The optimal Babel
Efficiency and distributional justice with dynamic preferences applied to language rights*

Bengt-Arne Wickström
Institut für Finanzwissenschaft
Humboldt-Universität zu Berlin
wickstr@wiwi.hu-berlin.de

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Abstract

We analyze the distribution of language rights in a dynamic and multilingual setting. A general model for the analysis of language rights in a dynamic setting is set up. This model is then used to find the efficient allocation of rights. It is shown that when rights today influence the status of a language in the future, the "naive" static analysis has to be augmented in favor of minority rights in order to take into account the dynamic aspect. It is further demonstrated that a traditional welfare-economic analysis goes even further in the support for minority rights. If externalities on other communities are taken into consideration, however, these results are reversed in a pure efficiency analysis. If redistribution arguments are taken into account, this provides an effect in the opposite direction again.
Keywords: equivalence principle, minority rights, changeable preferences, dynamic preferences, welfare economics.

Zusammenfassung

Wir analysieren die Verteilung von Sprachrechten in einer dynamischen und mehrsprachlichen Umgebung. Ein allgemeines Modell für die Analyse sprachlicher Rechte in dynamischen Situationen wird erstellt. Dieses Modell wird benutzt, um die effiziente Allokation von Rechten zu beschreiben. Es wird gezeigt, daß im Falle, daß Rechte heute den Status einer Sprache in der Zukunft beeinflußen, eine "naive" statische Analyse ergänzt werden muß zum Vorteil von Minderheitsrechten, um die dynamische Struktur zu berücksichtigen. Es wird weiter gezeigt, daß die Ergebnisse einer traditionellen Wohlfahrtsanalyse noch weiter in der Unterstützung von Minderheitsrechten gehen. Wenn Externalitäten auf andere Gemeinde berücksichtigt werden, werden diese Ergebnisse in einer reinen Effizienanalyse jedoch reversiert. Umverteilungsargumente bringen wieder eine Wirkung in die Gegenrichtung.

Resumo

Ni analizas la distribuon de lingvaj rajtoj en dinamika kaj multlingva ĉirkaŭaĵo. Ĝenerala modelo por la analizo de lingvorajtoj en dinamika situacio prezentiĝas. La modelo uzatas por karakterizi efikajn rajtojn. Ni montras, ke en la kazo kiam rajtoj hodiaŭ influas la statuson de lingvo en la estonteco, la rezultoj de la "naiva" statika analizo pro la dinamika eco de la modelo devas ŝanĝiĝi

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en la direkto de pli fortaj rajtoj por la malplimulto. Krome montriĝas, ke tradicia bonfarta teorio postulas eĉ pli grandan subtenon de malplimultrajtoj. Eksteraj influoj sur aliaj komunumoj tamen renversas tiujn konkludojn en pura efikecanalizo. Redistribuaj deziroj aliflanke signifas kontraŭan efikon.

Ἐν ἀρχῇ ἦν ὁ λόγος
Ἰωάννης, 1:1

1 Introduction

Language is certainly the most important means of communication in all human societies. At the same time, language is one of the most important aspects of an individual's personality, as well as its social and cultural identity. These two aspects of language often find themselves in conflict with one another. One the one hand, network externality properties of the communication aspect implies that the greater is the number of speakers of a certain language, the more useful is that language in communication and in the limit it would be efficient to have only one single language for communication.

Balancing this tendency is the desire of many individuals to preserve their language as a marker of identity. In a static perspective, language, like talents and other personal characteristics, can be seen as part of the definition, or initial endowment, of the individual. In a dynamic setting, we have to distinguish between dynamics within a generation and between generations. Of course, an individual can over its life span change its language, or acquire additional idioms. However, the more drastic changes occur between generation, where a language shift often happens over three generations: the grand-parents are unilingual in one language, their children grow up bilingual and their grand-children unilingual in the second language.

The survival of a language, if it is implanted in the next generation or not, depends on many factors, one of which is the status of the language in society. This status is influenced by, among other things, the possibilities to use the language in various social areas, domains. Whether a language receives an official status or not, is very often a political issue, and it is an instrument used by majorities to control and exploit ethnic minorities. One can also, however, look at the problem from a constitutional or normative perspective.

One may look for an acceptable allocation of rights, where the choice of rights for minorities is based on individual preferences and (fictional) improvements on some initial situation – the equivalence-principle approach – or where the choice is governed by some normative paternalistic principles – welfare approach. These approaches may or may not consider the effects on other external communities.

In this essay the dynamic aspect of assigning rights is tied together with these views. We first set up a formal dynamic model of language evolution in section 2.1 and then specify this model in section 3, in order to analyze first the equivalence-principle approach in section 3.1.1. We then in section 3.2 show that this approach causes negative externalities outside of the ethnic community. Finally, in section 4, it is demonstrated that in a paternalistic welfare model of justice these externalities are relativized.

2 Language and the allocation of rights

One can distinguish between various characteristics of the goods enjoyed by the individuals of a society. One such subdivision is between individually consumed (or private) goods and collectively available (or public) goods. The actual use of a language is of course an individual matter, giving benefits to the individual using it.[1] Whether a person chooses to use a certain language or not in a given situation, will

[1] Of course, one person's use of a language might very well affect the well-being of the person it is talking to, or might want to speak with, producing an externality, be it positive or negative. The larger is the number of speakers of a language,

to a large extent depend upon the constraints it is facing. One important constraint is, of course, whether one is understood or not and manages to communicate. This can partially be determined by legal rights, forcing, for instance, public offices to accept the use of certain languages in doing official business. Such rights to communication in a certain language are public goods, available to all individuals to the same extent. Unlike many other rights, like the right to smoke in public places versus the right to enjoy fresh air at the same location, the right to use a certain language in a given setting is a non-exclusive right that does not prevent the right to use another language in the same setting: my right to communicate with (and get answers from) a public office in Tok Pisin, say, does not infringe on your right to use Volapük in doing your business with the same office.

Here we are focusing on these legal rights and not on all the other possibilities to use a language outside the public sector. The latter possibilities are, of course, determined primarily by the number of speakers, but also by other factors, such as the domain in which a certain interaction takes place. In a comprehensive analysis of language rights and justice also these aspects would have to be taken into account.[2] In this essay, however, we limit the analysis to formal legal rights.

2.1 The basic model

2.1.1 Benefits and costs

An individual i is born into society at a certain time and lives two periods. In the first period it is socialized into a certain language l. Official language rights are legally specified in various domains d. That is, for each language we have a list of legally defined domains, where the language has an official status. The right to use a certain language in a certain domain is valuable to the individuals. The propensity of individual i to pay for the right to use language l in domain d is written b^{ild}. This is, of course, only well-defined in relation to a *status quo*. We take as our bench mark that there are no rights in effect in *status quo*.

The right to be able to use a certain language in a certain situation, can be looked upon as a non-rival good. The "demand" or propensity to pay for this good will vary over the individuals. The sum of all individuals' propensities to pay will give society's total propensity to pay for this specific right. Of course, the propensity to pay will depend (directly or indirectly) on a number of exogenous factors such as income and prices, but also the availability of other language rights will enter the demand for any specific right to use a certain language.[3]

There are, of course, costs to society in providing these rights. Let c^{ld} be the costs to society of giving official status to language l in domain d. These costs will also depend on a number of factors, most notably on the number of speakers of language l.

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the greater is the potential number of contacts and, hence, the benefit of the language to a person knowing it. This net-work externality is central in the analysis of the long-term dynamics and equilibria of language as a means of communication. This is analyzed by, among others, Selten and Pool (1991), Church and King (1993), as well as Güth, Strobel and Wickström (1997), who look at the benefits of learning other languages in addition to the mother tongue, and Wickström (2005), where the survival of communities of native speakers is analyzed. The present analysis treats this aspect as part of the set of the exogenous constraints facing the individual and is, hence, a possible factor influencing its propensity to pay for a certain language right.

[2] For more general analyses in this direction, the reader is referred to, for instance, Kymlicka and Patten (2003) and the references therein. For a more formal analysis, see also Van Parijs (2002), as well as the contribution of the same author in Kymlicka and Patten (2003).

[3] The latter point can be partially operationalized as the "linguistic distance" between the languages. See, for instance, the analysis in Ginsburgh, Ortuño Ortín and Weber (2005) or Fidrmuc, Ginsburgh and Weber (2005). These authors use such a distance as a measure of disenfranchisement. However, the propensity to pay in general will depend on other factors as well. Especially the emotional attachment to the language seems to be important. Compare, for instance, the situation in Wales, where virtually every Welch-speaker is bilingual in English, too – see, for instance, the statistic in Grin (1992) – or in the Basque country, where almost all speakers of Basque are bilingual in French or Spanish. Nevertheless, the propensity to pay for an official status of the respective language seems to be considerable among its speakers.

2.1.2 Dynamic structure

It is reasonable to assume that the rights given to language l in period t influence the status of that language in that period and, hence, the choice of language of the next generation. That is, the number of individuals speaking language l in period $t+1$ is partially determined by the rights given to that language in period t.[4] In addition, the distribution of the individuals on the different language groups will also influence the size of the groups in the next cohort. That is, the distribution of the next cohort on the language groups is determined by the allocation of rights as well as the size of the language groups. The more rights language l has today, the more speakers it will have tomorrow.

This is the crucial assumption of the model.

2.1.3 Efficiency

The simplest criterion for efficiency is that the benefits of a policy exceed the costs. That simply means that the sum of the individual propensities to pay for a right be greater than the costs of the introduction of this right:

$$\sum_i b^{ild} \geq c^{ld} \tag{2.1}$$

If that is true, then one could in principle demand a contribution θ^{ild} from each individual, such that

$$\theta^{ild} \leq b^{ild} \tag{2.2}$$

and

$$\sum_i \theta^{ild} = c^{ld}. \tag{2.3}$$

That is, the contributions would pay the costs and no individual would pay more than what the right is worth to him. The introduction of the right would be voluntary and, hence, an improvement to society.

As a rule, such individualized contributions are not feasible, and the costs of the rights would be financed over a general tax t^{ld} which is the same for all individuals. For some individuals the tax would be higher than the propensity to pay; they are losers. For others the tax would be less than the propensity to pay; those are winners. However, as we saw above, the winners could in principle compensate the losers and the situation is potentially voluntary and, hence, efficient.

3 An example

In order to simplify the analysis, we will concentrate on a simple example. In spite of its simplicity, the example suffices for our purposes in this essay. We limit ourselves to two languages and two language groups, A and B. An individual i belongs to either group. Group A is the majority and B the minority, and we analyze the efficiency of providing full rights to the minority language in only one domain, denoted by $r^B = 1$, if the right is granted and $r^B = 0$, if it is not. Assuming "selfish" preferences, we let the propensity to pay for this right be $b^i = 0$, if i is in group A, and $b^i > 0$, if i is in group B. Let the size of the two groups be n^A and n^B, respectively, and the cost of providing the right, $c\left(n^B\right)$. The function c is assumed to be concave.[5]

[4] The long run effects of certain allocation of language rights would be part of the "emotional" aspect in determining the propensities to pay. The designation of certain languages as "official" in given domains gives them a higher status, which reduces the incentives of following generations to use the non-official ones, reducing the number of speakers. This can also lead to a situation of diglossia where the domains of the official language are constantly extended at costs of non-official languages. This, in turn, would give the speakers of the official language a head start. In the long run, it might even lead to the death of non-official languages. For a further discussion of this possibility, see Wickström (2005).

[5] For various assumptions on this function, see Wickström (2007).

It will now be efficient to provide the right if

$$\sum_{i\in B} b^i - c\left(n^B\right) > 0. \tag{3.1}$$

We can rewrite this condition as

$$b^B - \frac{c\left(n^B\right)}{n^B} > 0, \tag{3.2}$$

where b^B is the average propensity of the B individuals to pay for the right.

Since an individual lives over two periods and the lives of the generations overlap, the problem is slightly more complex. In period t there will be both young and old individuals in the two groups. Let the sizes of the different groups be n^{A0} and n^{A1} as well as n^{B0} and n^{B1}. We will further denote by $n^B := n^{B0} + n^{B1}$ the total number of individuals of type B alive in period t and correspondingly for type A. Further, we denote the propensities to pay for individuals alive in period t by b^{i0} and b^{i1}. The average propensities are defined as

$$\begin{aligned} b^{B0} &: = \frac{1}{n^{B0}} \sum_{i\in B} b^{i0} \\ b^{B1} &: = \frac{1}{n^{B1}} \sum_{i\in B} b^{i1} \\ b^{B} &: = \frac{1}{n^{B1}+n^{B0}} \left(\sum_{i\in B} b^{i1} + \sum_{i\in B} b^{i0} \right). \end{aligned} \tag{3.3}$$

The total discounted aggregated net propensity to pay, S^B, for the right now becomes

$$\begin{aligned} S^B &= \sum_{t=0}^{\infty} \delta^t \left[n_t^{B1} b_t^{B1} + n_t^{B0} b_t^{B0} \right] r_t^B - \sum_{t=0}^{\infty} \delta^t c\left(n_t^{B0} + n_t^{B1} \right) r_t^B \\ &= \sum_{t=0}^{\infty} \delta^t n_t^B r_t^B \left(b_t^B - \frac{c\left(n_t^B\right)}{n_t^B} \right), \end{aligned} \tag{3.4}$$

where $\delta \leq 1$ is a discount factor, and the dynamics of n^B is given by

$$n_{t+1}^{B0} = g\left(r_t^B, n_t^{B0}\right), \tag{3.5}$$

with

$$\begin{aligned} g\left(1, n_t^{B0}\right) &> g\left(0, n_t^{B0}\right) \\ \frac{\partial g\left(r_t^B, n_t^{B0}\right)}{\partial n_t^{B0}} &> 0 \end{aligned} \tag{3.6}$$

or

$$n_{t+1}^B = n_{t+1}^{B0} + n_{t+1}^{B1} = g\left(r_t^B, n_t^{B0}\right) + n_t^{B0} =: h\left(r_t^B, n_t^{B0}\right). \tag{3.7}$$

The problem of finding an optimal allocation of rights, that is finding a sequence of r_t^B that is efficient, can be divided into several cases. We can see it from the point of view of all, present and future, B individuals or from the point of view of only the B individuals alive in period t. We can also consider the effect on the A individuals, that is possible external effects due to the introduction of the right for language B.

3.1 Group-internal considerations

If only the interests of the group are taken into consideration, there are two basic views to consider. Either only the individuals alive at a certain time are to be counted in the decisions. This can be seen as close to a positive analysis and is in the tradition of the equivalence principle. It is not unreasonable to assume that individuals will seek institutional setups leading to efficient allocations. This is a question asked in constitutional economics and it has its roots in Wixell. A more normative point of view takes also unborn generations into account. We will see that the results then can differ from the more egocentric view.

3.1.1 Cohort-centered analysis

The total aggregated propensity to pay for the right for language B at time t and $t+1$ of the individuals living at time t, that is the gross benefit of the right being in effect in periods t and $t+1$ to the individuals alive at time t, is now

$$\sum_{i\in B} b_{t-1}^{i1} + \sum_{i\in B} b_t^{i0} + \delta \sum_{i\in B} b_t^{i1} = n_t^{B1} b_t^{B1} + n_t^{B0} b_t^{B0} + \delta n_{t+1}^{B1} b_{t+1}^{B1} = n_t^B b_t^B + \delta n_{t+1}^{B1} b_{t+1}^{B1}, \tag{3.8}$$

The cost of providing the right at time t is $c\left(n_t^{B1} + n_t^{B0}\right) = c\left(n_t^B\right)$ and at time $t+1$, $c\left(n_{t+1}^{B1} + n_{t+1}^{B0}\right) = c\left(n_{t+1}^B\right)$; from the latter costs, however, the propensities to pay of the next generation alive in period $t+1$ have to be subtracted. From the point of view of the individuals living in period t, the cost-benefit calculation, equation 3.4, hence, becomes

$$\begin{aligned} S_t^B &= n_t^B b_t^B r_t^B + \delta n_{t+1}^{B1} b_{t+1}^{B1} r_{t+1}^B - \left\{ c\left(n_t^B\right) r_t^B + \delta \left[c\left(n_{t+1}^B\right) - n_{t+1}^{B0} b_{t+1}^{B0} \right] r_{t+1}^B \right\} \\ &= n_t^B \left(b_t^B - \frac{c\left(n_t^B\right)}{n_t^B} \right) r_t^B + \delta h\left(r_t^B, n_t^{B0}\right) \left(b_{t+1}^B - \frac{c\left[h\left(r_t^B, n_t^{B0}\right)\right]}{h\left(r_t^B, n_t^{B0}\right)} \right) r_{t+1}^B. \end{aligned} \tag{3.9}$$

It is efficient to have the right in effect at time t if this maximizes S_t^B and makes it positive. That is,

$$\begin{aligned} S_t^B &= n_t^B \left(b_t^B - \frac{c\left(n_t^B\right)}{n_t^B} \right) + \delta h\left(1, n_t^{B0}\right) \left(b_{t+1}^B - \frac{c\left[h\left(1, n_t^{B0}\right)\right]}{h\left(1, n_t^{B0}\right)} \right) r_{t+1}^B > 0 \\ \Delta S_t^B &= n_t^B \left(b_t^B - \frac{c\left(n_t^B\right)}{n_t^B} \right) + \delta \Delta n_{t+1}^B \left[\left(b_{t+1}^B - \frac{c\left(n_{t+1}^B\right)}{n_{t+1}^B} \right) - n_t^B \frac{\partial}{\partial n_{t+1}^B} \left(\frac{c\left(n_{t+1}^B\right)}{n_{t+1}^B} \right) \right] r_{t+1}^B > 0, \end{aligned} \tag{3.10}$$

where $\Delta n_{t+1}^B := h\left(1, n_t^{B0}\right) - h\left(0, n_t^{B0}\right)$. First we note, that if one expects r_{t+1}^B to be zero, the criterion reduces to the static one. If one expects r_{t+1}^B to be equal to one, the static criterion changes through the addition of a second term. The sign of the first expression in the square brackets is undetermined, but the second expression is positive due to the concavity of the cost function. We first analyze the steady state of the process.

Steady state A steady state, $n^B\left(r^B\right)$, is given by

$$n^B\left(r^B\right) = h\left[r^B, n^{B0}\left(r^B\right)\right], \tag{3.11}$$

and it is clear from our previous discussion that

$$n^B(1) > n^B(0). \tag{3.12}$$

The expressions above now reduce to

$$S^B = (1+\delta)\, n^B(1) \left(b^B - \frac{c\left[n^B(1)\right]}{n^B(1)} \right) > 0 \tag{3.13}$$

for an efficient $r^B = 1$, and

$$S^B = (1+\delta)\, n^B(0) \left(b^B - \frac{c\left[n^B(0)\right]}{n^B(0)} \right) < 0 \tag{3.14}$$

for an efficient $r^B = 0$. Since the cost function is concave, it is possible that b^B lies between the average costs of the two possible steady states:

$$\frac{c\left(n^B(0)\right)}{n^B(0)} > b^B > \frac{c\left(n^B(1)\right)}{n^B(1)} \tag{3.15}$$

In this case, both the introduction of the right, $r^B = 1$, and its non-introduction, $r^B = 0$, could be efficient in the dynamic analysis if the influence of the right on n^B is small enough. That is, the dynamic process and the optimal sequence of r^B's can be path dependent.

Dynamics with high propensities to pay In order to analyze equation 3.10, we have to distinguish several different cases. We assume that the average propensities to pay stay constant and start with the case when

$$b^B > \frac{c\left[n^B(0)\right]}{n^B(0)} > \frac{c\left[n^B(1)\right]}{n^B(1)}. \tag{3.16}$$

The interesting starting point is one with a rather small initial $n_t^B < n^B(0)$, such that $c\left(n_t^B\right)/n_t^B > b^B$. It will then be increasing over time and hence

$$b^B - \frac{c\left(n_t^B\right)}{n_t^B} < b^B - \frac{c\left[h\left(1, n_t^{B0}\right)\right]}{h\left(1, n_t^{B0}\right)} \tag{3.17}$$

for all t. As time goes on, the second term of S_t^B in 3.10 will change from negative to positive before the first term becomes positive under the assumption that the right will stay in effect in the following period. Similarly the square brackets in the expression for ΔS_t^B will turn positive before the first term. However, by induction it is clear that if it is efficient to introduce the right in period t, it will also be efficient to retain it in period $t+1$. That is, due to the dynamic structure and the status effect of the overlapping generations, it will become efficient to introduce the right earlier than what would come out of a static analysis.[6]

Medium propensities to pay We now turn to the case when

$$\frac{c\left[n^B(0)\right]}{n^B(0)} > b^B > \frac{c\left[n^B(1)\right]}{n^B(1)}. \tag{3.18}$$

Here, starting with a small B community, according to the static criterion the introduction of the right would not be efficient. In the dynamic analysis, it would be efficient if, with $r_{t+1}^B = 1$, for n_t^B sufficiently close to $n^B(0)$, S_t^B and ΔS_t^B become positive.

[6] Because of the discrete time modeled here, we, of course, cannot exclude the possibility that as the second term turns positive also the first term becomes positive. In continuous time this would not happen though and the statement in the text is true in general.

Low propensities to pay Finally, if

$$\frac{c\left[n^B(0)\right]}{n^B(0)} > \frac{c\left[n^B(1)\right]}{n^B(1)} > b^B, \tag{3.19}$$

the interesting case is one with a big initial $n_t^B > n^B(1)$, such that $c\left(n_t^B\right)/n_t^B < b^B$. As long as n_t^B is big enough it is efficient to provide the right. As it decreases over time, the decision-making cohorts will consider the net benefits of abolishing the right. The decision-making cohorts in period t have to make predictions about the existence of the right in period $t+1$. Either one predicts that the right will not be in effect in period $t+1$ independently of the decision in period t or since the abolishment of the right will decrease the size of the next B generation and hence the propensity to pay, or one predicts that the abolishment of the right in period t also makes the right in period $t+1$ inefficient; that is, the abolishment of the right today forces its abolishment tomorrow, too. In the former case the intertemporal structure becomes irrelevant and the static decision criterion is valid. In the second case, the net benefit of keeping the right in period t becomes

$$S_t^B = n_t^B\left(b_t^B - \frac{c\left(n_t^B\right)}{n_t^B}\right) + \delta h\left(1, n_t^{B0}\right)\left(b_{t+1}^B - \frac{c\left[h\left(1, n_t^{B0}\right)\right]}{h\left(1, n_t^{B0}\right)}\right). \tag{3.20}$$

Since n_t^B is decreasing over time, the expression in parenthesis in the second term is smaller than the one in the first term. That is, if the second term is negative, S_{t+1}^B will also become negative and as a consequence r_{t+1}^B will be set equal to zero. This approach is, hence, inconsistent, and the only relevant efficiency criterion is the static one.

3.1.2 Intergenerational efficiency

If we treat all future generations equally, the relevant net future benefits are given by expression 3.4:

$$\begin{aligned} S_t^B &= \sum_{\tau=t}^{\infty} \delta^{\tau-t} r_\tau^B n_\tau^B \left(b_\tau^B - \frac{c\left(n_\tau^B\right)}{n_\tau^B}\right) \\ &= r_t^B n_t^B \left(b_t^B - \frac{c\left(n_t^B\right)}{n_t^B}\right) + \sum_{\tau=t+1}^{\infty} \delta^{\tau-t} r_\tau^B n_\tau^B \left(b_\tau^B - \frac{c\left(n_\tau^B\right)}{n_\tau^B}\right) \end{aligned} \tag{3.21}$$

In comparison to the analysis in section 3.1.1, we see that the correction due to the intertemporal structure has increased, since not only the net benefits of the individuals in the B group alive at time t count, but the benefits of all future generations are also calculated. The same holds for ΔS_t^B. We can, hence, conclude that in the case of high propensities to pay with a growing number of B individuals the introduction of the right should happen even earlier than in the cohort centered analysis. In the case of a decline in language B, the decision about the abolishment of the right should be based on the static criterion.

Steady state We can also find the steady-states conditions, which do not differ from the cohort-centered case

$$S^B = \frac{1}{1-\delta} n^B(1)\left(b_\tau^B - \frac{c\left[n^B(1)\right]}{n^B(1)}\right) > 0 \tag{3.22}$$

for the optimal r^B to be equal to one and

$$S^B = \frac{1}{1-\delta} n^B(0)\left(b_\tau^B - \frac{c\left[n^B(0)\right]}{n^B(0)}\right) < 0 \tag{3.23}$$

for the optimal r^B to be zero. Again, path dependency is a possibility.

3.1.3 Discussion

The simple analysis in this section has demonstrated that the simple static criterion for determining the optimal allocation of language rights tends to underestimate the net benefits of the right to the speech community. We have here discussed only the right in one specific domain. However, there are in general several domains and the net benefits of various rights can be ordered from the most desirable to the least. Any decision criterion will then divide the potential rights into two sets, those that are to be realized and those whose net benefits are not big enough. What our analysis tells us, is that a static analysis of the net benefits will lead to a to small set of realized rights, since the status effect on the language of the introduction of the right would not be sufficiently accounted for. *In nuce*, it is efficient from the point of view of a language community to introduce rights that go beyond the instantaneous cost-benefit calculations.

3.2 Global considerations

In addition to the effects analyzed above, there is also an effect on the A group due to the increase in the B group in period $t+1$ and later. We here only look at the cohort-centered analysis. the other cases are straight-forward extensions. If a right is introduced in period t and, as a consequence, the B group increases by $\Delta n_{t+1}^{B0} := h\left(1, n_t^{B0}\right) - h\left(0, n_t^{B0}\right)$ in the subsequent period, then, by constant cohort size, the size of the next A generation, n_{t+1}^{A0}, will decrease by Δn_{t+1}^{B0} and the aggregated propensity to pay for the right of language A in the next generation will decrease. In the cost-benefit calculus in the cohort-centered analysis, the young individuals in period t will hence suffer a loss in period $t+1$, giving us a total aggregated (negative) gain to the A individuals alive in period t equal to

$$\Delta S_t^A = \delta\left[c'\left(n_{t+1}^A\right) - b_{t+1}^{A0}\right]\Delta n_{t+1}^{B0}. \tag{3.24}$$

This loss would in a global analysis have to be compared to the gain to the B community:

$$\Delta S_t^B = n_t^B\left(b_t^B - \frac{c\left(n_t^B\right)}{n_t^B}\right) - \delta\left[c'\left(n_{t+1}^B\right) - b_{t+1}^{B0}\right]\Delta n_{t+1}^{B0} \tag{3.25}$$

This gives us the change in net benefit due to the right for both communities:

$$\Delta S_t^A + \Delta S_t^B = n_t^B\left(b_t^B - \frac{c\left(n_t^B\right)}{n_t^B}\right) + \delta\left\{\overbrace{\left[c'\left(n_{t+1}^A\right) - c'\left(n_{t+1}^B\right)\right]}^{-} + \left(b_{t+1}^{B0} - b_{t+1}^{A0}\right)\right\}\Delta n_{t+1}^{B0} \tag{3.26}$$

Since *ex hypothesi* $n_{t+1}^B < n_{t+1}^A$ and c is concave, the loss to the A community due to the intertemporal effect is greater then the gain to the B group, unless the average propensity to pay in the B group is significantly larger than in the A group. That is, the introduction of the right for language B causes a negative externality to be imposed on the A community. In a global analysis of efficiency, we hence would have to reverse the conclusions in the previous section. It is efficient to introduce less minority rights than what a simple instantaneous analysis would imply. We can find an "efficient discrimination" of minorities.

4 Rights and fairness

The liberal theory of justice, also referred to as justice as fairness, basically takes the position that in making normative judgments, an individual should abstract from its own position in society in order to determine what are a just allocations of the resources of a society. This way of thinking goes back at

least as far as antiquity. In Plato (ca. -395) Socrates uses such an argument to justify to Crito why he would not be prepared to leave Athens even in the face of imminent execution. In modern times, Rawls (1971) has become the standard reference in the moral philosophy applied to the social sciences.

In the case of non-exclusive rights, like the right to use a language of one's choice, one can chose a *status quo* where each individual has the same right in relation to a language of its choice and then allow voluntary interchanges in the form of side payments for less rights. This would be in the spirit of fairness. The choice of a *status quo* with equal rights in this sense, however, is not quite obvious and different choices have different implications.[7]

In this essay, we will take as our *status quo* the absence of all rights and as a first best optimum define compensation payments according to expression 2.2. If such payments are possible and realized, a first-best optimum is realized, under the condition that all the externalities discussed in section 3 are accounted for.

The problem becomes interesting, however, when certain compensation payments are impossible, restricted for instance to a general tax.

4.1 Welfare-optimal allocations of rights

Returning to the problem in section 3.2, we have to modify the efficiency analysis and introduce some welfare criterion. A common criterion is to give weights to individuals that vary inversely with their benefits. That is, a Euro given to a poor person is worth more than a Euro given to a rich person. Let the effect of a policy on an individual be given by a^i. then the change in welfare is given by

$$\Delta W = \sum_i \beta\left(a^i\right) a^i, \tag{4.1}$$

where the exogenously given policy variables are decreasing functions of a^i.

Assuming that the costs of the rights are distributed equally within the language communities but that there is no transfer between them, we find the average gains and losses to the members of the two communities, a^A and a^B,

$$\begin{aligned} a_t^A &= b_t^A - \frac{c\left(n_t^A\right)}{n_t^A} > 0 \\ a_t^B &= b_t^B - \frac{c\left(n_t^B\right)}{n_t^B}, \end{aligned} \tag{4.2}$$

if the minority right is in effect at time t. Since *ex hypothesi* $n_t^A > n_t^B$, it follows that $a^A > a^B$ and in the case of redistribution in favor of the losers, $\beta^A < \beta^B$. Evaluation of the introduction of the right in period t in the cohort-centered case, one has to compare the welfare value with and without the right:

$$\Delta W = \beta^B n_t^B \left(b_t^B - \frac{c\left(n_t^B\right)}{n_t^B}\right) + \delta\left\{\beta^A\left[c'\left(n_{t+1}^A\right) - b_{t+1}^{A0}\right] - \beta^B\left[c'\left(n_{t+1}^B\right) - b_{t+1}^{B0}\right]\right\}\Delta n_{t+1}^{B0} \tag{4.3}$$

This would have to be positive for the introduction of the right to be socially optimal.

Depending on the choice of the policy parameters β, the intertemporal effect, the second term, can become positive or negative. If the β's are equal, we have the pure efficiency case, equation 3.26:

$$\Delta W = \beta\left[n_t^B\left(b_t^B - \frac{c\left(n_t^B\right)}{n_t^B}\right) + \delta\left[c'\left(n_{t+1}^A\right) - c'\left(n_{t+1}^B\right) + b_{t+1}^{B0} - b_{t+1}^{A0}\right]\Delta n_{t+1}^{B0}\right] \tag{4.4}$$

[7] This is discussed in detail in Wickström (2007).

In the case of extreme redistributive preferences of the planner, $\beta^A = 0$, only the partial efficiency analysis of the B community contributes to the decision, equation 3.10:

$$\Delta W = \beta^B \left[n_t^B \left(b_t^B - \frac{c\left(n_t^B\right)}{n_t^B} \right) + \delta \left[b_{t+1}^{B0} - c'\left(n_{t+1}^B\right) \right] \Delta n_{t+1}^{B0} \right] \tag{4.5}$$

This brings us back to the situation, where minority rights should be stronger than what is implied by a static analysis.

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