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The complexities of social integration in a diverse society

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Increasing diversity: opportunities and risk

- Increasing ethnic and cultural diversity in western societies (in particular in Europe).
  - E.g. proportion non-western immigrants in NL doubled since 1975 (about 10% now)
- Opportunities
  - broader base of human capital
  - better social and economic integration across societies
- Risks
  - increasing social and economic inequality
  - social segregation, lack of normative consensus, conflicts

Interethnic contact and societal integration

- Contact and prejudice
  - Contact theory (Allport, Pettigrew):
    contact reduces prejudice
- Contact and social influence
  - Social influence (typically) reduces disagreement

⇒How much contact is there between different ethnic / racial / social groups in society, and which factors influence interethnic contact?

Homophily and segregation

"birds of a feather flock together"⇒ *homophily*

"people prefer to associate with others who are similar to themselves, which produces segregation in people's social networks along a variety of core demographic statuses, including race/ethnicity, age, education and income"

DiPrete, Gelman, McCormick, Teitler and Zheng, forthcoming in *American Journal of Sociology*

Some studies showing homophily:

Billy et al., 1984; Coleman, 1961; Blau, 1977; McPherson and Smith-Lovin, 1987; McPherson et al., 2001.

Interethnic contact in the Netherlands

Leisure time contact (Survey Integration Minorities, 2006)

	More with own group	Never with other group
Turks	66%	35%
Moroccans	54%	30%
Surinamese	31%	14%
Native-Dutch	91%	52%

Source: Annual report on integration 2007,
Social and Cultural Planning Office (SCP)

Contact primarily within own group

Similar results from other studies

(e.g. LAS)

Network segregation in society at large

- "it is remarkable how little hard evidence we have about the extent to which Americans have contact with people who differ from themselves…"

  DiPrete e.a. forthcoming in *American Journal of Sociology*

- Existing research limited
  - either only "strong" social ties (e.g. marriage, friendship…), *or*
  - addresses only specific settings (e.g. school classes)
- Conventional approach in network research:
  - Provide information on names and characteristics of your acquaintances, friends, …
  - Limits: number of names, reliability, confidentiality

Approach of DiPrete et al.

- Questions in 2006 General Social Survey:
  - "How many of the people that you are *acquainted with* are (African-American, Hispanic, …)"
  - "How many of the people that you *trust* are are (African-American, Hispanic, …)"
  - How many of the people that you are acquainted with are named …(Kevin, Karen, Jose, …)

⇒ large difference between people's answers (overdispersion) indicates lack of intergroup contact

⇒ name questions used to assess size of person's network

⇒ based on this, assess how much answers differ from what would be expected under random mixing (negative binomial model)

Preprint available at http://www.columbia.edu/~tad61/phily01042010.pdf

Some results on overdispersion

	Acquaintances		Trust		Work	
	Median	IQR	Median	IQR	Median	IQR
Asians	8.2	(1.3)	5.6	(1.0)	9.0	(1.8)
Blacks	10.7	(1.7)	6.8	(0.8)	10.7	(2.0)
Hispanics	8.8	(1.3)	7.2	(1.2)	12.8	(2.2)
Whites	44.5	(12.3)	9.9	(1.6)	29.7	(10.7)

Source: Table 3, DiPrete e.a. forthcoming in AJS

Example:

Standard deviation of #black acquaintances is about 3 times larger than under random mixing

$\Rightarrow$ indicates high segregation in the sense that people differ widely in how many blacks they know: some few, some many.

Some further results on segregation in U.S.

- Race and ethnicity are an important divide in American's social networks, but not necessarily the biggest one. Religiosity is about as big a divide.

- Racial and ethnic segregation despite multiple opportunities for intergroup contact in modern life.
  - "Outside of the family, race and ethnic segregation are generally of comparable size within the neighborhood, voluntary associations, and the workplace" DiPrete e.a. AJS

Which policies might help to reduce segregation?

The answers are (sometimes) complex.

Example school segregation (NL)

› Half of all primary schools in 4 biggest cities are "black schools" (> 50% immigrant students)
› Current policy in NL: encourage "mixing"

Friendship segregation in ethnically mixed schools

› Considerable degree of "ethnic homophily" in mixed schools
› The larger the minority proportion (the more 'mixing'), the stronger is observed ethnic segregation in friendship choices
  - US: e.g. Moody 2001, Quillian & Campbell 2003, Add Health Data
  - NL: e.g. Lubbers 2003

Modelling the dynamics of friendship networks

Effects of opportunity for in-group selection

› Larger minority, more opportunity for interethnic dyads
  • Feld & Carter 1998
› But: also more opportunity to "flock together" for minority
  ⇒ Minority size may increase segregation merely through opportunity given preference for in-group choice.

Our approach (Flache & Stark 2008)
(arXiv:0901.2825v1 [physics.soc-ph])

• Model theoretically mechanism driving network dynamics.
  ⇒ Agent based computational model based on SIENA (Snijders et al).

The general model (based on SIENA, Snijders et al)

- N agents, p_{min} proportion minority, Nx(N-1) dyads.
- Dichotomous network ties: $y_{ij} \in \{0,1\}$.
- In every discrete time step:
  - Select randomly an agent i
  - Calculate for every dyad $ij_{i \neq j}$ the utility of the network that results when toggling y_{ij}
  - Select one action probabilistically: toggle dyad ij with

$$p_{ij}(o_j) = \frac{\exp(o_j)}{\sum_l \exp(o_l)}$$

o_j: objective function representing utility of resulting network

$\Rightarrow$Random utility model

Modelling utility: objective function

- Utility of network state $y = \sum_k \beta_k s_{ki}$

- S_{ki}: network statistic for i, β_k corresponding parameter
- Network statistics (in our model):
  - Outdegree i: $s_{0i}(y) = \sum_{j \neq i} y_{ij}$
  - Number of reciprocated ties i : $s_{1i}(y) = \sum_{j \neq i} y_{ij} y_{ji}$
  - Number of ties to own group: $s_{2i}(y) = \sum_{j \neq i} y_{ij}(a_i a_j + (1 - a_i)(1 - a_j))$ (homophily or similarity effect)

Assumptions about preferences

- Agents prefer reciprocated ties $\beta_{1i}=+1$
- Agents prefer in-group ties $\beta_{2i}=+1$

- *Attractiveness of additional tie declines in outdegree*
  - Declining marginal utility

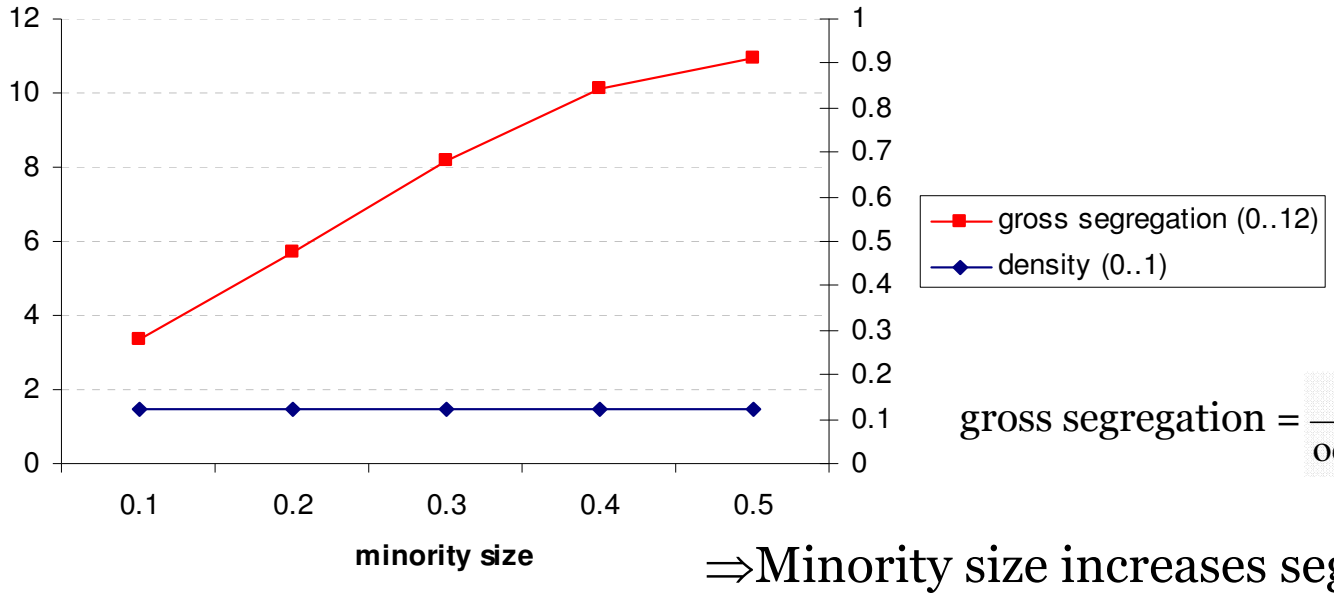
    $\Rightarrow$ Outdegree effect positive at zero, negatively sloped

$$\beta_0(s_{0i}(y)) = \beta_{0,0} + \beta_{0,1}s_{0i}(y), \quad \beta_{0,0} = 10, \beta_{0,1} = -0.5$$

- **Scenario for simulation experiment** (initial conditions)
  - Initial network empty
  - N=100, minority size varied across 0.1, 0.2 …0.5

Results computational experiment

› Mean density and gross segregation
(100 replications, means after 20.000 iterations)



$$\text{gross segregation} = \frac{\text{odds in-group tie}}{\text{odds between-group tie}}$$

⇒Minority size increases segregation

⇒No effect on density

Adding social influence (to homophily)

- **Social influence**
  - a fundamental tendency of people to adapt in social contacts their opinions towards influences from others.
- Can social influence overcome segregation?

  Previous formal social influence models:

  (French, Abelson, Harary…):

  In connected network all agents gradually move towards emergent *consensus*

  ⇒ but they do not assume homophily. What if we add this?

  ⇒we integrated homophily

  (Flache, Macy, 2006, arXiv:physics/0604201).

Combining homophily and social influence

› Like earlier models (French etc) we use *Social Influence*:

Move towards average opinion of influential neighbours (gradual convergence possible)

$$q_{iF,t+1} = q_{iF,t} + \frac{1}{C} \sum_{j \in neigh} w_{ijt} (q_{jF,t} - q_{iF,t})$$

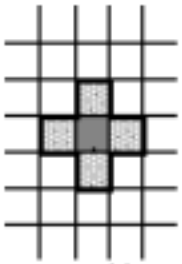
Unlike these earlier models, we assume *Homophily*:

The more overlap *i-j*, the more influence does *j* have

$$w_{ij,t+1} = 1 - \frac{\sum_{f=1}^{F} \left| q_{ift} - q_{jft} \right|}{\text{MaxDist}}, \quad 0 \le w \le 1$$

Embedding social influence and homophily in a spatial framework

- Agents are embedded in spatial grid
- Every agent is influenced only by local neighbours
  - *Repeat in random sequence*:
    1. Select some *agent* for a possible interaction.
    2. Selected agent adapts opinion



(a)
von Neumann neighbourhood

This is similar to the well known *Axelrod (1997)* model of cultural dissemination, but differs in two crucial ways:

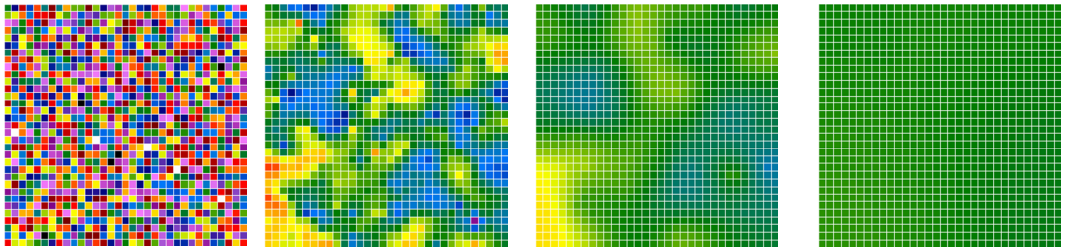
- we allow for *gradual convergence* (continuous features)
- social influence is exerted by all neighbours simultaneously

How social influence overcomes segregation – despite homophily

The mechanism:

- As long as their distance is not maximal, two agents remain connected and thus influence each other.
- Maximal distance is very unlikely from random start

⇒ Segregation in short run, emergent consensus *in long run in connected network*



initial | *t*=5 000 | *t*=20 000 | t = 500 000

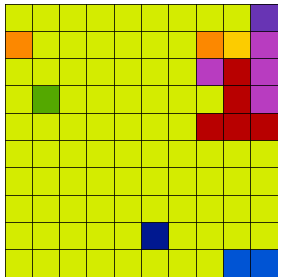
F=1, Q=10.000,

N=32x32, rad 1

Axelrod (1997) and extensions: different result

- Similar assumptions:
  - homophily
  - social influence
  - spatial interaction
- Extensions

  De Sanctis & Galla 2009, Phys Rev E
  - Metric features
  - External noise



Diversity is possible equilibrium state

(original Axelrod for F=5,Q=15, N=10x10)

Important difference: we assume gradual convergence ("blending")

Evidence for persistent social diversity empirical examples (1)

Political and social views in the US

› Glaeser & Ward (2007) analyzed data from PEW 1987–2003 Values Survey (≈ 2500 respondents) and concluded

"America is a country with remarkable geographic diversity in its habits and beliefs. People in different states have wildly different views about religion, homosexuality, AIDS, and military policy, as well as wildly different consumption patterns…The extent and permanence of cultural divisions across space is one of America's most remarkable features."

Quoted from Glaeser, Edward L. and Bryce A. Ward. 2006. "Myths and Realities of American Political Geography", *Journal of Economic Perspectives* 20(2), pp. 119-144.

Regional clustering of political and social views in the US

A: Beliefs—Fraction of States Respondents Who Agree with the Given Statement:

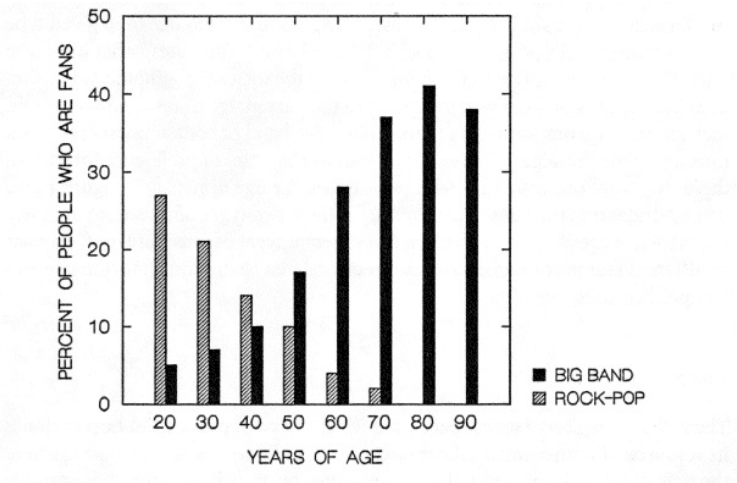
1. State	*N*	*Schools Should Have Right to Fire Homosexual Teachers*	*2. State*	*N*	*It is Okay for Blacks and Whites to Date*
Massachusetts	430	0.23	Kentucky	339	0.35
District of Columbia	74	0.26	West Virginia	230	0.40
Connecticut	272	0.26	Tennessee	497	0.41
Maryland	449	0.27	South Carolina	322	0.43
New Jersey	588	0.29	Alabama	382	0.46
West Virginia	230	0.54	Oregon	240	0.77
Oklahoma	261	0.56	California	1860	0.77
Tennessee	514	0.60	Delaware	58	0.79
Arkansas	226	0.61	Maine	124	0.81
Mississippi	283	0.65	District of Columbia	74	0.88

Table 1 from Glaeser, Edward L. and Bryce A. Ward. 2006. "Myths and Realities of American Political Geography", *Journal of Economic Perspectives* 20(2), pp. 119-144.

Clustering in socio-demographic space and diversity:

Socio-demographic characteristics and music taste

- Mark 1998 (cf. 2003) analyzed respondents' liking of 18 different music styles from 1993 General Social Survey (≈ 1600 respondents).
- For example: Clustering of music preference in age group



Source: p. 458, in: Mark, N. 1998. "Birds of a Feather Sing Together." *Social Forces*(77):453-85.

What could explain persistent diversity *with blending*? Heterophobia and negative influence

- Previous models assume that agents never change opinions to *increase* similarity
- But: agents may also distance themselves from disliked others
  - social balance theory, cognitive dissonance theory, optimal distinctiveness theory, and
  - empirical evidence for "negative referents", "profiling"

We included heterophobia and negative influence

(Macy, Kitts, Flache, Benard 2003, Flache & Mäs 2008a,b, see also Mark 2003, Jager & Amblard 2004, Baldassari & Bearman 2007)

- Heterophobia
  - if difference too large, relations become negative
- Negative influence
  - If relations are negative, agents increase distance

Heterophobia and negative influence included in the model.

Positive and negative social influence:

Influential neighbours "pull" or "push" depending on weight i-j:

$$q_{if,t+1} = q_{if,t} + \frac{1}{C}\sum_{j \in neigh} w_{ijt}(q_{jf,t} - q_{if,t}), \quad -1 \le w_{ijt} \le +1$$

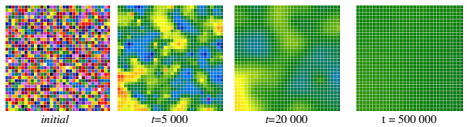
Homophily and heterophobia:

Low overlap *i-j*: negative weight, high overlap: positive weight

$$w_{ij,t+1} = 1 - \frac{2\sum_{f=1}^{F}\left|q_{ift} - q_{jft}\right|}{\text{MaxDist}}, \quad -1 \le w_{ijt} \le 1$$

How heterophobia and negative influence generate persistent polarization

› Simulation experiments
(N=32x32, F=2, Q=10.000, radius 6)



⇒ Without heterophobia and negative influence: monoculture

⇒ With these assumptions: Polarization is likely equilibrium outcome, but only two extreme opinions survive

› Explanation
- Agents who disagree initially with many others move away from their "enemies" towards extreme end of opinion scale
- Their "friends" follow them, their enemies move in opposite direction: emergent polarization.
- More features, more opinions survive

A strategy to avoid polarization?

Timing of structure in settings with demographic dissimilarity (Flache & Mäs 2008a,b)

- We assume that overlap i-j depends on both demographic and opinion (dis)similarity

$$w_{ij,t+1} = 1 - \frac{2\left(\sum_{d=1}^{D}\left|q_{idt} - q_{jdt}\right| + \sum_{f=1}^{F}\left|q_{ift} - q_{jft}\right|\right)}{\text{MaxDist}}, \quad -1 \le w_{ijt} \le 1$$

D fixed demographic features,

F changing opinion features

- Higher demographic dissimilarity
  $\Rightarrow$ higher likelihood of negative relation
- To avoid polarization, initially keep highly dissimilar actors apart!

Computational experiments (Flache & Mäs, 2008, CMOT)

r = strength of faultline

4 homogenous subgroups aka "caves"

	r = 0.8			r = 0.6			r = 0.4			r = 0.2			r = 0		
i*	attr. A_1	attr. A_2	attr. A_3	attr. A_1	attr. A_2	attr. A_3	attr. A_1	attr. A_2	attr. A_3	attr. A_1	attr. A_2	attr. A_3	attr. A_1	attr. A_2	attr. A_3
1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
3	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1
4	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1
5	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	-1	1
6	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	-1	1	-1	1	-1
7	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	1	-1	-1	1	-1
8	-1	-1	-1	-1	-1	1	-1	1	-1	-1	1	-1	-1	1	-1
9	-1	-1	1	-1	1	-1	-1	1	-1	-1	1	1	-1	1	1
10	-1	1	-1	-1	1	1	-1	1	1	-1	1	1	-1	1	1
11	1	-1	-1	1	-1	-1	1	-1	-1	1	-1	-1	1	-1	-1
12	1	1	1	1	-1	1	1	-1	-1	1	-1	-1	1	-1	-1
13	1	1	1	1	1	-1	1	-1	1	1	-1	1	1	-1	-1
14	1	1	1	1	1	1	1	1	-1	1	-1	1	1	-1	1
15	1	1	1	1	1	1	1	1	1	1	1	-1	1	-1	1
16	1	1	1	1	1	1	1	1	1	1	1	-1	1	1	-1
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-1
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

*Note that actors' numbers *i* in this table do not correspond to those in table 1.

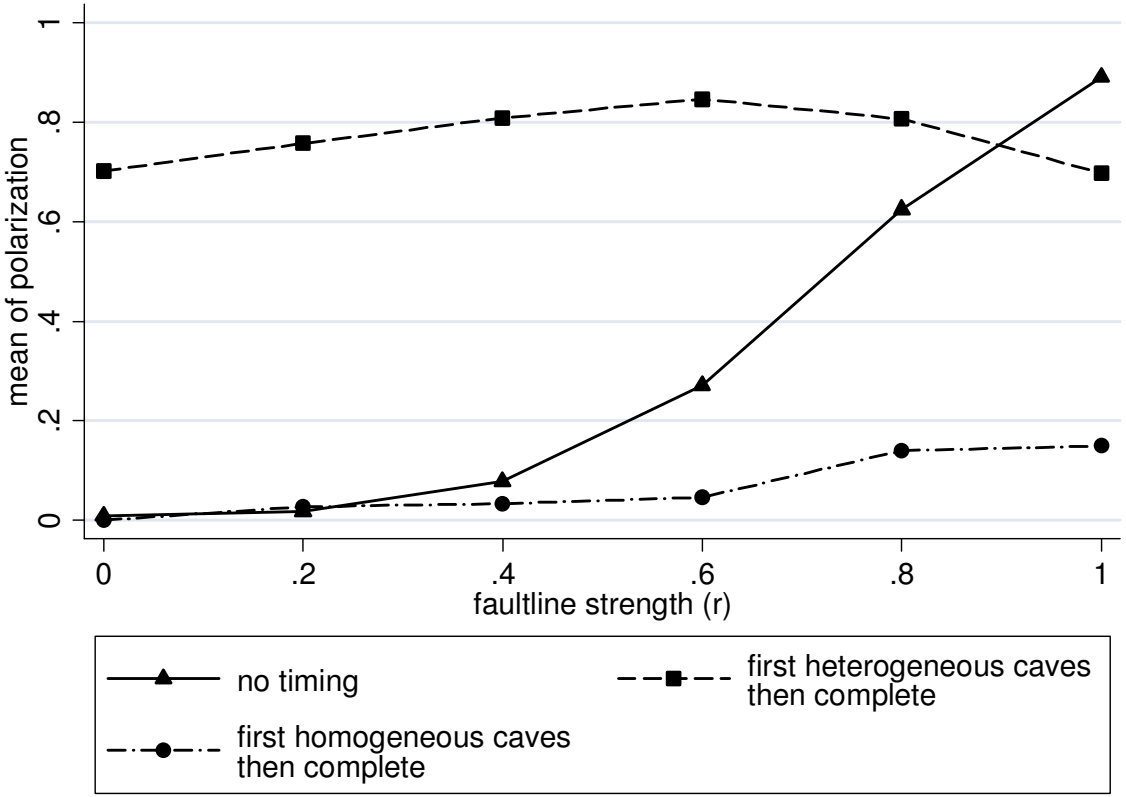
Source:

Flache, A, M. Mäs. 2008. How to get the timing right. Computational and Mathematical Organization Theory 14.1:23-51.

Results: right timing avoids negative faultline effects

500 replications per condition, outcomes measured after 100 iterations per replication

N=20, D=3, F=4



Source:

Flache, A, M. Mäs. 2008. How to get the timing right. Computational and Mathematical Organization Theory 14.1:23-51.

But is negative influence really the problem? Experiments (Takács, Flache, in progress)

We conducted a series of 4 experiments with in total 443 subjects.

Overall design:

We asked subjects' opinions on range of pre-selected issues, numerically scaled.

› E.g. "0..100 percent of immigrants who come to the Netherlands for economic reason should receive a residence permit. "

› We paired subjects systematically varying distance on opinions and other characteristics.

› Subjects were repeatedly exposed to others' opinions, could exchange messages to influence each other, and could then change their opinions.

› Attractions were also measured repeatedly

› In some conditions, we manipulated initial attraction

- E.g. dictator games, football support, different moral positions

Results

- Homophily + heterophobia
  - Higher opinion distance decreases liking and induces disliking. Supported.
- Positive + negative social influence
  - The more liking, the more opinions converge. If liking, opinion distances decrease. If disliking, opinion distances increase.

    Not supported.
  - Instead: when subjects interact, opinion distances decrease (almost) always!
- Is negative influence irrelevant for polarization?
  - Premature. But: it remains a challenge to study "us vs them" dynamics in controlled lab conditions.
  - And it remains the challenge to identify its empirical conditions.

And there are more mechanisms that play a role

- **Bounded confidence** *(Deffuant, Weisbuch, Hegselmann, Krause)*
- **Persuasive argument theory**

  (Mäs, Flache, Takács, Jehn, under review)

  Opinions are shaped by arguments, arguments are exchanged in interaction.
  - The more similar agents are, the more they interact.

    ⇒Interaction with similar others reinforces existing opinion tendencies, which reinforces interaction between similar others, ...
    ⇒ polarization...,
- **Stubborn extremists** *(Deffuant, Amblard,Weisbuch,Faure, 2002)*
  - Extremists are not open to influence, but moderates are...
- **Social identity theory**: "distinctiveness" "individualism"

  (e.g. Salzarulo 2006; Mäs, Flache, Helbing, under review).

Finally

- Polarization may be tempered and integration be fostered by social policies that support 'optimal' interaction structures, but…
- which structure might be optimal is strongly dependent on the mechanism that underlies societal diversity.
- A range of mechanisms have been proposed
  - How do the mechanisms relate to each other, how do they differ in the conditions under which integration or polarization is predicted? ⇒ Theoretical quest continues
  - Which mechanism applies under which conditions in the real world? ⇒ (More) high quality, longitudinal data on influence and attraction dynamics are needed (both lab and field).