Diversity and Culture in Knowledge Creation: The Story of the Tower of Babel Revisited*

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Thank you very much for kind introduction. Ni men hao. An-nyeong ha-shim-ni-kka. Good morning ladies and gentlemen. I am very honored and pleased with this great opportunity to speak at this 17th conference of Association for Cultural Economics International in Kyoto today. It is my understanding that this is the first ACEI conference in Asia. My presentation is entitled Diversity and Culture in Knowledge Creation: the Story of the Tower of Babel Revisited. In speaking about the importance of culture and diversity in knowledge creation and sustainable development of human society, I believe there would be no better place in Japan than Kyoto. Indeed Kyoto is one of the best examples of cities where innovation and sustainable development has been achieved over 12 hundred years, absorbing diverse culture initially from India, China and Korea and later from European countries and from America, while developing its own unique and rich culture. But about Kyoto I will talk later.

Now let me open the Power Point. My presentation today is concerned about the development of so called Brain Power Society since the late 20th century. As we know, recently the revolutionary development in information communication technology and transport technology has been promoting on one hand the so called globalization of world economy in trade and investment, and on the other hand, the development of the so called brain power society where the creation of new knowledge or innovation has been becoming the major activity of most countries and regions throughout the world. Together it has been bringing out the major reorganization of global economic・political・social systems.

First, concerning the globalization of the world economy in terms of production and trade of traditional goods and services, everyone would agree that the lower the transport costs the greater the efficiency, meaning that paradise for the traditional economy would be a world with zero transport costs. Next, concerning the development of Brain Power Society, can we say that for the production and transfer of knowledge broadly defined, the lower the communication barriers the better the outcome? In other words, is paradise for Brain Power Society a world of effortless communication with no communication barriers?

It is true that multiple languages, distance or space erect barriers for communication, as illustrated in the recent movie, Lost in Translation by director Sofia Coppola. On the other hand, exactly because of barriers for communications due to multiple languages, distance and space, each region can develop its own local culture and the knowledge. So if the diversity is important in knowledge creation for human society in the long run, then the net effect of the existence of such communication barriers on the long run development of knowledge for the entire world could be positive.

In this respect, first, let me explain why the diversity and culture are important for Brain Power Society. Needless to say, the fundamental resources in the Brain Power Society are individual brain power, your brains or knowledge in your brain. But exactly the same brains do not yield any synergy. So the important thing is the diversity in people's brain in society, which creates the synergy in innovation. Likewise, in the context of interregional and international cooperation for innovation, it is the diversity in culture that creates synergy in innovation activity.

Therefore in the cooperative process of knowledge creation, the key factor is the diversity of people in their knowledge composition. Let me elaborate on this point. Let us take

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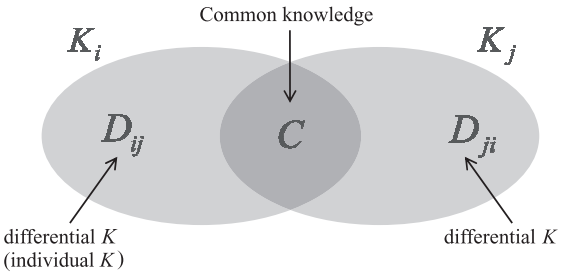
two persons, i and j, and let's assume that the ellipse in the left hand side represents the composition of the knowledge of person i, and the right hand side ellipse represents knowledge composition of person j. If two knowledge compositions have no overlapping, meaning no common knowledge, then communication is not possible. So they cannot cooperate. On the other hand, if two ellipses completely overlap, there is no need for cooperation. Therefore the cooperative process of knowledge creation, the balance of three components, namely, common knowledge and differential knowledge of each other are essential. By fusing the differential knowledge of two persons through the common knowledge, eventually wonderful new ideas will come out.

Figure 1



This idea of creating new ideas through the encounter of heterogeneous people and culture, is well known since a long time ago. For example, in China there is an old saying, "San ge chou pi jiang dig e zhu ge liang". In Japanese we say "San nin yoreba monju no chie". Roughly speaking in English, this means that with three ordinary persons together, splendid ideas will come out. Indeed, this is a wonderful saying. But the question is, is it true in the long run? Suppose we have two persons, initially each having a different composition of knowledge. They become good friends and they started writing papers together, for example. Initially the diversity of knowledge will create synergy and they will produce interesting papers. But if they continue too long their corporation, then their common knowledge will expand relatively to the differential knowledge of each person. So the productivity will eventually diminish. After three ordinary persons meeting for 3 years, no splendid ideas will come out. We must be careful about this point.

Therefore, generally speaking, in the close cooperation of heterogeneous knowledge workers, there is a fundamental antimony. In the short run, through close communications synergy will increase and they will become very productive in the knowledge creation. But if the same people keep cooperating in the knowledge creation, in the long run common knowledge will relatively expand while heterogeneity will diminish. Eventually, synergy will also decrease and productivity will eventually diminish. So our question is how to resolve this fundamental problem? We might be able to get a hint from the Story of the Tower of Babel.

By the way in the top, I made mention of the "nominication" in Japan. What does it mean? Let us recall that in 1980s Japan was still growing rather fast like China today. And that same 1980s, I was teaching in the Wharton School at the University of Pennsylvania. The question at that time in the Wharton School was what would be the secret behind the Japanese great success. One answer was, it would be the "nominication" in Japan. For example in Tokyo, after office workers working together, they do not go home immediately; they go to, for example, drinking place, and keep drinking wine or Japanese sake and talking, communicating for long evening. In that way, they developed intimate relationship for knowledge exchange. When Japan was in the process of catching up to the US and European economies, I believe, nominication or learning by drinking contributed to Japanese success. But because of the real success based on nominication, in the early 1990s Japan became one of the top in the world in terms of GDP per capita. When Japan became one of the top of the world in terms of GDP, what required for Japan was not mainly learning or imitating innovation, but to explore the cutting edge of knowledge frontier. But to be really in the cutting frontier of innovation, Japanese people in my opinion turned out to be too homogeneous. That was, I think, one of the results of nominication. How to resolve this fundamental problem in worldwide?

We might be able to get a hint from the Story of the Tower of Babel. So let me move to the Story of the Tower of Babel told in Chapter 11 in the book of Genesis. Once upon a time in some Mesopotamian region, there was a united humanity speaking a single language, forming a powerful empire. And in this empire, the people got too uppity, arrogant, and started building a giant tower reaching the heaven, thus challeng-

ing the God. God became angry and confounded their language by introducing many different languages, and scattered them upon the face of all the earth with each region speaking a different language. In this way, the united humanity was expelled from the paradise of effortless communication, leading to the multilingual, multiregional world. Now my question today is, was it really a punishment, or blessing in disguise?

In investigating this question, let me pose a related question. We have been witnessing a great revolution in the development of ICT (information communication technology) recently. My question is, does ICT really enhance knowledge productivity? When thinking about this problem, we must differentiate the transfer of knowledge and information from the creation of information and knowledge. The development of ICT, without doubt, greatly enhanced the transfer speed of knowledge and information. On the other hand, each person has a limitation in absorbing new information and knowledge. But, we receive so much information, every day through newspapers, mass media and internet, resulting in the so called information explosion. So naturally we have the mass media and the search engine that will condense very big amount of information to a very small amount of information or knowledge. For example, each person will actually see only the top 3 or 4 items of search engine, resulting in the expansion of the common knowledge. So it is not obvious whether the development of ICT will advance or diminish the creativity of people.

Let me pose another related question. As you know, the Shinkan-sen in Japan opened on October 1st in 1964, 9 days before the Tokyo Olympics. And exactly that morning Mr. Seiki, here the picture, was a driver of 1st Shinkan-sen from Osaka to Tokyo. This is a recent article about his recollection at that time. He notes that in 1964 at the time of opening Shinkan-sen, the culture in Tokyo was very different from the culture of Osaka or Kyoto. He believes that Shinkan-sen contributed much to making Japanese culture homogeneous, in particular making the west and the east homogeneous. Partly because of Shinkan-sen, eventually Tokyo has become the monopolar in terms of not only politics, business and economy but also culturally. Hence, question is, has the Shinkan-sen contributed to enhancing the creativity of Japanese society or not?

Next, let me present some soft evidences about importance of the diversity for creativity. The first soft evidence is the interesting article by Yoko Towada, an internationally renowned writer, that I recently read in the JAL Skyward, a free magazine of JAL group. She was born in Tokyo but also lived in Germany for 26 years, writing both in Japanese and German. So half the life in Tokyo and half the life in Germany. She won the Akutagawa prize and Tanigaki prize in Japan but also the Lessing prize and the Goethe Medal in Germany. In this article, there is a series of interesting questions and answers but let me just take 2 questions and answers. The first question is: what about the Japanese tradition? The answer is: 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. The next question is: aren't you sometimes afraid of losing Japan? The answer is: No. on the contrary while I was living in Japan, I never thought much about own culture since it was there. For example the Noh theatre became important to me only here in Europe. It's the difference between the two cultures that makes me productive, not the Japanese culture as such. Incidentally, I went the first time to the United States for studying at University of Pennsylvania in 1968. And I came back to Japan after staying in Philadelphia for four years. When I came back to Kyoto after four years, I was amazed to realize how beautiful Kyoto was. I think you will also have many similar experiences.

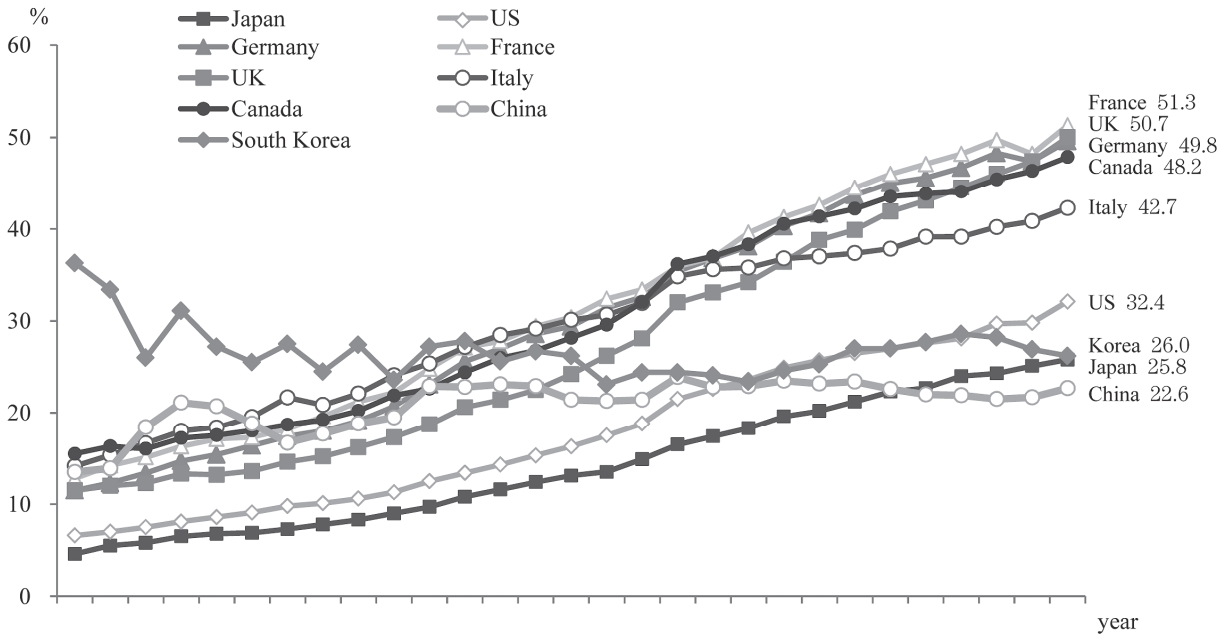
Let me present another soft evidence about the importance of diversity for creativity. This is about the data on the National Institute for Material Science (NIMS) in the Tsukuba region in Japan. Tsukuba is a research town. Among many research institutions in Tsukuba, NIMS has the largest number of foreign researchers, about 600. But originally NIMS didn't have this many foreigners. It is a result of intensive efforts by NIMS. In 2004, the ministry of education designated NIMS as a center for young international researchers. Then in 2007, NIMS was designated as the MANA, an international research center for nano architechtonics. Since then, NIMS tried

very hard to increase the number of foreign researchers. At the start of 2001, there was less than 4 percent of foreign researchers, but now it is approaching to 25 percent. As the result, what happened to NIMS? This is the world ranking of research institutions in terms of citation in the field of material science. Before NIMS starting the real promotion for inviting foreign researchers, between 1994 and 2004, NIMS was at rank 18 in terms of citation in the material science. However, after promoting internationalization, inviting many young foreign researchers, the ranking of NIMS in terms of the citation between 2007 and 2011, NIMS moved to the number 4. The top is China Academy of Science, but this is a nationwide institution. The second is Max Plank Society, but it is also German-wise institution. So among individual institutions, MIT is the top and NIMS is the second. This represents a result of NIMS's internationalization. Furthermore, among top 10 papers at NIMS in terms of citation, 8 papers were written by foreign researchers and Japanese together. Among the top 31 papers, 24 were written by Japanese researchers and foreign researchers together. This represents a good example in showing how the diversification of knowledge workers has increased productivity in a research institution.

This is another diagram, showing the share of academic papers with international coauthors, published between 1981 and 2009. International coauthors mean people belonging to different institutions in different countries. In terms of the share of international coauthors, the first is France, and then Germany. Until recently, Japan was the lowest in this diagram. The US was the next lowest. But the US is a big country, with 50 states, and each state is almost like a country. And, within the United States, each research institution has a rich diversity of foreign researchers. This diagram suggests that Japan needs more internationalization of research cooperation.

Lastly for the soft indication, this diagram is based on the recent interesting article in Papers in Regional Science written by Prof. Fritch and Graf in the Jena University in Germany. They compare two representative research cities, Jena and Dresden, in East Germany with two representative cities, Karlsruhe and Aachen, in West Germany. Each city is about 1 million population with an elaborate network of research cooperation within the city or region. I don't have much time to explain how these links in the maps have been drawn. In comparison of the two cities in East Germany and

Figure 2: Share of international coauthors



Source: National Institute of Science and Technology Policy, *Research Material 214: Japanese Science and Technology Indicators 2012*

the two in West Germany, we can see that in East Germany the links among research institutions in each city is much denser. According to the traditional explanation of the importance of knowledge-network density in research productivity, East German cities should have a higher productivity. But the actual result is exactly the opposite. In terms of per capita patent registration, West German cities are about twice of East German cities. How to explain this surprising result? Because each person has the capacity for research cooperation, the dense internal linkage means the linkage with outside world is rather weak. And that's the opposite state of West German research cities. So again this result suggests that we should not concentrate too much on the internal research cooperation. Rather, we must make more open research links and cooperation.

Next, based on the long introduction so far, let me present my recent research work on modeling the dynamics of Brain Power Society. In this model the question is, how the diversity of knowledge workers and the local culture develops endogenously, how it is related with the growth rate of knowledge in the whole society, how it is related with the growth rate of world economy. However, because I do not have much time today, I will not talk about economic growth, but concentrate on the question of how the diversity of knowledge and local culture affects the growth rate of knowledge in the whole society.

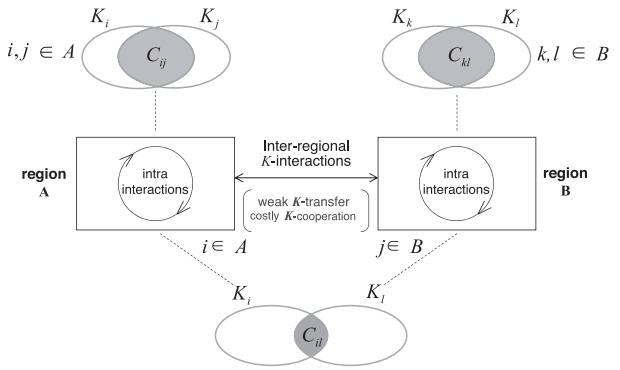
The following presentation is based on my recent research work with Marcus Berliant at the Washington University in St. Louis. The first paper is Knowledge Creation as a Square Dance on the Hilbert Cube. About square dance I will explain later. Next paper represents the fusion with endogenous growth theory and the dynamics of knowledge diversity. And recently we expanded this single-region model to multi-region model, introducing culture and diversity in knowledge creation, which my discussion today is based on.

Before going to the model, let me explain about square dance. If you are from United States, you might know it. The square dance was very popular in the US frontier. When the people migrating from east to west, in the night they camped surrounding the fire, and enjoyed square dance. Square dance is basically with 8 persons. While each pair of persons performs partner dance, but they quickly exchange the partner. In the formation of 8 persons, there is so much variety. If you go to access the internet, you have a printout of 20 pages of formation immediately. Incidentally, I recently wrote 3 papers, with Marcus Berliant. But we meet only 3 or 4 weeks in each year. And rest of the time I work with other people, while Marcus Berliant also works with other people. Thus, we are essentially performing square dance in developing new papers. I think this is typical among economists. That's why I modeled the knowledge creation process in terms of square dance.

Let me explain the basic idea of our culture and diversity model in the case of 2 regions. Suppose we have region A, maybe Japan, and region B, for example United States. Let us assume that each region has the same number of knowledge workers or researchers. Of course within Japan or region A, they are easier to communicate, so intra-interaction is very dense. Likewise, region B also has a very dense intra-interaction. But between the two regions, because of the travelling time and cost, interregional research-cooperation is not easy. (Here, we are not considering migration.) Furthermore, there is much weaker knowledge transfer from the United States to Japan and vice versa. For example, few Japanese people read American newspapers, and few Japanese people watch American television. So if we take typical two persons in region A, their common knowledge is relatively large. The same thing happens to region B or the United States. In contrast, if we take one person from region A and one person from region B, then naturally their common knowledge is relatively much smaller. This means that within each region common knowledge is big but internationally or inter-regionally differential knowledge is big. In this context, knowledge creation in the whole human society will take place as follow. For creating incremental innovations, each region can achieve it within each region utilizing their large common knowledge. But when exploring the cutting edge of the science frontier, for example new bio-technology or real new software, diversity in knowledge workers is essential. In this case, international cooperation becomes very important. Because each region has a different culture, there is a large diversity between regions. In this way, the very existence of spatial barriers in communications will contribute to enhancing the productivity of knowledge creation for

the whole society. That's the basic story, but let me explain a little bit more detail.

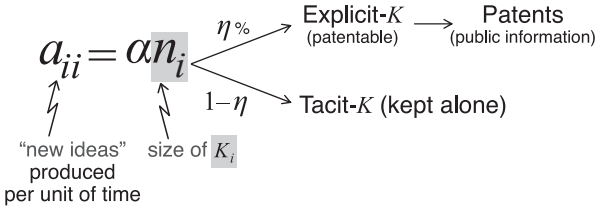
Figure 3



Nowadays, people often talk about the network in terms of knowledge spill over. But our question today is mainly about the production of new idea or knowledge. So we need knowledge production function. Here we consider a simple knowledge production function. At a given time we assume that each person can, for example, as an economist, you can write papers in isolation. But, alternatively you can work together with somebody else and write joint papers. Therefore, there are two alternative ways of creating new ideas. In the case of isolation, let's assume a very simple knowledge production function. That is, the number of new ideas produced per unit of time is just proportional to the size of this person's knowledge. And the alpha represents the proportional parameter. So in each time, proportionally to the size of his or her own knowledge, new ideas come out. Further assume that among new ideas produced, a certain percent represents the explicit knowledge that becomes patents absorbed by other people as public information. But the rest becomes tacit knowledge, kept alone by this person, accumulating as the differential knowledge.

Figure 4

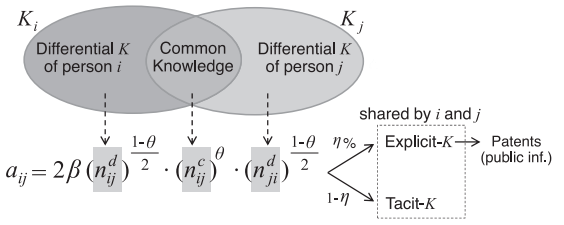
① in isolation (person i)



That is the case of single person. Next, let us consider two persons cooperating in the same region. As I said, for the cooperation in knowledge creation, the balance of three components is important. Considering this point, we consider the knowledge production function by two persons, i and j, in which the three components of their whole knowledge are multiplied each other: The three components are the size of their common knowledge, the size of the differential knowledge of person i from j, and the size of differential knowledge of person j from i. However, instead of simply multiplying the three components, let me put power θ on the size of common knowledge. Parameter θ represents the importance of common knowledge in research coopetaion. That θ is close to 1 means the common knowledge is very important in this particular type of innovation. That θ is close to 0 means the diversity is very important in knowledge creation. But here θ is a fixed parameter. Next, in the case of interregional cooperation of two persons, we multiply τ to the original knowledge production function, where τ is less than one. For example, when τ =0.8, the productivity decreased 20 percent because travelling take a lot of energy, time and money. But if the matching is good, they will work together, realizing interregional research cooperation.

Figure 5

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



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

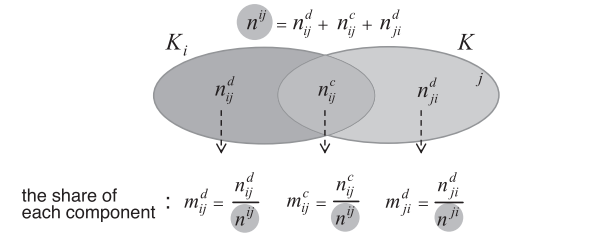
③ in meeting of two persons in the different region ($i \in A, j \in B$)

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

We have 3 variables in the knowledge production function. Let me reduce the number of valuables by normalization because production function is linearly homogeneous. I divide 3 components by the total size of the knowledge of two persons, and use proportions instead of sizes. But the three proportions sum up 1. So I have only two valuables. In

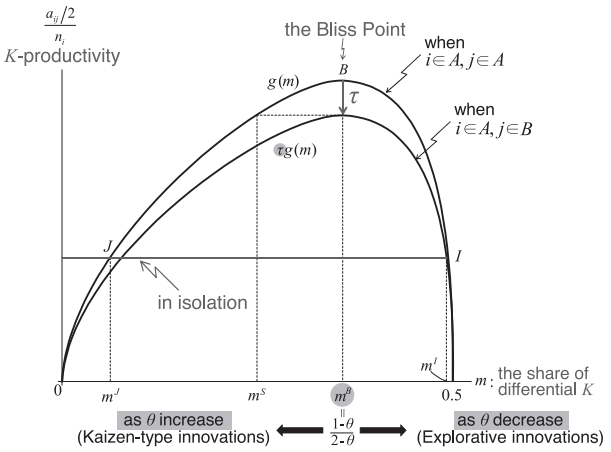
order to reduce one more variable, I assume for simplicity that the size of the knowledge of each person is the same. Then, since the size of common knowledge is the same by definition, the proportion of differential knowledge is the same for two persons. In this symmetric situation, knowledge production function can be represented by single variable. That is, when two persons are in cooperation, the per capita output is one half, and hence we divide a_{ij} by 2. Furthermore, since the real input is n_i (the size of each person's knowledge), we also normalize the output by n_i. Hence, in the symmetric case, the normalized knowledge production function can be expressed by a single variable, m^d, the share of differential knowledge of each person. By definition, $0 \leq m^d \leq 0.5$.

Figure 6



In this figure, considering the symmetric case, the horizontal axis represents the share of differential knowledge of each person, and the vertical axis shows the normalized knowledge productivity. The top curve represents the knowledge productivity of each person when the two persons work together in the same region. Depending on the share of differential knowledge, we have different value of productivity. As shown in this figure, the productivity curve is single-peaked, achieving the highest at the bliss point m^B. That is, m^B represents the best matching in terms of the share of differential knowledge of two persons. In the case of inter-regional research cooperation, the productivity will go down proportionally to parameter τ. For example when τ is 0.8, 20 percent will go down. Finally, when each person works in isolation, productivity is represented by the horizontal blue line.

Figure 7

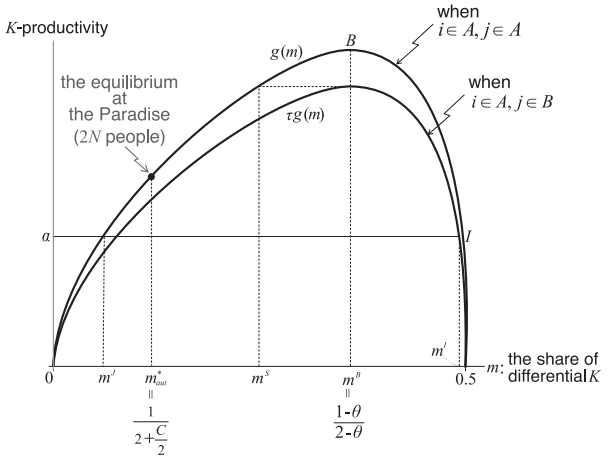


Next, for simplicity, let me assume that at the initial time zero, size of knowledge is the same for all research workers. Then, we can show that at any time on the equilibrium path, the size of the knowledge is the same for all workers. Therefore, the pair-wise symmetry in knowledge composition is maintained on the equilibrium process. We must note, however, that pair-wise symmetry does not mean that every pair has the same share of differential knowledge. For example, within Japan, two persons keep the symmetry, but their common knowledge is relatively large. But for the pair with one Japanese and one American, the share of common knowledge will be much smaller than for Japanese pair. Anyway, we assume that at each time each person will form a pair by selecting the best matching partner in terms of knowledge productivity. But if they keep the same pair too long, they are enlarging the common knowledge too much. So each person will sequentially change the partner like square dance.

Given this explanation of the two-region model of diversity and culture, let us revisit the Story of the Tower of Babel. Let us assume that before the expulsion from the paradise of effortless communication, we have all the 2N people in one empire, enjoying effortless communication. It is good to enjoy effortless communication, but on the other hand, so much common knowledge is being accumulated. In this context, parameter C is important, which represents the capacity for absorbing public knowledge in comparison to the creativity of each person. Here we assume that C is large, so too much common knowledge is being absorbed. As a consequence, the equilibrium point in the paradise of effortless

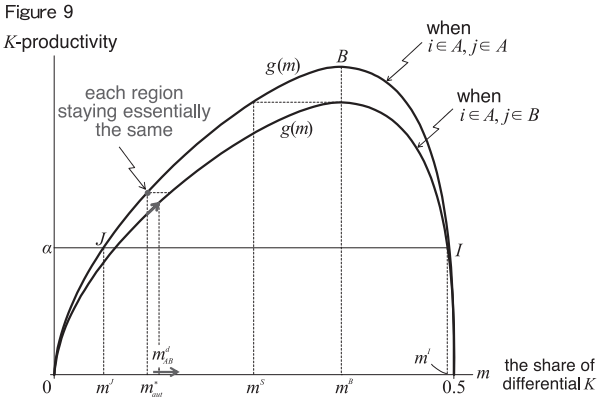
communication is given at the red point in the figure, meaning much lower productivity than the bliss point.

Figure 8



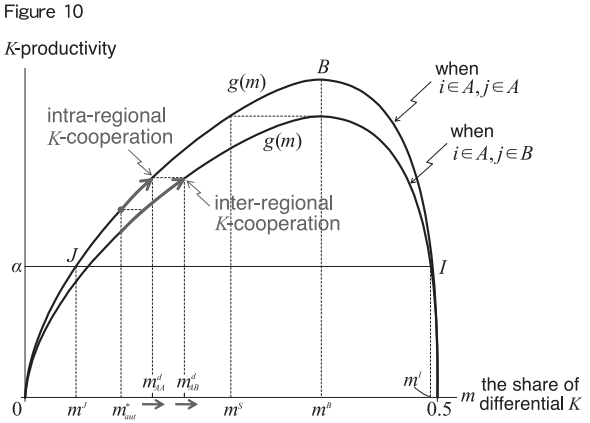
Next, let us go to the Phase 1, and assume that God expelled 2*N* people from the paradise, and divided them into two regions, with each region having *N* people and a different language. Then what happened? Just after the expulsion not much happened because each region still has a very large number of people, half of the previous one but still very big. Just after the expulsion each region inherits the same culture. Given this situation, since the inter-regional cooperation decreases the productivity, naturally people in each region cooperate only internally. Furthermore, interregional knowledge spillover is naturally week. Therefore, soon or later, each region develops its own culture.

Figure 9



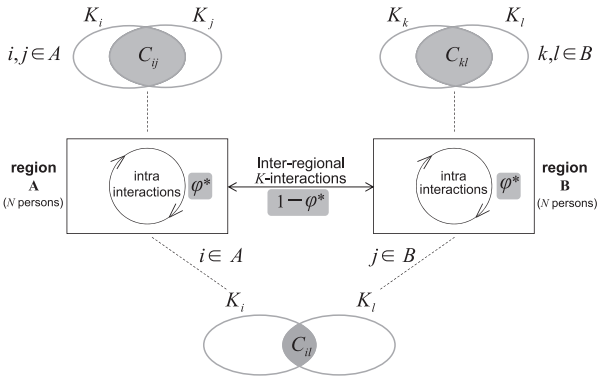
Eventually, we move to Phase 2 where the interregional difference in knowledge composition becomes large enough so that the productivity in the interregional cooperation becomes comparable to that in the intraregional cooperation. Therefore, each person starts cooperating internally as well as inter-regionally.

Figure 10



This figure explains the situation of Phase 2 in another way. Each person in each region uses a certain proportion of time, φ^*, for intraregional knowledge cooperation. But the rest of the time, $1\text{-}\varphi^*$, is used for the inter-regional knowledge cooperation. So each person is utilizing effectively large common knowledge within the same region, and large differential knowledge between the two regions. That's why they can gradually moving upwards both in the intraregional and interregional productivity curves.

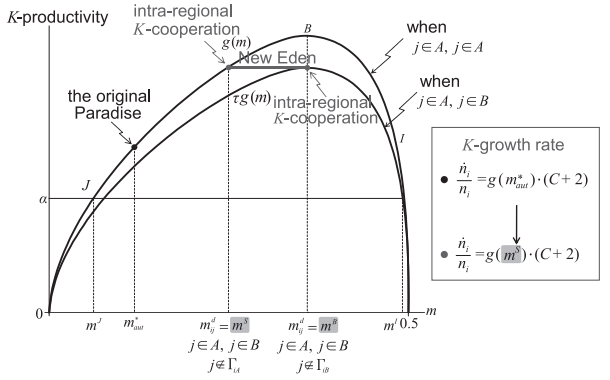
Figure 11



Eventually in Phase 3, they reach the highest point in terms of the interregional productivity curve, which I call the New Eden. Now, every person achieves a much higher knowledge productivity than in the original effortless communication paradise. Therefore, as shown by the two equations, the growth rate of knowledge of each person at the

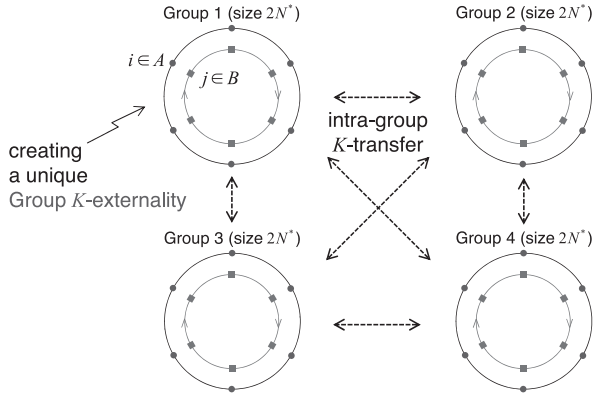
New Eden is much higher than that in the original effortless communication paradise.

Figure 12



By the way, going back to Phase 2 for a while, it is not difficult to understand why inter-regional knowledge diversity increases gradually. But why intraregional knowledge diversity also increases gradually? To understand this, let us imagine, for example, Japanese economists working together with American counterpart economists. In this case, Japanese economists are not working equally with every economist in the United States. In practice, American economists and Japanese economists form many different groups, such as the Harvard group, Yale group, Chicago group, Stanford group, etc. In each group, they closely work together because of group externalities. Within the same group, they enjoy strong group externalities, while inter-group externalities are relatively weak. Then, since all economists divide into a large number of groups, Japanese economists also develop heterogeneity among themselves. This is why the interregional cooperation also promotes the intraregional knowledge diversity.

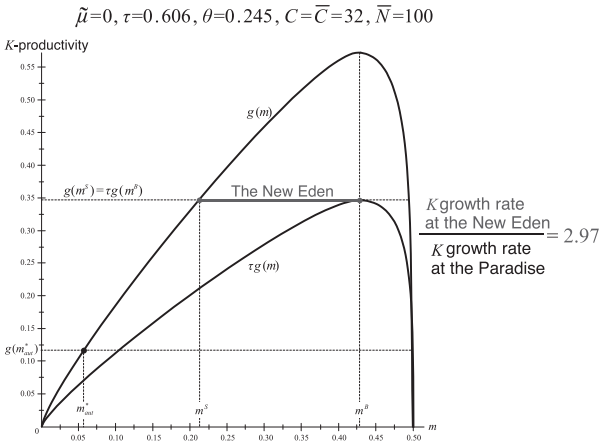
Figure 13



Incidentally, this way of interregional knowledge cooperation is very similar to a Chinese dinner party. In Chinese restaurant, a certain number of people surround each different table. And, in front of each person, we have a dish. But at times we must regularly rotate the table or dishes. This is somewhat similar to the case of interregional research cooperation. Each Japanese economist sits in front of an American economist. While eating the knowledge of each other, they create new ideas. But after a certain time, they switch the partner. In both Chinese restaurant and interregional research cooperation, they perform square dance while enjoying both intra-group and inter-group externalities.

This example shows that the growth rate of the knowledge of the whole society at the New Eden is about three times higher than that at the original paradise of effortless communication. That is, by breaking the one region into two, the whole society can achieve a big improvement in knowledge creation over the one region case. This can happen even when the interregional cooperation is rather costly (i.e., $\tau = 0.6$).

Figure 14



Let us recall our original question: Was the expulsion from the paradise of effortless communication to a multiregional, multilingual and multicultural world a punishment or a blessing in disguise? The results of our model suggest that quite possibly, it was a blessing in disguise.

Incidentally, you might think that I am against towers. But, I am not against all towers. Indeed, I love towers. I am

only against the tower by single empire. On the contrary, let hundreds of towers bloom all over the world. Indeed, countless number of wonderful towers has been built throughout the world , with each tower signifying a unique local culture. For example, recently I visited Ayasofya in Istanbul, and found it wonderful. Ayasofya was originally built in the mid-6th century by the Byzantine Empire as a Christian Church, but it was converted to a mosque when it was taken over by the Ottoman Empire. It locates exactly at the cross point of Eastern culture and Western culture. Next, let us jump to Japan. This Horyu-ji Temple in Nara was built in AC 607 at about the same time with Ayasofya. But it is very different from Ayasofya. Horyu-ji Temple is a wooden building, very flexible one, and exactly the same building still exists today over 1400 years. By the way this Horyu-ji tower was built by the carpenters from the Kudara region in Korea. Let me move to other towers quickly. Of course we have Taj Mahal in India, fantastic one. We have this Golden Pagoda in Yangon in Myanmar. And this is the famous twin tower in Kuala Lumpur. By the way, one tower was built by a Korean construction company and the other tower was by a Japanese construction company. I heard that each company accused that the other tower was not straight. Anyway, of course, China also has built so many towers. This is the television tower built in Pudong area in Shanghai in 1994. But so many towers have been built in this area since then. In the United States, we have of course Empire State Building built in 1931, then the highest tower in the world. More recently, this is the Trump Tower in Manhattan built by the real estate tycoon, Donald Trump. This tower represents, in my opinion, the American culture of greed is beautiful. And, this is the Tower of Pisa, and this is the Big Ben. You might know that recently Big Ben was formally renamed, celebrating the 60 years anniversary of Queen Elizabeth's accession to the throne, as the Elizabeth Tower. Of course we have Eiffel Tower in Paris built in 1889. We also have Tokyo Sky Tree that just completed. Kyoto also has the To-Ji tower built about 1200 years ago. Kyoto has also a modern Kyoto Tower in front of Kyoto station. I could continue forever. But, let me just show that animal can also build a tower. For example, this ant tower is about 7-meter high. In terms of human proportion, it is about 5000-meter high. But still I like the tower made of human being, and this is exactly the tower made of human being in Catalonia in Spain. You can see how many people in each story. In the bottom, about 1000 people, in the second story about a hundred people, 3rd story about 30 people…and we have 9 stories of human tower. And you can see that in the bottom very strong men, in the middle young men, and in the top two stories young girls because in the age of around 10 years old, mentally and physically girls are stronger than men. This tower represents a real human collaboration.

Now let me finish my presentation by closing words borrowed from the famous book by August Losch, Die Raumliche Ordnung der Wirtschaft, or Spatial Order of Economy, published in 1940. As you know, Losch is a giant scholar in the field of location theory, born in 1906 and died in 1945. This wonderful picture was taken in 1935 when he was just 29 years old. Let me read the Epilogue on Space in the last page of the book:

"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 makes 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. Particularly is the price of our existence".

Merci Beaucuop. Xie xie. Kamsa hamnida. Thank you.