Segragation

- In MM Schelling covers roughly two models of segregation.
- In one the local conditions are important, i.e., how many neighbours of a particular type one has.
- In the other the proportions of different types in a bounded setting is important.
- Segregation can happen along a variety of dimensions.
- Typical examples concern race or skin colour, religion, gender, age, wealth and education.

- Some types of segregation are not of interest here.
- For instance, the population can be separated to the luxus car owners and non-owners.
- More generally the rich are in many instances segragated from the poor.
- But this is the result of the latter not being able to afford the same things the former can afford.
- The interest is in segregation that can be a result of individual discriminatory actions.

An index of segregation

- It is not particularly interesting to talk about segregation unless one has some measures of it.
- Consider a city which is divided in n smaller areas generally denoted by $i \in \{1, 2, ..., n\}$.
- Assume that people can have characteristic x or y.
- The number of people with characteristic x in area $i \in \{1, 2, ..., n\}$ is denoted by x_i, and correspondingly y_i.
- The total number of people with characteristic x is denoted X, and correspondingly Y.
- So called index of dissimilarity is given by

$$D = \frac{1}{2} \sum_{i=1}^{n} \left| \frac{x_i}{X} - \frac{y_i}{Y} \right|$$

- Dissimilarity is considered high (in some circles) if $D > 0,6$.
- It is very dependent on how the areas are defined.
- Its value tells which shares of people with characteristics x and y should move in order to have an even distribution, i.e., $D = 0$.
- There are plenty of other indeces, for instance the Isolation index indicates the probability that members of two groups meet.

Local interaction and preferences

- Consider a neighbourhood with two types of households, A and B.
- Both types can tolerate one neighbour of the other type but not more

$$\begin{array}{cccc} A & b & & B \\ & a & b & a \\ & A & & \\ A & & & B \end{array}$$

- The dissatisfied ones are denoted by lower case letters.
- Assume that the households move sequentially starting from upper rows from the left.

- Assume that households just marginally prefer to go up and left, and that they move to the first free place.
- The first one to move $(1,2)$ and the result is

A			B
	A	b	a
	A		B
A			B

- Then $(2,3)$ moves and the result is

A			B
	A		a
	A		B
A		B	B

- Then $(2, 4)$ moves and the result is

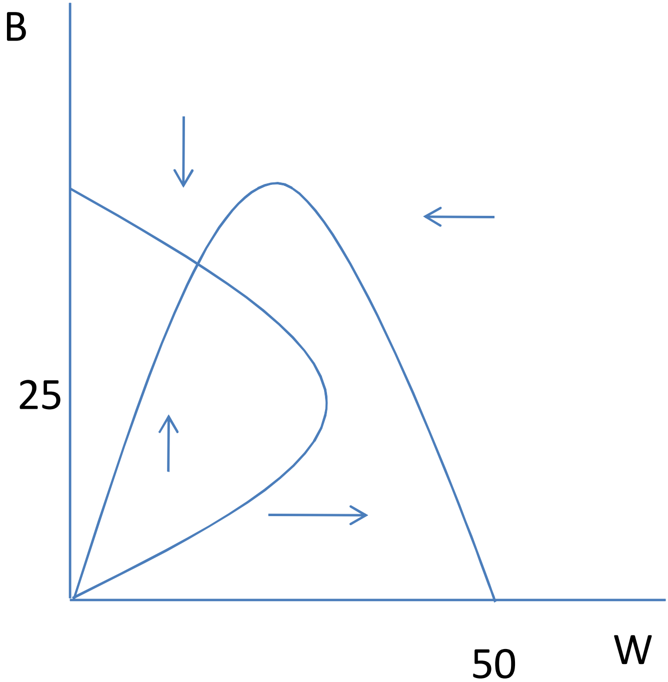
$$\begin{array}{cccc} A & A & & B \\ & A & & \\ & A & & B \\ A & & B & B \end{array}$$

- The end result looks like almost total segregation even though there is actually reasonably much tolerance amongst the households.
- Let us study this in a more efficient setting http://ccl.northwestern.edu/netlogo/models/Segregation

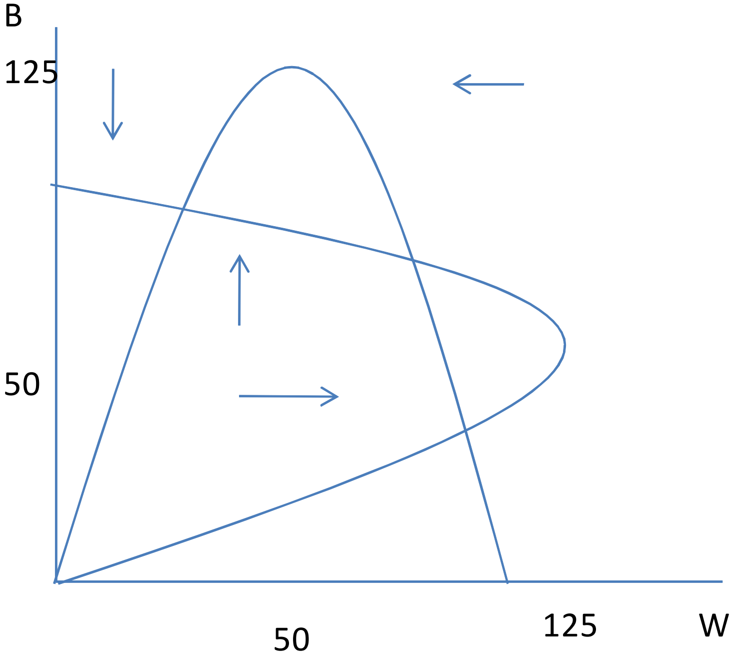
Bounded neighbourhood models

- The idea is that people have some treshold level, and if there are particular types above this treshold then they want to move away.
- A typical example is parents who do not want that their children are in a school where there are too many pupils of a particular type.
- Assume again that there are two types of people whites and blacks as in MM.
- Assume that there are 100 whites, and that their tolerance varies such that the most tolerant is willing to have 2 blacks per one white, and the least tolerant 0.
- Assume that the distribution is uniform.
- Assume that blacks have similar tolerance but that there are only 50 blacks.

- One can draw a useful picture about this.


B
25
50
W

- The common area below both curves is such that both whites and blacks are satisfied with the situation.
- If we assume that in these cases both types will move to the area we get an adjustment dynamic indicated by the arrows.
- But then only completely white or completely black neighbourhoods are the only stable equilibria.
- There are other possibilities.
- Assume that there are equal numbers of blacks and whites.
- Assume uniform distributions such that medians members can tolerate 2.5 times as many opposite types.


B
125
50
50
125
W

- Now there is a stable equilibrium at (80,80).