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Poverty Action Lab



TRANSLATING RESEARCH INTO ACTION

How to Randomize?

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Lecture Overview

- Unit and method of randomization
- Why not simple lotteries?
- Revisiting unit and method
- Variations on simple treatment-control

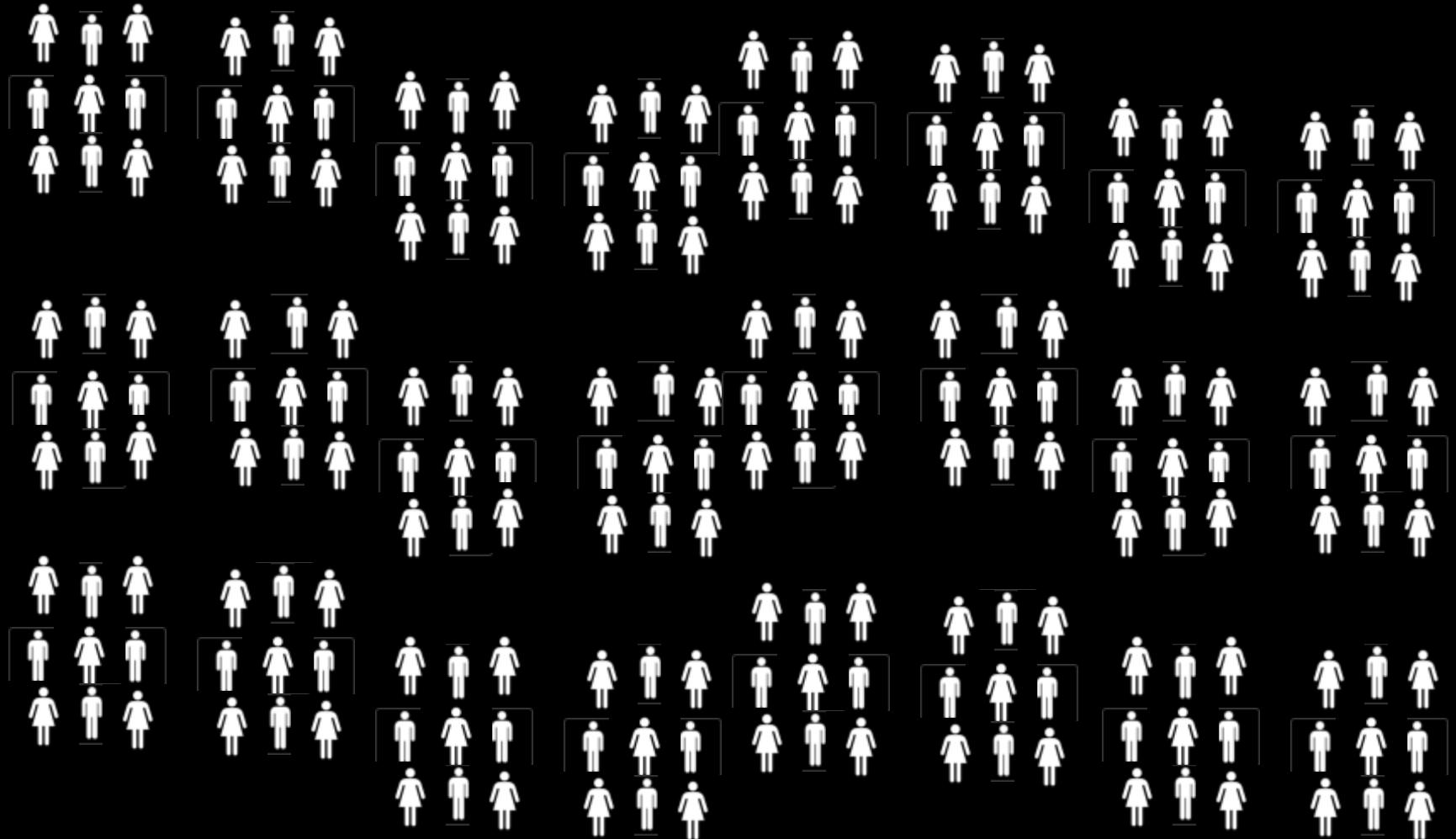
Lecture Overview

- Unit and method of randomization
- Real-world constraints
- Revisiting unit and method
- Variations on simple treatment-control

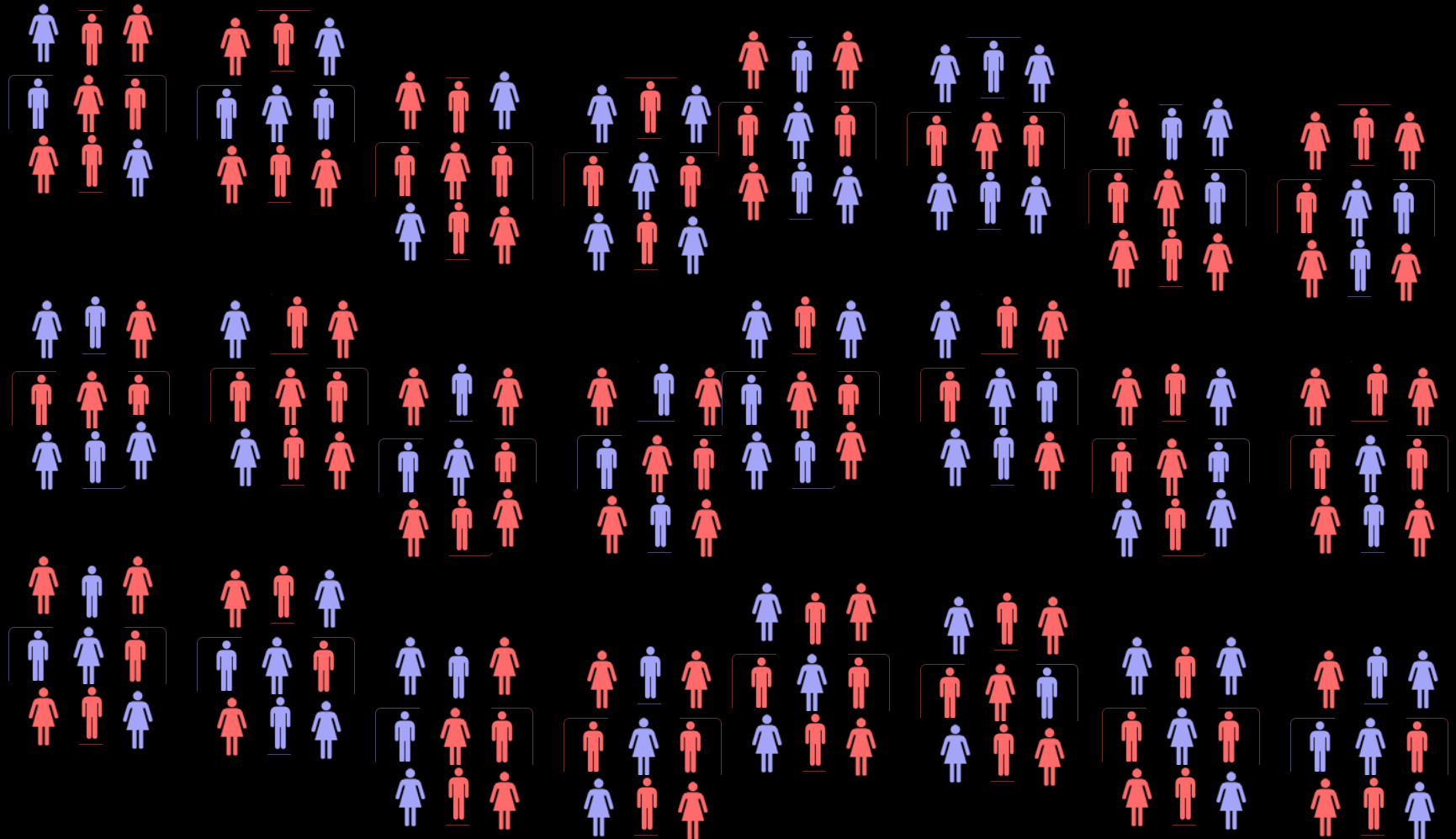
Unit of Randomization: Options

1. Randomizing at the individual level
 2. Randomizing at the group level
“Cluster Randomized Trial”
- Which level to randomize?

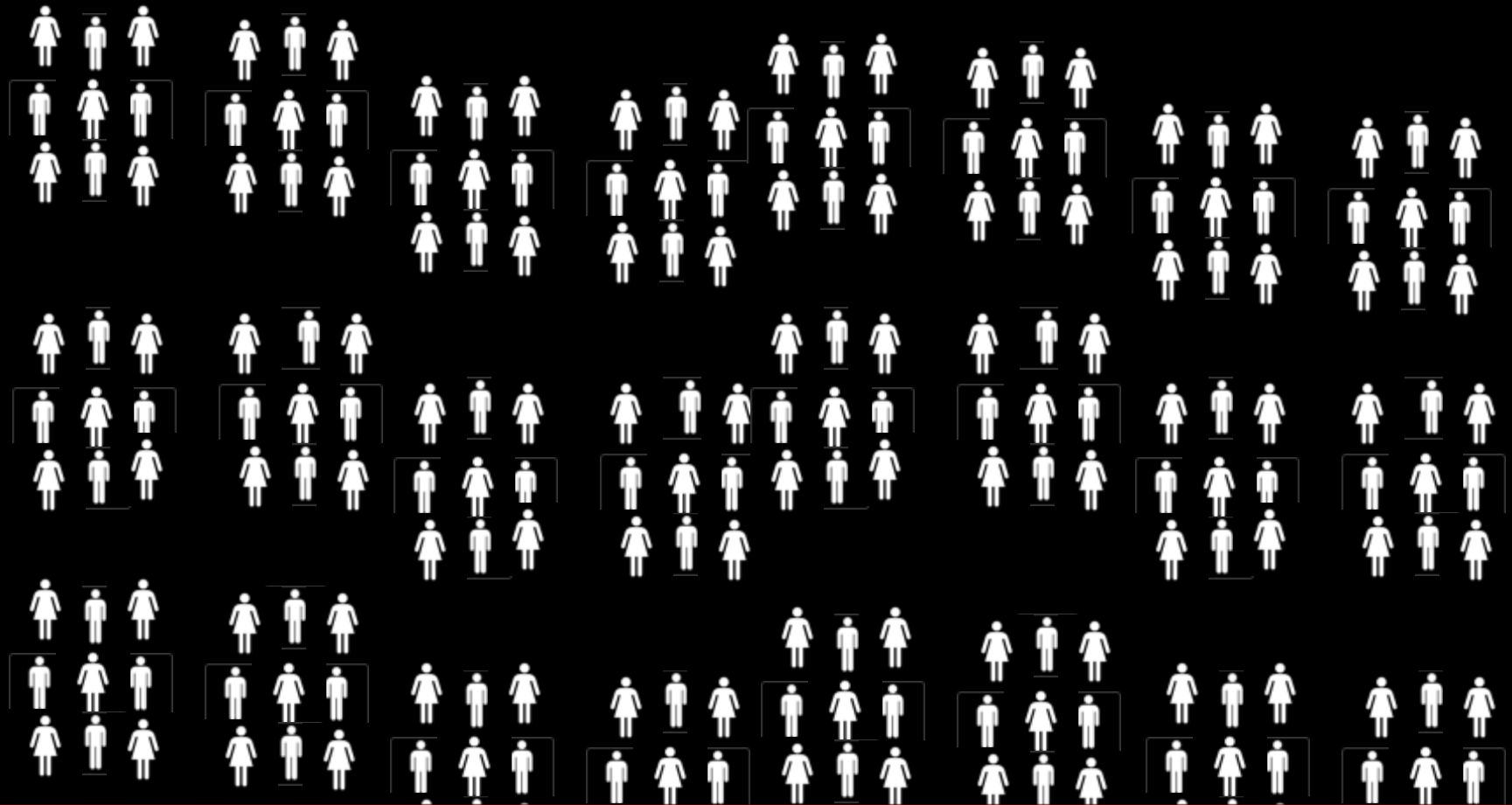
Unit of Randomization: Individual?



Unit of Randomization: Individual?

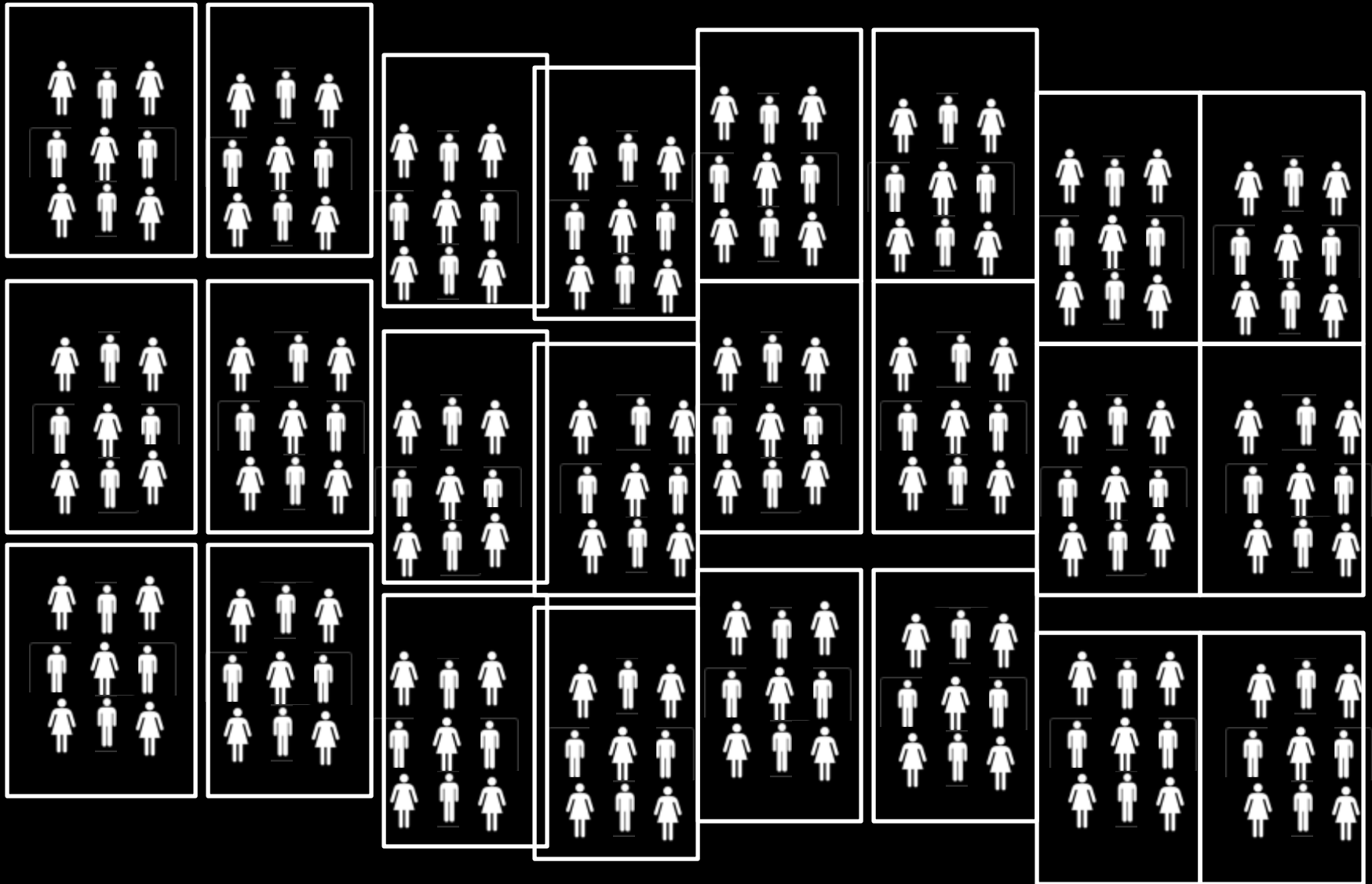


Unit of Randomization: Clusters?

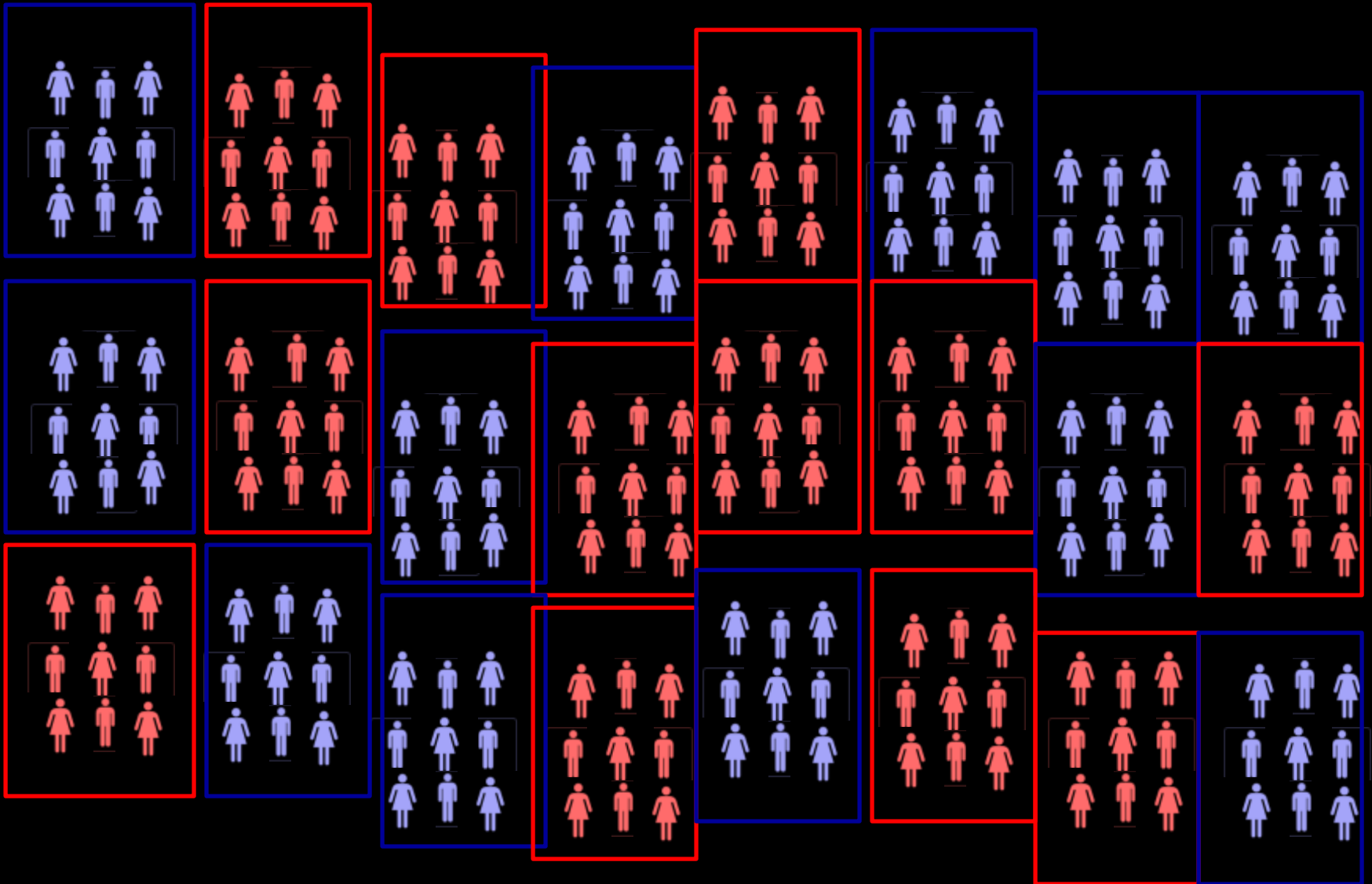


“Groups of individuals”: Cluster Randomized Trial

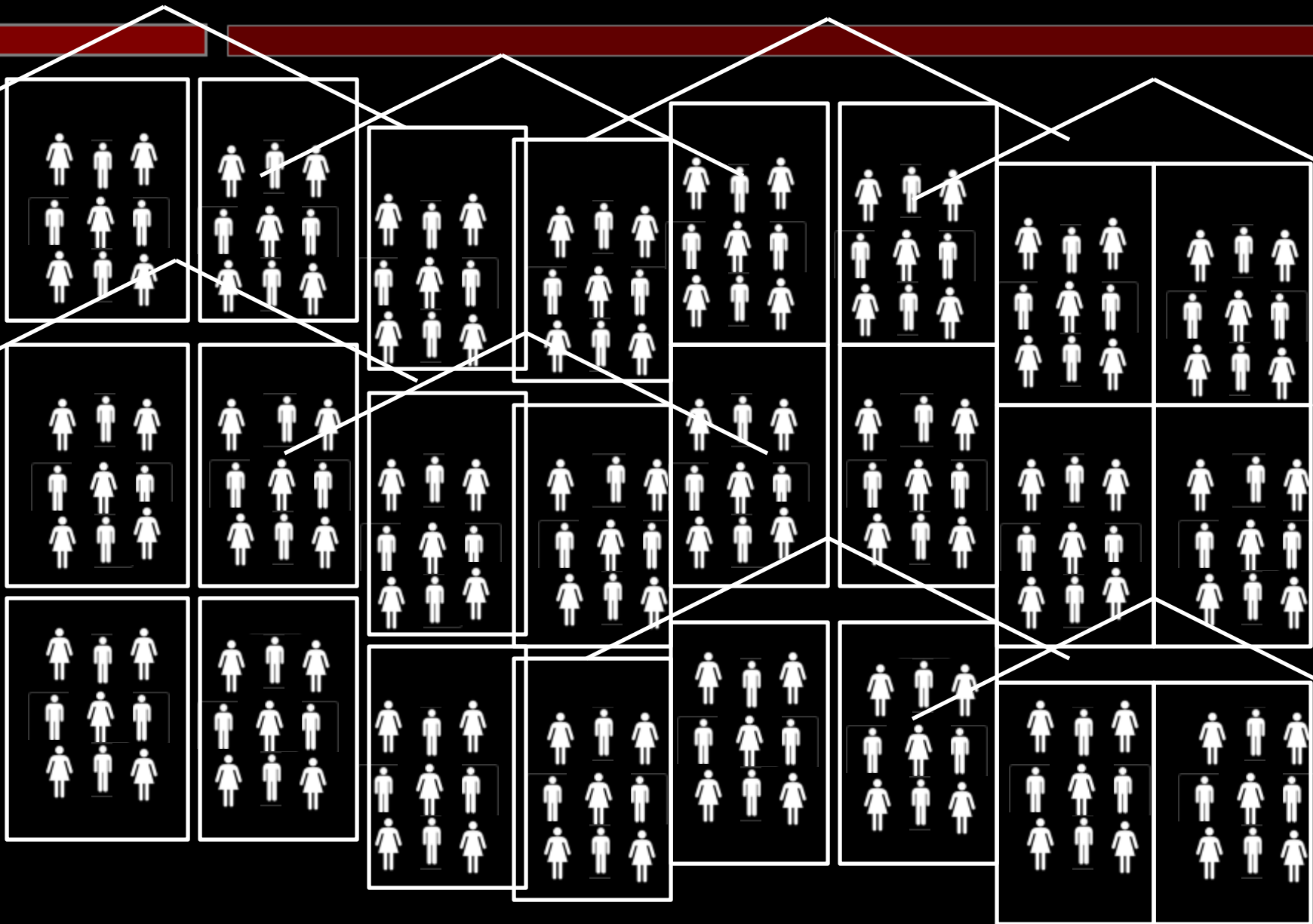
Unit of Randomization: Class?



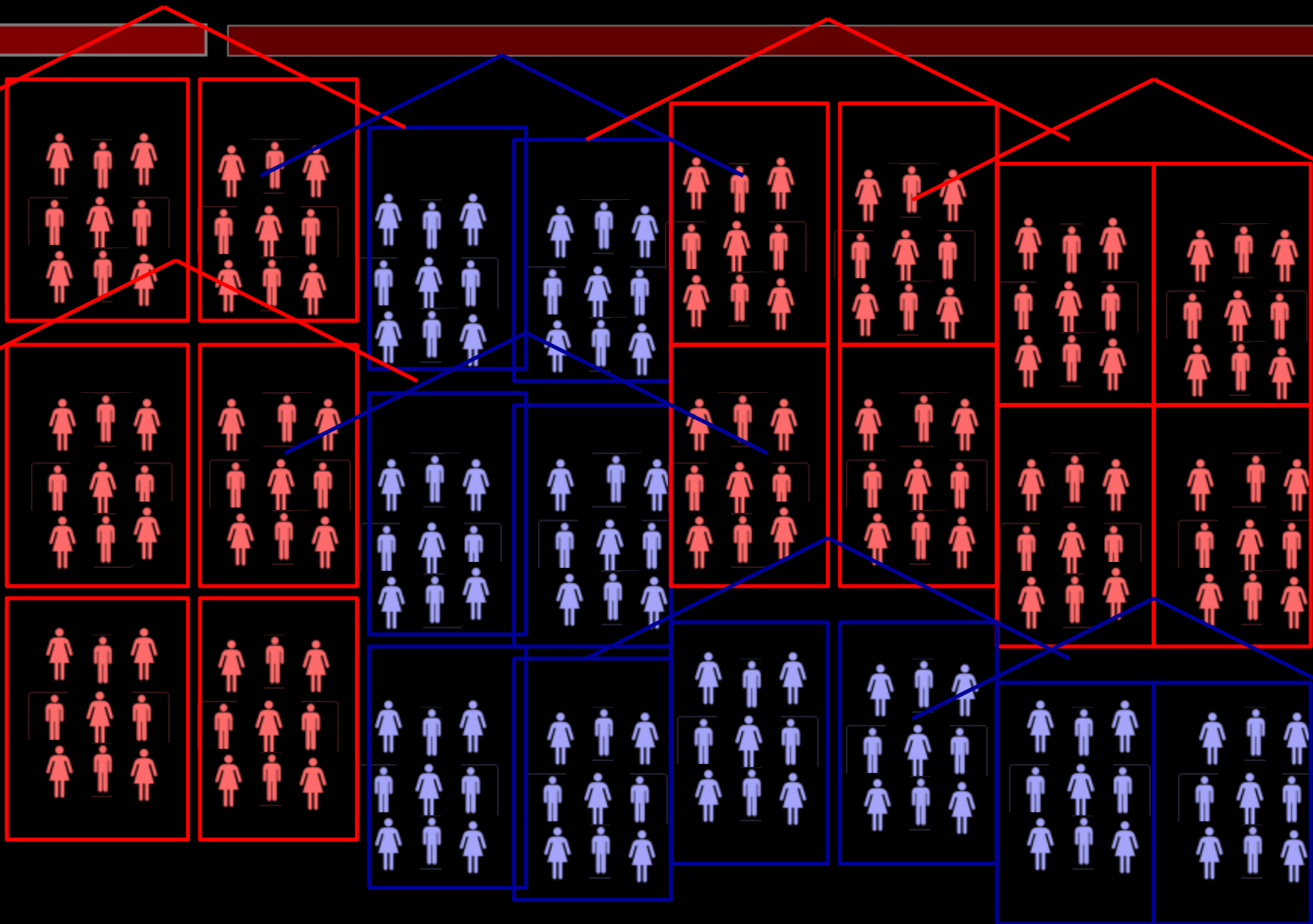
Unit of Randomization: Class?



Unit of Randomization: School?



Unit of Randomization: School?



Some examples

- Deworming: randomization at the school level.
75 schools in average 400 students per school
- Information provided to students about returns to schooling: school level
- CCT for employment program in France: randomize at the Job Youth Center
- Public work in Cote d'Ivoire: randomize individuals
- Morocco microcredit: randomize villages

How to Choose the Level

1. Can randomize units and follow individuals at a more disaggregated level
 - Example: randomize at the school level but follow students
 - Deworming: 75 schools, 400 student per school: 30.000 students
 - Sample of 4000 students
 - Do not follow every youth in each school (54 per school)

How to Choose the Level

2. Need a large number of randomized units
 - Balancing property is true if you randomly assign a large number of units
 - Precision of estimation also depends on the number of randomized units
- A large sample with few randomized units is not good
- Size of the sample do not balance the number of randomized units

How to Choose the Level

3. Need to consider **diffusion effects**

- Treatment can affect the treated but also other individuals
- Deworming again: worms transmit from one student to the others. One treated student has beneficial effects on his/her peers
- Providing information to youth within a class: diffusion of information within the class

How to Choose the Level

- Want to avoid people in the control group being affected by the treatment
- Consider randomizing units that are “small independent worlds”
 - Deworming: randomize at the school level
 - Information: also randomize at the school level
- Follow then a random sample of individuals within the randomized units

How to choose the level: fairness, politics

4. What will people feel about randomization
 - Randomizing at the child-level within classes, parents get angry
- Very important issue
 - Being assigned to the control group should have no impact on individuals
- Level of randomization can help to deal with this issue
- CCT for youth in France: that was the issue

Lecture Overview

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Simple lottery

- Most simple design
- Existing pool of potential participants: 5000
- Given number of slots: 1000
- Randomly assign potential participant to a treatment group or a control group: with proba $1/5$

Lotteries and limited resources

- A case where randomization can naturally arise is when programs have limited resources
 - Case for most programs, especially pilots
- Results in more eligible recipients than resources will allow services for
- Random assignment naturally arises as a way to allocate resources
- Limited resources can be an evaluation opportunity

Example: firm training in Morocco

- Providing managers of Income Generating Activities with a management training
- 600 IGA registered
- But budget available to provide training for only 200 IGA
- Randomly draw 200 in the 600 population
- Possible to draw randomly 200 in the 600 just rank randomly

Lotteries: political advantages

- Lotteries are not as severe as often claimed
- They are simple
- They are transparent: can be publicly organized
- Participants know the “winners” and “losers”
- Simple lottery is useful when there is no a priori reason to discriminate
- Can be perceived as fair!
- They are commonly used outside RCT

Example: Public Work in Cote d'Ivoire

- 12.000 individuals but 3.000 jobs available
- Organize lotteries
 - Registration sessions
 - Randomization session: participant called to draw a paper from a basket and to show it to everybody
- Frequently implemented outside the context of an experiment
- Perceived as fair way to allocate resources

Lotteries: power

- RCT are implemented because there are questions about the program
 - Does the program work?
- **Statistical power** is the ability of the experiment to provide the right answer
 - Answer **yes** when the truth is **yes**
- Using lotteries achieve the **highest power**

What if you have 500 applicants for 500 slots?

- Outreach activities to increase the number of applicants
 - Make some efforts to reach 1000 applicants
- If impossible?
 - Does it make sense to evaluate a program that will never grow over the 500 applicants you have
- Would it be ethical?
 - Need to think about it: what is the usefulness of what you will learn

Sometimes screening matters

- Suppose there are 2000 applicants
- Screening of applications produces 500 “worthy” candidates
- There are 500 slots
- A simple lottery will not work



- What are our options?

Consider the screening rules

- What are they screening for?
- Which elements are essential?
- Selection procedures may exist only to reduce eligible candidates in order to meet a capacity constraint
- If certain filtering mechanisms appear “arbitrary” (although not random), randomization can serve the purpose of filtering *and* help us evaluate

Consider the screening rules

- However when doing that it is necessary to think about it
- This changes the population that you consider as relevant for the program
- Program is evaluated on this population
 - Program effect can be heterogeneous and different on the marginal population
- Known as **randomization bias**

Problems with simple lotteries

- Sometime difficult for **program officers** to accept lotteries
- Better if RCT tasks (randomization, information) are performed by researchers
 - Was very important in France with youth programs – caseworkers strongly involved in their “social” role

Problems with simple lotteries

- Sometimes difficult for **applicants** to accept lotteries
 - Find it unfair
- Important that applicants' behavior in the control group is not affected by the experiment
 - **Hawthorne effect**
 - Can also be associated with differential response rate to survey
- If impossible to deal with consider alternative designs

Lotteries: summary

- Simple lotteries are a very powerful tool
 - Easy to implement
 - Good power property
 - They can be perceived as fair
- They can however have some drawbacks
 - Can be seen as unfair by participants
 - Can fail in matching slots requirements
 - Can be seen as unfair by program officers
- Need sometimes to consider alternative design

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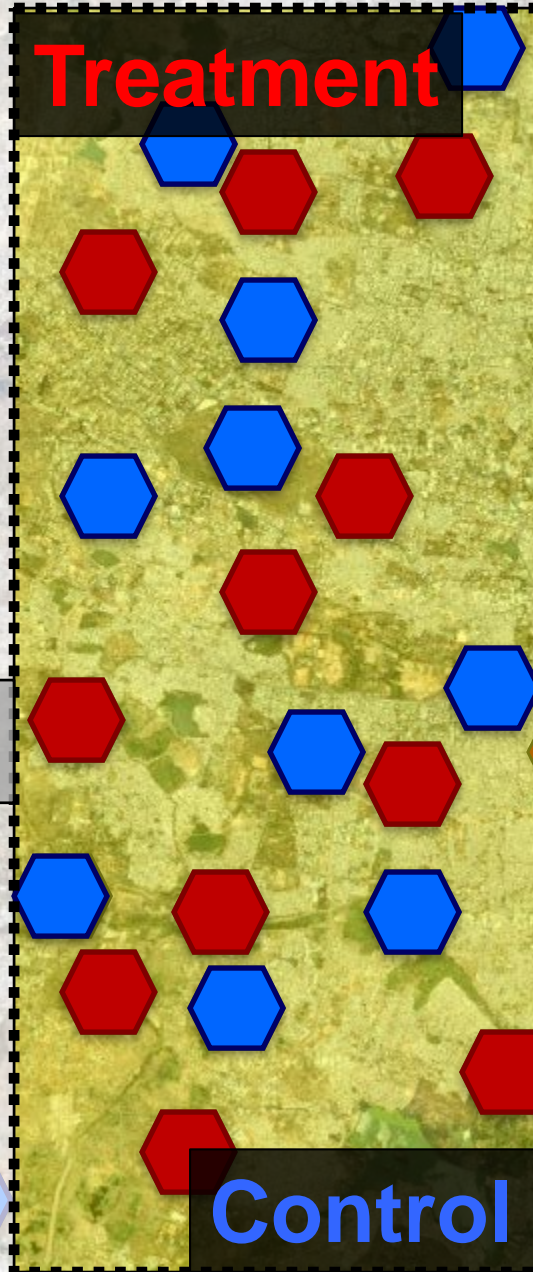
Randomization in “the bubble”

- Sometimes a partner may not be willing to randomize among eligible people.
- Partner might be willing to randomize in “the bubble.”
- People “in the bubble” are people who are borderline in terms of eligibility
 - Just above the threshold → not eligible, but almost
- What treatment effect do we measure? What does it mean for external validity?

Randomization in “the bubble”

Within the bubble, compare **treatment** to **control**

Non-participants



Participants

When screening matters: Partial Lottery

- Program officers can maintain discretion
- Example: Training program
- Example: Expansion of consumer credit in South Africa
- Example: Microcredit in Bosnia. Applicants marginally rejected were randomly assigned

Phase-in: takes advantage of expansion

- Everyone gets program eventually
- Natural approach when expanding program faces resource constraints
- What determines which schools, branches, etc. will be covered in which year?

Phase-in design

Round 1

Treatment: 1/3

Control: 2/3

Round 2

Treatment: 2/3

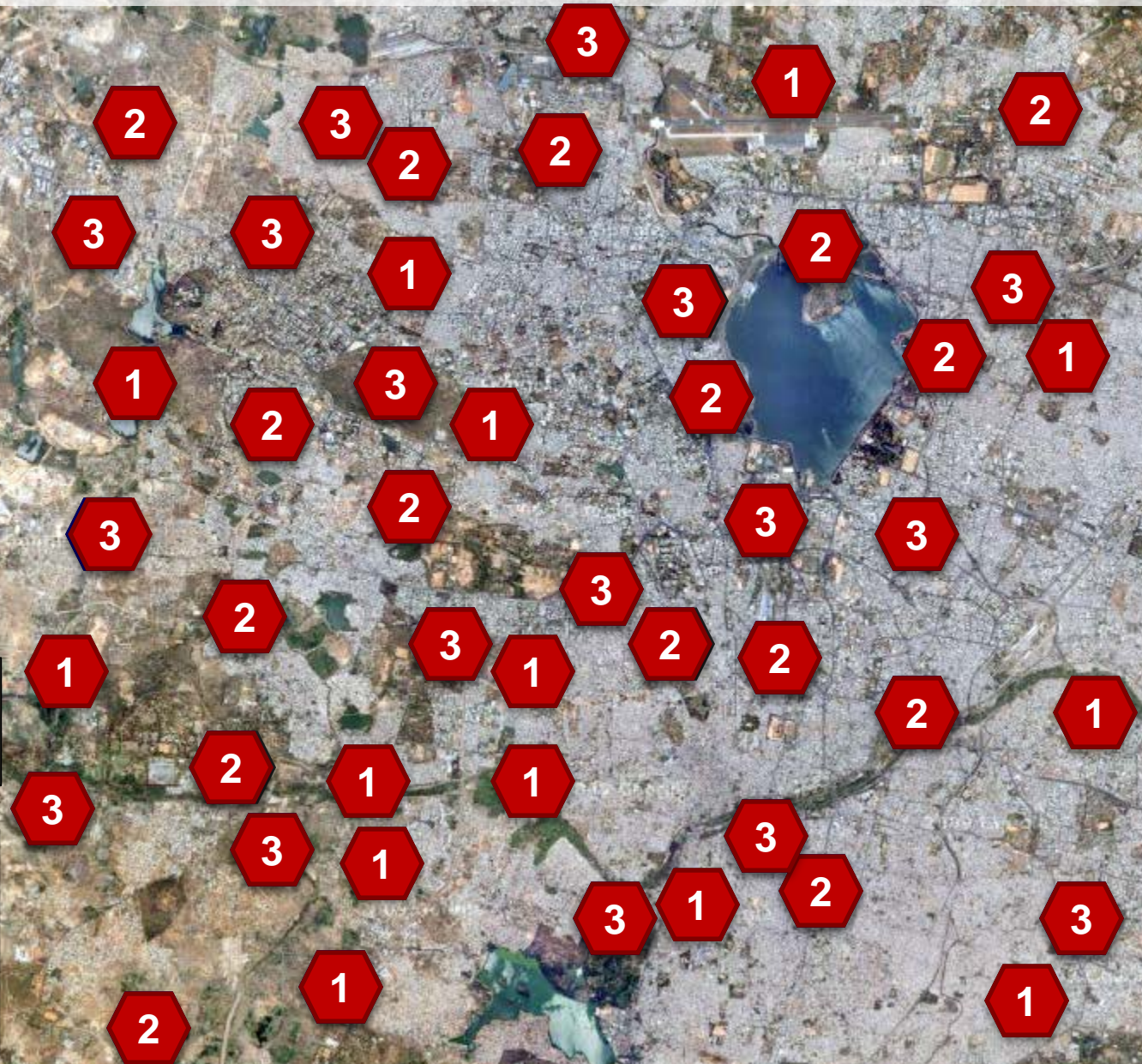
Control: 1/3

Randomized
evaluation ends

Round 3

Treatment: 3/3

Control: 0



Phase-in designs

Advantages

Everyone gets something eventually

Provides incentives to maintain contact

Concerns

Can complicate estimating long-run effects

Care required with phase-in windows

Do expectations of treatment change actions today?

Encouragement design: What to do when you can't randomize access

- Sometimes it's practically or ethically impossible to randomize program access
- Randomize encouragement to receive treatment
- Not every body in **the encouraged group** will receive the treatment
- Some in the **non-encouraged group** will

What is “encouragement”?

- Something that makes some folks more likely to use program than others
- Not itself a “treatment”
- Examples
 - provide information about program availability or just propose participation
 - Deny or not participation in the control group
 - El Mashrou in Egypt: send sms to watch the tv show

Encouragement design

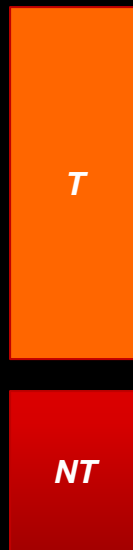


Assigned to treatment
Encouraged



Assigned to control
Not encouraged

Encouragement design



Assigned to treatment
Encouraged

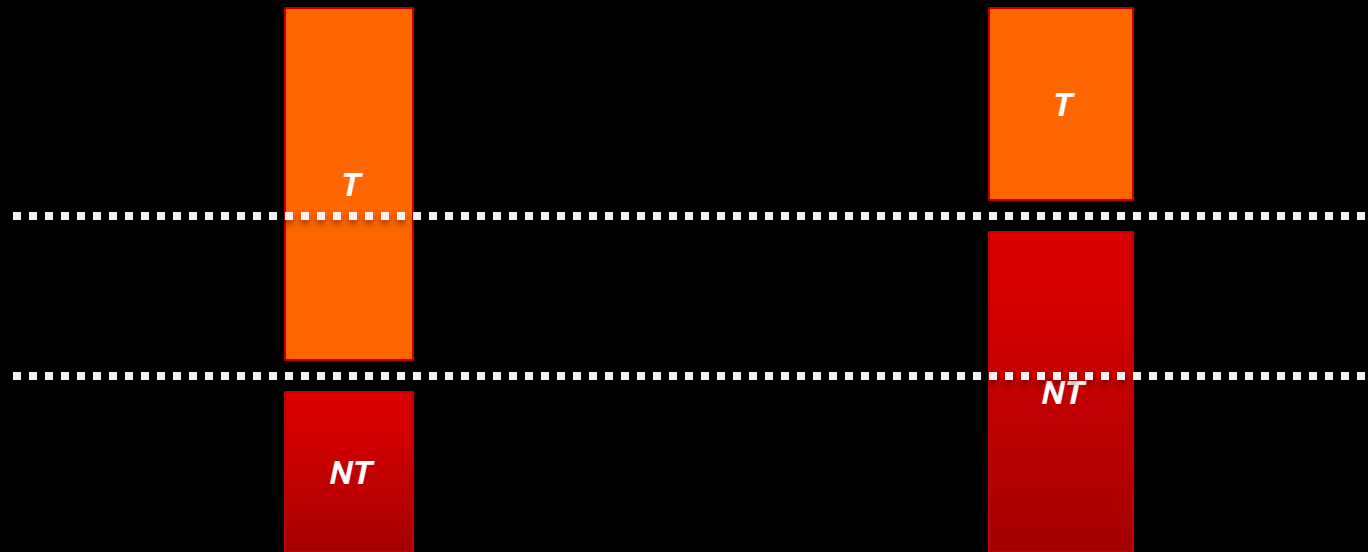


Assigned to control
Not encouraged

Does it work?

- This is enough to evaluate the program impact
- Specific population of **compliers**: these who get the treatment because of encouragement
- Compare the average of the two **Z** groups
- Scale by the share of **compliers**
- However evaluation is only for **compliers**

Encouragement design



Assigned to treatment
Encouraged

Assigned to control
Not encouraged

Encouragement design

- Need to assume that encouragement only affects treatment
- Example microcredit in Morocco
- Randomly assign villages to two groups
- In one group MFI offers microcredit in the other not
- However only 15% of household offered a microcredit take one
- Can we assume the 85% who were offered a microcredit are not affected?

To summarize: Possible designs

- Simple lottery
 - Randomization in the “bubble”
 - Randomized phase-in
 - Encouragement design
- Note: These are not mutually exclusive.

Methods of randomization - recap

Design	Most useful when...	Advantages	Disadvantages
Basic Lottery	<ul style="list-style-type: none">•Program oversubscribed	<ul style="list-style-type: none">•Familiar•Easy to understand•Easy to implement•Can be implemented in public	<ul style="list-style-type: none">•Control group may not cooperate•Differential attrition

Methods of randomization - recap

Design	Most useful when...	Advantages	Disadvantages
Phase-In	<ul style="list-style-type: none">•Expanding over time•Everyone must receive treatment eventually	<ul style="list-style-type: none">•Easy to understand•Constraint is easy to explain•Control group complies because they expect to benefit later	<ul style="list-style-type: none">•Anticipation of treatment may impact short-run behavior•Difficult to measure long-term impact

Methods of randomization - recap

Design	Most useful when...	Advantages	Disadvantages
Encouragement	<ul style="list-style-type: none">•Program has to be open to all comers•When take-up is low, but can be easily improved with an incentive	<ul style="list-style-type: none">•Can randomize at individual level even when the program is not administered at that level	<ul style="list-style-type: none">•Measures impact of those who respond to the incentive•Need large enough inducement to improve take-up•Encouragement itself may have direct effect

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Multiple treatments

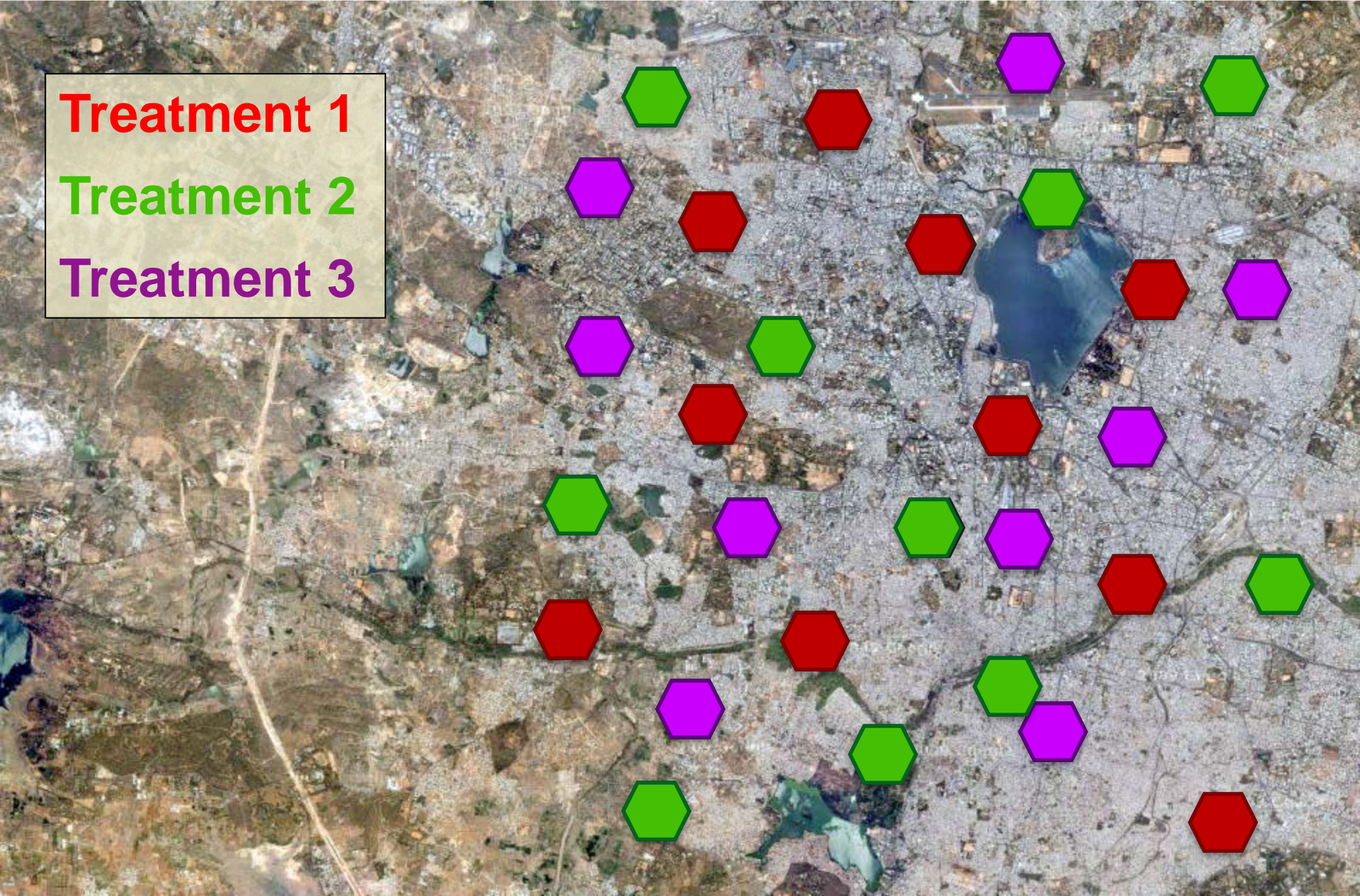
- Sometimes core question is deciding among different possible interventions
- You can randomize these programs
- We might have two treatments: 2 and 1. We can measure the impact of 2 compared to 1.
 - Just need to assign either to 2 or to 1
- We can also measure impact of 2 and impact of 1
 - Need in addition to assign to a control group

Multiple treatments: example

- Public Work as treatment1
- Public Work + Business training as treatment2
- Control group
- Treatment 1 compared to control
- Treatment 2 compared to control
- But also treatment2 compared to treatment1
- Is it possible to turn short term Public Work gains into long term gains?

Multiple treatments

Treatment 1
Treatment 2
Treatment 3



Cross-cutting treatments

- Test different components of treatment in different combinations
- Test whether components serve as substitutes or compliments
- What is most cost-effective combination?
 - Can help answer questions, beyond simple “impact”
 - Actually interests both practitioners and researchers

Two opposite examples

- Example 1: business
 - control
 - Treatment 1 Micro credit
 - Treatment 2 Business training
 - Treatment 1+2 Microcredit+Business training
- Example 2: ultra poor
 - Control
 - Treatment: package of interventions (asset transfer, consumption stipends, training, health)

One last rule to end

- Order of field action matters
 1. Register units
 2. Do baseline survey
 3. Randomize
 4. Announce treatment status
- Important for example not to run baseline after revealing status

Conclusion

- There are many ways to introduce randomization
- Can be done in a very flexible way
- So as to fit operational constraints
- Can also be done in a sophisticated way to measure the impact of combination of treatments



THANK YOU!