Rhesis International Journal of Linguistics, Philology and Literature

Historical Linguistics and Cognitive Science

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Abstract

In this paper we investigate possible links between historical linguistics and cognitive science, or theory of the mind. Our primary goal is to demonstrate that historically documented processes of a certain type, i.e. those relating to semantic change and grammaticalization, form a unified theoretical bundle which gives insight into the cognitive processes at work in language organization and evolution. We reject the notion that historical phenomena are excluded from cognitive speculation on the grounds that they are untestable. Rather, we argue for an extension of Labov's uniformitarian doctrine, which states "that the same mechanisms which operated to produce the large-scale changes of the past may be observed operating in the current changes taking place around us." (Labov, 1972:161). This principle is transferable to the current context in the following way: first, language as a system is no different today than it was millennia ago, easily as far back as diachronic speculation is likely to take us; and second, the human brain is structurally no different today from the brain of humans of up to ten thousand years ago. The cognitive-linguistic parallelism between the past and the present makes speculation possible, in this case about code-switching, even if it is not testable in the laboratory. It further allows us to make forward and backward inferences about both language change and its cognitive underpinnings.

Keywords: historical linguistics, cognitive science, code-switching, semantic change, grammaticalization

1. Why study language change?

In this paper we hope to establish the parallelism between cognitive science and historical linguistics.We begin with a brief survey of the domain of historical linguistics, with illustrative examples. The purpose of this survey is to provide an outline of the usual concerns of the historical linguist, whose concentration typically falls far from that of the cognitive scientist. This intellectual distance accounts for the general absence of meaningful dialogue between language historians and cognitive scientists. We do not seek exhaustiveness in this review, either of topic areas or of bibliographical coverage. In the interest of space, our presentation has a rather telescopic character.

The study of language change affords us a systematic view of the history of a language or language family, its speakers, and their cultural practices. All languages are in a constant state of change, some more accelerated than others. For example, change is rapid in a widely spread language like English, with more than a billion first- and second-language users. English has even developed a number of named varieties such as *Nigerian English, Australian English, Indian English* and so on since the period of

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European expansion, a trend which continues today under the influence of immigrant populations learning English in the US, the UK and elsewhere.

A slow rate of change, by contrast, can be seen in a language like Icelandic, which is spoken in a geographically limited area by a relatively small number of people with a historic resistance to external linguistic influences. Despite these differences, change, at whatever rate, seems to be a defining characteristic of language, and for this reason alone its study may provide insights into cognitive processes.

2. Some fundamental questions and areas of concern for historical linguistics

In this section we review, mainly by examples, some traditional areas of concern for the historical linguist. Fully elaborated discussion of each of these areas can be found in standard textbooks of historical linguistics such as Luraghi (2006) and Campbell (2004) and many others. We have intentionally omitted some areas (e.g. cultural reconstruction) which take us too far afield.

2.1 What parts of the linguistic system are affected by change?

They all are, and consequently the answer to this question is rather lengthy. Basically, the following are some contemporary examples of change currently taking place, as well as some older, more traditional examples of the type usually discussed in the survey literature. We cite contemporary examples because we endorse the position that variation represents change in progress (discussed extensively in Labov, 1994). The areas identified below comprise the four core levels of the linguistic system (Phonology, Morphology, Syntax and Lexicon). Historical linguistics is efficient at describing changes such as the following for periods of up to 5-6000 years. This fact alone should be sufficient to answer the question of whether historical linguistics can provide a window on the present, and vice versa.

Phonology:

<u>Contemporary examples</u>

§ American English dialect pronunciations such as:

The vowels /a/ and /ɔ / as in *cot* /kat/ and *caught* /kɔt/ are merged in Western Pennsylvania as /a/ [ed. /O/ and /kOt/ should have “open o”, 2x]

The vowels [ɪ] and [ɛ], as in *pin* /pɪn/ and *pen* /pɛn/ are merged as [I] before nasals in many dialects of English[ed. /E/ and /pEn/ should have “epsilon”, 2x]

§ The alternation of *-ing* /ɪŋ/ vs. *in'* /ɪn/ (*running* vs. *runnin'*) [ed. N should be “engma”, a velar nasal

§ r-less vs. r-ful pronunciations (/fahm/ vs. /fa˛m/ *farm*) [ed. Second word in phonetics should have “upside down r”, not R in circle

<u>Historical examples</u>

§ Latin long vowels were lost in modern Romance languages

§ Latin *h* was lost in Romance

§ English underwent the “Great Vowel Shift”, which raised or diphthongized every vowel in the system

Morphology:

Contemporary examples

§ Variation in the past tense of *dive* (*dived, dove*); *lie* (*lay, laid*); *hang* (*hung, hanged*)

§ Variation in the plural of (computer) *mouse* (*mice, mouses*, with *mice* surely winning out, as evidenced by aisle markers in electronics stores)

§ Historical (narrative) marker in *–s* (*I say**s**, you say**s***)

§ Singular *they* (***Someone's** at the door. Let **them** in*)

Historical examples

§ Loss of case system from Old English to Modern English

§ Loss of neuter gender as a morphological category from Latin to Romance

§ Development of a set of auxiliary verbs from Latin to Romance

Syntax:

Contemporary examples

§ Extension of the "progressive" to stative verbs (*I am liking this, Are you wanting another sandwich*?)

§ Positive *anymore* (*John's being a real pain anymore*)

§ African American English multiple negatives (*I don't got no money no way*)

Historical examples

§ Word order change from Old English SOV to Modern English SVO

§ Development of compound tenses like Ital. *ho visto* in Romance

§ Replacement of Latin middle/passive with reflexive in some Romance languages, e.g. Lat. *venditur*: Ital. *si vende* 'it is sold'

Lexicon:

Contemporary examples

§ *To go = to say* in narrative (***So I go***: *Hey, what are you doing*? ***And she goes**: I'm just standing here.* ***And I go**…*)

§ *Be like = to say* in narrative (***So I'm like***: *Hey, what are you doing*? ***And she's like**: I'm just standing here.* ***And I'm like**…*)

§ *Comprise* as a passive verb (*This book **is comprised of** five chapters*) for the standard active verb (*This book **comprises** five chapters*)

§ Slang in general, such as *slammin'* (awesome), *hot* (sexually attractive) or *the bomb* (something extraordinarily good)

Historical examples

§ *Have* 'possess', formerly 'seize'

§ *Tener* in Spanish 'have' from Latin *tenere* 'hold'

§ Italian *cosa* 'thing' from Latin *causa* 'lawsuit'

2.2. What are the appropriate methods used in historical classification and reconstruction?

Language classification (into subgroups, families, and further into phyla or stocks) is a historically-based activity. Specialists reconstruct protolanguages by evaluating shared features of attested languages and making methodologically-informed judgments about their filiation. Once relatedness among languages is determined, earlier forms and

constructions are postulated based on established methodologies. The standard methods are:

a. The comparative method (phonological matching to determine relatedness, followed by triangulation and the establishment of proto-forms; this method requires at least two languages). This is a universally applicable method which relies primarily on lexical and phonological data.

b. The method of internal reconstruction (internal analysis, primarily of morphology, to determine and recover the oldest stage of a single language). Because it focuses mainly on morphological alternations, this method is less useful for morphology-light languages like Chinese or Vietnamese, but is ideal for morphology-heavy systems like Greek or Sanskrit.

c. Other universally accepted approaches and methods such as determining the effects of language contact, analogy, and inferences based on typological dependencies. The outcomes of these other ways of approaching linguistic data must be separated from those uncovered by the comparative method. We do not include "mass comparison" (Greenberg, 1987) or any of the other "long distance" methods which purport to generate phylum-level classifications such as Nostratic or Amerind. These controversial approaches typically lack rigor, and yield results which are often suspect.

2.3. How are languages related to each other (genetic linguistics)?

As languages change they leave behind traces. These traces are often the access points to the history of individual languages. It is through the cautious inspection and evaluation by specialists that relevant data are identified and their role in an earlier stage of the language under evaluation is assessed. In this way it is determined whether any two or more given languages are related, that is, whether they share genetic material in the form of common linguistic features inherited from a single ancestor. For example, Modern English has a class of irregular verbs (*sing-sang-sung*, *drink-drank-drunk*) which are outside the normal pattern of perfect tense and perfect participle formation (*love-loved-loved*, *touch-touched-touched*). These irregulars pattern in exactly the same way in Modern German (*singen-sang-gesungen*, *trinken-trank-getrunken*). This parallel between English and German is the type of trace data which provides evidence of common ancestry.

Related languages are generally portrayed in a family tree diagram of the conventional type (see Baldi 2002 for a tree of the Indo-European languages). Groupings reflect bundles of shared features. For example, all West Germanic languages show consonant doubling between a short vowel and a resonant: cf. Old English *settan*, Old Saxon *settian*, but Old Icelandic *setja* 'set'.

2.4. How are the languages of the world the same and how are they different (linguistic typology)?

Linguistic typology is a means of classifying languages according to certain non-arbitrary structural features. For example, languages can be grouped according to whether or not they have clicks in their phonological system; according to the structure of their system of word-formation; according to their patterns of word order; and so on.

Typology is ahistorical; it does not contribute to the classification of languages genetically, but rather structurally. Indeed, it is indifferent to genetic relations between languages. For example, French is typologically closer to English than German is, even though German is closer to English genetically.

Thus typology is an auxiliary tool for historical linguistics. The results of a typological classification can at times provide insights into language change and history, especially through the utilization of implicational statements which can make some historical predictions. For example, it is a typological fact that SOV languages (*She him sees*) are typically postpositional (*Give the book the girl-to*). If then, one discovers a trace postposition in an otherwise prepositional language, such as Lat. *mecum* 'with me' instead of **cum me*, one might infer from this that Latin was at one time postpositional, which further suggests, by implication, that it was at one time dominantly SOV. The use of typology in establishing distant filiation is explored by Blasco Ferrer (2011).

2.5. What are the effects of language contact on language change?

The effects of contact can be negligible, or they can be huge. Which it turns out to be is very much a matter of how much borrowing there is, and what type of borrowing it is. For example, if a language borrows a few dozen words from another language, as, say, English has from Swahili, there is insufficient weight to the borrowings to have an effect outside the lexicon, which now contains such forms as *bwana*, *simba*, *safari*, *daktari*, etc. If, on the other hand, there is a large number of borrowings, large enough that morphological patterns are imported into the borrowing language (such as English vocabulary from Latin/French, which now forces us to recognize prefixes like *pro-*, *in-*, and *suf-*, or suffixes such as *–ation*, *-ence*, or *–ity*), then the long-term effects are important structurally as well as lexically. Even more extreme cases are to be found through the study of pidgins and creoles, or mixed languages like *Michif Cree* (Bakker 1997) or *Media Lengua* (Muysken 1997), where structures from the second (lending) language have been incorporated right into the syntax of the first (borrowing) language. One sure mechanism which underlies the formation of mixed languages is code-switching, which will be examined below. The study of code-switching is interesting for two reasons. First, it provides insight into the processes of linguistic change in a severely shortened time frame. Second, and directly relevant for our purposes, it can be used to create a link between historical linguistics and cognitive science, given that the diachronic processes identified during the study of language change can provide an explanation for the computational procedures that operate during the real-time processing of code-switched language. This last point is developed in greater detail below.

2.6. What does historical linguistics have to offer to other disciplines?

As the oldest subdiscipline within linguistics, and the most conservative, it is not surprising that historical linguistics has left its mark on many fields: classical philology, archaeology, anthropology and other mainly historical disciplines have benefited from the contributions of historical linguists (see the still useful summary in Anttila 1972: 377-388). And in recent years there has been a concentrated effort exploring the mutual

findings of historical linguistics and population genetics, represented prominently in the work of Cavalli-Sforza[1].

3. Generative grammar

In the early days of generative grammar, there appeared to be a direct link between historical linguistics and psycholinguistics, specifically on the issue of language change and language acquisition. The general claim was that children were the initiators of language change, and each child has to create language for him/herself. On this view the main source of change in a language is to be found in the transmission of the parents' grammar to the child. In the course of this process the child learns the parent's language imperfectly, and creates a grammar which differs from the adult grammar; the differences are often in the form of simplifications, specifically analogies such as *goed* for *went* or *singed* for *sang*. Changes accumulate throughout the child's grammar-building years, and by the time the process is complete, the adult grammar and the child grammar are demonstrably different[2].

The parent-to-child psychological model integrates change and language learning, and it would surely qualify as a demonstration of the link between historical linguistics and cognitive science if it were a valid position. It has remained a feature of generative approaches, and although it has been refined and strengthened, it still suffers from the fact that there is no good evidence that language change takes place between generations, or, perhaps more seriously, that children learn their language exclusively from their parents. Change takes place in children's speech not when they are babies, but when they identify with peers in the 6—12 year range. A gap between generations occurs later, when children become adolescents, and the mechanisms are sociological, not psychological. The generative literature presents the language change issue in terms of *competence* and *performance*. The now famous "Model of Linguistic Change" represents the parent-to-child, generation-to-generation fiction popularized by generative grammar in the '60's and 70's. For discussion see King (1969: 64-104, esp. 85 for the diagram).

Given the failure of generative grammar to connect historical linguistics and language acquisition in a way that explains language change, one might seriously wonder whether a connection between historical linguistics and cognitive approaches to language is possible at all.

4. Cognitive Science

We come now to *cognitive science* "the mind's new science".[3] University programs in cognitive science embrace not only cognitive psychology and theoretical linguistics, but

[1] See his highly readable book (1996) for an account of the population genetics research, including its partnership with historical linguistics. One must be forewarned, however, that Cavalli-Sforza follows the methodology and findings of Joseph Greenberg, which of course fits well with his big-picture perspective,

2 Initial proposals in Kiparsky (1965), popularized by King (1969), modernized to keep pace with trends in generative grammar and typology by Lightfoot (1991), summarized and critiqued by Hale (2007).

3 Not to be confused with Cognitive Linguistics or Cognitive Grammar, often associated with the work of George Lakoff: see his and Mark Johnson's *Metaphors We Live By* (1980), and Lakoff's *Women, Fire*

also computer science, analytical philosophy, neuroscience, artificial intelligence and other disciplines, depending on the organization of relevant institutional strengths (anthropology, sociology and education are included in some universities).

Is there a role for historical linguistics to play in this supremely interdisciplinary effort? The answer appears to be: "It depends." A recurring issue seems to be, what kind of historical linguist or cognitive scientist is doing what kind of research? Most historical linguists come out of the philological/classical tradition, and are concerned with topics like the reconstruction of a Proto-Indo-European verb form, an etymology, or a micro-problem of phonology or morphology such as those outlined above. Such micro-research is hardly of direct relevance to cognitive science. Most cognitive scientists, on the other hand, come out of psychology or computer science programs. They are involved with questions of how information is represented, perceived, processed, and transformed by humans (and other animals) and by machines in complex systems such as memory and language. They study how we hear and see; how we move, reason, learn and remember. The explosive growth witnessed in the sub-disciplines of computer science and neuroscience has profoundly affected the field of cognitive science. It is now widely accepted that the main function of the brain is to process and analyze information (i.e., the brain is a "computer of sorts"), and the resulting effort has been to represent its function in formal computational models which have brought critical advances in our understanding of visual perception, thinking, memory and language. Cognitive scientists with particular interests in language examine how we produce and understand spoken and signed languages, and how these extraordinary abilities depend upon the workings of the brain. At the same time, it has become increasingly clear that the brain is a type of "computer system" that imposes powerful constraints on the kinds of computation it undertakes. And it is in working out what these constraints are that we believe historical linguists and cognitive scientists can team up. By and large cognitive scientists know little about language change and historical linguists know little about the mind and its properties. But we believe that just as cognitive science has benefited tremendously from advances in computer science and neuroscience, the symbiosis between historical linguistics and cognitive science can bring about advances in both fields which can provide powerful new insights into the types of information that potentially constrain language comprehension and production. And so we ask: *Is cognitive historical linguistics possible*? If so, what kind of questions could it address?

5. Cognitive historical linguistics

Cognitive historical linguistics should be possible in principle, primarily because the brain structure found in modern humans has not changed over the longest span considered for diachronic linguistics, about 10,000 years. So what we say about language change based on synchronic observations should in principle be transferable to the diachronic situation. This is what Labov meant by the clever title of his 1974 paper "On the Use of the Present to Explain the Past". Of course not every language change lends itself to cognitive speculation, so we must be cautious as we proceed, isolating those

and Dangerous Things (1987). Also relevant is the work of Ronald Langacker: see his *Foundations of Cognitive Linguistics I* (1987).

cases which are clearly relevant to the question. For example, we need not explain every sound change or borrowing with reference to cognitive principles. But there do seem to be some domains which lend themselves to broader explanation. For demonstration purposes we have identified two areas that we feel are describable in historical-cognitive terms: semantic change and grammaticalization.

5.1. Semantic change

The study of semantic change is in some ways as old as the study of meaning itself. Plato, in the *Cratylus*, speculated on the origin of words, and etymology was established by the Roman grammarian Varro (d. 27 BCE) as one of the principal divisions of linguistic study (the other two being morphology and syntax). Of course in those early days, language study, including etymology, was entirely non-scientific, which is to say that there was no real method, and there were virtually no constraints on etymological proposals. Etymological investigation was based largely on speculation and imagination, and because the ancients did not appreciate the diachronic dimensions of language, etymology (which we may take as equivalent to semantic change) was closer to what we now call "folk etymology" than to scientific etymology.

The advent of scientific linguistics in the eighteenth and nineteenth centuries changed the way scholars approached language, and the rigor of the post-Neogrammarian approach eventually spread to semantics, primarily in the work of Bréal (1897). Bréal, who regarded semantics as a historical discipline[4], worked out the basic mechanisms of semantic change, which were later refined by such scholars as Ullmann (1964).

Given the extensive etymological documentation of language families with deep written traditions (Indo-European and Afro-Asiatic, for example), it is not surprising that semantic change as evidenced in these older systems has served as a grand template for the study of semantic change in general. Nor is it surprising that this abstract system of interlocking word meanings is based in large part on the mechanisms of metaphor and metonymy.

Metaphor, which has to do with the figurative extension of a word, is at work when we perceive something in terms of something else. For example, when a physical action or object is viewed abstractly, this is considered a metaphorical extension. An example of this is *to understand,* literally 'to stand amidst' which comes to mean 'to comprehend'; note the similar behavior of the verbs *to grasp, to get* and the expression *to get one's mind around something*. Other examples of metaphor which have taken root as permanent semantic changes are: *prayer,* which comes to mean 'bead' based on the association of counting one's prayers on a string of beads; Ital. *firma* 'signature' from the verb 'to close', and Eng. *chill* 'to calm down' from a verb originally meaning 'to cool'. In like manner when we call someone a *snake* or a *lion*, we are extending features of the snake (chiefly stealth) or of the lion (chiefly bravery) to the person. Similarly, we also can refer to a person who is 'behind the times' as a *dinosaur*; we speak of *live ammunition,* we debate *a dead issue* (neither ammunition nor issues are animate and therefore not destined to die); we elect the *head* of the department (the person at the top);

[4] Of course there is more to semantics than its diachronic properties, but we will be discussing mainly diachrony in this section.

we refer to the *mouth* of a river (where the river widens and expels massive volume into the adjoining waterway); and finally in building (construction) we nail the *footers* to the floor and the *headers* to the ceiling. Each of these metaphorical constructs extends the original meaning of the base word into new contexts and applications.

Metonymy, closely related to metaphor, has to do with the substitution of a word for another word with which it is closely associated. In Old English, for example, the word *çêace* 'fleshy side of the face below the eye' meant 'jaw', but has shifted now to 'cheek'. Wines like *Champagne, Chianti* or *Asti Spumante* are all direct transfers from the place where they are made.

Finally we have a few words to say about *synecdoche*, part-whole transfer. This mechanism of semantic change, often grouped with metonymy, has been a powerful vehicle semantic change in the lexicon from the beginning. Synecdoche has to do with the use of a more comprehensive word for one that is less comprehensive, or vice versa. Typically a part is used to designate the whole, as in the following examples: *wheels* to designate a *car*; count *heads* or *count noses* instead of *people*; hire *hands* (*laborers*), give *a hand* (*help*), and in colloquial speech we often use *face* or *ass* to represent a person, as in *I don't want to see your face/ass in here again*.

As an example of an older change we offer the following. In an earlier paper (Baldi & Cuzzolin, 2005) we it was demonstrated that within the IE family, there are no fewer than eight unrelated roots recoverable for PIE which are reconstructible with the meaning 'seize, control, conquer'. Over time each one of these eight independently developed into verbs signifying 'have, possess, own'. It is remarkable that each one followed the same "semantic itinerary", recoverable in part from the written record, but mainly traceable by viewing the various stages through the apparent universals of semantic change, going from 'conquer, seize' to 'have control over' to 'possess', to 'have'. And as we will see below, other advanced meanings of 'have' figure prominently in a variety of grammaticalized structures in Spanish involving code-switching, which further strengthens the utility of serious etymology in cognitive science.

These mechanisms (metaphor, metonymy and synecdoche) are all important devices which speakers use to organize their lexicons. And of course there are many more paths which words can follow as the lexicon of a language is enriched by internal changes (ellipsis, hyperbole, compounding, etc.; see Campbell, 2004). Psycholinguistic experiments have affirmed the central role of these kinds of lexical strategies in cognitive organization. The main point is this: the mechanisms of lexical modification and change which we identify and verify by laboratory experimentation or by simply observing their use in naturally occurring speech are the very same ones that we can infer for the long-term history of languages. Metaphor, for example, isn't something that came about in modern times, or even in classical times: it has been there all along. So when we delve into the Indo-European lexicon, for example, we can unite the disparate lexical data with a sound, replicable arsenal of mechanisms that mirror those of today. This is enough in our view to establish the universality of these mechanisms, and by implication, their place in the cognitive domain.

So one thing that historical linguists can offer to cognitive science is a deep understanding of diachronic semantic change, which can provide insight into the cognitive foundations of lexical semantic structure and the organization of the lexicon. This is surely one area of intersection for cognitive and historical linguistics.

This much is laudable, but clearly we have not yet fully established the potential partnership between historical linguistics and cognitive science. Can we find another

way for historical linguists to contribute to cognitive science, especially as concerns the structural core?

5.2. Grammaticalization

Grammaticalization is the change whereby lexical items and constructions come in certain linguistic contexts to lose their lexical meaning and serve grammatical functions, or, the change whereby a grammatical item develops a new grammatical function.

As a process which in effect creates grammar out of words, grammaticalization is of special interest to the language historian. It may be viewed as an entry point into the history of at least some parts of the structural core of the language system. Furthermore, grammaticalization simultaneously sheds light on phonological, morphological, semantic and syntactic processes as they work together as a mechanism of grammatical creation.

We can illustrate grammaticalization with a few conventional examples:

§ The development of the English preposition/adverb *back* (*Give it back to me*.) from the noun *back.*

§ The development of the Romance adverbial suffix *–mente* (as in Ital. *facilménte* ’easily’) from the Latin word *mens, mentis* ‘mind’.

§ The development of the English preposition /adverb *ahead* (*Max has gone ahead*) from the noun *head*.

§ The development of the English adverbial suffix *–ly* (*quickly*) from Old Eng. *lîc* *líc* ‘body’.

§ The development of the past and future tenses of Romance languages like Italian or French from the verb *have*, as in Ital. *ho fatto, farò*.

§ The development of the English verb *will* from a lexical verb meaning ‘want’ to a grammatical marker of the future tense, as in *Marcia will go when she’s ready.*

Grammaticalization is prevalent globally, and works in much the same way in languages which are geographically, genetically and typologically separate from each other[5]. For this reason it can be considered at least statistically universal, and therefore part of the design of language change. It (may) follow from this that grammaticalization can be described in terms of cognitive properties which reflect such phenomena as learning strategies and economy. Typical characteristics of grammaticalization are:

1. Loss of lexical meaning
2. Phonological reduction
3. Reanalysis

[5] Some scholars deny the existence of grammaticalization as a special mechanism of change, arguing that it is merely the instantiation of other, “everyday” changes such as semantic change, phonological change, and especially reanalysis. While we recognize the merit of some of these arguments, we nonetheless pursue grammaticalization as a separate category here since the results of grammaticalization are cumulative in ways that other changes are not.

5.2.1. Loss of lexical meaning = fading, semantic bleaching or desemanticization

When a lexical item loses (some of) its dictionary properties, this is called desemanticization. Some useful examples are:

§ Old E *hâd* ‘condition’, which developed into the suffix *–hood* (*girlhood*)

§ Old E *lîc* ‘body’, which developed into the adverbial suffix *–ly* (*quickly*).

The original lexical meanings of both of these suffixes are now invisible to speakers.

§ Fr. *pas* ‘step’ came to be used in emphatic motion contexts like *je ne vais pas* ‘I don’t go a step’. The emphatic construction is parallel to English ‘no way’, as in *I’m not going no way to the movies with Zelda*! It eventually spread out of the motion context, and *pas* lost its spatial characteristics. As *pas* loses its lexical meaning it acquires the grammatical meaning ‘not’, which it has absorbed from the now-omittable *ne* (*Je Ø vais pas*). Such a change is often referred to as *elliptical*, since there is an ellipsis of the original negation marker *ne*. In any case, *pas* has undergone desemanticization, and *ne* has become superfluous.

§ Finally the verb *have*, which has a long and complicated history in many languages, typically evolves in a succession of changes from its original meaning ‘grasp, seize’, to ‘hold’, to ‘have’ as a verb of possession, and in some languages all the way to a marker of past time, as in Fr. *je l’ai fait*, Eng. *I have done it*.

5.2.2. Phonological reduction

It is well known that historical linguistics is built around regular sound change, without which reconstruction and meaningful language classification would be virtually impossible. It is interesting that the phonological dimension of grammaticalization is often marked by *irregular* phonological development, that is, by phonological changes which apply in special contexts and do not have a general applicability. We can illustrate with a few examples.

§ The English verb of obligation/necessity, *to have to* is generally pronounced as *hafta* in all but the most formal contexts *(What do I hafta do to convince you*?). The change of [v] to [f] before [# t] is not a regular change in English. For example, for the sentence *Take the Rav to the garage* (a *Rav* is a model of car) it would not be possible to say **Take the Raf to the garage*. Likewise with *salve* (pronounced [sæv]), as in *It’s a good salve to use on your skin*, where **It’s a good* [sæf] *to use on your skin* would also be impossible. Thus the collapse of *have to* into *hafta* is irregular in that it reflects a process that does not apply every time that its structural conditions are met.

§ English auxiliaries like *’ll* (< *will*), and [P] (< *have*) are also the result of irregular phonological change. The following examples illustrate the distribution of full lexical verbs *have* and *will* versus the reduced auxiliary verbs written here as *‘ll* and [P]. First *will*, then *have*:

I’ll donate $500.00 to the zoo [= *I will donate $500.00 to the zoo*]

but not

**I’ll you my ’58 Dodge* [=*I will you my ’58 Dodge*]

*I should’*P *left earlier* [= *I should have left earlier*]

but not

**I'P $500.00 in the bank* [= *I have $500.00 in the bank*].

§ The elimination of the French unstressed particle *ne* as a carrier of negation has been mentioned above. This particle also occurs in other grammatical contexts where it is not susceptible to deletion, thereby providing another example of irregular phonological change. For example, the *ne* in constructions like *Je ne fais que d'arriver* 'I just arrived' is not omittable, so that **Je fais que d'arriver* is not possible.

5.2.3. Reanalysis

§ The English auxiliary *have* has many alternative outcomes, some of which we have already discussed. A peculiar one that shows the power of phonology is the reanalysis, not only in writing, of *have* as *of* (*I should of done it*; *We couldn't of ever found it.*). From the point of view of English grammar, the preceding sentences are impossible. But the reduction of *have* to '*ve*, spelled and pronounced *of*, is common in the speech and writing of unskilled or young language users. It shows that despite the senselessness of the construction, reanalyzed as *should of*, for example, the fact that *of* is a recognizable word seems to be enough for it to be treated as part of the construction. It is highly reminiscent of folk etymology, where phonology suggests a word, and meaning is ignored, as when Ojibwa *wotchek* is reanalyzed in English as *wood chuck*. *Wood chucks*, also known as *groundhogs*, it should be remembered, don't chuck wood.

§ The reanalysis of the Latin relative pronoun *quod* in Romance languages as a complementizer *(che, que*) is a well-studied phenomenon. From a Latin construction like *Scio quod fecit* 'I know what he did', *quod* is reanalyzed as the marker introducing the second clause, viz. 'I know that he did'.

§ For our final example of reanalysis, we note the English (also Romance) future construction (*Jason is going to visit Zelda*), in which *go* is being used as a true motion verb, followed by a complementary infinitive. Eventually the verb *go* begins to occur in non-motion contexts. The implied futurity of the first context (motion) is made explicit in the second, and the verb is reanalyzed as a verb expressing futurity rather than motion. The spread of one construction to another, here as elsewhere, is the result of analogical associations, which work together with the other steps in the grammaticalization process to create new constructions.

5.2.4. Stages in the grammaticalization process—a pseudo-chronology of French *ne pas*

The creation of the standard marker of negation in Modern French from emphatic negation in motion contexts is revealing in its complexity, encompassing an ordered sequence of stages on its way to colloquial French *pas* 'not'. We call the following stages a "pseudo-chronology" because it did not actually happen like this in real time. What we are saying is that if this process were to be analyzed diachronically, these are the steps it would follow.

Stage 1: as a negated verb of motion, Fr. *aller* 'to go' can be optionally extended by *pas* 'step' in emphatic contexts: *je ne vais pas*.

Stage 2: *ne* 'not' undergoes phonological reduction, which eventually leads to its complete (optional) elimination.

Stage 3: *pas* undergoes semantic bleaching and is reanalyzed as having a grammatical function, first marking negation emphatically, then serving as a simple marker of negation.

Stage 4: The newly grammaticalized non-emphatic *pas* is extended analogically to non-motion verbs (*je ne sais pas*)

Stage 5: *pas* is reanalyzed as being the primary marker of negation (*je vais pas*; cf. *pas du tout, pas encore*), spreading to new contexts where *ne* had never occurred.

Once semantic bleaching has taken place, grammaticalization proceeds along a "cline of productivity" (i.e. as a series of changes), such as

CONTENT ITEM > GRAMMATICAL WORD>CLITIC>AFFIX

The development of Fr. *pas* represents only the first two steps. The full process is seen in the development of the future tense in French, Italian and elsewhere from the verb *have*: Lat. *cantare habeo* "I have to sing" > "I will sing". From LEXICAL ITEM to GRAMMATICAL WORD to CLITIC to AFFIX (*je chanterai, canterò*).

Italian *avere* "to have"

Present Tense

Io **ho**	Noi **abbiamo**
Tu **hai**	Voi **avete**
Lei h**a**	Loro **hanno**

Future Tense of *pensare* "to think"

Io penser**ò**	Noi penseremo
Tu penser**ai**	Voui penserete
Lei penser**à**	Loro penser**anno**

The *passato prossimo* of *pensare* "to think"

Io **ho** pensato	Noi **abbiamo** pensato
Tu **hai** pensato	Voi **avete** pensato
Lei h**a** pensato	Loro **hanno** pensato

French *avoir* "to have"

Present Tense

J'**ai**	Nous **avons**
Tu **as**	Vous **avez**
Il **a**	Ils **ont**

Future Tense of *penser* "to think"

Je penser**ai**	Nous penserons
Tu penser**as**	Vous penserez
Il penser**a**	Ils penser**ont**

Passé composé of *penser* "to think"

J'**ai** pensé	Nous **avons** pensé
Tu **as** pensé	Vous **avez** pensé
Il **a** pensé	Ils **ont** pensé

The non-transparency between the source construction and the eventual grammaticalized form illustrates the fact that grammaticalization is often accompanied by irregular phonological development.

Grammaticalized forms may coexist with their source lexemes (*avoir*, *-ai*; *have*, *'ve*,[ed. Move ' to next line with schwa] ' P), but not always (cf. *hâd,–hood*).

Furthermore, grammaticalized forms may exhibit loss of inflection (*that-those* as pronoun, but only *that* as a complementizer).

5.2.5. Why is grammaticalization important for historical linguistics and cognitive science?

Grammaticalization is important for historical linguistics first because the process is widespread. Though we hesitate to use such terms as "universal" when we have done no statistical analysis, we are confident that statistics would favor the claim of universality, particularly because of the heavy component of analogy in most grammaticalizations (Kiparsky, 2012). Furthermore, and even more suggestively, there are a number of recurring grammaticalization paths that languages seem to follow. It surely cannot be accidental, for example, that languages as disparate as Spanish, Kwa and Bemba all use direct object markers based on locative prepositions (Campbell, 2004: 294-296). Universality, or statistical dominance, suggests something that is part of the design of language, or more directly, part of the ways in which language data is manipulated by learners in the processes of acquisition and use. Functional strategies which make the data to be processed more salient, iconic, or transparent may be part of the evolutionary process when applied to language.

Second, and more relevant for the present purposes, grammaticalization is important because it can be tested psychologically and can be associated with recognizable psychological and sociolinguistic processes. We illustrate this point with a linguistic phenomenon known as *code-switching*. We first provide a working definition of code-switching and illustrate how code-switching research has been used to examine a central question in cognitive literature: that of the relationship between the production and comprehension mechanisms. We then illustrate how insights from historical linguistics can help cognitive scientists understand the production patterns that shape comprehension difficulty.

6. Code-switching: what is it and why do cognitive scientists care about it?

In many bilingual communities, speakers regularly *code-switch*, changing from one language to another, often several times in a single utterance. One characteristic of code-switching is that it is often spoken without hesitation, pauses, and corrections, suggesting that code-switching is not random interference of one language on the other. Rather, code-switching is a natural process that reflects a systematic and exquisitely controlled integration of two linguistic systems and thus comprises an integral part of the linguistic competence of bilingual speakers (e.g. Lipski, 1985; Sankoff & Poplack, 1980).

One important distinction in the code-switching literature is the division between inter-sentential and intra-sentential switches. In inter-sentential code-switches, language switching takes place at sentence boundaries, as illustrated in the following Spanish-English example (English words in italics):

(1) Acaba de llegar un paquete. *Let's open it.*
'A package has just arrived. Let's open it.'

In intra-sentential code-switches, the alternation from one language to the other occurs within a single sentence:

(2) *My friend* dijo me que *because her parents* están *travelling*, se tiene que quedar a cuidar a su *little brother*.
'My friend said that because her parents are travelling, (she) needs to stay to take care of her little brother'

Early studies of language contact during the first half of the 1970's viewed code-switching primarily as part of the performance of the non-fluent bilingual who code-switched because of an inability to continue a conversation in the language of the floor at the moment (Myers-Scotton, 1993). Code-switching was considered by many monolingual and bilingual speakers as an ignominious degradation of the monolingual's rule governed language; a sign of laziness and lack of education. In his seminal work on Spanish-English bilingualism in Texas, Lance (1969) built a strong argument against the view that bilinguals who code-switched possessed only an impoverished vocabulary in their two languages and a very limited knowledge of both grammars:

Almost invariably, when this charge is made of Mexican-Americans, the first -- and often only-- example is the use of *troca* when there is a perfectly good Spanish word *camión*; the accusers, however, never say that Texas English has been corrupted by the borrowing of *plaza* in naming shopping centers when the good English word mall and the even more elegant French loan word *centre* are available or that *porch*, *piazza*, *yard*, *stoop*, *garden*, *veranda*, or *terrace* should be used instead of the Spanish word *patio*. Rather than being "nonlingual"--a patently absurd claim anyway-- the "Tex-Mex" speaker merely has a highly versatile linguistic competence encompassing a dialect of English, a dialect of Spanish, and the ability to use a mixture of the two when the social situation is ambiguous as to the choice of language or dialect for etiquette purposes. (p.12).

It is safe to claim that to date code-switching research has focused almost exclusively on the search for linguistic constraints that predict the generation of "good" or "acceptable" switches and ban those that are "unacceptable" or "ungrammatical." However, the past five years or so have seen an increase in interest on intra-sentential code-switching by cognitive scientists (e.g., Kroll, Dussias, Bogulski, Valdés Kroff; Kutas, Moreno & Wicha, 2009). Why? Because intra-sentential switches require greater simultaneous control of both languages, so they can be used as a tool to uncover the cognitive and neural mechanisms underpinning human language. It is only at the intra-sentential level that the interaction between two grammatical systems can be observed, and these interactions, to the extent that they can be systematically characterized, provide a unique opportunity for psycholinguists to investigate language processing viewed from the perspective of both sentence production and sentence comprehension.

7. Understanding human language comprehension and production

As mentioned earlier, a central goal in cognitive science has been to understand how humans are so incredibly fast and efficient at comprehending and producing language. Under ordinary circumstances, we are able to read with ease, speak fluently, and understand what is said to us with remarkable speed and accuracy. The average college-

age student takes approximately 250~300 milliseconds to read a word and speakers are able to produce an average of 200 to 300 words per minute. The fact that people are rarely aware of the mechanisms that support these skills masks the complexity of the cognitive and neural processes that enable human language comprehension and use.

Psycholinguistic studies examining monolingual linguistic behavior have shown that comprehension and production involve many of the same representations and processes (Treiman, Clifton, Meyer, & Wurn, 2003). In comprehension, listeners quickly map the signal onto lexical entries, whose semantic and syntactic information becomes available for constructing the syntactic structure and meaning of utterances. Similarly, in production, speakers select lexical items, each carrying syntactic and morphological features affecting the selection of additional words (Treiman et al., 2003). Given this connection, a major goal in cognitive psychology has been to investigate how comprehension and production interact. One model that argues for the existence of a close correspondence between comprehension difficulty and production patterns is the Production-Distribution-Comprehension framework (MacDonald & Thornton, 2009 and related work). The premise of the model rests on the idea that sentence complexity effects observed during reading comprehension derive from particular distributional patterns in production, which in turn create distributional regularities that shape comprehenders' interpretations. For instance, it has been well-documented in the psycholinguistic literature that when English speakers read the sentence "Mary said that John left yesterday," they typically interpret it to mean that the 'leaving' event took place yesterday, even though the adverb could plausibly refer to the 'saying' event instead. According to the Production-Distribution-Comprehension framework, this is not because of hardwired constraints on the comprehension system (e.g., expressions like 'yesterday' initially modify the verb that is nearest). Instead, the preferences observed during comprehension are learned from patterns in the input which arise from constraints on production.

The Production-Distribution-Comprehension framework grants a major role to frequency: frequent constructions are more readily activated by appropriate information sources than less common constructions. For example, studies show that comprehension difficulty is influenced by the match between syntactic structure and the frequency with which verbs appear in that structure. Thus, transitive verbs (e.g., *believe*) most often used by speakers with sentential complements cause less comprehension difficulty when followed by a sentential complement than by a noun phrase (NP) complement (e.g., Garnsey, Pearlmutter, Myers, & Lotocky, 1997). Further evidence for the strong dependency between production and comprehension has been supplied by Gennari and MacDonald (2009), who found that relative clauses that speakers do not produce frequently were difficult to comprehend. That is, the verb and noun types that speakers tend to produce in active or passive relative clause constructions are easier to process when they, in fact, occur in those syntactic structures. Based on this evidence, a prediction in code-switching is that ease of comprehension of code-switched language should reflect production patterns. Of course, while construction frequency may not always predict comprehension preferences, growing evidence from experience-based studies of sentence processing indicates that frequency of exposure to certain constructions should modulate comprehension difficulty.

These correspondences between comprehension and production have been recently tested in code-switching using psycholinguistic methods, with findings indicating that frequently produced code-switched structures are easier to process by the comprehension

system than less-frequently produced ones. We briefly turn to describe these findings.

7.1. Linking comprehension costs to production patterns using code-switching data

In a recent study, Guzzardo Tamargo (2012) examined a view in the sentence comprehension literature which attributes comprehension difficulty to particular distributional patterns in speaker's production choices (MacDonald & Thornton, 2009). The purpose was to ask whether the correspondence between production patterns and comprehension difficulty observed in monolingual sentence processing extended to bilingual code-switching. Her focus was on Spanish-English code-switches involving two types of auxiliary phrases because of their distribution in written and oral naturalistic codeswitching corpora. Switches involving the Spanish auxiliary *estar* 'to be' and an English present participle (los profesores están *developing a new course*/ the professors are developing a new course) occur with the same frequency as switches at the auxiliary (los profesores *are developing a new course*). However, switches involving the Spanish auxiliary *haber* 'to have' and an English past participle (los actores han *rehearsed the scene*) are less frequent compared to switches at the auxiliary (los actores *have rehearsed the scene*) (Pfaff, 1979; Poplack, 1980).

The predominance of switches involving the progressive construction over those involving the perfect construction is revealing of the differential behavior of these two Spanish auxiliaries. Although they represent the same type of construction in structural terms, they do not seem to be used with the same frequency during bilingual expression. This may give rise to differences in the way the two types of switches are processed by the comprehension system.

Spanish-English bilinguals were recruited who reported being exposed to code-switches in their daily interactions and who themselves code-switched. To measure comprehension difficulty, participants' eye-movements were recorded while they read code-switched sentences on a computer screen. The assumption with this method is that, everything else being equal, longer reading times on sentence X compared to sentence Y index comprehension difficulty. Participants read four types of experimental sentences. Conditions 1 and 2 were code-switched conditions with the progressive structure. In Condition 1, the switch occurred at the auxiliary (El director confirmó que los actores *are rehearsing for the movie*) and in Condition 2 the switch occurred at the English present participle (El director confirmó que los actores están *rehearsing for the movie*). Conditions 3 and 4 were analogous to Conditions 1 and 2, but involved the perfect structure instead (El director confirmó que los actores *have rehearsed for the movie* and El director confirmó que los actores han *rehearsed for the movie*, respectively). The Production-Distribution-Comprehension framework would lead to the prediction that the more frequently produced code-switches (those involving the progressive structure) should be easier to process by the comprehension system than the less-frequently produced ones (those involving the perfect structure). And this is precisely what Guzzardo found. Reading times showed that participants took longer to read the auxiliary phrase in Condition 4 compared to Condition 3 but that switches in Conditions 2 did not take longer to read than switches in Condition 1. These findings lend support to models such as the Production-Distribution-Comprehension model (Gennari & MacDonald, 2009) in which linguistic experience plays a crucial role in the way language is processed.

7.2. Asymmetry in the production of code-switches: Historical linguistics knocks on the door of cognitive science

The findings reported above suggest a tight link between the production and comprehension mechanisms. However, for the Production-Distribution-Comprehension model to have explanatory adequacy, the question of the origins of the distributional patterns in production needs to be addressed. In the context of code-switching, this question may take the following form: what constraints may be responsible for the distributional patterns of auxiliary phrase code-switches found in production, which in turn affect comprehension difficulty? One answer may be that code-switches are facilitated where the languages involved share word order. This is, in fact, the claim made in recent studies investigating code-switching from the perspective of cognitive psychology. The argument in terms of cognitive mechanisms is that the co-activation of languages caused by shared word order should facilitate code-switching. On this account, speakers should have a clear preference for using the shared word order when they switch in and out of languages. Although this claim finds experimental support in recent code-switching studies (e.g., Kootstra, van Hell, & Dijkstra 2012), it cannot explain the different distributional patterns for the code-switches discussed here. Indeed, English and Spanish share exactly the same auxiliary+verb word order, yet one switch type is more frequent that the other.

One promising avenue to explain the differential occurrence in production of auxiliary phrase code-switches comes from the literature on grammaticalization. The basic idea, explored in more detail below, is as follows. Switches between *estar* and the present participle are possible on the hypothesis that although *estar* has grammaticalized to aspectual functions, it still retains some original lexical meanings attributed to the auxiliary (Torres Cacoullos, 1999). The autonomous status of *estar* renders the elements in the constituent more discrete, which in turn allows for a code-switch to occur. Conversely, *haber* and past participle have reached a point where they can no longer be analyzed independently, constraining the possibility of a code-switch at this site.

7.3. Explaining the asymmetric production of auxiliary phrase switches: A grammaticalization account

How can we best characterize the variable status of auxiliary+participle switches in the Spanish-English production and comprehension data discussed here? The fact that the *haber*+English participle constructions resist code-switching strongly suggests that these two elements act as an "indivisible entity." Evidence for this indivisibility comes from the grammaticalized status of Spanish *aver*, a process that dates to the Middle Ages. With the introduction of *tener* as a new verb of possession, the use of *aver* as a main verb in Old Spanish decreased from prototypical possession to metaphorical possession, until it was no longer used to express possession (Garachana Camarero, 1997; García Gallarín, 2002). *Aver*'s functions were reduced in other contexts as well. In the case of the future auxiliary, *aver* was grammaticalized until it became an affix to the main verb; in the case of obligation, it was substituted by the modal verb *deber* ('should'); and as an impersonal verb, it was replaced by the use of *se* in impersonal

middle constructions (García Gallarín, 2002, p. 20). The boundedness that exists between *haber* and the past participle is further evidenced by the fact that in contemporary Spanish no element can intervene between the two. Also, *haber* rarely occurs by itself and when it does, it is employed either as an existential verb (*hay* 'there is/are') or it appears in a few archaic fixed phrases such as *ha lugar* 'there is cause for' and *he de trabajar*'(I) should work' (Alarcos Llorach, 1995, p. 186). What is relevant for our purposes is that the strong bond between *haber* and the past participle blurs the distinction between these two elements and considerably limits the possibility of code-switching at this syntactic site. This would explain the distributional patterns found in code-switching in Spanish-English corpora.

In contrast to *haber*, the auxiliary *estar* is more autonomous in its syntactic behavior. First, it can followed by a present participle but also by other expressions such as adverbial and adjectival phrases (e.g., *estoy* en el parque/ 'I am at the park,' and *estoy* molesto/ 'I am angry'). Word order can also vary when *estar* is involved. For example, in more literary or poetic prose, the present participle can precede (instead of follow) *estar* (e.g., cantando estoy 'singing (I) am'). In addition, there are instances in which intervening material occurs between *estar* and its participle (e.g., estoy <u>en casa</u> estudiando '(I) am at home studying'). Additional evidence for the autonomous status of *estar* vis-à-vis *haber* is found in the literature on grammaticalization. Torres Cacoullos (1999) argues that periphrastic expressions composed of one of three auxiliaries (*estar*/'be'; *ir*/'go', from a verb meaning 'follow' or 'keep on'; *andar*/ 'walk, go around') plus a present participle have undergone different degrees of grammaticalization. Through a detailed analysis of the distribution of the three auxiliaries across types of main verbs (physical activity, general activity, mental, motion) and of the different locative expressions that co-occur with each auxiliary, Torres Cacoullos shows that the auxiliaries still retain part of their original lexical meanings (*andar*, of general location; *estar*, of locative meaning, and *ir*, of allative meaning), although they have grammaticalized, so that their locative and movement lexical meanings have generalized to progressive and continuous aspectual meanings. In terms of degrees of grammaticalization, *andar* represents the least grammaticalized of the three auxiliaries, followed by *ir*, and then by *estar* — the most grammaticalized one. On this account, switches between *estar* and the present participle are possible because although the form has grammaticalized to aspectual functions, it still retains some original lexical meaning attributed to the auxiliary. This makes the elements in the constituent more discrete, allowing for a code-switch to occur.

To summarize, the different degrees of lexical autonomy of these two auxiliaries can explain their distribution in naturalistic code-switching production. *Estar* still retains some of its original lexical meaning and thus behaves more autonomously, allowing for a code-switch to occur between auxiliary and the present participle. By contrast, *haber*, which has lost all of its original meaning and now exhibits only grammatical information, is tightly linked to its following past participle such that both elements have become an indivisible phrasal unit. The degree of fusion or boundedness between *haber* and its participle may explain their resistance to allow a code-switch**.**

8. Conclusion

Cognitive science is an inherently interdisciplinary field. To answer the question *How does the mind work?*, scholars have turned to advances in a number of fields of inquiry, including neuroscience, biological sciences, computer science, philosophy, anthropology, artificial intelligence, and linguistics. Combinations of knowledge from these diverse fields have provided insights critical to our understanding of the fundamental principles underlying the workings of the brain.

As mentioned briefly, the question of how the brain analyzes linguistic information and the computational and neural underpinnings of linguistic communication has, in particular, benefited from recent collaborative efforts of linguists and cognitive scientists. The knowledge gained from research in several subdisciplines of linguistics, including syntax, morphology and phonology, has been used by cognitive psychologists to create experiments that help answer questions about the types of computational constraints imposed on language comprehension and language production. These efforts have brought about powerful new insights in understanding language and the brain. It is in this context that we asked whether historical linguistics should be added to the list of areas of knowledge that cognitive scientists draw from to understand the process by which humans comprehend and produce sentences. We argued that it belongs on the list on the grounds that the processes identified during the study of language change have real potential to provide explanations for the computational procedures that operate during real-time language processing.

Here we showed that closely matched linguistic contexts involving the Spanish auxiliaries *estar* and *haber* have, according to prior research, very different distributions of code-switches: *estar*+English participle switches are frequent relative to *haber*+English participle switches. We also showed that the differences in distributional patterns of these two types of code-switches in speakers' language environments have consequences for the comprehension system: frequent code-switches are easier to process by the human comprehension system and less frequent switches produce elevated processing costs. Why these different syntactic contexts are affected by the nature of the auxiliary involved is an important point to address to go beyond "what's frequent is easier" type results. In other words, what's critical is to explain the nature of the production pressures that create these different distributions. We think that these pressures can find an answer in historical processes: when lexical items lose their autonomous status — when they become grammaticalized as in the case of Spanish *haber*+participle constructions — the fusion of what used to be two independent lexical items leaves little room for code-switching to happen.

There is nothing in the scenario just outlined which is not only imaginable for the distant past, but is indeed likely. What other mechanisms could possibly be responsible for blended languages like Michif Cree or Media Lengua? One can imagine all sorts of plausible explanations for phenomena that have been part of the classical canon for decades such as Etruscan-Latin or Latin-Gaulish bilinguals, to mention only a few of the many combinations found in the corpus (Adams, 2003). Let's bear in mind that ancient societies did not have language policies, nor did they much care whether the linguistic sensitivities of conquered peoples were being met. In the melting pot of the ancient world, you said what you had to say in whatever language you had at your disposal, mixing languages if necessary to increase the likelihood of fruitful communication. It could only be the same in dark prehistory, and dare we speculate on this as a productive

process as languages were emerging as autonomous units after untold periods of linguistic mixing (a thought first proposed by Trubetzkoy in his (in)famous article of 1939)? Dare we speculate even further and suggest that far from being the result of now familiar sociolinguistic processes, perhaps languages like Michif Cree and Media Lengua constitute the historical norm, the unmarked case in language evolution?

So many questions, so many possibilities for productive research… Does historical linguistics have anything to contribute to cognitive science? Absolutely! It's time for researchers from these two areas to begin taking each other seriously, as we have done, hopefully with a useful result.[6]

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[6] This paper began its life as the magisterial lecture of the first author after he had completed his two-month Visiting Professorship at the University of Cagliari, February-March, 2012. At that time, working alone, Baldi concluded weakly that a productive relationship between historical linguistics and cognitive science was possible, but he cautioned that historical linguists did their best work in the library, not the laboratory, and that the reverse was true for cognitive scientists. The addition of P. Dussias for the written version changed that, since she searches after answers to questions that are typically far outside the scope of historical linguists, and thereby brings the social science perspective of a cognitive psychologist to the narrowly humanistic domain of the historical linguist. And because of her perspective Baldi's weak conclusion became Dussias and Baldi's strong conclusion as each author dragged the other out of their traditional comfort zone (library, laboratory) and into their less comfortable zone (laboratory, library). This article then represents an example of what we feel the two fields can and must do in order to make significant progress. (Footnote by P. Baldi).

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Author Note

The writing of this chapter was supported in part by National Science Foundation grant BCS-0821924 to Paola E. Dussias and Chip Gerfen, and NSF Grants BCS-0955090 and OISE-0968369 to Judith F. Kroll and Paola E. Dussias.

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