Homophily vs. Friendship Hypergamy:

An Agent-Based Model

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HOW DOES SES AFFECT FRIENDSHIP PREFERENCES OF SCHOOL CHILDREN?

Motivation

- Having a higher-SES friend in school positively affects educational outcomes [1] and adult income of (especially lowest-SES) [2] children;
- But there is not enough research on influence of SES on friendship preferences [3];
- The few existing studies employ different theoretical models and operationalizations of SES [3];
- Many researchers employ logic used for studying ethnicity and friendships, which might not adequately fit the unique inequality structure of SES [3].

[1] Carolan & Lardier Jr. 2018; Cherng et al. 2013; Crosnoe & Muller 2014
[2] Gurzo et al. 2024
[3] McPherson et al. 2001; Malacarne 2017; Chabot 2024

Existing Approaches: Homophily

- Homophily is the approach used in most studies on the effect of SES on friendship preferences;
- The results of the studies are conflicting, ranging from finding strong homophily to no homophily at all [4], sometimes within the same study using the exact same measurements [5];
- The latter studies suggested, but did not test* potential reasons for such conflicting results.
- Even though homophily is theorized to apply to many social characteristics [6], some studies note it might take on a different form or not be the main mechanism when it comes to SES

[4] McPherson et al. 2001; Smith, Maas, and van Tubergen 2014; Malacarne 2017
[5] Chabot 2021; Zwier & Geven 2023
[6] McPherson et al. 2001
[7] Malacarne 2017; Chabot 2024
* Zwier & Geven (2023) tested restrictedness of school choice, no effect found

Friendship Hypergamy

- SES is hierarchical in nature: while similarity by ethnicity can be seen as a binary (same or different), similarity by SES is a scale, whether it is seen as education, income, occupational prestige or a combination of them;
- Higher-SES students have more friends and are nominated as friends more often [8], making clear that homophily is not the only preference mechanism when it comes to SES and friendship;
- At the same time, lower-SES students have less nominations and friends and at a higher risk to be isolated, being less socially capable to make and maintain friendships, being less visible in school = having much different opportunities to make friends [9]

[8] Hjalmarsson & Mood 2015, Malacarne 2017, Raabe et al. 2024
[9] Raabe et al. 2024

Friendship Hypergamy

- Hypergamy is usually used for behavior on marriage markets when one prefers to “marry up”, so marry someone of a higher status;
- No research has used this term for friendship preferences so far; but I will, in the following sense:

Friendship hypergamy is a mechanism of friendship selection where one sees those with a higher social status as more attractive people to be friends with.
Higher SES = more attractive as potential friend.

Conclusion

- The few existing studies employ different theoretical models and operationalizations of SES (Chabot 2024), and since their results are contradicting, we do not have a clear picture of how SES is reproduced through friendship preferences in school, nor how we can best help lower-SES children achieve upwards social mobility;
- Homophily as the main mechanism of friendship preference does not seem sufficient, at least in case of SES;
- More theory-building work is needed, hopefully leading to better models of friendship selection and further - to better models of inequality reproduction.

Model Idea

- Homophily and Hypergamy are two friendship preference mechanisms, employed by students simultaneously;
- They can be employed to a different extent: some classrooms will lean towards homophily, others - hypergamy;
- Some SES-specific factors mediate SES to an extent, like hobbies/ extracurricular activities, capacity to make and maintain friendships;
- Network effects, namely transitivity, also affect friendship formation.

To unite the existing research into a theoretical frame, I will use an **agent-based model** calibrated on existing research.

THE MODEL

Agents: School Children. They Have:

SES

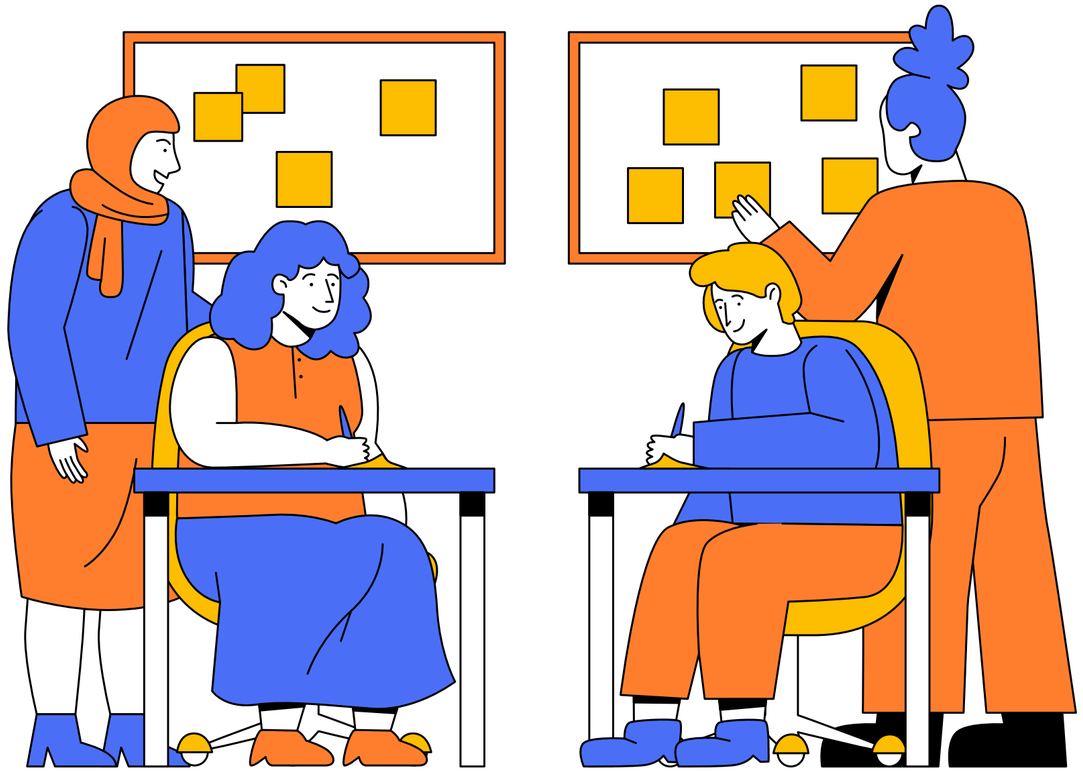
A range of discrete numbers, e.g. from 1 to 6; SES categories, ordered

HOBBIES

A range of numbers; ordinal (e.g. hobby 1 and 2 are more similar than hobbies 1 and 6); some hobbies are available to all, some - only to high SES

GENDER

Binary: girls and boys



They Can:

MAKE TIES

KEEP TIES

BREAK OFF TIES

MODEL FLOW

Send out tie requests

Agents send out tie requests to everyone they like = whose utility exceeds their **threshold**

Receive tie requests

Every agent gets a list of people who sent them a tie request

Accept/ignore tie requests

Agents accept **reciprocated** tie requests (seeing whether the incoming tie comes from an agent who got sent a tie request from them in the previous step)

Check existing ties

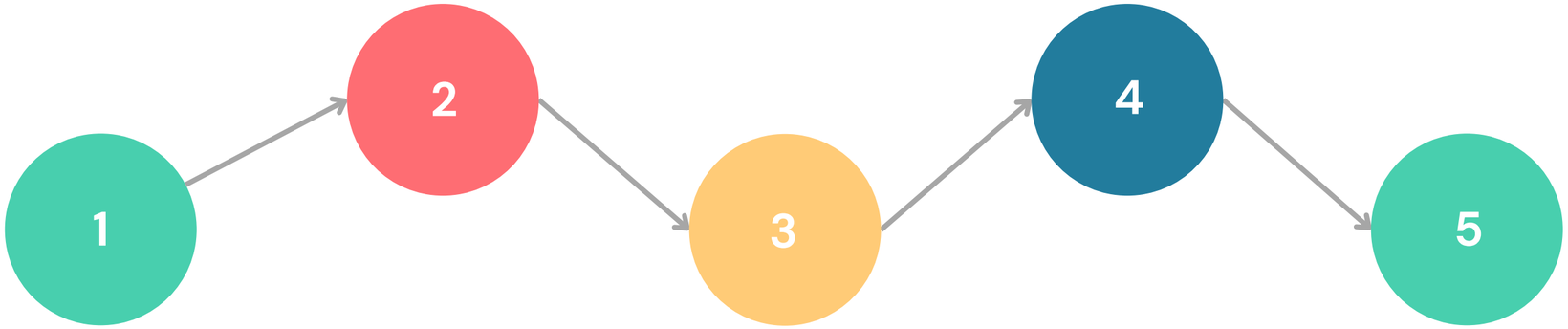
Agents check if they now have too many friends. If yes, they are **burdened** by too many friends; they find friends with lowest utility and see if their **utility** *minus* **burden** is still higher than the threshold

Losing/ keeping ties

If a tie utility *minus* extra friend burden is still higher than the threshold, the tie is kept, and the agent now has more friends than their maximum. If it's lower than the threshold, this tie is lost

Burden of too many friends

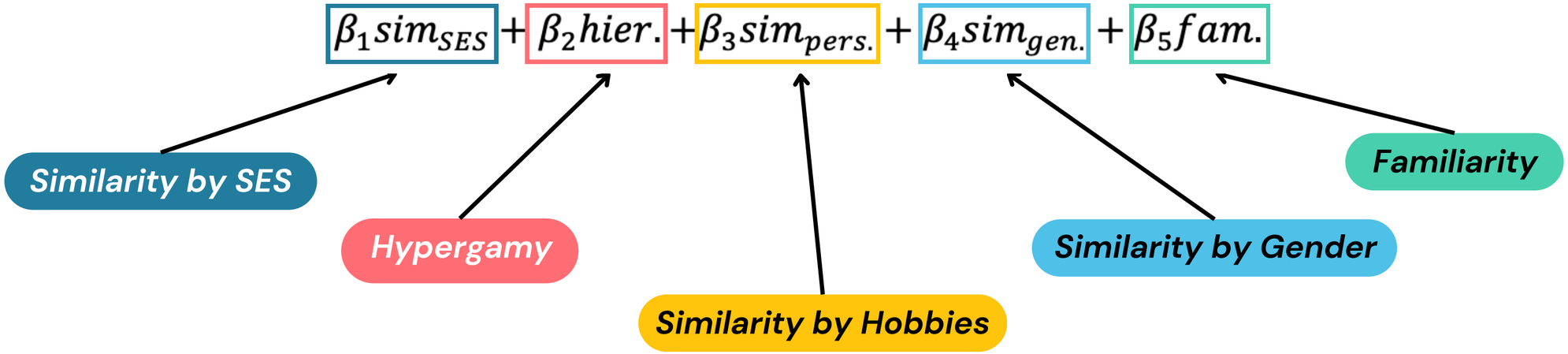
Every friend over the maximum of friends brings an additional burden. Sometimes a friendship is worth this burden and is kept, exceeding the maximum of friends.



Miro link

The Utility Function & Threshold

- A formula that agents use to decide the utility of existing or potential friendhsip:



Agents: School Children. They Have:

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A range of numbers; ordinal (e.g. hobby 1 and 2 are more similar than hobbies 1 and 6); some hobbies are available to all, some - only to high SES. **Correlated with SES**

GENDER

Binary: girls and boys

MAX. N OF FRIENDS

Correlated with SES: higher SES = higher maximum friends

BURDEN OF TOO MANY FRIENDS

Every friend over the maximum of friends brings an additional burden.

FAMILIARITY

How well agents know each other. Increases while a tie exists; decreases when it is absent

+

Effects of similarity in all factors; how important friendhsip hypergamy is for friendship formation

+ Transitivity

PRELIMINARY RESULTS

Simulated Networks: Setup

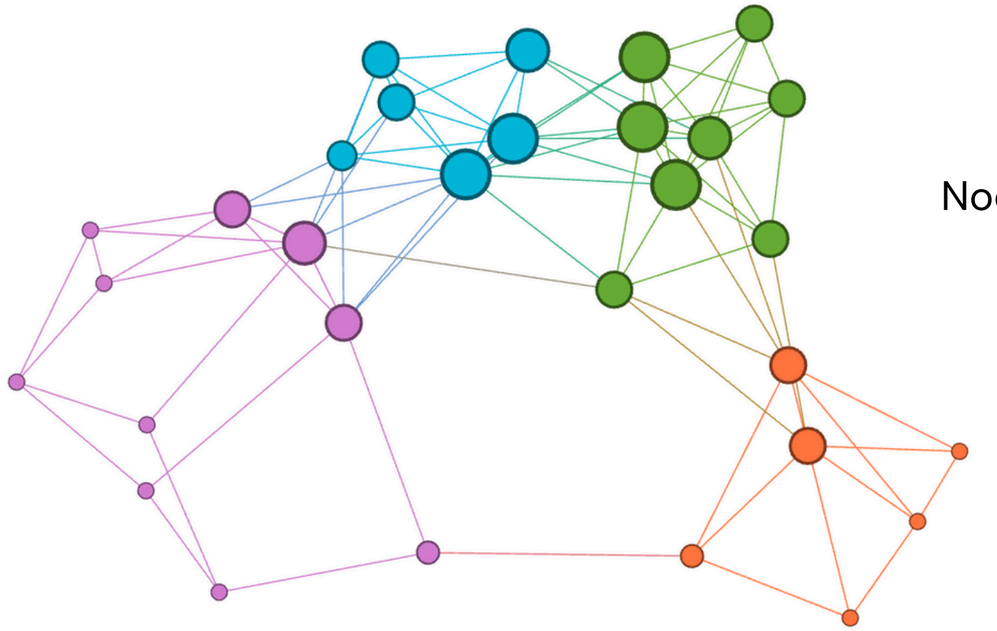
10 networks at 4 different settings:

1. Homophily only
2. Homophily + Hypergamy, evenly present
3. Hypergamy + to a lesser extent, Homophily
4. Hypergamy only

Average degree is kept around 6,05 (the average number of friends nominated by youth in network studies, Neal 2025);
For that purpose, in "Hypergamy only" setting the friendship threshold is set lower than in all others!

Analysis

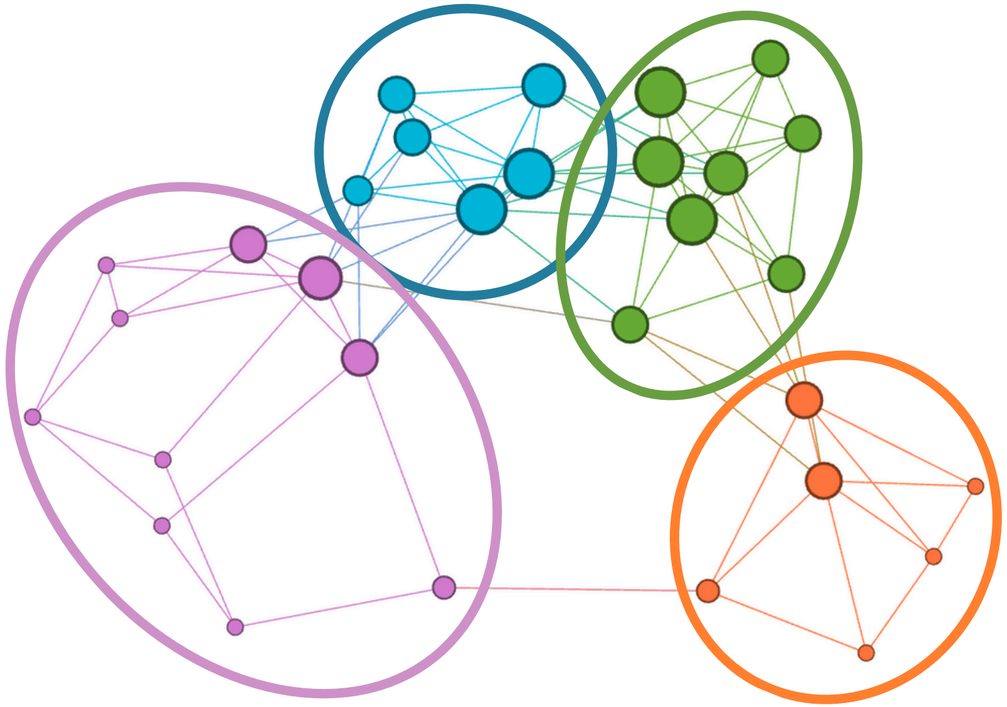
Louvain method of community detection:



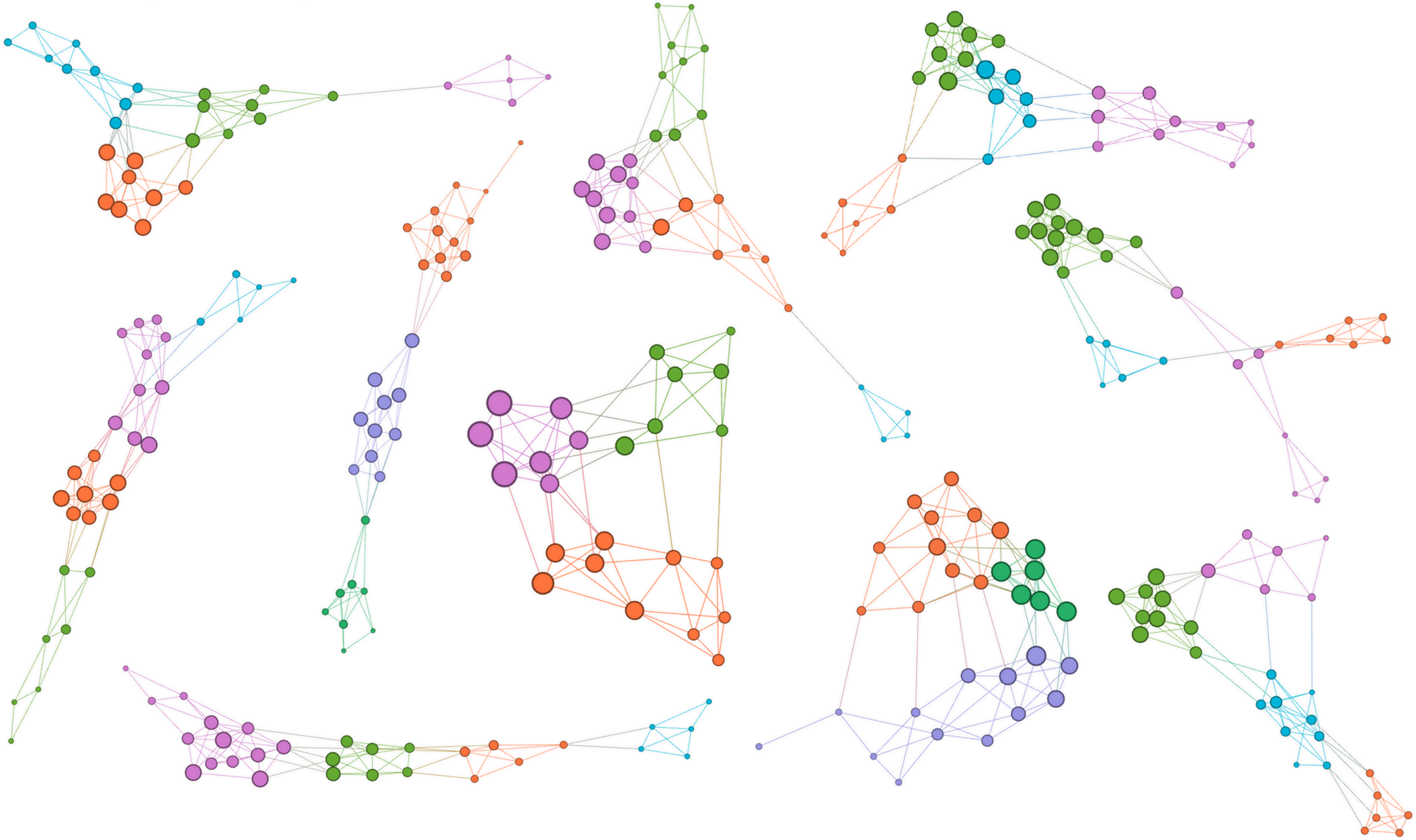
Node Size = SES
Node Color = assigned community

Analysis

Louvain method of community detection:

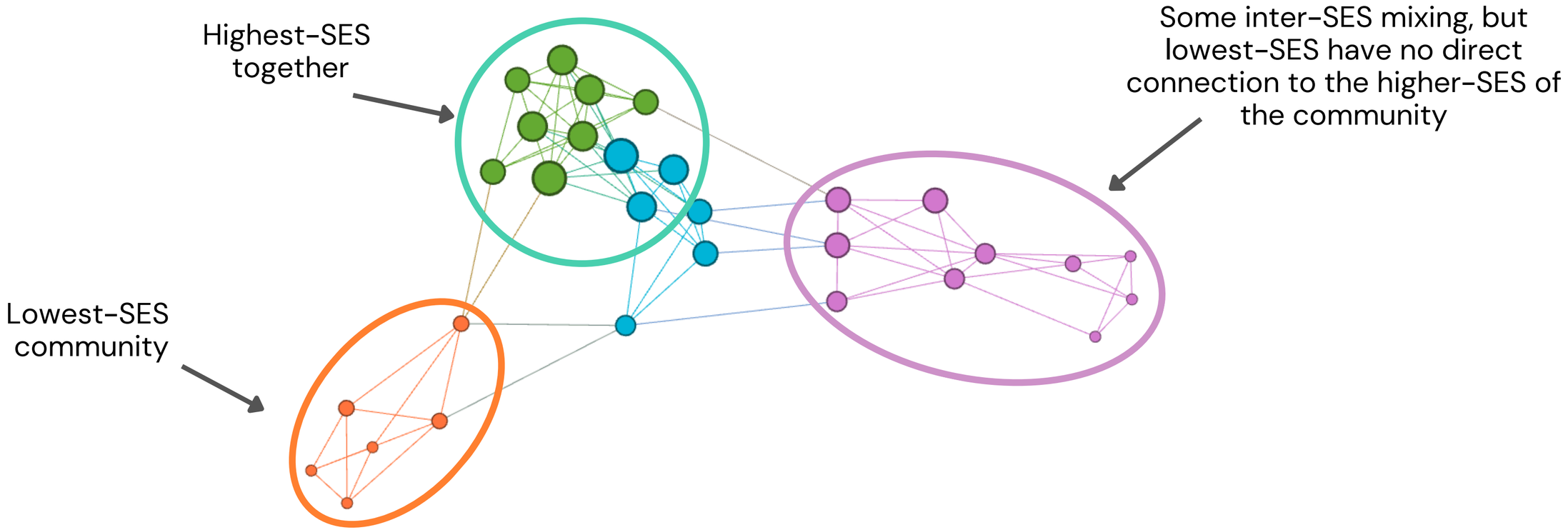


1.Homophily

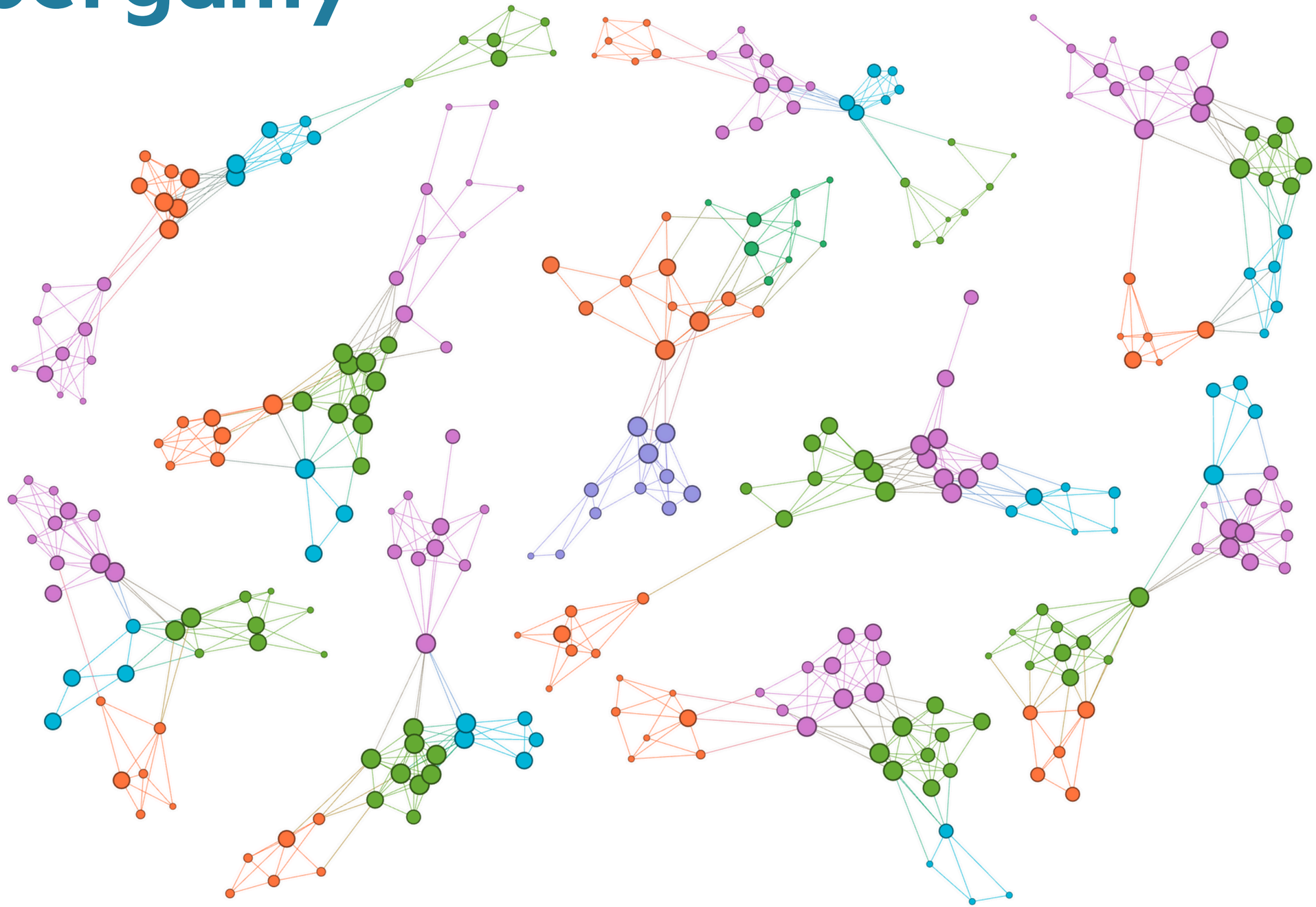


1.Homophily

- High-SES nodes together in 1-2 communities (2 because of gender divide)
- Lower-SES nodes are consistently on the outskirts, in their own communities

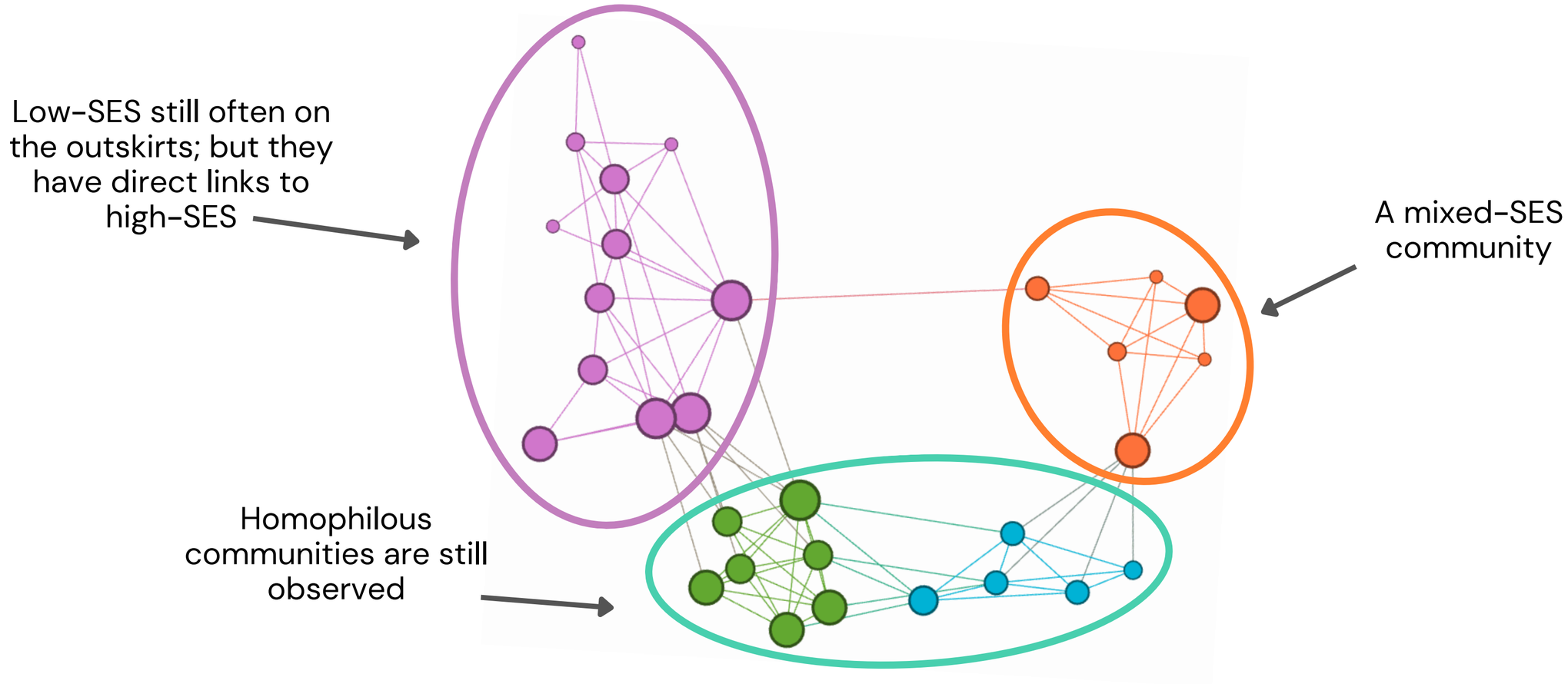


4. Hypergamy

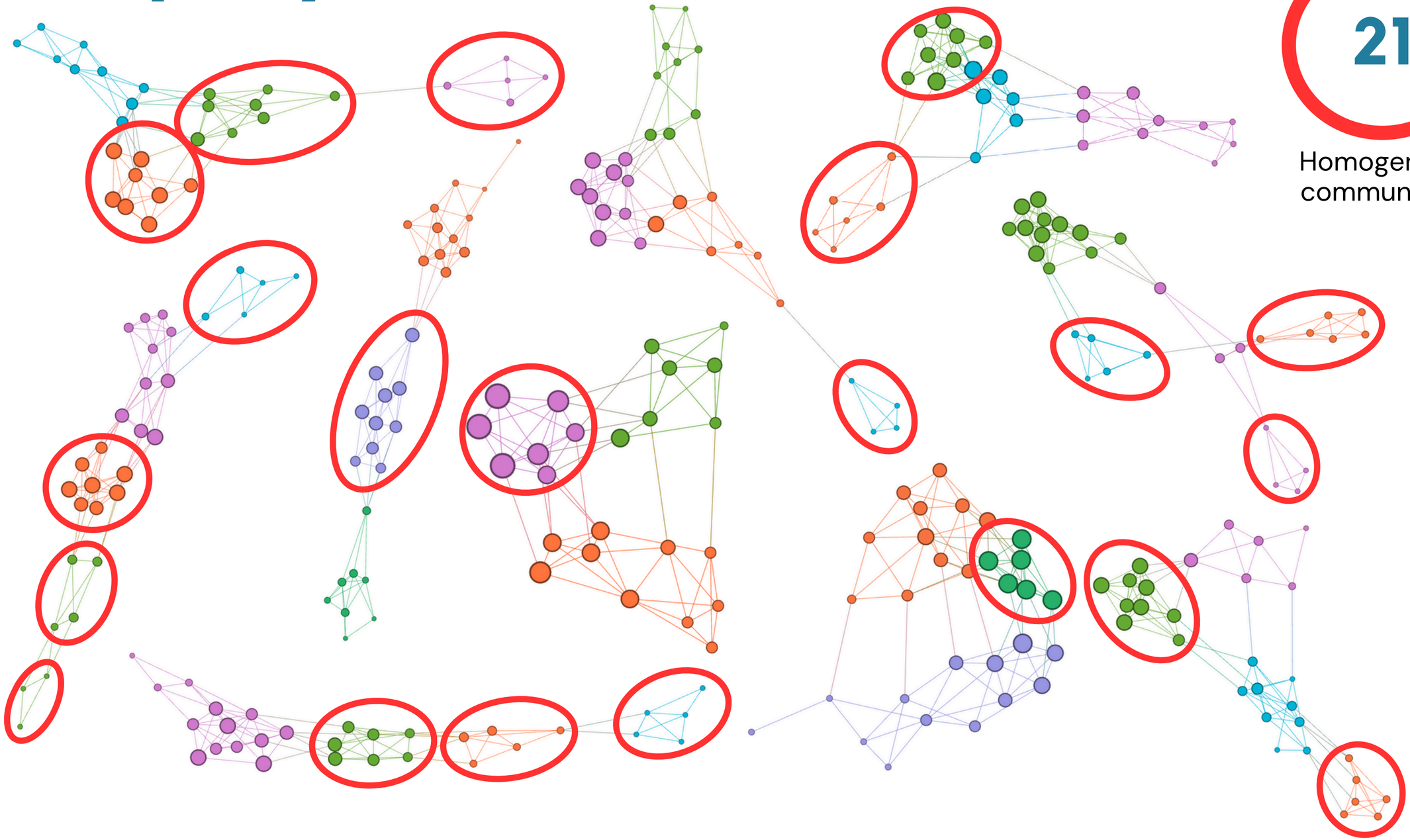


4. Hypergamy

- Much more communities include nodes of diverse SES;
- Lower-SES nodes are not always isolated, often have direct links to high-SES nodes



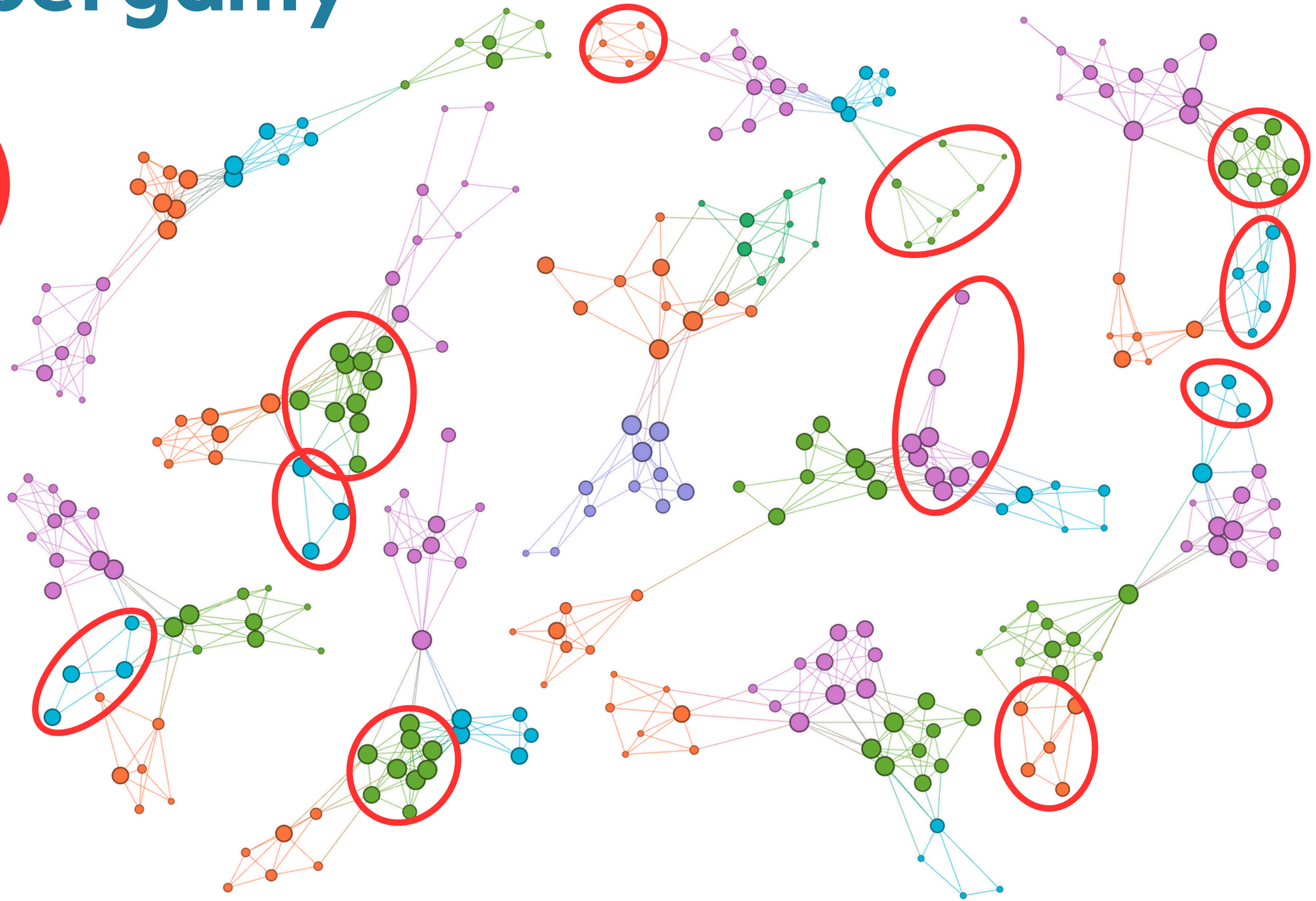
1.Homophily



4. Hypergamy

11

Homogenous communities



Conclusion

- Preliminary analysis shows that Hypergamy leads to substantially different networks in terms of inter-SES mixing than Homophily;
- The communities in simulated Hypergamous classrooms are more diverse by SES than Homophilous ones;
- Which implies that inter-SES ties are more common in a Hypergamous setting;

-> But! There is an implication of higher inequality in popularity through high-SES students being perceived as more attractive potential friends;

- Hypergamous friendship preferences lead to less dense networks; in presented networks in hypergamy setting, agents must have lower friendship standards in order to reach the desired average degree.

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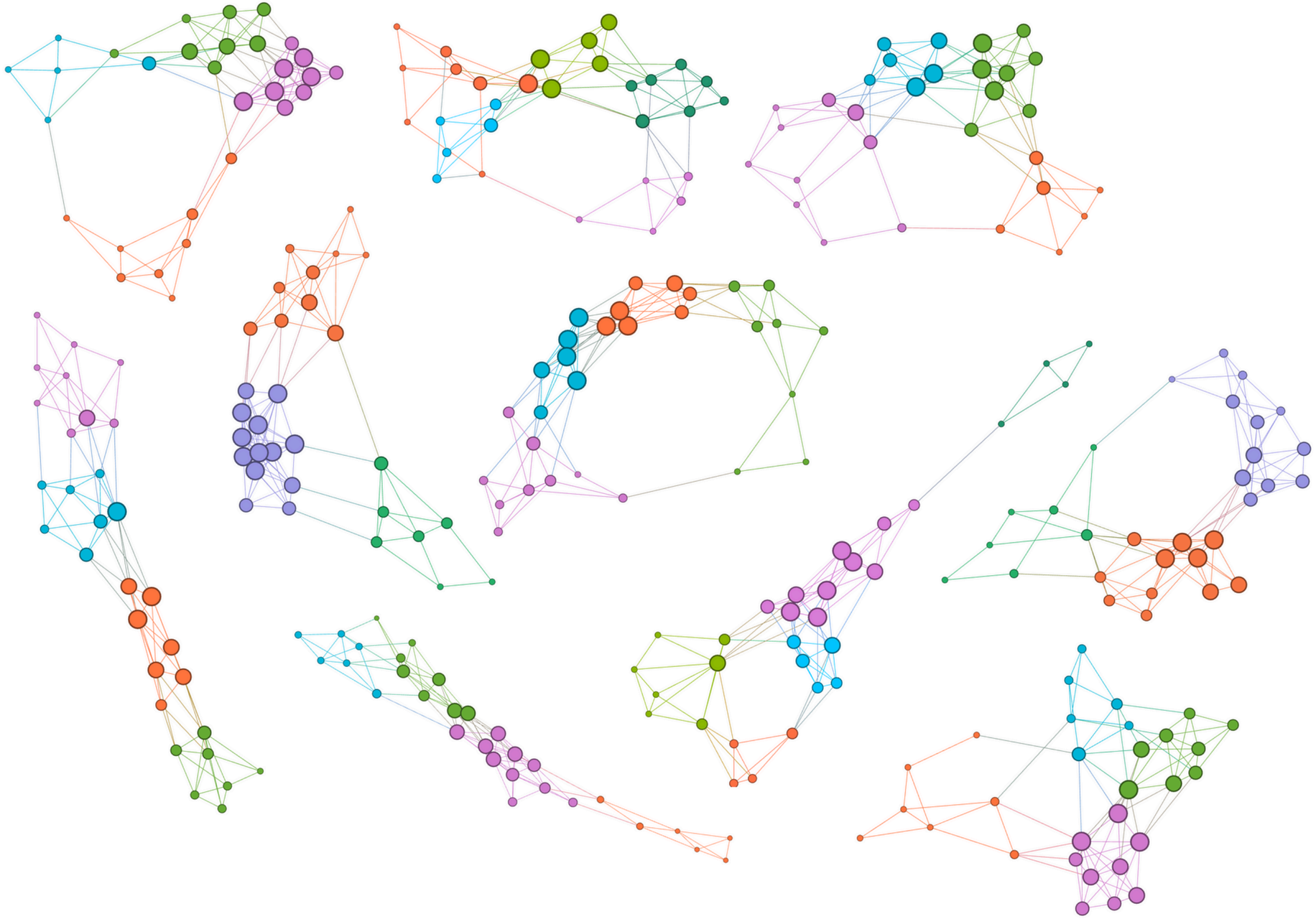
THANK YOU!

2. Homophily + Hypergamy, equal



3. Hypergamy + little Homophily