

**Romanicisation world-wide:  
The impact of French, Italian, Portuguese, and Spanish on the  
autochthonous languages of Africa, the Americas, Asia and  
Austronesia (with special focus on Hispanicisation)**

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**Towards new generation of dynamic systems models for language  
contact studies**

**1. Introduction: Why new models of language contact?**

Sociolinguistics and language contact studies have been since the work of Labov and Bickerton, to name just two major theoretical figures in the two fields, in search for adequate theoretical models. Due to the dominance of Chomskian linguistics in the 70s and 80s both made compromises with the logical machinery underlying Chomsky's proposals:

- Labov designed since 1969 grammars with variable rules more or less adapted to current generative models (e.g., the standard model of Chomsky, 1965). This led to major difficulties. First the probabilistic format responding to the application of statistics in sociolinguistics contradicted major postulates (in Chomsky programmatic booklet: Syntactic Structures), secondly the sociological claims and hypotheses of Labov's sociolinguistics were quickly overridden by the consideration of inner linguistic complexities (e.g., phonological and morphological contexts of rule application). This was partially due to the fore-grounding of grammatical rules and grammar in sociolinguistic studies. In his later work Labov gave up the issue of a sociolect-(variation-) grammar and returned to more classical issues of urban dialectology and language change. More mathematically minded sociolinguists like David Sankoff pursued the issue but had little impact on the further development (cf. my own publications on variable rules and linguistic variation in Wildgen, 1977a, b; 1994b).
- Bickerton started from analyses in Creole linguistics (cf. Bickerton 1975) and formulated his bioprogram hypothesis as an explanation of universal features of Atlantic and Pacific Creoles. In analogy to Chomsky's UG (Universal Grammar) he postulated a universal species-specific capacity to create new grammars in situations of language loss or in case

of a very imperfect transmission of language between the generations. If the parent-generation communicates in a rudimentary Pidgin (loosing or not using their own language) the children generation may repair this lack by activating the human bioprogram of linguistic creativity, which in cases of normal acquisition quickly overridden or integrated by the grammar inherent in the language of adult care givers. In his publication on language and species and protolanguages, Bickerton used again selected features of a Chomskian grammar, now Government and Binding-theory (Chomsky, 1981), and proposed that X-bar-structures and case-structures (T-roles) make up the core of a protolanguage (cf. Wildgen 2004a: chapter 8 for a critical comment). In the more recent book with Calvin (Calvin and Bickerton, 2000: 129) this issue is concentrated on three ingredients of a social “calculus”: (1) the ability to distinguish individuals and (2) to distinguish different types of actions, finally (3) the representation of the roles of participants in actions. The machinery of grammar calculus is given up in favor of more pragmatic dispositions.

If we take these two proponents of sociolinguistics and contact linguistics, we can summarize that between 1966/1975 and 2000/2001 the search for models first followed the Chomskian paradigms, but that it could not really make profit of their major features; the authors had to select local features, which in most cases were soon given up in the further evolution of Chomskian models.<sup>1</sup> Most empirical results were obtained without any connection to these models. One can propose two kinds of conclusions:

- a) These fields are not yet ripe for models formulating central principles and regularities; they should be further developed collecting raw observations and data (using the tools of statistics).
- b) The type of models, which were at least initially well adapted to computational, technical linguistics, is not able to capture the insights and questions issued in sociolinguistics and contact linguistics.

I guess that many of the participants of this conference, who are struggling with problems of fieldwork, data collection and data-evaluation, will support the first conclusion. In the following I will rather follow the line of the second alternative. My major argument is that in the long run any data collection will, due to the divergence of aspects, controlled factors and investigated levels ask for an instrument, which should bring all this stuff together, and the

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<sup>1</sup> The partial application, mostly after the establishment of a new generation of generative models had almost no impact on the development of generative linguistics itself and it could not change the sociolinguistic abstinence of theoreticians in this tradition.

necessity to create a clear, systematic, and coherent architecture of the results, will show up. The demand for a model is, therefore, unavoidable in any scientific enterprise.

## 2. Why language is rather a dynamic system than a stative structure

To be clear one should recognize that although Chomsky's (1955) dissertation had the title: "The logical structure of language", which reminds us of the Vienna circle background in his education (Carnap, Quine), the program of his 1957 booklet ("Syntactic Structures" has definitely a dynamic flavor. In chapter 3 (An elementary Linguistic Theory) Chomsky describes finite state grammars as "the minimal linguistic theory that merits serious consideration" (p. 24). Such a grammar describes sentences as state transitions. Although Chomsky is not concerned with its statistical features, this model fits the ideas of the Russian mathematician Markov (cf. Markov chains). The system produces the sentence from left to right, considering choices (bifurcations), loops, transition probabilities and stand- and stop-conditions. The following schema is from Chomsky (1957), I have just added transition probabilities in order to show its affiliation to Markov's models.

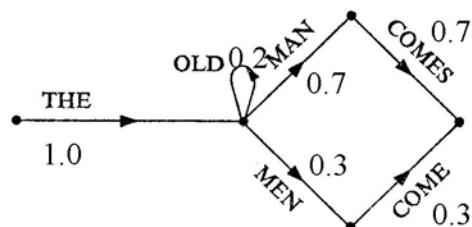


Figure 1 : Example of a Markov-chain producing the sentences: The man comes, the men come (cf. Chomsky 1957: 19 for a similar schema).

In a psycholinguistic reading such a model could describe the planning and uttering of two alternative sentences, i.e., two processes in time. Due to the transitions  $p_1 \dots p_n$  an information of the sentences may be computed. I neglect the complications introduced by context-free, context-sensitive and transformational rule schemata. In all cases a dynamic interpretation where time is either the measure of production or reception/analysis is possible. It is not favored in Chomsky's theory who sees grammar  $G_1$  just as a recursive definition of the notion "grammatical sentences" in language  $L_1$ . The major features of his dynamic system are:

- The steps are discrete; i.e., we have a discrete time, hopping from state to state.

- The transitions may have a probability measure (as in Markov chains) and a Shannon information value.

I make a big step from sentence production/reception (time in milliseconds) to language learning (time in months, years). In describing the acquisition process Chomsky (1979: 68) uses the same Markov chain model. The child starts with an initial state  $S_0$  for which Chomsky assumes some inborn UG (Universal Grammar). Crossing the learning stages  $S_1 \dots S_n$  the child finally proceeds to the knowledge of grammar in a stationary state  $S_s$ , it is now a native speaker, the proper object of the analyses of grammarians. If we add transition probabilities, we have again a Markov chain and there may even exist short-lived alternative states  $S'_n, S''_n$ , because in some acquisition states children may show deviant lines although the final outcome is the same. In the research on Pidgin-like immigrant language acquisition in Heidelberg, this idea has been elaborated to a schema of transitory linguistic varieties:  $V_i$ . Thus the immigrants have a starting position  $V_0$  and through the transitory stages:  $V_1 \dots V_n$  they may arrive at  $V_s$ , the full competence in the target language.

There are, however, even in this very simple description major differences which have to be considered:

- a) Typically, the sequence is halted before the speaker has full competence. The competence of immigrant workers normally “freezes” at a certain stage depending on their age, their contacts (the type of work and the linguistic contact it admits, etc.). The result is a rather rudimentary version of the target, a kind of Pidgin German (cf. Heidelberger Forschungsprojekt 1975 and Klein/Dittmar 1979).
- b) The targets are themselves multiple. In later studies the research group studied the local target for working class speakers in Heidelberg, i.e., lower class dialect (a variant of “Pfälzisch”). In reality, there are more targets; beyond the dialect and a local version of the German standard, the immigrant meets the foreigner talk of German workers, and the Pidgin varieties of other immigrants.
- c) The initial stage,  $V_0$ , is variable depending on the native language/dialect of the immigrant and possible other languages he/she has learned either in school or while she/he worked in other countries (e.g., France, Switzerland, Netherlands, etc.).

Therefore, the simple linear model proposed by Chomsky and presupposed in all further elaborations breaks down (cf. Bechert and Wildgen, 1991: 118-121, for further discussion).

A more fundamental problem concerns the network of grammatical categories one may presuppose. In the practical work on inter-grammars in the Heidelberg project, it became clear that it is almost impossible to find a general and stable set of such categories (phonological, morphological, lexical, syntactic) which are neutral to the process of acquisition, i.e., the grammars matching the transition stages  $V_1 \dots V_n$  are not just changes in the probabilities of rule-application, the basic set of such rules and the categories they use may be affected by the process.

If one looks back at Chomsky's example of primary language acquisition, one wonders if  $S_0$  and  $S_s$ , the initial and final stats, are really given. The evident fact of language change tells us that  $S_s$  the target, changes in time and that this change is due to language acquisition.  $S_0$  is not given by birth (or in the moment of impregnation), the process rather begins at the end of the first year and it continues, as the research of Piaget and many others have show, the acquisition of senso-motoric-skills and basic symbolic schematization (cf. object permanence). As these are not identical in all children and contexts  $S_0$  is variable too.

In the transition From  $S_0$  to  $S_s$ , the child must make inferences from given inputs; moreover, the attainment of the target, even if it is homogeneous, is only possible at the limit. As in the case of the immigrants, the child stops this process before it may reach this limit; i.e., at a stage:  $S_{s,i}$ . As a consequence the competence of one child (even if all targets are identical) is not identical with that of other children. As any society is more or less multilingual/multidialectal, the targets vary. Thus we have three sources of changes between the generations:

- 1) Variations in the starting position of language acquisition after maturation and cognitive development.
- 2) Variations in the incomplete stop-positions of the acquisition process.
- 3) Variations in the targets themselves.

As the generations do not follow in a specific and discrete rhythm valid for the whole population, these variations define a continuum of linguistic change, i.e., language is in a steady process of change based on the accumulation of an imperfect "copying" of the target and of the intrinsic variability of targets in a language community. It is under this perspective that language change may be compared to biological evolution driven by mutation and genetic drift. The difficult part in this comparison concerns selection and speciation. In any case, simplistic dynamics of a linear and discrete sequence of states, identically realized by all

language learners as suggested by Chomsky is an illusion and we have to consider non-linear and continuous dynamic systems in our quest for a model adapted to the questions arising in sociolinguistics and contact linguistics.<sup>2</sup>

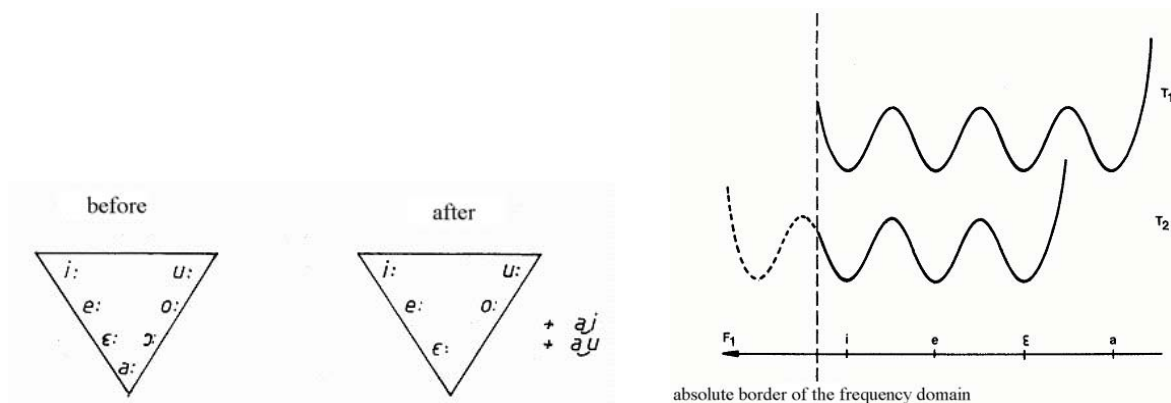
### **3. Language shift and language loss as sudden (catastrophic) events**

In biological evolution one may observe rather large anatomical changes which induce far reaching differences in behavior and in the relation of a species to its ecology (to other co-species or to the physical/biological environment). Upright walk, the fabrication of instruments, the transition between warning calls to a full-fledged lexicon were such transitions in the evolution of modern man. In linguistic change, large scale moves as the great vowel-shift in English or Grimm's law for plosives (p, t, k) are classical examples. Shifts between morphological types: flecational, agglutinative, analytic, or between ergative/nominative case systems, in basic word order (SVO, SOV, etc.) of sentences are such macro-changes. I cannot treat this topic in detail here, because it does only indirectly concern language contact<sup>3</sup> but becomes clear that one has to consider the *optimality* of a subsystem (phonological, morphological, syntactic) in order to explain these phenomena. This means that language as a system (of subsystems) has internal measures of self-organization, which are able to distinguish unstable, transitory stages and stable, in some way optimal stages. The process in search for stability and optimality is nonlinear, i.e., after a phase of transition with high variability (turbulence) a plateau is reached which is like an attractor of the system, an internal goal (not a target for any individual speaker but a super-individual "invisible hand" state). In Wildgen and Mottron (1987: 103-109) the great vowel-shift in the history of English has been modeled using catastrophe theory.

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<sup>2</sup> The evolution of human language, mainly the dramatic differences between humans and other animals in this respect, suggests that language is an open rather than a closed system. It has an essential range of flexibility and creativity. These features are not only visible in the historical change of languages but also in language acquisition and situated language use.

<sup>3</sup> Heine and Kuteva (2005) show that patterns of grammaticalization depend on language contact.



**Figure 2 : The „great vowel shift as a global shift of an attractor configuration beyond the borderline and the creation of diphthongs as a structural consequence (cf. Wildgen and Mottron, 1987: 104f)**

An even more dramatic shift occurs if a population gives up its language in favor of another language or in the case of language death. This case has occurred many times in the process of colonization of the Americas, either because the population died out physically or because it adopted a Creole language induced by colonial contact and gave up its indigenous languages. Sometimes these cases are compared to the extinction of a species although language death without a follow up mixed language is rare. A simple case than that of Pidgins and Creoles may be observed in the shift from regional dialects to a prestige language, e.g., in Bremen the shift from the Bremer Platt to High German at the end of the 19<sup>th</sup> and the beginning of the 20<sup>th</sup> century. In this case, one may observe a rather *quick* break down of a language/dialect in the urban context. Thus, the period from old Saxon to Middle Low German and New Low German has a time depth of at least 1000 years (ca. 900 to 1900) whereas the language-shift took only two generations (ca. 1870 to 1920) this is an acceleration of  $1000:50 = 200$  times quicker. Details of the process have been elucidated using the method of linguistic biographies collected during fieldwork done in the years 1982-1988. The general picture is that of a dominance shift in the use of spoken Low German in favor of the written language of school and administration: High German. This shift is first a shift in the attitudes towards the value (market position) of the dialect and then a shift in the preferred choices in a bilingual situation. Figure 3 shows the dominance shift as a change of attractor landscapes with two attractors: A and B at time 0, 1 and . The level c indicates a kind of fluid caught by the attractor; at time  $t=1$  it fills both attractors , at time  $t=2$  it has definitely changed to attractor B.

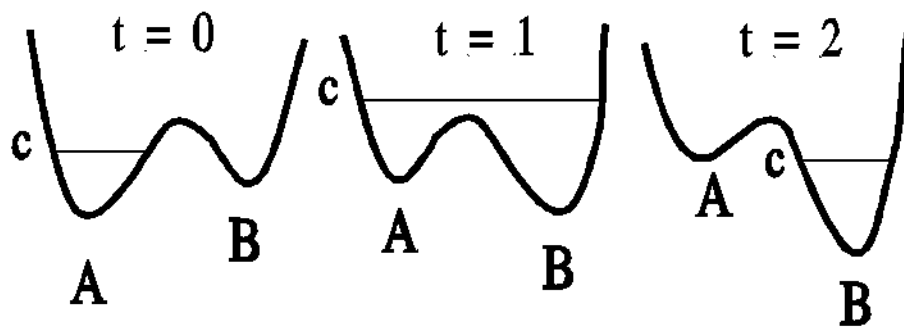


Figure 3 : Shift in an attractor field.

Figure 4 shows the bifurcation set  $(u,v)$  in a bipolar dynamic field (small pictures) called the cusp in catastrophe theory which drives a change of the type indicated in Figure 3.

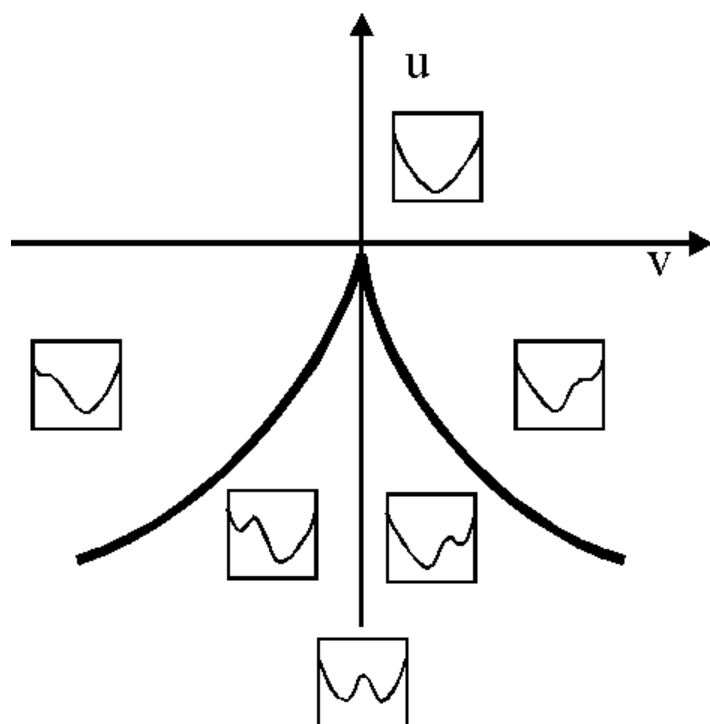


Figure 4: Language shift as a path in a bipolar field called “cusp”.

A more refined synergetic model has also been proposed in Wildgen (1986: 126-135) in analogy with models for migration in towns triggered by in-group and out-group sympathies; i.e. small demic migrations in towns to specific dwelling areas seem to have similar dynamics as symbolic migrations of linguistic varieties (cf. Wildgen, 2005). In the case of Bremen the autobiographic novels of Georg Droste (1876-1935) show that the urban context, which he had lived in at the end of the 19<sup>th</sup> century witnessed a dramatic demic (=population) migration, as new streets were built with houses sold to middle and high class citizens, whereas the poor population living in a network of cottages (“Katen”) linked by foot paths (“Gänge”) left the area. After a phase of social and linguistic contacts the population *and* the



language had been exchanged/shifted. Thus the shift of language was parallel to a massive social migration inside the town (linked to work migration from rural areas into the town and to migration of middle and upper class people from other towns to Bremen). This shows that the parallel treatment of demic and linguistic migration is not just a fiction of the model; both processes stand in a causal relationship and show similar dynamics.

#### 4. The dynamics of interference/transference in language contact

The basic problem of traditional contact studies has been the integration or impact of elements, structures of a contact language on the language studied. Thus, for German, one may analyze how Latin and Greek words and patterns were integrated into Germanic Bible translation, how old and middle French, later English and Slavonic languages left traces in the lexicon and grammar of German. The underlying theoretical problem is that of “blending” and of the psychological (mental/neural) and sociological conditions of such a process.<sup>4</sup>

We may start with the technical question, how an item of language  $L_1$  is transferred to language  $L_2$ . In order to answer this question we first need a proper format for the representation of the item. If we follow the “information paradigm” of Pollard and Sag (1987)<sup>5</sup>, the phonology (PHON), the syntax (SYN) and the semantics (SEM) of the item should be described by a set of features (phonological in the first, syntactic in the second, and semantic in the third case). The interference or blending is then an operation on the sets: PHON and SEM (I shall neglect the syntactic feature set in the following). Basically if  $PHON = \{p_1 \dots p_n\}$  and  $SEM = \{s_1 \dots s_m\}$  the blending may be just a choice function, a filter of two items (defined as a couple of feature sets)  $(PHON_1, SEM_1)$  and  $(PHON_2, SEM_2)$ . If an item is transferred/borrowed into/by a new language, the choice function blends it with the standard type of an item in the same category. Thus one could describe formally the phonological transfer from lat.: *tabula* to old High German: *tavala/tabala* and to New High German: *Tafel* by a transformation (change and deletion) of the phonological feature matrix. In a similar way the semantic features could be modified, such that readings like “painting on wood” only show up in compounds like “Tafelbild” or the reading as “board” only in “Wandtafel”, etc. The fact that English “table” is now rather translated into “Tisch” (than

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<sup>4</sup> For a general description of borrowing and transfer cf. Beichert and Wildgen, 1991.

<sup>5</sup> It is philosophically based on Dretske, 1981, and further elaborated in HPSG-grammars.

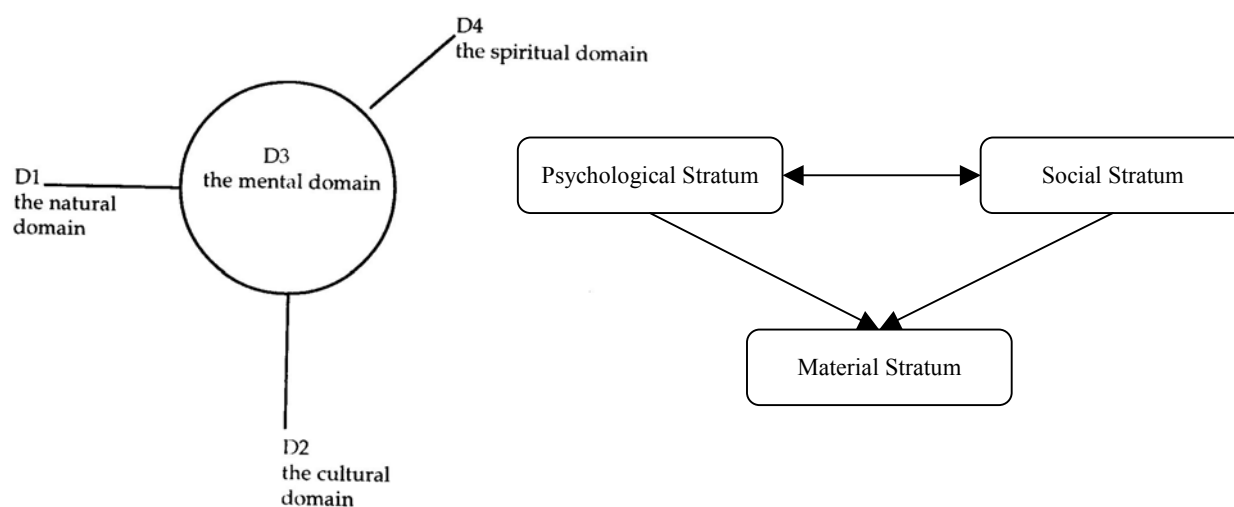
“Tafel”) shows the divergence of the process. The fact that the preferred (prototypical) shapes have also shifted, would ask for further onomasiological specifications.

My questions are, however, more fundamental:

1. Are check lists with criteria (or features) an adequate description (in phonology and semantics)?
2. Are transformations operating on discrete finite sets (replacement, deletion, possibly addition) the correct model for the dynamics one can observe in language contact situations?

The simple example above shows already that rather complex operations in the articulatory/auditory space occur not only in the integration of foreign patterns, but also in the operations of language change which shape them after the borrowing. In the semantic or even in the referential domain (cf. the tradition “Wörter und Sachen”) continuous shifts occur, i.e., the blending is not describable by a kind of replacement mechanism characteristic for generative grammars. As continuous and non-linear models are rare in linguistics, no straightforward solution is available for this basic problem of contact linguistics. I can just discuss some types of improvements.

1. The tempting idea of Dretske (1981) and Pollard and Sag (1987) (many others asked for a standardization of the divergent grammar style in the 80s) is that we have just one homogeneous space that of information, which may be further separated by labels like: phonological, semantic, syntactic. However, authors like Fauconnier (mental spaces) or Lakoff (metaphors) have shown the fundamentally divergence of domains/spaces and the relevance of mappings between them. A rather specific architecture has been proposed by Brandt (2004: 26) who distinguishes from domains as illustrated in Figure 5a (cf. Brandt, 2004: 26) or b (cf. Poli, 2005: Figure 1b).



**Fig. 1: (a) The panorama of semantic domains (cf. Brandt, 2004: 26), (b) the triangle of strate (cf. Poli, 2005: Figure 1b).<sup>6</sup>**

The etymological path of a word may show referential changes ( $D_1$ ) due either to its mapping to the mental image ( $D_3$ ) or to cultural changes in the world it refers to ( $D_1$ ) properly; more abstract blends involve  $D_2$  and  $D_4$  (cf. the lexicon of intellectual concepts). The blending theory of Fauconnier and Turner (2004) considers the existence of basic schemata, which may control the selection of a blend, they may be rooted in  $D_3$  (cognition), which contributes specific measures of simplicity and optimality. If blendings are rather evident in semantics (cf. metaphors, irony, wit), phonological blendings operate on a phonetic space (auditory, acoustic, articulatory) i.e., they are organized by principles in  $D_1$ ; but cultural preferences ( $D_2$ ) and properties of the system of oppositions/contrast ( $D_3$ ) contribute to its dynamics.<sup>7</sup> As a conclusion one may say that the artificial

<sup>6</sup> In Poli (2005) the triangle of interrelations is proposed based on the consideration of arguments put forward in European phenomenology. The relation between the proposal of Brandt and Poli is rather indirect because the American discussion on blending and mental maps discussed by Brandt has also its roots in European phenomenology.

<sup>7</sup> The partial aspect made structuralists like Hjelmslev think that the linguistic system is basically an abstract formal machinery like logics.

homogeneity of feature-(information-)models does not correspond to the phenomenological stratification of human sign behavior.

2. The natural domain ( $D_1$ ) has evidently a continuous space-time organization (in  $R^4$ ) and a type of dynamics corresponding to these spaces; whereas the mental domain  $D_3$  entails a preference for quasi-categorical and pseudo-stable spaces and thus rather a kind of discrete dynamics. Generative grammars have generalized and radicalized this trend (they tend therefore to a cognitivistic interpretation). The cultural domain, most visible in sociological, ethnological, cultural studies of language, is characterized by statistical flows, chaotic phases, decentralized dynamics with the effect of divergence or convergence. Thus models encompassing the effects of this domain are neither low dimensional, continuous as  $D_1$ , nor categorical as  $D_3$ , but rather stochastic with flows (fashions, trends, invisible hand effects). I dare not comment  $D_4$  but myth, religion, and literature, art show very complicated effects which mix individual creativity and cultural trends (i.e.,  $D_2$  and  $D_3$ ); cf. for innovation in art, Wildgen, 2004b.
3. Linguistic and cultural contacts involve all the basic spaces. In the case of  $D_4$  the construction of linguistic identity involves the invention or assembling of myths; evaluative shifts underlying language shift involve theories/ideologies and future projections, which direct the projective socialization of parents (mothers) in view of the career of their children. Therefore, it would be false to consider transfer-phenomena just on the level of  $D_1$  (phonetics) or  $D_3$  (neural organization of bilingual minds). Nevertheless the basic spaces  $D_1$  and  $D_3$  seems to govern a large part of transfer processes and therefore traditional methods have made a good choice.

## 5. Conclusion

The macro-dynamics of language shift on a historical scale are accessible to methods of dynamic systems theory and can use the already successful models for demic migration and economic dynamics. At the cognitive level it becomes clear that non-linear and chaotic dynamics are relevant and these insights limit the application of the mechanistic computer metaphor to cognitive linguistics. In the proper field of contact linguistics the constructions of political and cultural identities ( cf.  $D_4$ ) and cultural dynamics (including its economic conditions) have been highlighted in studies on Pidgins and Creoles. An integrating model which involves the dynamics of the whole architecture ( $D_1$ - $D_4$ ) is not yet accessible, but it becomes clear that the unification of the grammatical model which neglects, for simplicity reasons, the phenomenological multiplicity of the linguistic sign was a garden path .



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