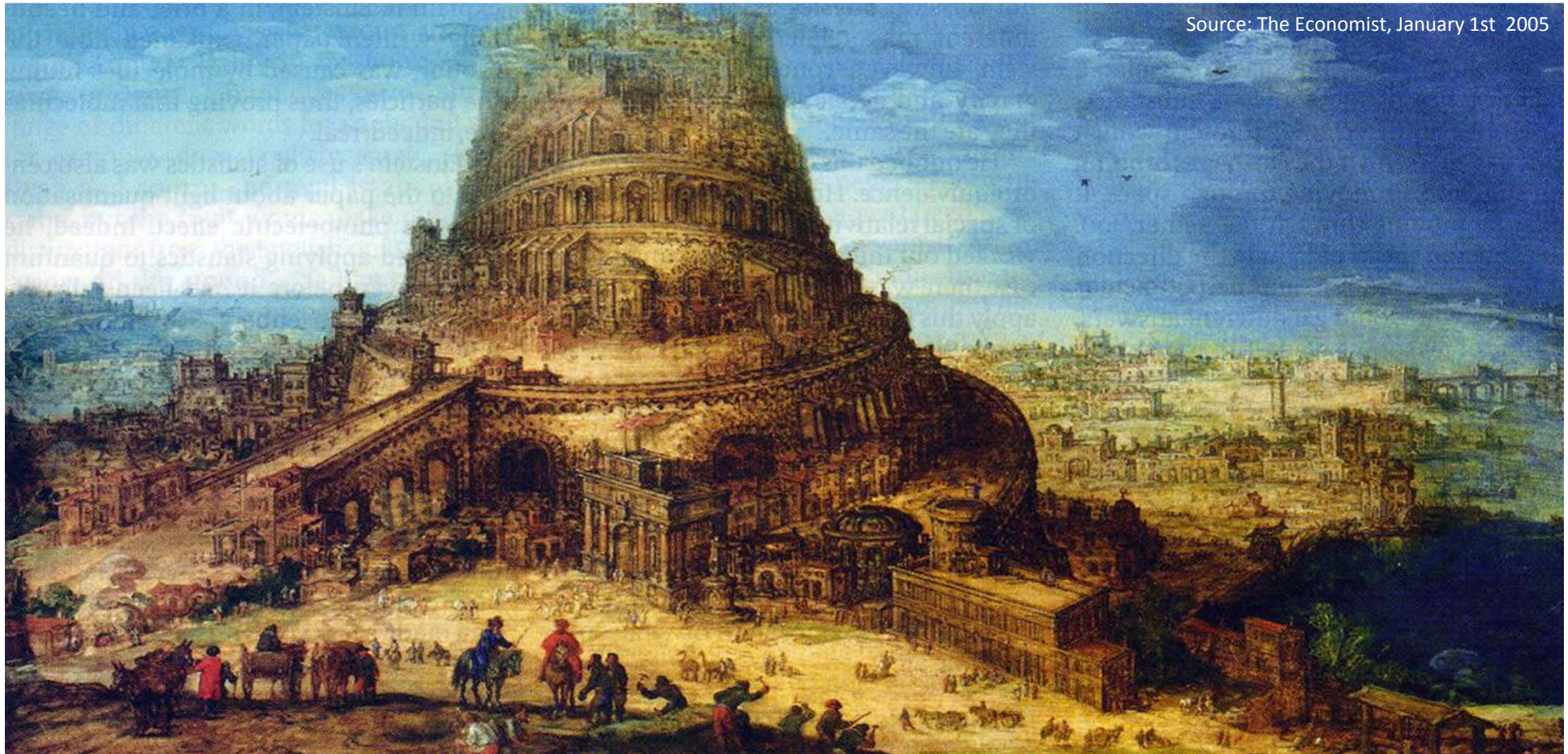


53rd ERSА Congress, 27-31 August 2013, Palermo

Regional Integration and Cultures in the Age of Knowledge Creation —The Story of the Tower of Babel revisited—

Source: The Economist, January 1st 2005

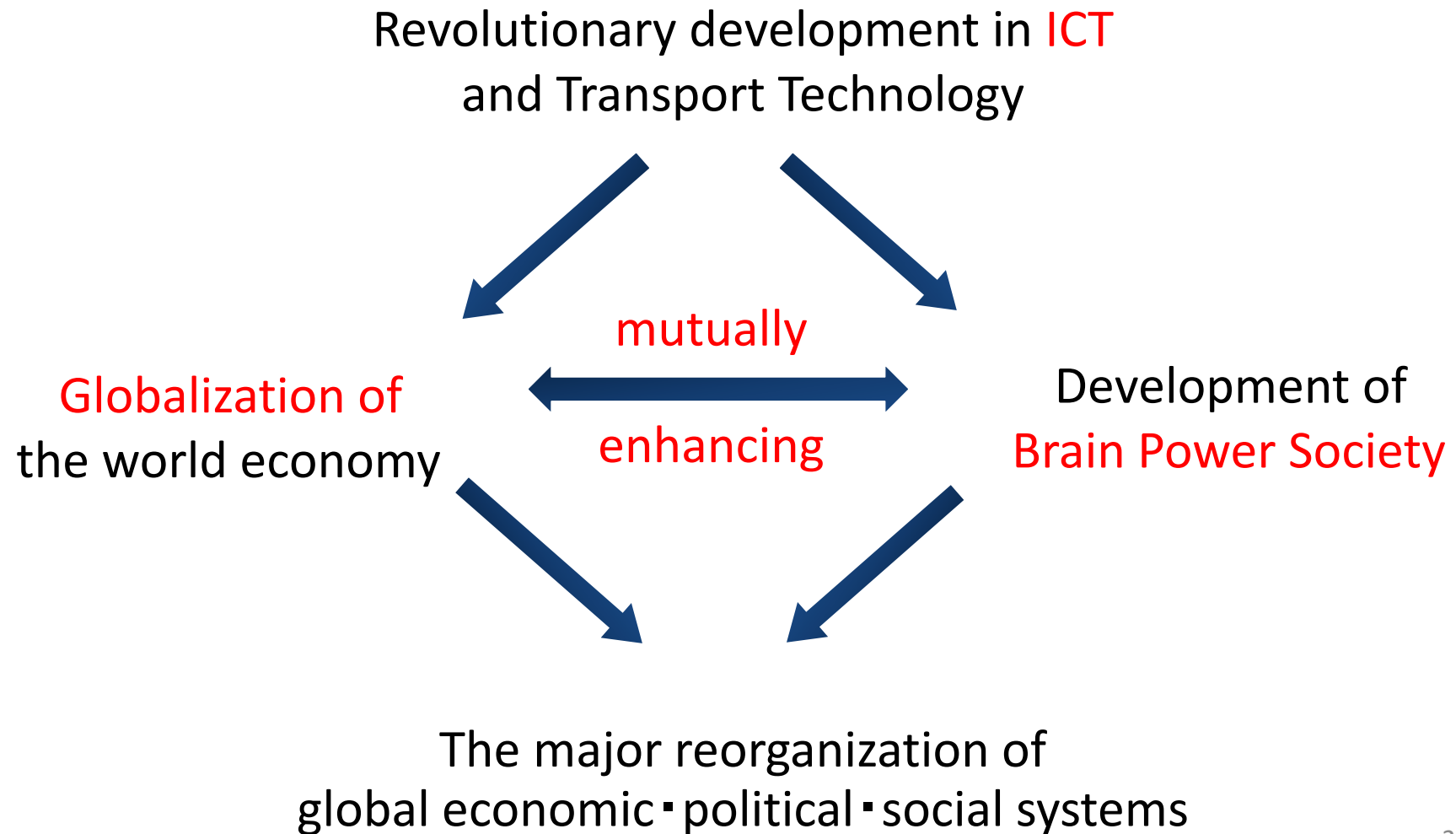


Masahisa Fujita

Konan University / Kyoto University / RIETI

1. Introduction

Development of the **Brain Power Society** since the late 20th century



European Integration and Beyond

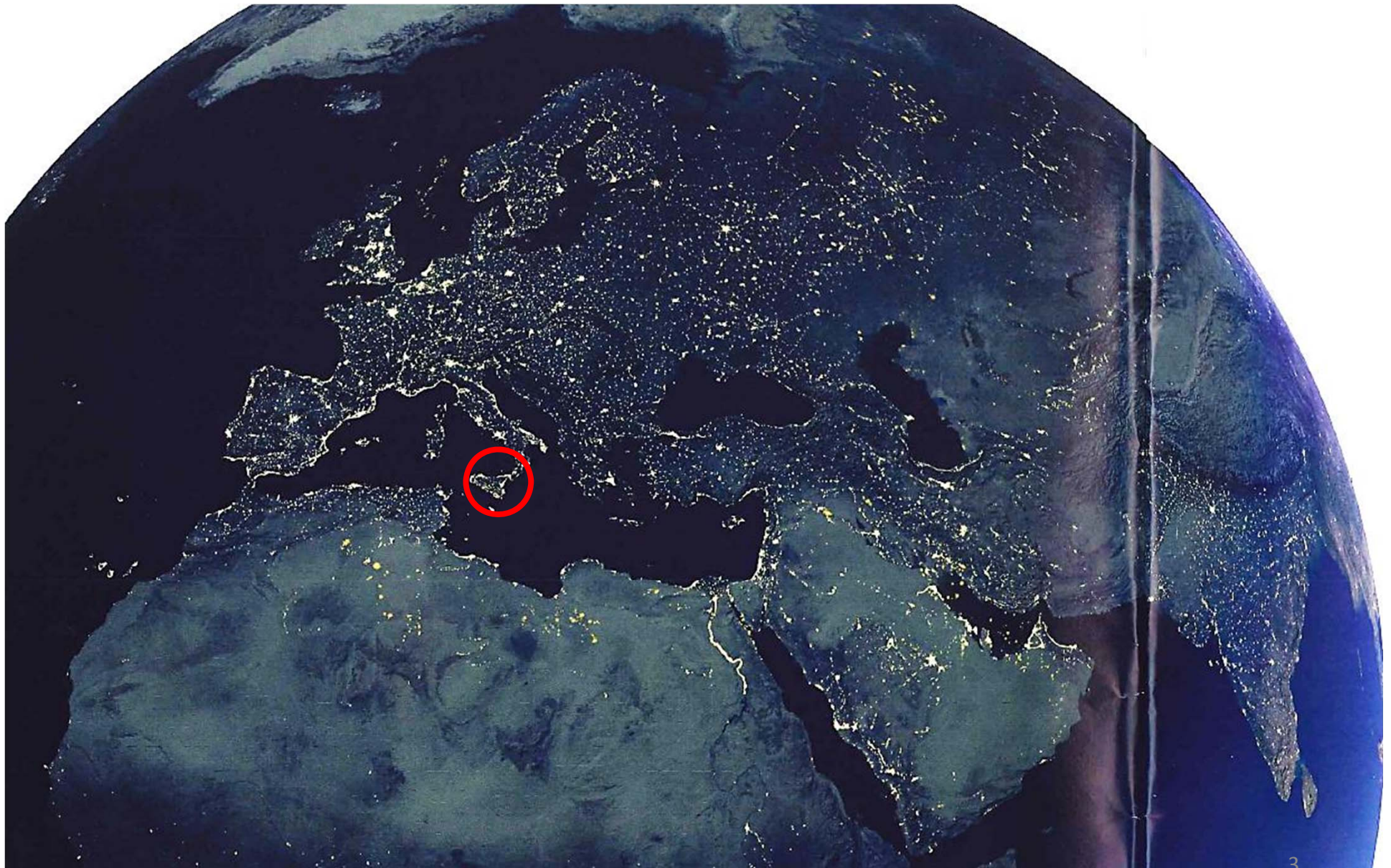


Photo: FT.COM/ 50IDEAS, June 2013

Tabula Rogeriana (World Map) by Muhammad al-Idrisi

Drawn at the Court of Ruggero II in **Palermo** in 1154
together with **Geografia**



Source: Wikipedia (shown upside down)



From the cover of **The Economist**, July 12TH-18TH 2008

- For the production and trade of **traditional goods**,
the lower the transport costs, the greater the efficiency

**paradise for
the traditional economy** = a world with
zero transport costs

- For the production and transfer of **“knowledge”**,
the lower the communication barriers,
the better the outcome ?

**paradise for
Brain Power Society** = a world of
effortless communication
with no communication
barriers ?

From the viewpoint of **culture**, is it **the ultimate goal of European Integration** that every one becomes **THE PERFECT EUROPEAN**?

- **cooking...like a Brit**
- **driving...like a French**
- **humorous...as a German**
- **available...as a Belgian**
- **famous...as a Luxembourger**
- **patient...as an Austrian**
- **talkative...as a Finn**
- **flexible...as a Swede**
- **discreet...as a Dane**
- **generous...as a Dutchman**
- **sober...as an Irish**
- **technical...as a Portuguese**
- **organized...as a Greek**
- **humble...as a Spaniard**
- **controlled...as an Italian**

Source: from cartoons drawn by J.N. Hughes-Wilson

United in diversity: The EU motto

distance • space • multiple languages

barriers for
communications
(*Lost in Translation*)

fostering the diversity of
local culture • knowledge

The net effects could be big positive
in the long-run development of knowledge
for the entire region/world

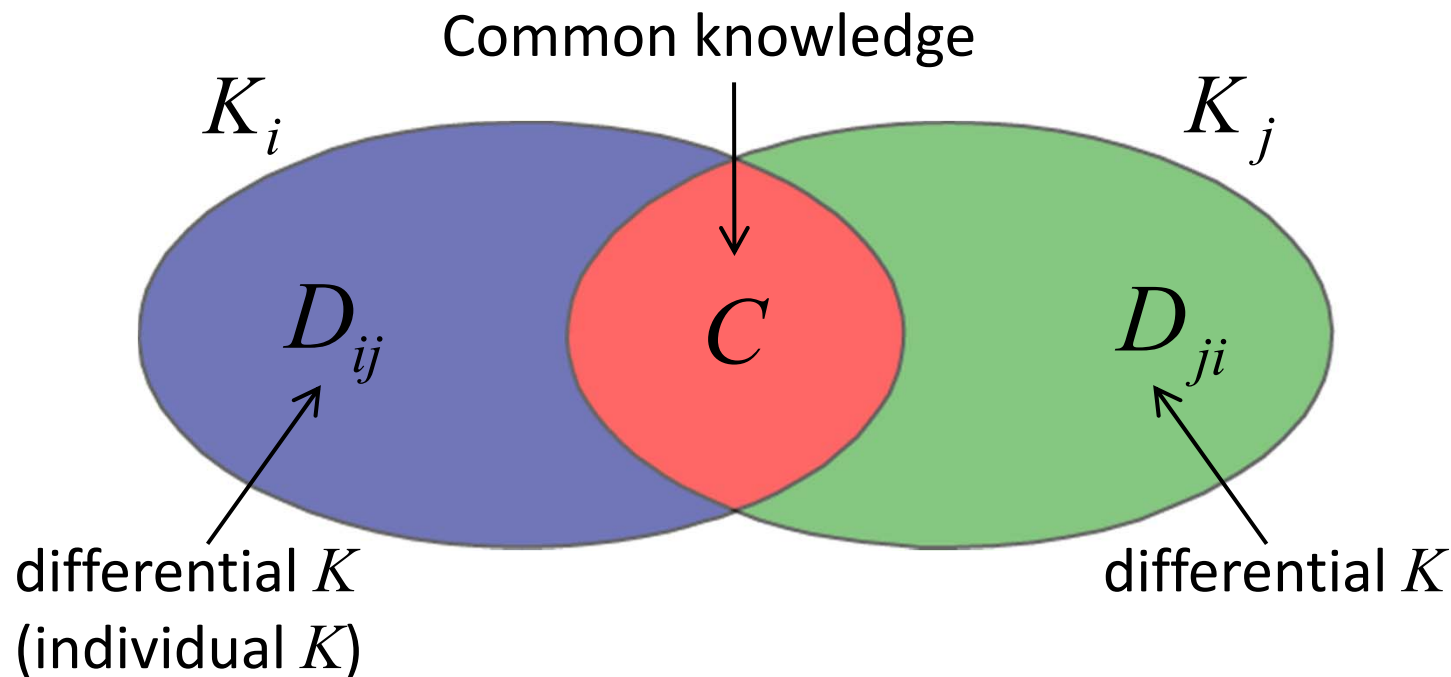
2. Why are **diversity and culture** important for Brain Power Society?

The fundamental resources in the Brain Power Society

- Individual Brain Power
- **Diversity in people ▪ brains** in the society
 - **Synergy** through **heterogeneous people ▪ brains**
- **Diversity in cultures** among different regions
 - **Synergy** through **heterogeneous cultures**

in the cooperative process of K -creation
the key factor:

diversity of people



creation of new ideas

through the encounter of heterogeneous people and culture

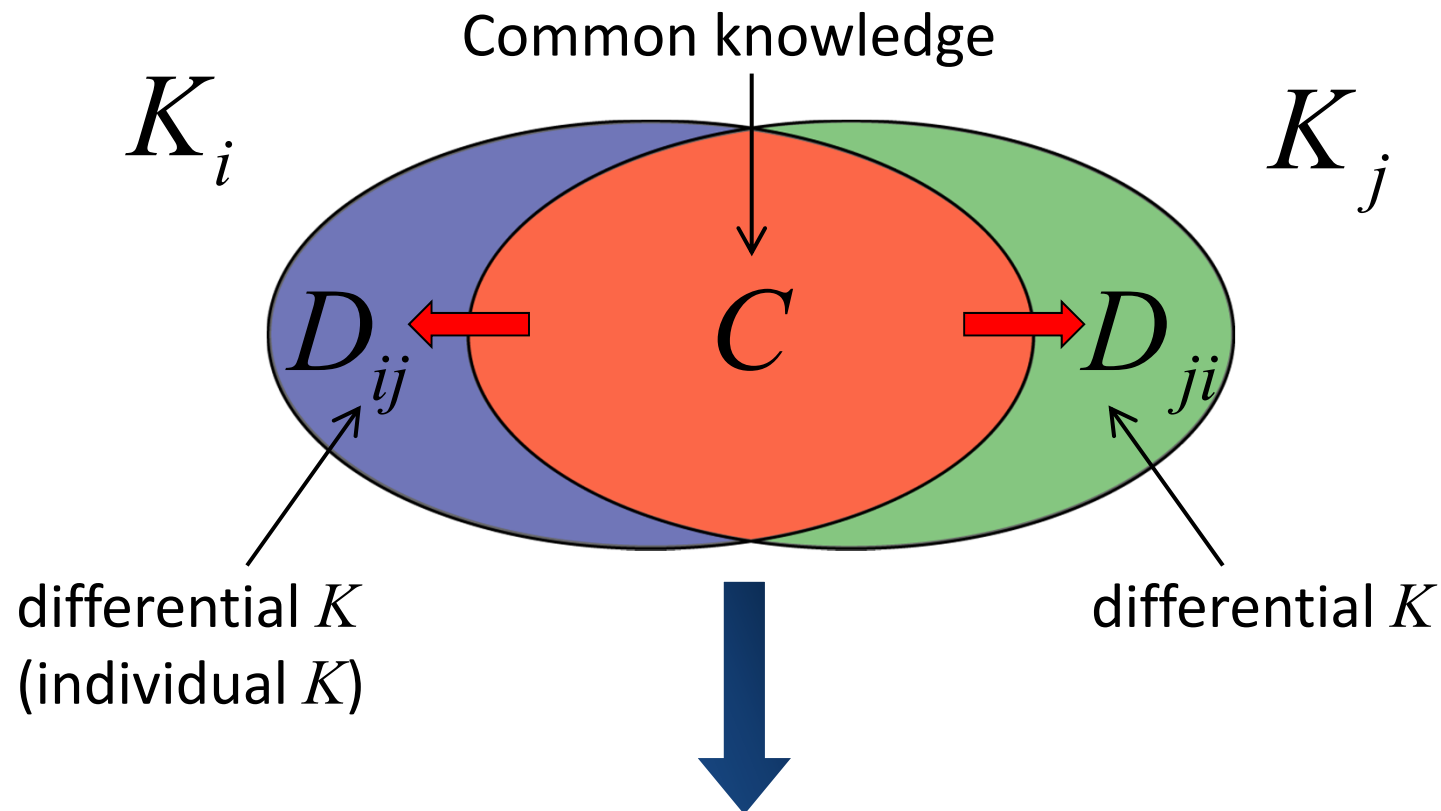
“三个臭皮匠、
抵个诸葛亮”

“三人寄れば文殊の智慧”

With three ordinary persons together,
splendid ideas will come out.
(Two heads are better than one.)

“With three ordinary persons together,
splendid ideas will come out.”

Is this true in the long-run?



After three ordinary persons **meeting for three years**,
no splendid ideas will come out.

close cooperation of
heterogeneous *K*-workers
(e.g. “nominication” in Japan)



antinomy

in the short-run

through
close communications
synergy ↑

in the long-run

Common knowledge ↑
→ heterogeneity ↓
→ **synergy** ↓



Hint: The Story of ↑ **the Tower of Babel**

How to resolve this fundamental problem?

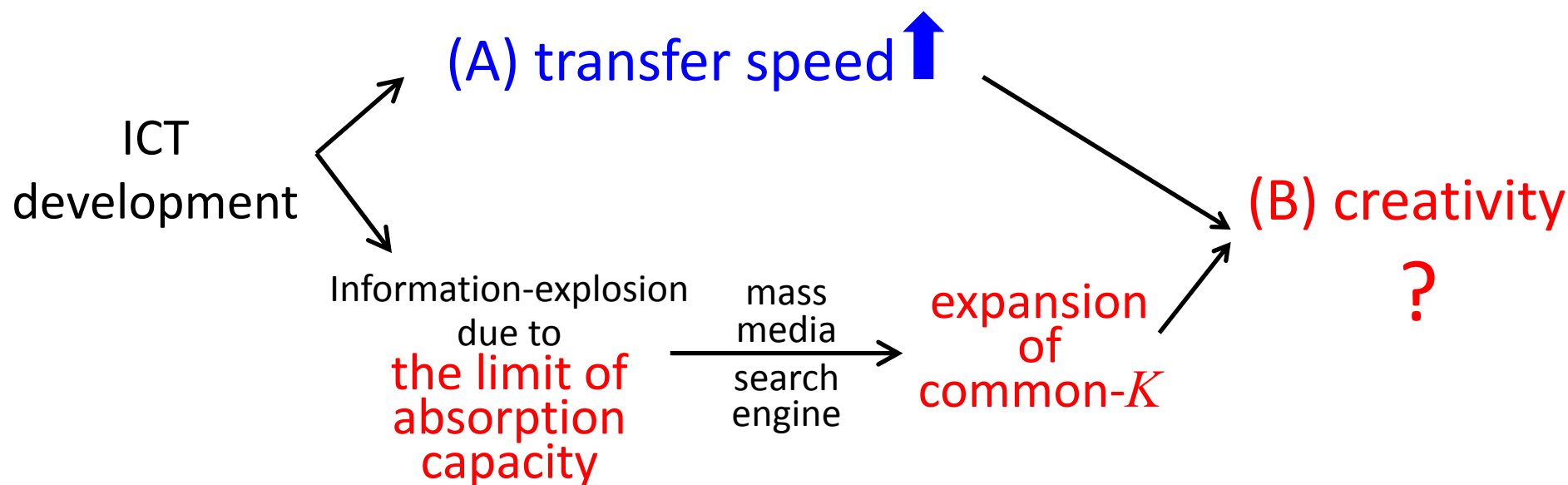
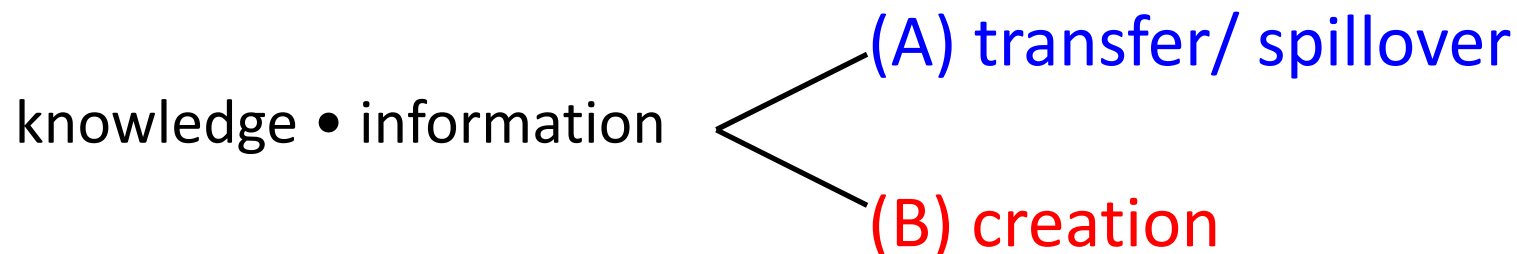
The Story of The Tower of Babel (Chapter 11, the Book of Genesis)

a united humanity, speaking single language

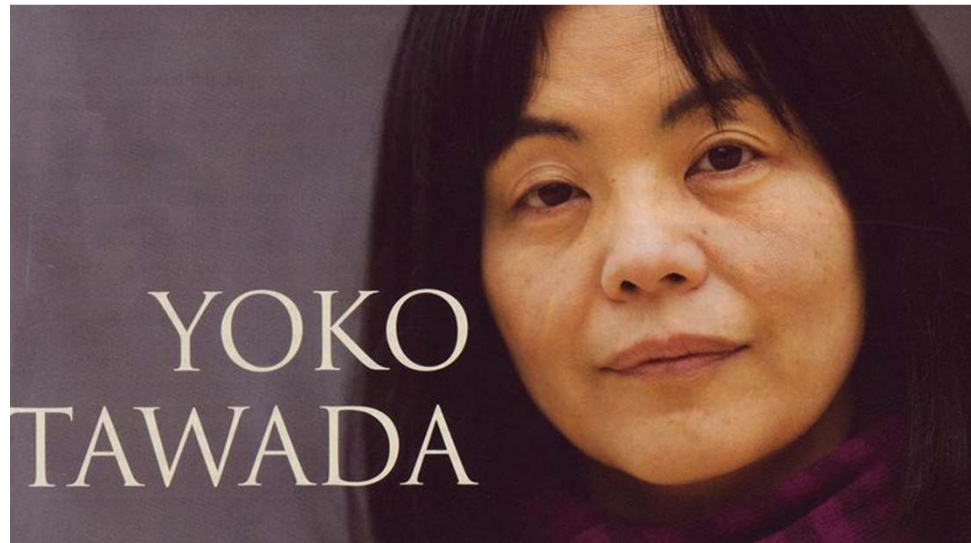
- people getting too uppity, challenging God, building a giant tower
- God confounded their language, and scattered them upon the face of all the Earth
(expulsion from the paradise of effortless communication)
- multilingual / multiregional world

Question: Was it a punishment, or blessing in disguise?

Does ICT really enhance the K -productivity?



3. Diversity and creativity— soft evidences



- ◆ An internationally renowned writer
- ◆ Writing in both Japanese and German
- ◆ Born in Tokyo, lived in Germany for 26 years
- ◆ Winning
Akutagawa Prize, Tanigaki Prize in Japan
Lessing Prize, Goethe Medal in Germany

Q: What about Japanese Tradition?

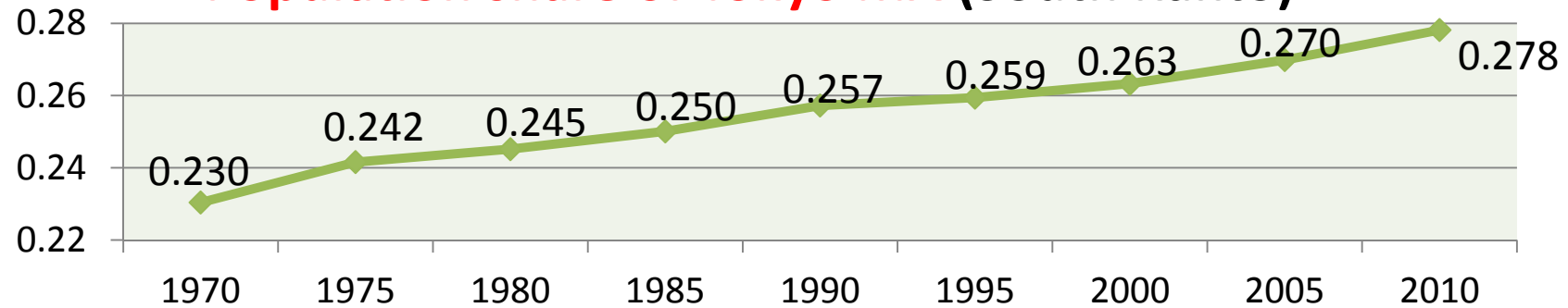
A: The Japanese tradition was of course familiar to me but seemed too close in terms of space and time. (While I was in Japan) Nothing evolved from it, neither curiosity nor desire.

Q: Aren't you sometimes afraid of losing Japan?

A: No. On the contrary: while I was living in Japan, I never thought much about my own culture, since it was there. For example, the No (能) theater became important to me only here in Europe. ...

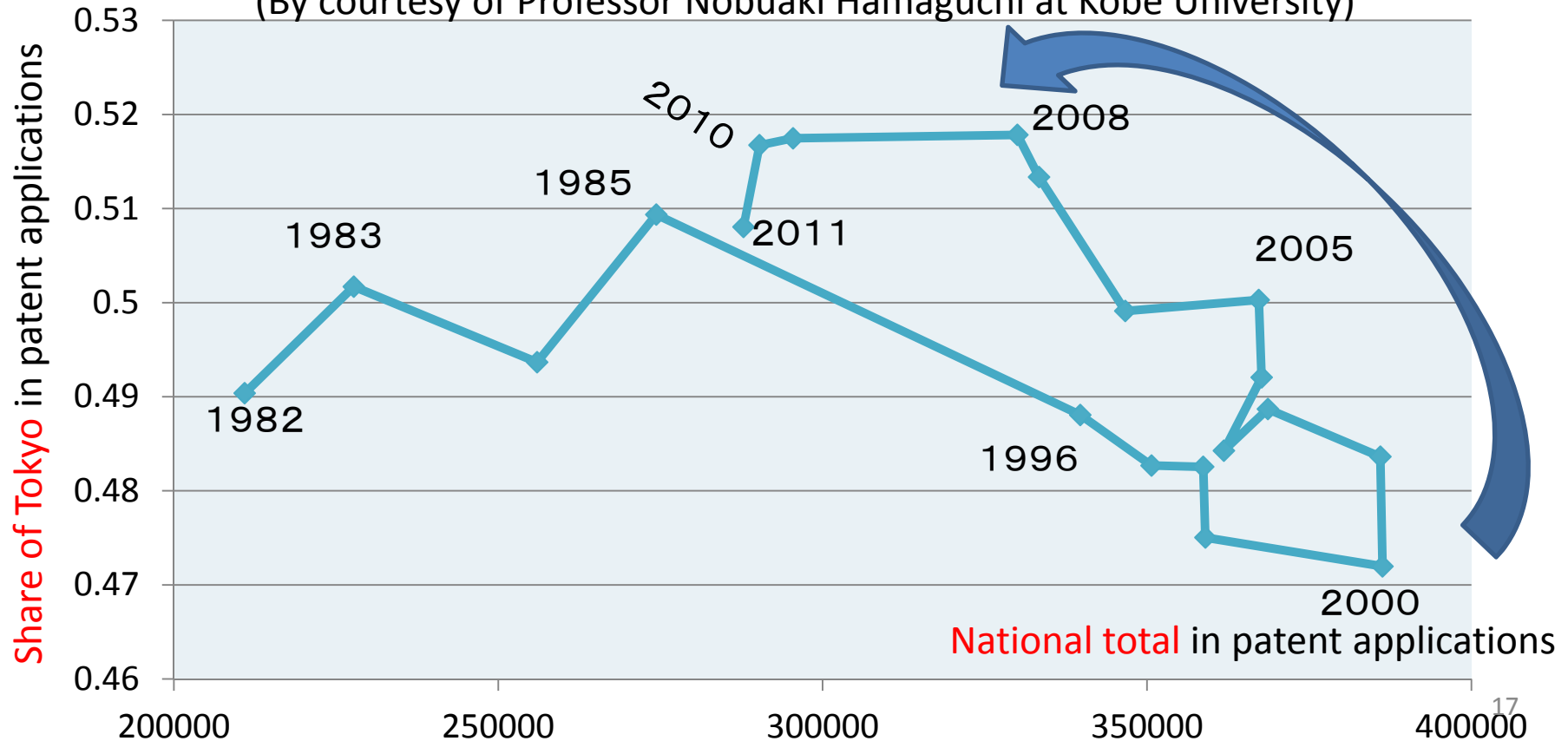
It's the difference between two cultures that makes me productive, not the Japanese culture as such.

Population share of Tokyo MA (South Kanto)

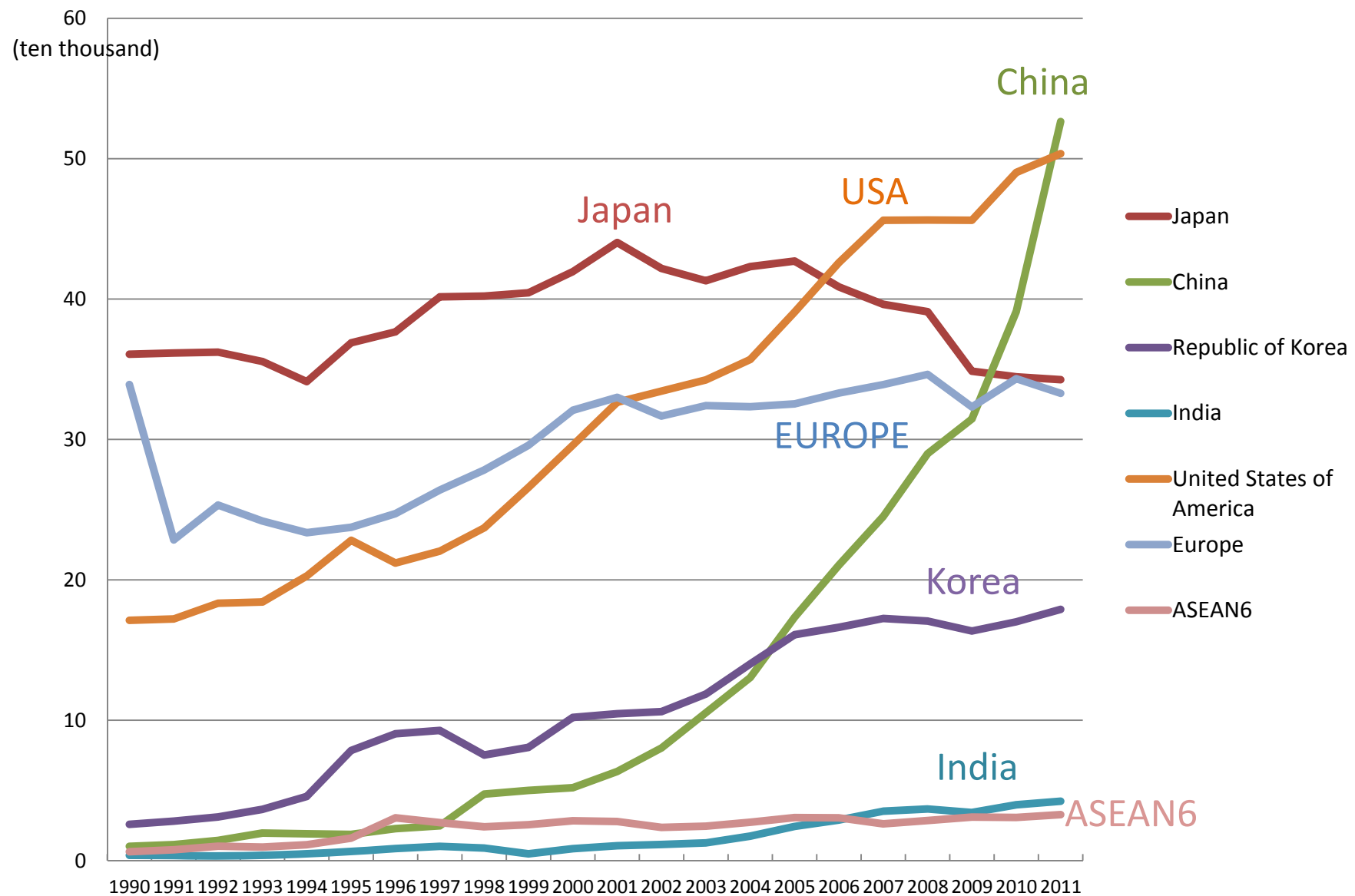


Tokyo concentration and patent applications in Japan

(By courtesy of Professor Nobuaki Hamaguchi at Kobe University)

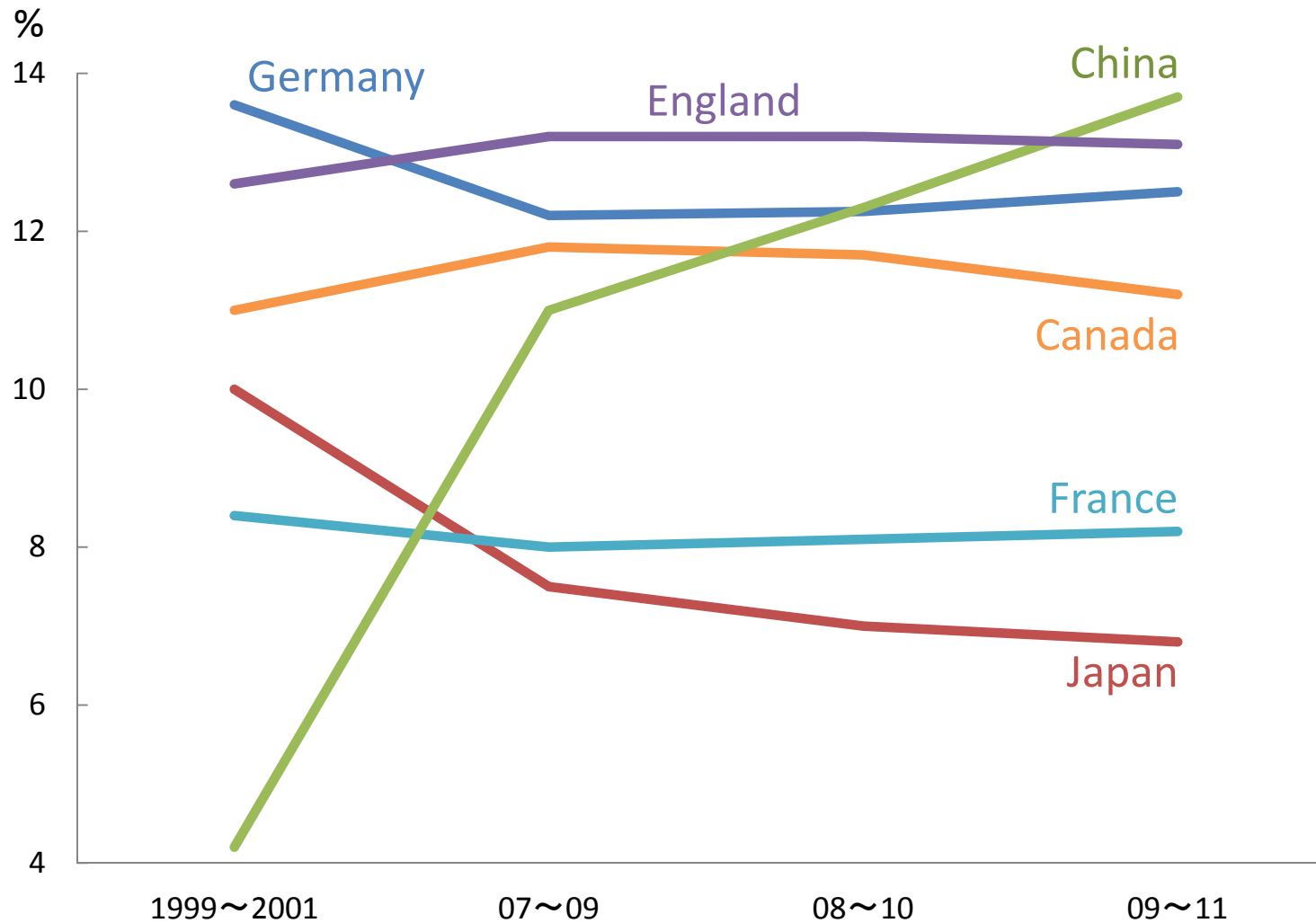


The number of patent applications in each country/region

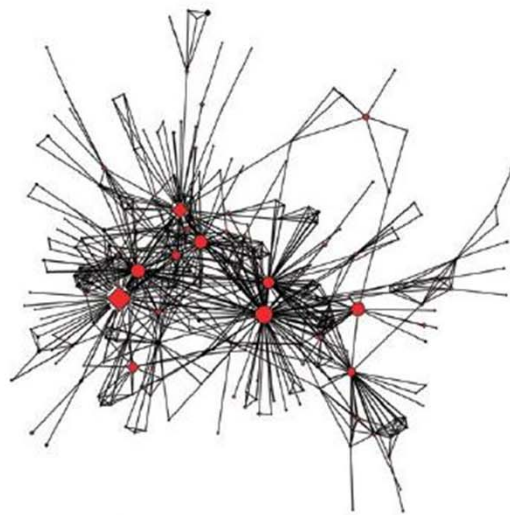


Source: WIPO statistics database. Last updated: March 2013

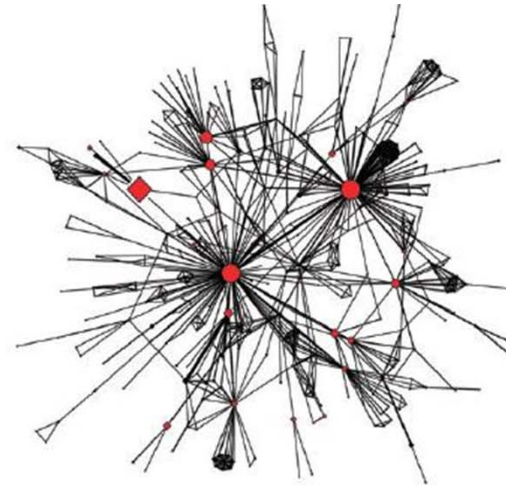
The share of each country in the international papers with American coauthors



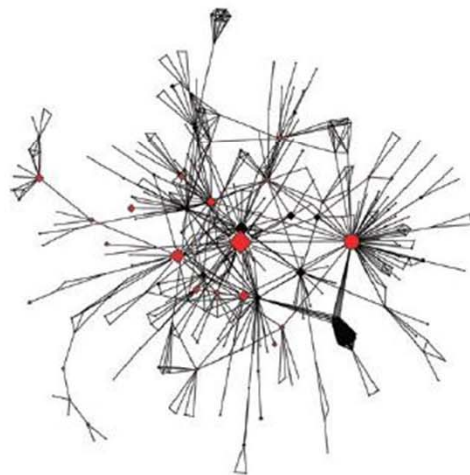
Comparison of leading regional innovation systems East Germany vs. West Germany



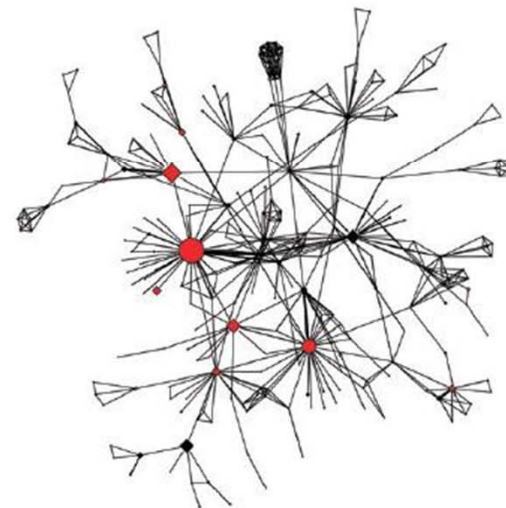
(a) Jena



(b) Dresden



(c) Karlsruhe



(d) Aachen

Source: M. Fritch and H. Graf, How sub-national conditions affect regional innovation systems: The case of the two Germanys, Papers in Regional Science vol.90, No.2 June 2011

Diversity and creativity: National Institute for Materials Science (NIMS)

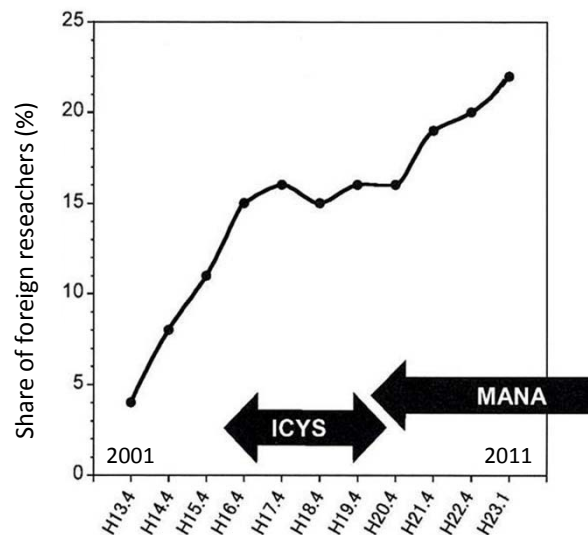
Table 1. The number of foreign researchers in public research institutes in Tsukuba (2011, March)

研究機関	外国人研究者数
(独) 物質・材料研究機構	585
(独) 産業技術総合研究所	493
(共) 高エネルギー加速器研究機構	305
(独) 国立環境研究所	130
(独) 農業・食品産業技術総合研究機構	64
(独) 国際農林水産業研究センター	51
(独) 農業生物資源研究所	28
(独) 農業環境技術研究所	18
(独) 土木研究所	12
気象庁 気象研究所	10
(独) 森林総合研究所	6
(独) 建築研究所	3
国土交通省 国土技術政策総合研究所	1
国土交通省 国土地理院	1

Table 2. World ranking in terms of citations in materials science

ICYS/MANA 開始前の 1 1 年間の計 (Jan. 1994 to Dec. 2004)			直近 5 年間の計 (Jan. 2007 to Jan. 2011)	
Institute	Citation		Institute	Citation
1	Max Planck Society	25739	Chin. Acad. Sci.	45576
2	Tohoku Univ.	23891	Max Planck Soc.	16318
3	MIT	18568	MIT	11514
4	UC Santa Barbara	17338	NIMS	11266
5	Penn. State Univ.	15503	Natl. Univ. Singapore	11209
6	Chin. Acad. Sci.	15101	Tsing Hua Univ.	10436
7	Univ. Cambridge	14977	Tohoku Univ.	10291
8	Kyoto Univ.	13301	Georgia Tech.	9463
9	Osaka Univ.	12575	Ind. Inst. Tech.	9459
10	Russ. Acad. Sci.	12556	Univ. Manchester	9197
.....				
.....				
.....				
18	NIMS	10474		

Figure 1: share of foreign researchers at NIMS



プログラム名：MANA, 国際ナノアーキテクトゥクス研究拠点：
ICYS, 若手国際研究拠点

- Among high-ranking papers at NIMS in terms of citations, the number of papers written by author(s) including foreign researcher(s)

among top-10 papers: 8

among top-31 papers: 24

SOURCE: Ariga and Urao, "Productivity enhancement of a research institute through the contribution of foreign researchers," Science & Technology Trends No.127, 2012, 1•2, Ministry of Education and Science

Cultural Diversity and Economic Performance

US cities: Ottaviano G.I.P. and Peri G. 2006, J. of Economic Geography 6

European Regions: Bellini E., G.I.P. Ottaviano, D. Pinelli and G. Prarolo, 2008, HWWI Research Paper 3-14.

Figure 2. Shares of foreigners in European regions, 2001

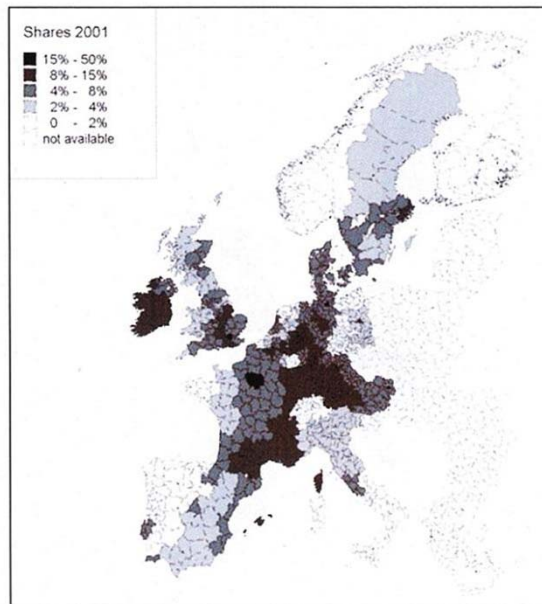
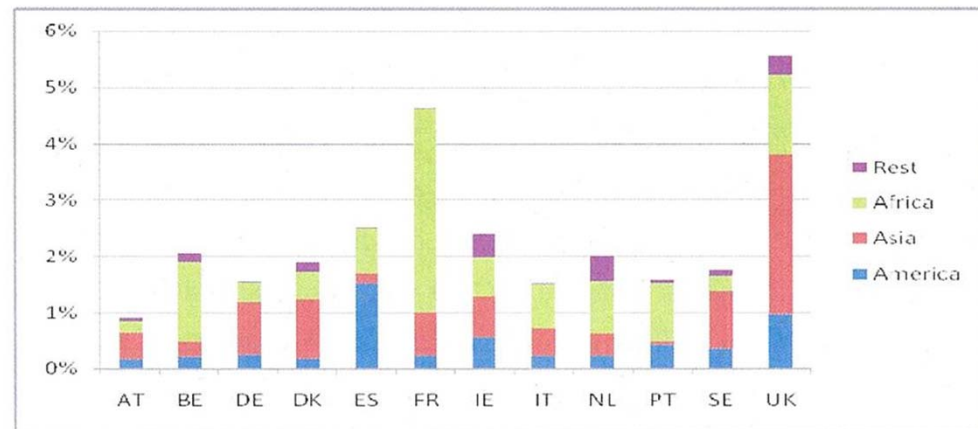


Figure 7: Composition of foreign population in 2000



Econometrics results

Ottaviano and Peri (2006): “US-born citizens are more productive in a culturally diversified environment.”

Bellini et. al. (2008): “Diversity is positively correlated with productivity where the causation runs from the former to the latter.”

Clash of Cultures?: EU-U.S. trade talks

- Last June, France successfully lobbied **the EU to exclude European film, music and TV industries from the trade talks**. Paris has long protected its audiovisual sector under a subsidy policy known as the “**cultural exception**.” (The Wall Street Journal, June 18 2013)
- **UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions** (20 October 2005), reaffirming the sovereign right of governments to formulate and implement cultural policies and to adopt measure to protect and promote the **diversity of cultural expressions**: From ‘**cultural exception**’ to ‘**cultural diversity**’ (C.B.Grabar, JIEL 9(3), 2006)
- An empirical study on **global music consumption and trade** since 1960 by F. Ferreira and J. Waldfogel (Economic Journal 123, 2013)

Substantial bias towards domestic music that increased in the past two decades

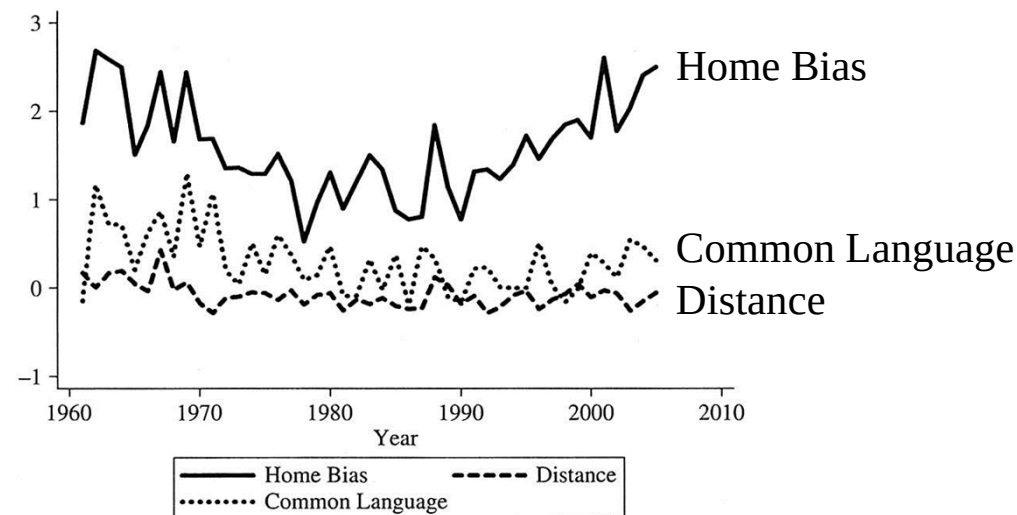
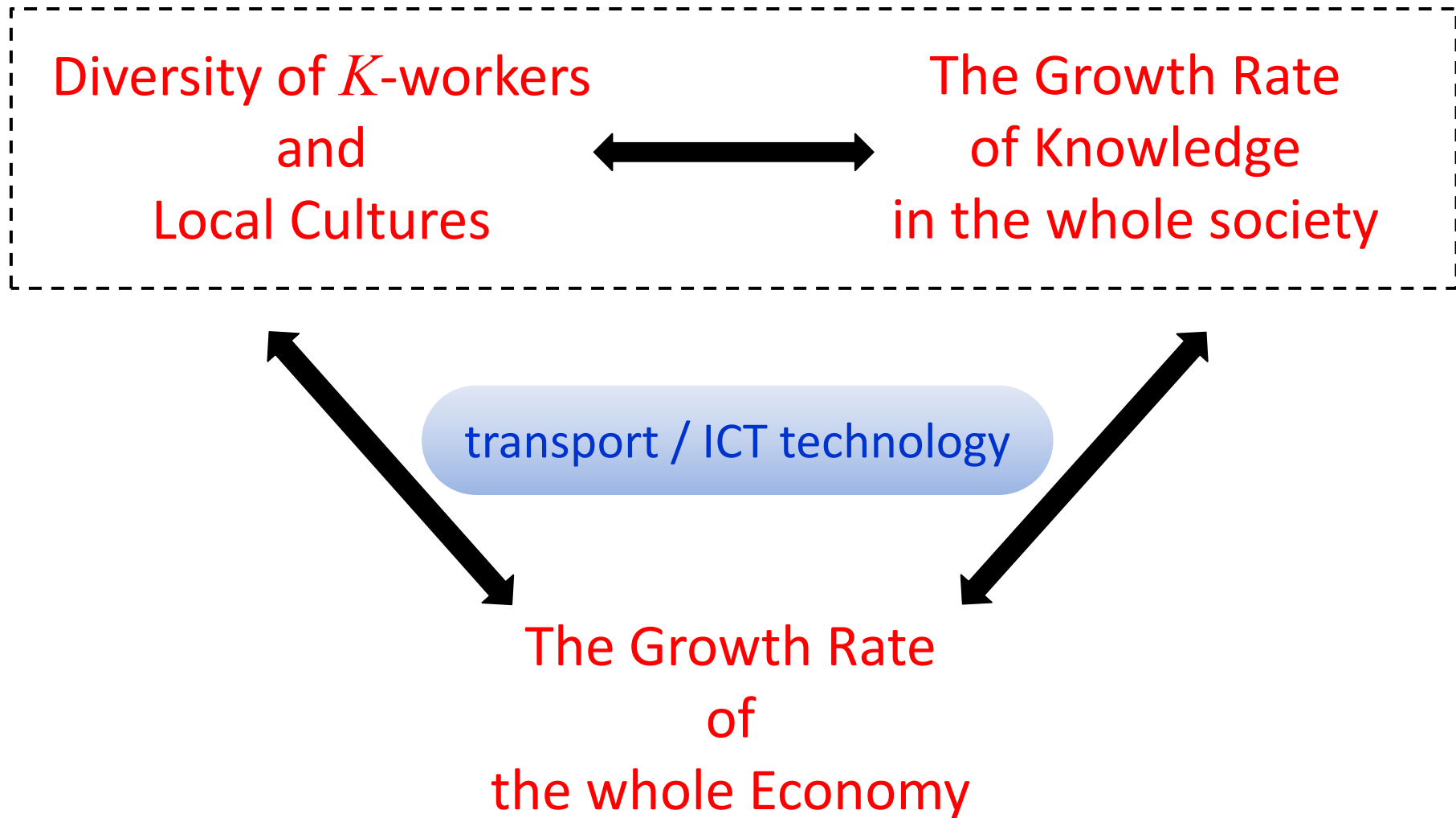


Fig. 8. Estimated Home Bias, Same Language and Distance Effects, 1960–2006

4. Modeling the Dynamics of Brain Power Society



Knowledge Creation as a **Square Dance** on the Hilbert Cube

Berliant and Fujita, International Economic Review 49, 2008

fusion with
endogenous growth theory

The Dynamics of Knowledge Diversity and Economic Growth

Berliant and Fujita, Southern Economic Journal 77, 2011

extension to
a multi-regional model

Culture and Diversity in Knowledge Creation

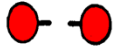
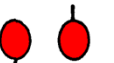
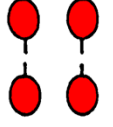
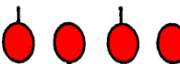
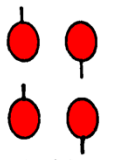
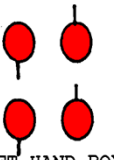
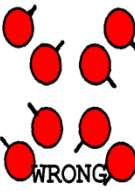
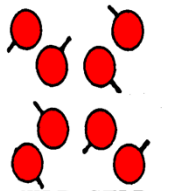
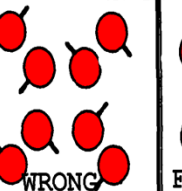
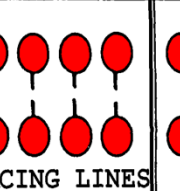
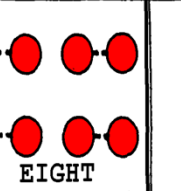
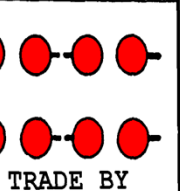
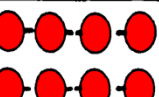
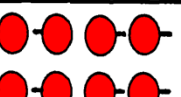
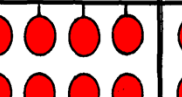
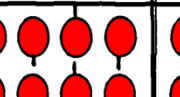
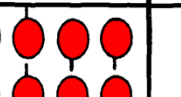
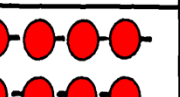
Berliant and Fujita, Regional Science and Urban Economics 42, 2012

FORMATION

Names & Pictograms of selected formation arrangements (callerab 1980)

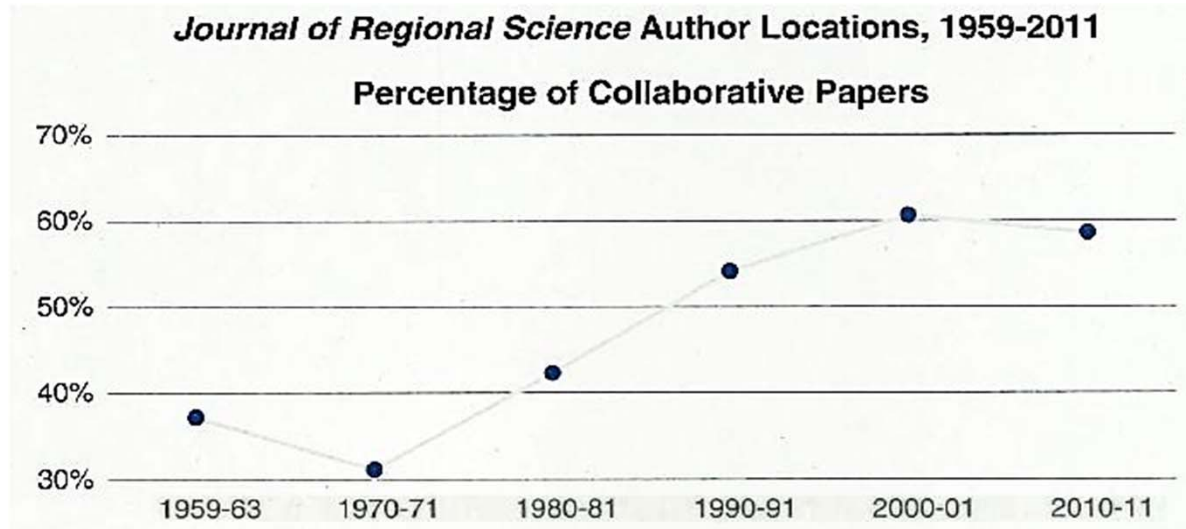
CALLERLAB

CALLERLAB APPROVED 1980

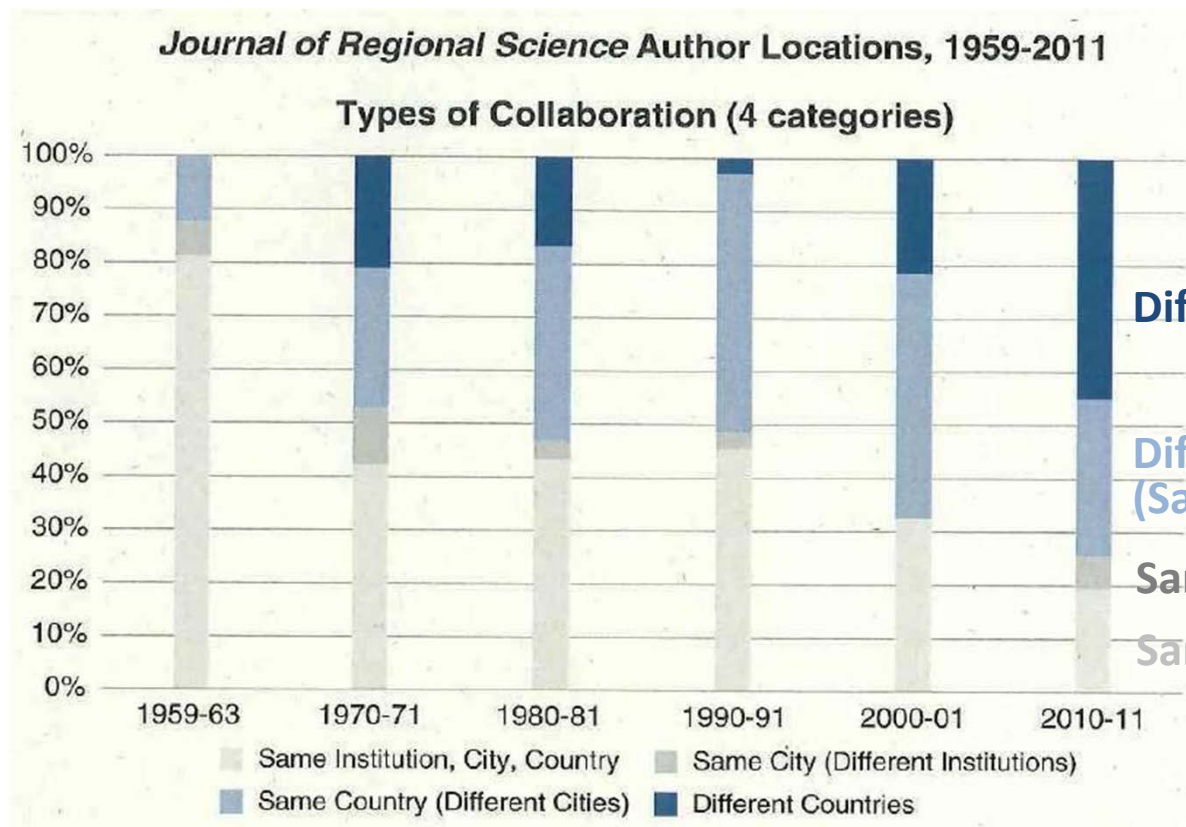
 COUPLE 1	 FACING COUPLE	 BACK TO BACK DANCERS	 MINI-WAVE (RIGHT HAND)	 MINI-WAVE (LEFT HAND)	 FACING COUPLES 6
 BACK TO BACK COUPLES	 OCEAN WAVE (RIGHT HAND)	 OCEAN WAVE (LEFT HAND)	 Right Hand Box Circulate 10	 LEFT HAND BOX CIRCULATE 2	 TWO FACED LINE (RIGHT HAND)
 TWO FACE LINE (LEFT HAND)	 STATIC SQUARE	 CIRCLE	 SINGLE FILE PROMENADE	 ALAMO STYLE	 PROMENADE
 WRONG WAY PROMENADE	 THAR STAR	 WRONG WAY THAR	 FACING LINES	 EIGHT CHAIN THRU	 TRADE BY
 DOUBLE PASS THRU	 COMPLETED DOUBLE PASS THRU	 LINES FACING OUT	 PARALLEL WAVES	 PARALLEL TWO FACED LINES	 COLUMNS (RIGHT HAND)

Square Dance

- once very popular in the US frontier
- a partner dance with sequential changes of partners

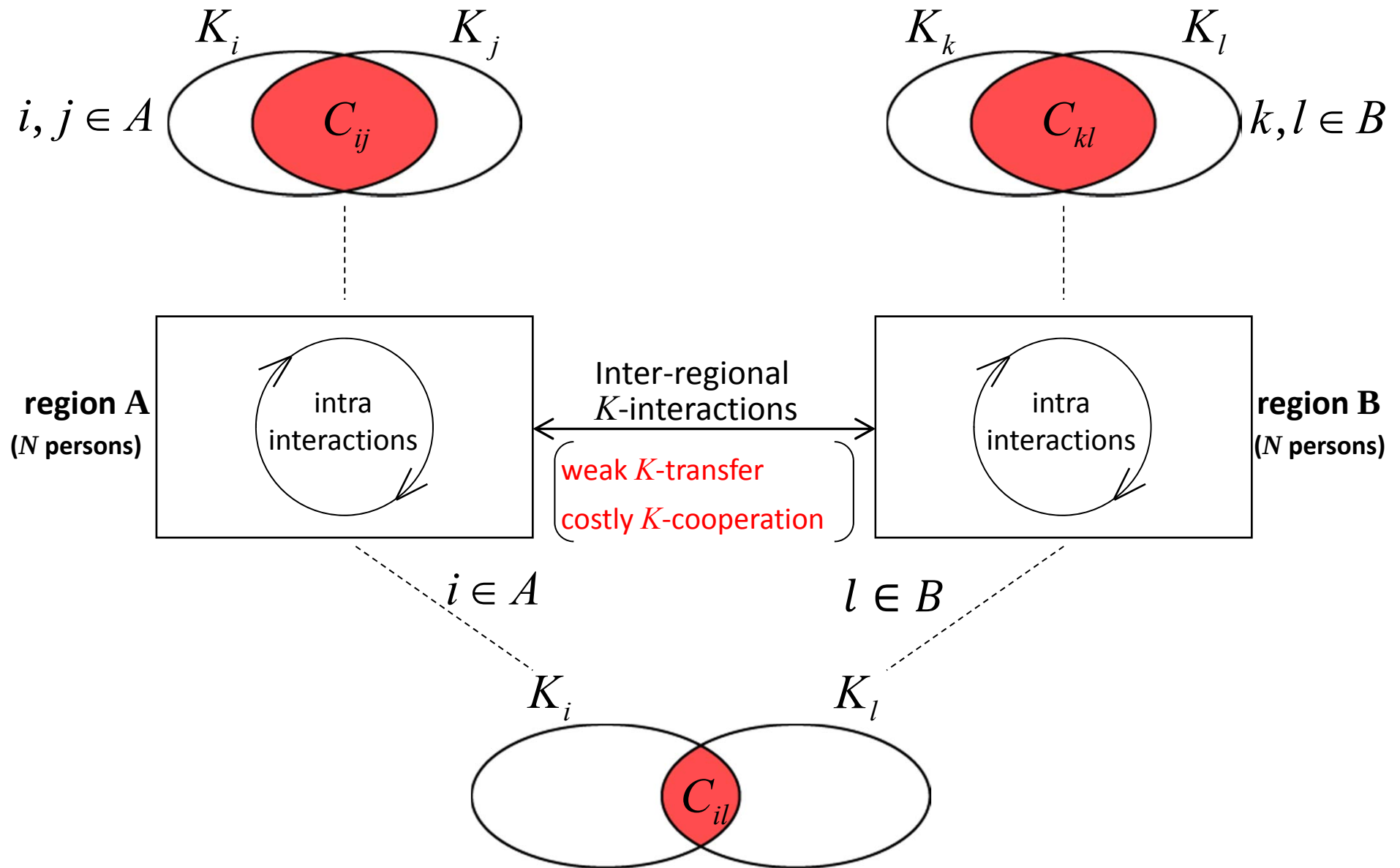


**Square Dance
in
Regional Science**



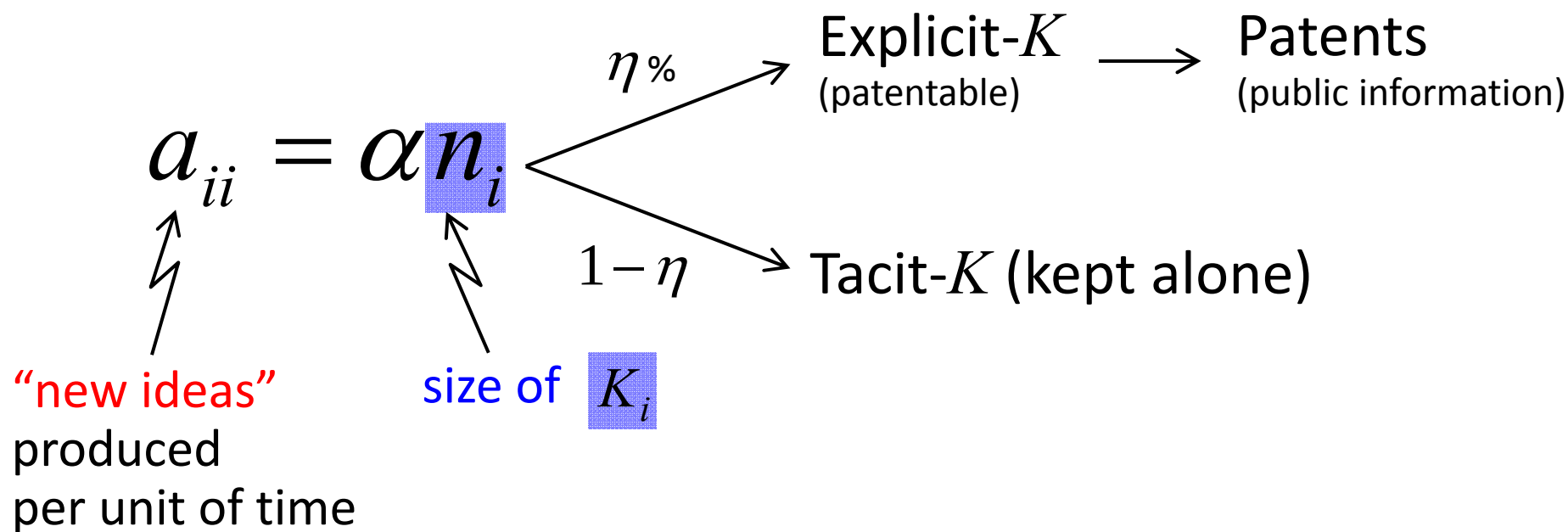
Source: Peter Gordon (2013), *Annals of Regional Science* 50, 667-84

A two-region model: Culture and Diversity

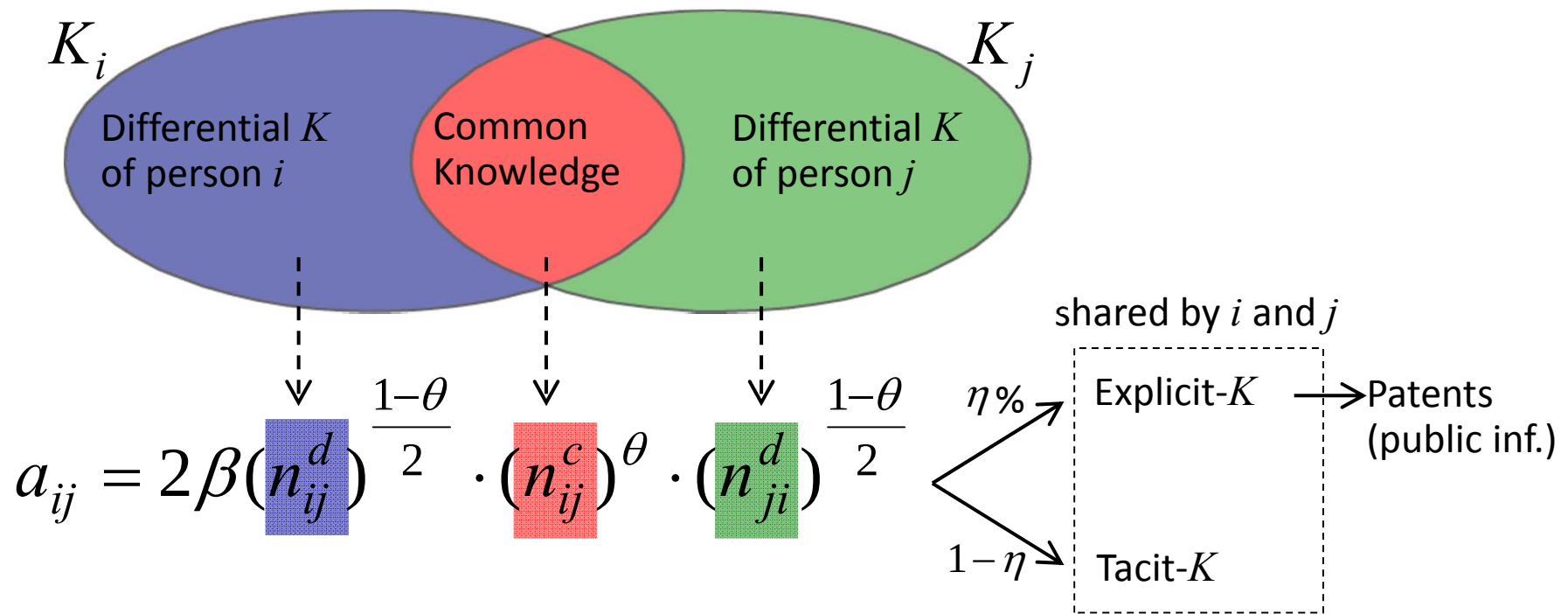


Production of new ideas / patents (at a given time)

① in isolation (person i)



② in meeting of two persons in the **same region** ($i, j \in A$)

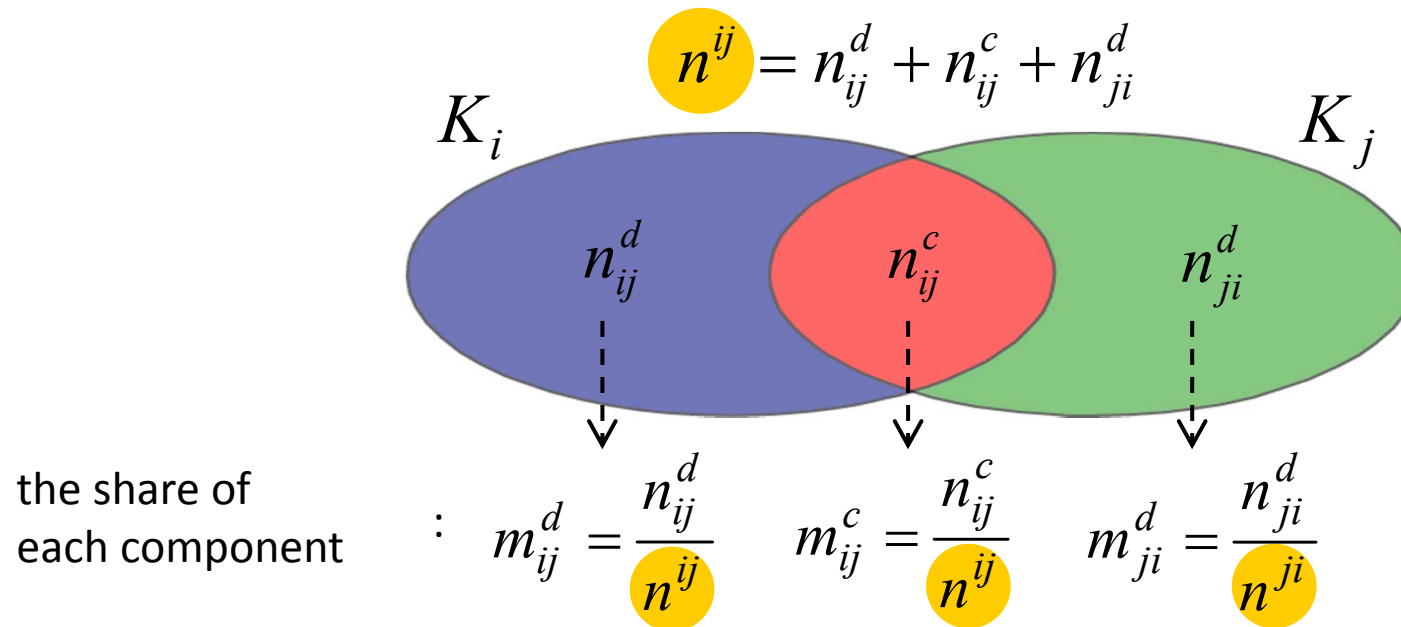


where θ the weight on the common- K ($0 < \theta < 1$)

③ in meeting of two persons in the **different region** ($i \in A, j \in B$)

$$a_{ij} = \tau 2\beta(n_{ij}^d)^{\frac{1-\theta}{2}} \cdot (n_{ij}^c)^\theta \cdot (n_{ji}^d)^{\frac{1-\theta}{2}} \quad 0 < \tau < 1$$

linearly homogenous K -production function $\rightarrow$ normalization



when $n_i = n_j \Rightarrow m_{ij}^d = m_{ji}^d = m^d$ (symmetric K -structure)

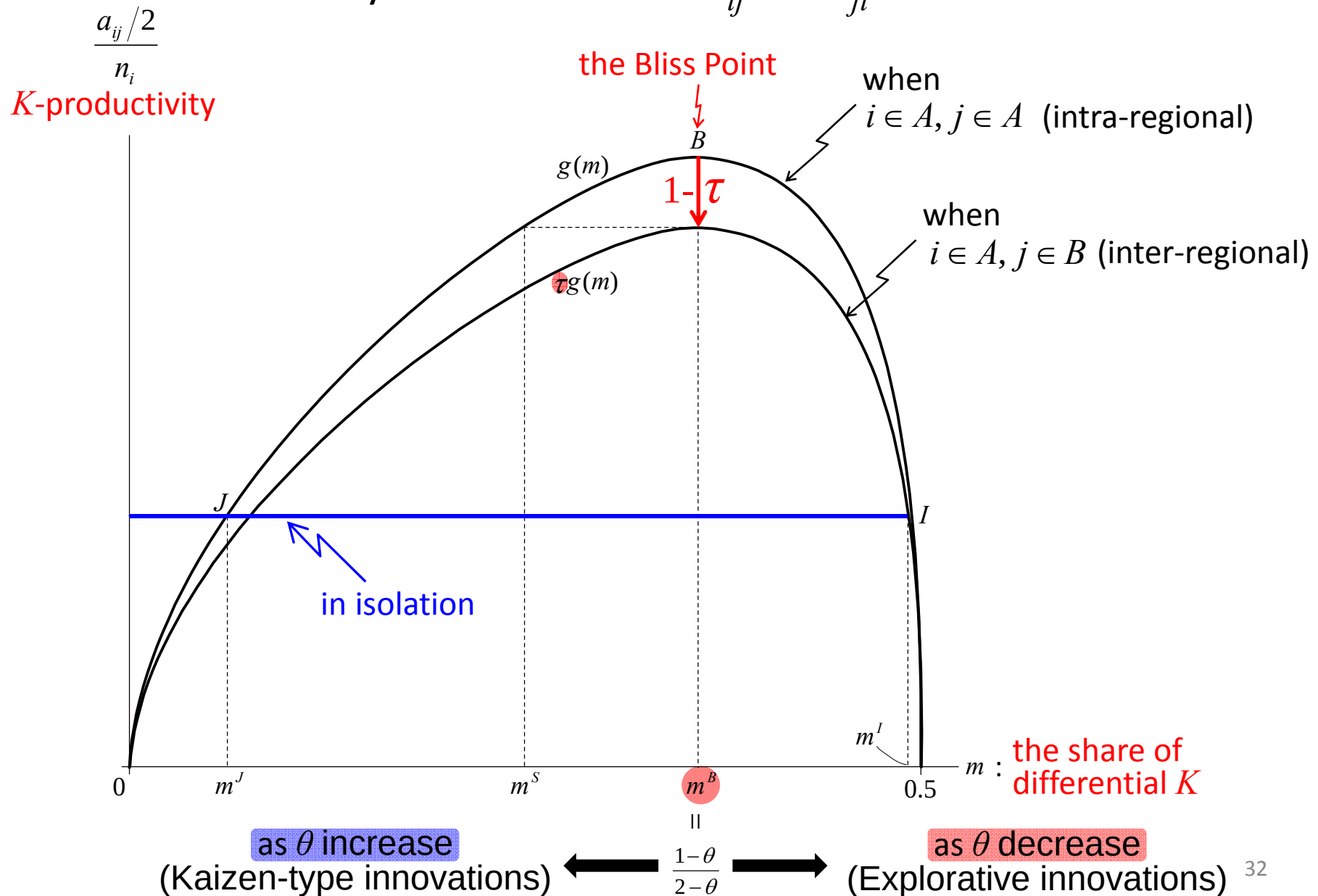
$$\frac{a_{ij}/2}{n_i} = \beta \cdot \frac{(1 - 2m^d)^\theta \cdot (m^d)^{1-\theta}}{1 - m^d} : \text{the normalized } K\text{-production function}$$

$$\equiv g(m^d)$$

where m^d = the share of differential knowledge

Productivity in intra- and interregional K -cooperation

symmetric case: $m_{ij}^d = m_{ji}^d = m$



- ① For simplicity: at the initial time $t=0$,
the K -size is the same for all K -workers:

$$n_i(0) = n_j(0) \text{ for all } i \text{ and } j$$

on the equilibrium process, for all $t \geq 0$

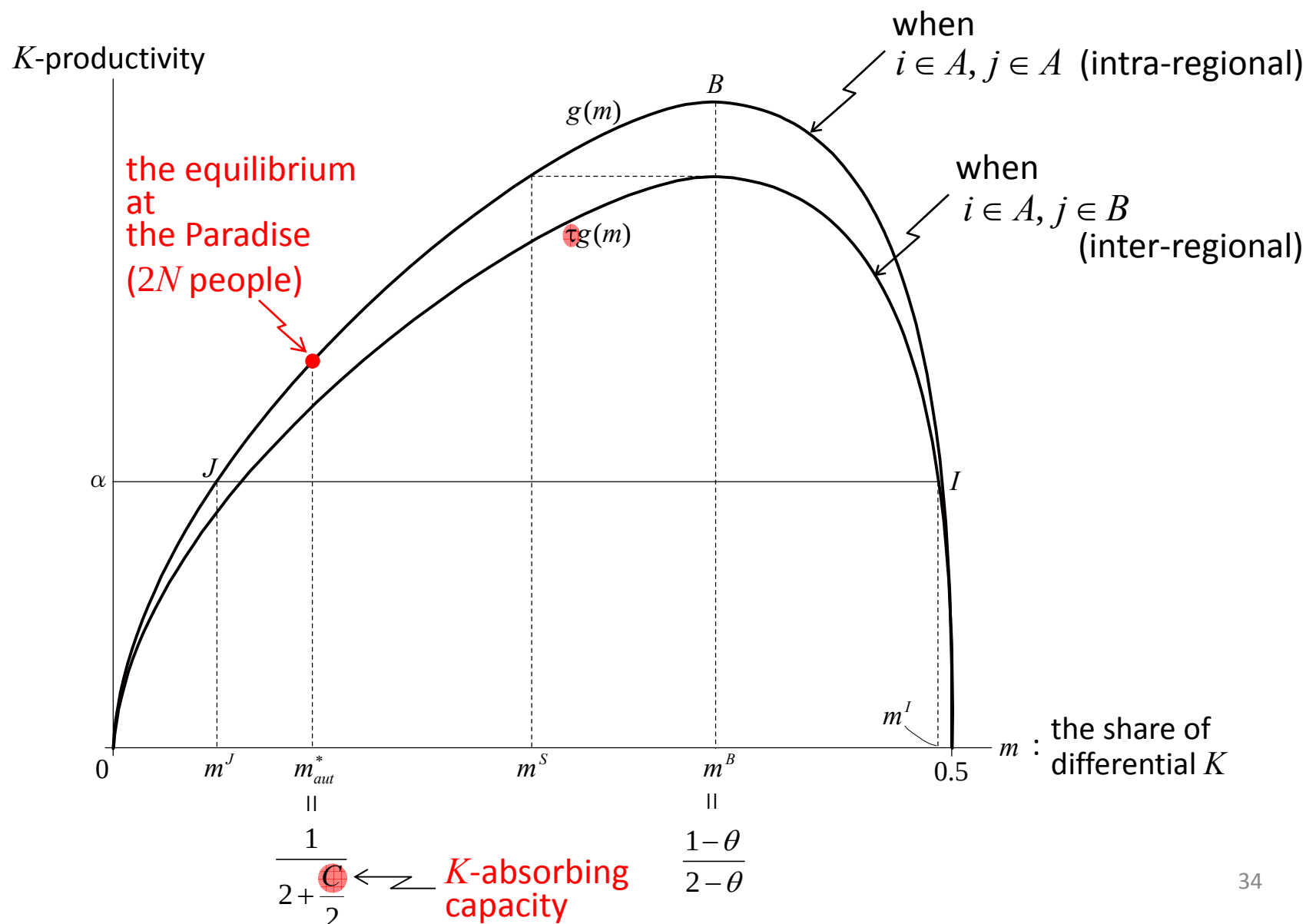
➡ $n_i(t) = n_j(t)$ for all i and j

➡ $m_{ij}^d(t) = m_{ji}^d(t) : \text{pair-wise } K\text{-symmetry}$
for all pair i and j

- ② At each time, each person will **form a pair by selecting the best-matching partner** (in terms of K -productivity)
- ③ Given that keeping the same pair too long will result in enlarging the common- K too much, **each person will sequentially change the partner** (Square Dance)

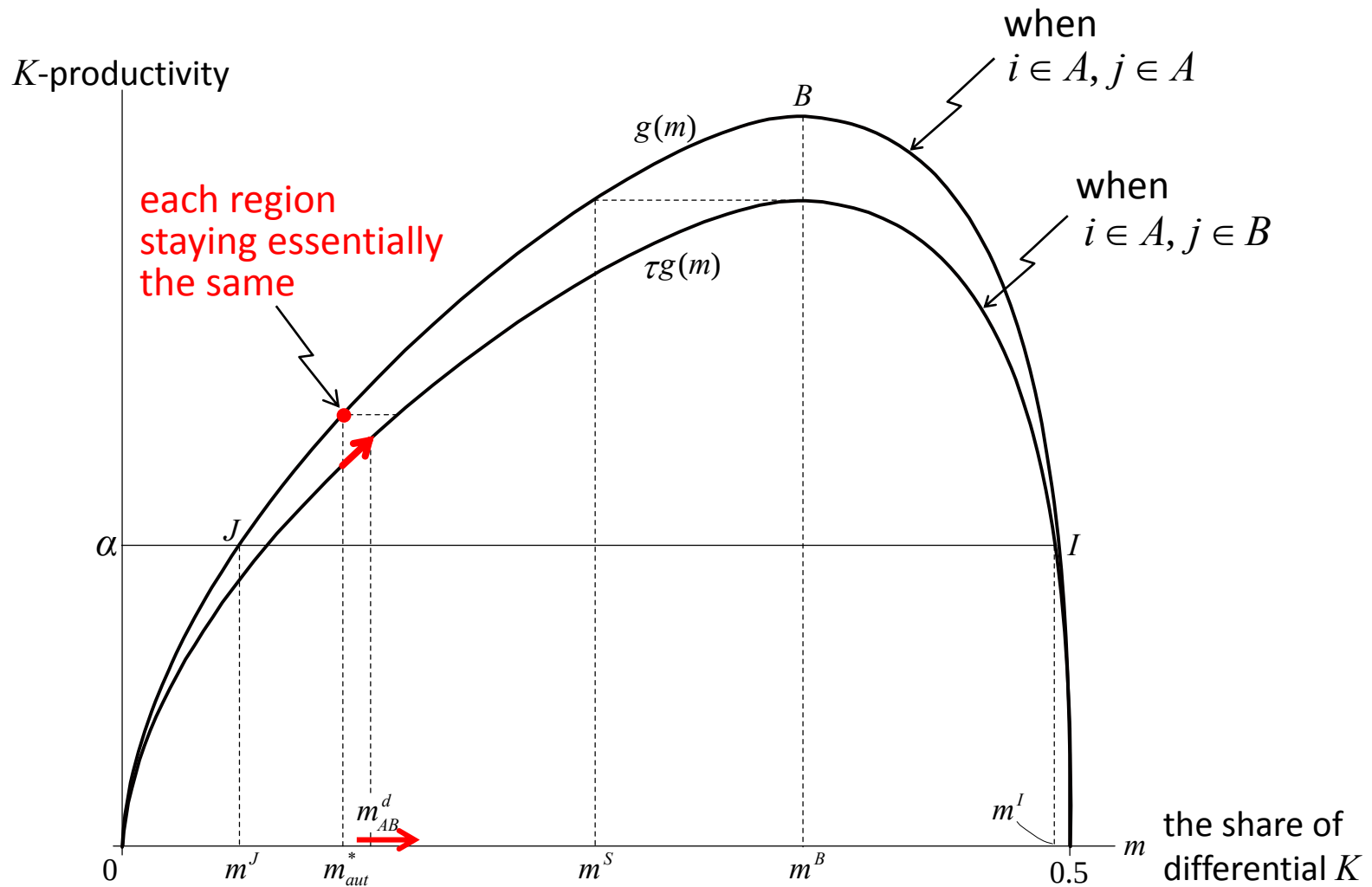
5. The story of the Tower of Babel revisited

Before the expulsion from the Paradise of effortless communication

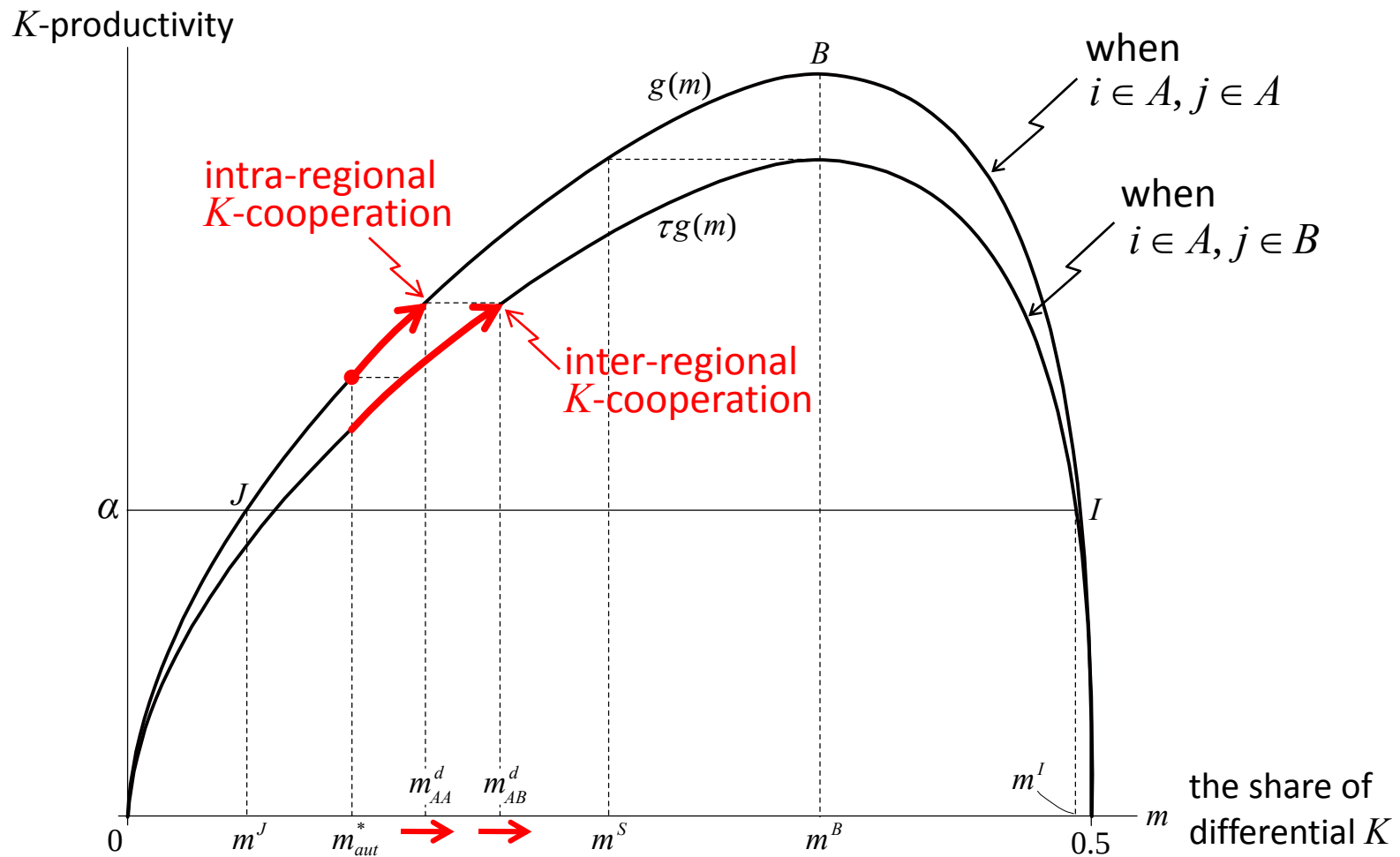


Phase 1: Just after the expulsion ($2N \rightarrow N$ in region A , N in region B)

yet, no inter-regional K -cooperation

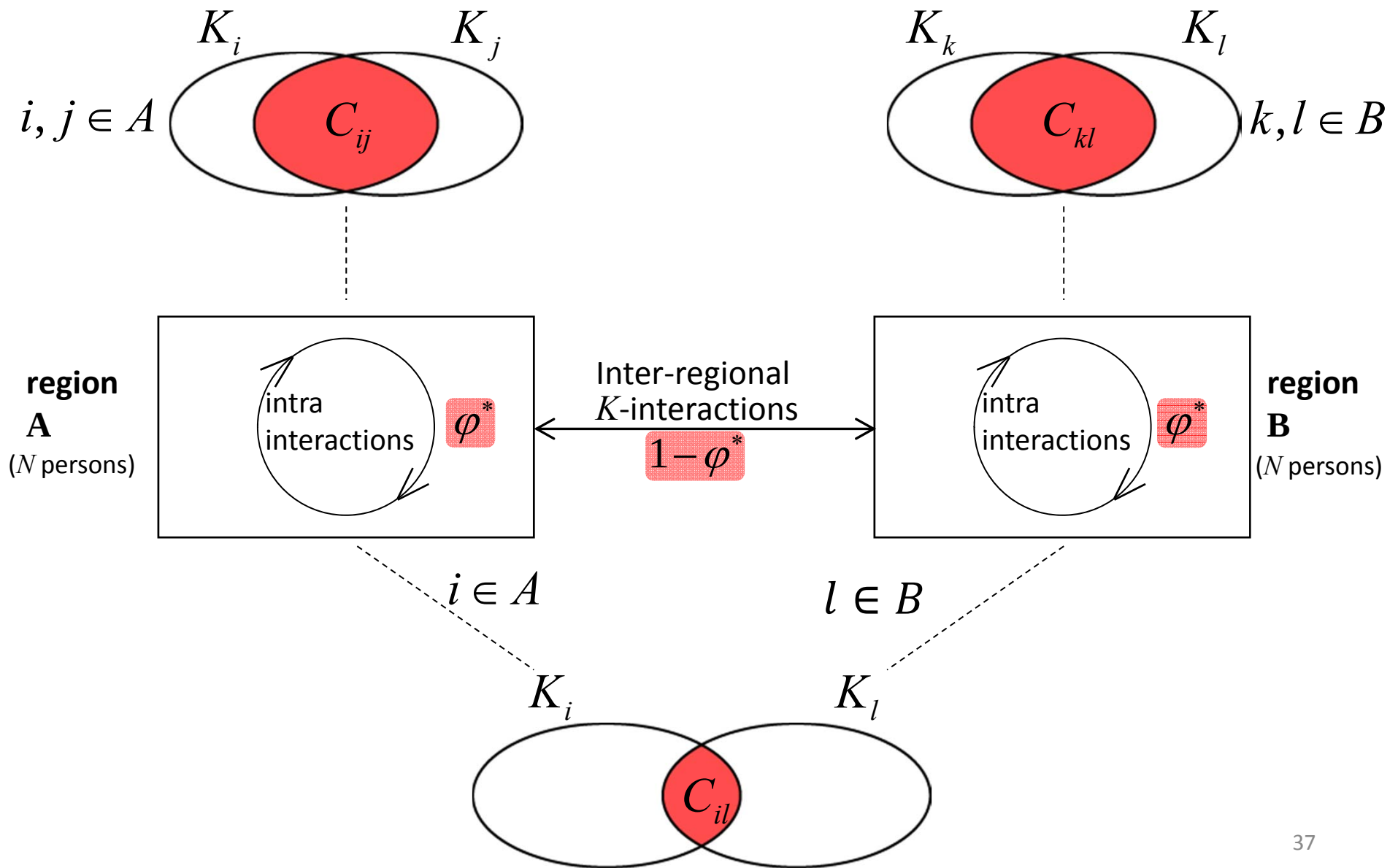


Phase 2: After a sufficient elapsion of time, inter-regional
 K -cooperation starts $g(m_{AA}^d) = g(m_{AB}^d) > g(m_{aut}^*)$

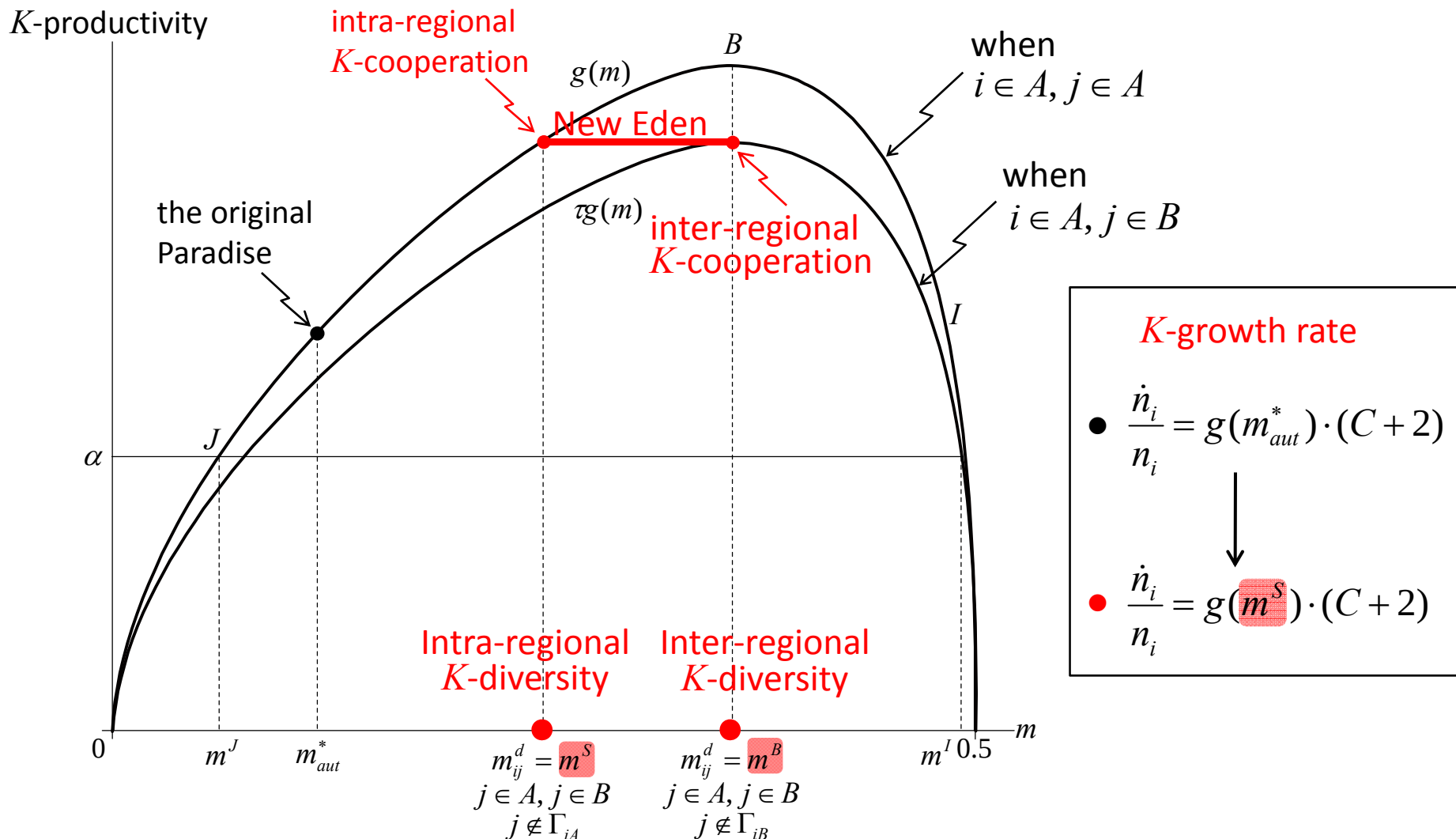


both inter-regional and intra-regional K -cooperation taking place

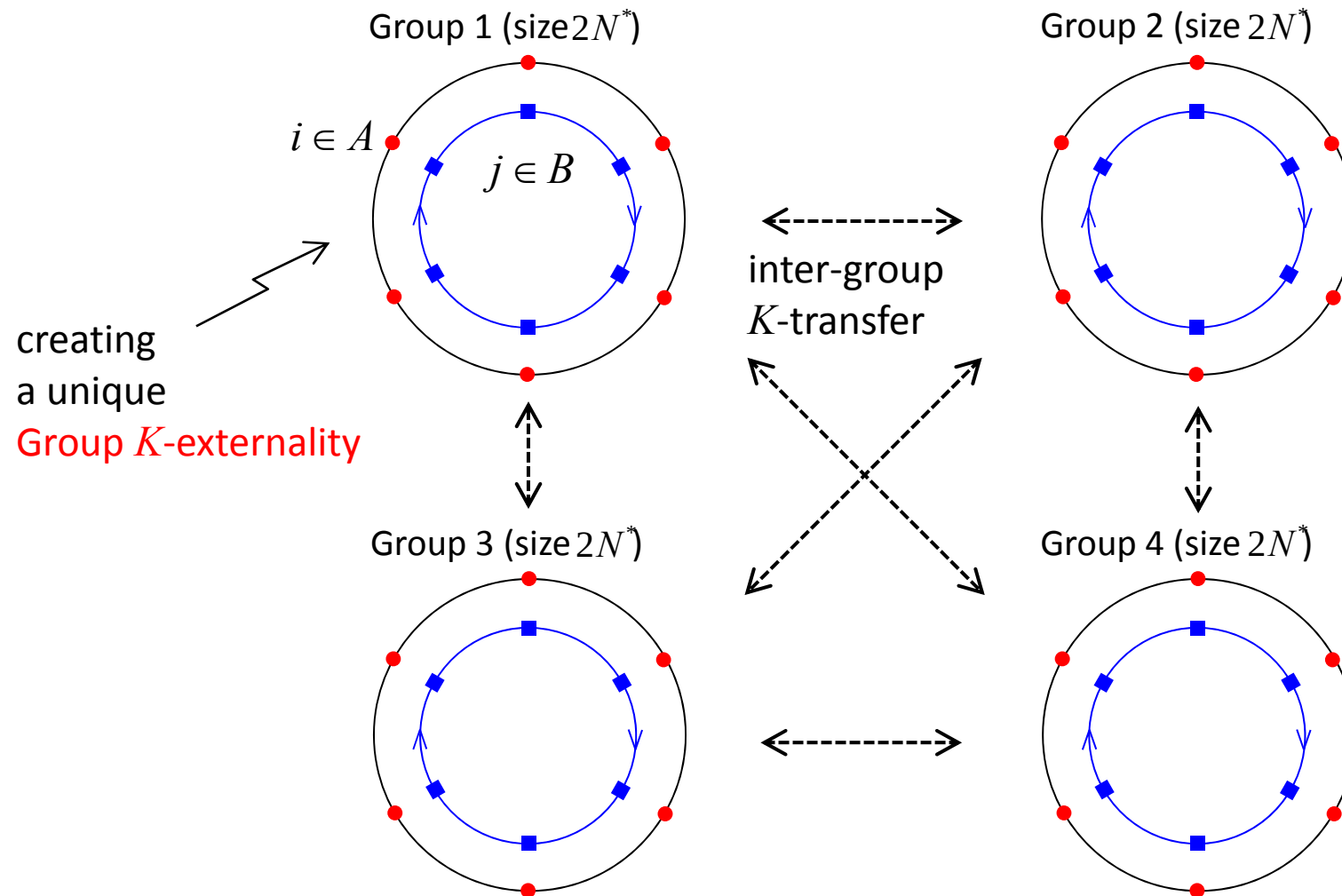
(φ^* = the proportion of time for intra-regional K -cooperation)



Phase 3: reaching and staying at **The New Eden** ($m_{AA}^d = m^S$ and $m_{AB}^d = m^B$)
 (achieving a high K -productivity through diverse cultures)



An illustration of **inter-regional K -interactions** at the New Eden (Dinner party at a Chinese restaurant)

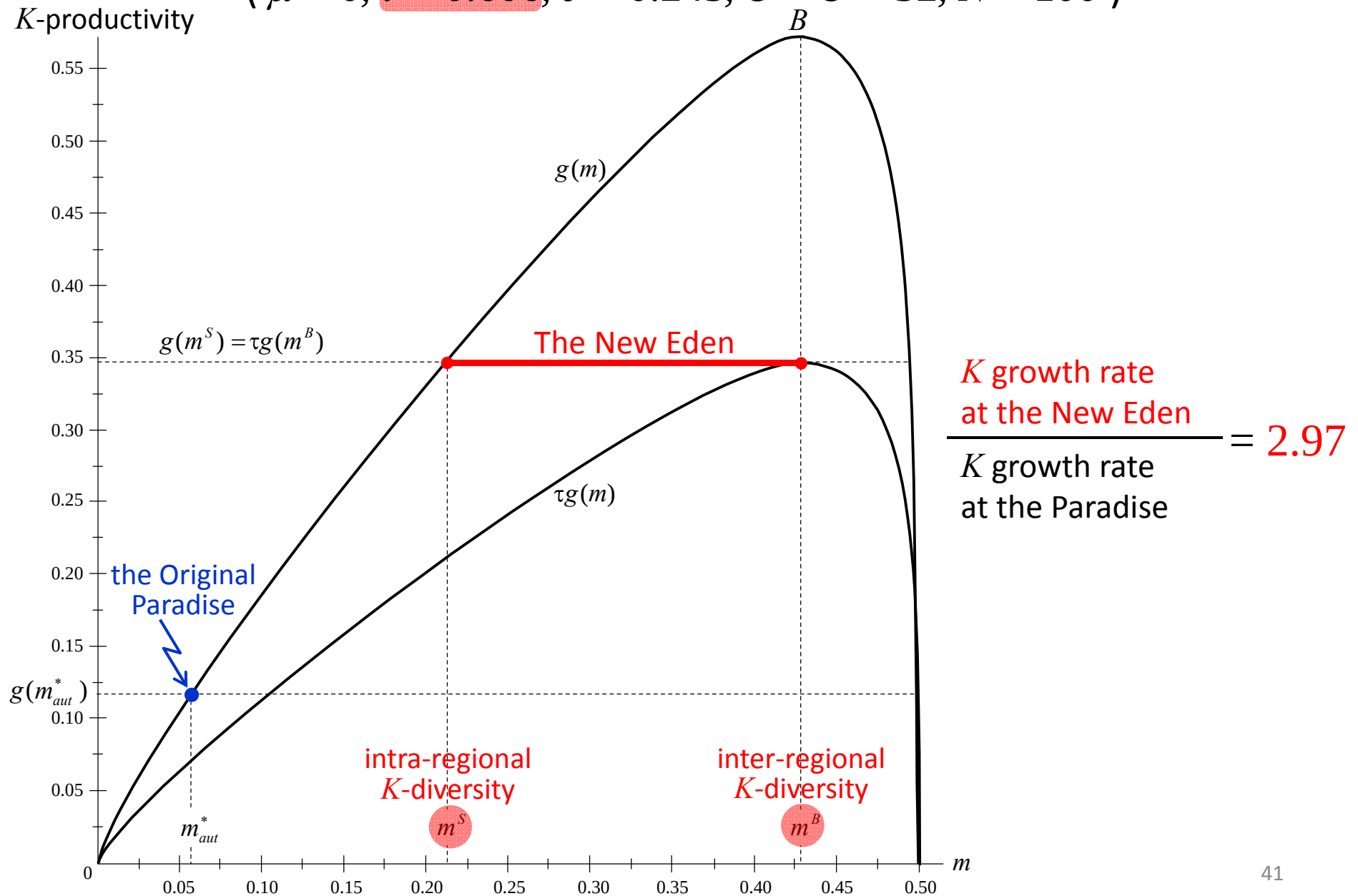


Inter-regional Square Dance in the form of Chinese dinner table



An Example of the New Eden

($\tilde{\mu} = 0$, $\tau = 0.606$, $\theta = 0.245$, $C = \bar{C} = 32$, $\bar{N} = 100$)



Tentative Conclusion about The Story of The Tower of Babel

Expulsion from the paradise of effortless communication

- Multilingual / multicultural world
- Was it a punishment, or a blessing in disguise?

Answer: It could have been a blessing in disguise.

6. Conclusion: **Let hundreds of towers bloom**

S. Giovanni degli Eremiti, Palermo



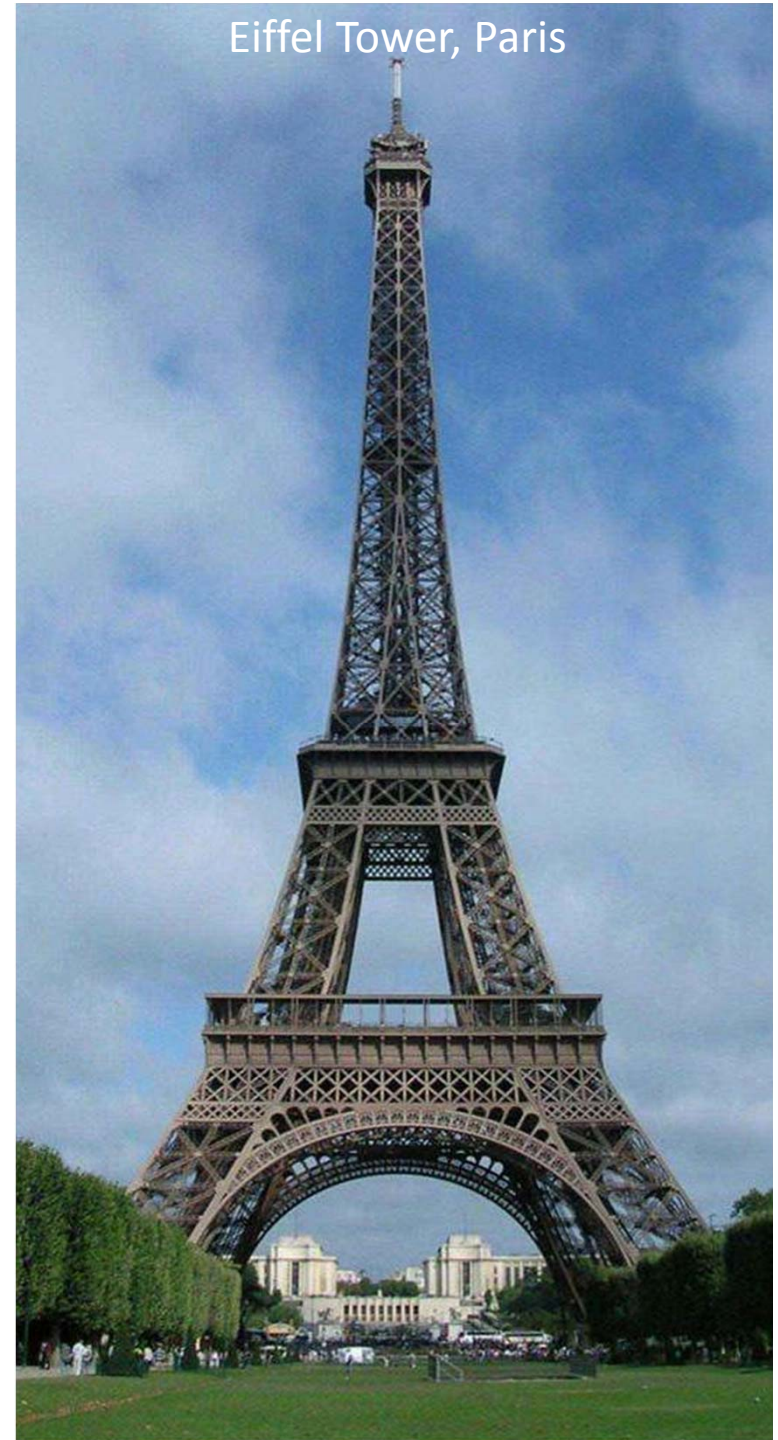
Leaning Tower of Pisa



Big Ben / Elizabeth Tower, London



Eiffel Tower, Paris

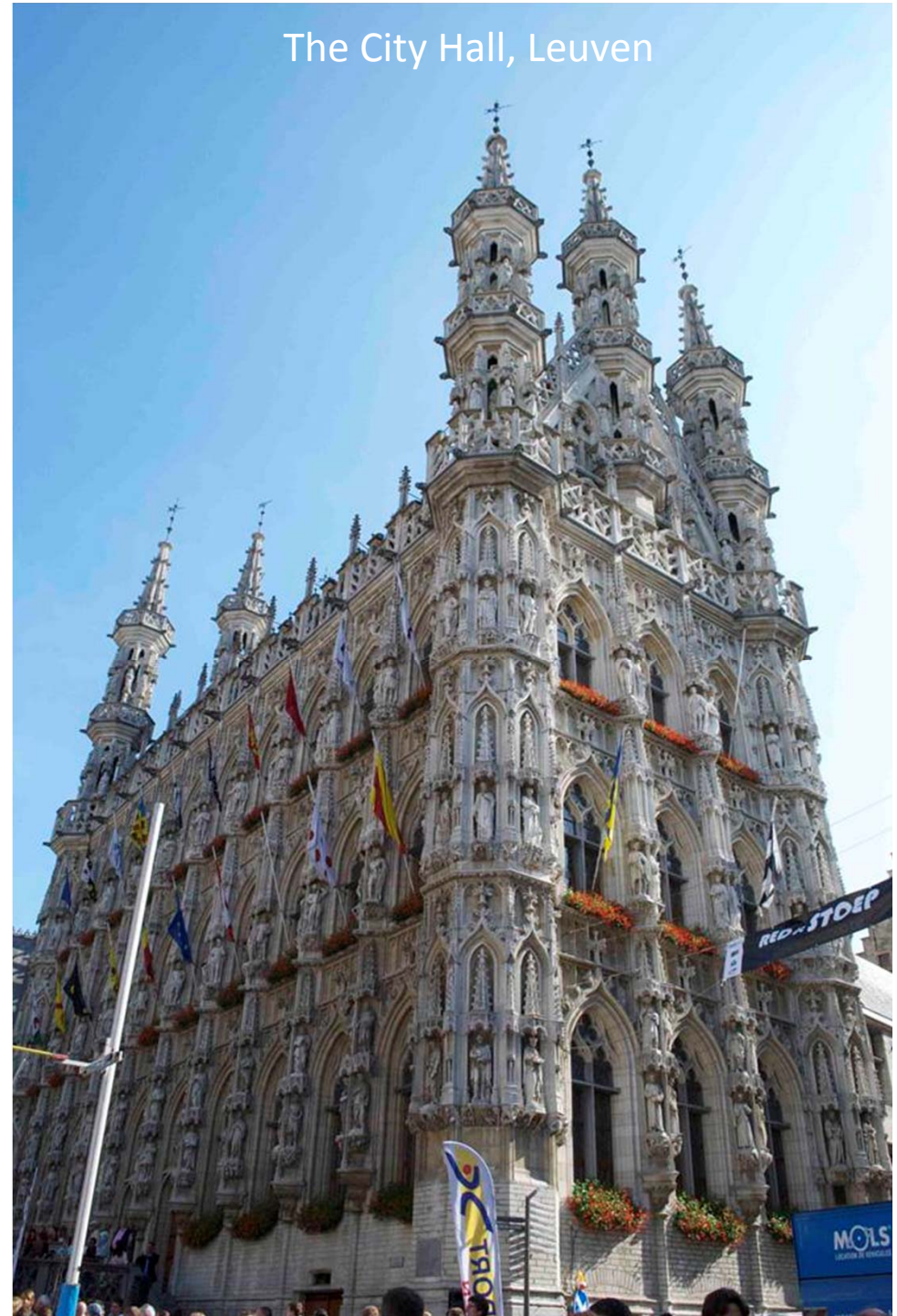


Congratulations! new prince George Alexander Louis

Cologne Cathedral, Köln



The City Hall, Leuven



Tower of Belém, Lisbon



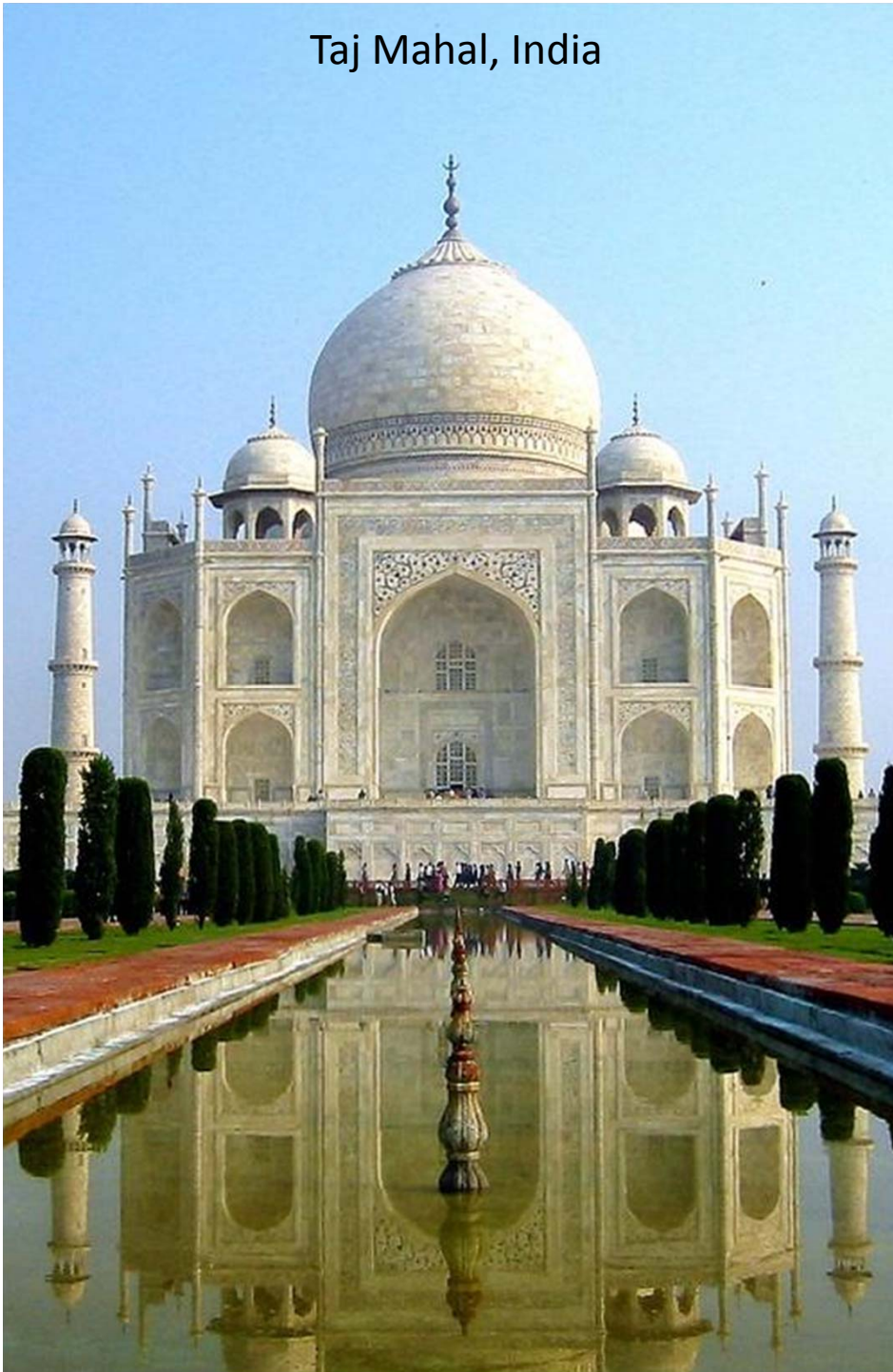
The Great Windmill, Netherland



The Parthenon, Athens



Taj Mahal, India



Shwedagon Pagoda, Yangon



Empire State Building, Manhattan



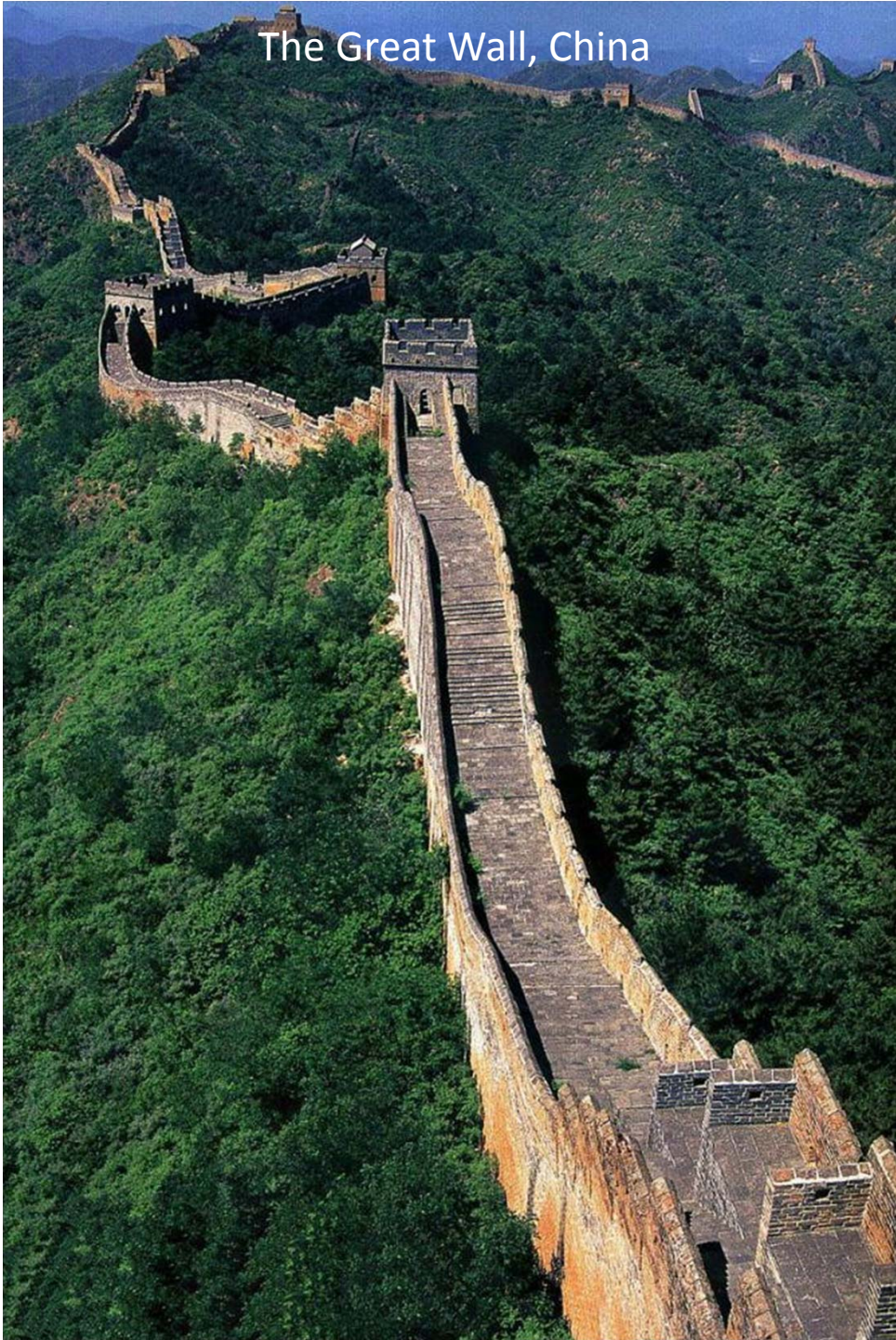
Symbol of Capitalism

Tramp Tower, Manhattan



Greed is beautiful.

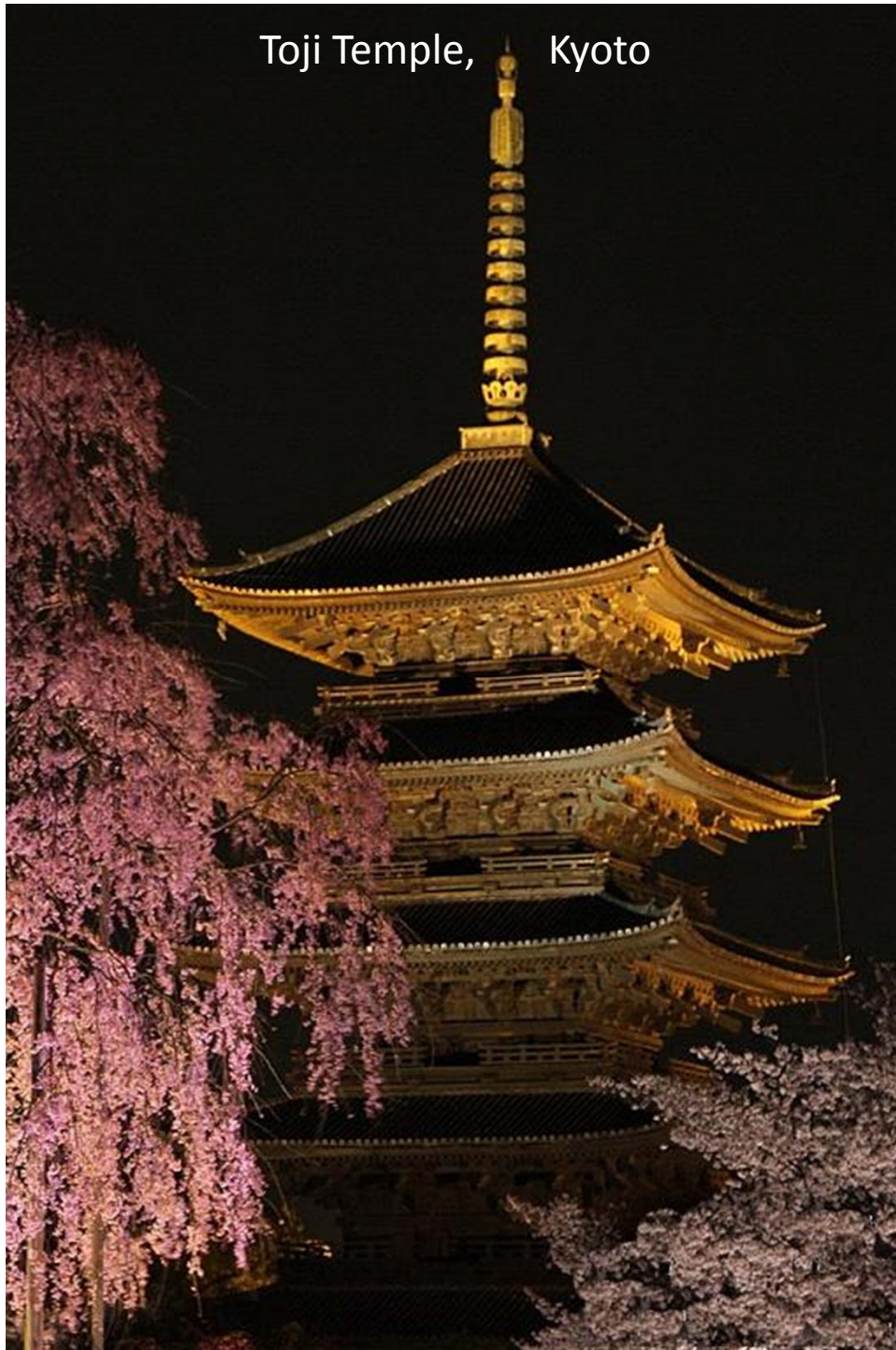
The Great Wall, China



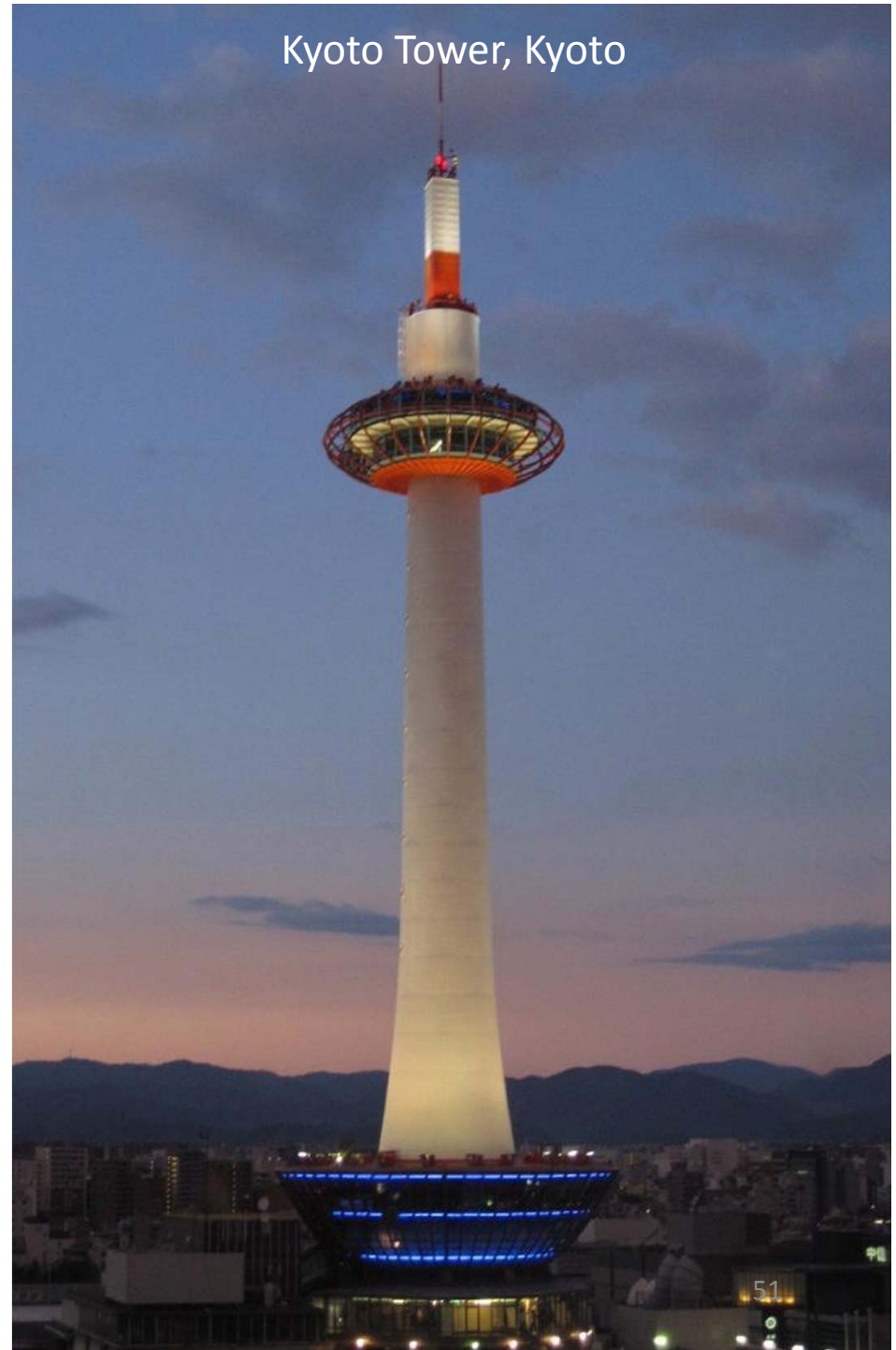
Oriental Pearl Tower, Shanghai



Toji Temple, Kyoto



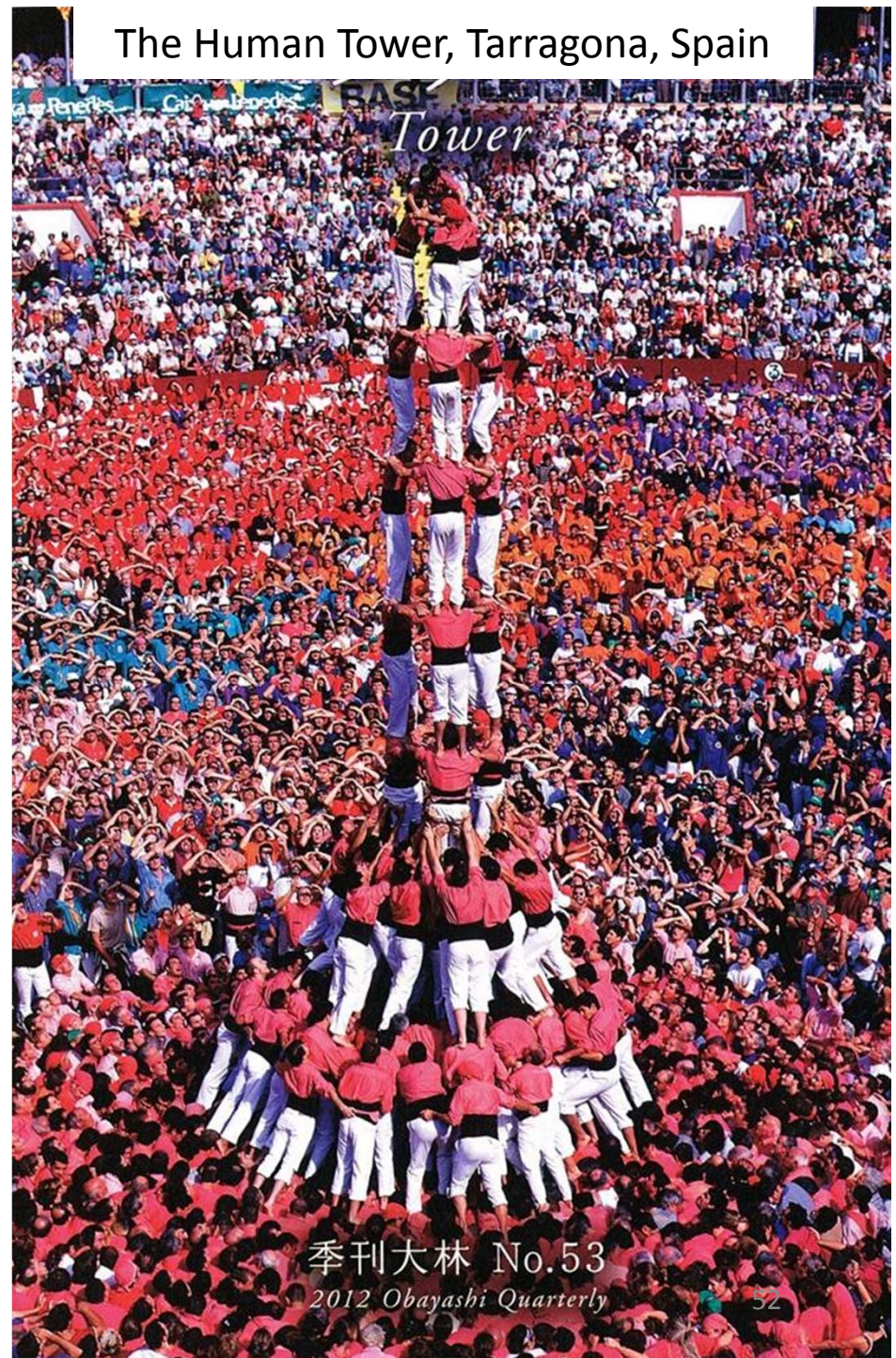
Kyoto Tower, Kyoto



Anthill, Africa



The Human Tower, Tarragona, Spain



Closing words borrowed from August Lösch

Die Räumliche Ordnung der Wirtschaft (1940)



August Lösch in 1935
(15 October 1906 – 30 May 1945)

Epilogue. On Space

If everything occurred at the same time there would be no *development*. If everything existed in **the same place** there could be **no particularity**. Only space make possible the particular, which then unfolds in time.

Only because we are not equally near to everything; only because everything does not rush in upon us at once; only because our world is restricted, for every individual, for his people, and for mankind as a whole, can we, in our finiteness, endure at all. - - -

Space creates and protects us in this limitation. Particularity is the price of our existence. - - -

Thank you
Merci
Danke schön
Dank u wel
Merci
Danke schön
Kiitos
Tack
Tak
Dank u
Go raibh maith agat
Obrigado
ευχαριστώ
Gracias
Grazie