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Design of a Basic Analytical Framework for Human Capital, Public Goods and Institutions Based on Linguistic Economics

Abstract: - In the paper, we analyze and demonstrate the economic nature of language from the aspects of human capital, public goods and institutions, and put forward three topics in the field of Language Economics: language human capital; Language is a kind of public goods; Language is a system. As human capital, it is one of the important factors that determine people's employment and income in the labor market. It is closely related to people's social and economic activities and economic conditions; As a public product, language can directly affect the choice and formulation of language policy; As a system, language not only affects the transaction cost, but also affects the effectiveness of other institutional arrangements. As far as the existing research is concerned, the research on proposition 1 has become a very mature field of language economics. The research on propositions 2 and 3 has just started, but the prospect is very broad. This is worth studying. It is reasonable to believe that the follow-up research of language economics is usually based on or supported by these three arguments. In this sense, they can be used as the basis of linguistic economic analysis.

Keywords: language; language economics; human capital; public goods; institution

I. INTRODUCTION

We know that the economics of language has only been a branch of economics for half a century, but the use of economic methods to pay attention to language has a long history, no less than any branch of economics [1]. The originator of economics paid attention to the problem of language very early, and was able to reflect on the formation process of the market order from the similarity of the social mechanism of the spontaneous generation of grammar. and the different talents of compound languages", in which he formed his contractual theory on the origin of language [2]. Tell people that language evolves spontaneously. The subsequent formation and improvement of human capital theory and educational economics theory further promoted the development of language economics. In this period, language skills were regarded as a kind of human capital and empirical tests were conducted (as shown in Table 1). (shown) to name the economics of language, thinking that the economics of language is a paradigm of theoretical economics [3]. The analysis of the attributes of language enriches the research content of the economics of language and builds the theoretical framework of the economics of language to a certain extent [4]. It is true that language economics has made great progress in the past 40 years, and has achieved a lot of research results, but we see that the theoretical framework of language economics has not been fully established, and the

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prospects are not yet clear.

Table 1 Green's model of linguistic value

	Personal value	Value to society
Market value	A	C
market value	B	D

In a broad sense, the study of language itself from the perspective of economics, or the study of the correlation between economics or economic relations and language and speech acts, can be called the generalized economics of language, that is, the use of economic theories and methods to study language and speech. The generation, development and change of behavior, or the study of language and speech act on economic theory [5]. The impact and role of methods or economic performance (which ultimately comes down to these two points, otherwise it cannot be called "economics") economics [6]. Several formulations and their meanings identified earlier in this section are included in the broad economics of language [7]. Drawing on the practice of Law and Economics, we think that the English equivalent of language economics in a broad sense can use the word Language and Economics, which seems to be better able to express its meaning, and in-depth research in a specific field or branch as shown in Figure 1.

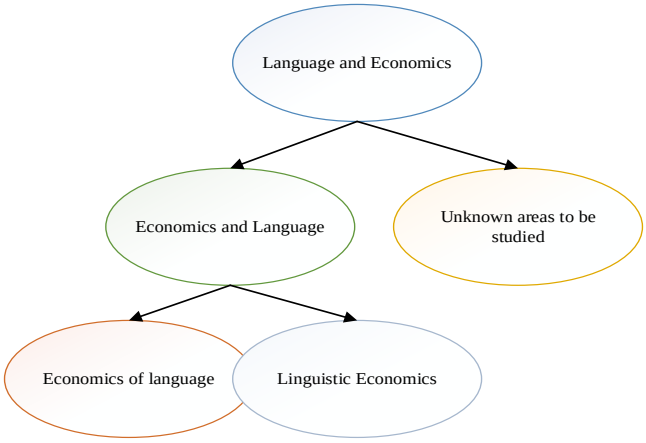

Figure 1 Disciplinary structure of the economics of language

Regarding the determination of the official language, although previous studies such as political science or sociolinguistics also believed that it needs to be implemented by the state, but its explanatory power is insufficient, and this conclusion can be more reasonable in economics from the perspective of public goods [8]. Not only that, Figure 2 also shows that there is an equilibrium number for the determination of the official language of a country or region.

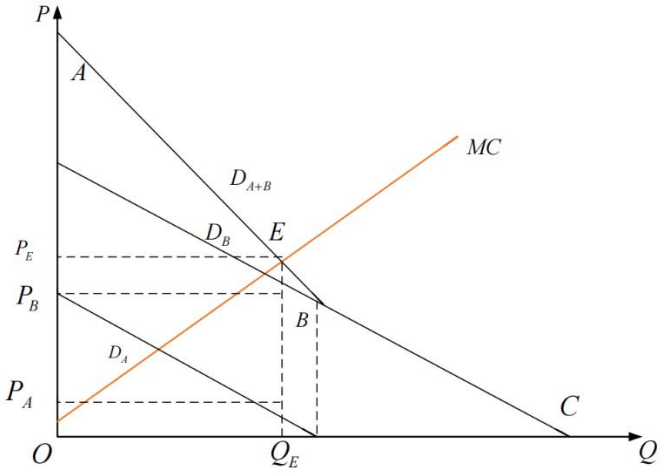

Figure 2 Demand and supply of official languages

As a tool of human thinking and communication, language has great economic significance. Language economics believes that language can be regarded as human capital, and the cost and time spent learning one or more languages is a special form of human capital investment and language affects transaction costs[9]. Because of its particularity, it also affects the effectiveness of other institutional arrangements. This paper discusses the framework of effective analysis of tripartite relations from the perspective of linguistic economics.

II. RELATED WORK

Throughout the ancient and modern Chinese and foreign language studies, many linguists were influenced by the prevailing economic ideas at that time or introduced economic ideas into their own research, mainly manifested in their attention to the principles of language economics [10]. The economic principle of language was first put forward by French linguists, and the main scope of the initial research was the evolution of language [11]. The effort-saving principle proposed by a professor at Harvard University in the United States is applied to the analysis of the law of sound change. In [12], through the quantitative level statistical data and qualitative level case analysis, the labor-saving principle embodied in human behavior is explained in depth and detail. The distribution law of words in natural language is explained by using the principle of labor saving. Linguists also refer to the principle of "saving effort" when describing the evolution of language. In [13], the economic principles of language have been specially discussed. The economy of its language expression is related to people's communicative needs.

The study of the economic principles of language is extended and introduced into the analysis of language derivation. It believes that representation and derivation in syntactic operations are in line with economic principles [14]. In [15], it believes that sentence derivation conforms to the above two principles, and for a single sentence, the best and most preferred derivation should be the simplest and shortest derivation. Since then, domestic and foreign scholars have analyzed and supplemented the economic principles derived from this language [16] [17][18].

In recent years, domestic discussions on the economic principles of language have mainly focused on the micro level [19]. The introduction of economic principles into the study of pragmatics expands the previous economic principles and discards the previous research and discussion of economic principles, which are only quantitative explanations, that is, explanations of the number of lexical structures in language expressions [20]. The economic principle of language should be the economic principle of pragmatic utility realization in human expression. It is

believed that human communicative behavior can be explained by the economic principle of new language (the pursuit of pragmatic utility maximization) [21]. Whether the grammatical structure is economical is related to the distribution of people's cognitive effort and the amount of denotative functions carried by the grammatical structure itself [22][23]. Whether economists use “economic analysis” to interpret language problems, or linguists introduce economics in their research. Thought or economic methodology, both provide useful attempts and models for the economic analysis of linguistic meme variation, and make it possible to analyze linguistic meme variation from an economic perspective.

Compared with the time when the economics of language was born, the domestic research on the economics of language started later, and there are only a handful of research results [24]. Basically it belongs to the introduction, introduction and review of foreign research. Among them, the in-depth research on the economics of language is undoubtedly the [25], which initially established the economics analysis framework of language, especially about the public goods and institutional attributes of language is a deepening of the theory.

III. METHODS

Combined with the existing research results of language economics, and considering possible future research directions, language economics research can be theoretically supported by three basic (and core) propositions.

3.1 Language is a human capital

Despite the cost of acquiring language skills, once the investment is made, people will have more communication possibilities, as well as higher incomes or better jobs. Whether it is on consumers, or on manufacturers (especially service providers, such as service outsourcing companies), language reflects productivity. For example, searching for information such as price, quality, and efficacy of products or services requires a certain level of expressiveness or literacy. For those consumers who lack language skills, they are searching for the lowest price when purchasing products and services.

3.2 Language is a public good

The so-called public goods refer to the goods that the consumption of a certain good by a consumer will not reduce the consumption level of other consumers of the good, and at the same time, this kind of good is non-exclusive and open to all members of the group.

For private goods, there are:

$$X_j = \sum_{n}^{i=1} X_j^i \left(j = 0, ..., J \right) \quad (1)$$

X_j is the total consumption of the j st product, and i is the i nd consumer. The formula shows that the total consumption of product j is equal to the sum of the consumption of product j by each consumer.

For pure public goods, there are:

$$X_k = X_k^i \left(i = 1,...,I; k = J+1,...J+K\right) (2)$$

Among them, X_k is the total consumption of the k st public product, X_k^i represents the consumption of the i rd consumer of this public product, that is to say, the consumption of any consumer is the entire public product, and the personal consumption is equal to Consumption of the whole, rather than the total consumption of pure private products, needs to be aggregated; public products are indivisible among individuals, and if they want to consume, they should consume the whole of the public product, not part of it like private products.

During the production process, the expert group gives full play to their respective advantages in production, conducts demonstrations, discussions, repeated revisions and consensus, and will eventually Products are reported to the Ministry of Education in the form of research conclusions; the Ministry of Education, as a provider of language quasi-public goods, provides final products to language consumers. This process is equivalent to B in Table 2. Of course, from the above point of view, this is an efficient process. Compared with the Ministry of Education, the production language, a quasi-public product, has comparative advantages, especially professional advantages. Meanwhile, the Ministry of Education, as a provider of language quasi-public goods, It has the advantage, that is, it has the authority and coercion of language implementation. Purely from the perspective of separation of public product producers and providers, this is indeed efficient, but it is not a reasonable process. Before the Ministry of Education commissioned an expert group to produce language quasi-public goods, language users had not been fully consulted. Preference, of course, we will do a specific analysis in the third part.

Table 2 Separation table of public goods producers and providers

		Producer	
		Government public sector	Non governmental organizations
Provider (arranger)	Government public sector	A	B
	Non governmental organizations	C	D

3.3 Language is an institution

Commons' definition is simple: "Institutions can be interpreted as collective actions controlling individual actions". The definition of North in New Institutional Economics is the most representative. He believes: "Institutions are a series of formulated rules, orders, and moral and ethical norms of conduct, which aim to restrain the welfare of the subject or maximize the utility of individual behaviors that maximize the interests of individuals". ", further stated that "institutions are the rules of the game in a society," or more formally, they are some constraints set for determining people's mutual relations".

It is assumed that the amount of investment in language human capital depends on people's rational behavior, that is, each person's expectation of investment is to maximize his economic welfare. Obviously, the equilibrium of investment in language human capital depends on the relationship between supply and demand. The demand curve

of language human capital is also the marginal yield curve of language investment. As with other human capital investments, the expected marginal benefit of learning another language decreases with increasing language fluency, so it has a negative slope. The marginal cost of learning another language is convex (that is, the price function for acquiring higher power is an increasing function), so the supply curve is a positive slope.

As shown in Figure 3: D represents the marginal yield curve brought by each additional unit of investment by an individual, and S represents the marginal cost of an individual. According to Marshall's partial equilibrium, the optimal amount of language human capital investment must be determined at the intersection of the supply and demand curves, the net benefit of language investment is maximized. Because as long as the expected marginal benefit is greater than the marginal cost, people will continue to invest in human capital until the two are equal. The same goes for language human capital investments. Equilibrium is assumed to be at E, and the optimal amount of investment is C.

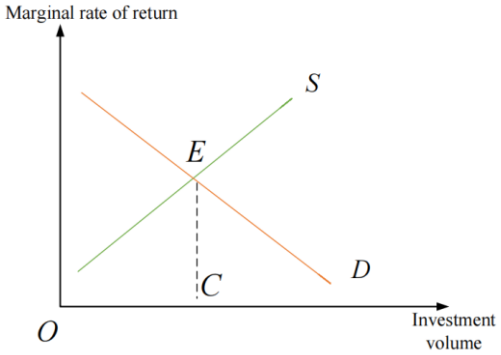

Figure 3 Optimal language human capital investment

IV. CASE STUDY

4.1 Further explanation of the nature of language public goods

We point out that language is a public good. As a public good, language has a strong network externality. Suppose there are only two groups. Group 1 consists of n people, who can communicate with each other in a common language L, and group 2 consists of m people, and the common language is L2. where n is greater than m. In the initial stage, because the two groups do not communicate due to different languages, the communication is only carried out within their respective groups, and the number of potential communications in each group is limited. In theory, without considering other factors, a larger language group can attract more members outside the group to learn the language because it can provide more communication opportunities. Therefore, it is assumed here that only members of group 2 choose to learn the language of group 1. As shown in Figure 4, as long as any person in group 2 (such as A_1) learns the L language, not only communication between groups is made possible, but all members of group 2 also have the ability to communicate with all members of group 1. possible (with A_1 as the middleman). For group 1, on the surface, A_1 Learning the L language means that a new network member has been added to the group, but by A_1, The network externalities of group 1 language are manifested. In fact, in real

life, there are more than one person who learns a second language, and there are more than two different language groups. Therefore, in general, language can not only make communication impossible to communicate, but also improve communication efficiency. , because with the increase of the number of learners, more people can communicate autonomously, and there is no need for intermediaries to relay. Therefore, communicative value is one of the important values of language. The second is the indirect effect derived from network expansion.

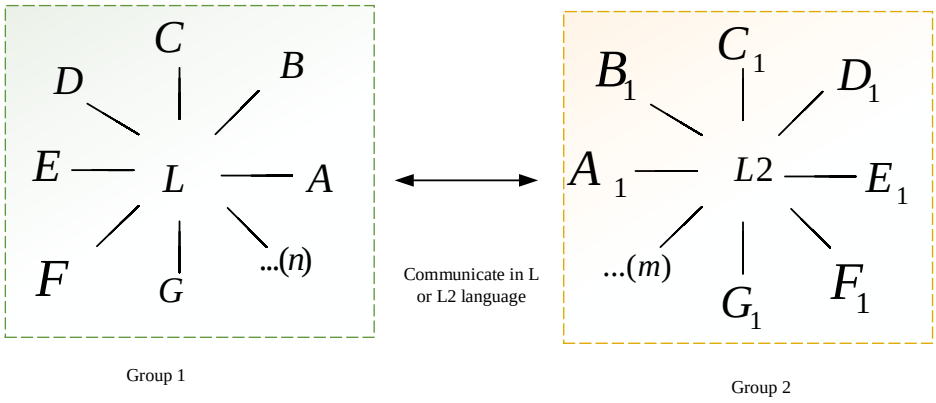

Figure 4 Linguistic communication between two groups

\4.2 Determination of the official language

The supply of official languages belongs to the supply of pure public goods. We assume that a country is a multilingual country, and there are multiple options for determining the official language. In fact, monolingual countries also have multiple options for choosing an official language. Take China as an example, in theory, any language such as English, French, Italian, etc. can be selected as the official language, but the supply cost is too high to be implemented.

As shown in Figure 5, P is the cost or price of the official language, and Q is the number of candidates for the official language, which theoretically refers to the number of all languages in the world. Language has the characteristics of public goods and is prone to free-rider behavior, and consumers of official languages are reluctant to reveal their preferences. Nonetheless, 'According to Samuelson's assumption, there are discerning people who know consumers' preferences. Therefore, the demand hypothesis for the public good of language is knowable. D_A and D_B represent the individual demand curves for language of consumer A and consumer B, respectively, and MC represents the marginal cost curve, which is the supply curve of the official language. Since public goods have the characteristics of non-competitive consumption, the total social consumption remains unchanged for each additional consumer, and the total social demand curve can be obtained by adding the individual demand curves vertically, that is D_{A+B}, It turns from point B to point C and coincides with the D_B curve, because after point B, the price that consumer A is willing to pay is equal to zero, Only consumer B can pay the price alone. Point E is the equilibrium point of the supply curve represented by the D_{A+B} curve and the MC curve, and the

equilibrium price is P_E, that is, the sum of the prices P_A and P_B that consumers A and B are willing to pay in the quantity Q_E. Since $P_A + P_B = P_E + MC$, the price paid by individuals is equal to their respective marginal benefits from consuming the language itself. In theory, the government could tax consumers separately according to their marginal benefit for the supply of language itself. But in fact, the marginal benefit that consumers get from the language itself is difficult to measure. Therefore, the most effective way to use this pure public product of the official language is to consume all, the cost is shared, and the supply must be completely implemented by the state.

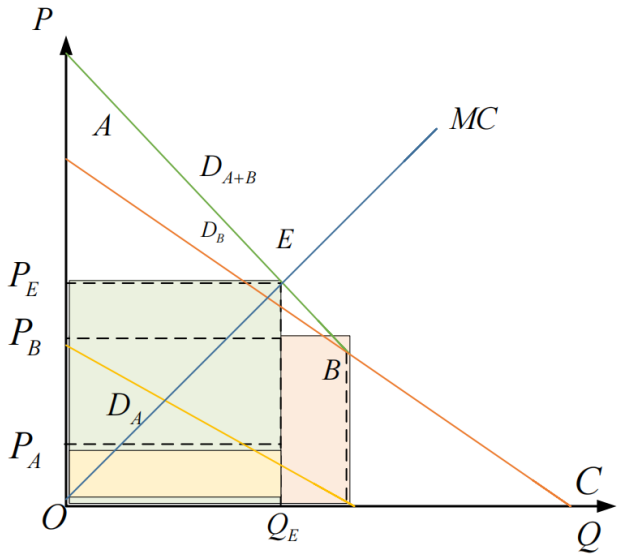

Figure 5 Demand and supply of official languages

Regarding the determination of the official language, previous studies such as political science or sociolinguistics also believed that it needs to be implemented by the state, but its explanatory power is insufficient, and this conclusion can be more reasonable here in economics from the perspective of public goods. explain. Not only that, but Figure 5 also shows that there is an equilibrium quantity for the determination of the official language of a country or region.

4.3 The public goods nature of language promotion

Taking the country as a unit, language promotion includes domestic promotion (including domestic second language education) and international promotion, and its supply belongs to the supply of language education. Different from the supply of official languages, the supply of language education should belong to the supply of quasi-public goods, because it has partial exclusivity of consumption and non-competitiveness of consumption. For example, in the same school or training class, when the quota for the current period is full, those who participate in language education have a relative exclusivity to the latecomers in the current period, but not absolute exclusivity, because the latecomers can accept the following A period of language education. As for the competitiveness of language education consumption, a person's consumption of language education does not affect other people's consumption.

As shown in Figure 6, the horizontal axis represents the private cultural benefit (yp) of language A, and the

vertical axis represents the community cultural benefit (ye), which is also used to describe the private economic benefit (ye) of a common language. OA The curve represents the contribution of yp to yc . Now assume that the common language (non-A language) private economic benefit is equal to yeo . If yp happens to be yco , it can be seen from OA that the cultural benefit of the community is yco . Since $yeo < yco$, the general language does not provide enough economic incentives for people, and people will not change the situation of using language A . The so-called A language survival area is (yeo, yco) . If the private cultural benefit of language and innovation becomes ypl , the community benefit will be ycl , $yeo < yco$, people will give up language A and turn to the common language, and the difference between the two benefits (yeo, yco) is the language assimilation zone. Therefore, the innovative ability of a given language determines the survival or assimilation of the language.

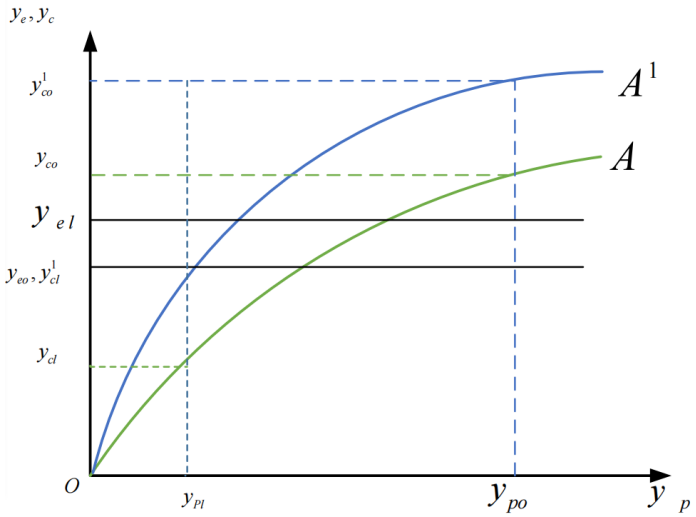

Figure 6 Survival and Assimilation of Languages

Now assume that the externality of the impact of innovation on local cultural dynamism is positive and the sociocultural benefit (ys) exists. OA moves to OA' . At this point the yc value relative to yp will be affected. As shown in the figure, not only has the language living area expanded, from (yeo, yco) to (yco, yeo) , on the contrary, when ypl , $ycl = yeo$, the assimilation zone $(yeo > yco)$ disappears. It is clear that a country or community's support for local language innovation is beneficial for language survival.

For a common language, the more people use it, the greater the potential benefits the language brings to people. Therefore, we abandon the assumption that the private economic benefit of a common language is constant, then its private economic benefit may be an exogenous increase, suppose the graph increases from yeo to yel . It means that the cultural benefits of the community are unchanged, we have $yel > yeo > ycl$, the language assimilation

area expands, and the language survival area decreases. It can be reasoned that the assimilation and survival of language also applies to OA, the curve. More people will be integrated into the noncommon A language[26,27].

Discussion: If the private economic benefit of the common language is fixed at yeo in a certain period, $yeo = yco$ is a critical point, that is, the benefit of a second language (such as common language) is consistent with the original language at this time. On one side of the tipping point, $yeo < yco$, the original language survives, although at this point, all members may be bilingual. But it does not mean that they will take the second step of language assimilation, which is to give up their mother tongue. On the other side of the critical point, $yeo < yco$, people take the second step and language assimilates.

V. CONCLUSION

To sum up, the current economics research on language is only at the level of cognition and has not thoroughly explored the effective measures for its effective provision and reasonable arrangement. Of course, this paper is still based on the existing research results, and reinterprets the economic properties of language from four aspects: non-exclusivity and non-competitiveness, network effects, policy and market failure, and takes the nature of language public goods as an example to discuss the role of language as a public product should pay attention to several problems in the process of supply adjustment and demand, and propose an effective way to rationally arrange the special basic social system of language.

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