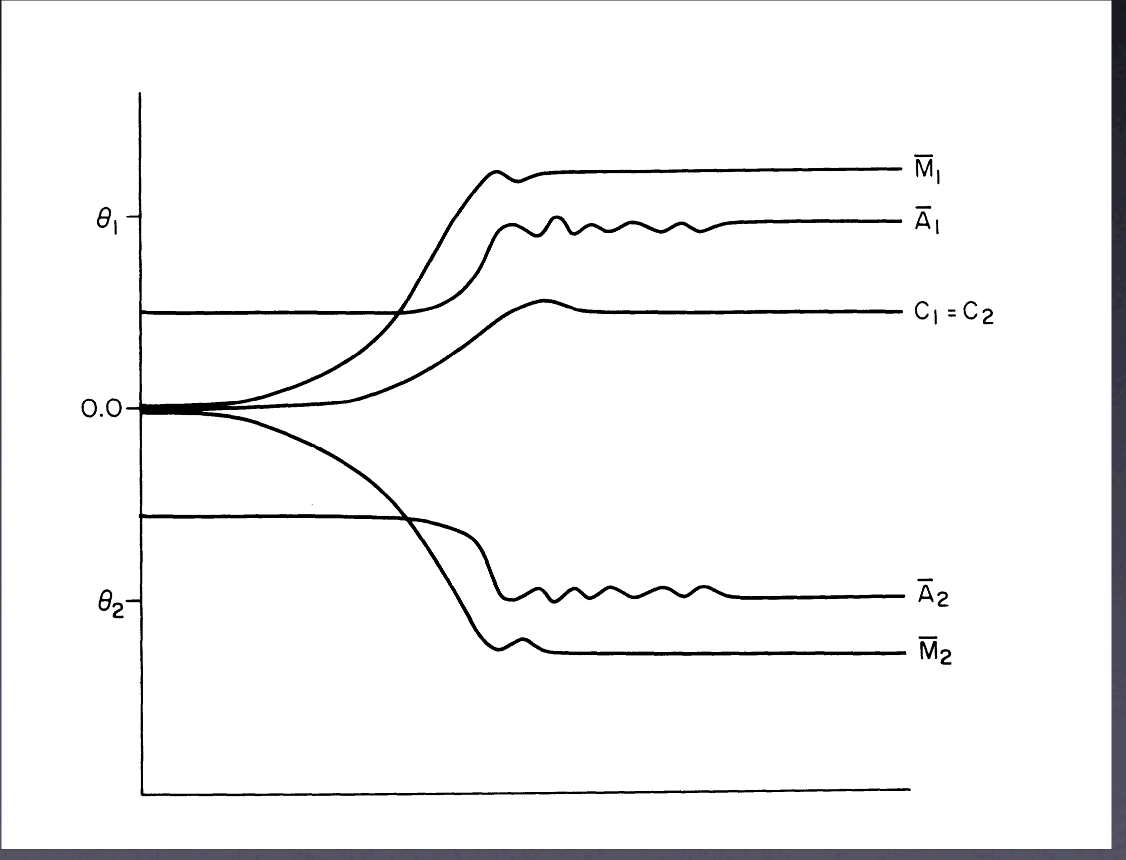
the evolution of ethnic markers in the lab

charles efferson

rafael lalive



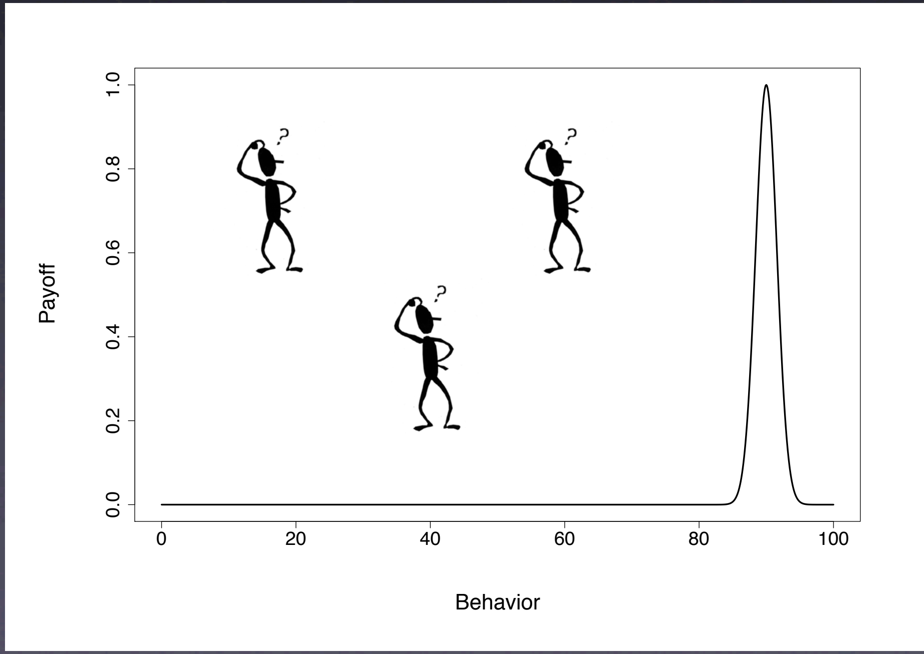
Boyd and Richerson, 1987

what exactly is an in-group member?



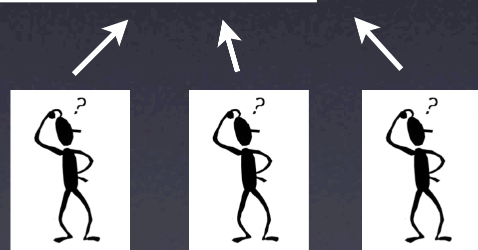

Pando
Peru
Brasil
Beni
La Paz
Cochabamba
Santa Cruz
Oruro
Potosi
Chuquisaca
Tarija
Paraguay
Chile

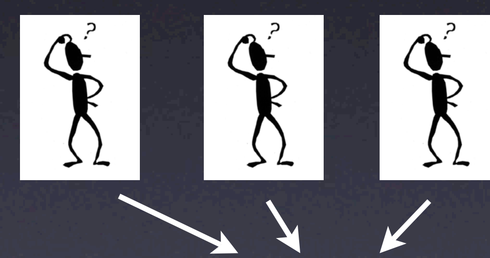
local and exotic interactions in a complex world (Boyd and Richerson 1987)



local and exotic interactions in a world of norms (McElreath et al. 2003)

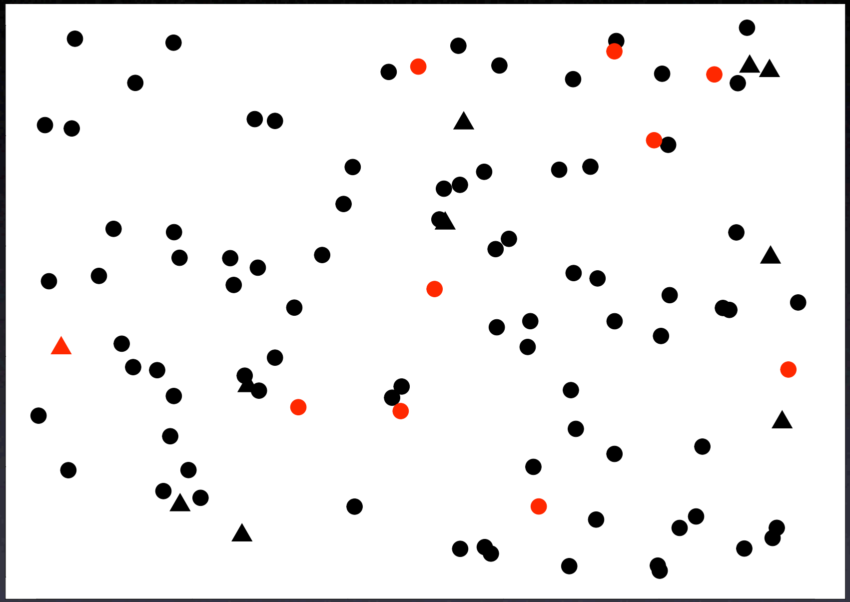
$1 + \delta$	1
1	$1 + \delta$



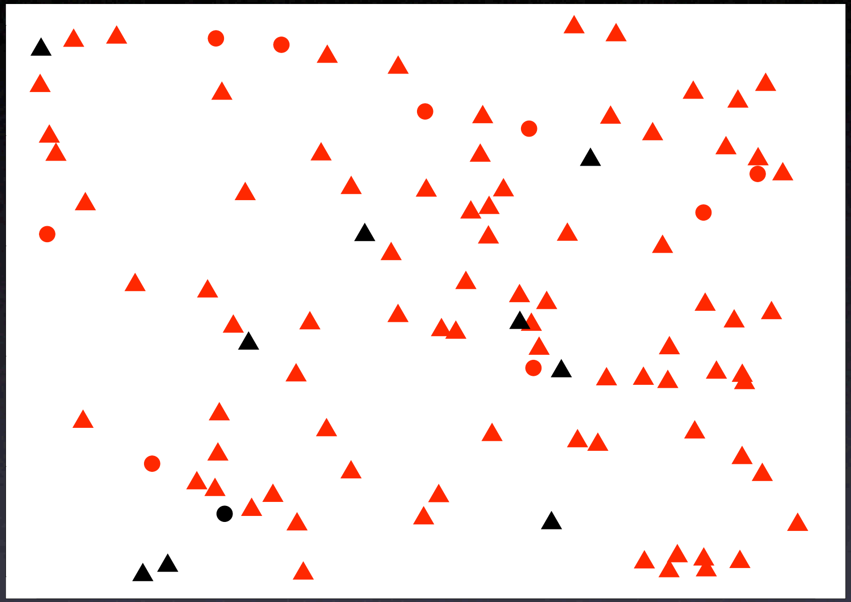


$1 + \delta$	1
1	$1 + \delta$

key idea: migration creates covariance where it didn't exist before



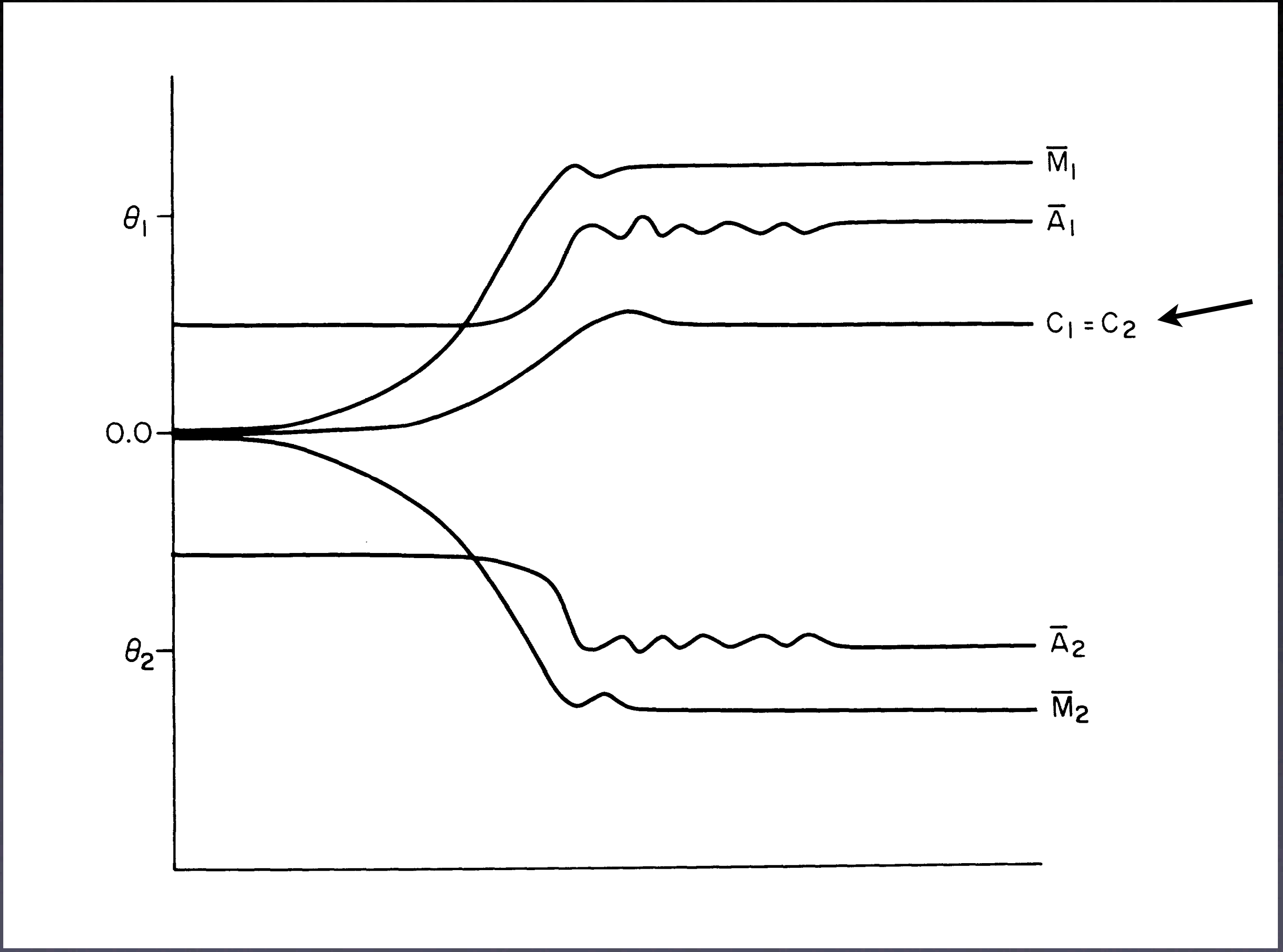
81 black circles
9 black triangles
9 red circles
1 red triangle



81 red triangles
9 red circles
9 black triangles
1 black circle

If you sample 10 from each sub-population, you'll mainly get black circles and red triangles.
=> covariance between shape and color

dynamically accumulated covariance



there it is!

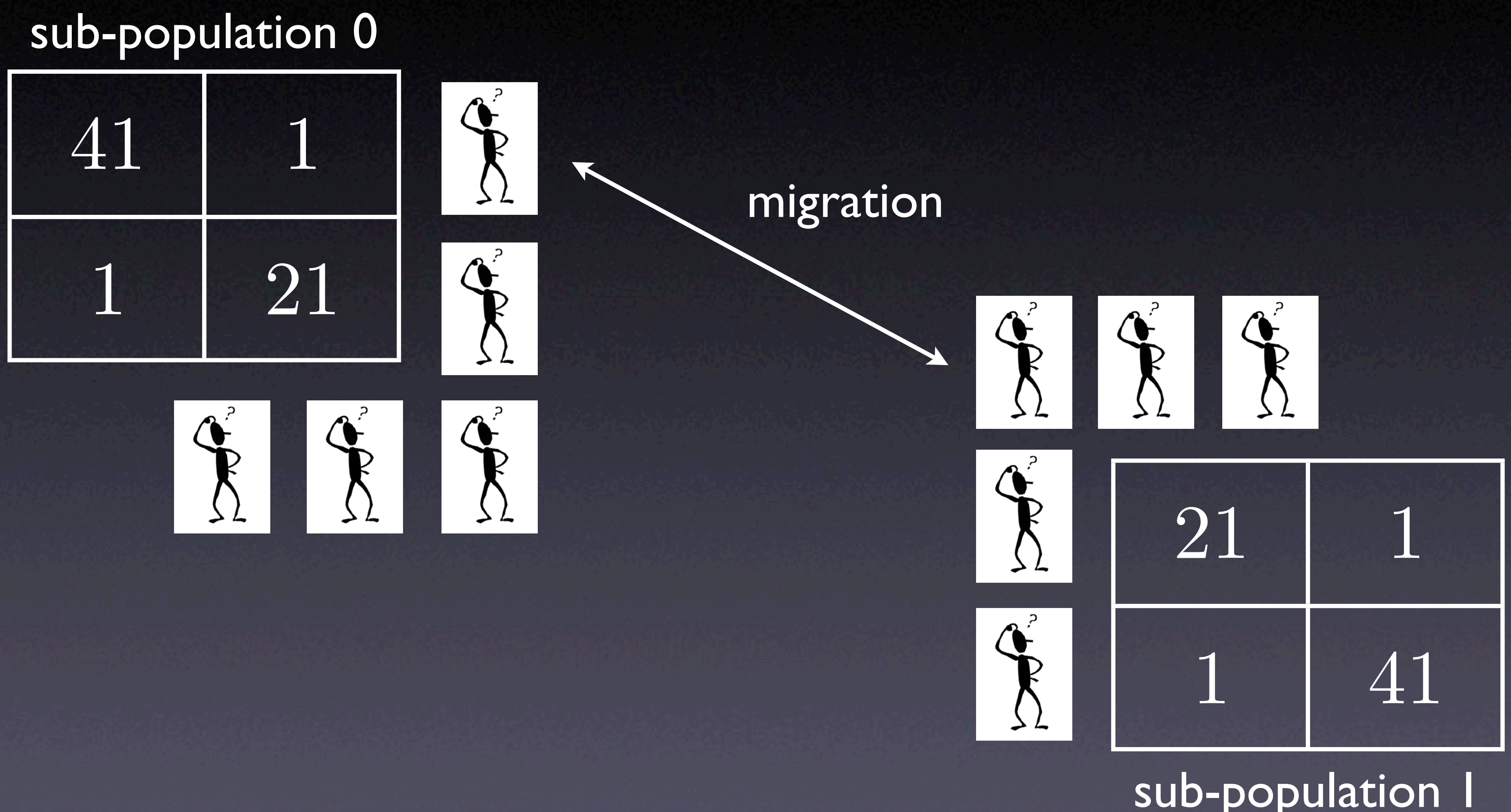
Boyd and Richerson, 1987

local and exotic information in a world of social interactions

- These theories share the feature that individuals are confronted with both local information, which is valuable, and exotic information, which is inappropriate or misleading.
- If the story ends there, individuals have no basis for discriminating between the two types of information, and exposure to information produced outside the local system will limit social learning, performance, norm adherence, etc.
- Biasing social interactions, however, toward individuals with the same arbitrary, symbolic traits (i.e. ethnic markers) can ameliorate the problem in theory. This happens by exploiting an endogenous correlation that develops between different symbolic traits and the origin (local or exotic) of payoff-relevant information. Can the same thing happen in the lab?

basic experimental design

(worlds of 10 divided into 2 sub-populations of 5 with migration)



stage 1

- Period 1: player chooses a {0,1} behavior (“A” or “B”) and a {0,1} shape (“triangle” or “circle”)
- Subsequent periods:

  i) Player reminded of her own lagged behavior, shape, and payoff
  ii) Player views lagged behavior, shape, and payoff of a randomly selected other from the same sub-population
  iii) Player chooses behavior and shape for current period

stage 2

- Blind migration
- Two treatments:

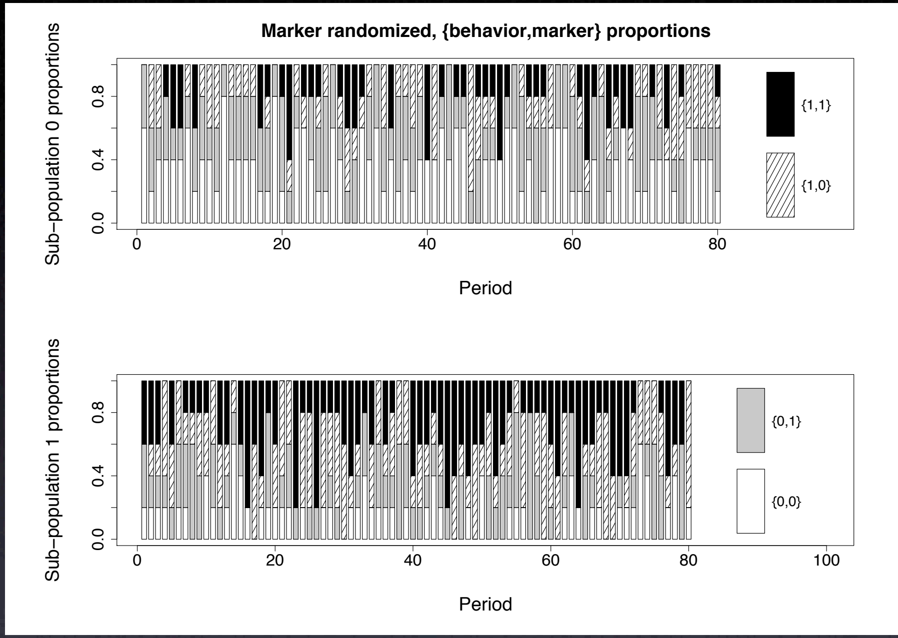
  i) In the *randomized marker treatment*, a shape is randomly assigned to each player regardless of player's stage 1 choice of shape.
  ii) In the *treatment in which the marker is maintained*, this does not happen. The player simply retains her chosen shape.

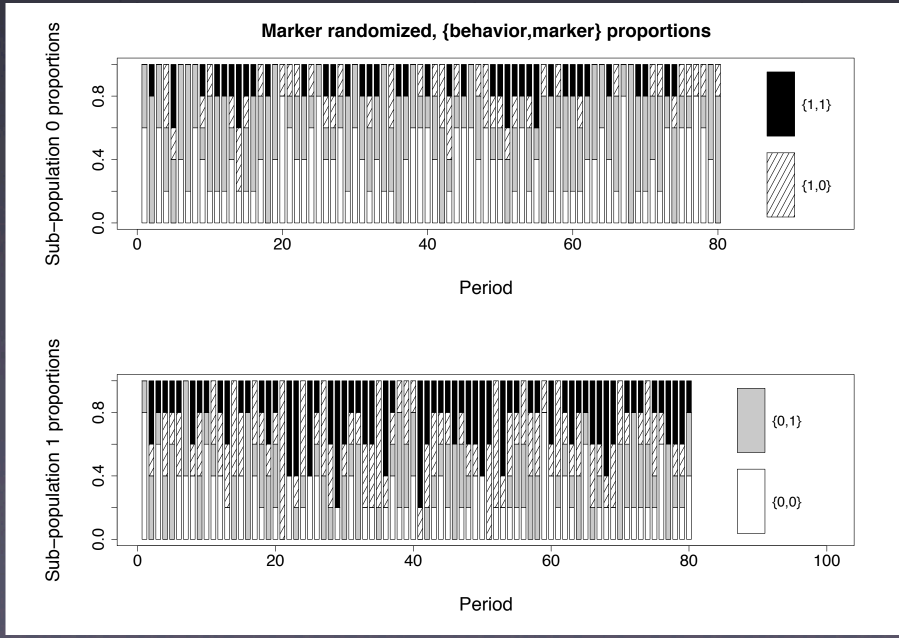
- Player chooses one of the following interaction policies.
  i) If at least one other player in my sub-population ('group') has the same shape I do, randomly select one of these players to be my partner.
  ii) The shape of my partner does not matter. Pair me with any randomly selected player in my sub-population ('group').

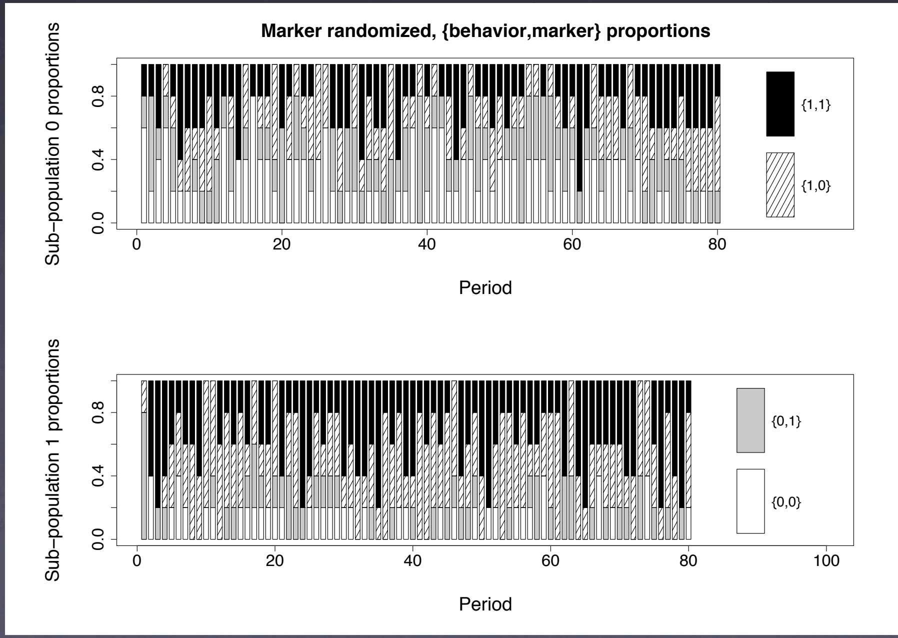
stage 3

- Interactions policies are implemented, players are paired, payoffs assigned.
- Each player is informed if her requested interaction policy was successful and how many points she received.

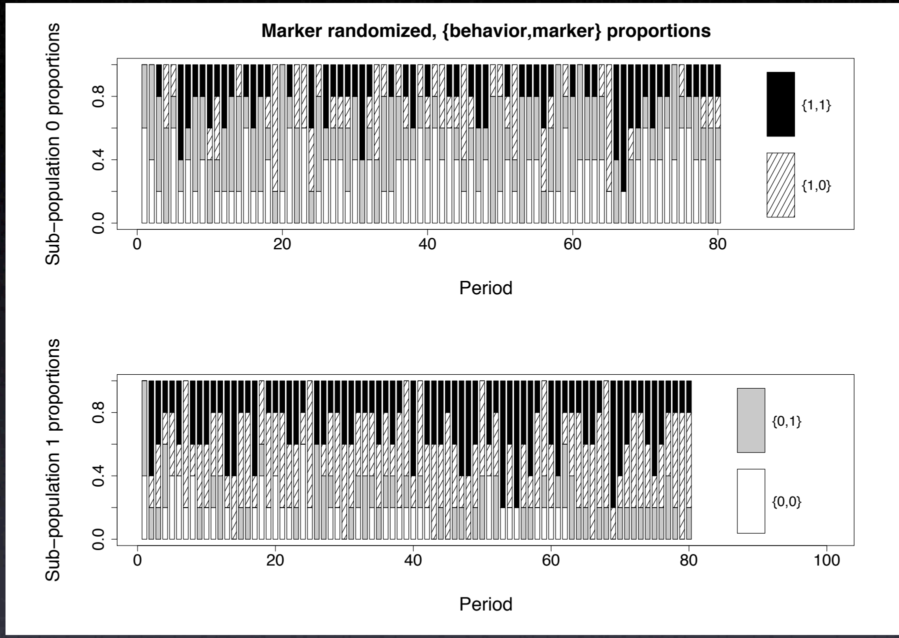
(i) behavior/marker association

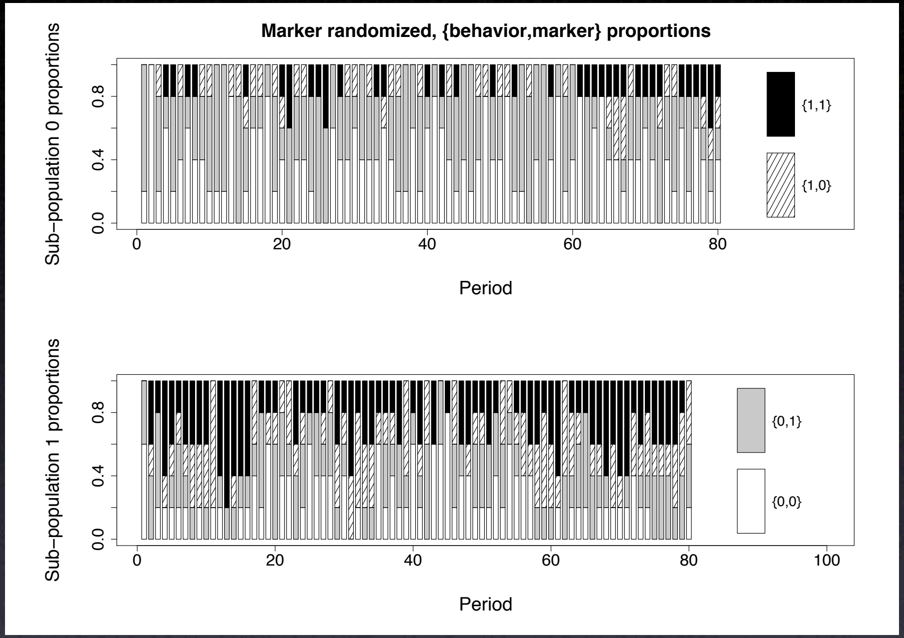


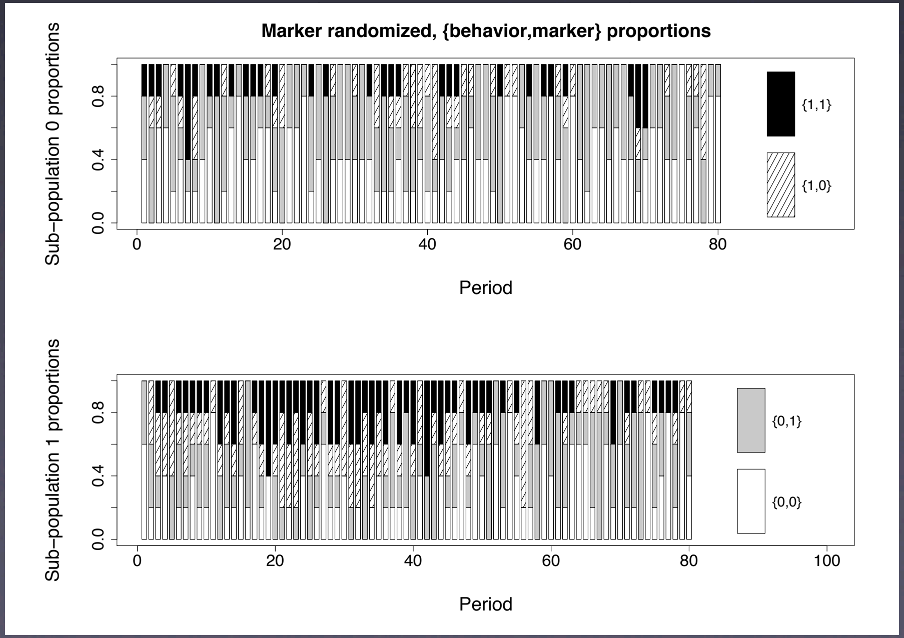




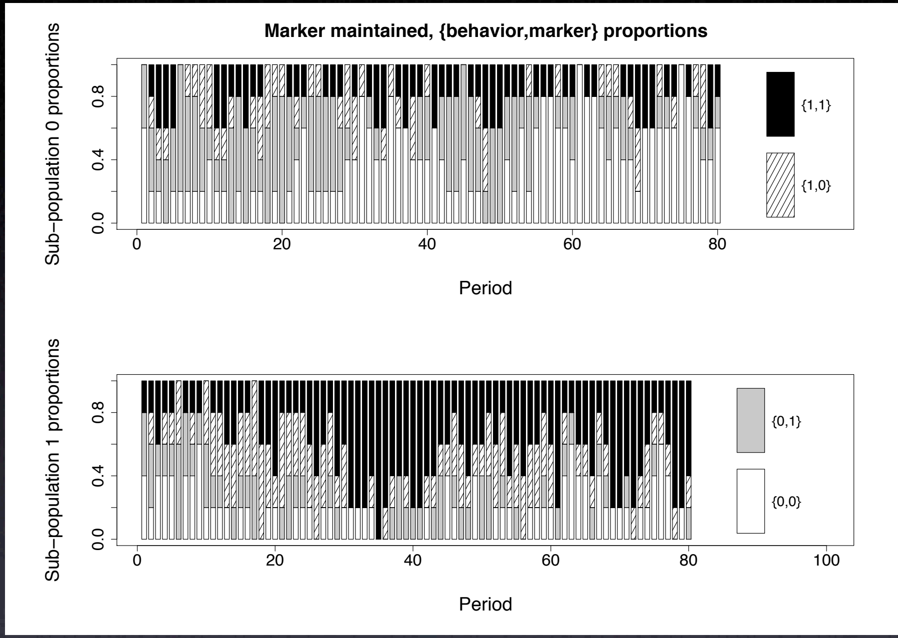
(ii) behavior/marker association

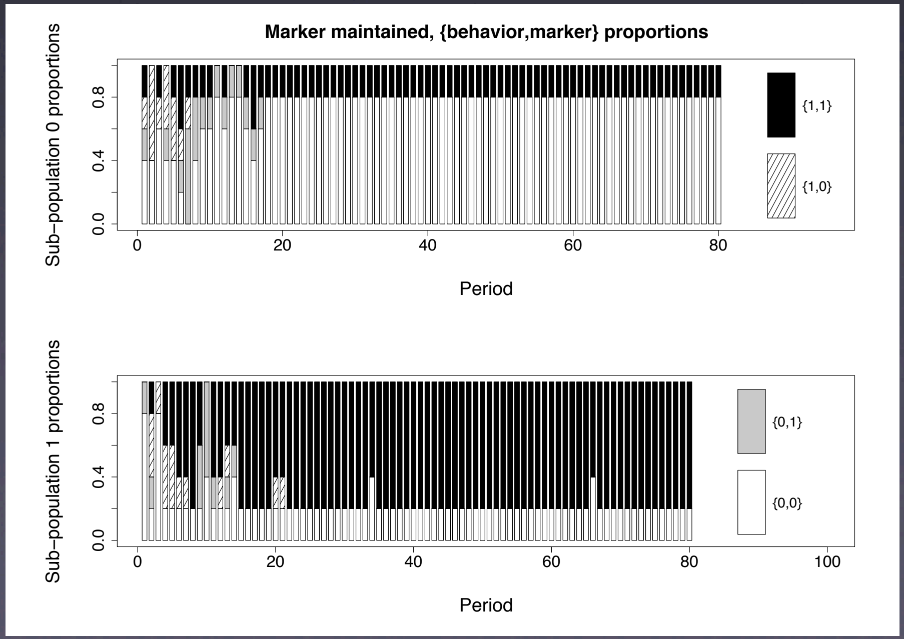


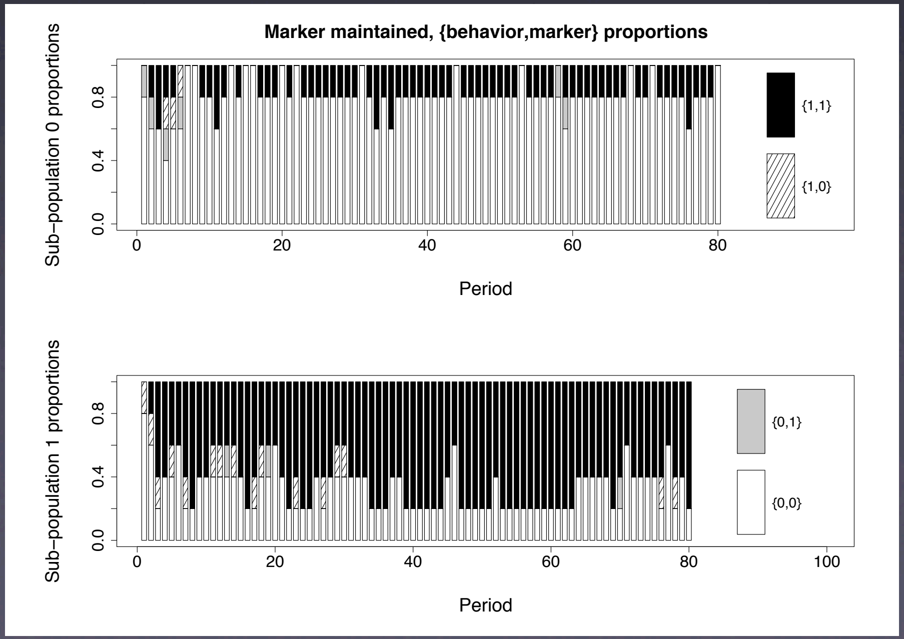




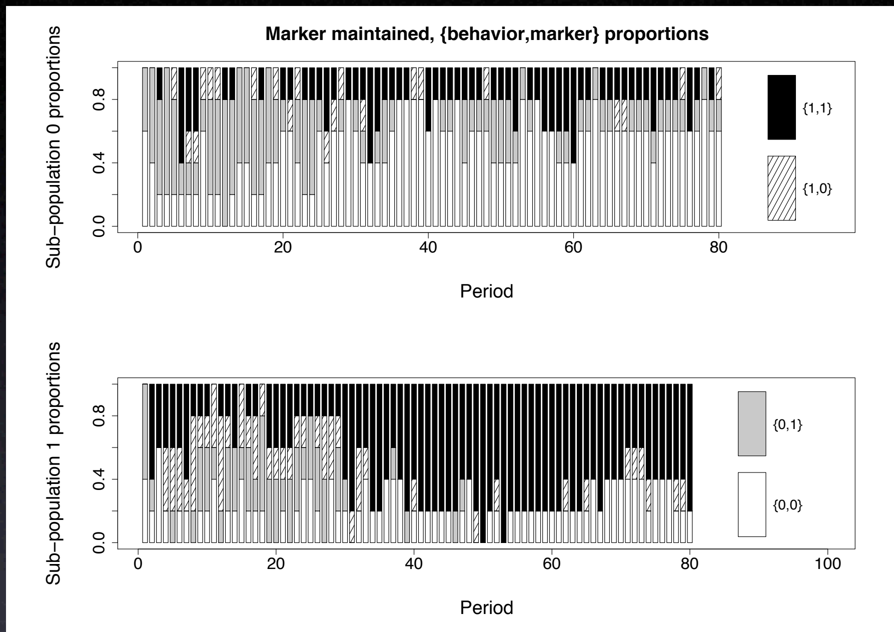
(iii) behavior/marker association

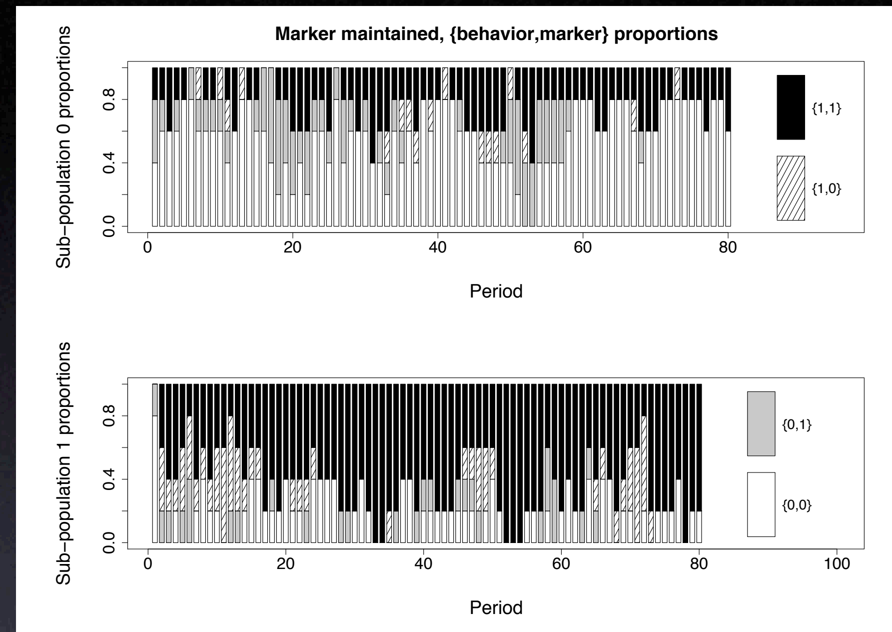


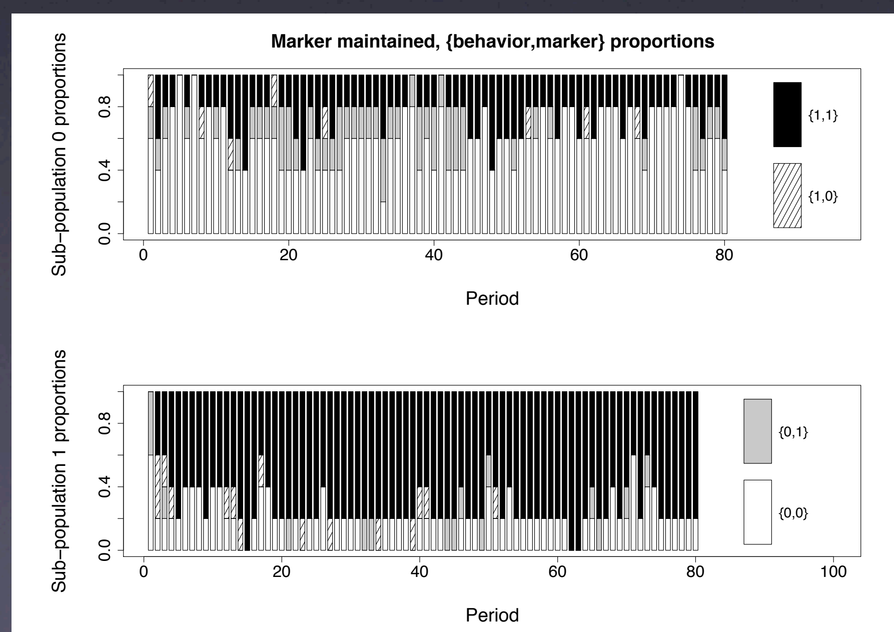




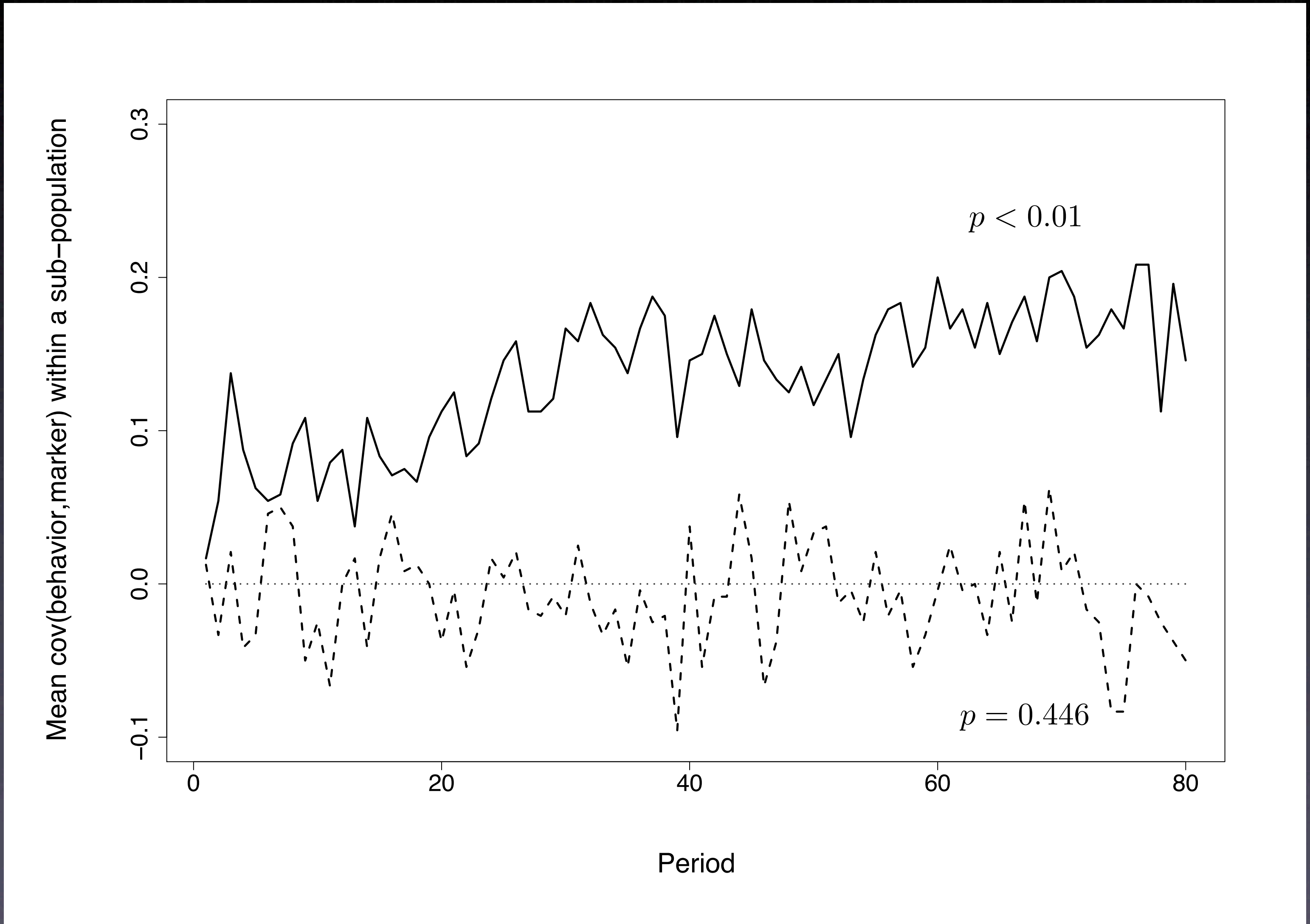
(iv) behavior/marker association



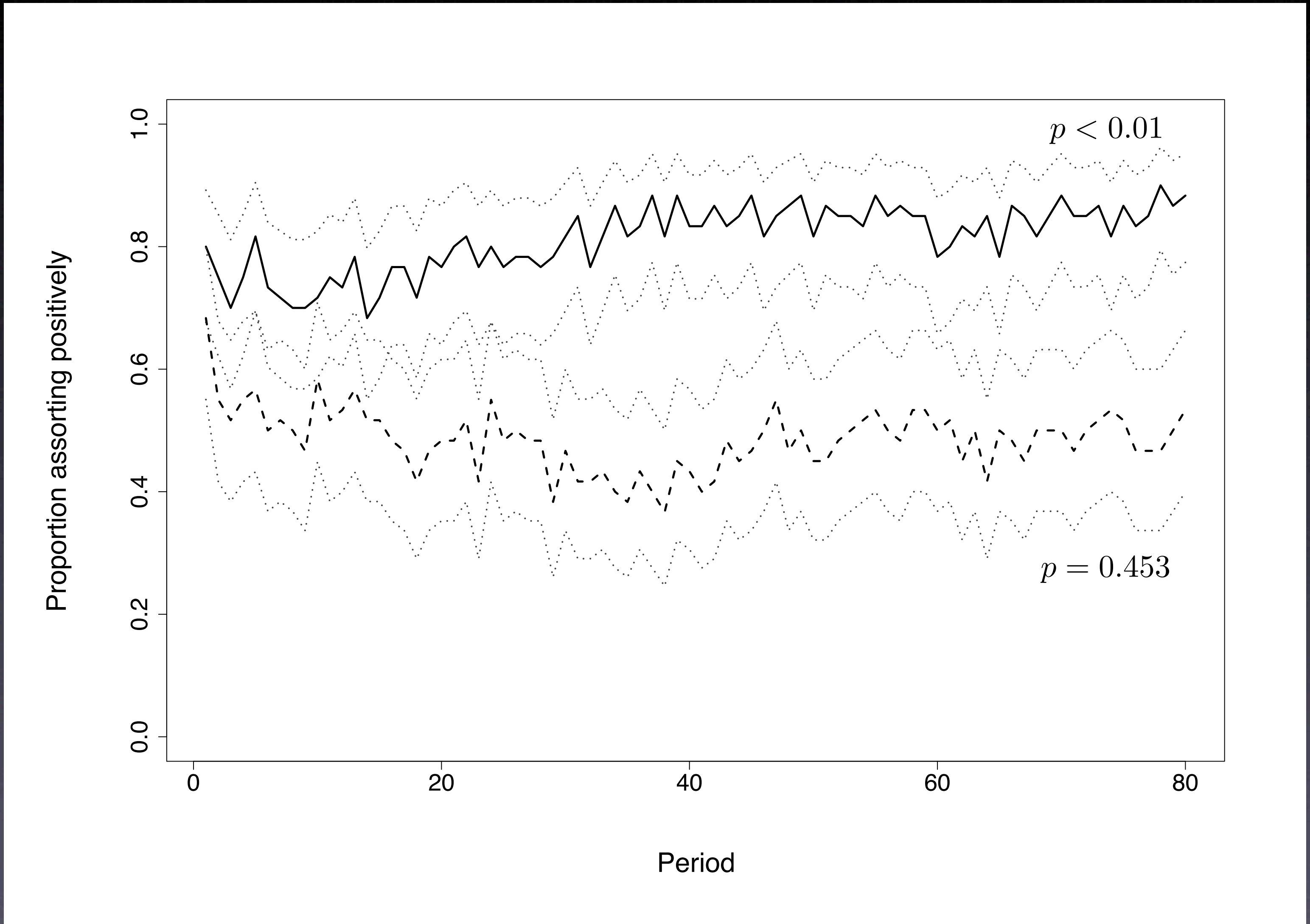




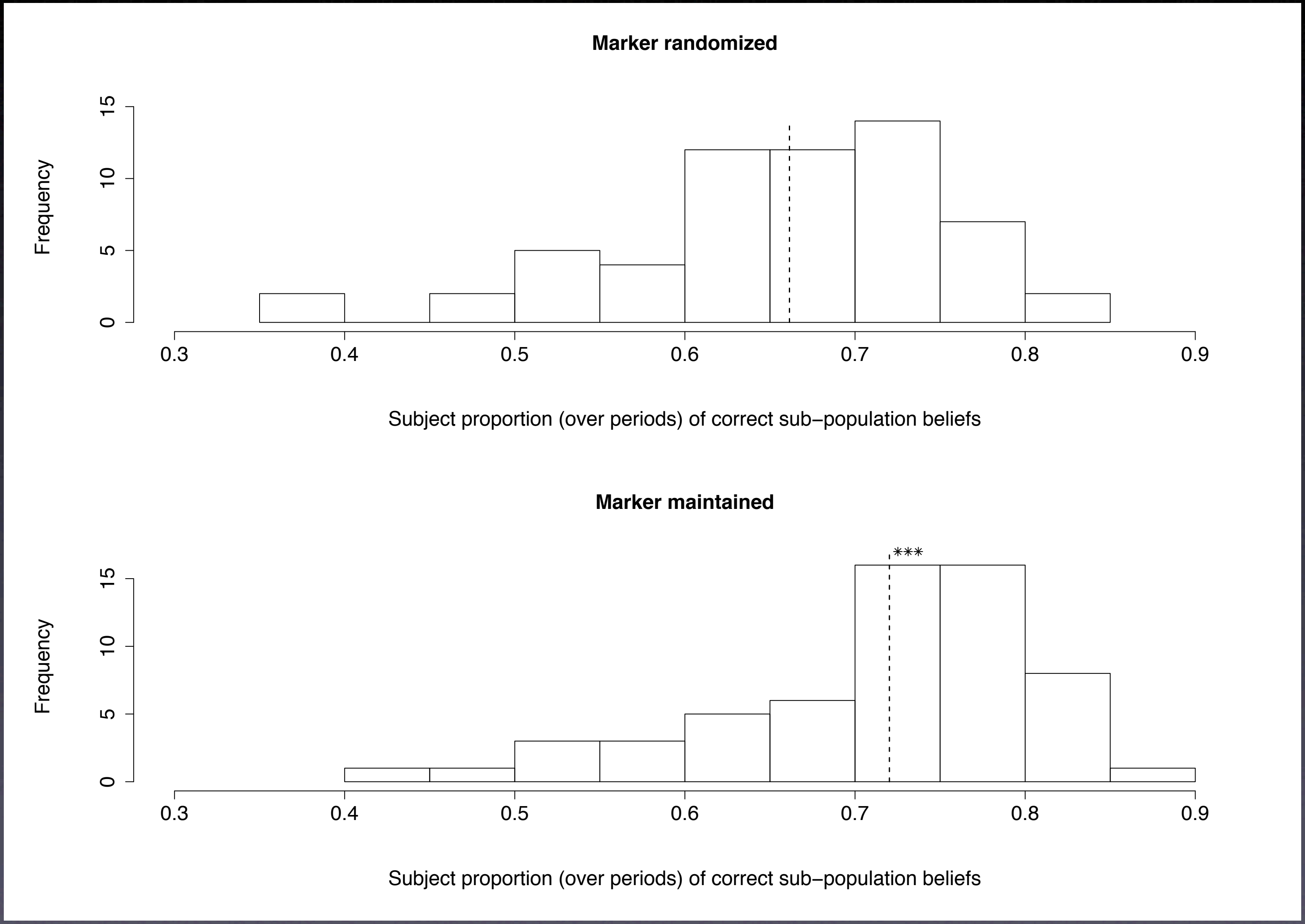
(v) behavior/marker association



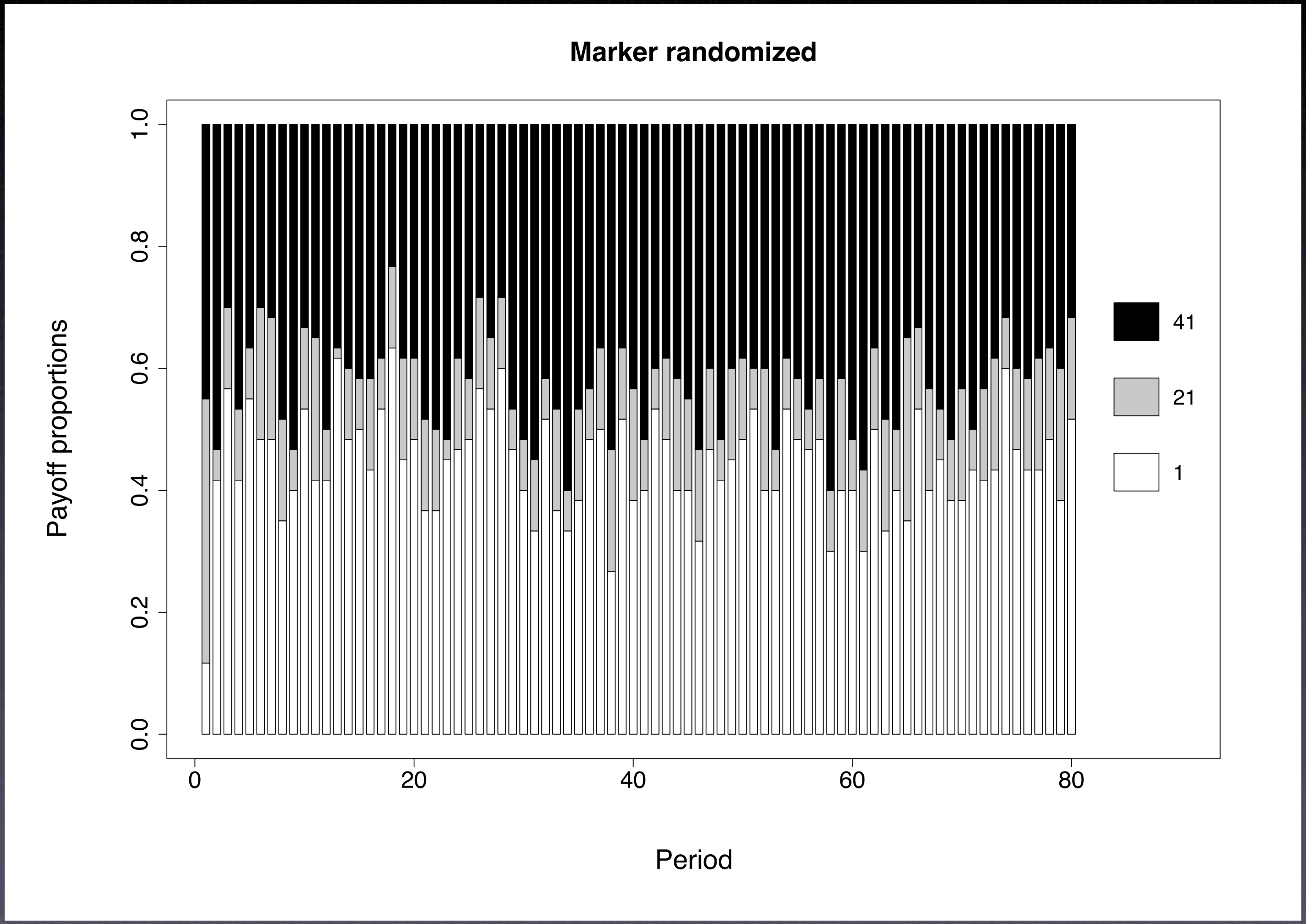
interaction policy dynamics



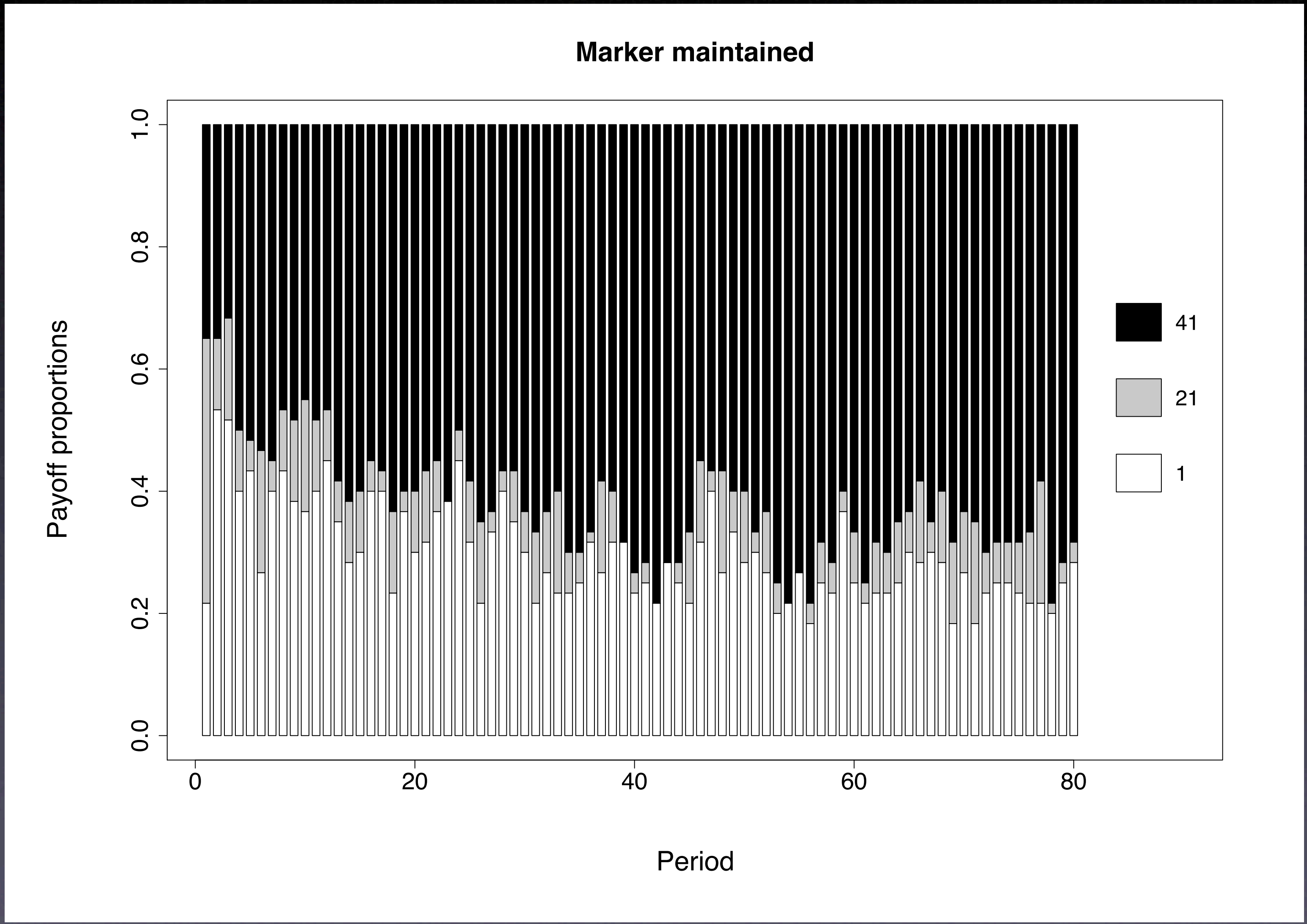
coordinating more with markers improves the accuracy of beliefs . . .



payoffs under irremediable information flow



payoffs under ethnic marking



multinomial logits

$$\Pi_{21,i} \in \{0,1\} \qquad \Pi_{41,i} \in \{0,1\}$$

$$\Pi_{1,i} = 1 - \Pi_{21,i} - \Pi_{41,i}$$

$$\ln\left\{\frac{P(\Pi_{21,i}=1)}{P(\Pi_{1,i}=1)}\right\} = \beta_{21} \cdot x_i$$

$$\ln\left\{\frac{P(\Pi_{41,i}=1)}{P(\Pi_{1,i}=1)}\right\} = \beta_{41} \cdot x_i$$

model fitting . . .

Table 1: Multinomial logit models fit to 9600 observations.

Model	Individual effects	World effects	Period × marker rand.	Period × marker main.	Freq. Pareto opt. behavior	Assort pos. × marker rand.	Assort pos. × marker main.	Beliefs correct	Num. of parameters	AIC$_c$	w_i
1	✓	✓	✓	✓	✓	✓	✓	✓	274	10693.68	0.012
2	✓	✓	✓	✓	✓			✓	270	10715.92	$\ll 0.01$
3	✓	✓			✓	✓	✓	✓	270	10729.24	$\ll 0.01$
4	✓	✓		✓	✓		✓	✓	270	10690.66	0.054
5	✓	✓		✓	✓			✓	268	10717.14	$\ll 0.01$
6	✓	✓			✓		✓	✓	268	10725.02	$\ll 0.01$
7			✓	✓	✓	✓	✓	✓	14	10685.39	0.748
8			✓	✓	✓			✓	10	10770.99	$\ll 0.01$
9					✓	✓	✓	✓	10	10719.62	$\ll 0.01$
10				✓	✓		✓	✓	10	10688.16	0.187
11				✓	✓			✓	8	10768.63	$\ll 0.01$
12					✓		✓	✓	8	10716.01	$\ll 0.01$

model 7

Table 2: Summary of model 7.

Parameter	Point estimate	Std. error	Lower CI	Upper CI
Intercept (21)	3.059	0.170	2.719	3.399
Period $\times$ marker rand. (21)	0.001	0.002	-0.003	0.006
Period $\times$ marker main. (21)	0.011	0.003	0.006	0.017
Freq. Pareto opt. behavior (21)	-7.931	0.279	-8.488	-7.374
Assort pos. $\times$ marker rand. (21)	-0.005	0.114	-0.234	0.224
Assort pos. $\times$ marker main. (21)	0.662	0.137	0.387	0.936
Beliefs correct (21)	-1.841	0.105	-2.052	-1.631
Intercept (41)	-7.788	0.195	-8.178	-7.398
Period $\times$ marker rand. (41)	0.005	0.002	0.002	0.008
Period $\times$ marker main. (41)	0.008	0.002	0.005	0.011
Freq. Pareto opt. behavior (41)	7.273	0.216	6.841	7.706
Assort pos. $\times$ marker rand. (41)	0.034	0.078	-0.123	0.191
Assort pos. $\times$ marker main. (41)	0.773	0.089	0.597	0.952
Beliefs correct (41)	3.039	0.077	2.886	3.193

model 4

Table 3: Summary of model 4.

Parameter	Point estimate	Std. error	Lower CI	Upper CI
Intercept (21)	3.528	0.476	2.577	4.479
Individual effects (21)	(e-mail me!)			
World effects (21)	(e-mail me!)			
Period $\times$ marker main. (21)	0.012	0.003	0.006	0.019
Freq. Pareto opt. behavior (21)	-8.710	0.312	-9.334	-8.086
Assort pos. $\times$ marker main. (21)	0.820	0.256	0.308	1.332
Beliefs correct (21)	-1.972	0.117	-2.205	-1.739
Intercept (41)	-8.750	0.409	-9.569	-7.932
Individual effects (41)	(e-mail me!)			
World effects (41)	(e-mail me!)			
Period $\times$ marker main. (41)	0.010	0.002	0.006	0.014
Freq. Pareto opt. behavior (41)	7.404	0.225	6.954	7.854
Assort pos. $\times$ marker main. (41)	0.7697	0.164	0.442	1.098
Beliefs correct (41)	3.196	0.082	3.031	3.360

conclusion

Yes, it works!