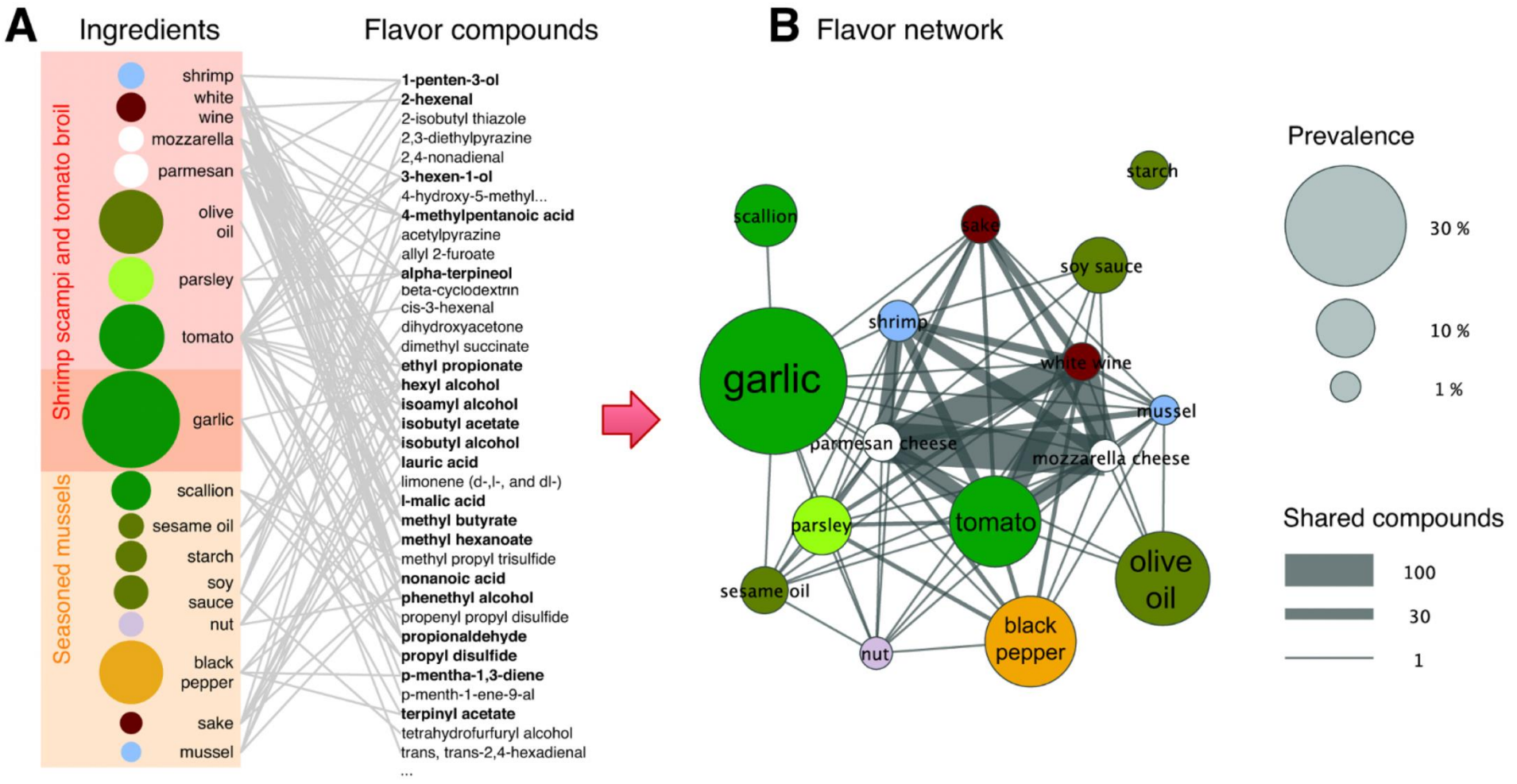
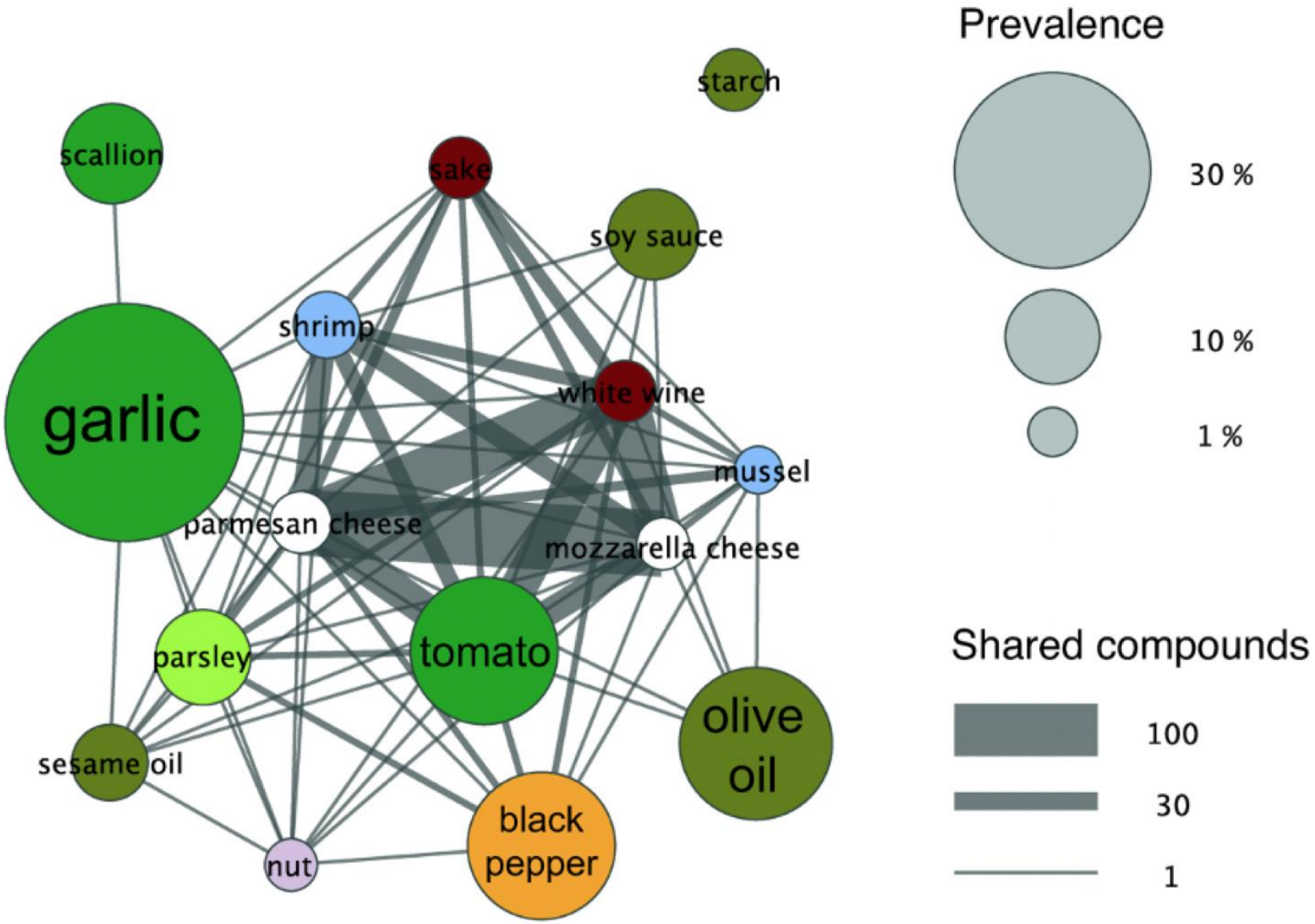
Day 4 - What Networks Could Be

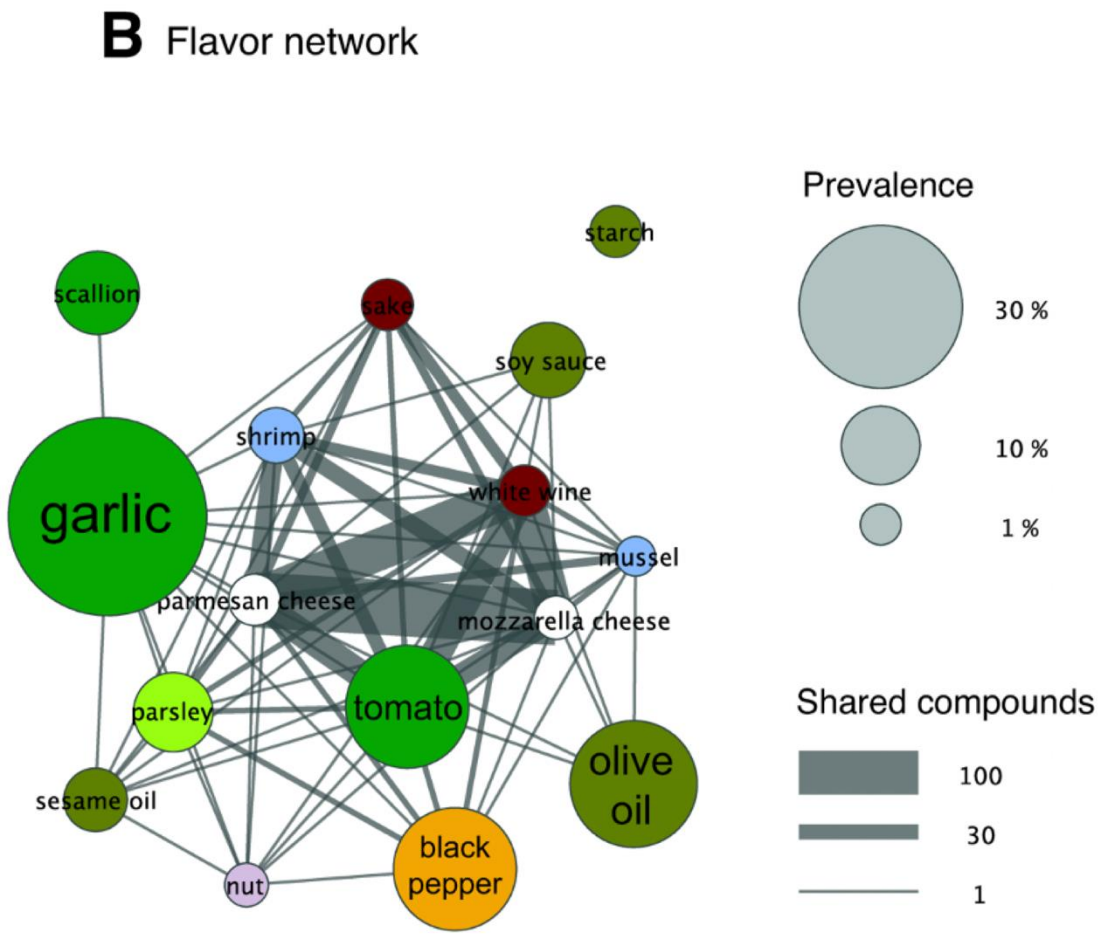
UMN CSS Workshop 2025

Instructor: Alvin Zhou


A
Ingredients
Flavor compounds
Shrimp scampi and tomato broil
Seasoned mussels
shrimp
white wine
mozzarella
parmesan
olive oil
parsley
tomato
garlic
scallion
sesame oil
starch
soy sauce
nut
black pepper
sake
mussel
1-penten-3-ol
2-hexenal
2-isobutyl thiazole
2,3-diethylpyrazine
2,4-nonadienal
3-hexen-1-ol
4-hydroxy-5-methyl...
4-methylpentanoic acid
acetylpyrazine
allyl 2-furoate
alpha-terpineol
beta-cyclodextrin
cis-3-hexenal
dihydroxyacetone
dimethyl succinate
ethyl propionate
hexyl alcohol
isoamyl alcohol
isobutyl acetate
isobutyl alcohol
lauric acid
limonene (d-,l-, and dl-)
l-malic acid
methyl butyrate
methyl hexanoate
methyl propyl trisulfide
nonanoic acid
phenethyl alcohol
propenyl propyl disulfide
propionaldehyde
propyl disulfide
p-mentha-1,3-diene
p-menth-1-ene-9-al
terpinyl acetate
tetrahydrofurfuryl alcohol
trans, trans-2,4-hexadienal
...
B
Flavor network
starch
scallion
sake
soy sauce
shrimp
garlic
white wine
mussel
parmesan cheese
mozzarella cheese
parsley
tomato
olive oil
sesame oil
black pepper
nut
Prevalence
30 %
10 %
1 %
Shared compounds
100
30
1

B Flavor network

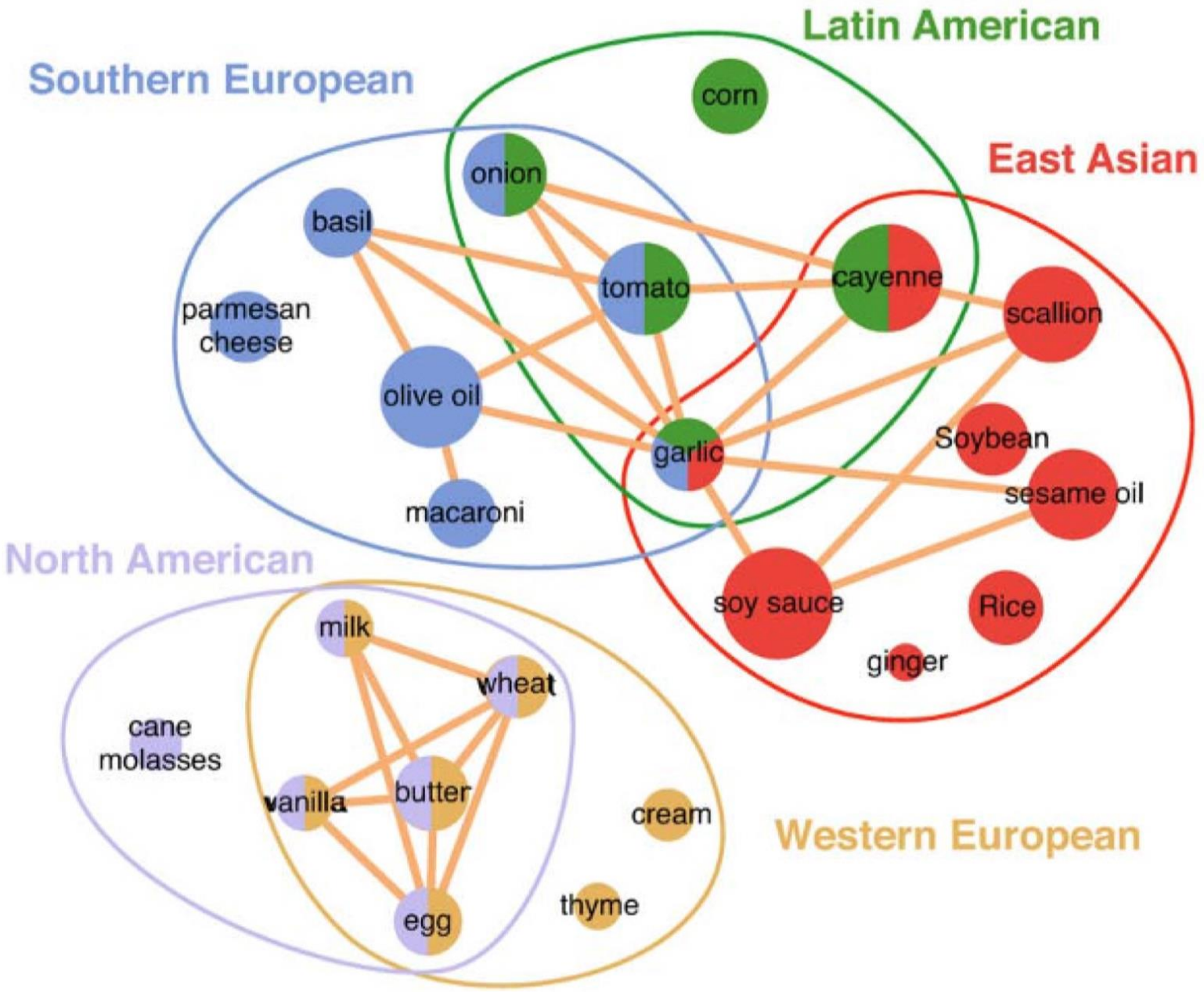


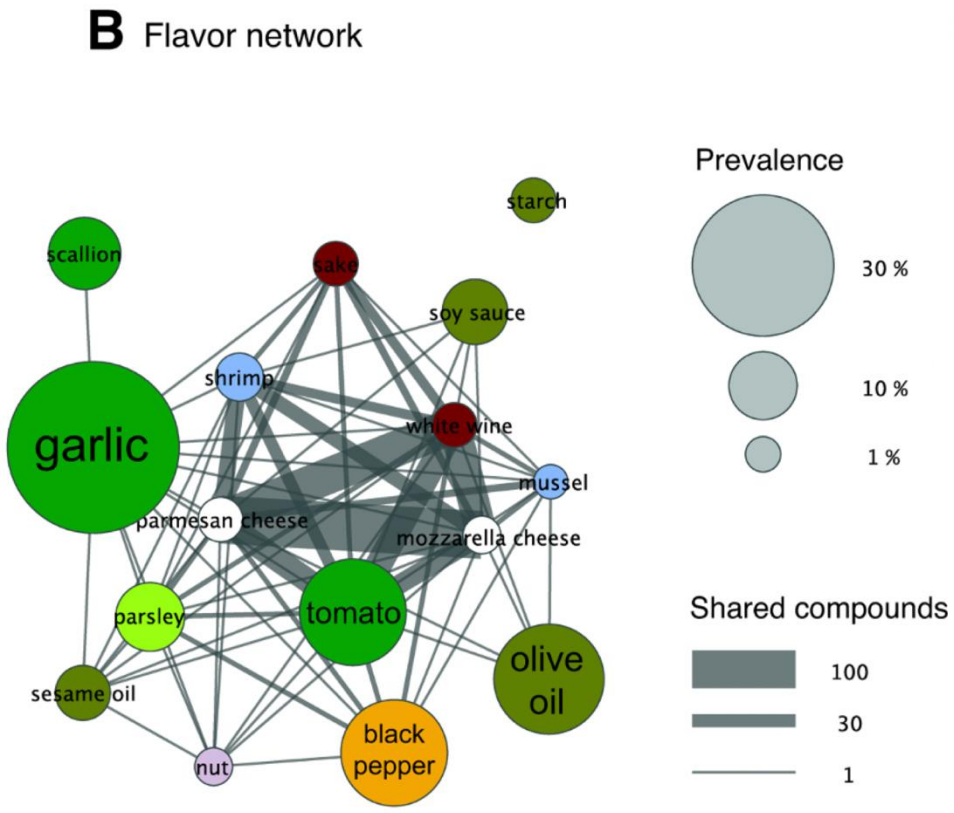


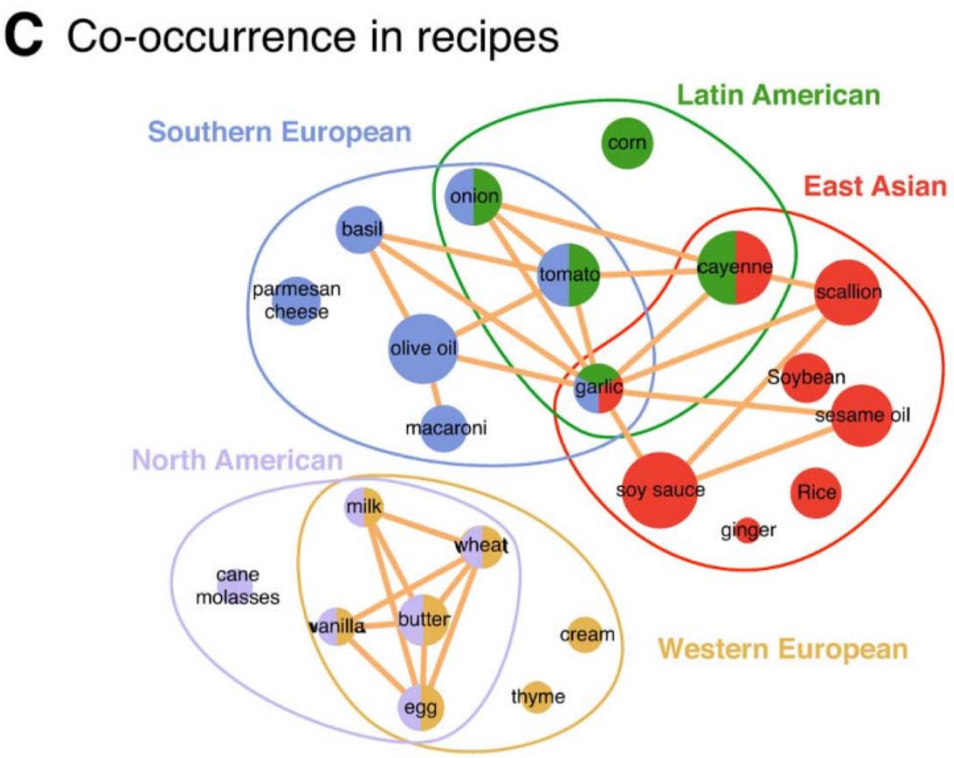
- Node: ingredient
- Tie: shared flavor compound

- What else could be the tie?

C Co-occurrence in recipes

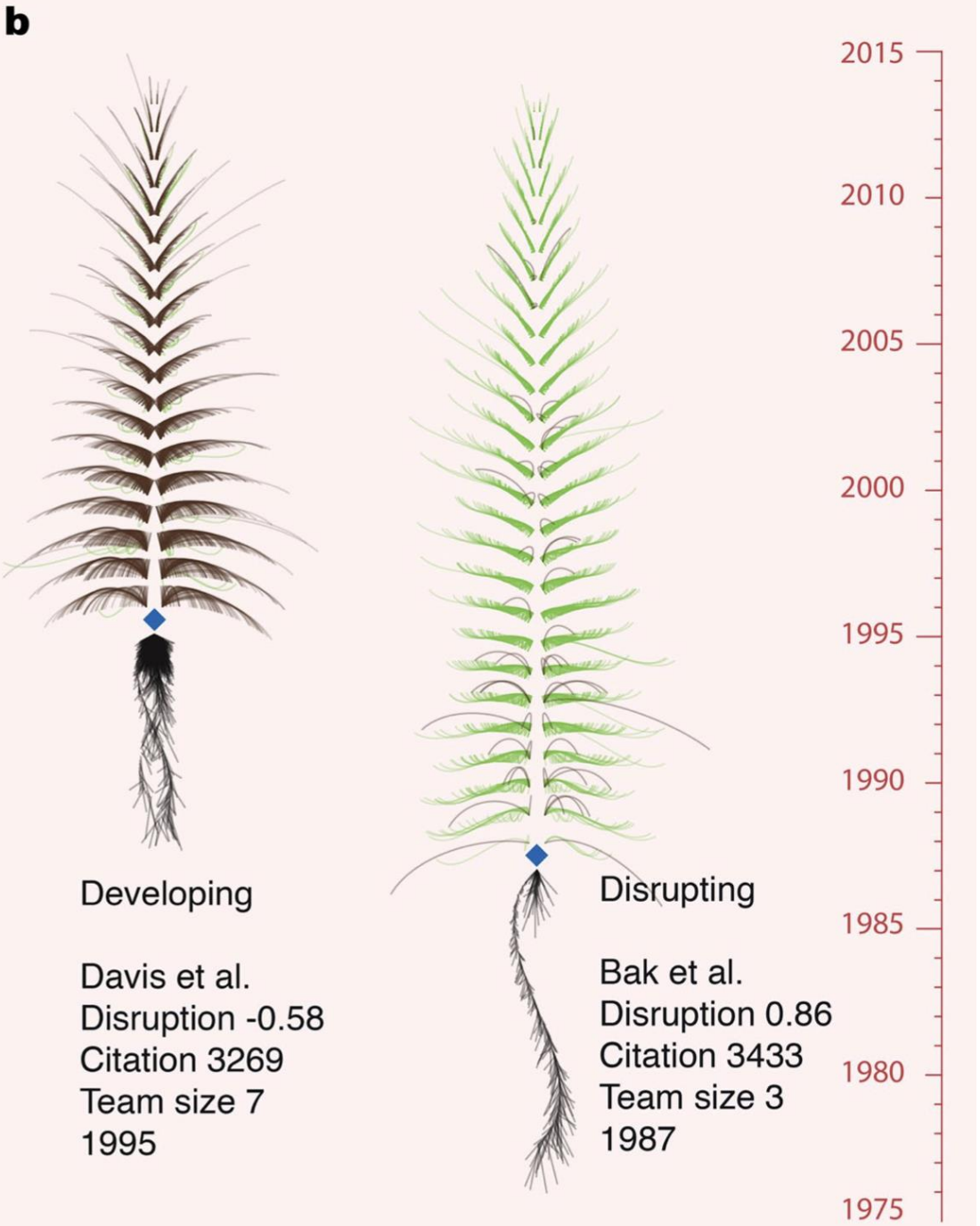


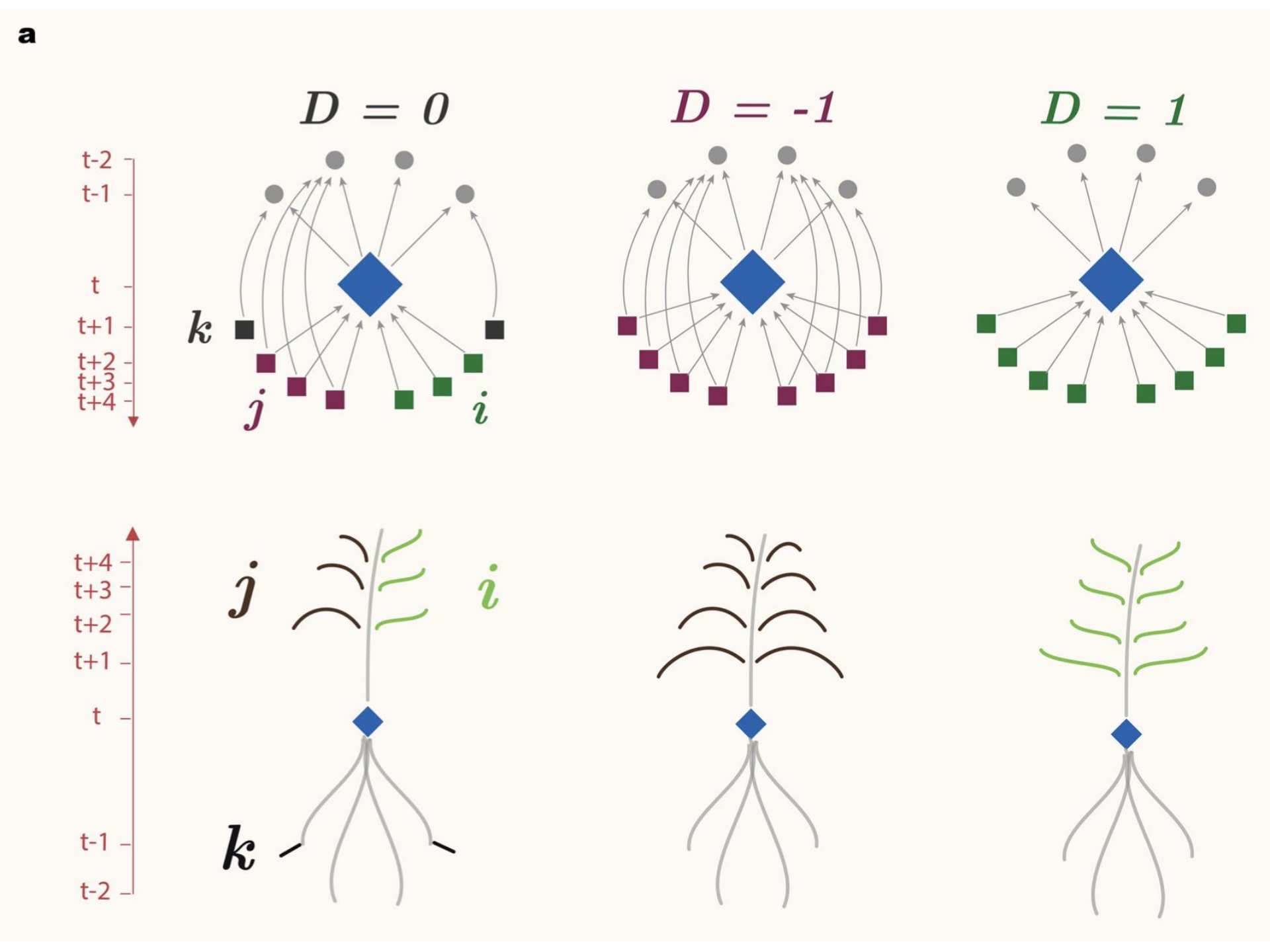


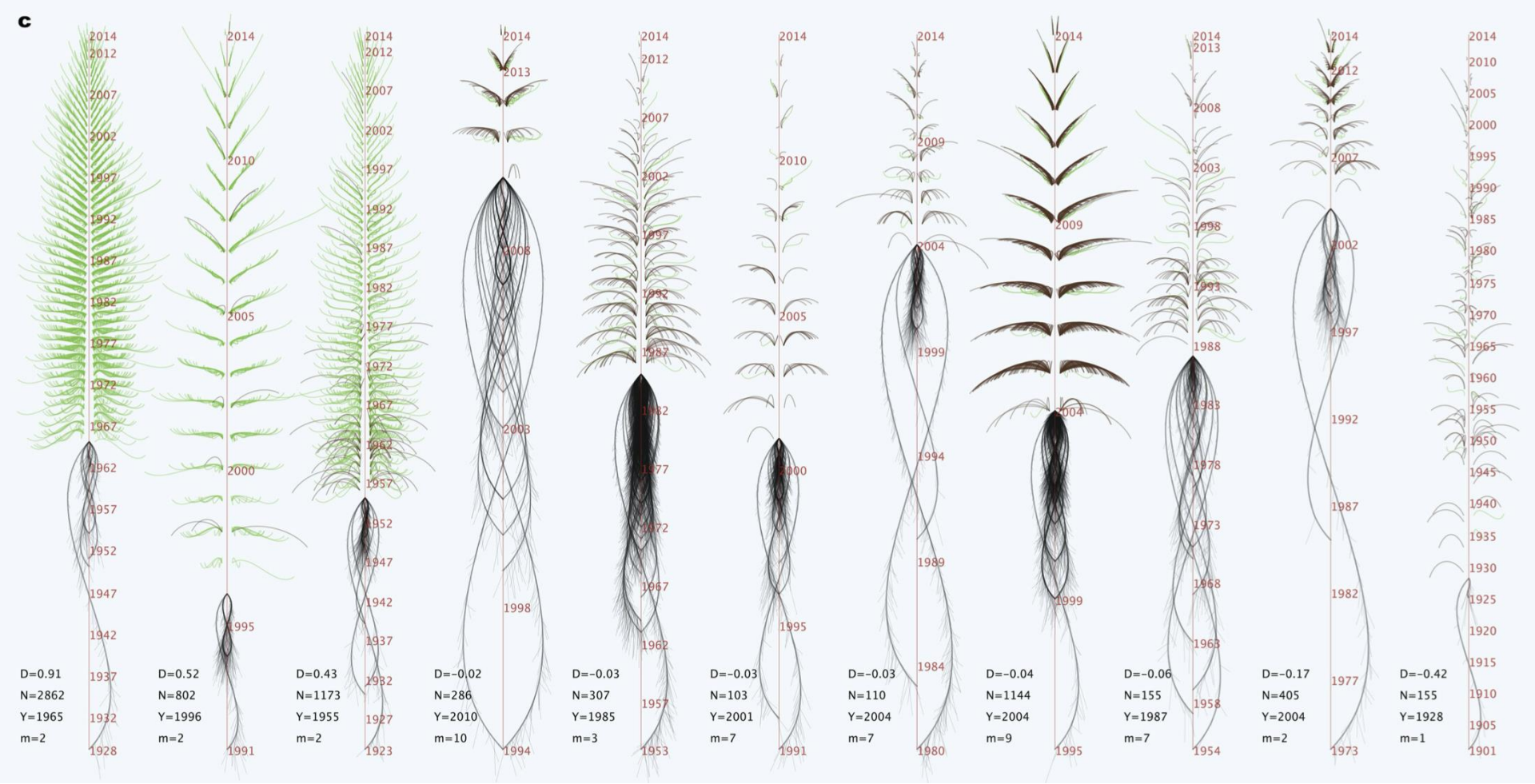


What other kinds of networks could be constructed from the data?

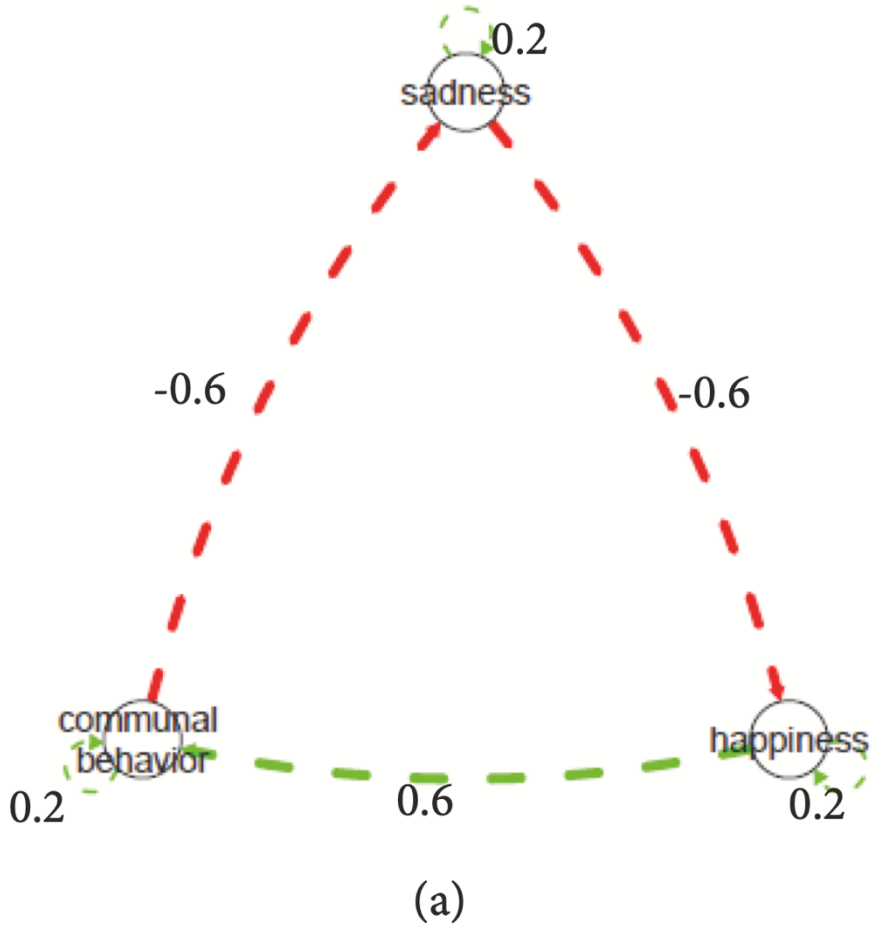
Ahn, Y.-Y., Ahnert, S. E., Bagrow, J. P., & Barabási, A.-L. (2011). Flavor network and the principles of food pairing. *Scientific Reports*, *1*(1), 196. https://doi.org/10.1038/srep00196


b
2015
2010
2005
2000
1995
1990
1985
1980
1975
Developing
Davis et al.
Disruption -0.58
Citation 3269
Team size 7
1995
Disrupting
Bak et al.
Disruption 0.86
Citation 3433
Team size 3
1987

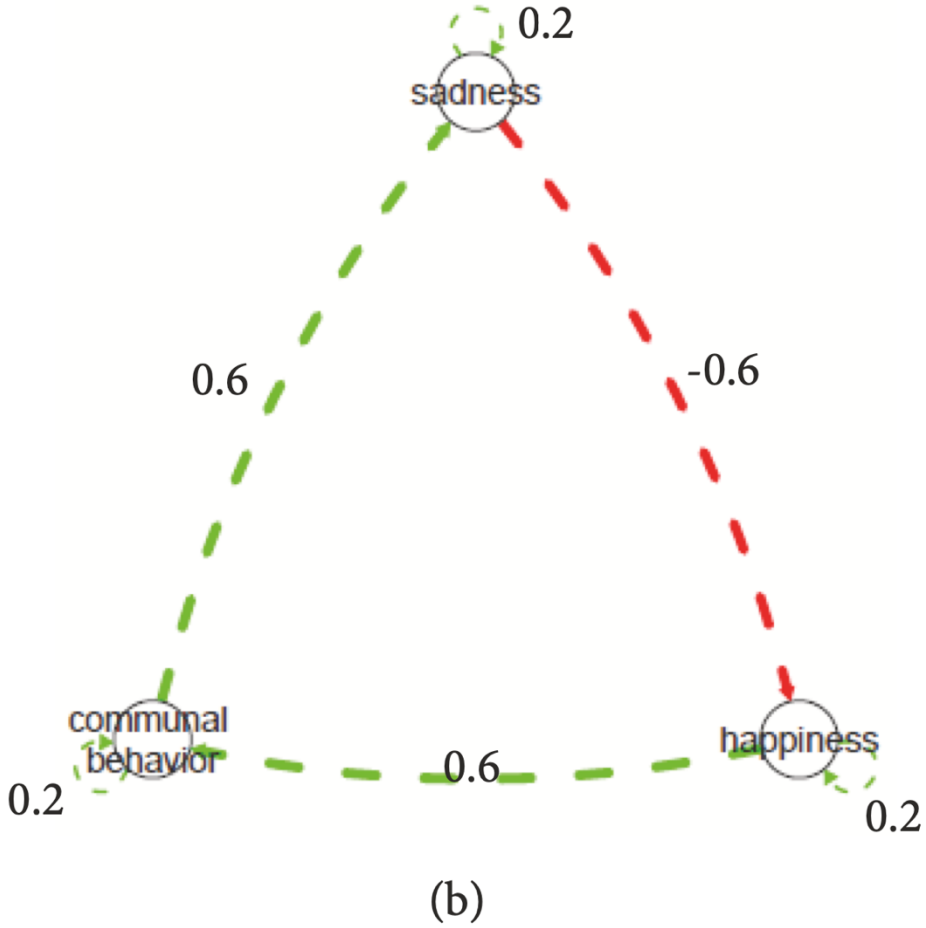

a
D = 0
D = -1
D = 1
t-2
t-1
t
t+1
t+2
t+3
t+4
k
j
i
t+4
t+3
t+2
t+1
t
t-1
t-2
j
i
k



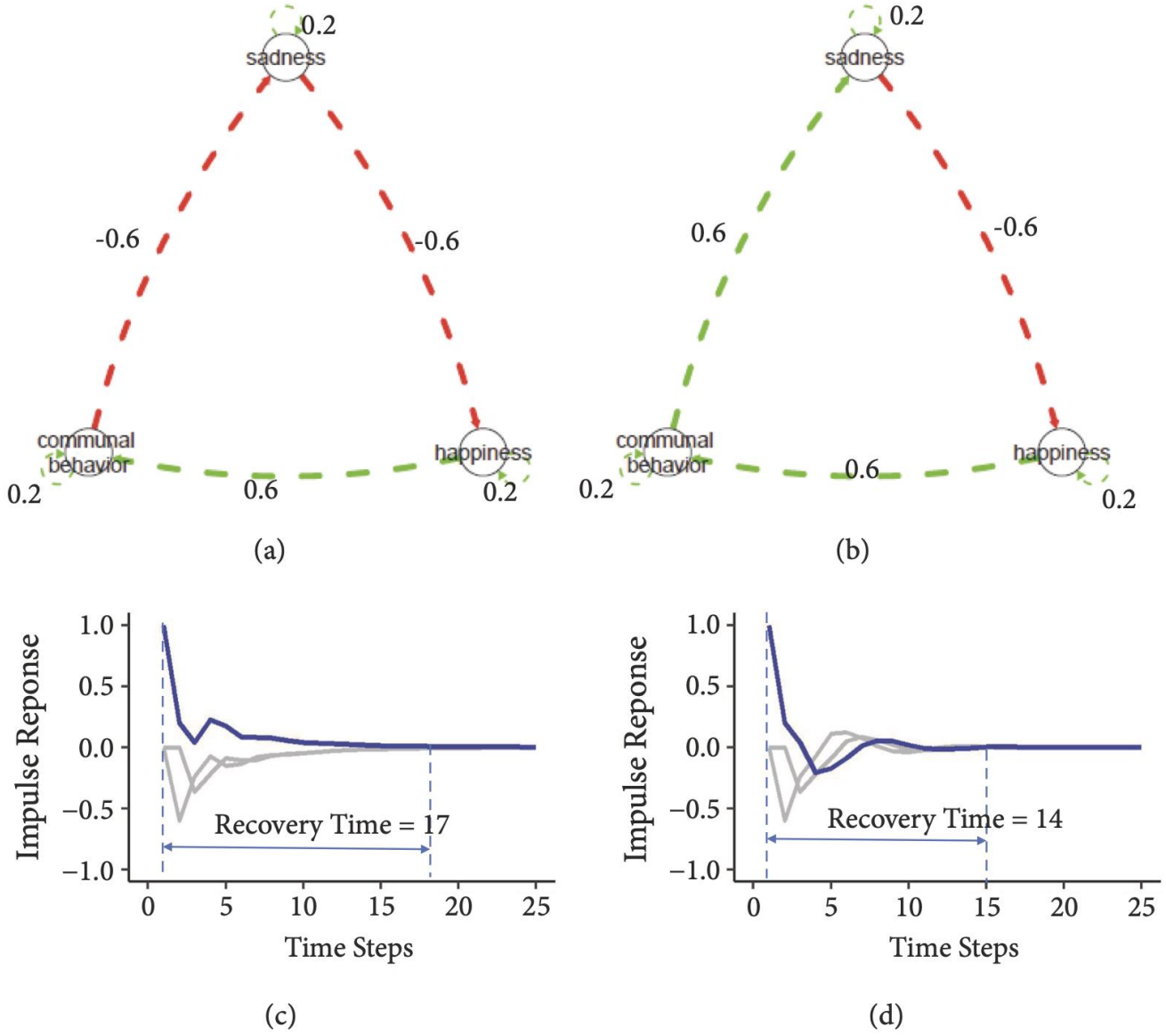
Wu, L., Wang, D., & Evans, J. A. (2019). Large teams develop and small teams disrupt science and technology. *Nature*, *566*(7744), 378–382. https://doi.org/10.1038/s41586-019-0941-9


0.2
sadness
-0.6
-0.6
communal
behavior
happiness
0.2
0.6
0.2

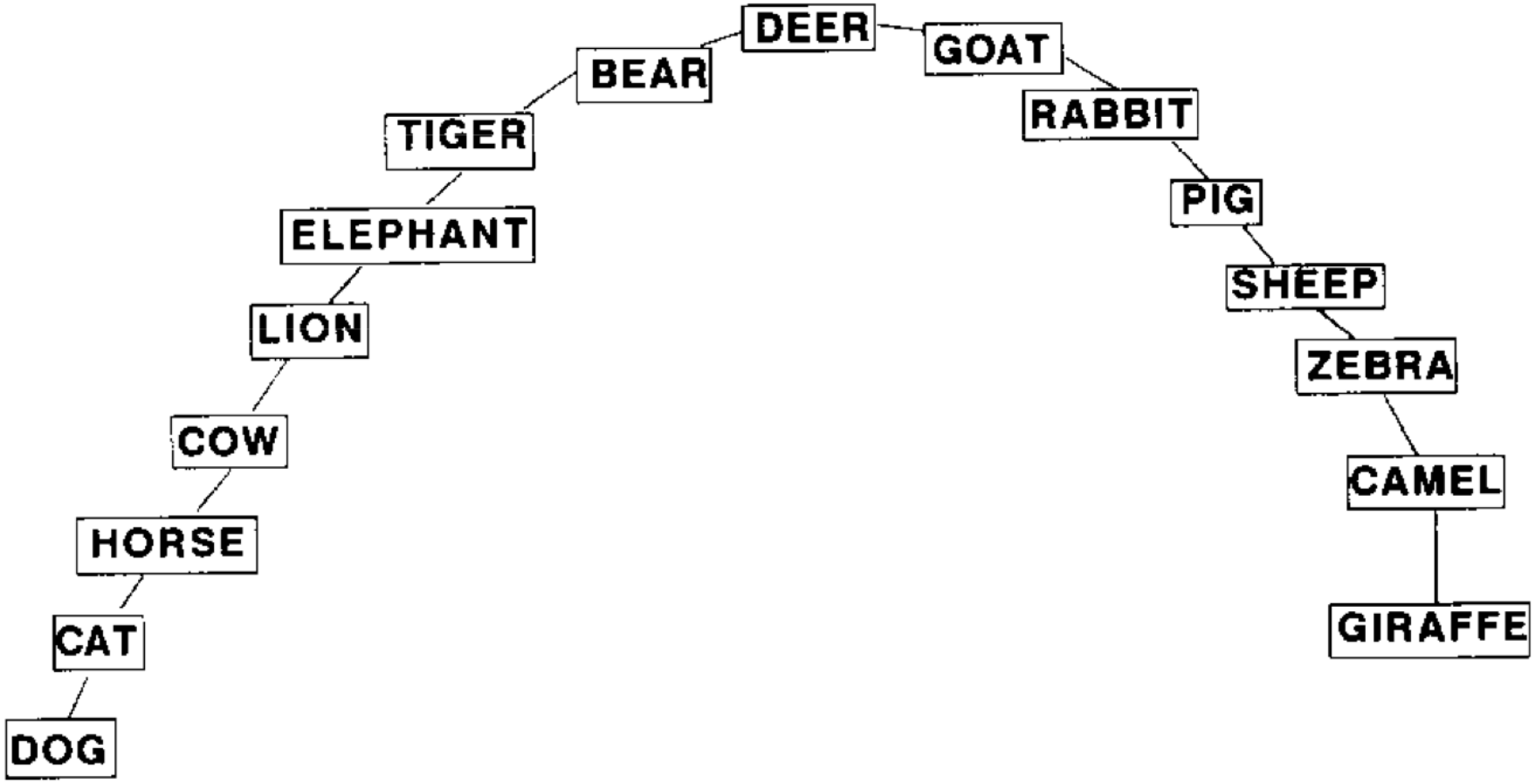
(a)

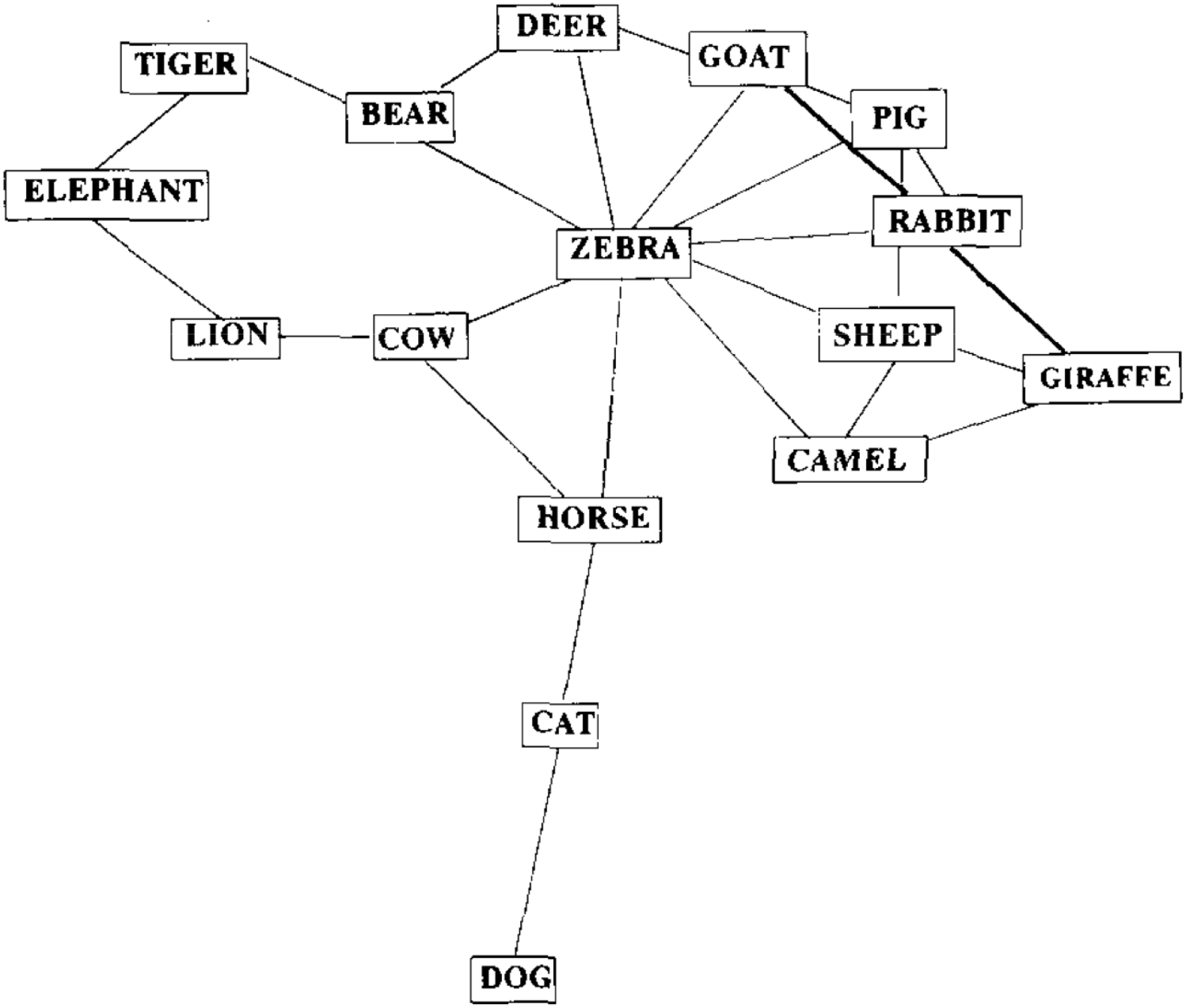

0.2
sadness
0.6
-0.6
communal
behavior
happiness
0.2
0.6
0.2

(b)



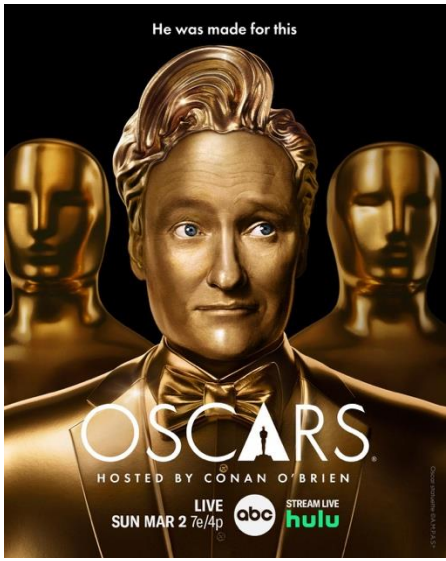
Yang, X., Ram, N., Gest, S. D., Lydon-Staley, D. M., Conroy, D. E., Pincus, A. L., & Molenaar, P. C. M. (2018). Socioemotional dynamics of emotion regulation and depressive symptoms: A person-specific network approach. *Complexity*, *2018*(1), 5094179. https://doi.org/10.1155/2018/5094179


DEER
BEAR
GOAT
TIGER
RABBIT
ELEPHANT
PIG
LION
SHEEP
COW
ZEBRA
HORSE
CAMEL
CAT
GIRAFFE
DOG


DEER
TIGER
GOAT
BEAR
PIG
ELEPHANT
RABBIT
ZEBRA
LION
COW
SHEEP
GIRAFFE
CAMEL
HORSE
CAT
DOG

Brainstorm Time - What Networks Could Be?

- Pick a topic
- Think of a network
- What's the node? What's the tie?
- Node size/color? Tie width/color?
- What will it tell us?



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