

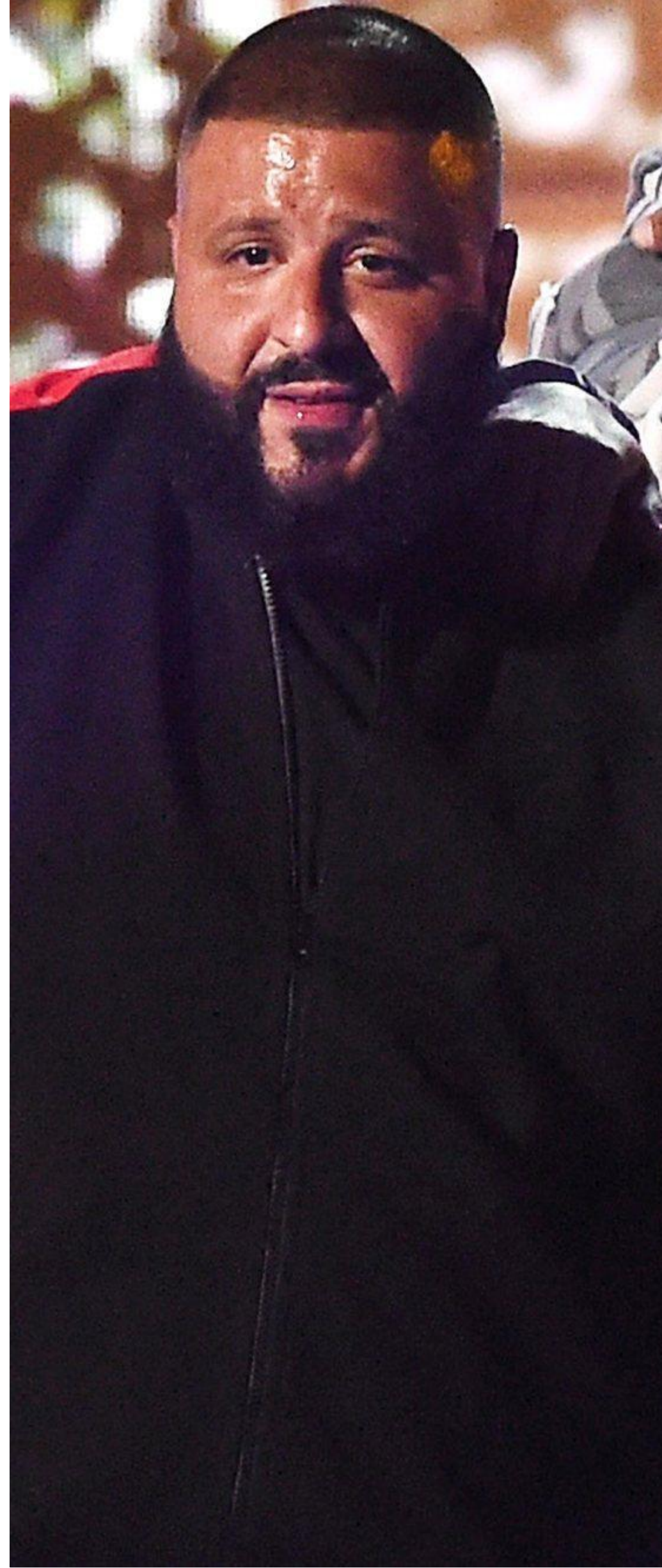


COLLABORATION PROFILES AND THEIR IMPACT ON MUSICAL SUCCESS

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DJ KHALED

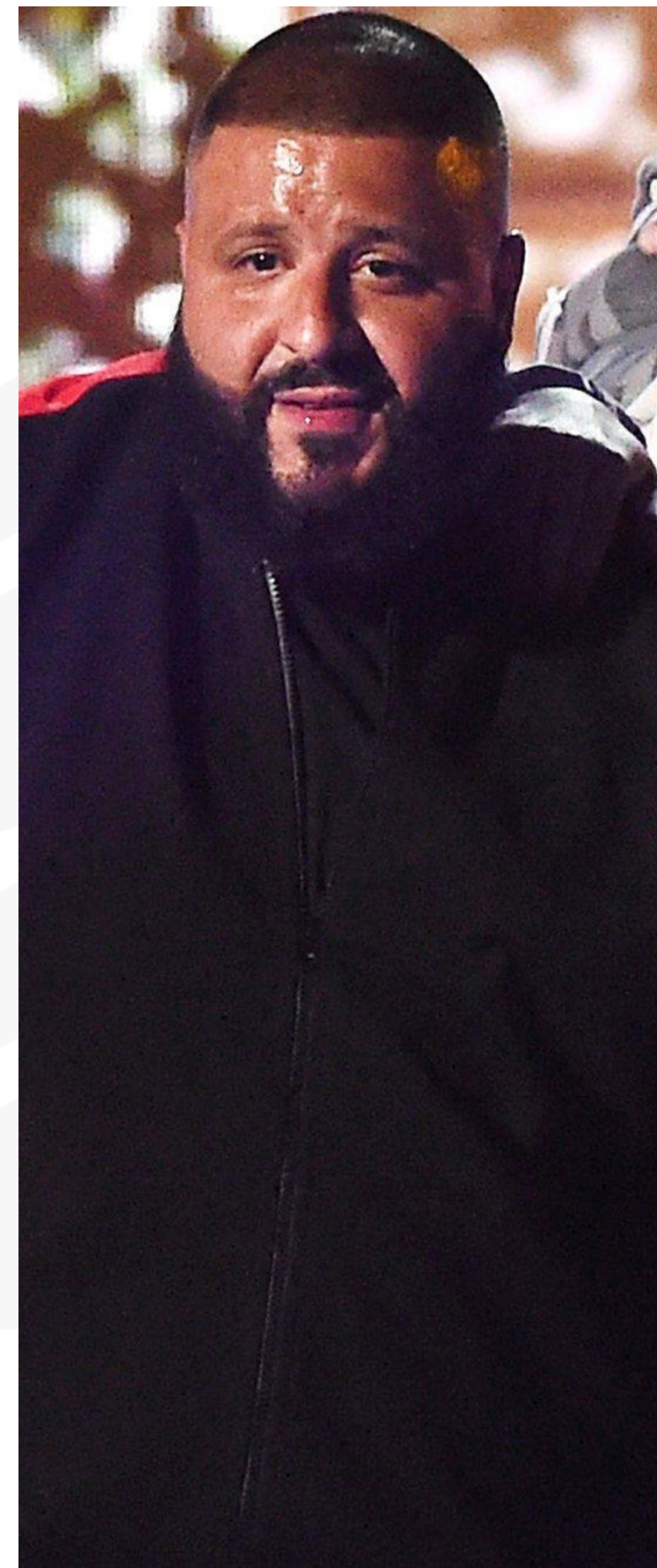
- American hip-hop producer and one of the most successful hip-hop artists in the world
- In just over a decade, Khaled has accumulated 24 hits on the Billboard Hot 100, all of them collaborating with famous artists*

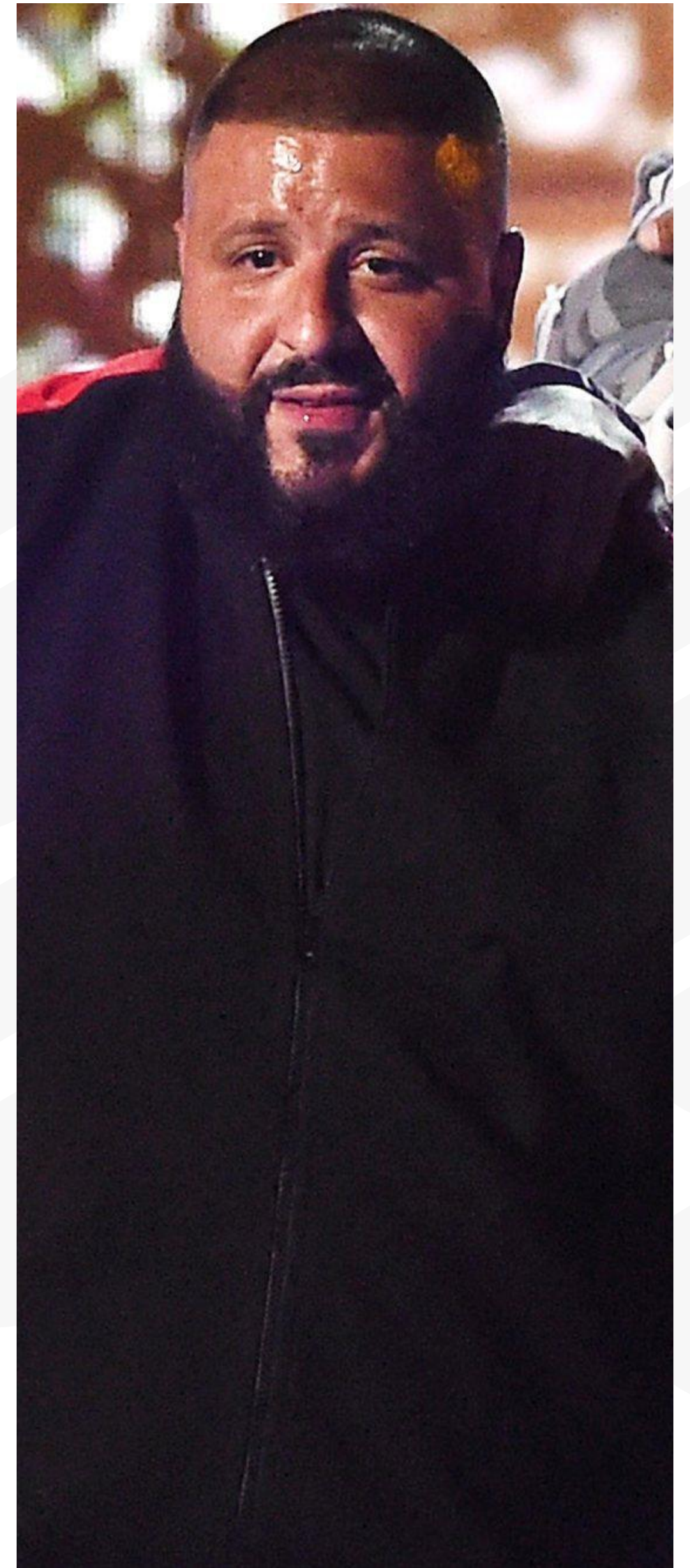


DEMI LOVATO



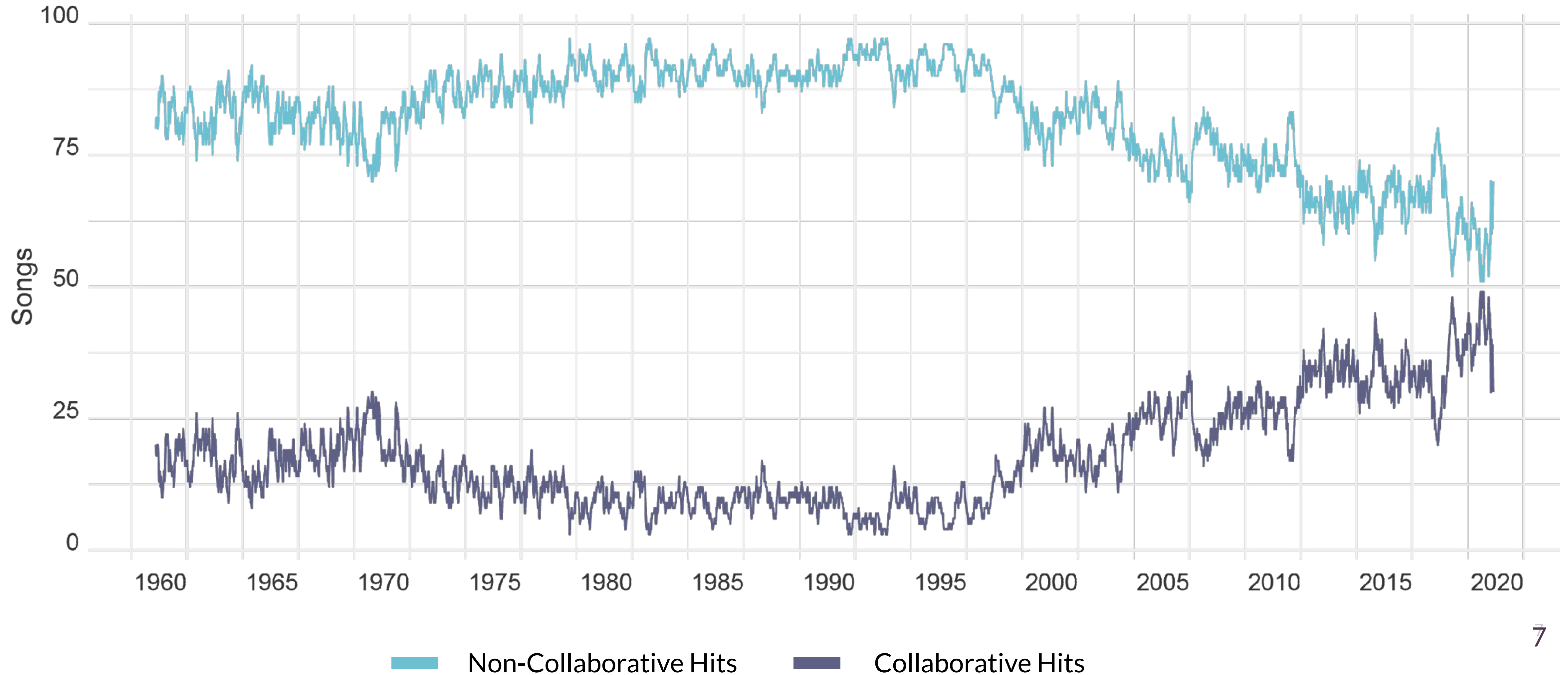
JUSTIN BIEBER





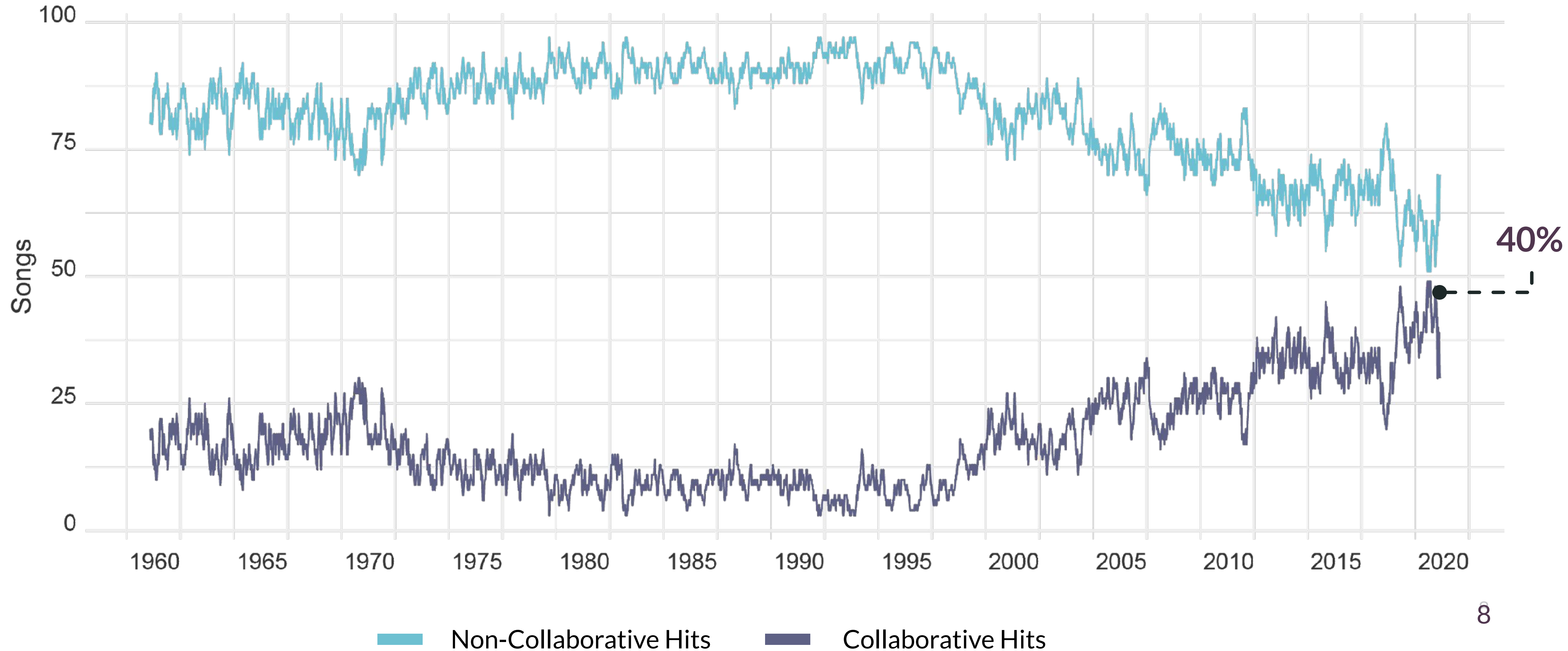
KHALED'S METHOD IS NOT INNOVATIVE

Billboard Hot 100 songs (1958 – 2018)

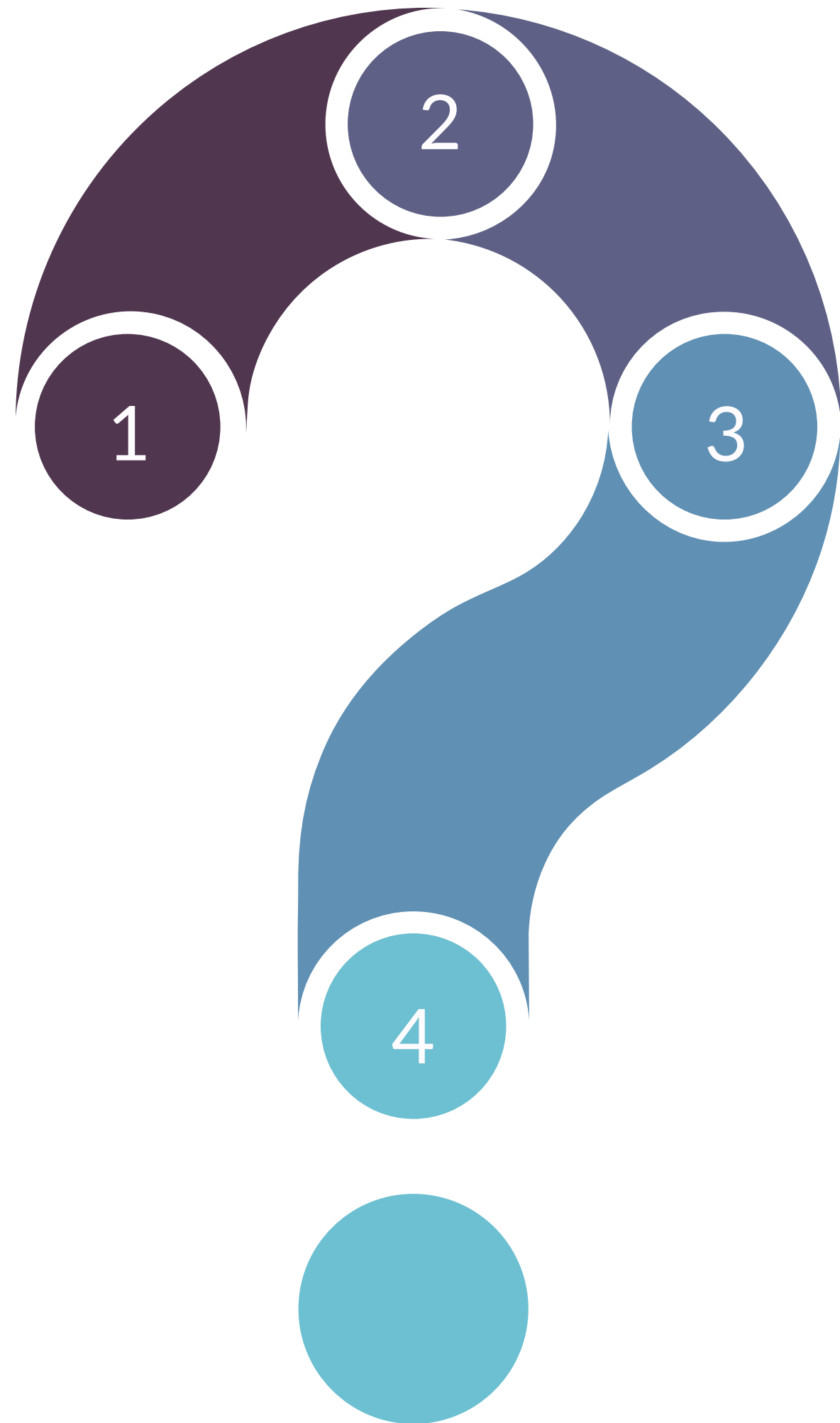


KHALED'S METHOD IS NOT INNOVATIVE

Billboard Hot 100 songs (1958 – 2018)



CAN COLLABORATION LEAD TO SUCCESS?



- 1 DJ Khaled is often criticized for the merits of his collaborative music with acclaimed artists
- 2 There is still controversy about the optimal structure and relative benefits of collaboration
- 3 The factors that lead to the success of a collaborative process are not entirely understood
- 4 While talent and status attract social connections, the researchers ignore that social networks can independently promote success

OUR PROPOSAL

An initial study to analyze and identify music collaboration profiles in a musical success-based network

OUR CONTRIBUTIONS

- 1 Detect communities and their respective **patterns of network collaboration**
- 2 Analyze the **impact** of these profiles on successful musical artists
- 3 Define four main categories of collaboration profiles: **Interaction, Distance, Influence** and **Similarity**
- 4 Perform evaluations: first three affect musical success more intensely than **Similarity**
- There are **distinct success factors** for music collaboration profiles that are socially measurable
- There are **common factors** to successful collaboration in the music market

METHODOLOGY



DATA COLLECTION



SN MODELLING



COLLABORATION
PROFILES



STATISTICAL
ANALYSIS

METHODOLOGY



DATA COLLECTION



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COLLABORATION
PROFILES



STATISTICAL
ANALYSIS

BILLBOARD

- Artist 100 Billboard (2014 – 2018)
- 211 rankings
- 21,100 → 1,135 distinct names



ARTIST 100

The week of September 1, 2018

SPOTIFY

Artists' features:

- Spotify ID
- Name
- Popularity (0 - 100)
- Number of followers
- Genres

METHODOLOGY



DATA COLLECTION



SN MODELLING



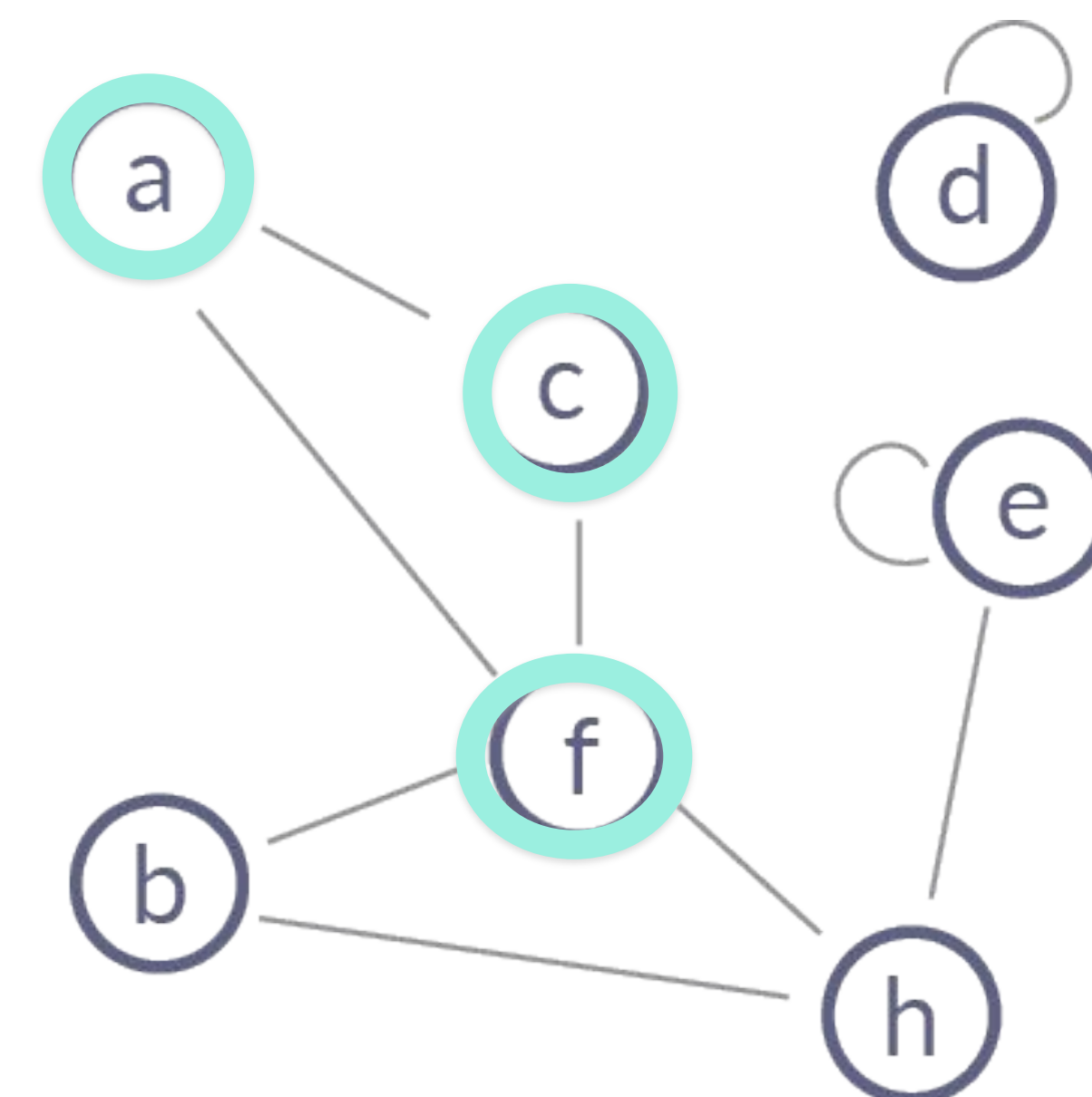
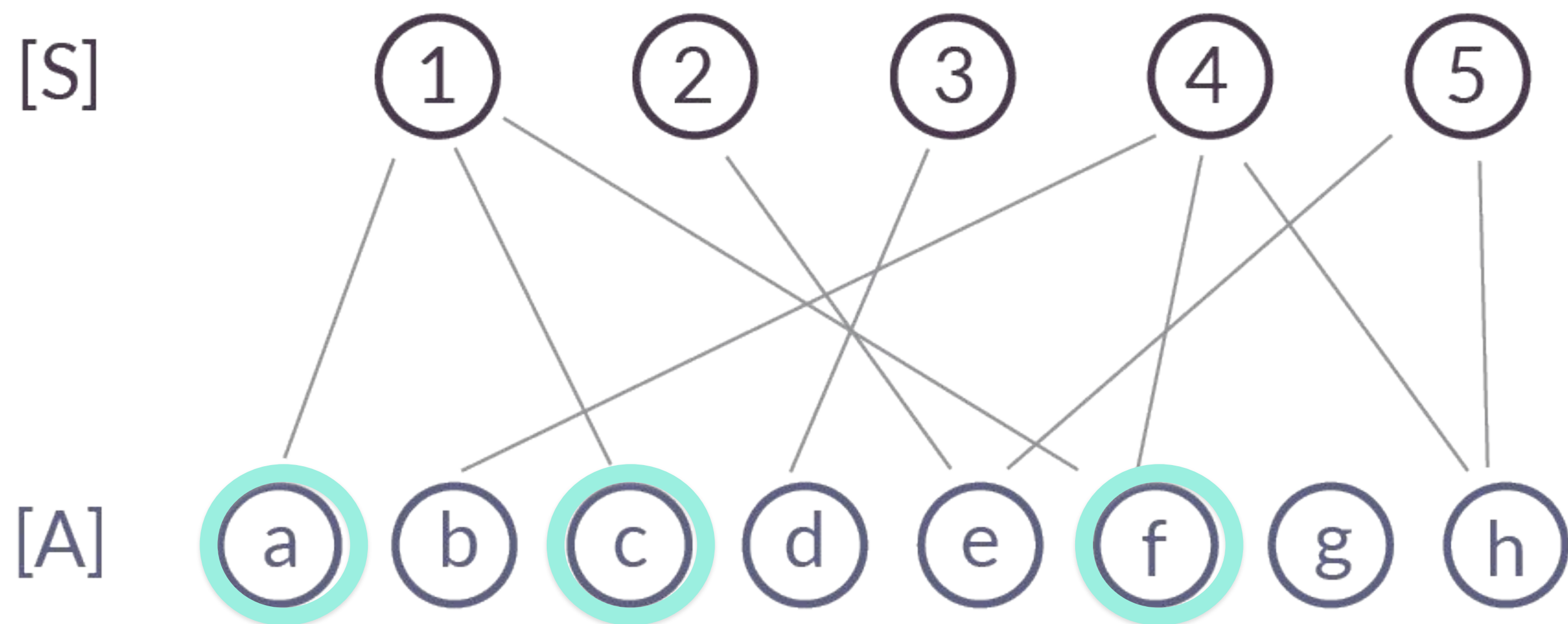
COLLABORATION
PROFILES



STATISTICAL
ANALYSIS

SOCIAL NETWORK MODELING

SINGLES



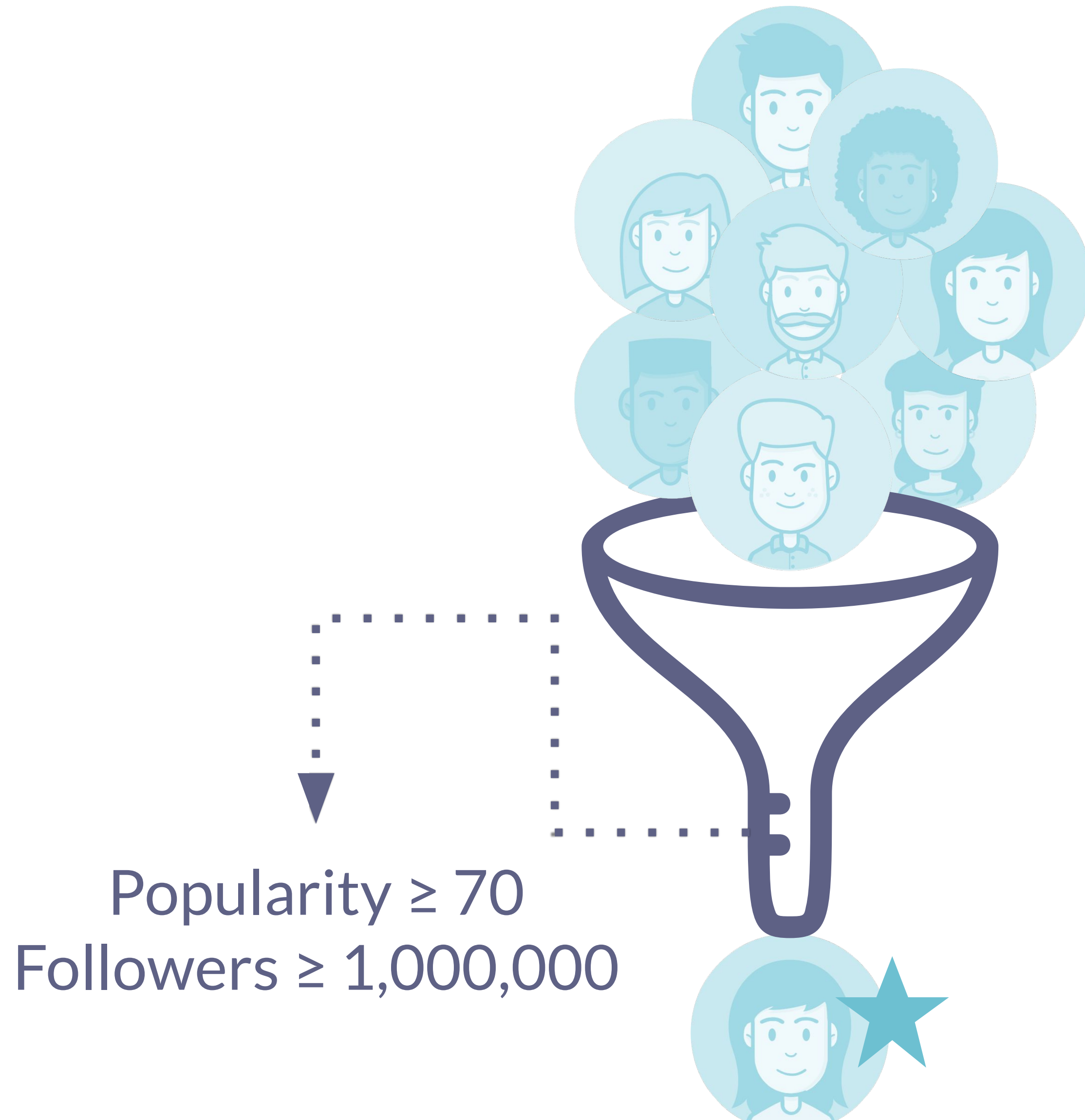
ARTISTS



A successful artist presents both
a high level of **popularity** and
a large **number of followers**”

The success S_i of an artist i is **high** if her/his popularity index $p_i \geq 70$ and number of followers $f_i \geq 1,000,000$

SUCCESS-BASED NETWORK



	ORIGINAL NETWORK	FILTERED NETWORK
# ARTISTS	2,152	354
# SINGLES	10,706	2,144
# COLLABS	5,335	922

METHODOLOGY



DATA COLLECTION



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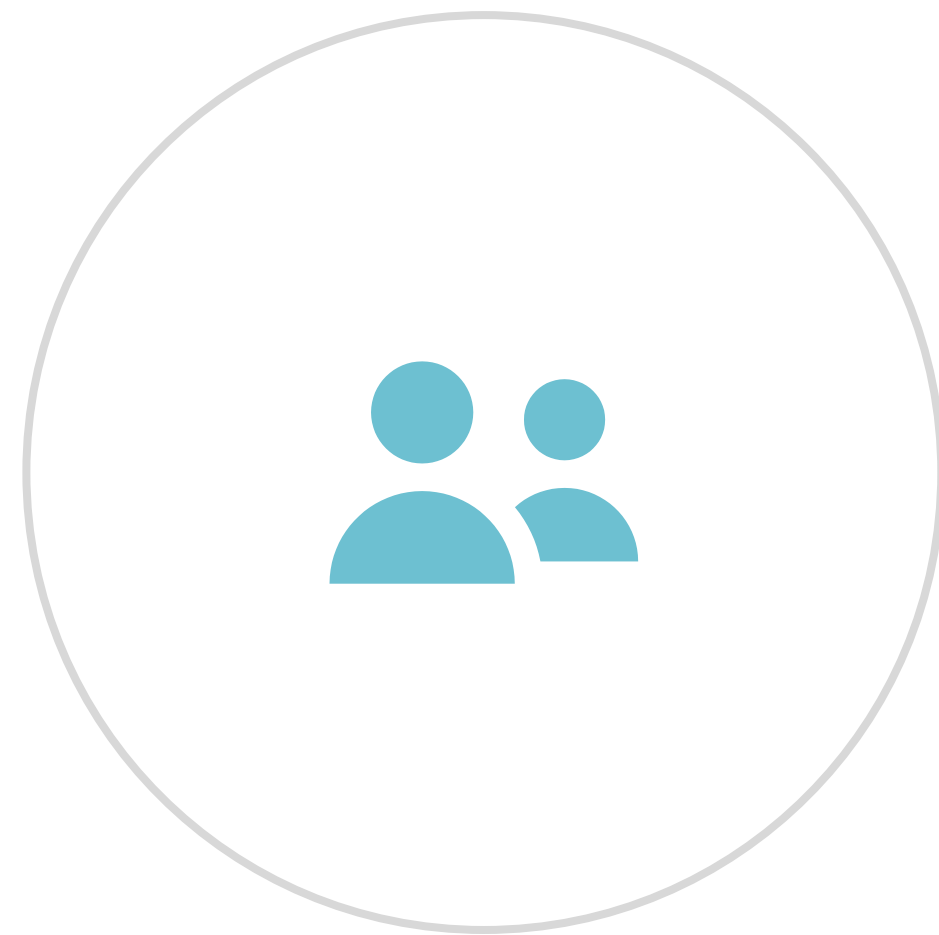


COLLABORATION
PROFILES



STATISTICAL
ANALYSIS

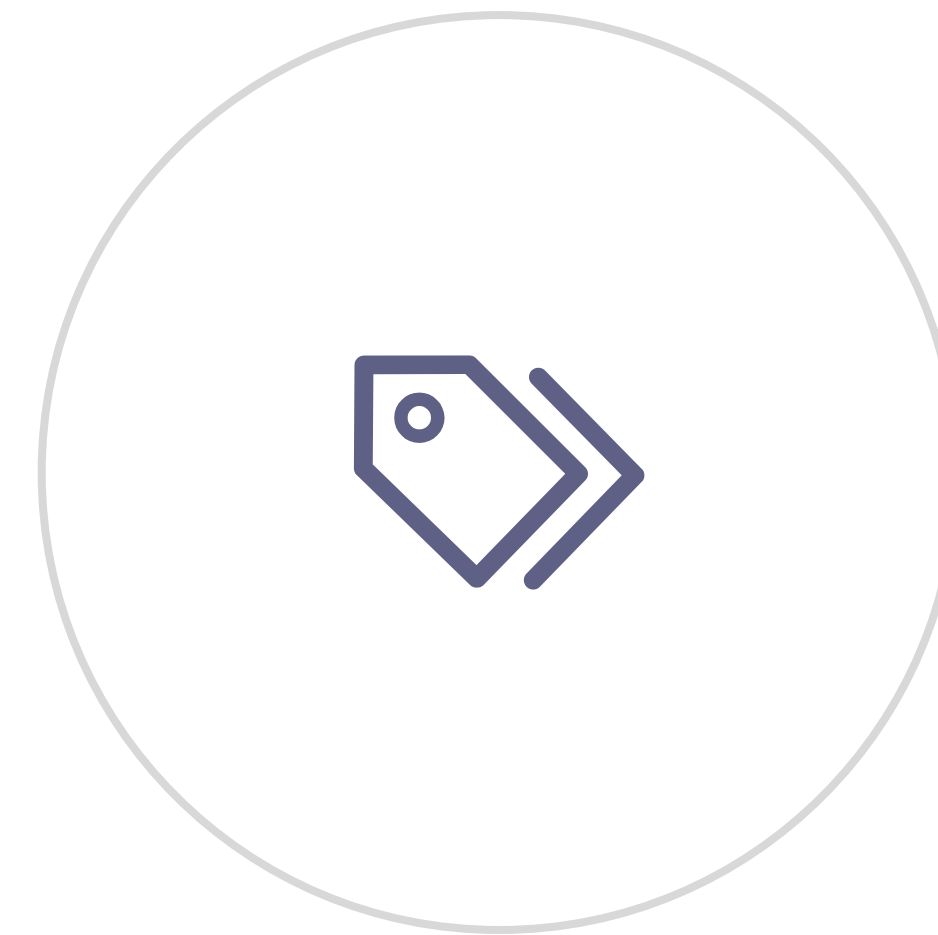
COLLABORATION PROFILES



INTERACTION



DISTANCE



SIMILARITY



INFLUENCE



INTERACTION

Based on node connectivity

Degree & Weighted Degree

↑ highly collaborative
↓ non-collaborative

Single-artist

Multi-artist



DISTANCE

Based on node proximity

Closeness & Eccentricity

↑ central nodes
↓ less central

Nearby

Distant



SIMILARITY

Clustering Coefficient

Link → musical collaboration

↑ similar connections (=)

↓ diverse connections (≠)

Inter-genre

Intra-genre



INFLUENCE

Based on network influence

Betweenness & Eigencentrality

↑ influential nodes
↓ non-influential nodes

Non-Influential

Influential



IDENTIFYING COLLABORATION PROFILES

- Calculate the topological metrics of each artist (referring to the categories)
- K-means
 - Clustering artists with similar topological features ➡ similar collaboration profiles

IDENTIFYING COLLABORATION PROFILES

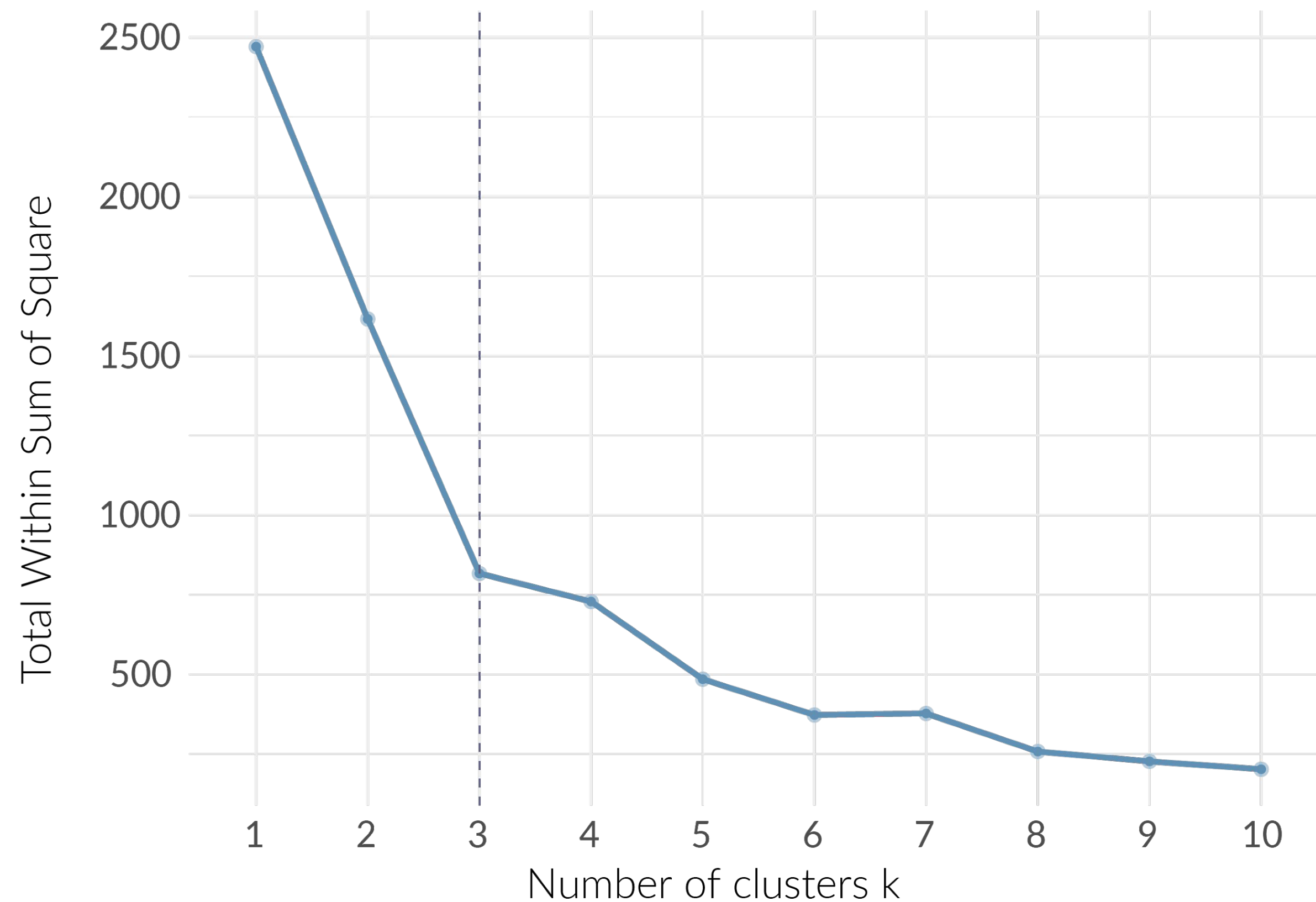
- Calculate the topological metrics of each artist (referring to the categories)
- K-means

○ Clustering artists with similar topological features → similar collaboration profiles

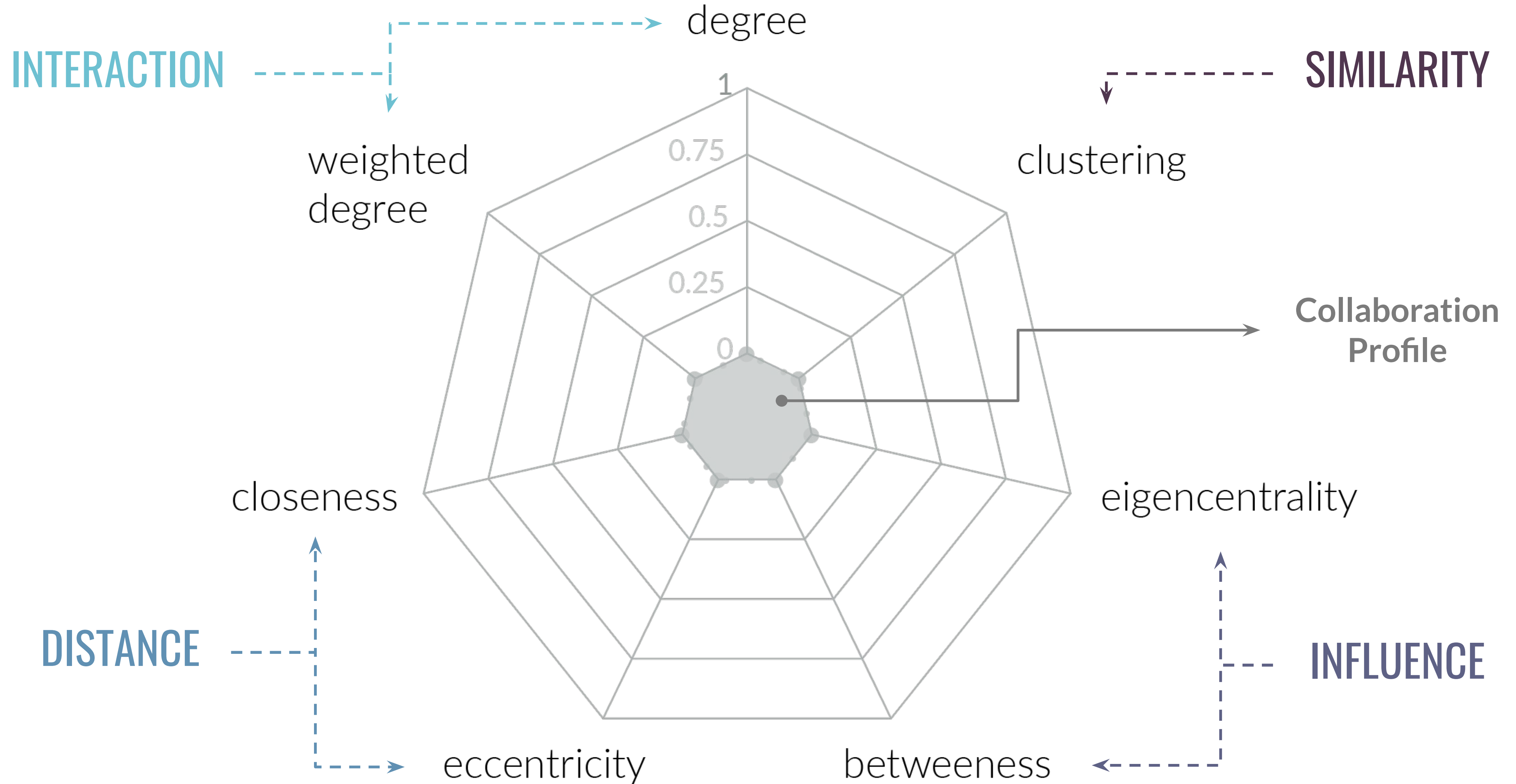
○ Elbow method → identify the optimum

number of clusters

○ **K = 3**

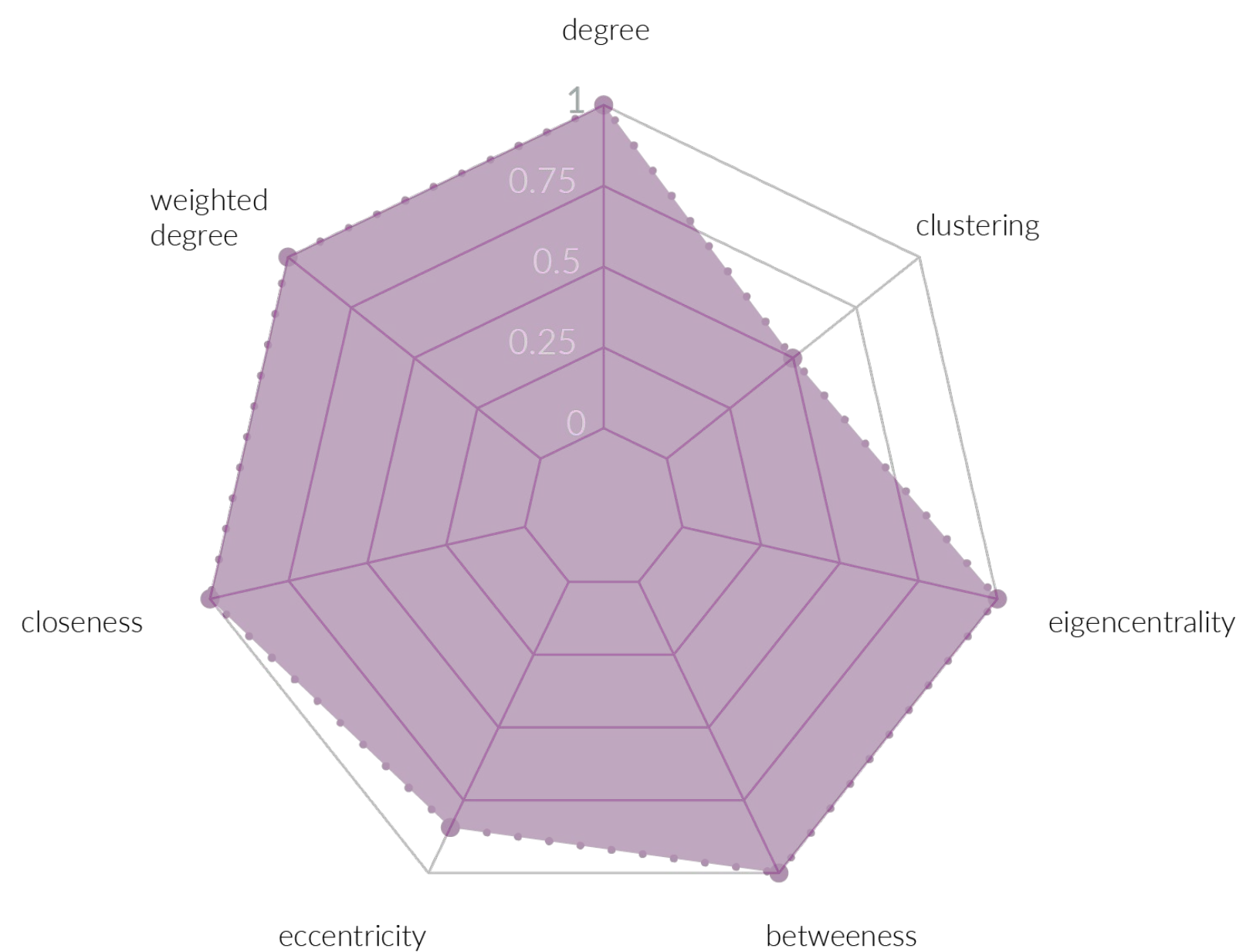


COLLABORATION PROFILES

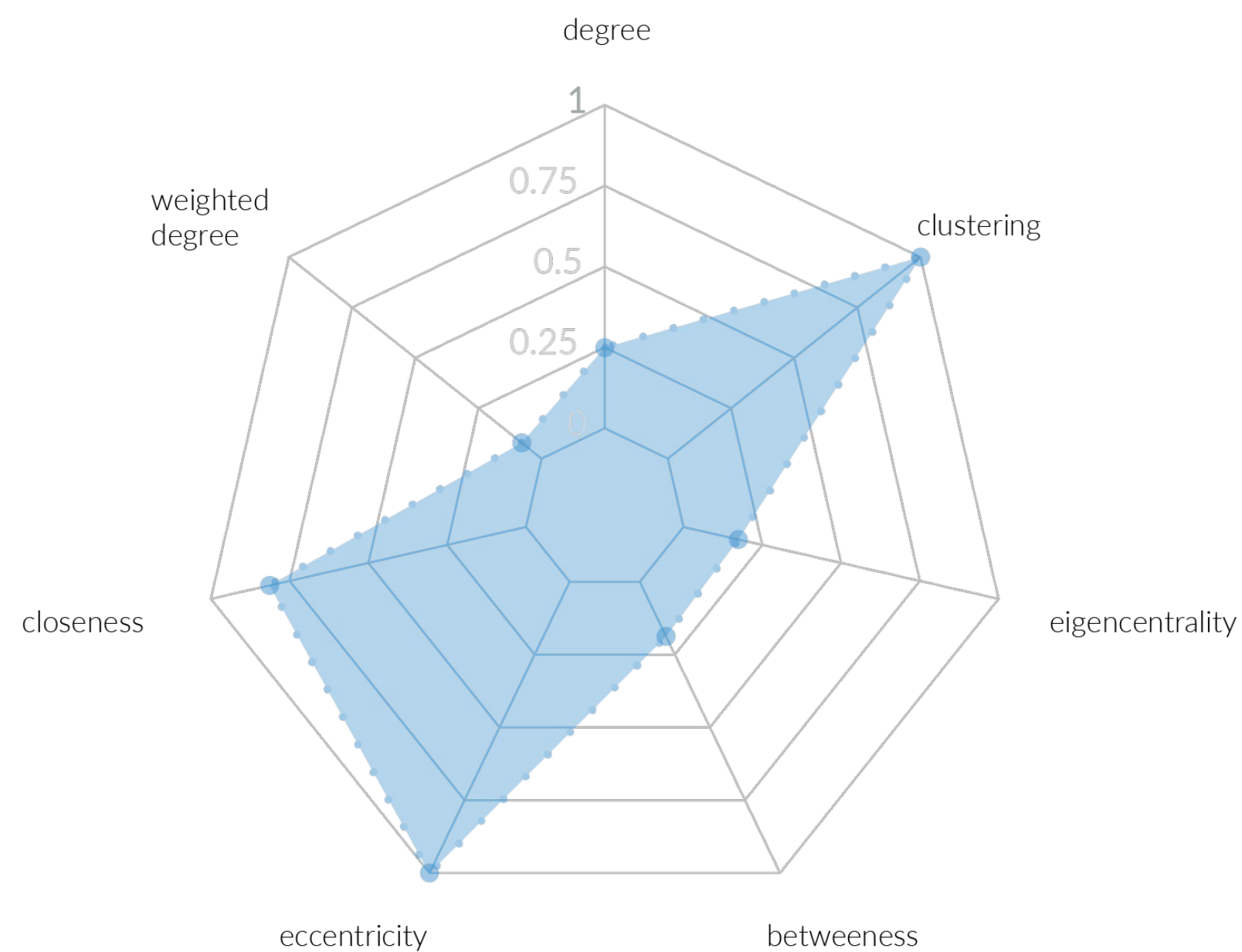


COLLABORATION PROFILES: CLUSTERS

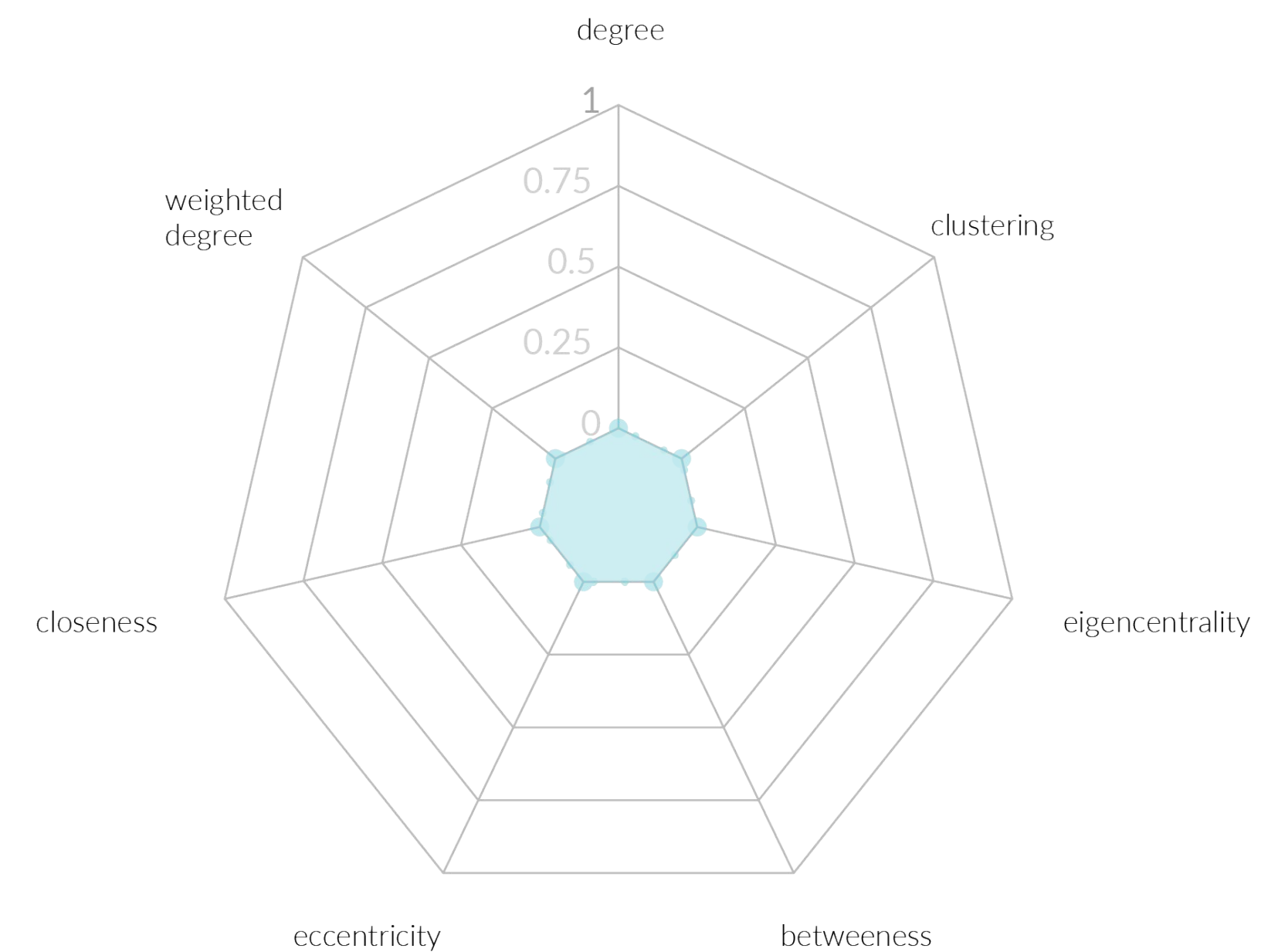
CLUSTER 1



CLUSTER 2

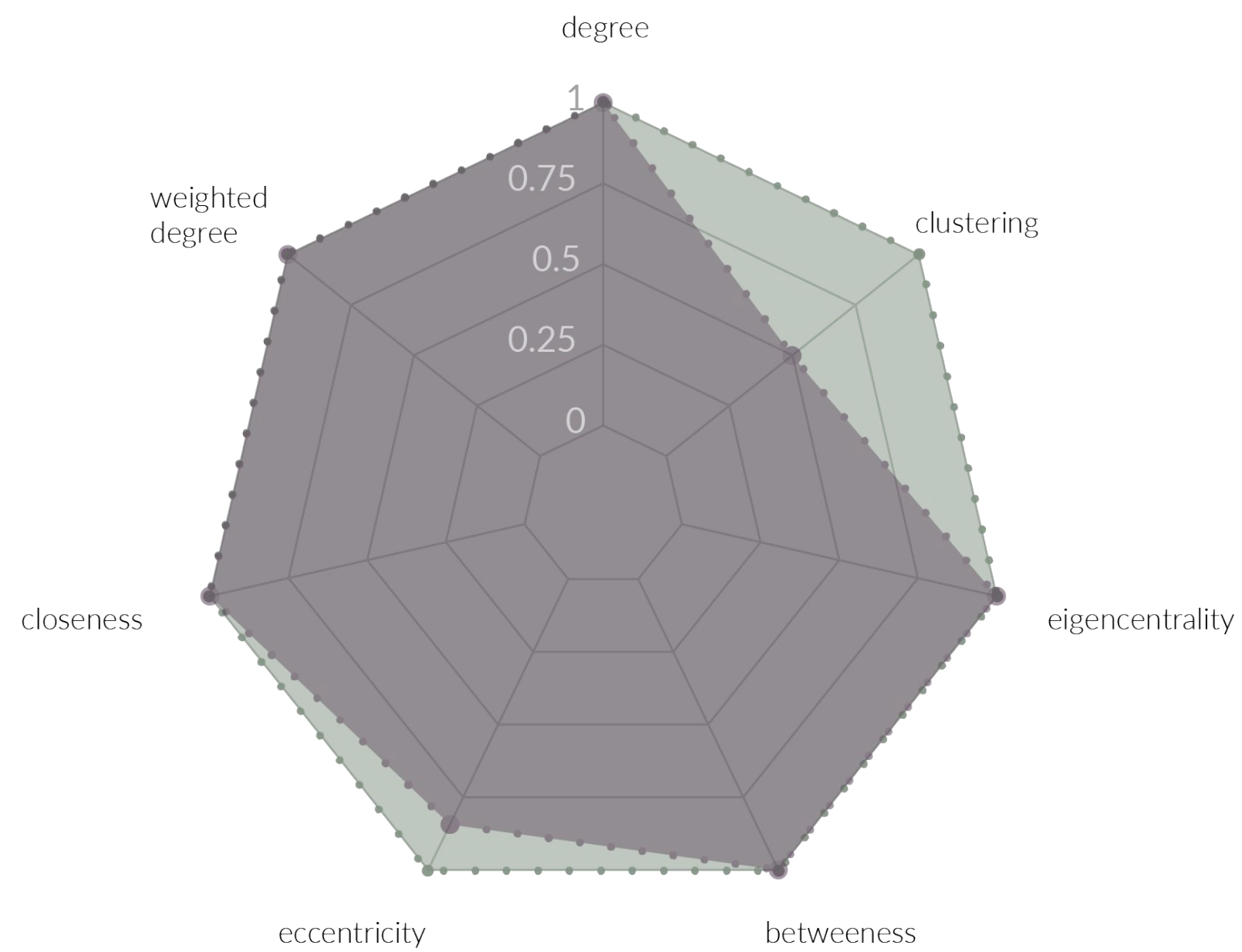


CLUSTER 3



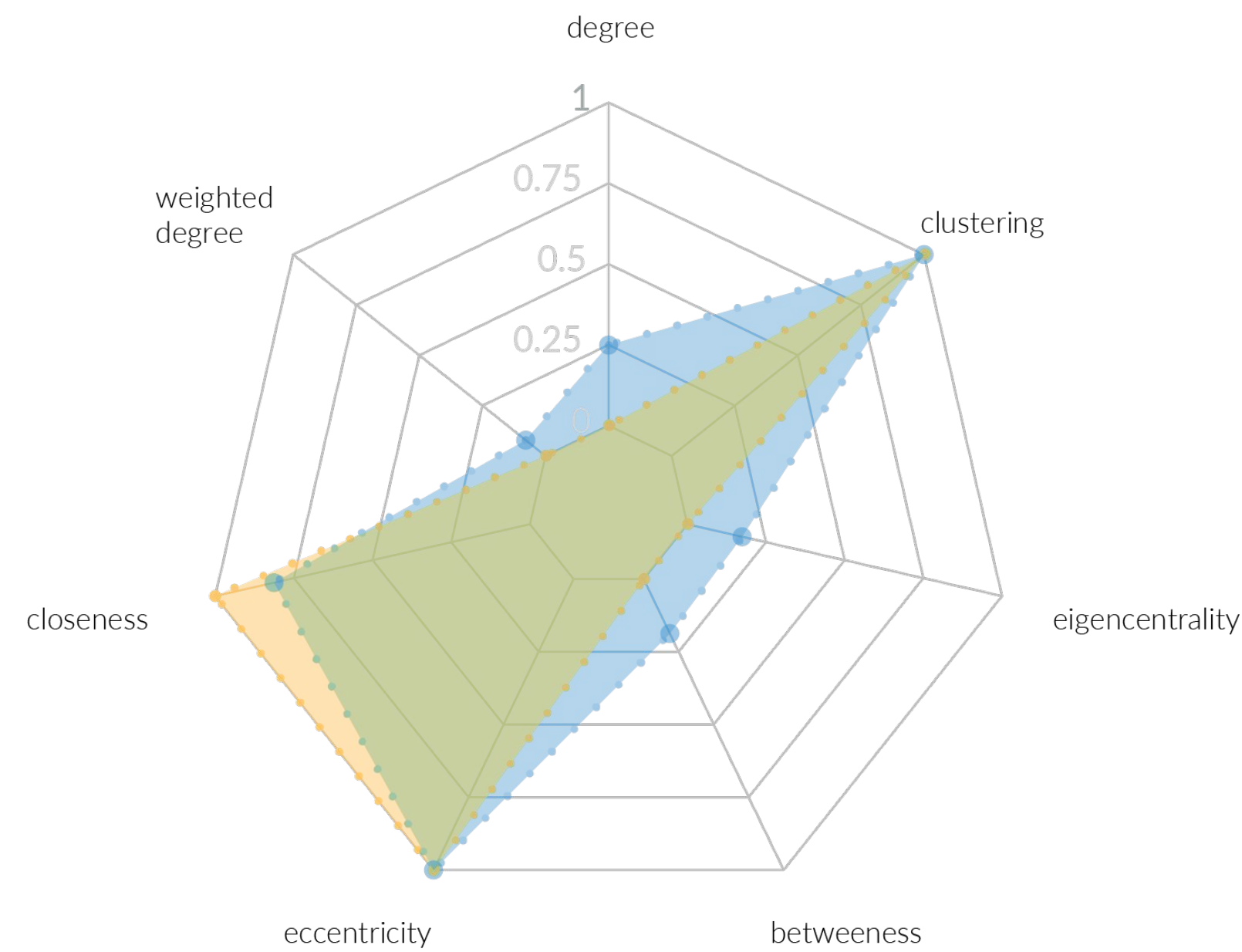
COLLABORATION PROFILES: COMPARISON

CLUSTER 1



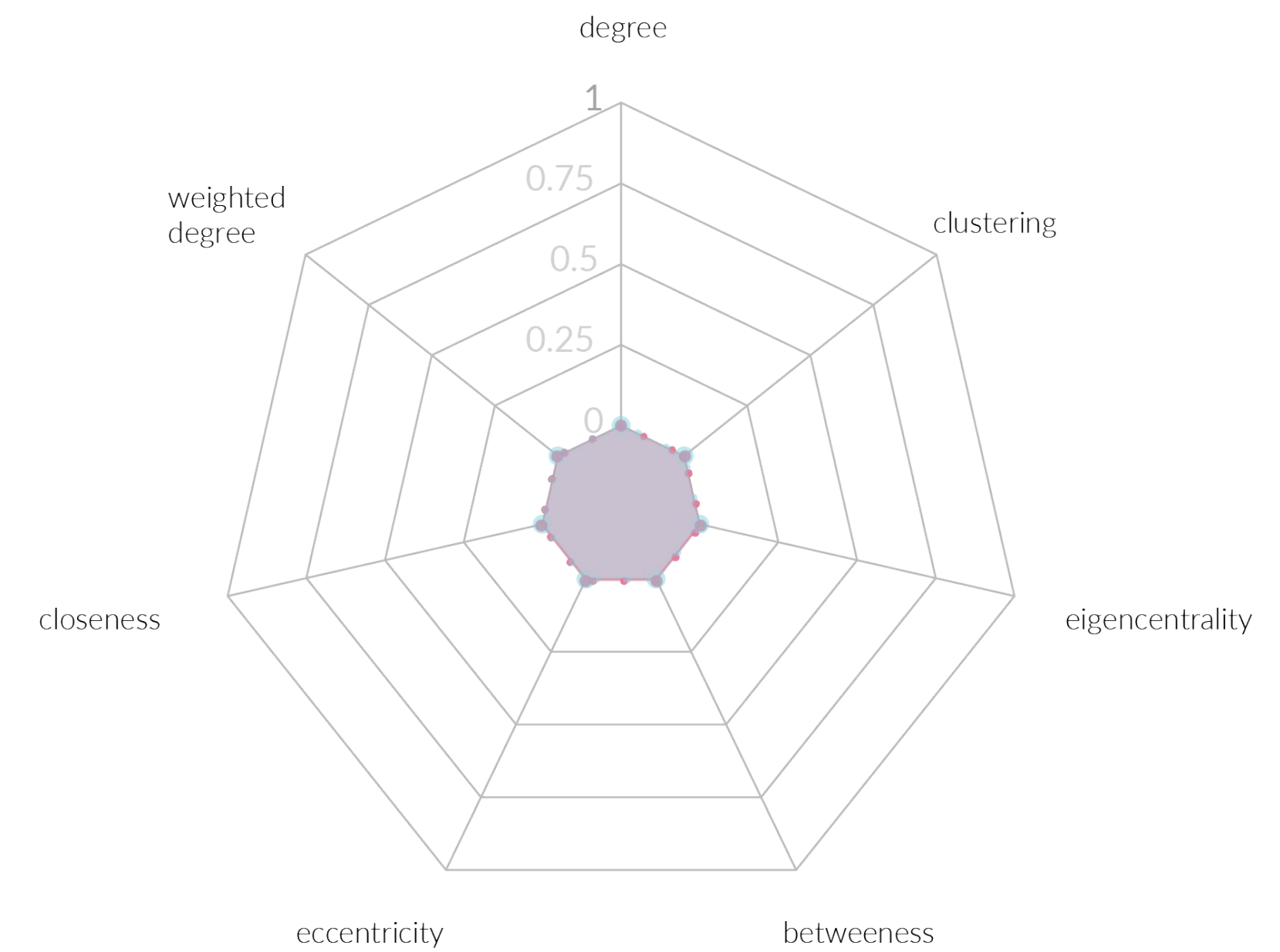
1B 2B 3A 4B

CLUSTER 2



1A 2B 3B 4A

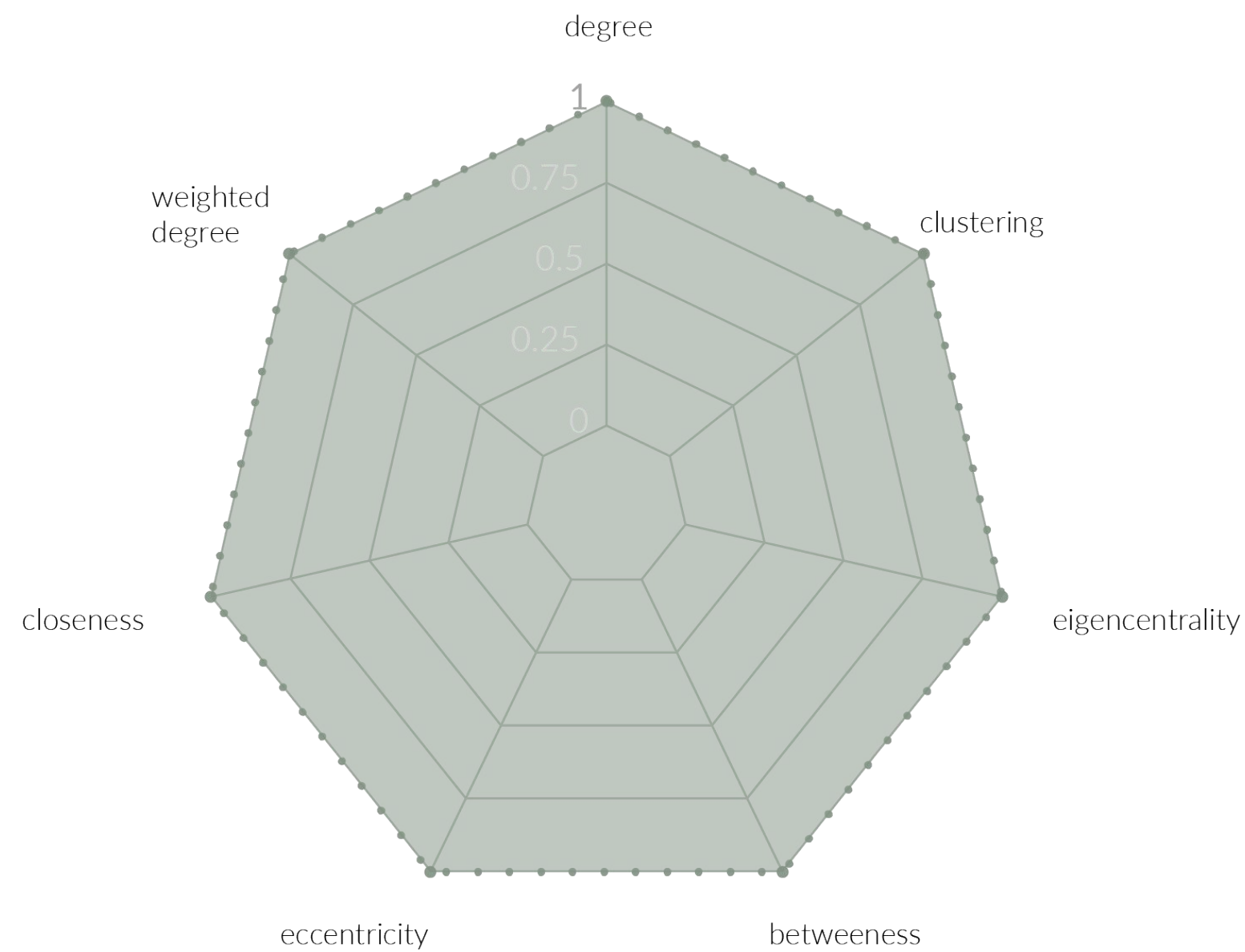
CLUSTER 3



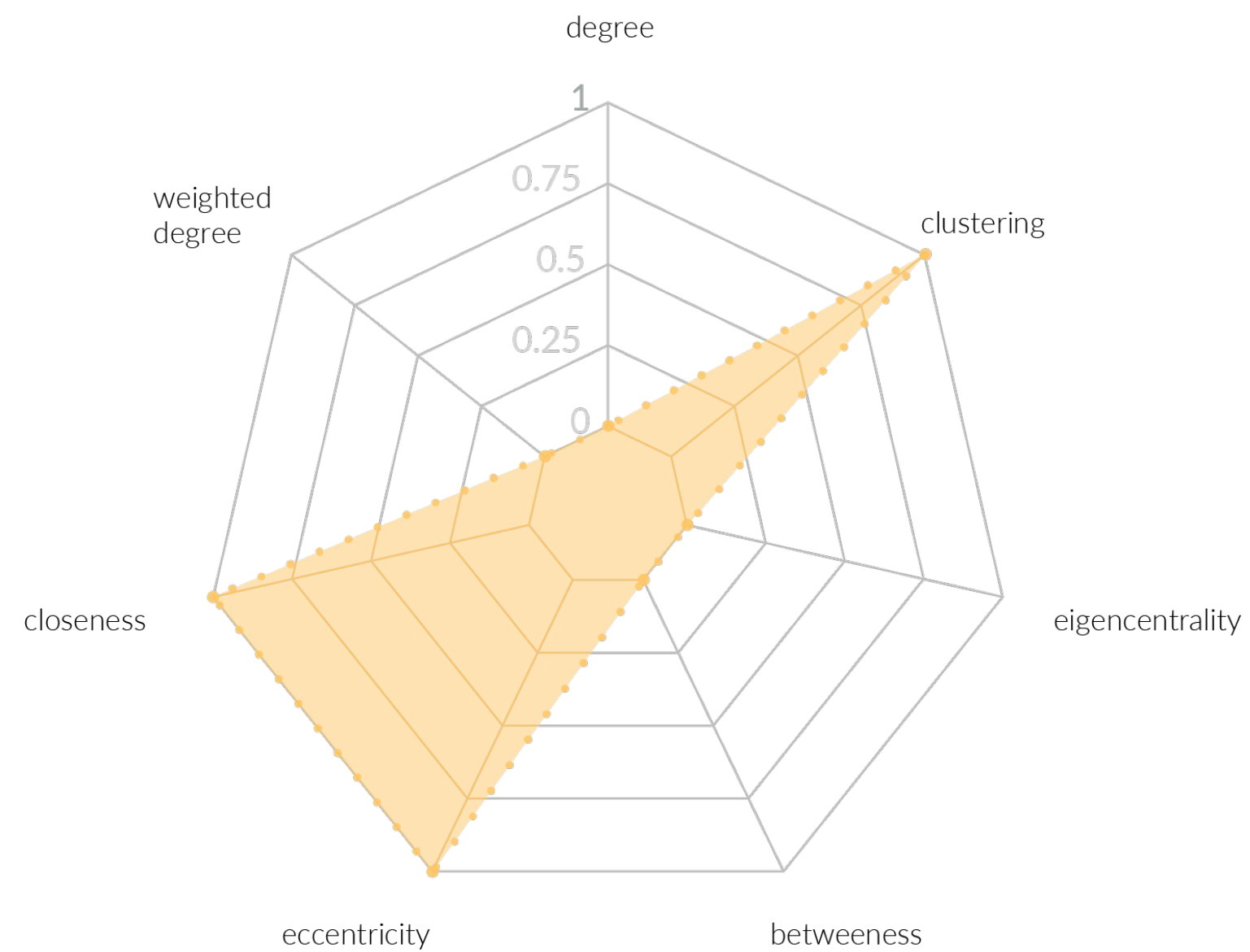
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3 PREDOMINANT COLLABORATION PROFILES

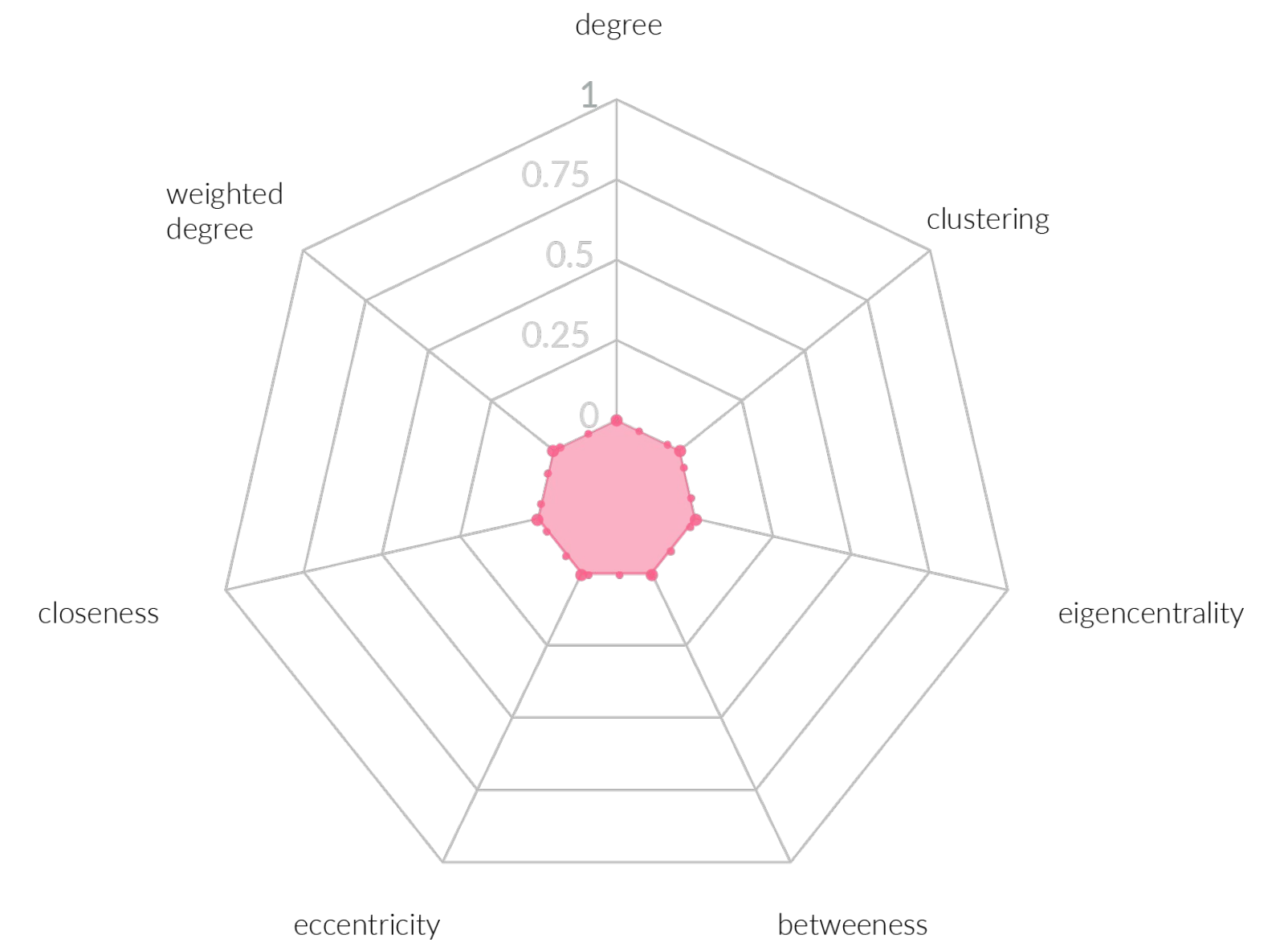
DIVERSE



REGULAR



ABSENT



- ✓ High interaction (collaborative)
- ✓ Highly central (distance)
- ✓ Slightly diversified
- ✓ Influential artists

- ✓ Low interaction
- ✓ Highly central (distance)
- ✓ Slightly diversified
- ✓ Non-influential artists

- ✓ Non-collaborative

METHODOLOGY



DATA COLLECTION



SN MODELLING



COLLABORATION
PROFILES



STATISTICAL
ANALYSIS



01

Normality Test

of Shapiro-Wilk to verify
if they follow a normal
distribution



02

Correlation Measures

Pearson, Spearman and
Kendall



03

Analysis

of each cluster in relation
to the success' measure



NORMALITY TEST: SHAPIRO-WILK ($\alpha = 0,05$)

SAMPLE	STATISTIC	p-value	NORMAL
POPULARITY	0.93788	5.269e-11	NO
FOLLOWERS	0.67370	< 2.2e-16	NO
DEGREE	0.78467	< 2.2e-16	NO
WEIGHTED DEGREE	0.76878	< 2.2e-16	NO
ECCENTRICITY	0.74696	< 2.2e-16	NO
CLOSENESS	0.78364	< 2.2e-16	NO
CLUSTERING	0.87115	< 2.2e-16	NO
BETWEENNESS	0.58553	< 2.2e-16	NO
EIGENCENTRALITY	0.66979	< 2.2e-16	NO

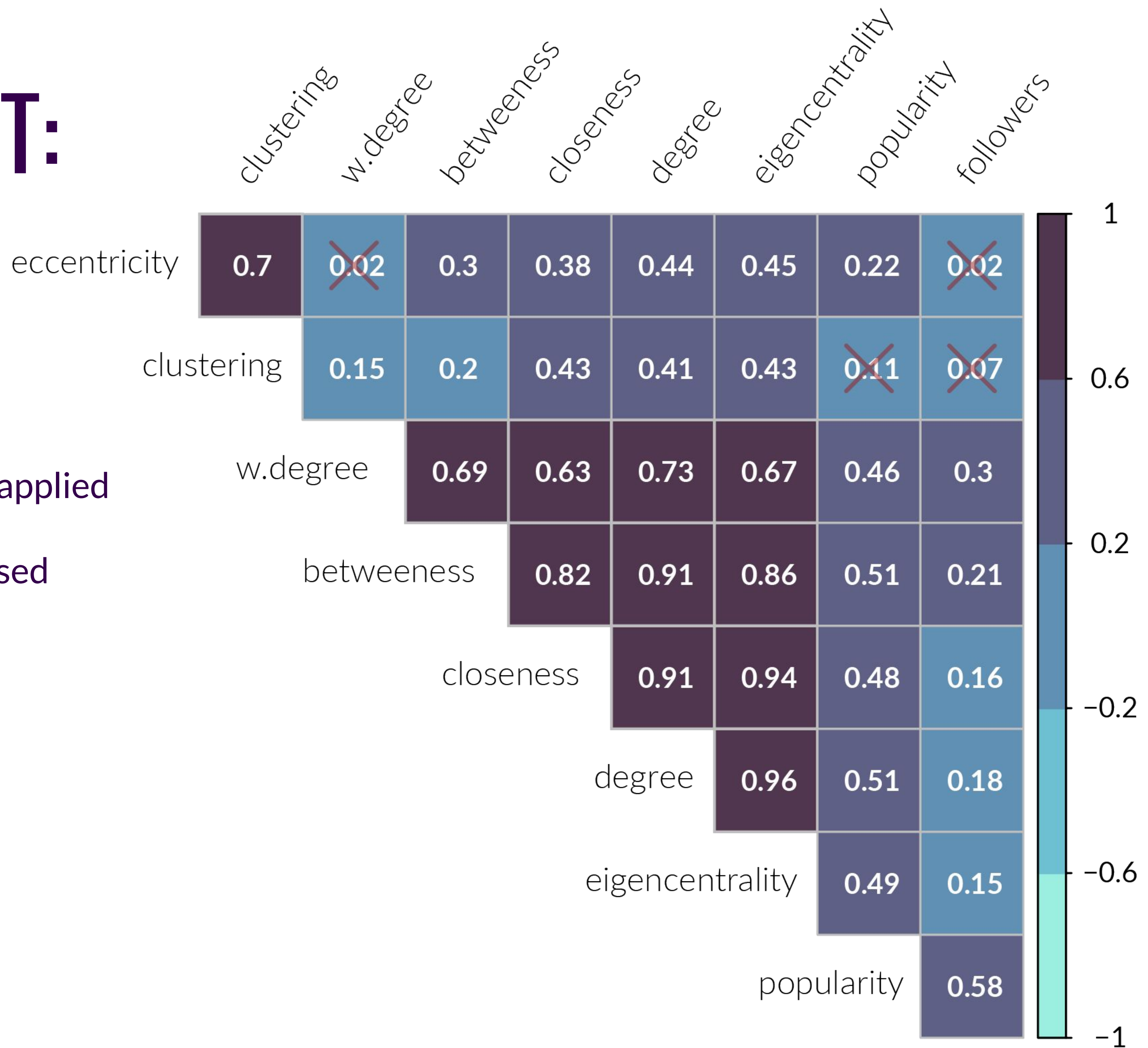
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The data distribution is significantly different from a normal distribution

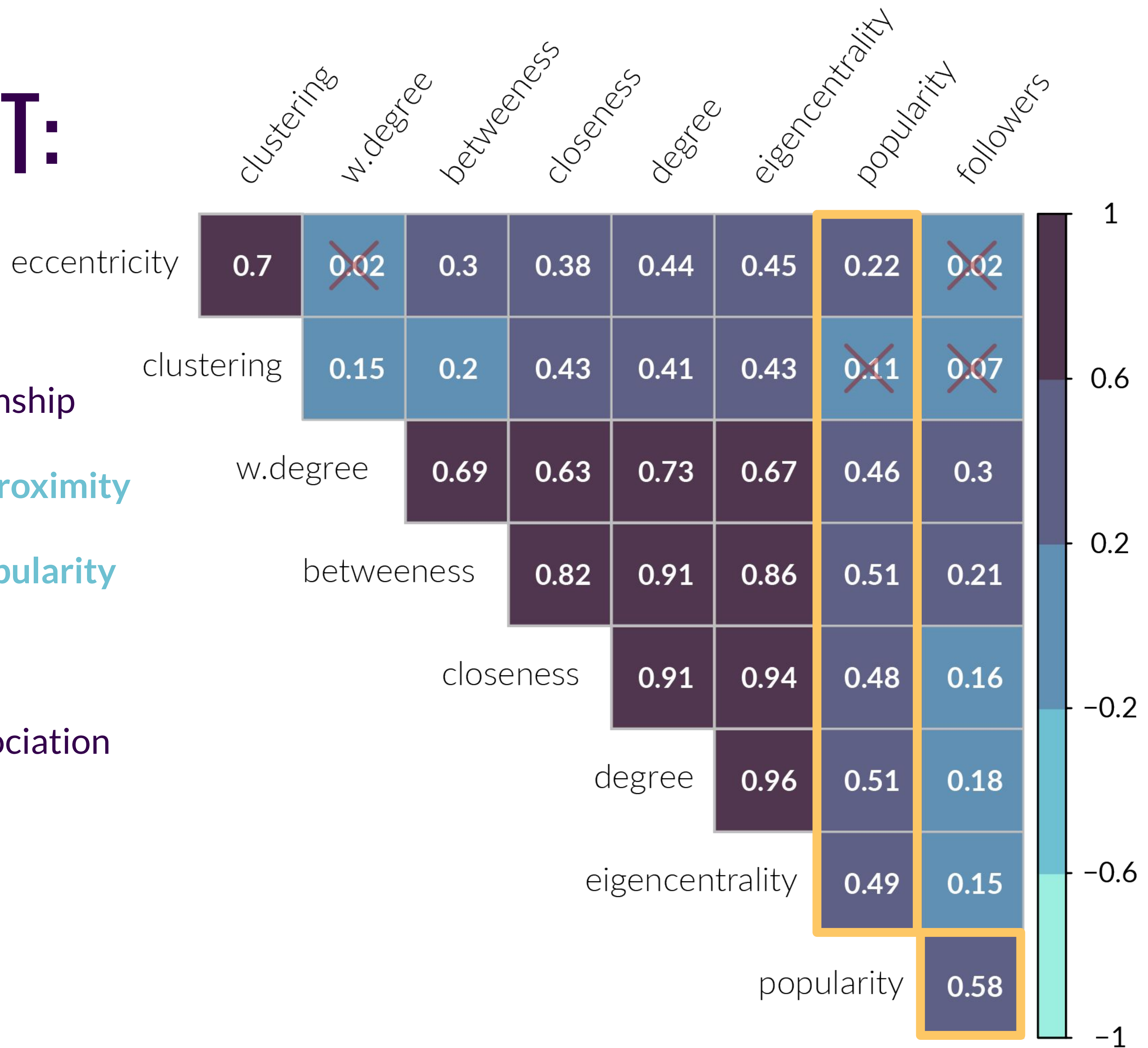
CORRELATION TEST: SPEARMAN

- As data is not normally distributed, non-parametric correlations must be applied
- Here, we consider **Spearman** rank-based correlation test



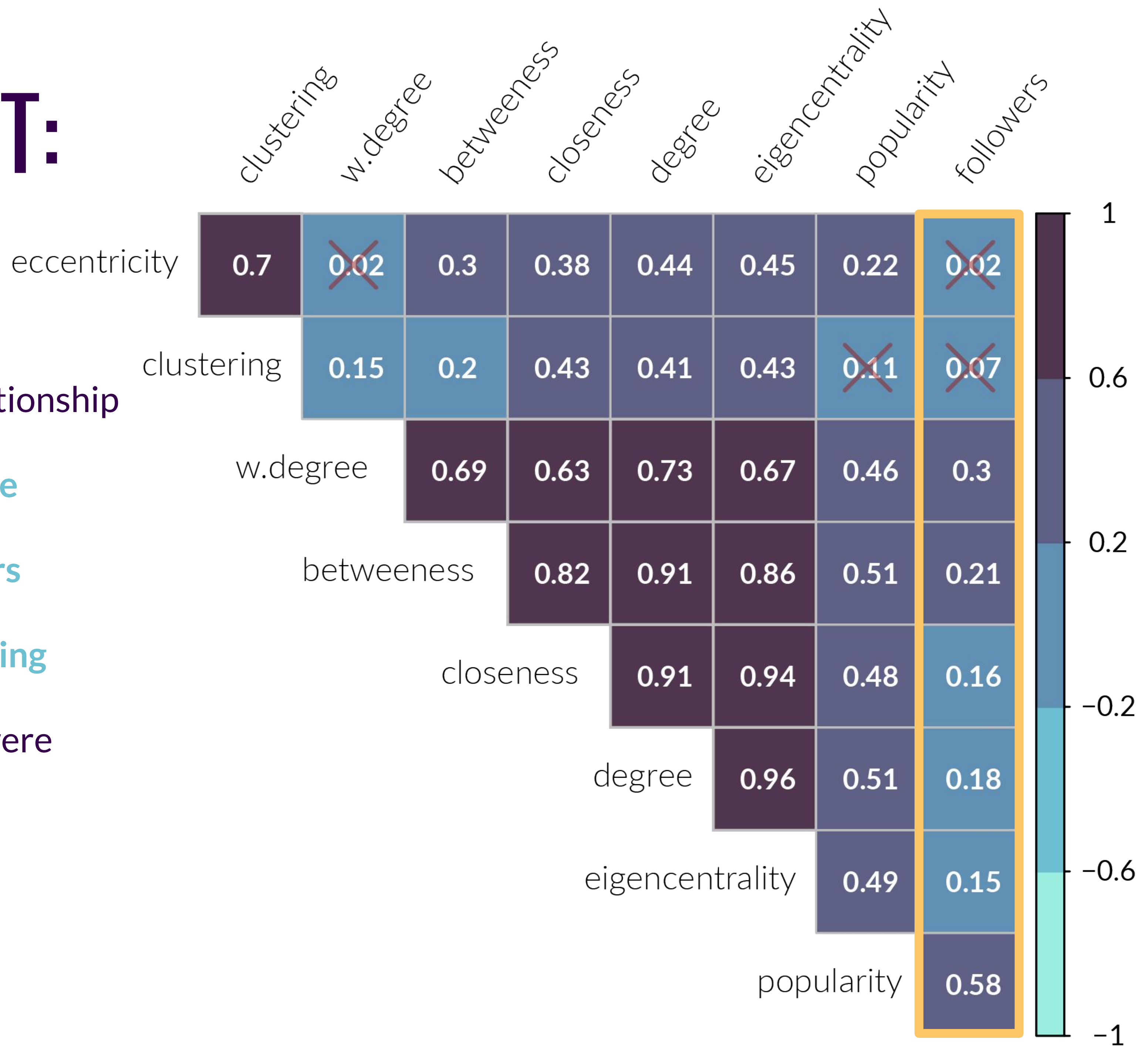
CORRELATION TEST: SPEARMAN

- There is a moderate to strong relationship between the metrics of interaction, proximity and influence, and the measure of popularity
- Only the eccentricity and clustering measurements showed a weaker association

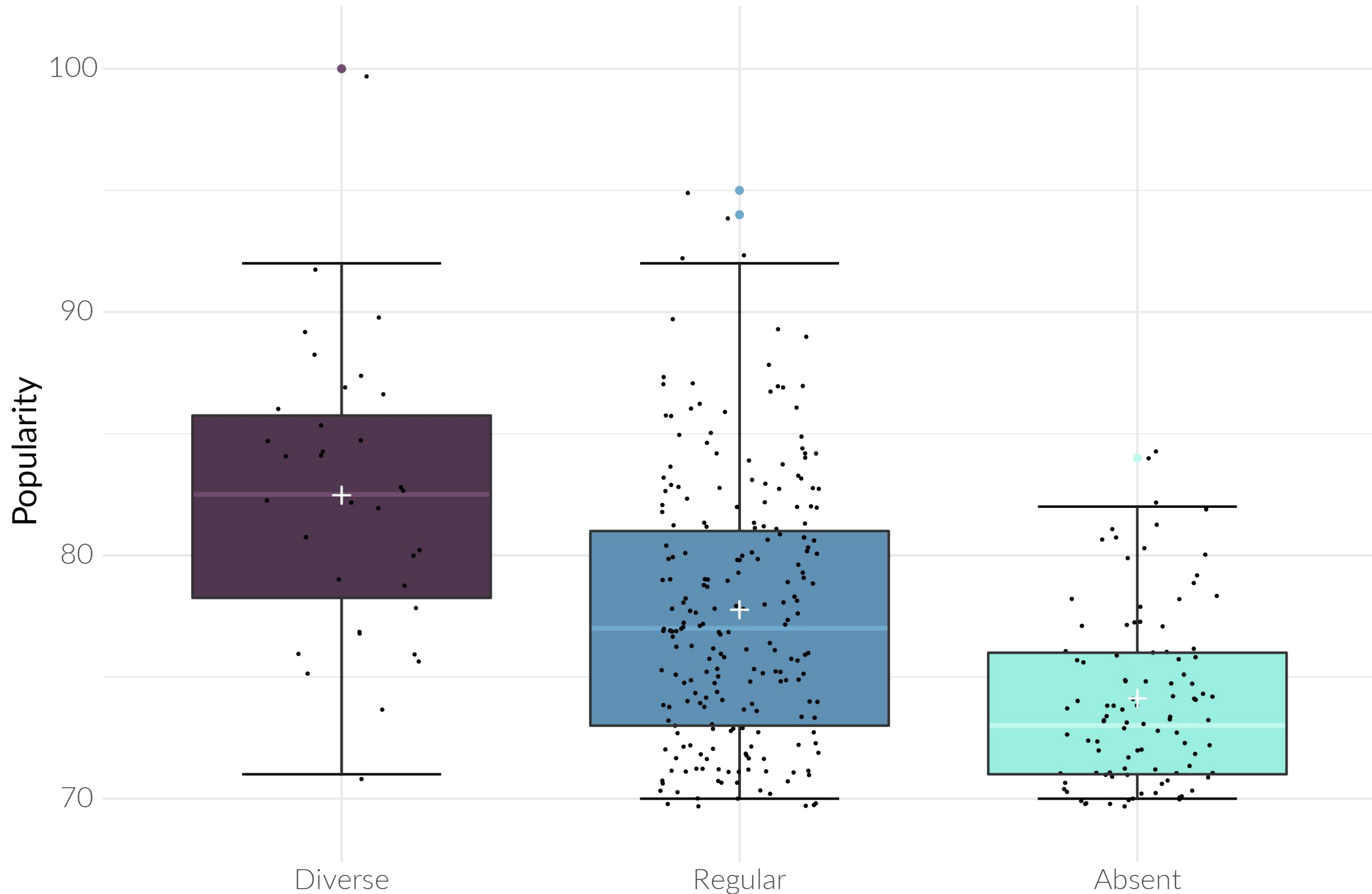


CORRELATION TEST: SPEARMAN

- **Weak** but statistically significant relationship between the **interaction** and **influence** measures and the **number of followers**
- Once again, for **proximity** and **clustering** metrics, no significant relationships were detected

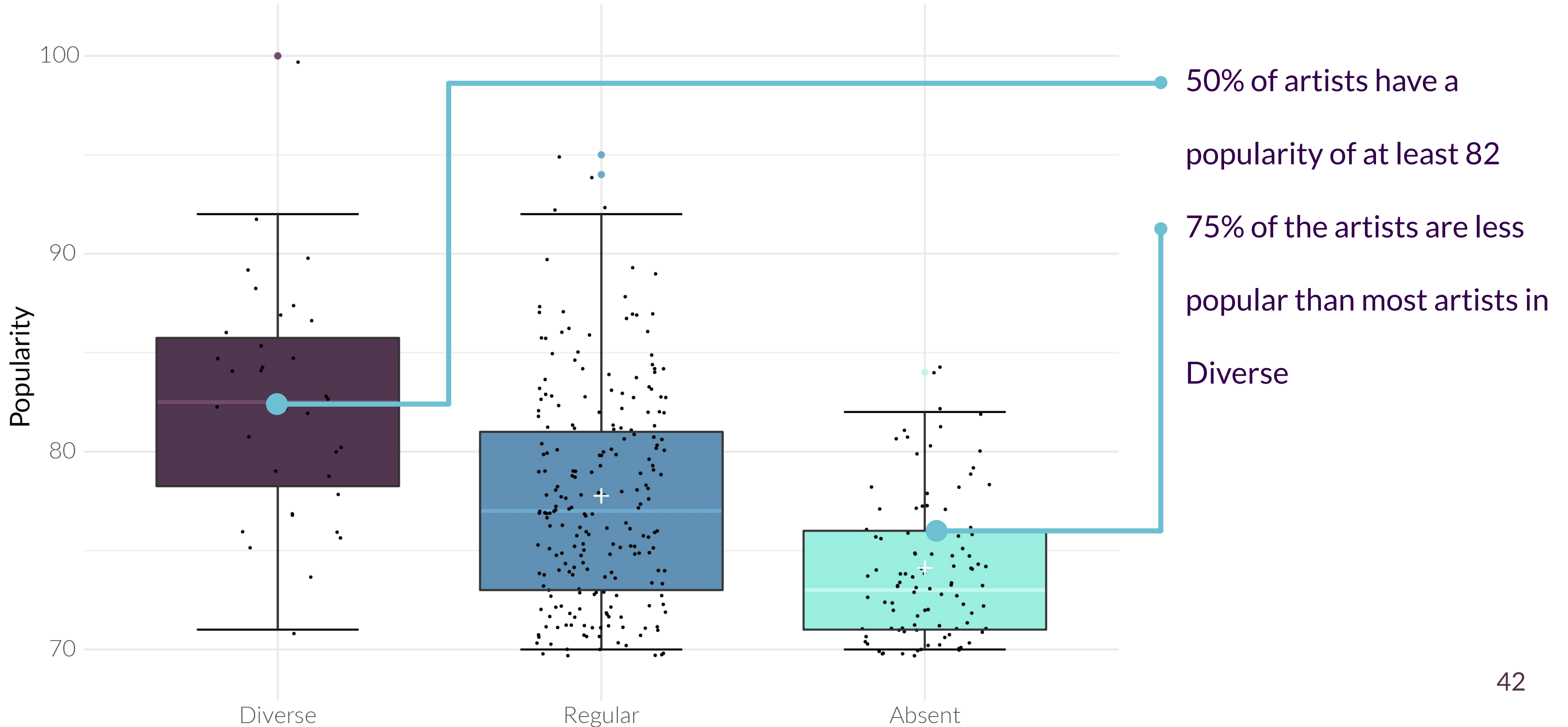


ARTIST DISTRIBUTION ANALYSIS: POPULARITY

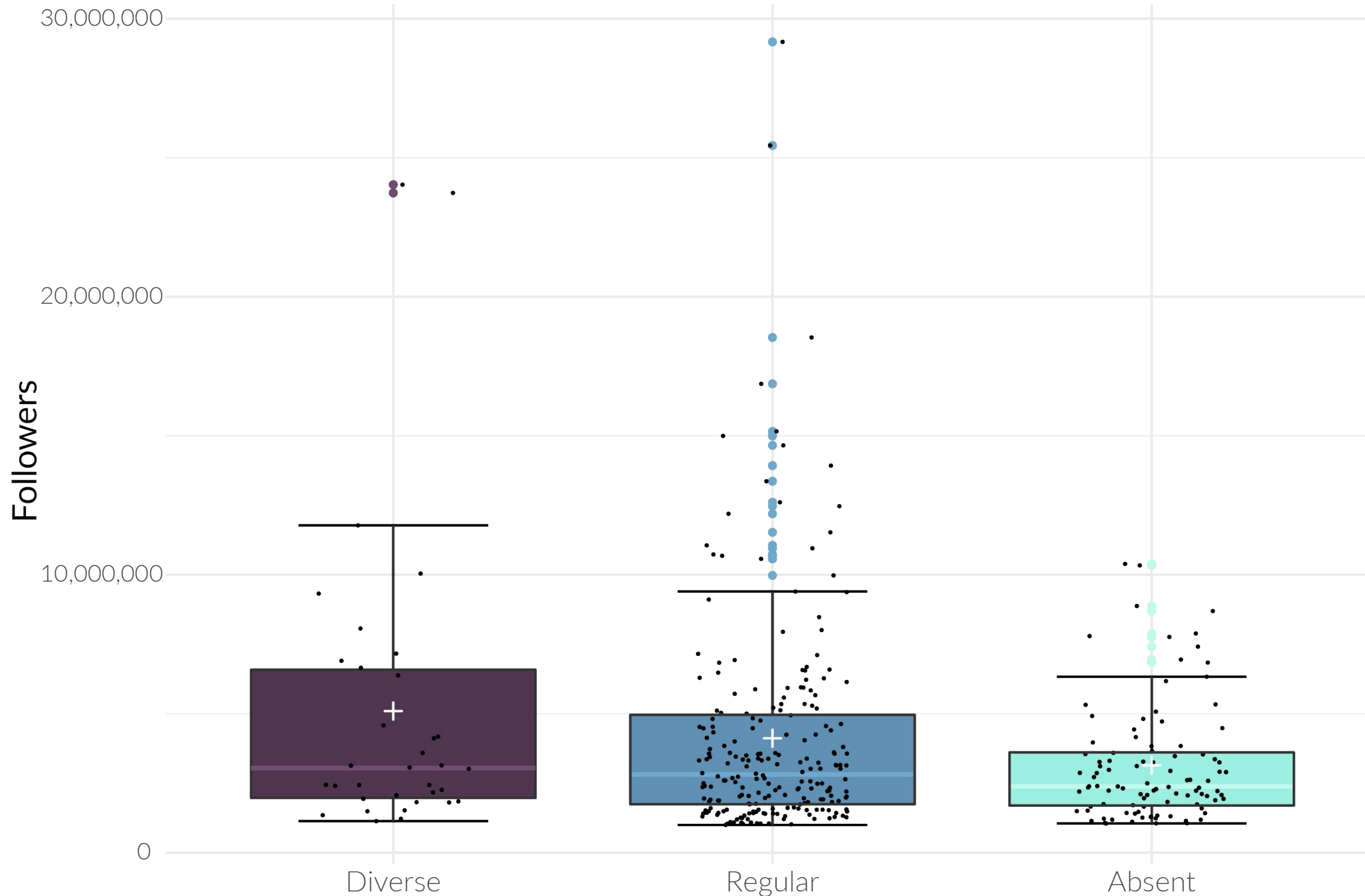


- All three clusters have different average levels of popularity
- Decreasing from **Diverse** to **Absent**

ARTIST DISTRIBUTION ANALYSIS: POPULARITY

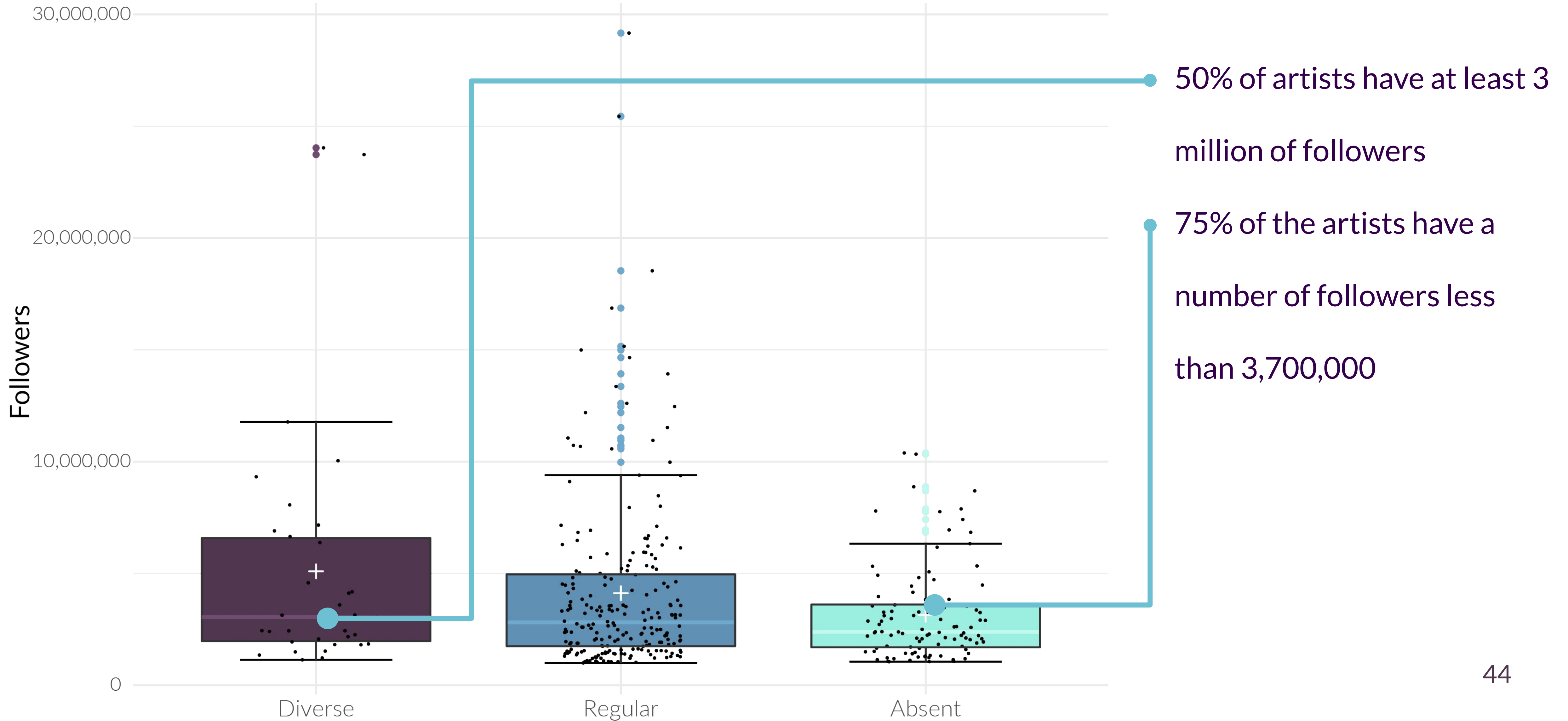


ARTIST DISTRIBUTION ANALYSIS: FOLLOWERS



- All three have equivalent median values regarding the number of followers
- Nevertheless, with respect to the mean, the rates are also decreasing from **Diverse** to **Absent**

ARTIST DISTRIBUTION ANALYSIS: FOLLOWERS



FINDINGS

01

Diverse is popular

- Highly collaborative, central, diverse and influential
- Composed of the most successful artists (Dj Khaled)

02

Absent is not

- Non-collaborative profile
- Lowest values of success measures

03

Collaboration is key

- Successful artists are more likely to have a **high degree** of collaboration between **influential** and **diversified** artists
- Those who prefer to pursue a non-collaborative music career may be missing an opportunity to improve and expand their potential

CONCLUSION

- ✓ We identified collaboration profiles present in a musical success-based network + analyzed the relationship between such collaborative patterns and the artists' success
- ✓ Our results provide strong evidence that clusters with a high degree of **interaction, influence, and diversity**, are more likely to present **successful artists**
- Plan to conduct a more accurate analysis on a shorter scale by exploring other metrics for artistic success
- On going: studying other possibilities to help establish causality relationships



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