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*'RESTRICTED' AND 'GENERAL' COMPLEXITY PERSPECTIVES ON
SOCIAL BILINGUALISATION AND LANGUAGE SHIFT PROCESSES*

1. A personal experience on complexity

Until some time ago, my personal approach to 'complexity' had not followed the same roads travelled by quantitative physicists, mathematicians, biologists and computational scientists exploiting the new possibilities of computer science. I was, and still am, more an adherent of the 'complexité' inspired primarily by Edgar Morin and supplemented by Norbert Elias's (1982, 2000) contributions to figurational and processual sociology. This perspective was also consistent with the perspective of authors in other fields, such as biology (Maturana & Varela, 2004) and theoretical physics itself (Prigogine & Stengers, 1979, 1992; Bohm, 1980; Capra, 2002). I have laid out the foundations of my synthesis of what we might call 'figurational complexity' or 'complex figurational sociology' in a few works that have recently appeared in print, so I will forgo detailed explanation here (Bastardas, 2013, 2013b, 2014, 2017).

In my case, Morin's 'complexité' and its strong push for an 'ecologisation' of thought – an approach also advanced by scholars such as Gregory Bateson (1972) and Lluís V. Aracil (1982, 1983) – confirmed for me the merits of building on the basis of a holistic vision of reality, one that is nonetheless conscious of the parts, in order to grasp sociolinguistic events and phenomena more effectively. Indeed, this notion of 'ecologisation' was not new to sociolinguistics. It had been proposed earlier by Einar Haugen (1972) and again later by William F. Mackey (1979, 1980, 1994) but it did stand in need of further elaboration. Biological ecology helps us with its theoretical propositions and models (Margalef 1991, Allen & Hoekstra 2014), yet human 'linguaging' (Maturana 2002) is clearly not a species and there was still a need to look beyond the initial analogies. This is what led me to postulate a 'sociocognitive' ecology for cases of language contact (Bastardas 1996, 2017),

an ecology based not on a simple transposition of ideas and concepts from biological ecology, but rather on the propositions of Edgar Morin, David Bohm, Fritjof Capra, Norbert Elias, The Gulbenkian Commission (Wallerstein 1996), and other scholars working in the sociocultural sciences.

This is the intellectual climate in which I sought, primarily, to draw on the various contributions of the authors mentioned above, in order to build a *complexical* and dynamic perspective that could offer an account of the factors affecting human language behaviour and its historical evolution. My main guiding principles were: a) the centrality of the brain/mind, b) self-organisation, c) emergence, d) circular, retroactive and recursive causality (vs. linear causality), e) the ecosystemic and holographic nature of reality, which implies not only that the part is in the whole, but that the whole is also 'in' the part, and f) that existence is processual and dynamic (cf. Bastardas, 1999, 2013, 2016b). These principles underlied my proposal to adopt an ecological framework and bring *sociocomplexity* into the study of language contact. The result, in practical form, was a dynamic, multi-layered 'orchestral' picture that can embrace the distinct domains underpinning human language activity and its interrelationships in order to gain a much better grasp of the factors affecting language behaviour and its historical evolution (see Bastardas 1996 and 2017). Succinctly put in the typical parlance of sociology, my work has taken as central human language behaviour in situations of personal and/or social cultural contact and then examined its interrelationships with the sociocultural factors that might co-influence its configuration and development.

It must be conceded that the use of the terms 'complex' and 'complexity' in the vast majority of publications appearing in English – the most widespread language of science – corresponds much more to 'restricted' complexity than to the more 'general' perspective, as Morin (2005) calls them. For instance, the activity of researchers at the Santa Fe Institute (Gell-Mann 1994; Holland 1996, etc.) has been immense and extremely interesting. At present, this approach is also seeing a generous crop of developments in Europe. This can be seen, for example, at the several European Conferences on Complex Systems (ECCS) and at other symposia. The contributions in Spain are also prominent and continue to spread among various universities and researchers as for example Maxi San Miguel and Albert Díaz-Guilera (2012) or Ricard Solé and Jordi Bascompte (2006). By contrast, much of Morin's work has not yet been translated into English or translations have appeared only slowly and have not reached a wide audience, and Elias's approaches remain at the fringes of mainstream sociology, even though they are gaining wider recognition with each passing day. The development of the mathematical and computational line poses a challenge and an obligation for us to enter into mutual dialogue. Today it is a

matter of profound urgency for us to examine what it has to offer, its contributions and its advantages, and to explore its limits as well, if we are to make headway in sociological knowledge, particularly in the field of sociolinguistics.

Recently, some authors have already taken this task in hand and are able to offer their reflections to us. This is the case, for example, with Castellani & Hafferty (2009), Malaina (2012), Roggero (2013), Ruiz Ballesteros (2013), Solana (2013), and Byrne & Callaghan (2014). I am especially delighted by the publication of the last one, because it has appeared in English – and can therefore reach a broader audience – and because it deeply takes both traditions into consideration, integrating and evaluating them, and it points to the limitations of ‘restricted’ complexity for the comprehension of human facts.

2. Models and agents

Models developed from the viewpoint of ‘restricted’ complexity -Castelló 2010, Castelló et al. 2011, 2013, for example- typically use cellular automata programs in a computer to depict agents governed by simple rules of conduct they apply in accordance with any other types of agents with which they come into contact. At the same time, these other types of agents will apply their own rules. After a given number of iterations, the result at the level of language will be the greater or lesser use of one or another of the languages present. For instance, if one of the groups of agents is more bilingual than another group and it is more predisposed to use its second language to speak with members of the other group than to use its first language, we can see on screen how such a situation will evolve. Depending on the number of agents present in each group, the program will enable us to observe – and calculate – the extent of each language use among the individuals and, as a consequence, the possible evolution of the situation as the behaviour resulting from the application of the rules becomes widespread.

Although we value the potential of these kinds of contributions to our understanding of phenomena such as bilingualisation or language maintenance and shift, it is also clear that a really complex approach to these phenomena does not stop here, even if we accept the validity of such contributions particularly when we are working with data from real cases, like Beltran 2009 and 2011¹. An examination of these kinds of phenomena from the viewpoint of general complexity also needs to be able to explain *how* and *why*

¹ The model is built based on a community using two languages, one dominant and one subordinate. Individuals are characterised as monolingual speakers of the dominant code, as bilingual with a preference for the dominant code, or as bilingual with a preference for the subordinate code.

particular rules have become established in agents, how the agents have been able to develop the necessary competences, whether it is possible for the agents to react and change their rules when they realise the effects of evolving mechanisms, or whether a group can change the rules if it sees that the outcome is that the group is not becoming as bilingual as another group and that this is harming it, for instance, at the economic level. If we accepted that the perspective of complexity should be confined to this sort of modelling and simulation, we would clearly be contradicting its paradigmatic principles, which are based on not “reducing the complex to the simple, but on translating the complex into theory” (Morin 1994:35).

Using the terminology of restricted complexity, the ‘agents’ in human societies are much more complex and changeable than the elements in the theory of physics, although it is true that human agents, in given situations and phases, may exhibit repetitive and regular behaviours that are frequently unconscious (Bastardas 1995). This phenomenon can be observed, for example, when the rules of language use have been established among the individuals of two language groups and the rules tend to be maintained in a routine and automatic manner, so that the individuals apply them with practically no conscious effort. However, this does not mean that, if some contextual or ideological change occurs, the speakers will not review and change the rules if they so choose. While human beings clearly depend on their contexts for the construction of the cognitive and linguistic faculties of their brains, they also possess autonomy of thought and control over their behaviours, even if this autonomy always exists in co-relation with the social pressures and developments of each society.

Cellular automata or agent-based models (Wolfram 1983, 2002; Axelrod, 1997) may partly capture the movement of agents and language use outcomes that emerge from their interactions at a given stage, but they are overly one-dimensional. They simplify too much and, at least in their current form, they do not incorporate other levels that play an important role. Even if we accept the mechanisms of inter-individual self-organisation, agents in reality face pressures originating in the economic and political domains as well as in the emotional domain, and these pressures can provoke a partial or complete overhaul of the rules, if the agents so deem². A perspective steeped in general complexity calls for a theory of cognitively and emotionally active

² Byrne & Callaghan take the same view that I do: “Agent-based models in particular remain trapped, when used in isolation, within a micro-emergent understanding of the social. The social is not merely micro-emergent and any account of it which ignores the reality of what we must call conventionally ‘social structure’ is always going to be incomplete” (2014:257).

agents embedded within a sociocultural ecosystem that they have co-constructed and that, at the same time, retroactively influences them.

3. The construction of a theoretical vision

The task of building, in a coordinated and integrated manner, a general complexity perspective such as the one depicted here requires progress on both the theoretical and the methodological levels. Indeed, at present, there are advances being made in both domains, although they appear to lack integration and mutual communication.

On the level of theory, general complexity –which we also can call *complexics*– needs to provide a set of principles, concepts and conceptual landscapes that can be applied transversally to distinct areas of knowledge and phenomena of reality, enabling us to gain a much firmer grasp of the complex aspects of their existence than we currently have.

One of the profound changes that we need to address from the epistemological perspective of complexics is the tendency to disconnect the elements of reality once we have given a distinct name to each of them. Apparently, the act of assigning different names tends to lead us to think of these elements as existing independently, not interrelatedly, when, in reality, what is most typical is precisely their interdependence and interwovenness. If we turn our thoughts to ‘society’, for example, we imagine an entity not only different from the agents – human beings – who comprise it and give it existence, but also an entity that is separate in space. Society, we say, is ‘on top of us’. On this matter, Norbert Elias, is clear: “We talk of the person and his environment, a child and his family, the individual and society, the subject and objects without always realising that the person also forms a part of his ‘environment’, the child is a part of his family, the individual is a part of society, the subject is part of the objects. (Elias, 1982:14).

In the phenomenon of language, this confusion can also arise. As we have already developed the concept of ‘language’, we may think that language exists in and of itself as an isolated and independent entity, when to the contrary we must conceive of it as a phenomenon closely tied to the human beings who give life to it and/or change it (or let it cease to exist). And this is where we have the debate on the *locus* of language – or of ‘linguaging’. Where do forms of languaging reside: in the individual or in society? As we can see, this is a spurious debate. ‘Society’ is not something outside the individuals who are its members. Rather, they cause it to ‘emerge’. It is always a society-of-individuals. For Elias, the patterns of human culture are an emerging property of social processes, the unplanned result of interwoven

plans and of the emotional and rational impulses of individual people: “From this interdependence of people arises an order *sui generis*, an order more compelling and stronger than the will and reason of the individual people composing it” (Elias, 2000:366). Indeed, the forms of human languaging are assuredly a singular phenomenon, because they live *in* and *among* people, requiring important conceptual changes to the representations that we have hitherto maintained. One approach is to think of them analogically as if they were a dance: “While different people can dance the same dance figuration, there is no dance as such without dancers” (Dunning & Hugues p. 53). Thus, we can study the different language ‘dances’ created by humans, but we must not lose sight of the fact that they are the socio-communicative actions of diverse groups of people. Forms of languaging are independent of any particular individual, but not of individuals as such.

4. Seeking to understand the complexity of language contact and bilingualisation

Even in their simplest form – for example, in the case of only two languages – the structure and evolution of the phenomena of language contact are not straightforward. In fact, they show a significant degree of complexity. The number of individuals engaged in contact may be large and there are also many different domains and inter-influences that occur in the lives of human beings. It may well hold greater interest, therefore, to apply a complexical and dynamic perspective that can enable us to see all the factors and their interrelationships and understand their interwoven evolution. This was clearly evident to Weinreich: “It is in a broad psychological and sociocultural setting that language contact can best be understood. (...) On an interdisciplinary basis research into language contact achieves increased depth and validity” (1968:4).

One of the fundamental distinctions that we must take into account from the outset is the type of society in which contact happens. Is the society still rural and poorly developed technologically and economically? Or does it, conversely, have a social structure characterised by a high degree of urbanisation and industrial development? In the first set of cases, there may be greater importance in factors that are more local in nature, concerning physical proximity and face-to-face contact, while the second set of cases will also feature the forceful interventions of a society’s various institutional organisations, ranging from those in the political sphere – the official administration, the educational system, the healthcare system, and so forth – to those that are more closely bound up with the economic sphere and the media. Within these organisations, is there large-scale face-to-face contact or

only contact through institutional channels, or do both types of contact occur at the same time?

It is also of special importance to stress that language contact must be understood as a historical and, therefore, temporal phenomenon, with earlier events playing a major role in how the phenomenon evolves. In other words, we need to pay attention not only to the synchronic elements, but also to the diachronic ones, because the latter may determine the future development of the phenomenon (Elias 1982). For instance, in the initial phase of contact between groups, one of the essential factors concerns the language competences that individuals have previously developed, as well as their mutual cognitive and emotional representations. If, for example, one of the groups possesses considerable knowledge of the language of the other group, while the latter has not acquired similar knowledge of the former's language, this difference will be a highly significant variable in the process as it develops. This type of situation, for instance, can give rise to a case in which one group – generally in a subordinate situation – has received instruction in the dominant language of the State in which it resides thanks to the compulsory educational system, while another group has not received instruction in the language of the first group. This is typically what happened in States such as Spain that are made up of diverse language groups, but have had only one official language at the central state level.

In this sort of context, when contact produced initially by political means turns into a different situation in which populations move beyond their traditional language areas and come into daily face-to-face contact, how the emerging interaction is organised will tend to favour the use of the more commonly shared language by both language groups (Hamers & Blanc 2000). This will tend to be the language that has become the exclusive language of instruction in the official educational system. The selection of this language in personal interactions, therefore, will be viewed as practical, convenient and 'normal'. At this point, the process will be acted upon by the social mechanisms of continuity and automaticity – Bourdieu's *habitus* (1980) – which encourage the development of routinised and subconscious behaviours that can eventually come to be seen as obvious and beyond question (Nisbet 1977). This is the typical case of contact between the majority group of a State and its subordinate minoritised groups, which, as we shall see, can embark on a negative course in the use of their customary language forms, particularly if the abandonment of these forms is also encouraged through the spread of a negative discourse and representations aimed at this result.

In this context, the vast majority of conversations between the subordinate bilingualised group and the other, monolingual group will tend to take place in the language of the latter. In this first phase of their encounter,

the bilingualised group will tend to maintain a distribution of functions, given that interactions between members of the group will continue to make use of the own group's language, while conversations outside the group, and often official written activities as well, will make use of the other language, the one dominant in the State. However, if social interpenetration is great and the presence of people from the group speaking the dominant language is common in the conversations of the bilingualised group, members of the latter will come under pressure to use the dominant language even among themselves, in order not to marginalise monolingual individuals from the conversation, at least until they have developed sufficient comprehension of the original language of the bilingualised group.

Starting to use the language originally acquired through the school system in everyday interactions of a private nature will represent a change among bilingualised individuals, increasing their colloquial competence in the language. Daily conversational practice will increase the automaticity of their speech and they may move from a more formal, written knowledge to a spoken and colloquial competence, which could make them feel more comfortable and fluent in their second language (Bastardas 1986). Gradually through feed-back (Wiener 1948) and recursively (Morin 1977), the effects will have an influence on behaviours, which will produce more effects, effects which are favourable in this case to the use of the dominant official language. With intergenerational change, the circumstances may give rise to a situation in which the minority group abandons its original language.

5. The interwoven evolution of situations

The contact between two language groups will never be static. It will change as a result of the effects of the encounter between the two groups and because of other factors that can arise out of the circumstances of life among the groups in contact. Even without the presence of official or institutionalised communications (Corbeil 1983), the groups' interrelation in and of itself can produce an increase in the oral skills of the smaller demolingualistic group and thereby contribute to greater interaction. This, in turn, can encourage the growth of pairings between individuals of mixed ethnic-linguistic origin by means of a recursive mechanism. In developed societies, these individuals will, in all likelihood, tend to use the dominant official language with one another and, depending on the case, this may or may not also be the language spoken by parents to their offspring. If it is, the children will typically only have the dominant language as their mother tongue. However, depending on the level of ethnic awareness or the usefulness that may correspond to the native language of the bilingual parent in such a pairing, he or she may choose

to speak this language with the children, enabling them to become socialised as bilingual within the family (Bastardas 2016). This kind of sociolinguistic organisation, however, typically requires the other parent to develop at least receptive skills in the other language. This is because uncomfortable situations can arise if they do not do so. For example, they may not be able to understand conversations between the children and the other parent in their own home.

If most couples of mixed origin choose to speak the language of the dominant group with one another and with their children, an interruption will occur in the family transmission of the first language of the bilingualised group, setting in motion a significant process of language shift. Indeed, this has been one of the mechanisms responsible for the loss of speakers in the Welsh case (Williams 2005), for example, and among immigrants (Boix-Fuster 2009). If the number of marriages between individuals of mixed origin is high, the number of individuals possessing the subordinate language will decline and these individuals will themselves become a pressure factor driving the social use of the dominant language among speakers who still have the initial language of the bilingualised group.

In some cases, the intergenerational abandonment of the group's own language in favour of the language used by the majority or dominant group within the State occurs not only because of mixed marriages, but also because of parents' decisions to use the dominant language with their children rather than the language of their origin. If parents have been sufficiently bilingualised through their exposure to the educational system and/or the use of their second language with speakers of this language within their society, they will potentially be in a position to use it with their children. This occurs especially if the parents live in situations in which the asymmetry of power between the groups is very high and if they have internalised negative mental representations of their own code and, conversely, possess representations of the other code that are favourable, e.g., that it is useful for socioeconomic mobility. In these kinds of situations – such as, for example, in Galicia (Lorenzo 2003) or in the autonomous community of Valencia (Querol 1990; Conill 2003; Montoya & Mas 2012) in Spain, or in communities of indigenous speakers in Mexico (Terborg & García 2011, 2013) – the language of origin can eventually be viewed as an obstacle to economic advancement and to individuals' social prestige. When this is the case, usage of the language of origin can be abandoned during intergenerational transmission in order to prevent the harmful conditions that parents have lived through from being suffered by their children as well. A similar situation often occurs in immigrant groups who arrive in countries where a different language is used. With intergenerational succession, immigrant groups can lose interest in

maintaining their language of origin and become monolingual in the language of their host country.

This kind of evolution, which is *a priori* more linear and predictable, can be depicted more readily by models, but it is perhaps more difficult to build into such models the possibility of changes that are, in principle, unexpected; changes that the agents themselves may decide to adopt at a given historical moment. Moreover, given that the world never stands still, new contextual factors can come into play and modify the projected evolution of any given case. Computational modelling appears suitable for taking into account any adaptive changes that happen to come out of the model itself, that is, the changes that correspond to the conditions and rules initially programmed into the software. What the software cannot predict, however, is the appearance of new meanings in a situation, much less the introduction of external events that can have influence on it. As a result, the predictive power of such models will necessarily be limited.

An illustration of this type of case comes from our real-world Catalan laboratory, where we have seen how agents who, in principle, should have followed the anticipated rules of monolingual Spanish usage with autochthonous Catalan speakers who are bilingual in Catalan and Spanish, have evolved over time toward their own bilingualisation not only at the level of comprehension, but even at the level of expression, particularly if they came as young people. With people they met when they were able to speak only Spanish, they have continued to use Spanish. With others with whom they have struck up a relationship since developing the ability to use Catalan for social contact, they regularly speak Catalan, even in the presence of other Spanish-speaking interlocutors. With the intergenerational replacement of the population, the number of people of immigrant origin who are able to speak Catalan and use Catalan with native speakers has risen where, of course, the necessary demolinguistic conditions have existed. How the situation has evolved corresponds not only to the strict application of the initial rules of the encounter between the two groups, but also to the socioeconomic contexts in which the encounter occurred. Given that Catalan remained the most utilised language in informal interactions among its own language group even during the Franco dictatorship, and also that Catalan speakers were in control of a large portion of the private sector, there was probably some rethinking of the sociolinguistic rules in play at the outset, even though the language policy under Francoism sought to impose the opposite outcome.

This does not mean that the political domain is of no importance in determining how situations of language contact evolve. The rules followed by individuals in the use of their languages are not solely the result of what occurs at the level of interactions. Taking the example of Catalonia, as noted earlier,

the individuals who came into contact with one another had different language skills at the start. While first-language Spanish-speakers arriving in the Catalan-speaking area had absolutely no knowledge of the language, most of the individuals of Catalan origin had, in fact, received schooling in Spanish and had studied the language. Clearly, the encounter did not occur on equal terms. The two sets of interlocutors could use Spanish with one another, but not Catalan, which has historically been the language of the host area. The rules of interaction that were established between them, therefore, did not arise solely from the properties of the simple encounter between the groups. They were also affected by past and present historical and political factors. Alongside the evolution described in the previous paragraph, which reflected the social bilingualisation of native Spanish-speakers, Catalonia also witnessed thousands of Spanish-speakers who did not develop the ability to speak Catalan, especially after the large-scale migrations in the period 1960-75. Subsequently, many new neighbourhoods sprang up in which the vast majority of residents were Spanish-speakers by origin. The opportunity to have close contact between the two populations was limited, and influence at the demolinguistic level was severely undermined. Given that only Spanish was supported at the political level, bilingualisation in Catalan was meagre (Alarcón & Garzón 2011).

Because humans are cognitive and emotional agents, the political level is also interconnected with the ideological level. At the end of the Franco dictatorship (the dictator died in 1975), the Catalan population mobilised to express its desire for political democracy and autonomy. Joining in these demands were many who had arrived in Catalonia in the previous decades. While the recent newcomers were sometimes not yet fluent speakers of Catalan, they were sympathetic toward the language and lent their support to its official recognition. In this setting, additional people with Spanish-speaking backgrounds sought to change their rules of language behaviour in order to speak Catalan with autochthonous Catalan speakers, even though it was hard at times. Nor was the change in behaviour much encouraged by individuals of Catalan origin, many of whom continued to apply the rule of adapting to the first language of the interlocutor, typically robbing Spanish-speakers of the opportunity to practice Catalan in conversation. Agents' ability to change the rules, however, reaches a high point when, in interactions between the two language groups, a native Catalan-speaker uses Spanish with an interlocutor of immigrant origin and the latter replies in Catalan. This is because the two wish to display their empathy and desire to adapt to each other, making clear that the variables of emotion and identity must also be taken into account.

In this ideological-political and interpretative domain, the self-representations of language groups also play a major role. These stem from the socio-political and economic history of each group. Within the language

area in which Catalan is used in its several variants, we find significant differences that can help to shed light in this respect. One of the complex aspects of Catalan/Spanish contact in Catalonia is to understand why the repression and prohibition of the public use of Catalan during most of the first three-quarters of the twentieth century produced disparate language behaviours and ideologies in Catalonia and other areas in the Catalan-speaking lands, such as the autonomous community of Valencia. At present, when the majority of the population of Catalonia is pushing for full restoration of the use of Catalan and is confronting the difficulties regularly interposed by the Spanish government, the authorities in the autonomous community of Valencia have been, until very recently, less active in defending the use of their language, and the process of intergenerational abandonment continues apace (Vila 2011; Boix-Fuster & Farràs 2013). It is not easy to explain the reasons for these contrasts. We would have to compare the historical evolution of these two language regions within the Catalan-speaking territories. One of the differential elements is the earlier industrialisation of Catalonia, which led to the creation of an autochthonous bourgeoisie and a positive self-image with respect to other areas of Spain, which lagged behind in this respect. The autonomous community of Valencia had a more agricultural economy that was less developed.

Today, however, the Valencia region has an advanced economy and developed agriculture. Yet the people's image of their identity, in large part, does not correspond to that of Catalonia. While numerous people in Catalonia report feeling strictly Catalan or more Catalan than Spanish, the opposite is true in the autonomous community of Valencia. That is, a substantial number of individuals feel more Spanish than Valencian or both in equal terms (Coller 2006.) It is in this aspect of the hierarchical organisation of identities where we can find an explanation for their differing language behaviours. The customary language of debates in the Parliament of Catalonia is predominantly Catalan, while in the autonomous community of Valencia, in general, has been Spanish. Language behaviour of this sort has a significant relationship to the identity-related representations that human groups possess. When making a choice of identity between the State and the community of origin, a positive group self-representation supports the intergenerational maintenance of the language. Conversely, if the group's own identity is considered to be subordinate to the State, the language will be viewed as dispensable and the group will opt for the State's dominant official language. Once again, we see how the elements that may have an effect on the selection of language behaviours are complexly intertwined, making it difficult to reduce them to precise, stable rules that remain unchanged over time.

What this comparison between Catalonia and the Valencian community again shows is how important it is to introduce the historical element when examining language behaviours in situations of contact and to study such situations on a case-by-case basis. Perhaps in many processes of bilingualisation and language shift, the elements are alike or very similar, but path dependency also exerts an influence and it can be crucial for the final outcomes. Early industrialisation, for example, can boost the positive representation of a given language group so that it is then able to confront a situation of political subordination with greater chances of success than a group embarking on economic development later, when the process of bilingualisation is already well underway and widespread among its speakers. In the latter case, the group in question can have a perception of its own inferiority with respect to the elites of the dominant group within the State, and this can lead the group to embrace the dominant group as a yardstick and, therefore, to attempt to assimilate. This will have a strong impact on language behaviours, which will then tend to favour use of the State's dominant language instead of the group's own language.

As we have seen, the socioeconomic level also appears to play a major role in the adoption or non-adoption of the dominant language. In the expansion process of Spanish in Spain, we can see clearly how the upper layers of different language groups are the first to adopt Spanish in family usage (Boix-Fuster & Torrens 2012). This is because they want to move closer to the centres of power and to distinguish themselves from lower social classes (Bourdieu 1984). A common consequence of this movement is the emulation of their behaviour by other socioeconomic segments, especially the middle classes, which seek economic advancement and associate the use of the dominant language – and the abandonment of their group's own language – with the social prestige of the yardstick group. On the value scale, the language of origin then becomes associated in terms of its social signification with groups lower down the social ladder and more backward in economic development. The temporal dynamic is essentially urban and centre-periphery in nature, from regional to sub-regional capitals and ultimately to municipalities, always starting with the upper classes.

In these contexts, intergenerational replacement will act as the major mechanism of language shift. Parents in search of better socioeconomic prospects for their children will tend to use the dominant language with them and not the language of origin. As a result, the dominant language will become native for the subordinate group. With the help of the compulsory educational system and the media, the process will accelerate and reach the vast majority of the population, who will see the adoption of the new language and the abandonment of their own language as the road to economic progress and social respect.

6. Language shift and its reversal

Gradually, this evolution leads to the extinction of many languages even within their own historic lands and it can be halted only with a change in the socio-political conditions in which contact occurs and, particularly, with a change in the cognitive and emotional representations of their speakers (Fishman 1991). The efforts made to reverse language shift in Spain in the past thirty-five years show some promise, but they also point to the limits of this kind of complex process. With the advent of democracy, Spanish lost the exclusivity of its use in the educational system and the other languages also acquired a range of (co)official uses in their own territories, expanding their administrative uses and their functions in the public arena, but not all have done so to the same degree and at the same pace (Siguan 1993; Turell 2001). Although the prospective legal framework was the same in all cases, the measures adopted by the governments of the various autonomous communities have differed. They have reflected the prevailing ideas and attitudes of each community. Thus, while governments in Catalonia and the Basque Country have tended to be largely in the hands of parties backing the restoration of their own languages, this has not always been so in the Balearic Islands, Valencia or Galicia, which nonetheless differ in degree from one another.

In communities whose own identity is less strong or where there is greater division among their citizens, the historical momentum of language shift is so powerful that, even though they have now declared official the previously subordinate language, the mechanism of its intergenerational abandonment continues apace and many families of autochthonous origin choose to use Spanish with their children instead of their language of origin. It is as if the ideas inherited from the time of the dictatorship, which ran counter to the maintenance and public use of languages other than Spanish, were still in force in people's mental representations and continued to act on their behaviours. In the ecology of pressures (Terborg & García-Landa 2013) that they perceive, the elements supporting their adoption of the dominant language of the State are strong and those that might back the intergenerational maintenance of the language of origin are losing out (Liebersohn 1970; Gal 1979). In all likelihood, differences in social meanings associated with each language also carry weight here. For example, they may associate Spanish with greater political, economic and cultural power, while attaching meanings to the other languages that relate to the rural, the lower class or lower literary prestige.

As I have indicated, it can be easier to overcome these difficulties and reverse processes of language shift and/or gain new speakers for the subordinate language if, historically, the group has achieved economic development and maintains a positive cognitive self-image with respect to the majority group of reference. In the case of Catalonia and the Basque Country (Azurmendi & García de Luna 2011), the identities of the people themselves have been viewed by a majority of their citizens as important and not subordinate to the Spanish identity of the State. The opposite tends to be the case in the autonomous communities of Valencia and Galicia, where the group's own identity seems to have less weight.

Adopting a complexity perspective to conduct a comparative study of cases in which a language has regained its official status and public use, we can see certain phenomena that are of interest for sociolinguistic theory. In the case of Catalonia, for instance, we clearly observe the different pace of changes in the political and administrative sphere and within society (Strubell & Boix-Fuster 2011). Although the language undergoing recovery increases its official uses and is introduced as the language of instruction in the school system, the communicative habits established in society as a whole do not change at the same speed. For some time longer, these habits preserve norms that became predominant as a result of sociolinguistic self-organisation. Confirming the distinction drawn by Corbeil (1983) between 'institutionalised' and 'individualised' communications and also by Ryan (1979), we can see how these two levels co-exist but are distinct, and how social agents acting on one of the two levels can pursue different patterns of behaviour.

The temporal asymmetry between what occurs at the institutionalised level and what happens at the level of individuals in their daily lives can also, conversely, explain the maintenance of languages other than the official language of the State for long periods in spite of government policies clearly aimed at encouraging their disuse, such as we saw in Spain during the Franco dictatorship. We can have periods that usher in the formal bilingualisation of a population by institutionalised means, but nevertheless see the maintenance of the groups' own varieties in everyday social uses, much as in the diglossic distribution of uses in the German-speaking region of Switzerland. However, in the long run, changes may arise in everyday social uses because of the influence exerted by uses at the level of institutionalised communications. It remains to be seen how quickly this may happen and how it will be distributed among different social classes and/or groups of different origin.

7. Closing thoughts: A necessary integration

As we have seen, historical processes exert an influence on the current state and evolution of situations of language contact. This influence is brought to bear from different domains, the economic and the political, the ideological and group identities, geo-demographics, and the habits of inter-group use. Clearly, this kind of phenomenon requires study from a complexical and holistic perspective in order to accommodate the variety of factors that belong to different levels and that interrelate with one another in the evolving dynamic of human languaging. The general complexity or complexical perspective allows for and encourages this integrated vision to account for what occurs autonomously at the level of agents' interactions and situations and, at the same time, for how all of these factors are eco-dynamically interwoven and inter-influence what occurs in the political, ideological, economic and technological contexts in which individuals live, contexts which they themselves co-develop.

It is clear that the appearance and/or consolidation of these new theoretical perspectives must necessarily have ramifications at the more practical level of methodology. New tools for the conception, apprehension and treatment of the data of experience will need to be devised to complement existing ones and to enable us to make headway toward practices that better fit complexical perspectives.

In the case of computational complexics, one characteristic of this kind of modelling is that it uses few parameters. This clashes with the aspiration of complexity theory to build a comprehensive ecology out of the elements involved: "Several models have been proposed to account for different mechanisms of social interaction in the dynamics of social consensus. The idea is to capture the essence of different social behaviours by simple interaction rules: following the idea of universality classes, in collective emergent phenomena details might not matter" (Castelló, 2010:24). Morin (2005:4) takes a rather more critical view: "Restricted complexity has enabled important advances to be made in formalisation, in the possibilities of models, which in turn stimulates the potential for interdisciplinary efforts. But one is still within the epistemology of classical science. (...) In some sense, complexity is acknowledged, but it is decomplexified"³. To gain an adequate view of the whole and to understand the *how* and *why* of the process pursued by the agents in reaching the states that guide their decisions, as Xavier Castelló has similarly put it, it will probably be necessary to use computational research

³ That said, nobody can deny the importance of the studies conducted to date from the perspective of complex systems, or the utility of modelling, which has brought us nearer to the essential elements of processes and to the expression of their interrelationships with the utmost clarity.

together with other types of research that are closer to the changing cognitive and emotional activity of the agents.

The need in my view is for the two lines to come to a meeting of the minds, and take steps toward a mutual integration based on the acceptance of the shortcomings of each approach, achieving progress through a non-contradictory complementarity of perspectives. It must be conceded that the practical and methodological applications of basic complexical ideas need to be developed much farther in order to apply them to specific research. At the same time, the limits of complex adaptive systems as computational strategies must be accepted in the pursuit of a better understanding of the dynamic and evolutionary processes typical of human beings.

It will certainly be useful for sociolinguists, for example, to gain familiarity with the contributions of quantitative-oriented physicists from the field of statistical physics modelling, such as Murray Gell-Mann, Maxi San Miguel and Albert Díaz-Guilera, and see their fruitful application in our disciplines and attempt to exploit them in a coherent and integrated manner. However, I think we must also be cognizant of the peculiarities of human phenomena, which are characterised by the existence not only of purpose and regularity in the control of behaviour, but also by the significant degree of agents' cognitive and interpretative autonomy and by the powerful influence of the emotional dimension.

It seems obvious, therefore, that human complexics must be seen as multi-methodological, insofar as necessary combining quantitative-computation methodologies and more qualitative methodologies aimed at understanding the historical mental and emotional world of people (cf. Malaina. 2012). Thus, the methods and concepts of restricted or computational complexics can help and be used as supplementary strategies that are highly useful in studying certain characteristics, the stages and speeds of processes of language contact, but always within the frame of the broader view offered by general complexics. As Byrne & Callaghan say, “[w]e see complexity as providing a framing for the unifying of a whole set of opposites in scientific practice, of quantitative and qualitative research, of analysis and holism as modes of understanding, and of relativism and hard realism as epistemological position” (2014:255).

References

- Alarcón, A., & Garzón, L. (2011). *Language, migration and social mobility in Catalonia*. Leiden: Koninklijke Brill NV.
- Allen, T. F. H., & Hoekstra, T. W. (2014). *Toward a unified ecology*. New York: Columbia University Press.
- Aracil, Ll. V. (1982). *Papers de sociolingüística*. Barcelona: La Magrana.
- Aracil, Ll. V. (1983). *Dir la realitat*. Barcelona: Edicions Països Catalans.
- Axelrod, R. (1997). *Complexity of cooperation*. Princeton: Princeton University Press.
- Azurmendi, M. J., & Martínez de Luna, I. (2011). Success-failure continuum of Euskara in the Basque country. In J. A. Fishman & O. García (Eds.), *Handbook of language and ethnic identity* (pp. 323-335). Oxford: Oxford University Press.
- Bastardas-Boada, A. (1995). Language management and language behavior change: policies and social persistence. *Catalan Review* 9(2), 15-38.
- Bastardas-Boada, A. (1996). *Ecologia de les llengües. Medi, contacte i dinàmica sociolingüística*. Barcelona: Proa.
- Bastardas-Boada, A. (1999). Lingüística general y teorías de la complejidad ecológica: algunas ideas desde una transdisciplinariedad sugerente. In *Lingüística para el siglo XXI* (pp. 287-294). Salamanca: Publ. Universidad de Salamanca.
- Bastardas-Boada, A. (2013). General linguistics and communication sciences: sociocomplexity as an integrative perspective. In M. À. Massip-Bonet, & A. Bastardas-Boada (Eds.), *Complexity perspectives on language, communication and society* (pp. 151-173). Berlin: Springer.
- Bastardas-Boada, A. (2013b). Language policy and planning as an interdisciplinary field: towards a complexity approach. *Current Issues in Language Planning*, 14(3-4), 363-381.
- Bastardas-Boada, A. (2014). Some physics, ecology and complexity ideas for a complex-figurational sociolinguistics. *History of the Human Sciences*, 27(3), 55-75.

Bastardas-Boada, A. (2016). Famílies lingüísticament mixtes a Catalunya: competències, usos i autoorganització evolutiva. *Treballs de Sociolingüística Catalana*, 26, 285-308.

Bastardas-Boada, A. (2016b). Complexics as a meta-transdisciplinary field. *Congrès Mondial pour la pensée complexe. Les défis d'un monde globalisé*. (Paris, 8-9 décembre). UNESCO. On-line : https://www.reseau-canope.fr/fileadmin/user_upload/Projets/pensee_complexe/bastardas_boada_complexics_meta_transdisciplinary_field.pdf

Bastardas-Boada, A. (2017). Complexity in language contact: A socio-cognitive framework. In S. Mufwene et al (Eds.), *Complexity in language: Developmental and evolutionary perspectives* (pp. 218-244). Cambridge, UK: Cambridge University Press.

Bateson, G. (1972). *Steps to an ecology of mind*. New York: Ballantine Books.

Beltran, F. S., Herrando, S., Ferreres, D., Adell, M. A., Estrader, V., & Ruiz-Soler, M. (2009). Forecasting a language shift based on cellular automata. *Journal of Artificial Societies and Social Simulation*, 12(3), 1-8.

Beltran, F. S., Herrando, S., Estrader, V., Ferreres, D., Adell, M. A., & Ruiz-Soler, M. (2011). A language shift simulation based on cellular automata. In E. G. Blanchard, & D. Allard (Eds.), *Handbook of research on culturally-aware information technology: perspectives and models* (pp. 136-151). Hershey – New York: Information Science Reference.

Bohm, D. (1980). *Wholeness and the Implicate Order*. London: Routledge & Kegan Paul.

Boix-Fuster, E. (2009). *Català o castellà amb els fills? La transmissió de la llengua en famílies bilingües a Barcelona*. Barcelona: Rourich.

Boix-Fuster, E., & Torrens, R. M. (2012). *Les llengües al sofà. El plurilingüisme familiar als països de llengua catalana*. Lleida: Pagès editors.

Boix-Fuster, E., & Farràs, J. (2012). Is Catalan a medium-sized language community too? In F. X. Vila (Ed.), *Survival and development of language communities prospects and challenges* (pp. 157-178). Clevedon: Multilingual Matters.

Bourdieu, P. (1984). *Distinction: A social critique of the judgement of taste*. Cambridge: Harvard University Press.

Byrne, D., & Callaghan, G. (2014). *Complexity theory and the social sciences. The state of the art*. London: Routledge.

Capra, F. (2002). *The hidden connections*. New York: Doubleday.

Castellani, B., & Hafferty, F. W. (2009). *Sociology and complexity science*. Berlin: Springer-Verlag.

Castelló Llobet, X. (2010). *Collective phenomena in social dynamics: Consensus problems, ordering dynamics and language competition*. Palma de Mallorca: University of the Balearic Islands doctoral dissertation.

Castelló, X., Vazquez, F., Eguíluz, V.M., Loureiro-Porto, L., San Miguel, M., Chapel, L., & Deffuant, G. (2011). Viability and resilience in the dynamics of language competition. In G. Deffuant, & N. Gilbert (Eds.), *Viability and resilience of complex systems*, (pp. 39-74). Heidelberg: Springer.

Castelló, X., Loureiro-Porto, L., & San Miguel, M. (2013). Agent-based models of language competition. *International Journal of the Sociology of Language*, 221, 21-51.

Coller, X. (2006). Collective identities and failed nationalism. The case of Valencia in Spain. *Pôle Sud*, 25, 107-136.

Conill, J. J. (2003). The situation of Valencian as reported in non-institutional sociolinguistic research (1998-2002). *Noves SL. Revista de Sociolingüística*, 1-9.

Corbeil, J. C. (1983). Éléments d'une théorie de la régulation linguistique. In É. Bedard, & J. Maurais (Eds.), *La norme linguistique* (pp. 281-303). Quebec & Paris: Conseil de la Langue Française.

Dunning, E., & Hugues, J. (2013). *Norbert Elias and Modern Sociology*. London: Bloomsbury.

Elias, N. (1982). *Sociología fundamental*. [Spanish translation of *Was ist Soziologie?* Munich, Juventa Verlag, 1970]. Barcelona: Gedisa.

Elias, N. (2000). *The civilizing process*. [English translation of *Über den Prozess der Zivilisation. Soziogenetische und psychogenetische Untersuchungen*. Basel, Haus zum Falken, 1939.]. Oxford: Blackwell.

Fishman, J. A. (1991). *Reversing language shift*. Clevedon: Multilingual Matters.

- Gal, S. (1979). *Language shift: Social determinants of linguistic change in bilingual Austria*. San Francisco: Academic Press.
- Gell-Mann, M. (1994). *The Quark and the Jaguar: Adventures in the Simple and the Complex*. New York: Henry Holt and Company.
- Hamers, J. F., & Blanc, M. H. A. (2000). *Bilinguality and bilingualism*. Cambridge: Cambridge University Press.
- Haugen, E. (1972). The ecology of language. In A. S. Dil (Ed.), *The ecology of language* (pp. 325-339). Stanford: Stanford University Press.
- Holland, J. H. (1996). *Hidden order: how adaptation builds complexity*. New York: Addison-Wesley.
- Lieberson, S. (1970). *Language and ethnic relations in Canada*. New York: Wiley.
- Lorenzo Suárez, A. M. (2003). Studies relating to the sociolinguistic situation of the Galician language (1990-2002). *Noves SL. Revista de Sociolingüística*, Primavera 2003, 1-9.
- Mackey, W. F. (1979). Toward an ecology of language contact. In W. F. Mackey, & J. Ornstein (Eds.), *Sociolinguistic studies in language contact* (pp. 453-460). La Haya: Mouton.
- Mackey, W. F. (1980). The ecology of language shift. In P. H. Nelde (Ed.), *Sprachkontakt und Sprachkonflikt*, (pp. 35-41). Wiesbaden: Franz Steiner Verlag.
- Mackey, W. F. (1994). La ecología de las sociedades plurilingües. In A. Bastardas-Boada, & E. Boix-Fuster (Eds.), *¿Un estado, una lengua? La organización política de la diversidad lingüística* (pp. 25-54). Barcelona: Octaedro.
- Malaina, Á. (2012). *Le paradigme de la complexité et la sociologie. Possibilité et limites d'une sociologie complexe*. Paris: L'Harmattan.
- Margalef, R. (1991). *Teoría de los sistemas ecológicos*. Barcelona: Publicacions de la Universitat de Barcelona.
- Massip-Bonet, M. À., & Bastardas-Boada, A. (2013). *Complexity perspectives on language, communication and society*. Heidelberg: Springer.

- Maturana, H. (2002). Autopoiesis, structural coupling and cognition. *Cybernetics & Human Knowing*, 9(3-4), 5-34.
- Maturana, H., & Varela, F. J. (2004). *De máquinas y seres vivos. Autopoiesis: La organización de lo vivo*. Buenos Aires: Lumen.
- Montoya Abat, B., & Mas i Miralles, A. (2012). Language teaching and family linguistic transmission: Two correlative factors in the Valencian Region (Catalan vs. Spanish)? *Sociolinguistic Studies*, 6(1), 45-63.
- Morin, E. (1977). *La nature de la nature*. Paris: Seuil.
- Morin, E. (1994). *La complexité humaine*. Paris: Flammarion.
- Morin, E. (2005). Restricted complexity, general complexity. *Colloquium Intelligence de la complexité : épistémologie et pragmatique*. (Translated from French by Carlos Gershenson in 17 June, 2014.)
- Nisbet, R. (1977). *The social bond*. New York: Random House.
- Prigogine, I., & Stengers, I. (1979). *La nouvelle alliance. Métamorphose de la science*. Paris: Gallimard.
- Prigogine, I., & Stengers, I. (1992). *Entre le temps et l'éternité*. Paris: Flammarion.
- Querol, E. (1990). El procés de substitució lingüística: la comarca dels Ports com a exemple. *Miscel·lània*, 89, 87-196.
- Roggero, P. (2013). Para una sociología según *El método*. In E. Ruiz Ballesteros, & J. L. Solana Ruiz (Eds.), *Complejidad y ciencias sociales* (pp. 103-123). Sevilla: Universidad Internacional de Andalucía.
- Ruiz Ballesteros, E. (2013). Hacia la operativización de la complejidad en ciencias sociales. In E. Ruiz Ballesteros, & J. L. Solana Ruiz (Eds.), *Complejidad y ciencias sociales* (pp. 137-172). Seville: Universidad Internacional de Andalucía.
- Ruiz Ballesteros, E., & Solana Ruiz, J. L. (2013). *Complejidad y ciencias sociales*. Seville: Universidad Internacional de Andalucía.
- Ryan, E. B. (1979). Why do low-prestige language varieties persist? In H. Giles, & R. N. St. Clair (Eds.), *Language and social psychology* (pp. 145-157). Oxford: Blackwell.

San Miguel, M., Johnson, J. H., Kertesz, J., Kaski, K., Díaz-Guilera, A., MacKay, R. S., Loreto, V., Erdi, P., & Helbing, D. (2012). Challenges in complex systems science. *The European Physical Journal. Special Topics*, 214, 245-271.

Siguan, M. (1993). *Multilingual Spain*. Amsterdam: Swets-Zeitlinger.

Solana Ruiz, J. L. (2013). El concepto de complejidad y su constelación semántica. In E. Ruiz Ballesteros, & J. L. Solana Ruiz (Eds.), *Complejidad y ciencias sociales*, (pp. 19-101). Seville: Universidad Internacional de Andalucía.

Solé, R. V., & Bascompte, J. (2006). *Self-organization in complex systems*. Princeton, N.J.: Princeton University Press.

Strubell, M., & Boix-Fuster, E. (2011). *Democratic policies for language revitalisation: the case of Catalan*. Basingstoke: Palgrave Macmillan.

Terborg, R., & García-Landa, L. (2011). *Muerte y vitalidad de lenguas indígenas y las presiones sobre sus hablantes*. México: UNAM.

Terborg, R., & García-Landa, L. (2013). The ecology of pressures: Towards a tool to analyze the complex process of language shift and maintenance. In À. Massip-Bonet, & A. Bastardas-Boada (Eds.), *Complexity perspectives on language, communication and society understanding complex Systems* (pp. 219-239). Berlin: Springer-Verlag.

Turell, M. T. (2001). *Multilingualism in Spain*. Clevedon, UK: Multilingual Matters.

Vila i Moreno, F. X. (2011). Language in education policies. In M. Strubell i Trueta, & E. Boix-Fuster (Eds.), *Democratic policies for language revitalisation. The case of Catalan* (pp. 119-149). England: Palgrave

Vila i Moreno, F. X. (2013). *Survival and development of language communities. Prospects and challenges*. Clevedon, UK: Multilingual Matters.

Wallerstein, I. (1996). *Ouvrir les sciences sociales. Rapport de la Commission Gulbenkian*. Paris: Descartes & Cie.

Weinreich, U. (1968). *Languages in contact*. The Hague: Mouton Publications.

Wiener, N. (1948). *Cybernetics or control and communication in the animal and the machine*. Cambridge & Massachusetts: The MIT Press.

Williams, C. (2005). The case of Welsh/Cymraeg in Wales. In D. Ó. Néill (Ed.), *Rebuilding the Celtic languages: Reversing language shift in the Celtic countries* (pp. 35-115). Talybont: Y Lolfa Cyf.

Wolfram, S. (1983). Statistical mechanics of cellular automata. *Reviews of Modern Physics*, 55(3), 601–644.

Wolfram, S. (2002). *A new kind of science*. Champaign: Wolfram Media.