language model, I can assist in generating MeSH (Medical Subject Headings) terms for search queries related to medical and health topics. While I can provide suggestions based on my training data, it's essential to note that **my suggestions may not always perfectly align with the specific context or requirements of a particular search.** MeSH terms are standardized vocabulary used for indexing articles and documents in the biomedical field, and they can be complex and nuanced. For accurate and precise results, consulting a professional or utilizing specialized tools designed for MeSH term generation and searching is recommended.



Example

You
what MeSH would you suggest for pet therapy?

ChatGPT
For the topic of pet therapy, here are some MeSH terms that might be relevant:

1. Animal-Assisted Therapy
2. Pet Therapy
- ~~3. Animal-Assisted Activities~~
- ~~4. Animal-Assisted Psychotherapy~~
5. Human-Animal Bond
- ~~6. Dogs, Therapy~~
- ~~7. Cats, Therapy~~
8. Equine-Assisted Therapy
- ~~9. Canine-Assisted Therapy~~
- ~~10. Feline-Assisted Therapy~~

True Mesh Headings

These MeSH terms can be used to refine searches in databases like PubMed or other medical literature resources to find relevant articles and research on pet therapy.



Synonym Generation using Generative AI (e.g. ChatGPT)

- One of the first most useful, relatively safe applications of ChatGPT in search strategy development
- Prompts matter
 - list synonyms of 'x'
 - list all the ways of saying 'x'
 - You are a professional librarian and English major. Tell me all the ways academics would refer to 'x'
 - list all the different kinds of 'x'
- Not exhaustive, can be misleading
- Overconfident even when very wrong

Lecture: how ChatGPT can help generate synonyms and brief prompting lesson with examples

Activity

1. Ask ChatGPT to generate synonyms for "self-care". Consider trying 2-3 different prompts
2. Compare the results with someone near you
3. Be prepared to discuss your results

Think / Pair / Share using ChatGPT to generate synonyms with different prompts

ChatGPT: Search Strategy Prompt-a-thon

(this is also available as a [google doc](#))

ACTIVITY 1 – Identify PICO Elements for a review

Note: Start a new chat and you will need a [ChatGPT account](#)

1) Go to ChatGPT: <https://chat.openai.com/>

2) Write a prompt for ChatGPT to find the PICO elements for the review on the association of body image and sport and exercise.

Prompting Tips:

- Give the **chatbot an identity** e.g. medical librarian, information specialist, etc.
- Give **details** eg. “PICO means Patient/ Problem, Intervention, Comparison and Outcome. PICO is a format for developing a good clinical research question prior to starting one’s research. It is a mnemonic used to describe the four elements of a sound clinical foreground question.” (Table 1, Wang, 2024)
- **Be specific** with the details of the review and question eg. define concepts, write the review question
- Remember the different type of prompts described by Wang et al (2024): simple, detailed and with examples

'Prompt-a-thon' for the
different stages of a review

Day 1 activity (online)

Activity Available From <https://osf.io/d26b4/>



ChatGPT for Boolean Searches

Instructions

1. Unmute and say hi to your group!
2. Select a reporter who will type or unmute and share what you discuss
3. Select someone to screenshare (if needed)
4. Open up chatgpt: <https://chat.openai.com/>
5. Complete the activity (task 1-3) there is a syntax chart at the end to explain the different codes between PubMed and Ovid MEDLINE

Task 1: Follow the prompts below using an article of your choice (or one that has been provided below)

All the below is taken from:

Shuai Wang et al. 2023. **Can ChatGPT Write a Good Boolean Query for Systematic Review Literature Search?** In Proceedings of the 46th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR '23). Association for Computing Machinery, New York, NY, USA, 1426–1436. <https://doi.org/10.1145/3539618.3591703>

[Also illustrated on this guide by UofT Libraries](#)

Note: Start a new chat and you will need a [ChatGPT account](#)

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**Prompt 1: Asks ChatGPT to produce a list of 50 "relevant" terms.**

Follow my instructions precisely to develop a highly effective Boolean query for a medical systematic review literature search. Do not explain or elaborate. Only respond with exactly

Wang et al (2023) 4  
step process.

Group Activity Day 2

Also ran during  
a faculty development session  
(individually)

Activity Available From <https://osf.io/d26b4/>





# BEYOND FACILITATING REVIEW WORKFLOW: GEN AI IN TEACHING STRUCTURED SEARCHING



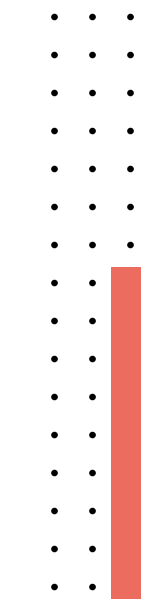
Critically Evaluate



Practice Writing  
Prompts



Reinforce learning  
objectives



# NOW IT'S YOUR TURN

- Let's work together to design a better activity to meet this learning objective:

*Generate a correct and comprehensive list of synonyms using ChatGPT*

- Menti 1: What type of activity should we do?
- Menti 2: How to set it up?
- Menti 3: How to take it up?

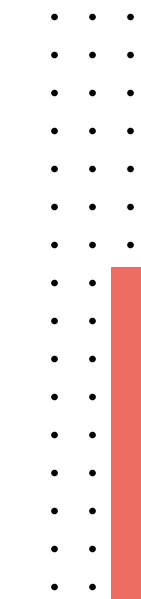


# MENTI POLL 1

What kind of activity should we do?

Examples:

- think / pair / share
- worksheet
- volunteer at the front of class
- synonym dance-off



# MENTI POLL 2

Great! We're going to design a .....

## How do we set this up?

Examples:

- Provide a concept example (e.g. international student) and ask the class for three more synonyms off the top of their heads
- Have them go into ChatGPT and prompt it for more synonyms
- Prize for the winner?
- In teams or individuals?
- Have the rest of the class thumbs up or thumbs down to agree/disagree

# MENTI POLL 3

That was fun! Now...

## How to take up?

Example:

- Instructor keeps track of list
- Shows difference between # of hits with original list vs. # of hits with new list

# THANK YOU!

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Teaching Material example  
and slides available at:

<https://osf.io/d26b4/>

