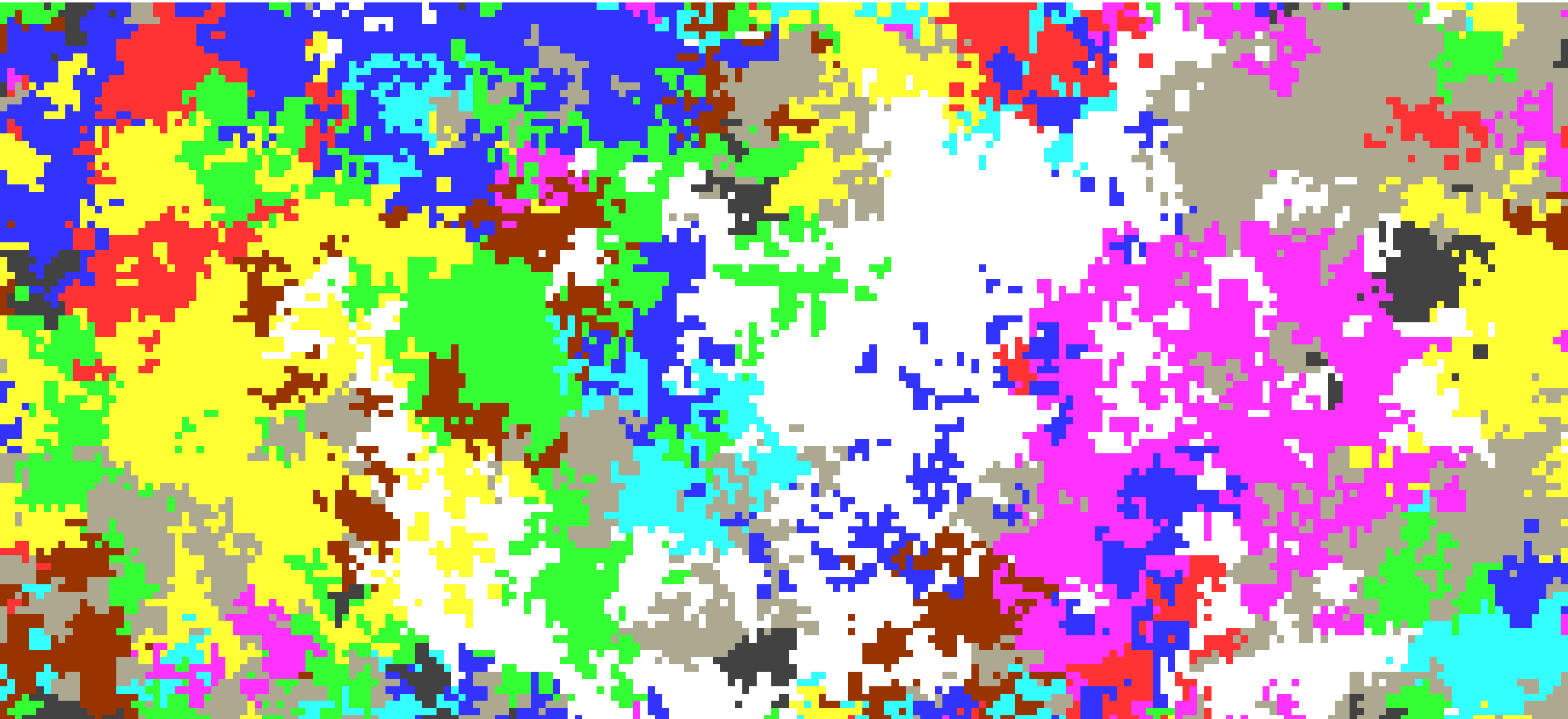
Opiniones

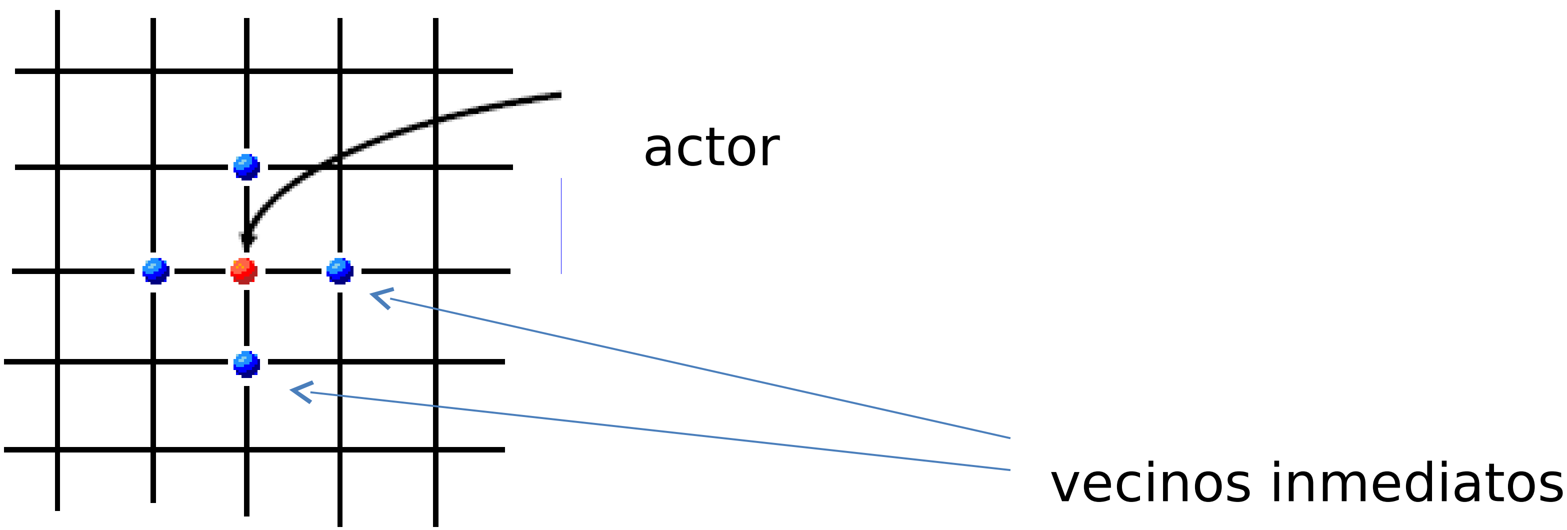
Modelo de Axelrod



•**Definition of culture:** Set of individual attributes subject to social influence

•**Basic premise:** The more similar an actor is to a neighbor, the more likely the actor will adopt one of neighbor's traits (communication most effective between similar people).

•**Novelty in social modeling:** it takes into account interaction between different cultural features.



Caracterizamos a los actores

$|\sigma_{i1}|$

$|\sigma_{i2}|$

$|\sigma_{i3}|$

...

$|\sigma_{iF}|$

El estado "cultural" de un individuo viene dado
Por
F características

Donde

la característica ***f*** puede adoptar ***q*** valores
(rasgos)

$$\sigma_{if} \in \{0,1,......,q-1\}$$

_Si F=3 y q=10_

$$q^F = 10^3$$

Posibles “estados culturales”

$$\begin{pmatrix} \sigma_{i1} \\ \sigma_{i2} \\ \sigma_{i3} \\ \sigma_{i4} \end{pmatrix}$$

Mecanismo de convergencia homofilia

$$\begin{pmatrix} 0 \\ 0 \\ 7 \end{pmatrix}$$

$$\begin{pmatrix} 5 \\ 3 \\ 7 \end{pmatrix}$$

Comparamos dos vecinos

La probabilidad de interacción

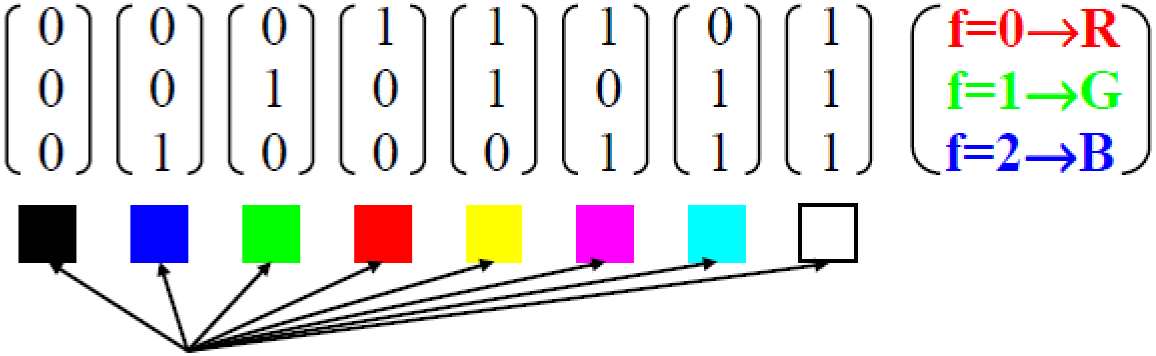
$$\frac{\text{numero de coincidencias}}{F}$$

Si da “bien”

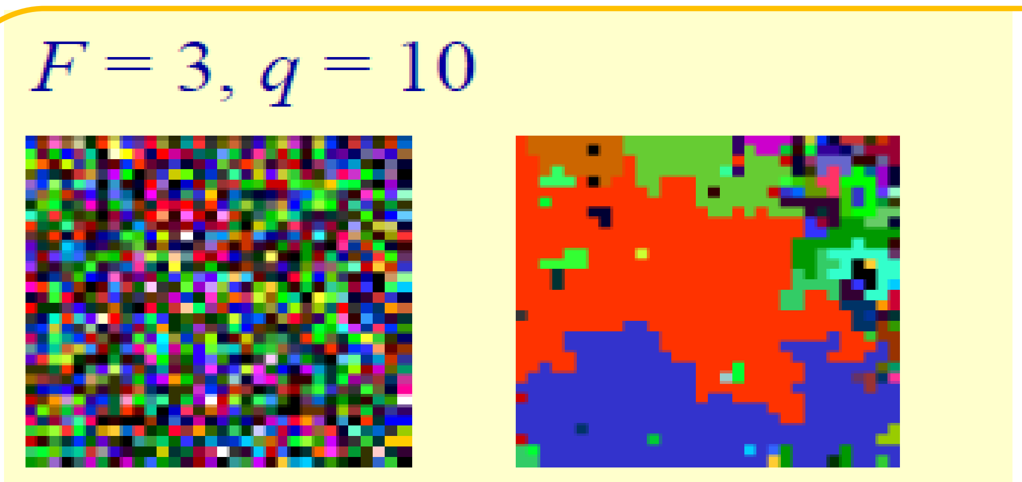
$$\begin{pmatrix} 5 \\ 0 \\ 7 \end{pmatrix} \quad \begin{pmatrix} 5 \\ 3 \\ 7 \end{pmatrix}$$

Elegido al azar

F=3, q=2



Para q > 2 , q “pesa” los colores



t=0 → Estado Congelado MULTICULTURAL

The Dissemination of Culture

A MODEL WITH LOCAL CONVERGENCE AND GLOBAL POLARIZATION

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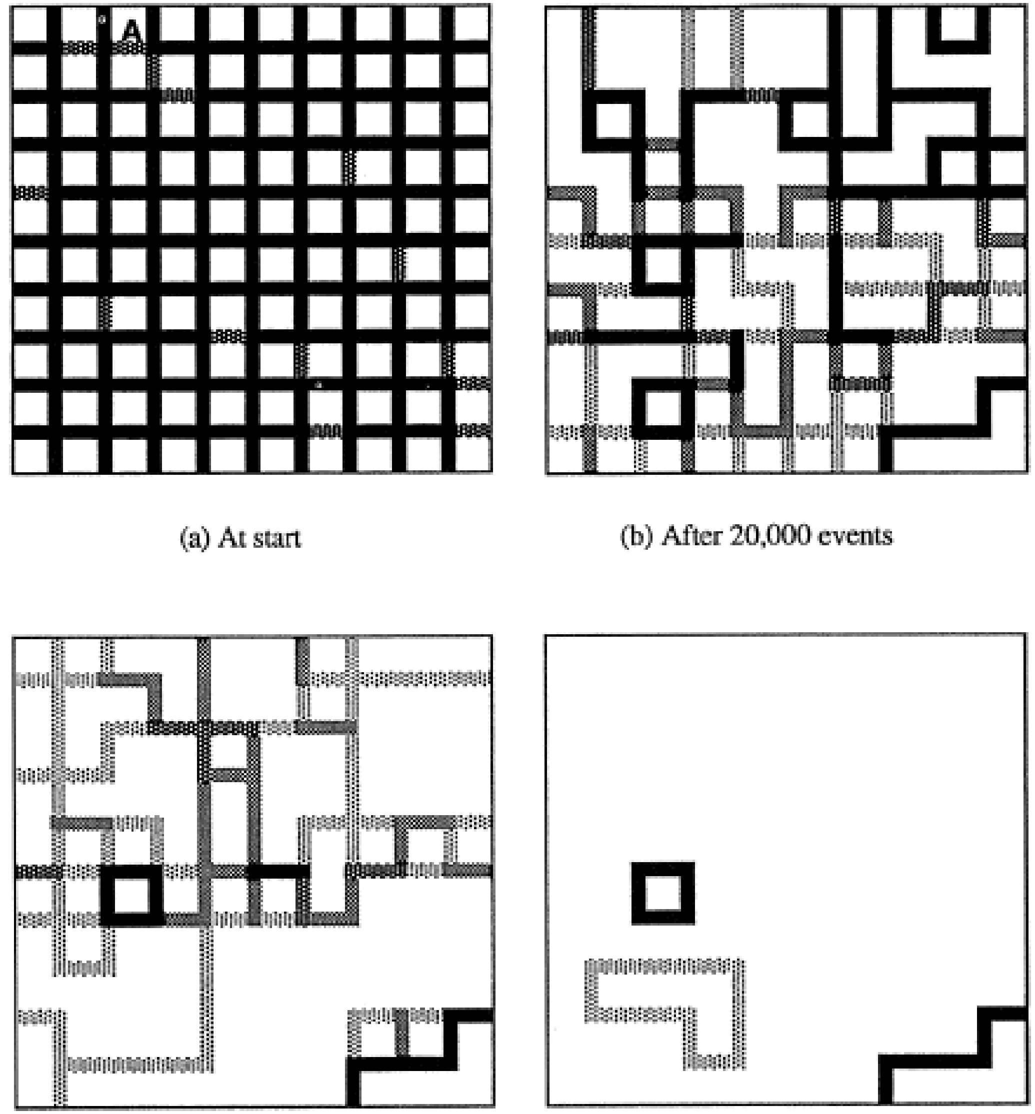
Cálculos de Axelrod

Posibles explicaciones

1. *Social differentiation*. Groups actively differentiate themselves from each other (Simmel [1908] 1955). People who identify with one group often emphasize and even promote differences with members of other groups. In the case of ethnic groups, this differentiation can lead to a sharpening of cultural and geographic boundaries between groups (Barth 1969; Hannan 1979).
2. *Fads and fashions*. When people want to be different from others, fads will come and go. When some want to be different but others want to copy them, the result is fashion: a never-ending chase of followers running after leaders.
3. *Preference for extreme views*. Tendencies toward homogeneity of opinion can be counteracted if people tend to prefer extreme positions on issues. This idea was first proposed by Abelson and Bernstein (1963). Recent simulation models have shown how this mechanism can lead to polarization and clustering (Nowak, Jacek, and Latane 1990; Latane, Nowak, and Liu 1994).
4. *Drift*. Random changes in individual traits can lead to differentiation among subgroups. For example, languages slowly evolve and differentiate.
5. *Geographic isolation*. If people move to be near others who are similar to themselves, the result can be a clustering of similar people (e.g., Schelling 1978). If carried to extremes, geographic or other forms of voluntary or imposed segregation can sustain differences by reducing interactions between members of different groups.
6. *Specialization*. People may have interests that are at least partially resistant to social influence. This resistance has been modeled as factors that have a persistent effect on an individual despite social influence (Friedkin and Johnsen 1990; Marsden and Friedkin 1993).
7. *Changing environment or technology*. When the environment is constantly changing, the response may be constantly changing as well. If the environment is changing faster than people can respond to it, then differences may persist as different people or groups change in different ways in response to their ever-changing environment.

The methodology of the present study is based on three principles:

1. *Agent-based modeling*. Mechanisms of change are specified for local actors, and then the consequences of these mechanisms are examined to discover the emergent properties of the system when many actors interact.[3] Computer simulation is especially helpful for this bottom-up approach, but its use predates the availability of personal computers (e.g., Schelling 1978).
2. *No central authority*. Consistent with the agent-based approach is the lack of any central coordinating agent in the model. It is certainly true that important aspects of cultures sometimes come to be standardized, canonized, and disseminated by powerful authorities such as church fathers, Webster, and Napoleon. The present model, however, deals with the process of social influence before (or alongside of) the actions of such authorities. It seeks to understand just how much of cultural emergence and stability can be explained without resorting to the coordinating influence of centralized authority.
3. *Adaptive rather than rational agents*. The individuals are assumed to follow simple rules about giving and receiving influence. These rules are not necessarily derivable from any principles of rational calculation based on costs and benefits or forward-looking strategic analysis typical of game theory. Instead, the agents simply adapt to their environment.



(a) At start

(b) After 20,000 events

Figure 1: Map of Cultural Similarities

NOTE: Cultural similarity between adjacent sites is coded as black ≤ 20%, dark gray = 40%, gray = 60%, light gray = 80%, white = 100%. This run was conducted using five cultural features and 10 traits per feature, using the initial conditions shown in Table 1. Each interior site has four neighbors.

1. Initially, most neighboring sites have little in common with each other and hence are unlikely to interact. However, when two sites do interact, they become more similar and hence are more likely to interact in the future.
2. Over time, specific cultural features tend to be shared over a larger and larger area. Indeed, regions start to form in which all the features are exactly the same.
3. Eventually, no further change is possible. This happens when every pair of neighboring sites has cultures that are either identical or completely different. If a pair is identical, they can interact but the interaction will not cause either to change. If they are completely different, they will not even interact. In the sample run shown in Figure 1, the process settled down with exactly three cultural regions, two of which had few sites.
4. Initially, there are almost as many regions as sites, but eventually there are only a few regions. An indication of the extent to which the process of social influence resists complete homogenization is the number of regions that remain when no further change is possible. The number of *stable regions* can be defined as the number of cultural regions that exist when each cultural region has nothing in common with any of the regions to which it is adjacent. In the sample run, shortly after the time shown in Figure 1d, exactly three stable regions survived, two of which had few sites.
5. In retrospect, the origins of the stable cultural regions can be seen far back in history.[8] For example, the cultural region of four sites in the southeast corner of Figure 1d can be clearly discerned as far back in time as Figure 1b. However, looking just at the map of cultural similarities at that early time would not allow one to know which of the many cultural regions that existed then would survive.

Regiones estables son aquellas en las que todas las features
Son iguales.

Numero de regiones que sobreviven

q

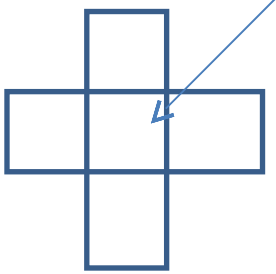
TABLE 2

Average Number of Stable Regions

	Traits per Feature		
Number of Cultural Features	*5*	*10*	*15*
5	1.0	3.2	20.0
10	1.0	1.0	1.4
15	1.0	1.0	1.2

NOTE: These runs were done with a territory of 10 × 10 sites, and each interior site had four neighbors. Each condition was run 10 times.

F



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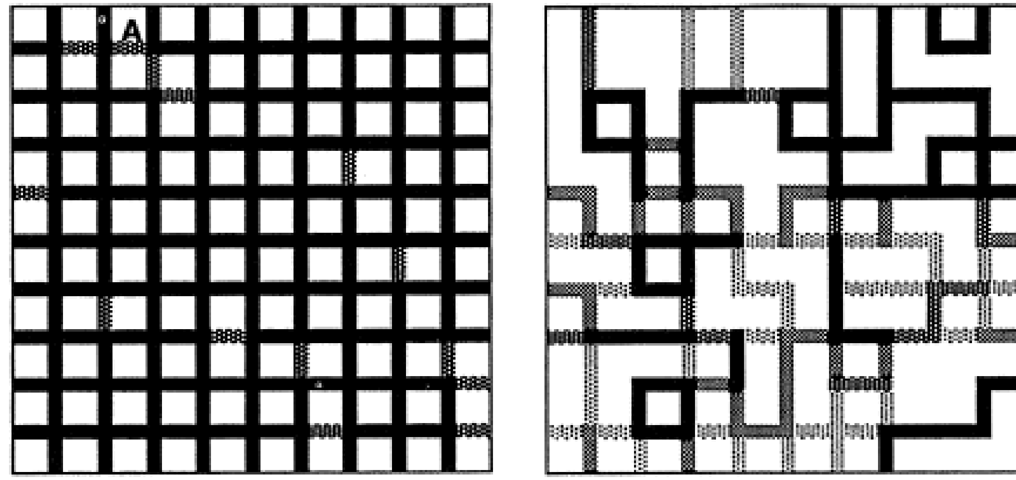
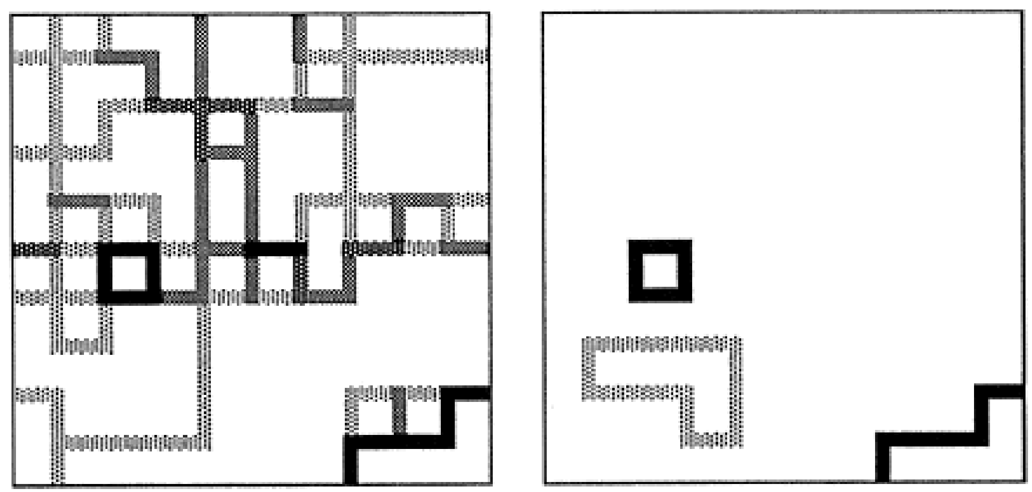


(a) At start

(b) After 20,000 events



F=5
q=15

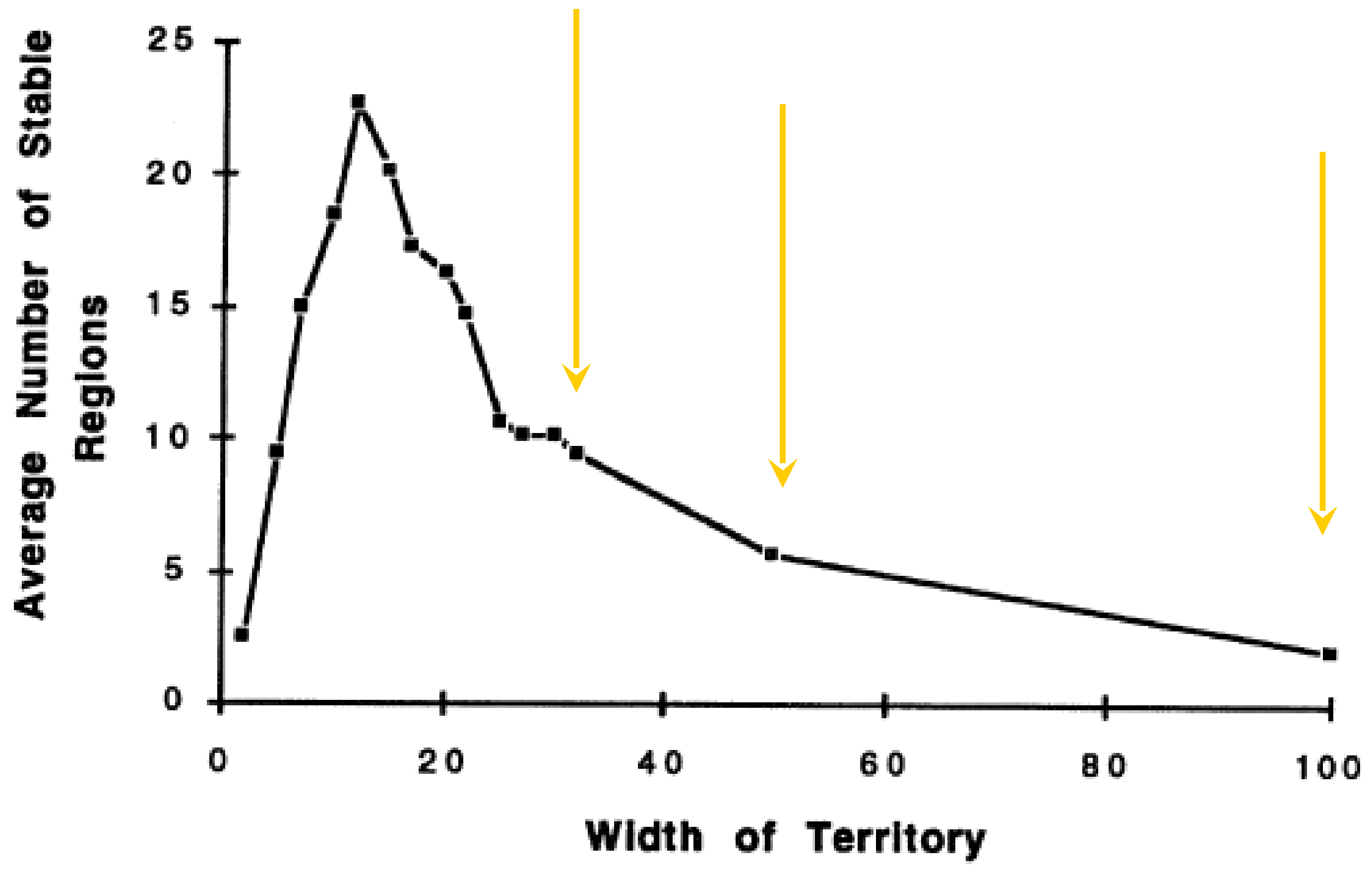


Figure 2: Average Number of Stable Regions

NOTE: The parameters for these runs are five cultural features, 15 traits per feature, and four neighbors for interior sites. Each territory size was replicated 40 times, except the territories with 50 × 50 sites and 100 × 100 sites territories, which were replicated 10 times.

CULTURAL ZONES

Recall that a cultural region is a set of contiguous sites with identical cultures. A related idea is a *cultural zone*: a set of contiguous sites, each of which has a neighbor with a "compatible" culture. Cultures are compatible if they have at least one feature in common. This means that neighboring sites with compatible cultures can interact. Thus, although the sites in a single cultural zone may include many different regions, each of the regions in a zone is able to interact with adjacent regions in the same zone.[9]

Zona Cultural : una serie de nodos contiguos cada uno de los cuales Tiene un vecino con cultura compatible (tiene al menos un feature en común → pueden interacturar

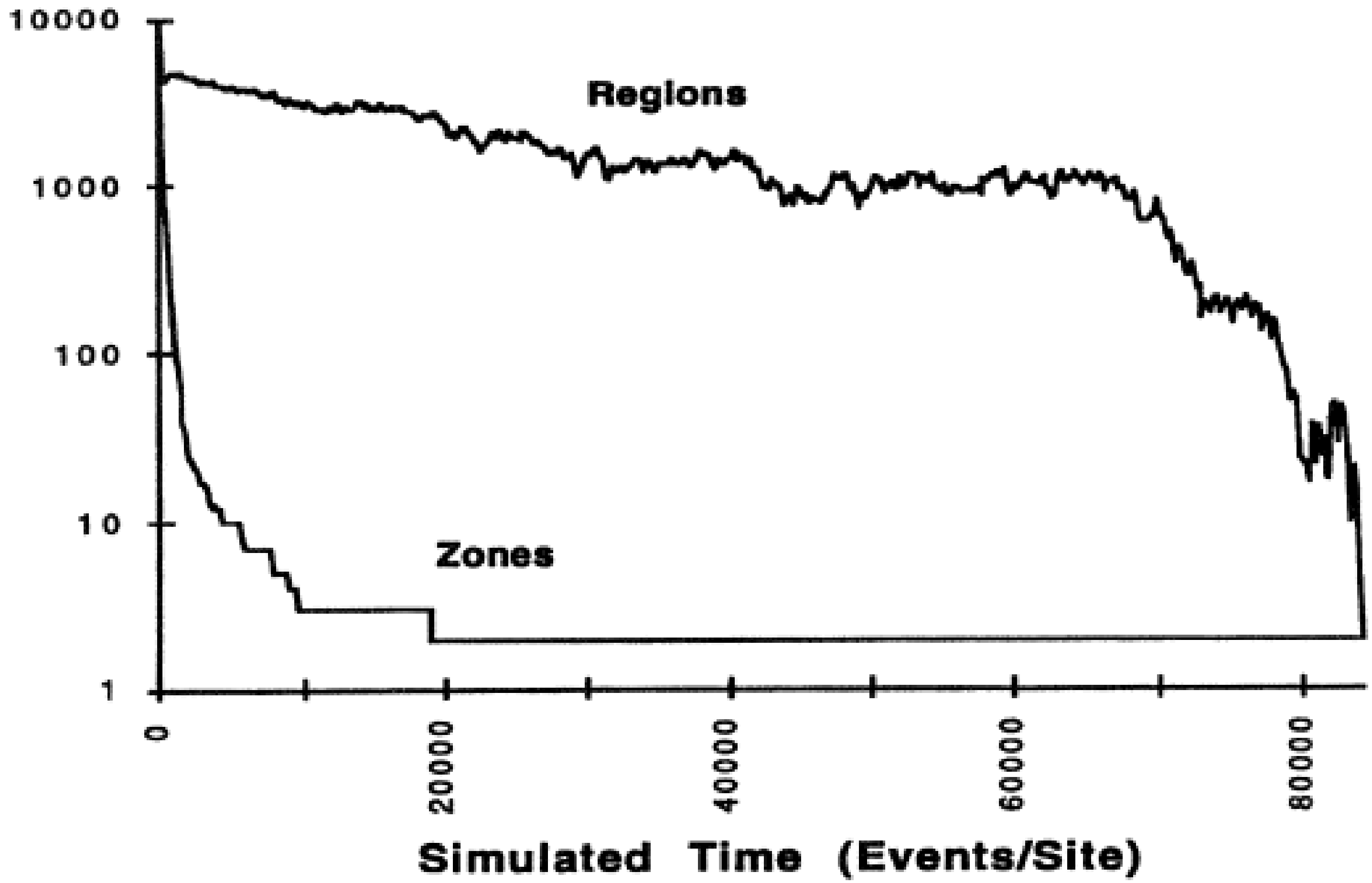


Figure 3: Number of Cultural Regions and Cultural Zones over Time in a Run with a Large Territory

NOTE: The territory is 100 × 100 sites. The other parameters are as in Figure 2. Note the logarithmic scale.

The degree of polarization is measured by the number of different cultural regions that exist when no further change is possible. Theoretical and statistical analysis shows that polarization increases when there are few dimensions to the culture, when there are many alternative traits on each dimension, and when interactions are only with adjacent sites. Moreover, polarization is highest when the size of the territory is big enough to allow for many cultures but small enough for the change process to settle down before all cultural boundaries are dissolved by the spread of cultural traits.

The social influence model illustrates three fundamental points:

1. Local convergence can lead to global polarization.
2. The interplay between different features of culture can shape the process of social influence.
3. Even simple mechanisms of change can give counterintuitive results, as shown by the present model, in which large territories generate surprisingly little polarization.

Transicion de fase en el model de Axelrod

Transicion de fase en el modelo de Axelrod

Nonequilibrium phase transition in a model for social influence.

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(February 1, 2008)

En este trabajo se adopta por comodidad un q continuo y una densidad de Probabilidad de Poison

$$\text{Prob}\left(\sigma_{i,j=k}\right) = q^k e^{\frac{-q}{k!}}$$

At each time step, a pair of nearest neighbor sites i and j is randomly chosen. A feature f is chosen randomly and if $\sigma_{i,f} \neq \sigma_{j,f}$ nothing happens. If instead $\sigma_{i,f} = \sigma_{j,f}$ then an additional feature f' is randomly chosen among those taking different values across the bond, $\sigma_{i,f'} \neq \sigma_{j,f'}$. Such a feature is then set equal: $\sigma_{i,f'} \to \sigma'_{i,f'} = \sigma_{j,f'}$. A "sweep" of the lattice, i.e. L^2 such time steps, defines the time unit as usual. Axelrod's model (at least in the original formulation) can be seen as F coupled voter models [6].

Observar la mecánica utilizada

Existe una configuración asintótica tal que

Dado que nada pasa cuando todos los features son iguales sobre un link

$$\sigma_{i,f} = \sigma_{j,f} \qquad \forall f$$

O son todos distintos

$$\sigma_{i,f} \neq \sigma_{j,f} \qquad \forall f$$

Un estado asintotico congelado corresponde a una situación en la que la condición segunda se satisface sobre las fronteras de las regiones que delimitan conjuntos donde se satisface la primera.

Existe una configuracion asintotica congelada

Q_c estara Por aca

F=2

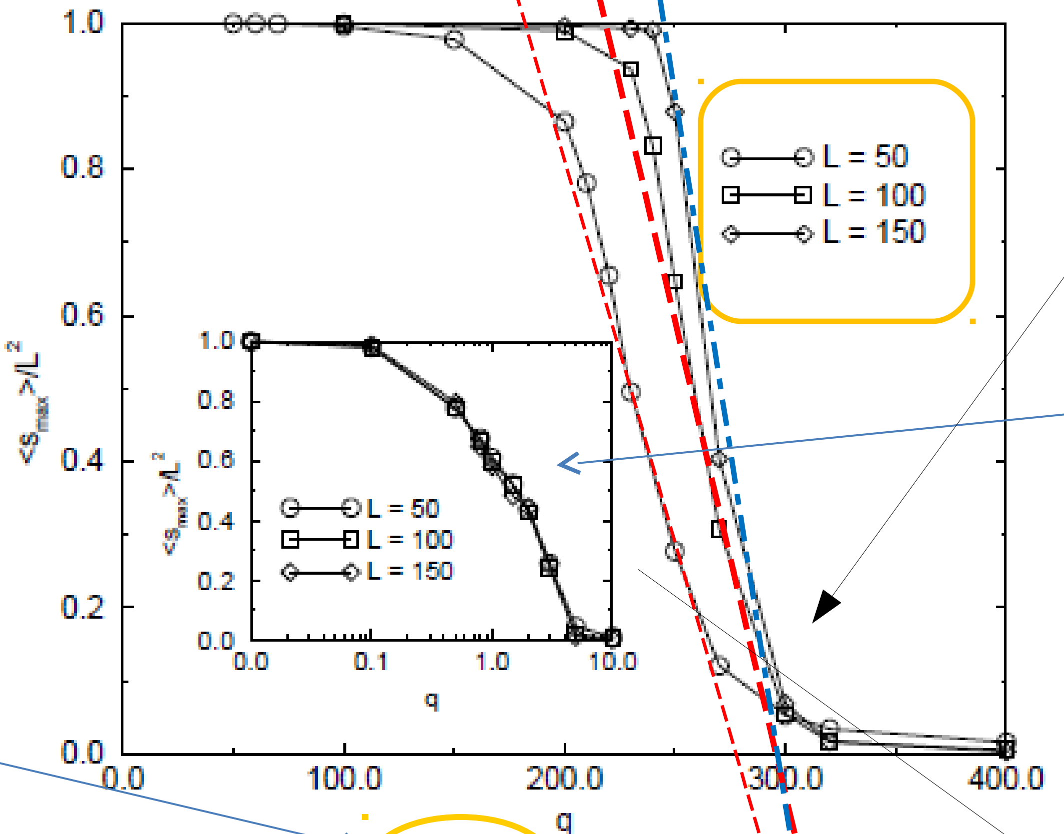
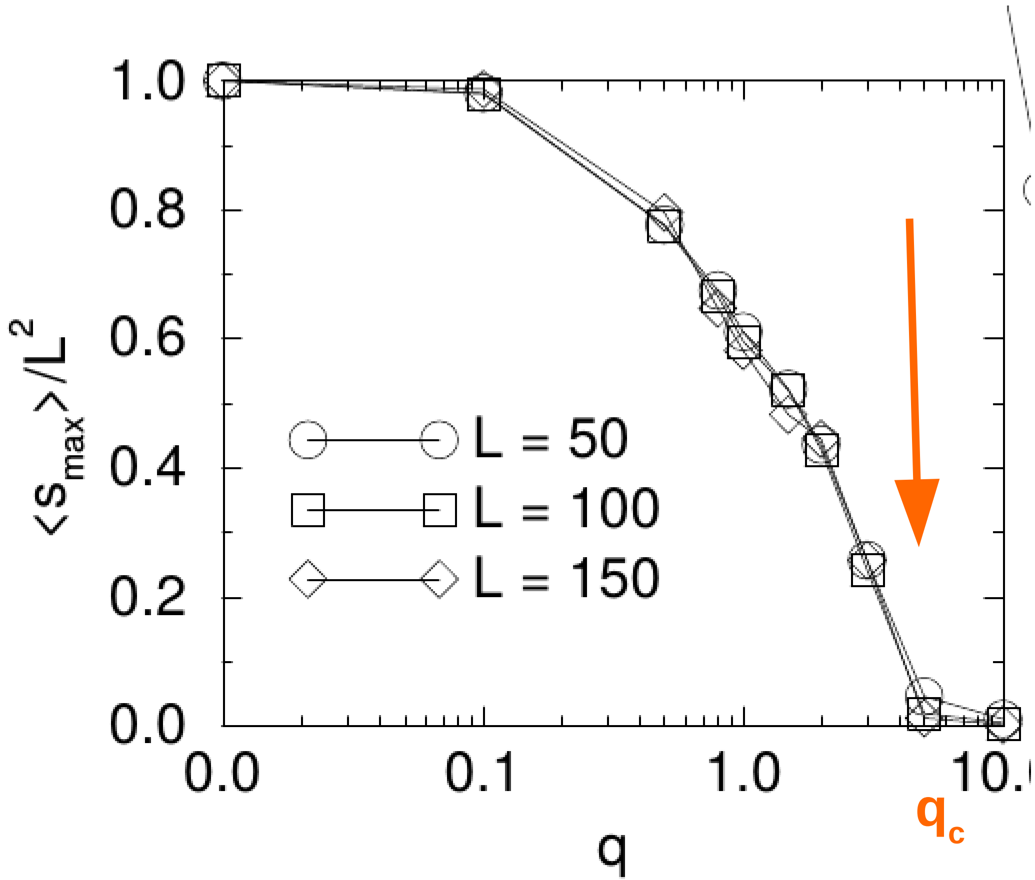


FIG. 1. Behavior of $s_{\max}/L^2$ vs q for three different system sizes and $F = 10$. In the inset the same quantity is reported for $F = 2$.

En particular en inset muestra que ocurre cuando F=2 y se observa que para Todo L es la misma curva salvo que en la flecha se hace mas abrupto



Rango 1

$$P_L(s,q) \sim s^{-\tau}$$

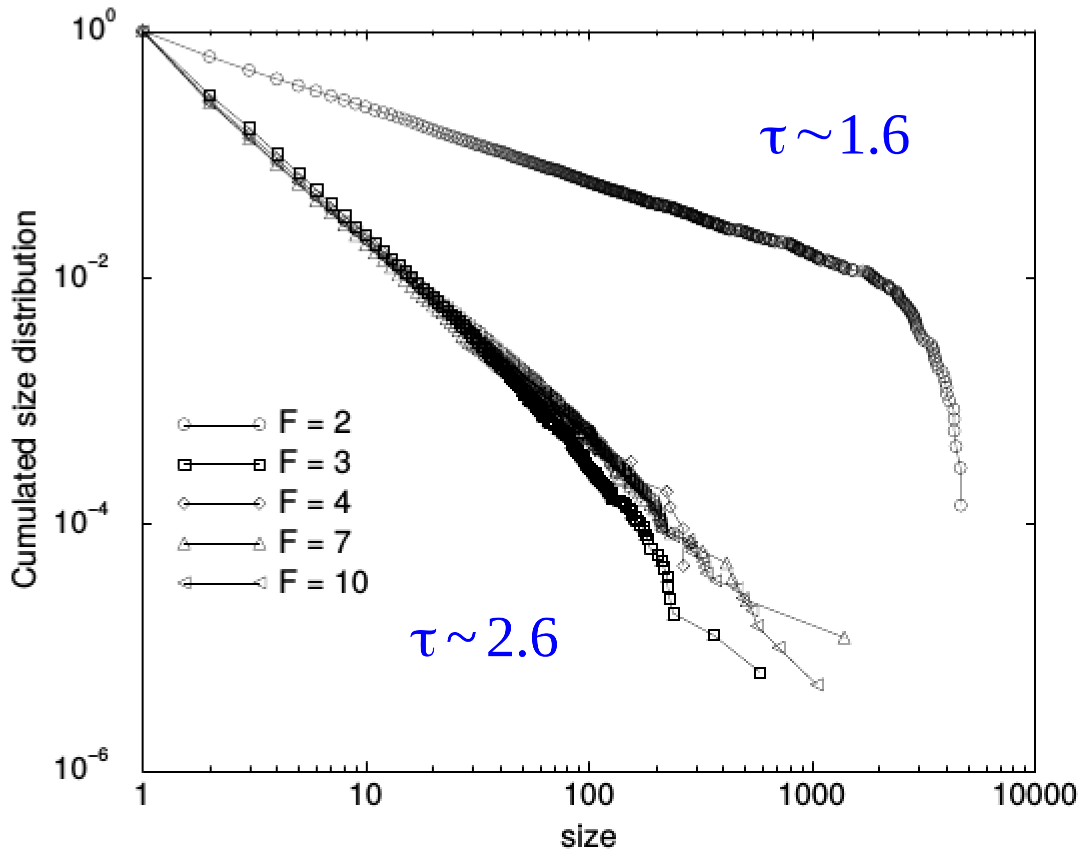


FIG. 2. Cumulated distribution of region sizes for $q \approx q_c$, $L = 100$ and several values of F.

Rango 2

Explicacion :

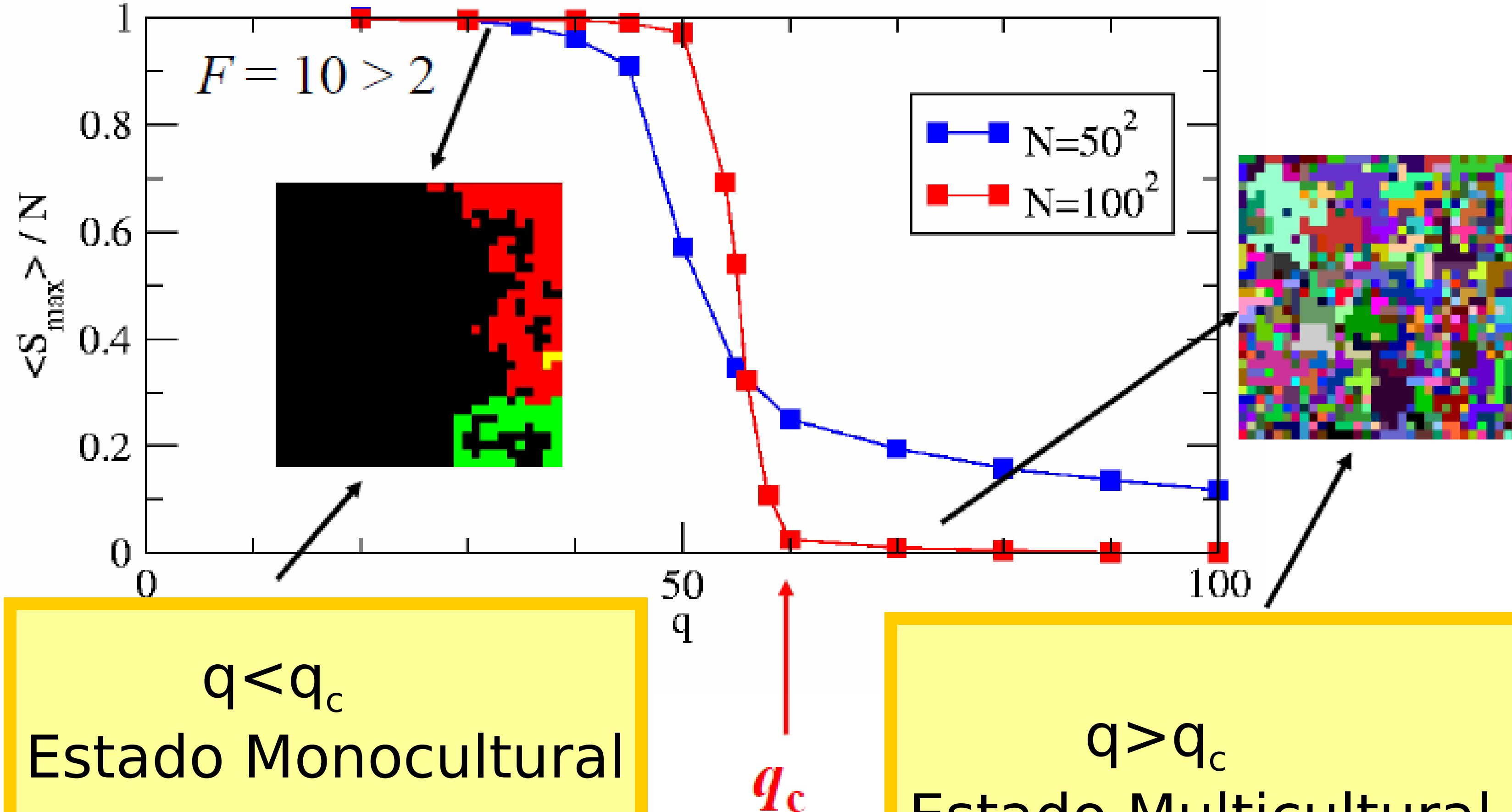
The different nature of the transition for F equal or greater than 2 can be related to the exponent τ. Let $N(q, L)$ be the total number of regions in the system. Requiring the total area to be L^2 leads to

$$L^2 = N(q, L)\langle s \rangle = N(q, L) \sum_{s=1}^{\infty} s\, P_L(s, q). \qquad (1)$$

For $q > q_c$ there are $N(q, L) \sim L^2$ domains of finite size and the sum on s is finite as $L \to \infty$. On the other hand, for $q < q_c$, there are few small domains and a large one of size $s_{\max} \sim L^2$. Hence the probability distribution can be written in the generic scaling form $P_L(s, q) = s^{-\tau}\mathcal{F}(s/s_{co}) + A(q)\delta_{s,s_{\max}}$ where s_{co} is a cut-off scale, the function $\mathcal{F}(x)$ is constant for $x \ll 1$ and decays very rapidly for $x \gg 1$ and $A(q) = 0$ for $q > q_c$.

Parametro de orden : S_{max} : dominio homogeneo mas grande

Parametro de control : q



q<q_c

Estado Monocultural

q>q_c

Estado Multicultural

Transicion de fase de primer orden , F>2

Information Feedback and Mass Media Effects in Cultural Dynamics

Journal of Artificial Societies and Social Simulation vol. 10, no. 3 9

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Information Feedback and Mass Media Effects in Cultural Dynamics

J.C. González-Avella, V. M. Eguíluz, and M. San Miguel

Dado el modelo de Axelrod

Cual es el efecto del feedback de información asociado a los medios masivos de comunicación? (MMC)

La dinámica esta regulada por la homofilia

Se prueban dos mecanismos :

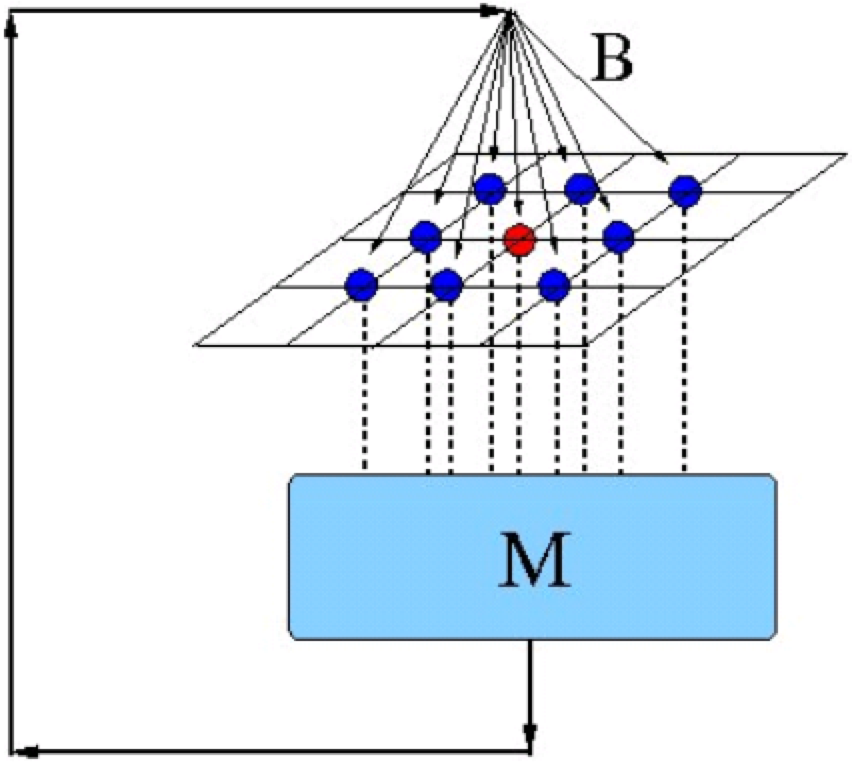
a)MMC global

b)MMC local

MMC Global

MMC (representado por M)
Estará en un estado caracterizado por

$$(\mu_{i1}, \mu_{i2}, \ldots, \mu_{iF})$$



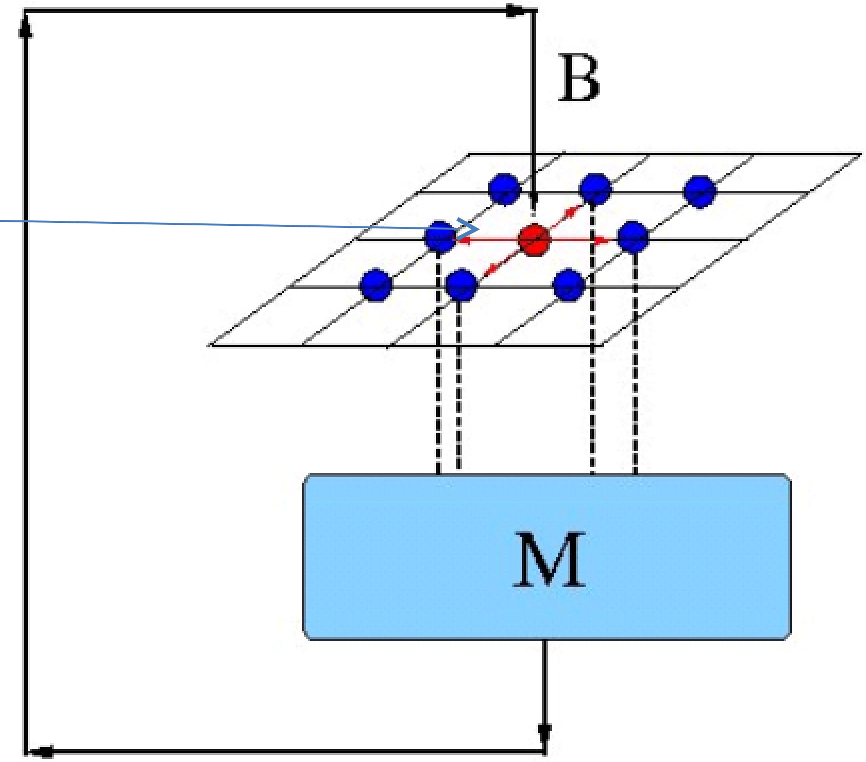
Es uniforme espacialmente

$$\mu_{if} \equiv \mu_f$$

Se determina como el valor medio de la componente f de los vectores de estado de todos los actores

Para el caso local:

μ_{if}



Se determina como el valor
medio sobre los vecinos
Inmediatos

Como en ambos casos el acoplamiento esta definido por el valor me
Sobre algún conjunto de actores, se justifica el termino feedback.

Acoplamiento del MMC con los agentes

$$B \in [0,1]$$

B denota la probabilidad de interacción entre el MMC y el individuo ("fuerza del MMC")

B obviamente representa muchas variables asociadas al probler

Acoplamiento del MMC con los agentes

Formalmente, el MMC actua sobre los agentes como un vecino extra

El MMC es representa por un agente adicional ϕ(i) tal que :

$$\sigma_{\phi(i)\,f} = \mu_{if}$$

Se procede según:

a) Seleccionar un agente al azar

b) seleccionar la fuente de la interacción **j**

con proba **B** seleccionar ϕ(i)

con proba **(1-B)** elegir agente **j** de los 4 vecinos

c) Calcula la superposición cultural

$$l(i,j) = \sum_{f=1}^{F} \delta_{\sigma_{if},\sigma_{jf}}$$

Calculamos superposicion

$$I(i,j) = \sum_{f=1}^{F} \delta(\sigma_{if}, \sigma_{jf})$$

Si se superponen
(pero no demasiado)

$$0 < I(i,j) < F \quad \Rightarrow$$

Interactúan con proba

$$p_{ij} = \frac{I(i,j)}{F}$$

Si se acepta la interacción
Elegimos h al azar de modo que

$$\sigma_{ih} \neq \sigma_{jh} \rightarrow \sigma_{ih} = \sigma_{jh}$$

Actualizar el estado de M

La proba total de interactuar con el MMC

$$B\, p_{iM} \; ; \quad \text{con} \quad p_{iM} = \frac{I(i,M)}{F}$$

El overlap con M $\quad I(i,M)$

La proba total de interactuar con el vecino j

$$\frac{1}{4}(1-B)\, p_{ij}$$

Comportamiento del sistema

$$g = \frac{\langle N_g \rangle}{N}$$

Numero medio de dominios culturales (regiones)

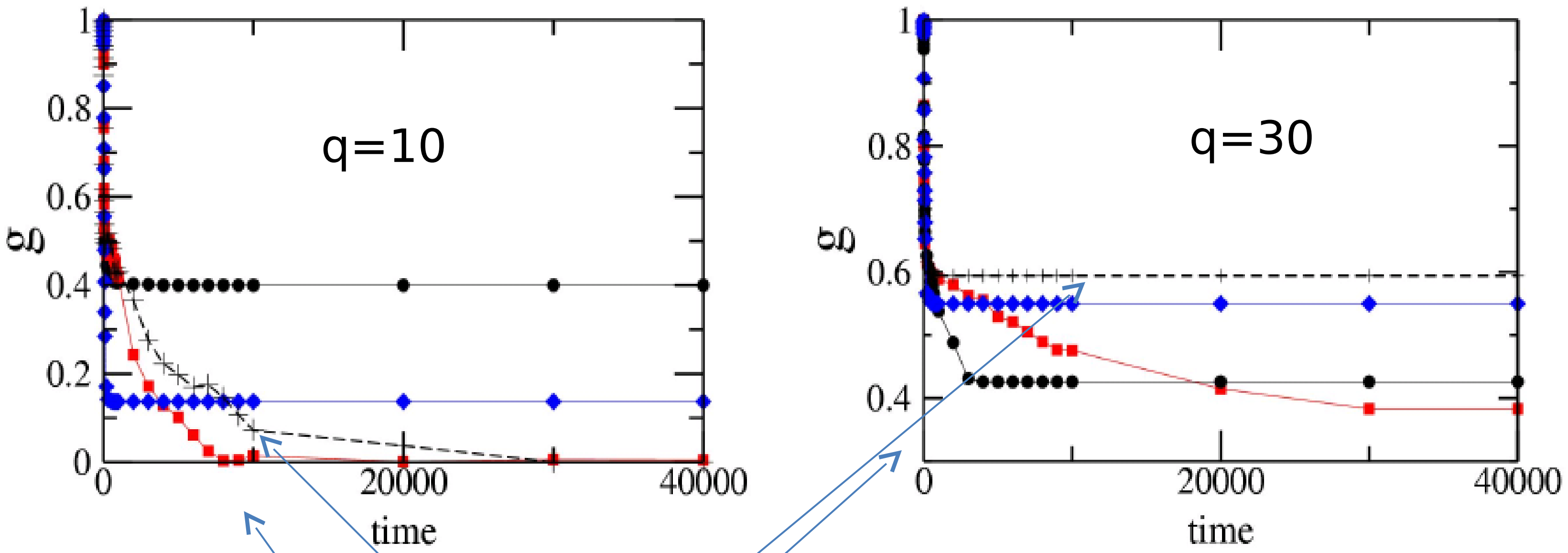
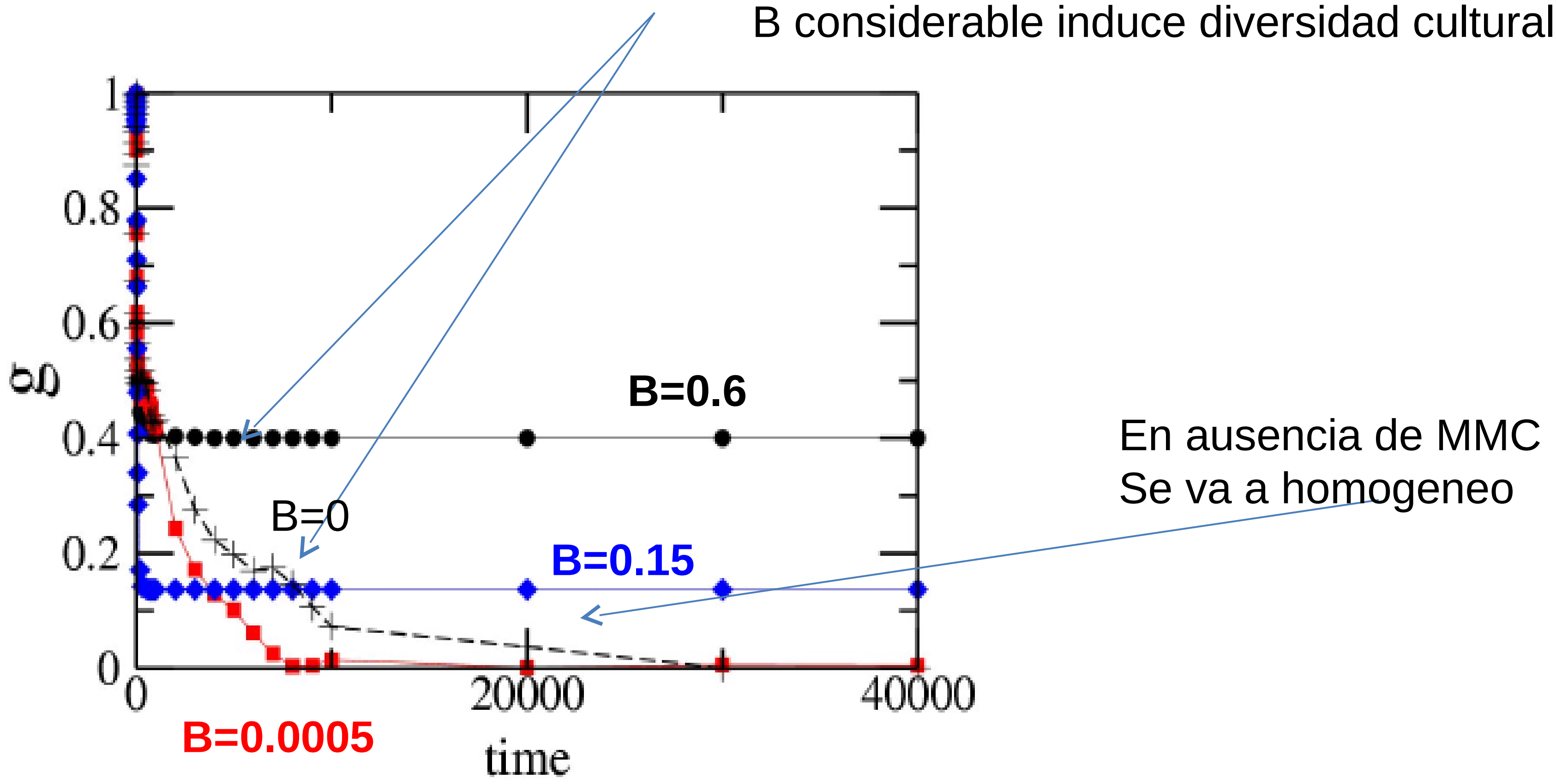


Figure 2: Evolution of g in a system subject to a global mass media message for different values of the probability B, with fixed $F = 5$. Time is measured in number of events per site. System size $N = 50 \times 50$. Left: $q = 10$; $B = 0$ (crosses); $B = 0.0005$ (squares); $B = 0.15$ (diamonds); $B = 0.6$ (circles). Right: $q = 30$; $B = 0$ (crosses); $B = 0.0005$ (squares); $B = 0.005$ (circles); $B = 0.1$ (diamonds).

Q=10, F=5, N=50X50



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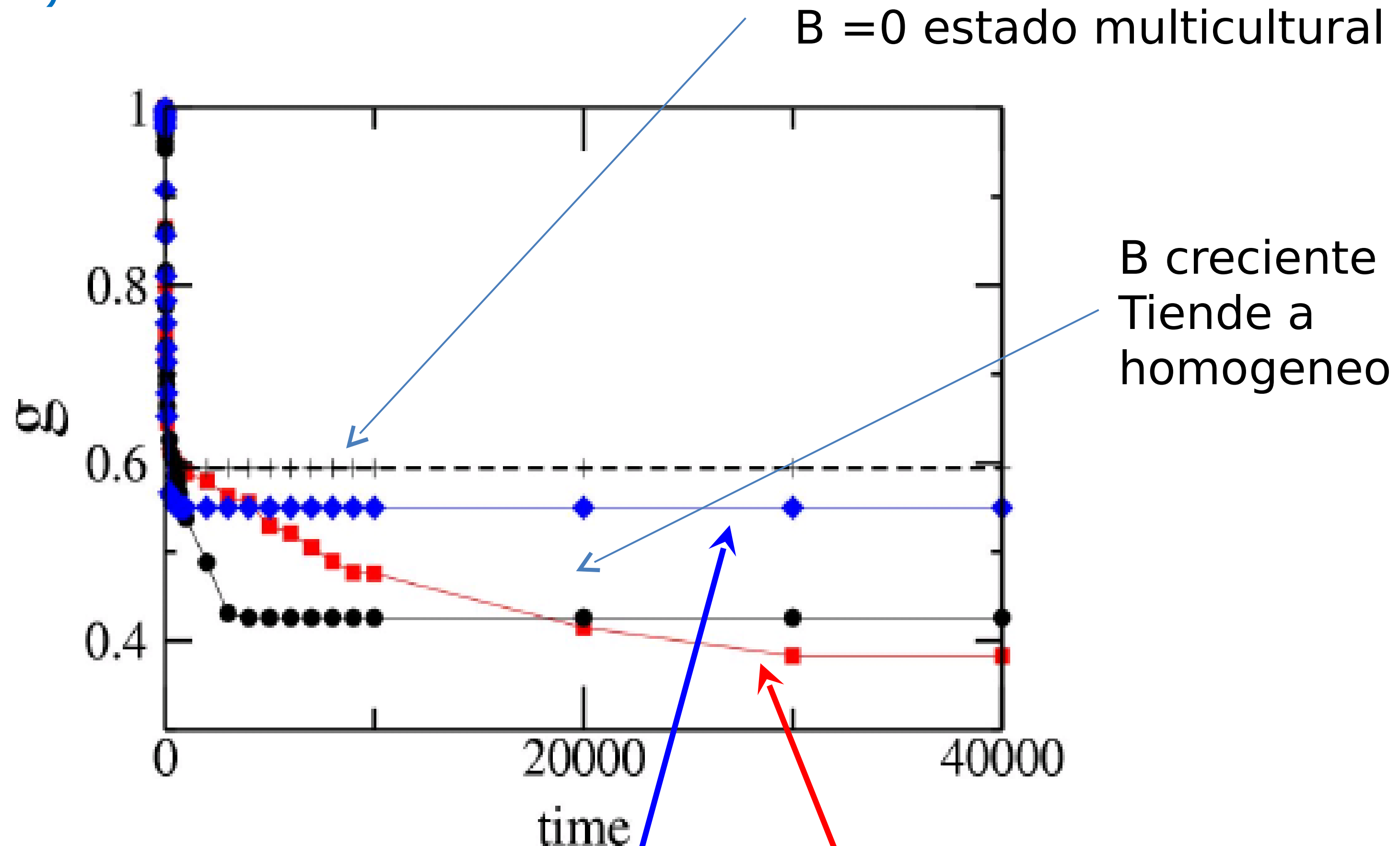
Q=30, F=5, N=50X50



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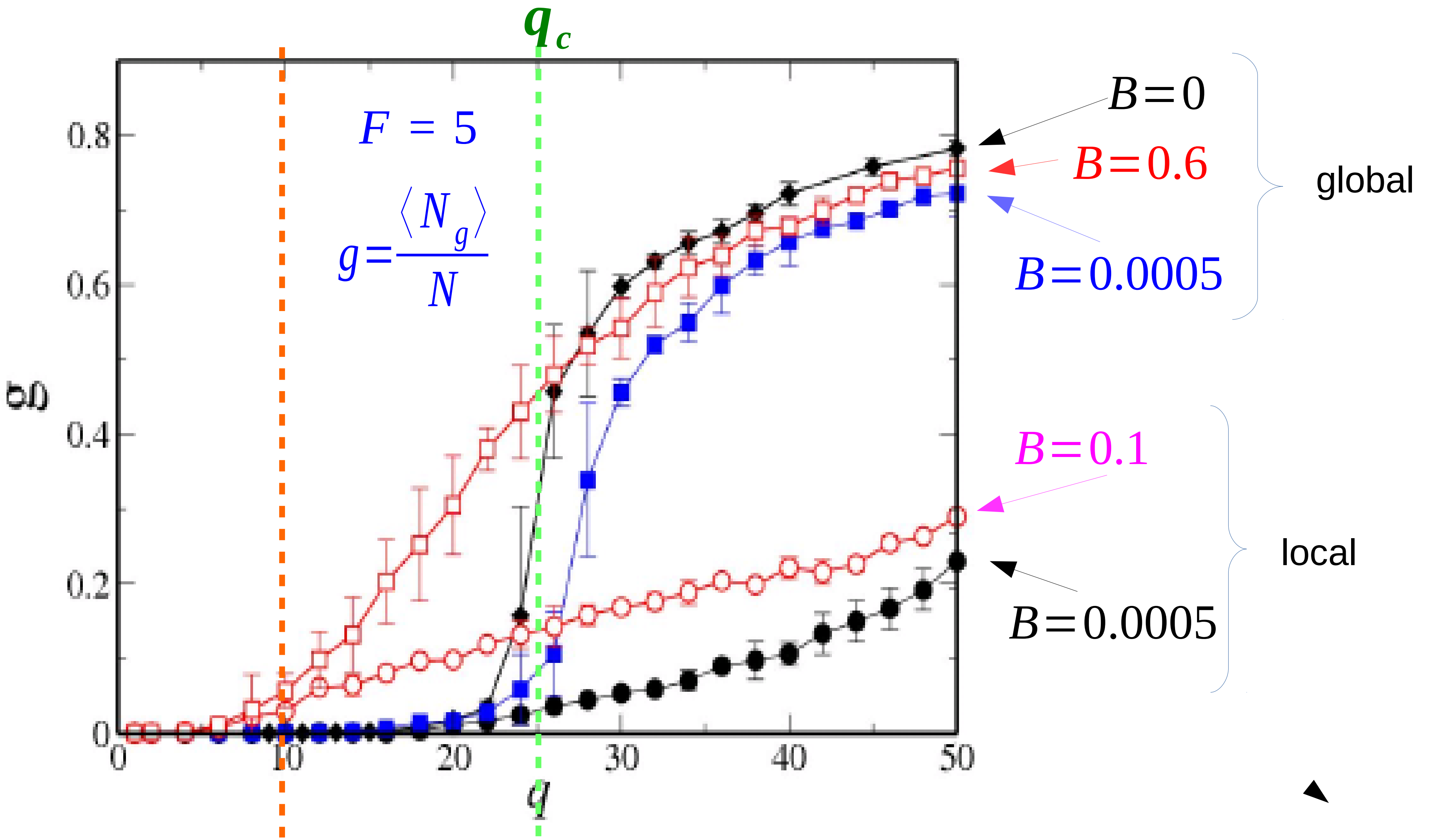


Figure 3: Asymptotic value of the fraction of cultural domains g as a function of q for different values of the probability B and for different types of mass media influences. $B = 0$ (diamonds); $B = 0.0005$ (solid squares, direct global mass media); $B = 0.6$ (empty squares, direct global mass media); $B = 0.0005$ (solid circles, direct local mass media); $B = 0.1$ (empty circles, direct local mass media).

Global

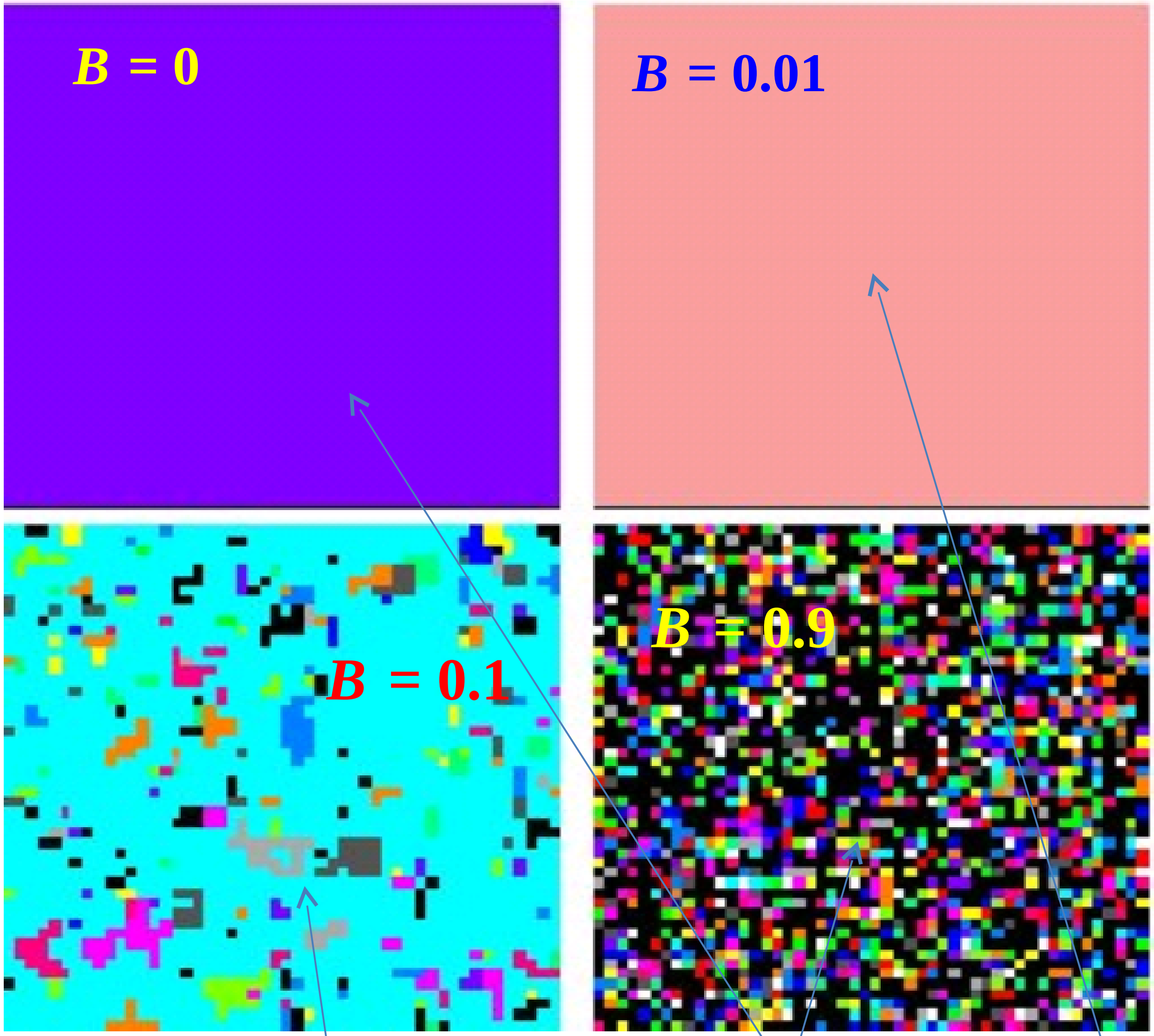


Figure 4: Asymptotic cultural configurations for different values of the probability B for a direct global mass media influence, for $F = 5$, $q = 10$, and $N = 50 \times 50$. Top left: $B = 0$; top right: $B = 0.01$; bottom left: $B = 0.1$; bottom right: $B = 0.9$

$q = 30$ por encima de q_c

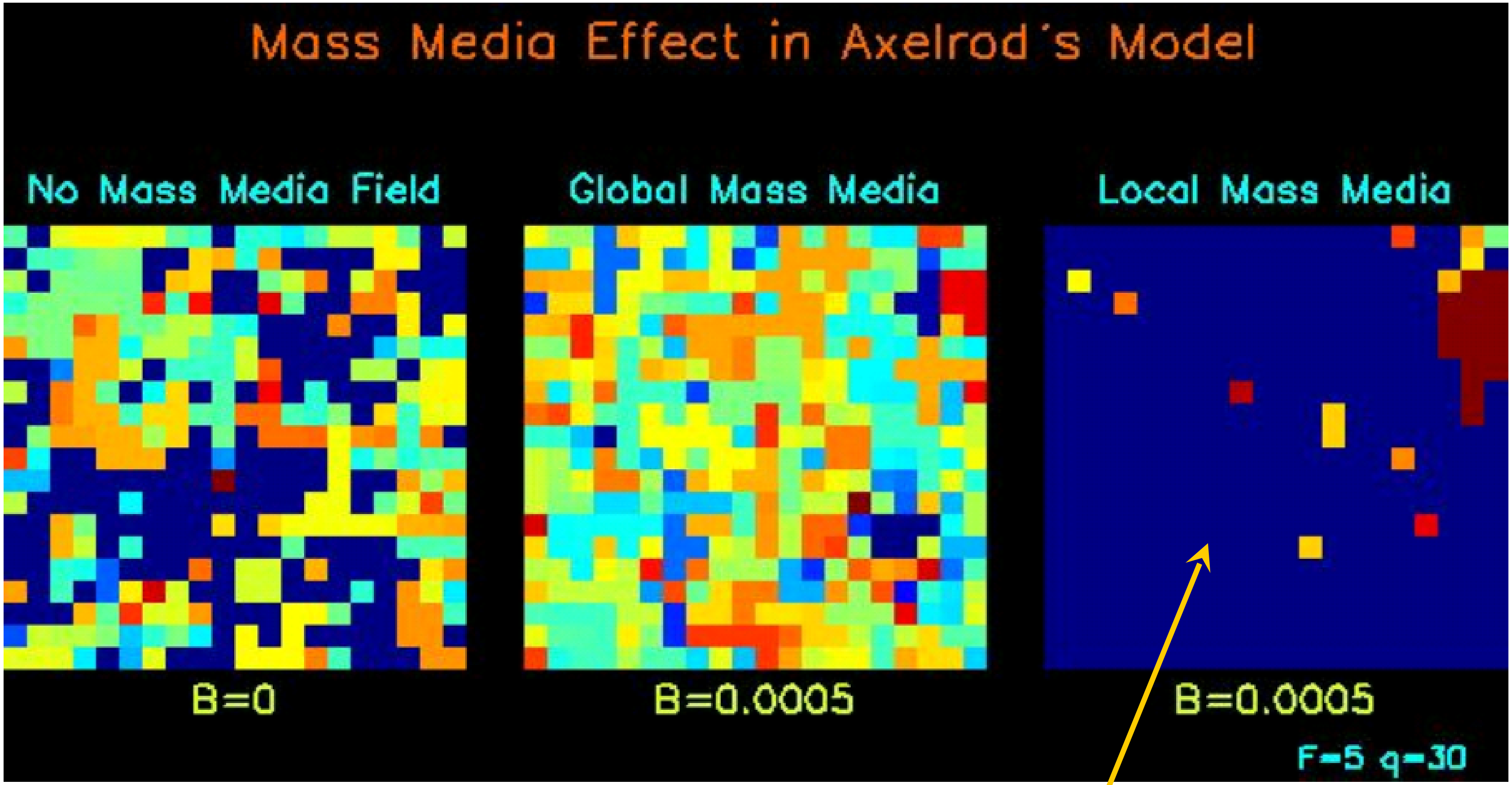
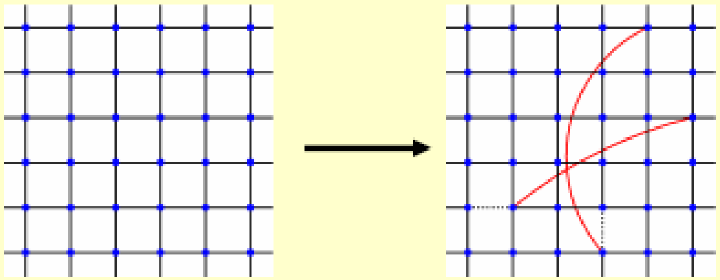


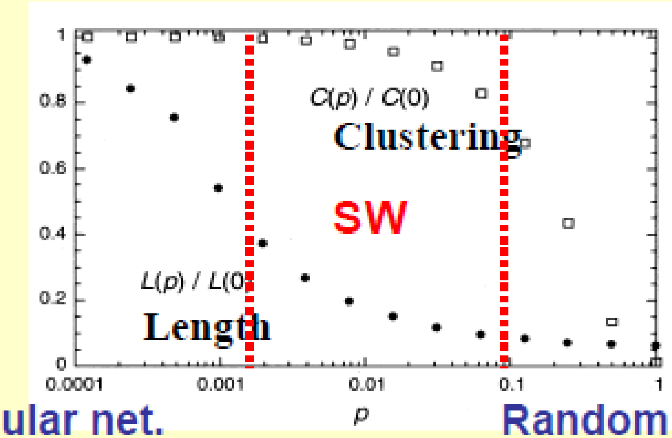
Figure 6: Cultural configurations for different values of the probability B for different mass media influences in the multicultural region, for $F = 5$, $q = 30$, and $N = 50 \times 50$. Left: no mass media $B = 0$; center: Global mass media with $B = 0.0005$; right: Local mass media with $B = 0.0005$. (see

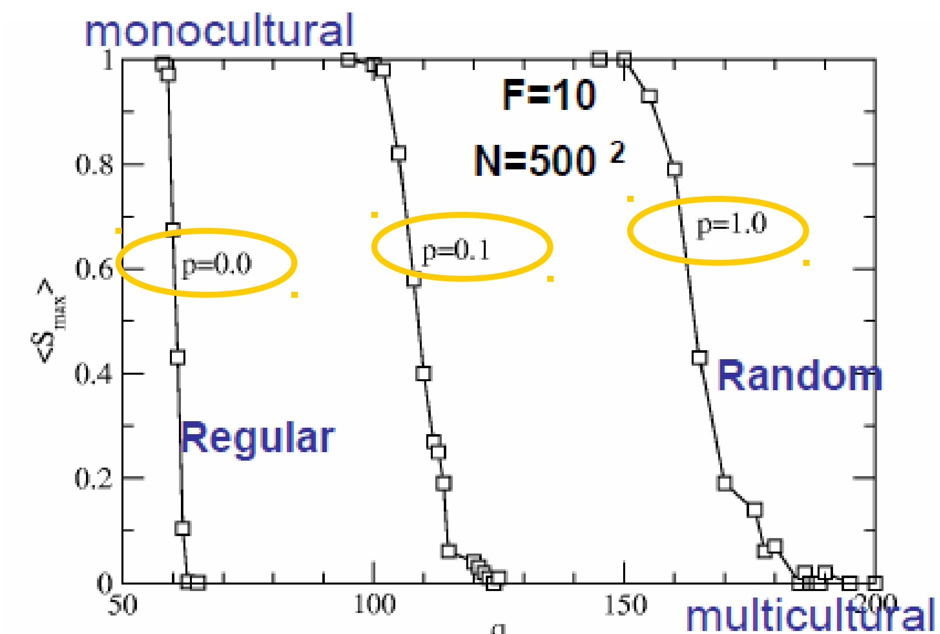
Redes Small World

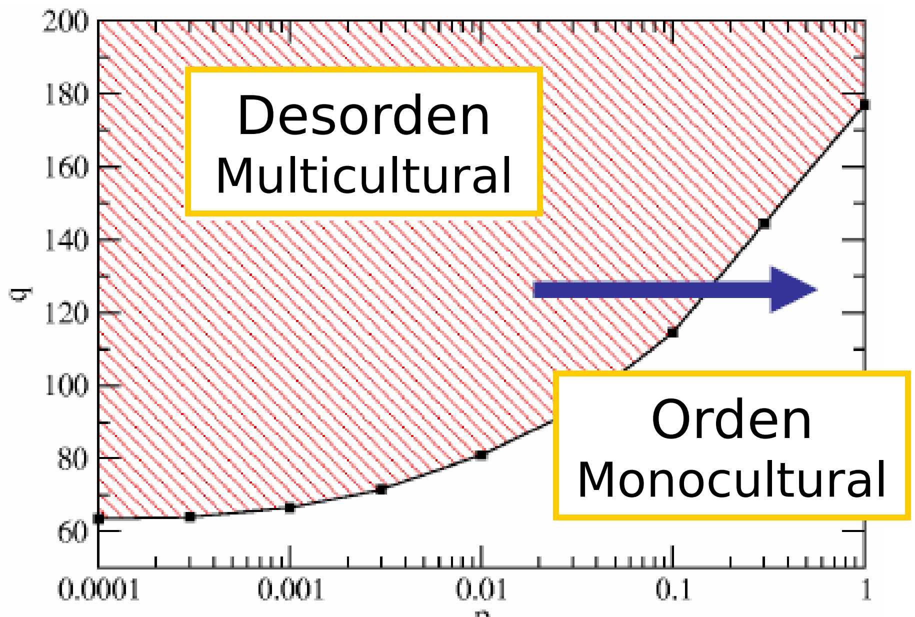
Watts, Strogatz, Nature 393, 440 (1998)



rewiring con proba p

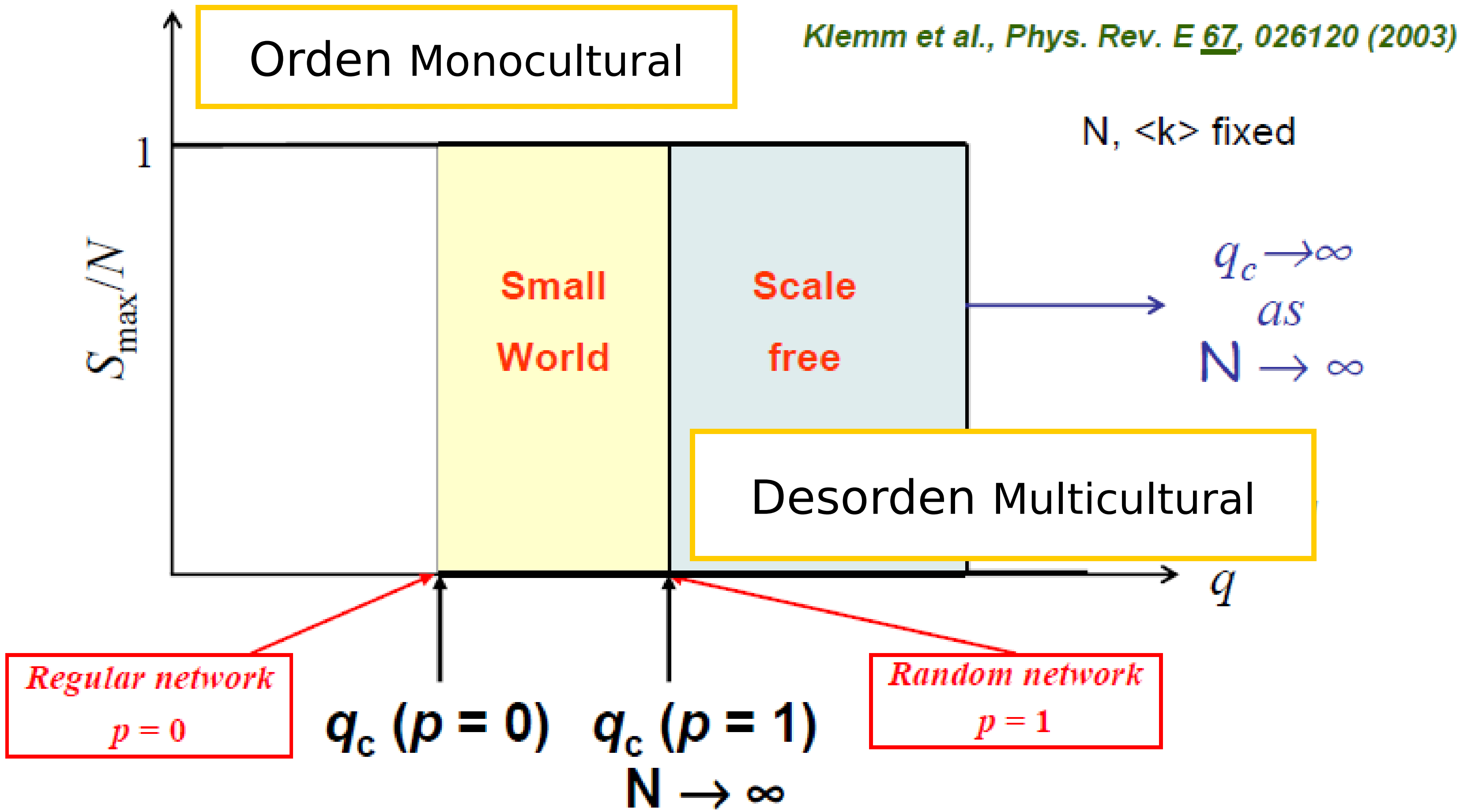






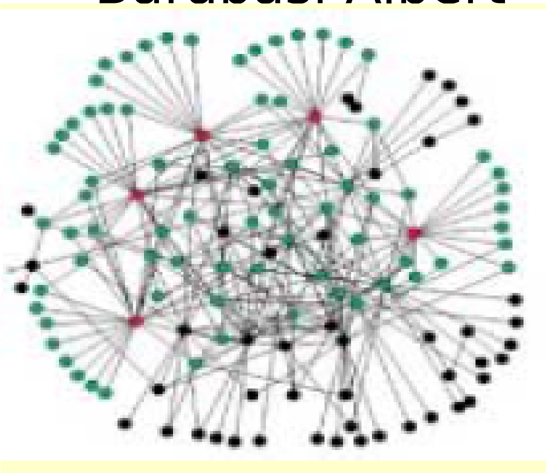
Small World favorece la globalización cultural

Redes Scale Free



Scale free connectivity is more efficient than random connectivity in promoting global culture

Barabasi-Albert



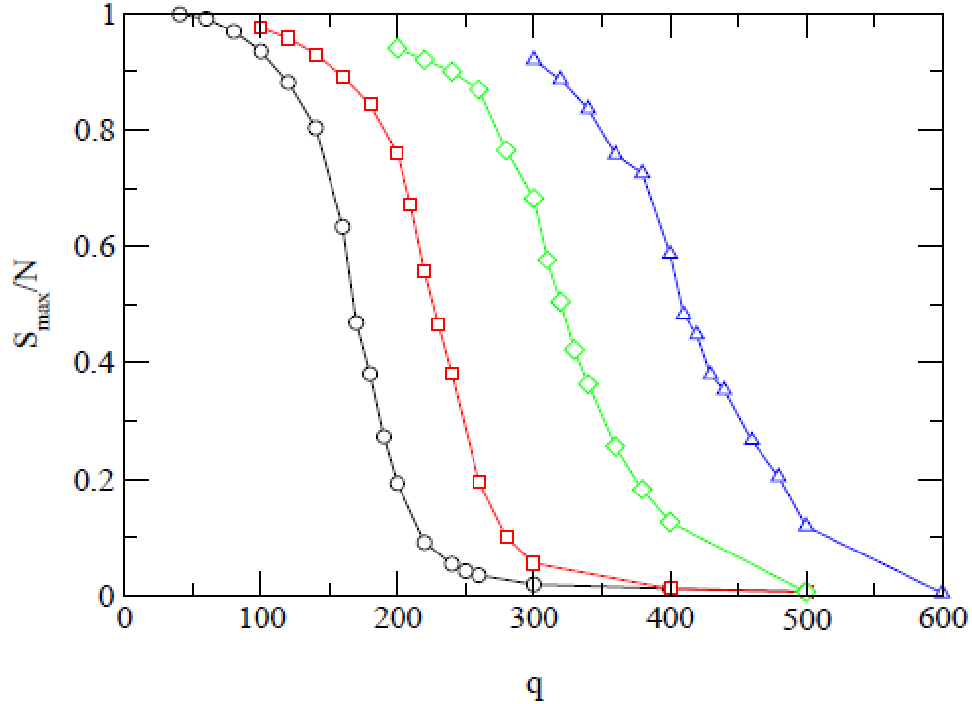


FIG. 5: The average order parameter $\langle S_{max} \rangle / N$ in random scale-free networks for $F = 10$. Averages are taken over 1000 independent realizations. Different curves are for different system sizes: 1000 (circles), 2000 (squares), 5000 (diamonds), and 10000 (triangles).

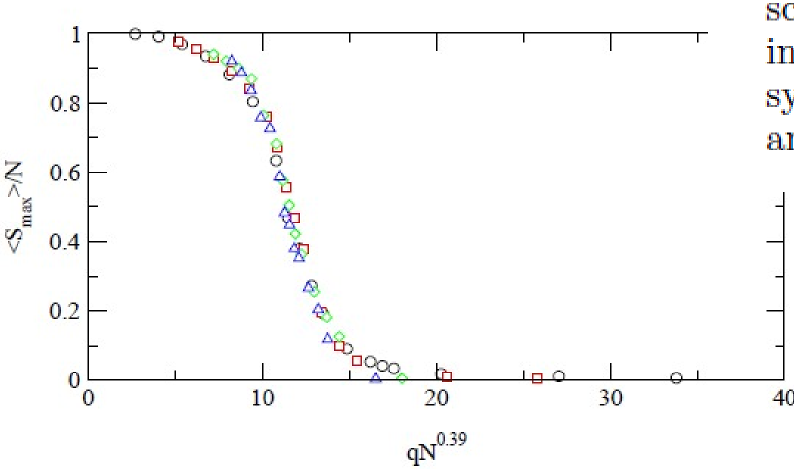


FIG. 6: Rescaled plot of the data shown in Fig. 5 for different system sizes.