


# MA4M4: Bow-tie Decomposition of Vaccination Views in Social Media

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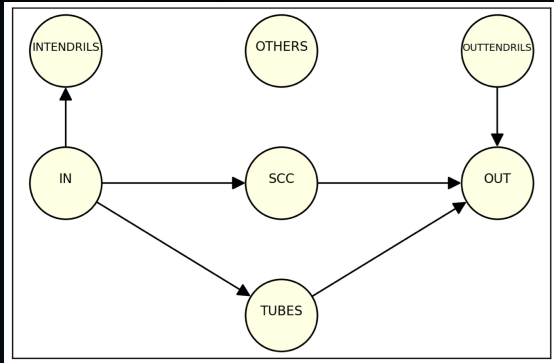
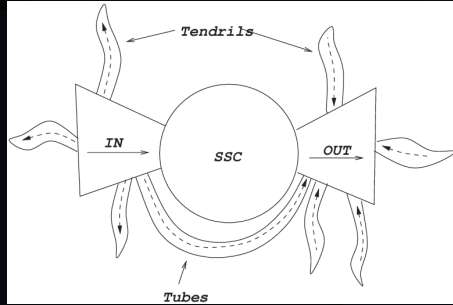
# Presentation Structure

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- Introduction of Bow-tie Structure
- Algorithm for Bow-tie Decomposition
- Evaluation of Bow-tie Component
- Data Background and Analysis
- Summary and Limitations

# Introduction of Bow-tie Structure

## What is bow-tie structure?



## Why interesting?

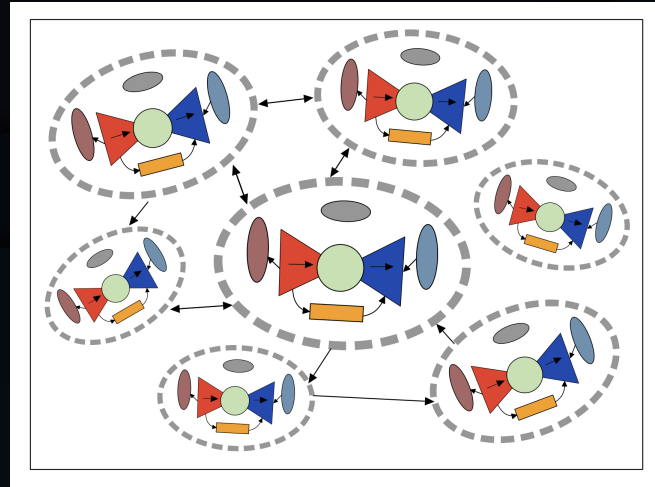
- Provide a systematic understanding of behaviour ecology
- IN - Listeners, OUT - Producers, SCC - Broadcast
- Large OUT:
  - more democratic, open to information
  - active in producing new content
  - prone to misinformation

### Large SCC:

- messages keep being repeat
- trap people inside an information bubble

# Algorithm for Bow-tie Decomposition

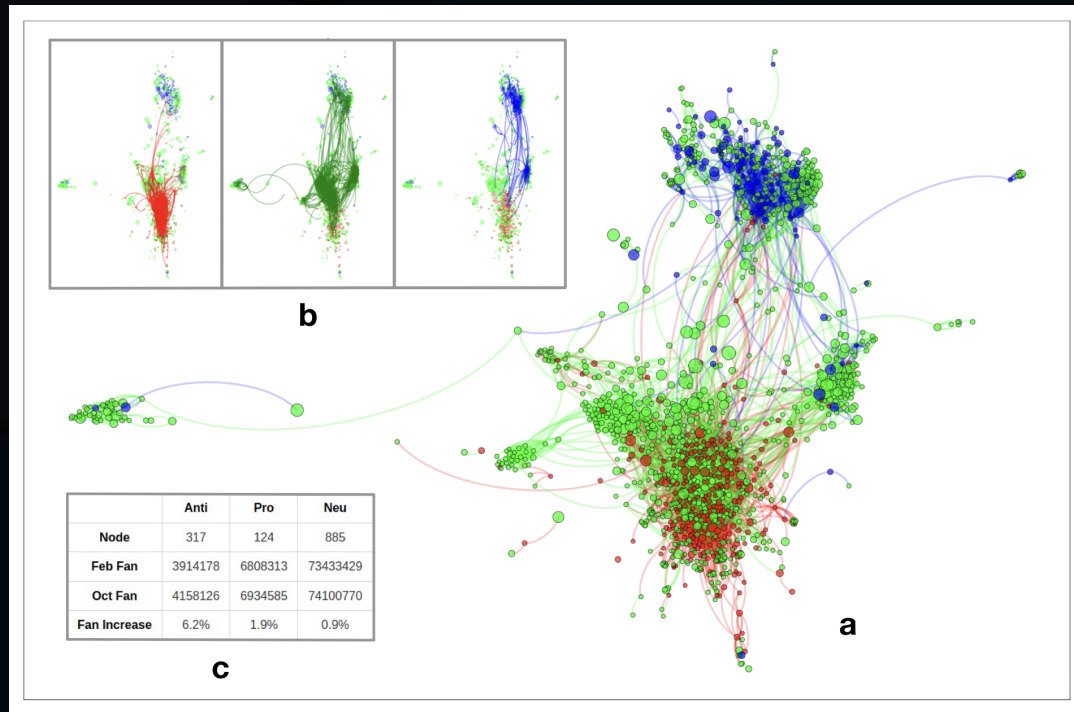
- Primitive bow-tie detection algorithm is provided by Yang in 2011.
- Current recursive bow-tie decomposition relies on either different choices of SCC or community detection.



# Evaluation of Bow-tie Component

- Empirical Criterion
- Statistical Significance
  - Presence of some large bow-tie component simply results from degree distribution rather than their initiative?
  - Benchmark: Newman's directed configuration model

# Data Background

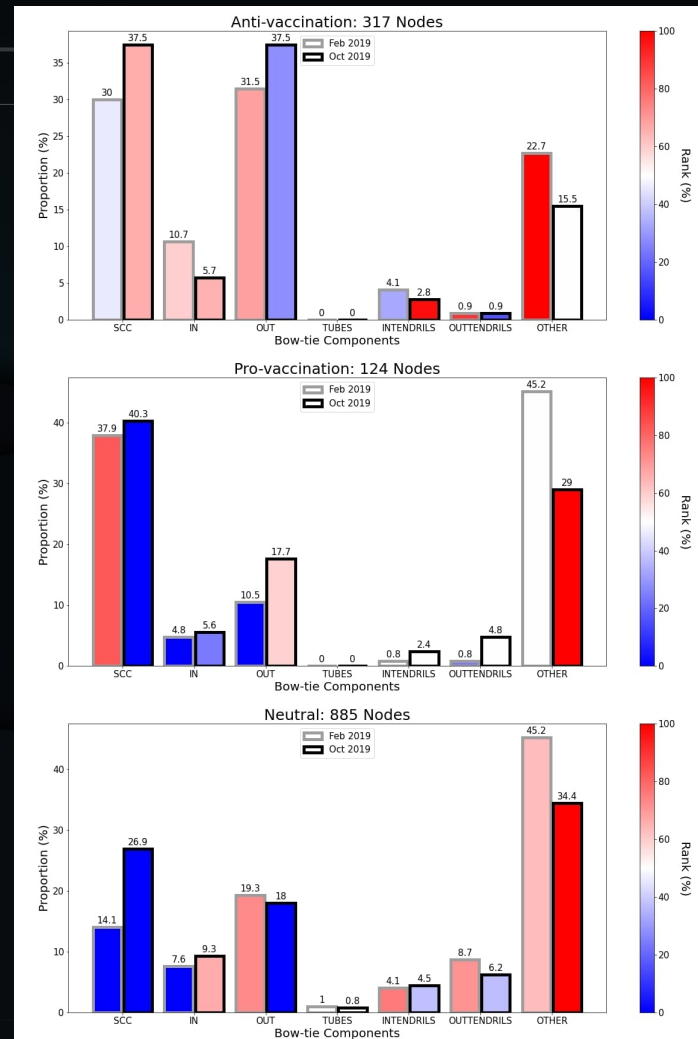


## Data

- Node: Facebook page with polarity
- Edge:  $A \rightarrow B$  means A recommends B to all its members at the page level

# Data Analysis

- Multi-scale Bow-tie Decomposition
- Analysis based on vaccine view groups
  - Anti: SCC and OUT dominate
    - active in content production + quick message transmission
  - Pro: Large SCC and small OUT
    - mostly repeat content
    - information bubble
  - Neu: OTHER statistically dominates
    - less involved in vaccine topic



# Summary and Limitations

## Summary

- Organize a systematic framework for analysis based on bow-tie decomposition
- Explain its application in an online social network, particularly about information bubble effect

## Limitations

- Newman's directed configuration model is used without checking its robustness
- Part of our real-life interpretations in bow-tie component currently has no empirical evidence to support