

# ECOLOGY AND DIVERSITY: A COMPARATIVE TRIP FROM BIOLOGY TO LINGUISTICS\*

## 1. Introduction

As the new century begins, humanity can approach the question of preserving both biological and linguistic diversity with a certain unity of purpose. Today there is a widespread awareness that many animal and plant species are threatened by extinction, and a growing realization as well, that many of the linguistic varieties that our species has developed throughout its history are in danger of disappearing. Given the simultaneous nature of these two large-scale phenomena and the apparent coincidences of the processes at work, it is tempting to conceptualize them together.

Though a firm believer in transdisciplinarity and the mutual nurturing of knowledge, I am nonetheless aware that an uncritical transfer of ideas and concepts from one field to another is unacceptable. We should be particularly careful to avert the danger of a biological reification of linguistics, something which this discipline has not always been able to avoid. Nevertheless, as the physicist David Bohm said, "a theory is primarily a form of *insight*, i.e. a way of looking at the world, and not a form of *knowledge* of how the world is". There is room then for creativity in our images and

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models of reality, and maybe transdisciplinary exploration can be suggestive and useful, and push our views towards the integration claimed by Wilson's idea of 'consiliency' (1998).

One of our first tasks is to define the differences between the objects that concern us. On the one hand, we have biological species, sets of organisms that belong to 'nature'; on the other, we have linguistic varieties, that consist of established socio-communicative codes and behaviours of human beings, ascribable, therefore, to the ambit of 'culture'. On one side, we have genetic organization and biological development, and on the other, cerebral cognition and interpersonal and social behaviours which in fact are the products of the ways in which we experience our genetic and biological endowments. So our objects of study are 'integrated' into the organisms themselves and into their interactions, though they correspond to different levels and probably require different theoretical representations to give a full account of their peculiarities (see Bastardas, 2002b).

This paper briefly presents the preliminary results of an exercise in reading certain contributions to the study of biological diversity from a 'linguistic' viewpoint. Never overlooking for one moment the differences between the objects, we have nonetheless tried to extract theoretical and conceptual analogies that may contribute to the construction of a socio-ecology or a linguo-ecology, thereby advancing, where possible, the perspective started by Mackey (1979, 1980, 1994) and a few others. This brief report of the study is provisional and exploratory and tries to generate debate. Its aim is to be a stimulus for thought, imagination and creativity.

## 2. The Formation of Diversity

A brief look at some of the questions and fields for research that have been revealed – or re-emphasized – by the study of biodiversity will make linguists immediately aware of the problem of the *formation* of diversity. We see this diversity all around us; we believe we should try to preserve it; but how did it emerge? What implications do the ideas and concepts of biodiversity have for the understanding of the formation of linguodiversity?

One of the most frequently noted causes of biodiversity is the genetic isolation of a particular type of organism:

Each biological species is a closed gene pool, an assemblage of organisms that does not exchange genes with other species. Thus insulated, it evolves diagnostic hereditary traits and comes to occupy a unique geographic range or habitus. Within the species, particular individuals and their descendants cannot diverge very far from others, because they must reproduce sexually, mingling their genes with those of other families (Wilson, 1994: 38).

This characteristic of isolation or the absence of interrelations that helps in the development of biodiversity is also present in the formation of linguodiversity. Just as "reproductive isolation between breeding populations is the point of no return in the creation of biological diversity" (Wilson, 1994: 46), if a fluid, relatively large-scale communication is not maintained, parts of linguistic groups of the same origin evolve in different ways, and increasingly grow away from possible innovations that the original nucleus may produce. In the long term, the various structural differences may become so widespread that mutual comprehension is no longer possible; the codes are experienced as totally distinct, unrelated objects. Geographical distribution of populations has a fundamental influence on the understanding of the production and existence of diversity. As Margalef says, in ecology "the importance of space should not be ignored" (1991: 174), because it "functions as an insulator (...) [and so] the relations may be limited to species whose individuals live in close proximity" (1991: 209).

Thus, 'linguistic speciation', like its biological counterpart, is based on geographical speciation. On the basis of the property of autopoiesis (self-organization), the reproductive isolation of a group favors the development of varieties of communication that are specific to each human subset; over successive generations these forms of communication have evolved dynamically to produce more historical diversity. As Capra states, "the theory of autopoiesis shows that creativity – the generation of configurations that are constantly new – is a key property of all living systems. A special form of this creativity is the generation of diversity through reproduction (...)" (1997: 216). This phenomenon, needless to say, is still alive today. The linguistic evolution of humanity is not a closed, finished process. It is in constant flux; the directions it takes are totally unpredictable.

## 3. Continuity

Once the diversity of the linguistic expressions of the species is created and spreads to the four corners of the planet, its continuity will be closely linked to the fortunes of particular bio-socio-cultural habitats and contexts. Linguistic varieties are likely to endure if there is a high level of intragroup relations and a low level of intergroup relations. As Wilson acknowledges, "the outright elimination of habitat (...) is the leading cause of extinction. But the introduction of aggressive exotic species (...) is a second cause of breakdown" (1998: 328). Similarly, in the linguistic field, while human groups live in a habitat without the presence of other linguistic forms that can compete with their own, the continuity of these varieties is guaranteed –

except for evolutionary modifications which may emerge inside the group. Without contact with other languages, basic permanence is a natural, inevitable fact. The intergenerational reproduction of linguistic forms is achieved via the process of socialization, though the auto-co-construction of speech varieties by members of the new generation may enable them to introduce some limited degree of innovation.

In the understanding of biological continuity a key role is played by the concept of 'ecological niche'. Centred then on the species – and not so much on the ecosystem – the concept of 'ecological niche' allows us to imagine the minimal contextual conditions required for a particular linguistic group to achieve sustainable continuity in a framework of linguistic contact. In addition, the accurate multidimensional conceptualization of this term by ecologists can be transferred to the linguistic domain, so that we can thereby study together "the combined effects of many variables on a single species over a long period of time or over the entire geographic range", since "abiotic conditions, competition, and predation all play important roles in limiting the local distribution of this species" (Brown, 1995: 32).

What environmental conditions do linguistic varieties require to achieve their continuity? What is the minimal ecological niche that a particular language needs in order to ensure its permanence and reproduction? In the domain of linguistic behaviour, the maintenance of linguistic varieties depends above all on the use their speakers make of them in time and space. And this use corresponds to social conventions that are adopted within the context of a particular socio-politico-economic situation as well as particular cognitive representations that rationalize, 'explain' and justify the behavioural decisions taken.

Once it is established that in situations of more or less irreversible linguistic contact the individuals present different levels of bi- or multilingualization, the key element is the societal distribution of functions of the languages involved, and the historical evolution of this distribution. Since, as the ecologists say, "stability at all levels is not a requirement for persistence, for only one stable level of organization is necessary" (Allen & H., 1992: 222), we should explore carefully Mackey's idea of 'exclusive functions' for codes which are in situations of close contact with others and are in danger of falling into disuse. Some situations, in Africa for example (though there are cases in Europe as well), show that a population that is functionally bi- or multilingual does not necessarily lose the use of its own language. This seems to happen in human groups able to maintain a clear functional distribution that assigns 'exclusive functions' to the code, that is the language of the society in question (vid. Bastardas, 1997).

#### 4. Change

If biodiversity presents variations during its evolution, linguodiversity presents even more variations. The forms of diversity present at a particular moment of history are not eternally fixed, since both forms of diversity live and reproduce – totally or partially – within the dynamic of ecological succession. These diversities will vary then not only in terms of time but also in terms of space, since populations and communities undergo quantitative and qualitative changes in their compositions, processes of expansion and processes of contraction (Flos & Gutiérrez, 1995: 194).

Evolutionary change, therefore, is seen from the ecosystemic perspective as "the result of life's inherent tendency to create novelty, which may or may not be accompanied by adaptation to changing environmental conditions" (Capra, 1997: 221), since "evolution is not just tinkering... It is emergent order, honoured and honed by selection", as Stuart Kauffman said (quoted by Capra, 1997: 221). Similarly for language, change and stability coexist in a continuous and interrelated flow, through the incessant 'linguaging' of human beings, which can be innovated autopoietically and/or organized adaptively to the various situations and configurations that humans experience.

So, in biological diversity, "all forms of life have emerged from that ancestry by a continuous process of variations throughout billions of years of geological history. In this evolutionary process many more variations are produced than can possibly survive, and thus many individuals are weeded out by natural selection, as some variants outgrow and out-reproduce others" (Capra, 1997: 218). In linguistic diversity as well – though over a shorter time period – evolution has produced new forms and varieties, some of which have reached us in often highly modified forms, while many others have existed and disappeared without a trace. Equally, in the incessant communication between individuals, new forms and terms are created which then spread to other groups, are used for a time and then forgotten.

According to Capra, "Lynn Margulis claims that the formation of new composite entities through the symbiosis of formerly independent organisms has been the more powerful and more important evolutionary force" (1997: 226). Perhaps we should consider this hypothesis even more seriously in the context of linguistic diversity. It is true that we are used to thinking that contact between populations that speak different languages tends to culminate in the extinction of one of the codes present – the language of the less powerful group – but we should not neglect the possibility of a kind of symbiosis, in which part of one of the codes lives in the structures that develop in the other. Examples of this include the emergence of new varieties of linguistic

communication formed through the mixing of different codes, reorganized at the system level to create a new set of structures. Good examples of this process are 'pidgins'. 'Pidgins' are formed from a base code, but adapt this base code to conform to structures from the language of the recipient population, and at the same time create innovative solutions based on the new, reorganized system.

## 5. Extinction

Whether or not linguistic contact is resolved symbiotically, it has always been one of the great forces of change in linguistic diversity existing throughout time. To use a term from bioecology, contact between languages could be described as a 'disturbance'.

A disturbance is any change, unpredictable from inside a particular system, that modifies the existing environmental conditions and creates new ones. It represents the disorganization of the ecosystem and releases new resources. Their frequency and intensity, and also the area they affect, are key attributes of the dynamic of the ecosystems and are at the basis of the organization of the environment. (...). The intensity of disturbances is usually measured in terms of their effects on the ecosystem (Flos & Gutiérrez, 1995: 193-194).

In the historical dynamic, many of these cases of contact lead eventually to the disappearance of the languages of proportionally weaker groups, and to their absorption – with a greater or lesser degree of modification – of the language of the dominant groups.

As is often the case in biology, the environment is particularly important in the evolutionary dynamics generated by linguistic contact. In the intense interaction between species, there will often be "environmental conditions that favour certain species to the detriment of others" (Flos & G., 1995: 205). Given that "most extinctions are caused by a combination of demographic population processes and environmental changes" (Brown, 1995: 159), our attempts to understand these dynamics must be centred on both level and we must be alert to their synergies and interdependences. Indeed, the cases in which language shift occurs most rapidly may be precisely those in which the disturbances are acute at both the demographic and the sociopolitical levels. The *tempo* of the evolution may be slow if the disturbance occurs at only one of the levels, but if it occurs at both at the same time, the imbalance in the sociolinguistic habitat will be far more serious and may indeed accelerate the abandonment of a population's own linguistic forms.

The sociopolitical context, however, may exert a profound influence on the evolutionary course of the contact, even in situations in which the influence of the demographic factor is low. As shown by cases in which the politico-economic subordination of certain groups has been the key element, with little – though select – immigration, the power of state institutions to transmit ideologies and representations is immense; once these ideologies are internalized, they justify the abandonment of the population's own code, and the adoption of the dominant group's language. As Allen & Hoekstra say with reference to biology, in the linguistic setting as well the "survival of the fittest is in fact survival of the ones that fit the context" (Allen & H., 1992: 31).

Another decisive factor is migration. As Brown says, and as we noted above, the "movement of individuals into new areas or out of previously inhabited ones can also have important effects on diversity on local to continental scales" (1995: 168). Migration can be one of the great determinants of extinction, of either species or languages. In the linguistic context, both the ecosystems that receive immigrants and the systems the emigrants leave behind may be deeply affected by the process, especially if it is on a large scale. For an established population in a particular setting, mass immigration may represent a major disruption of the sociolinguistic organization, particularly if the demographic proportions are strongly in favour of the immigrant group. As the new community evolves – above all if the recipient community is not socioculturally superior to the newcomers – the language of the immigrant population may predominate. The language of the recipient population may eventually die out if the immigrants do not adopt it for daily use.

Equally, in the communities that emigrants leave behind, the departure of large numbers from the traditional habitat – particularly in groups with relatively low populations – may mean the gradual disappearance of their language, especially if those who stay in the community come into politico-economic contact with another dominant language.

## 6. Preservation and Recovery

One of the key features of the vision of biological conservation is, as we have seen, the concept of the 'ecological niche', the habitat seen from the perspective of what a species needs for survival (Brown, 1995: 35). The vision, obviously, is based on the fact that species do not live in a vacuum, but are fully involved in their natural context and are interdependent inside it. What we have, then, as Gregory Bateson would say, are species-in-their-

context. Species and their habitat – their ecological niche – form the basic unit of existence. If we seek to transfer this idea to the domain of linguistic varieties the analogy may be useful in that it brings home to us the fact that languages are also languages-in-context.

The current era is characterized by the introduction of technological, economic, and political changes in the traditional organization of human groups, which lead to an indiscriminate increase in linguistic contact, either due to migratory movements, political associations, economic transnationalization or innovations in communication technologies. The great challenge, therefore, appears to be not so much to avoid this contact – inevitable in the vast majority of cases – but how to manage it to ensure that it does not destroy a large part of the linguistic diversity that human groups have created over the course of history (vid. Bastardas, 2002). In many cases, the level of contact that has been reached requires the creation of a “restoration ecology” (Allen & H., 1992: 265), so as to preserve what remains – in many cases, very little – but also to reinstate the lost equilibrium and thus to ensure a sustainable continuity of linguistic diversity.

A perspective for the management of an ecology for the restoration and preservation of biodiversity which I feel could be usefully applied to linguo-diversity is the one presented by Allen & Hoekstra:

The central management principle we wish to erect is: the most effective management will recognize the manner in which the context is missing, it will identify the services that the context would have offered to the managed unit, and it will subsidize the managed unit to as close to that extent as possible (...). Before management, the unit to be managed lies orphaned from the context. Management fosters healthy development in the absence of a natural context. (...) If the managed unit is being provided with all it might expect from a natural context, then it can function to full effect (1992: 276).

This is an area that ecological sociolinguistics has not yet researched enough. What should we prioritize in our reconstruction – or conservation – of the sociocultural contexts in order to recover and/or preserve the functions of the linguistic varieties in recession? What changes should be reintroduced in today's socio-political organization in order to bring about this revitalization? And what changes should be implemented in the economic domain? What, in sociocultural contexts, is vital for the preservation and recovery of languages in danger of extinction.

What is clear is that linguistic communities in recession today will continue on their way to disappearance unless they introduce major changes into the social organization of their habitat – changes that halt the neglect of their own codes and promote the recovery of their codes' functions. The actions implemented should be based on “(maximizing) the natural contri-

butions of energy to the functioning of the managed system, while minimizing artificial energy subsidies” (Allen & H., 1992: 275). The restorative intervention, then, must be conducted from a holistic perspective, since “sustainable solutions can only be achieved if the manager works with the underlying processes in the system to be managed, not against them” (Allen & H., 1992: 277-278). However, it may be more difficult to preserve a human language in danger of extinction than a species facing the same threat. A classic quotation from Dawkins which may help to illustrate situations of this type: “the fox runs for his supper, and the rabbit runs for his life” (quoted in Margalef, 1991: 176).

## 7. To Conclude

The systemic approach provided by biological ecology offers the chance to consider linguistic forms and codes as elements that are irremediably integrated into their sociocultural habitat. Analogously, we may think that linguistic forms and codes are interrelated within ecosystems with other objects, such as the ideas that individuals have of reality, the social meanings they attribute to forms and codes, the socioeconomic categorization of individuals, the political situation, the group's representations, etc. (vid. Bastardas, 1996).

We now have the opportunity to continue to build a strong and useful ‘ecology of languages’ as a holistic view on the life of languages and people, taking advantage – carefully – of the suggestions coming from bioecology but also from other scientific disciplines and paradigms. The hologramic metaphor of theoretical physics, i.e. – co-dependent systems are existentially *mutually dependent*, interweaving parts of a particular whole (Bohm, 1980) – and the perspective of ‘complexity’ – *distinguer sans disjoindre* – developed by Edgar Morin (vid. Bastardas, 1996 and 2002) could be, among others, sources of deep inspiration for the understanding and modelling of sociolinguistic facts and processes.

In fact, a linguoecological perspective should affect Linguistics in general in a way that goes far beyond the simple conceptualization of the (co)existence of the different varieties which humans use in order to communicate (vid. Bastardas, 1999). From a multidimensional and interdependent perspective we can try to give an integrated account of grammar, of the interpretation of meanings, and of language uses, as in fact they form an inseparable whole.

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