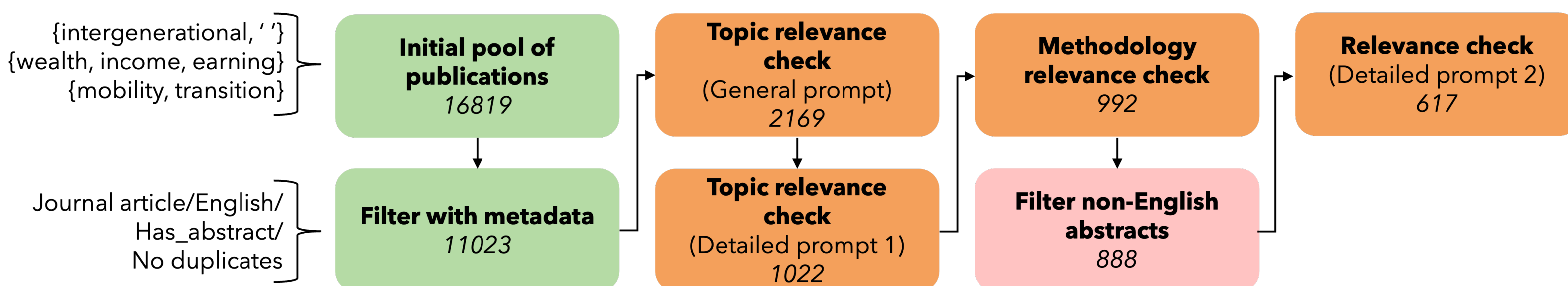


## Our Data Extraction Pipelines

- OpenAlex** was used primarily at the early stage to obtain the initial pool of the publications and do the simple filtrations based on the metadata.
- LLMs** generated labels for each article with prompts asking about the alignment with our research goal, and more articles were filtered out based on these labels.
- Python** filtered the abstracts that were not written in English, which were not captured by the metadata.



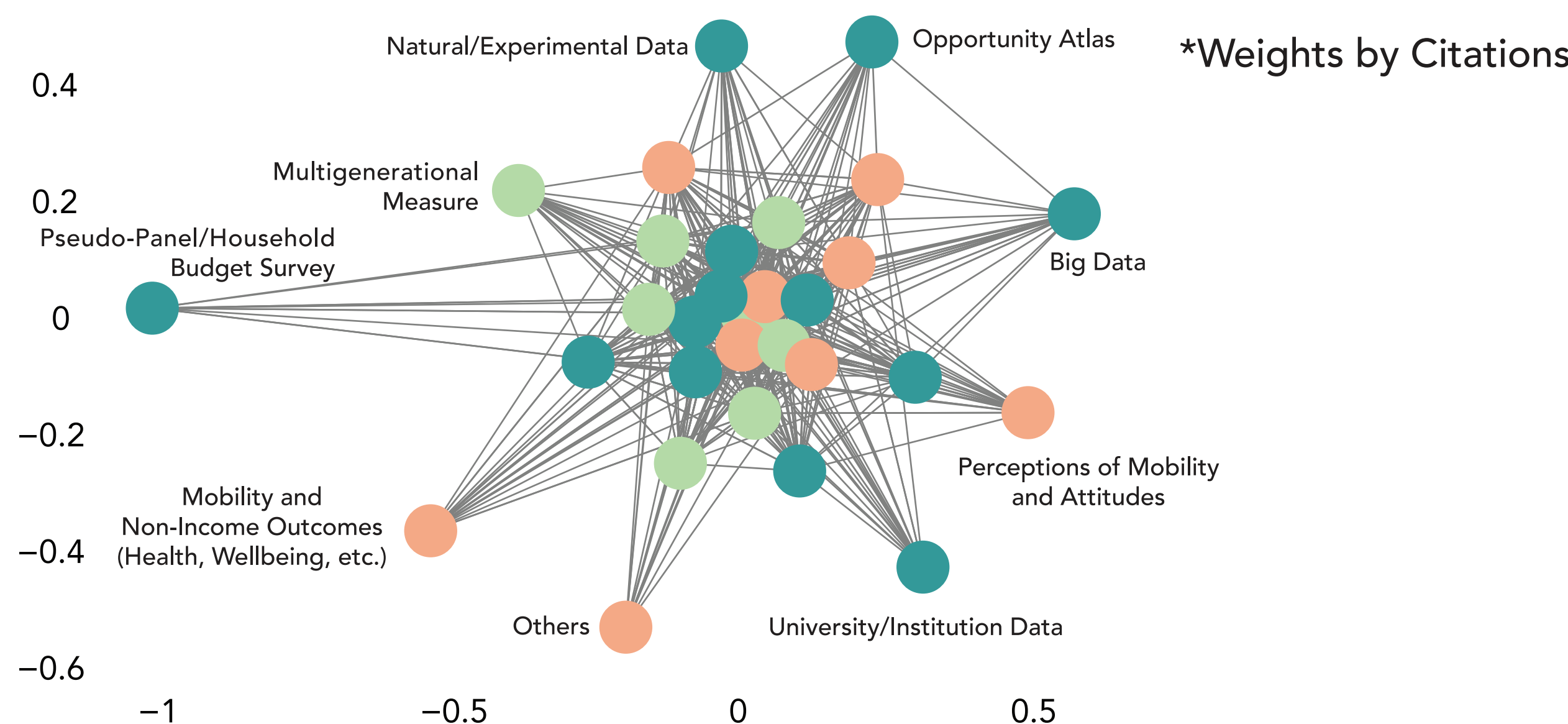
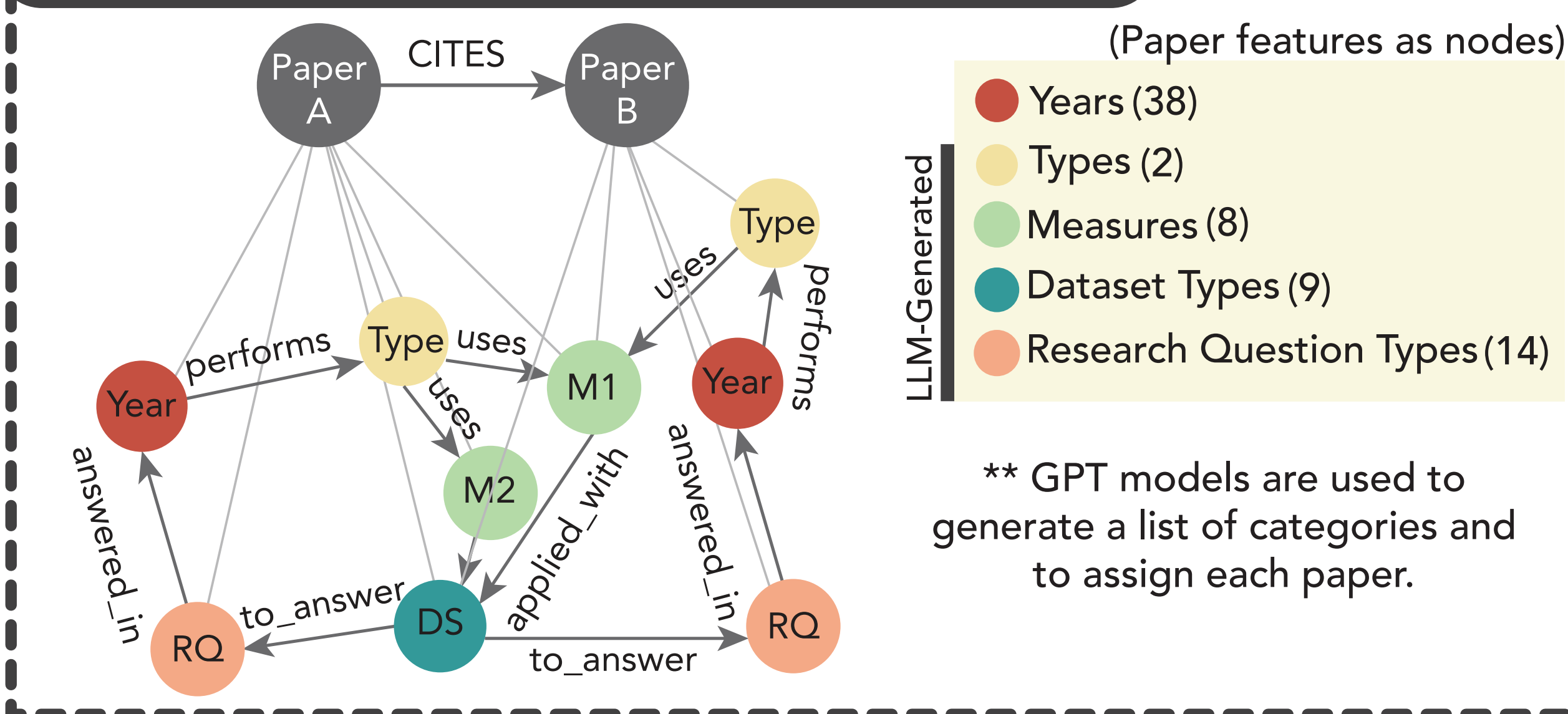
DATA ANALYTICS  
LABORATORY  
RESEARCH GROUP

# HOW LLMs REVEAL Hidden Patterns IN CITATION NETWORKS

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## Flipping Citation Networks Inside Out



At the core of the feature network (geometric, betweenness, top-degree):

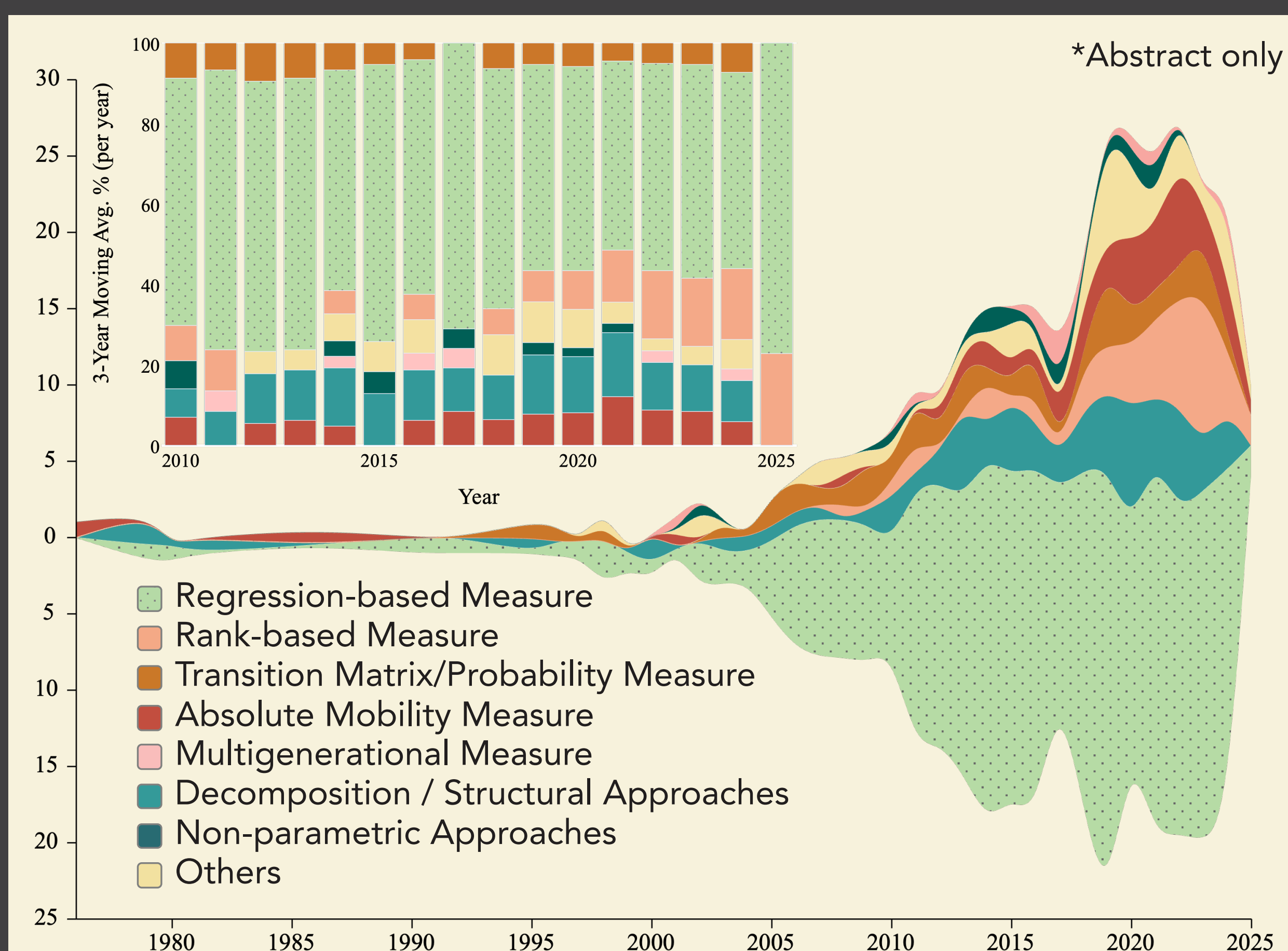
- Regression-based Measures
- Intergenerational Wealth Mobility and Inheritance
- Empirical Estimates and Determinants

### LLM-powered Labeling:

Filtering and detecting the core characteristics of desired papers

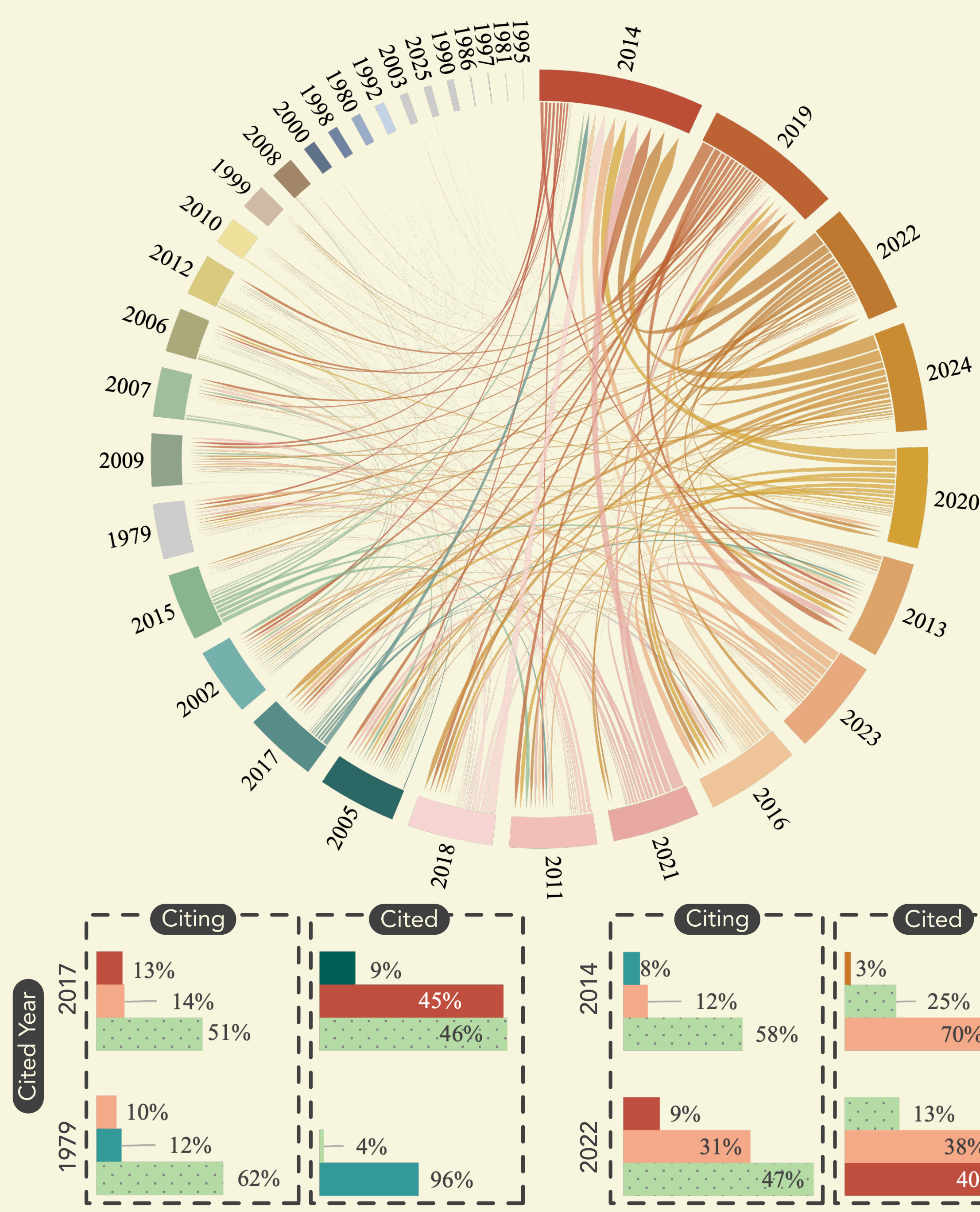
## Use Case

Are there methodological (r)evolutions in studying {wealth/income/earning} mobility ?



**Fig 1.** The stream graph shows the absolute counts of each measure present in the papers. The rolling averages in the bar chart is calculated by accounting for the two previous years in order to observe a smoothed trend. Overall, regression-based measures are the dominant wealth mobility measure.

Are the measures employed in highly cited papers actually influential ?

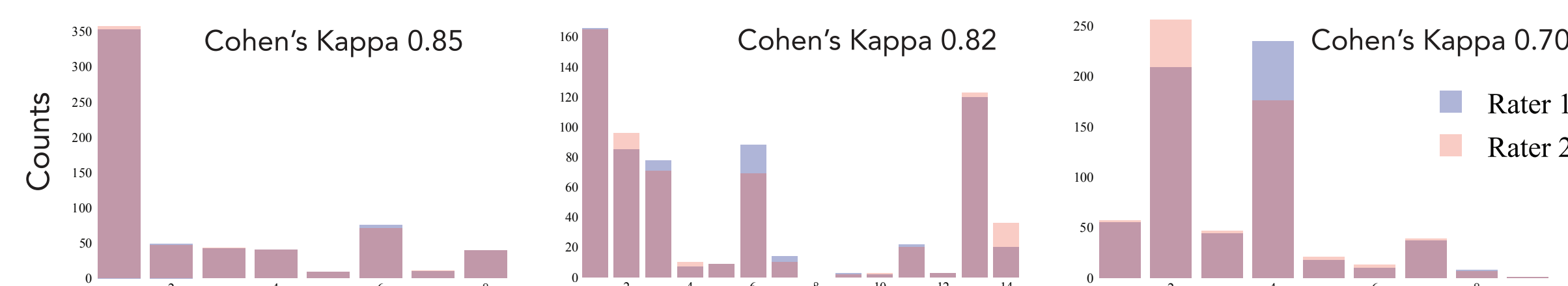


**Fig 2.** Citation behavior between years of the publications is shown in the chord diagram. The bar graphs compare the methods used by the cited and citing papers in the years when the cited papers were published. These four years are the only ones showing a large contrast between the citing and cited papers. The same color scheme is used as Fig1.

## Consistency?

Measures > Data Types > Research Question Types

e.g., Assignment of categories:



## Takeaway Points

- LLM-powered citation networks (knowledge graphs) can help uncover hidden patterns in a research topic/field. e.g., The prevalence of measures used in the papers.
- Some categorization tasks done by LLMs—especially at higher conceptual levels like Research Question > Data > Method—can be fuzzy, leading to inconsistencies. Still, the labels are generally accurate enough to identify (ir)relevant papers for the research question at hand.
- We are currently expanding this knowledge graph and look forward to uncovering new insights.