Paradigm change and language contact: A framework of analysis and some speculation about the underlying cognitive processes

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Abstract

This article contains some thoughts on the role of bilingual cognition in the diachronic change of morphological paradigms, with a focus on contact-induced change. In a first step, a general typology of paradigm change is proposed, based on a distinction between three levels of linguistic organization (the sign/Level 1, the category/Level 2, and the dimension/Level 3), and two types of change (neutralization and differentiation), thus distinguishing six types of paradigm change. Examples of these types (taken from the pertinent literature) are discussed, and two questions are addressed in each case: (i) To what extent does contact-induced paradigm change of a specific type differ from internal change? (ii) What are (potentially) the underlying cognitive processes motivating each type of change? The hypothesis is explored that there is a correlation between the three levels of analysis and three types of cognitive processes involved in paradigm change. It is suggested that change at Level 1 is typically based on analogy, change at Level 2 is often sensitive to frequency of use, and change at Level 3 may imply conceptual transfer, as discussed in recent work on weak relativity effects in the context of bilingual cognition.

1 Introduction

Research on language contact has brought to light a broad range of fascinating transfer phenonema in languages across the world (e.g. Thomason and Kaufman 1988, Aikhenvald 2002, Heine and Kuteva 2005, Aikhenvald and Dixon 2008, Siemund and Kintana 2008, Matras and Sakel 2009, among many others). The focus has mostly been on the description of various types of convergence phenomena, and the question of types of, and restrictions on, transfer (e.g. various types of 'borrowing hierarchies', cf. Matras 2007). One of the topics that has received relatively little attention is the question of how contact-induced language change relates to bilingual (or multilingual) cognition.[1] In the typological research tradition, bilingual cognition has not played a prominent role – obviously, as linguistic typology primarily aims at large-scale generalizations, rather than observations about individual speakers. Moreover, in some of the literature on language change, cognitive aspects have been claimed to be of secondary importance, e.g. in the model of language change proposed by Croft (2000).

1 In the following I will use the word 'bilingual', as the focus of this contribution is on pairwise language contact, but this does not of course mean that the speakers in question speak exactly two languages.

This is not to say that comparative linguists have not been interested in the micro-level of language contact – the bilingual speaker – at all. For instance, Matthews and Yip (2009: 366) assume that "...developments in bilingual individuals parallel, and ultimately underlie, those taking place in the course of contact-induced change". This is also the perspective taken in the present contribution. Those authors focusing on the role of social factors in language change, like Croft (2000), are of course right in emphasizing the importance of the 'propagation' of an innovation, and the social restrictions determining it; however, at some level linguistic innovations need to be created as well, and this is where bilingual cognition comes into play.

The question of how linguistic innovations are created by individual speakers has taken a more central position in research on second language acquisition, bilingualism and bilingual cognition (e.g. Ellis 1994, Gass and Selinker 2008, among many other publications), often with a focus on language learning and teaching (e.g. Krashen 1981, Cook 2001). Notions such as 'interference' (Weinreich 1953), 'transfer' (Lado 1957) and 'crosslinguistic influence' (Odlin 2003) concern, in some sense, "[t]hose instances of deviation from the norms of either language which occur in the speech of bilinguals as a result of their familiarity with more than one language, i.e. as a result of language contact ..." (Weinreich 1953: 1).

The two research traditions mentioned above – contact linguistics as a branch of linguistic typology, and the study of second language acquisition and bilingual cognition – are complementary in many respects and there are only few points of contact (though some early publications, such as Weinreich 1953, did actually combine the two perspectives). The difference does not only concern the 'level' of the object of study (community vs. individual), the foci have also been different in terms of the languages covered, and the linguistic phenomena investigated. While contact linguistics was (initially) prominently concerned with the question of linguistic areas, such as the Balkans (Sandfeld 1930) and South India (Masica 1976), most of the in-depth studies on second language acquisiton have focused on major Western European languages. And while in contact linguistics there has traditionally been a focus on matters of morphosyntax, studies of bilingualism have mostly been more interested in the lexicon (see for instance various contributions to Bassetti and Cook 2011, and the relevant theoretical discussion, as in Dong et al. 2005 and Grosjean and Li 2013).

The present study is intended as a contribution to bridging the gap between (broad-scale) research on language contact and contact-induced change on the one hand, and bilingual cognition as the source of linguistic innovations in situations of language contact on the other (cf. Muysken 2013 for a similar approach). The perspective is primarily a typological one (broadly speaking), and the focus is on paradigm structure and change – an area that figures more prominently in typological studies than in research on bilingualism (cf. Bisang and Robbeets 2014, Gardani et al. 2015). The main purpose of this study is to provide a framework for the analysis of paradigm change, with some exemplification from the literature on contact linguistics, and to venture some speculations about bilingual cognition as a source of linguistic innovations. Readers primarily interested in matters of second language acquisition and bilingualism should be warned that I will not go into any detail with respect to specific parameters of SLA, such as the direction of transfer (L1 → L2, L2 → L1), the specific circumstances of L2-acquisition or learning (spontaneous, instructed), etc.

I propose a distinction between three levels of linguistic analysis, (i) the sign, (ii) the (grammatical) category, and (iii) the (grammatical) dimension. Contact-induced language change may take place at any of these levels. When paradigm change implies either neutralization or differentiation, the structure of a paradigm changes. Change at Level 1 can also be 'structure-preserving'.

I suggest that instances of paradigm change at the three levels of linguistic analysis are – primarily,

not exclusively, of course – each associated with different underlying cognitive processes and mechanisms. Change at Level 1 typically involves analogy, change at Level 2 often relates to frequency of use, and change at Level 3 is connected to the ways the world is 'conceptualized' or 'partitioned' by (the speakers of) a given language. I am aware that these correlations imply a fair amount of speculation, as the empirical evidence for them is rather limited, and they are obviously open to challenge.

Following these introductory remarks Section 2 establishes some basic assumptions and terminology for an analysis of linguistic sub-systems (such as inflectional morphology). In Section 3, a framework for the analysis of paradigms is introduced. In Section 4 I propose a typology of structural paradigm change based on the three levels of linguistic analysis mentioned above (the sign, the grammatical category and the grammatical dimension), and two types of change (neutralization and differentiation). These types of paradigm change are illustrated with examples from the pertinent literature, and in each case the following questions are addressed: (i) To what extent does contact-induced paradigm change of a specific type differ from internal change? (ii) What are (potentially) the underlying cognitive processes motivating each type of change? Section 5 contains a brief summary.

2　Levels of grammatical organization

Language contact may affect linguistic systems at various levels.[2] We can distinguish at least four levels of grammatical organization. The lowest level is the one of the Saussurean sign (in a broad sense), i.e., a form-meaning pairing such as <[tʃɛə], ♜> (or, for the sake of simplicity, *chair*). Signs may change through a modification of either their form or their meaning. In the following we will mainly be concerned with functional (distributional) change. For example, the word *chair* has acquired new meanings in the history of English, such as the person managing a session at a linguistic workshop.

The second level at which language change may take place is the level of linguistic categories, which can (extensionally) be conceived of as sets of linguistic signs (van der Auwera and Gast 2010). For example, the verbal category 'future tense' of some language *L* can be regarded as the set of all future tense forms of *L*. Functional change in this case affects not only individual signs, but entire sets of signs (the members of the category in question). For instance, when a future tense acquires a modal function, any future tense verb may potentially be used in the corresponding environments (given that other preconditions apply, e.g. matters of semantic compatibility).[3]

The third level of change concerns what we can call (grammatical) 'dimensions' (Haspelmath and Sims 2010),[4] i.e., sets of linguistic categories. For example, 'tense' can be regarded as an abstraction over specific tenses. Extensionally speaking, the language-particular (verbal) dimension of 'tense' is a set of tenses. From a morphological point of view, English can be analyzed as having

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2　Cf. Aikhenvald (2007) for a similar approach, but with different levels and without specific reference to paradigm structure.

3　As a reviewer points out, functional change is mostly not abrupt, but gradual, sometimes spanning various generations, proceeding through the lexicon. In situations of language contact, there is moreover a lot of social variation. The reviewer has kindly pointed me to Boas (2009), Zürrer (2009), and Riehl (2015) for relevant (case) studies from the German-speaking world.

4　Aikhenvald (2007) uses the term 'grammatical system' for both 'categories' and 'dimensions', in terms of the present approach, as far as I can tell.

two 'primary' tenses (the present tense and the preterite), two 'secondary' tenses (the perfect and the non-perfect), and two aspects (progressive and non-progressive; cf. Huddleston and Pullum 2002). The tense and aspect categories of English together constitute the 'linguistic sub-system' of 'tense-aspect' in English – the fourth level of linguistic organization. The hierarchy 'sub-system > dimension > category > sign' is shown in Figure 1.
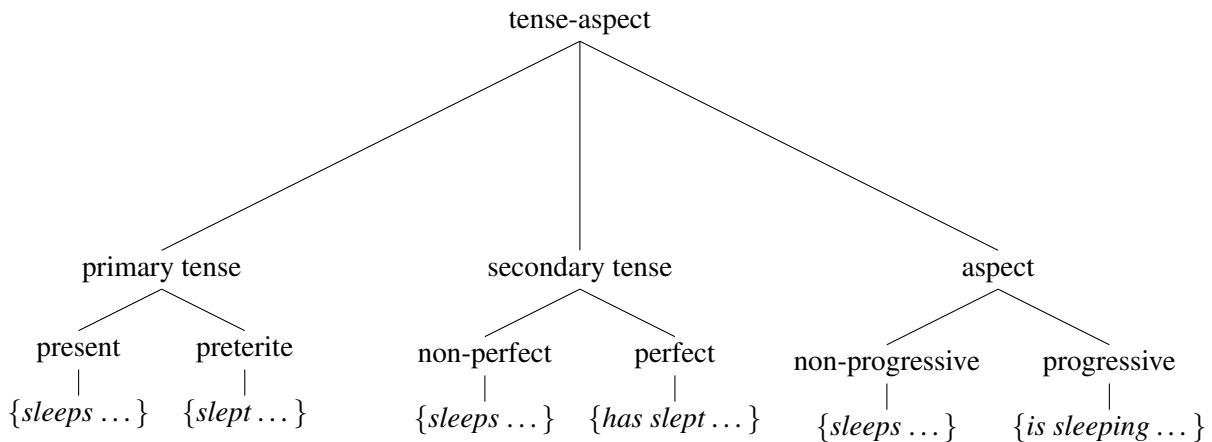

Figure 1: Hierarchy of levels of grammatical organization

Intensionally speaking, linguistic categories can be conceived of as features (properties) of the relevant elements. If a verb is an element of the category 'present tense', we can also say that it has the feature 'Present'. Features will be represented as attribute-value pairs, with the grammatical dimension as the attribute and the category as the value, e.g. 'PRIMTNS:PRES', 'SECTNS:PERF', etc. Such attribute-value pairs will be called 'category specifications'.

Note that the categories of a dimension stand in a paradigmatic relation to each other and are thus mutually exclusive. The grammatical dimensions are orthogonal, cf. Figure 2, which shows a partial paradigm of the verb *sleep* (only third person singular forms). The *x*-axis corresponds to primary tense, the *y*-axis to secondary tense and the *z*-axis to aspect.
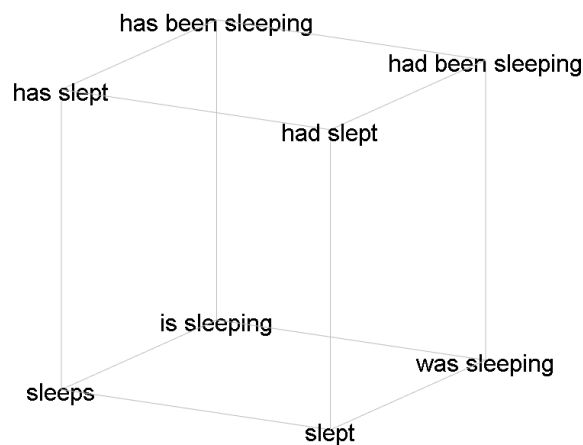

Figure 2: 3rd person singular forms of *sleep*

The verbal form *has slept* is an element of the three tense-aspect categories 'present (primary) tense', 'perfect (secondary) tense' and 'non-progressive aspect'. Moreover, it is contained in the categories '3rd person' and 'singular number', thus constituting the intersection of five linguistic categories. Intensionally speaking, it is associated with a set of category specifications: {PRIMTNS:PRES, SECTNS:PERF, ASP:NONPROG, PERS:3, NUM:SG}.

I will call sets of category specifications 'form specifications'. Rather than representing them as sets, I will treat them as Boolean expressions. This allows us to use conjunction and disjunction operators, as well as negations. For example, English distinguishes only two forms in the (primary) present tense, the 'bare' forms, and third person plural forms ending in *-s*. The latter form can be positively specified as shown in (1). The specification of the (finite) bare form contains a negation taking scope over the category specifications PERS:3 and NUM:SG (cf. (2)).

(1) form specification for *sleeps*
(PRIMTNS:PRES ∧ SECTNS:NONPERF ∧ ASP:NONPROG ∧ PERS:3 ∧ NUM:SG)

(2) form specification for *sleep* (finite)
(PRIMTNS:PRES ∧ SECTNS:NONPERF ∧ ASP:NONPROG ∧ ¬[PERS:3 ∧ NUM:SG])

3 The structure of paradigms

Paradigms have been defined as "set[s] of inflected forms sharing the same stem" (Bybee 2007: 960). They are not of course unstructured sets, however, as each member of the set comes with a form specification. Paradigms are commonly represented in the form of a table – cf. Table 1, which shows a minimal paradigm of Old Spanish on the right (cf. Penny 1993), and a general 'template' for a paradigm (of this type) on the left.

Table 1: Paradigm schema and example from Old Spanish (Penny 1993)

general schema				Old Spanish		
	dim 1				number	
dim 2	cat 1	cat 2		case	sg	pl
cat a	a1	a2		nom	*annos*	*anni*
cat b	b1	b2		obl	*anno*	*annos*

Technically speaking, paradigms can be regarded as sets of pairings of (i) a form specification, and (ii) and a linguistic form (for similar treatments, cf. Lieb 1993, Stump 2001, Stump and Finkel 2013; for alternative types of definitions see for instance Baerman and Corbett 2010, Bisang and Robbeets 2014). The paradigm in Table 1 can be represented as such a set as is shown in (3).

(3) $P_{ann\text{-}}$ = {<(CASE:NOM ∧ NUM:SG), *annos*>, <(CASE:OBL ∧ NUM:SG), *anno*>, <(CASE:NOM ∧ NUM:PL), *anni*>, <(CASE:OBL ∧ NUM:PL), *annos*>}

If we assume that paradigms map form specifications to exactly one linguistic form, they can be treated as functions. 'Paradigm functions', abbreviated as 'PF', will be regarded as mapping form specifications to their associated forms, cf. (4) (*p* stands for a pair of a form specification and a linguistic form, p_1 and p_2 for the first and second element of the pair, respectively). A general definition of paradigm functions is given in (3):

(4) $\text{PF}_{ann\text{-}}(p_1) = p_2, p \in P_{ann\text{-}}$

(5) for any paradigm P_L:
$\text{PF}_L(p_1) = p_2, p \in P_L$

Paradigm functions can be applied to any form specification, yielding as a value the corresponding form. This is illustrated in (6) for the form specification (CASE:NOM $\wedge$ NUM:PL) and the paradigm function $\text{PF}_{ann\text{-}}$.

(6) $\text{PF}_{ann\text{-}}(\text{CASE:NOM} \wedge \text{NUM:PL}) = anni$

Paradigms typically (or perhaps by definition) exhibit relationships of analogy (cf. 'classics' such as Paul 1880, Kuryłowicz 1949, Mańcak 1958; see also some more recent work, e.g. Lahiri 2003, Bybee 2007, Blevins and Blevins 2009). The most important type of analogy holds *across* (canonical) paradigms (cf. Corbett 2007 on the notion of 'canonical paradigm'). For any two words belonging to the same declension class – say, Latin *annus* 'year' and *dominus* 'master' – the relationship between the nominative singular form and the nominative plural form is the same: Where one form has *-us*, the other form has *-ī*. This is illustrated in (7). This instance of cross-paradigm analogy can be represented in a more general format as in (8), and, schematically, as in (9).

(7) $\dfrac{annus}{ann\bar{\imath}} = \dfrac{dominus}{domin\bar{\imath}}$

(8) $\dfrac{\text{PF}_{L_1}(\text{CASE:NOM} \wedge \text{NUM:SG})}{\text{PF}_{L_1}(\text{CASE:NOM} \wedge \text{NUM:PL})} = \dfrac{\text{PF}_{L_2}(\text{CASE:NOM} \wedge \text{NUM:SG})}{\text{PF}_{L_2}(\text{CASE:NOM} \wedge \text{NUM:PL})}$

(9) Cross-paradigm analogy
for any pair of lexemes L_1, L_2, and any pair of form specifications f_1, f_2:
$\dfrac{\text{PF}_{L_1}(f_1)}{\text{PF}_{L_1}(f_2)} = \dfrac{\text{PF}_{L_2}(f_1)}{\text{PF}_{L_2}(f_2)}$

A second type of analogy holds *within* paradigms. Such intra-paradigmatic analogy is a hallmark of agglutination. Analogy here holds between two elements that differ with respect to a single category specification. Consider the example of Turkish (nominal) number marking, indicated by a suffix *-lAr* (realized as *-lar* or *-ler*, cf. Göksel and Kerslake 2005: Sect. 8.1.1).[5] The relationship between the nominative singular form of *adam* 'man' and the nominative plural form of that noun is the same as the relationship between its genitive singular form and its genitive plural form – one form has no suffix where the other form has *-lAr*, cf. (10)–(12). Intra-paradigmatic analogy is generally defined in (12).

(10) $\dfrac{adam}{adam\text{-}ın} = \dfrac{adam\text{-}lar}{adam\text{-}lar\text{-}ın}$

(11) $\dfrac{\text{PF}_L(\text{CASE:NOM} \wedge \text{NUM:SG})}{\text{PF}_L(\text{CASE:NOM} \wedge \text{NUM:PL})} = \dfrac{\text{PF}_L(\text{CASE:GEN} \wedge \text{NUM:SG})}{\text{PF}_L(\text{CASE:GEN} \wedge \text{NUM:PL})}$

(12) Intra-paradigm analogy
for any lexeme L, categories a and b, and and category specifications a_1, a_2, b_1, b_2:
$\dfrac{\text{PF}_L(a_1 \wedge b_1)}{\text{PF}_L(a_1 \wedge b_2)} = \dfrac{\text{PF}_L(a_2 \wedge b_1)}{\text{PF}_L(a_2 \wedge b_2)}$

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5 See Göksel and Kerslake (2005: Ch. 3) on vowel harmony in Turkish more generally.

Intra-paradigmatic analogy does not hold in (inflectional) languages like Latin, where the relationship between *dominus* (nominative singular) and *dominī* (nominative plural) is not the same as the relationship between *dominī* (genitive singular) and *dominōrum* (genitive plural), cf. (13).

(13) $\quad \dfrac{\text{domin-us}}{\text{domin-ī}} \neq \dfrac{\text{domin-ī}}{\text{domin-ōrum}}$

Intra-paradigmatic analogy is reflected in the columns and rows of a paradigm, where all members of the row or column in question share an element. In the plural column of Turkish, for instance, there is invariably (in the relevant class of words) *-lAr*, and in the genitive row there is invariably (*-n*)*In* (cf. Göksel and Kerslake 2005: Sect. 8.1.3). Latin has no such segment that recurs in every row or column of the paradigm, cf. Table 2 (note that there is syncretism between the genitive singular form and the nominative plural form in this declension class).

Table 2: Fragments of nominal paradigms in Turkish and Latin

	Turk. *adam* 'man'		Lat. *dominus* 'master'	
	sg	pl	sg	pl
nom	adam	adam-lar	domin-us	domin-ī
gen	adam-ın	adam-lar-ın	domin-ī	domin-ōrum
...	...			

Both types of analogies – cross-paradigmatic and intra-paradigmatic ones – may hold to varying degrees across linguistic systems (cf. Plank 1999 for a parametric view of morphological systems). The larger the set of paradigms exhibiting a given analogy, the more the analogy in question will be conceived of as a (productive) rule. We can speak of 'generalized analogies' in such cases. For example, nouns belonging to the so-called 'o-declension' class of Latin exhibit (among others) the generalized analogy in (14).

(14) $\quad \dfrac{\text{PF(Case:Nom} \wedge \text{Num:Sg)}}{\text{PF(Case:Nom} \wedge \text{Num:Pl)}} = \dfrac{\text{N-}us}{\text{N-}ī}$

Having established some basic concepts of paradigm structure, we can now proceed to a discussion of types of paradigm change.

4   Types and levels of paradigm change

In analogy to the first three levels of linguistic organization distinguished in Section 2, we can assume three types of paradigm change:

1. Level 1: The level of the sign; the form corresponding to a category specification changes.
2. Level 2: The level of the category; a new category is added to or removed from a grammatical dimension within a paradigm.
3. Level 3: The level of the dimension; a new dimension is added to or removed from a paradigm.

Changes at Level 1 may imply a change of paradigm structure, changes at Levels 2 and 3 necessarily imply such a change. I will make a distinction between 'structure-preserving' paradigm change (traditionally called 'analogical leveling' and 'analogical extension', cf. Section 4.1), and 'structure-changing', or simply 'structural' paradigm change (Sects. 4.2–4.4).[6] Structural paradigm change may work in either of two directions, (i) neutralization (an opposition within a paradigm is lost), and (ii) differentiation (a new opposition is created). As structural change may take place at any of the three levels distinguished in Section 2, there are six types of structural paradigm change. They are shown in Table 3.

Table 3: Types of structural paradigm change

	Level 1	Level 2	Level 3
neutralization	N-1	N-2	N-3
differentiation	D-1	D-2	D-3

We will now take a look at each type of change individually, considering the role of language contact as we proceed.

4.1 Structure-preserving change

Structure-preserving change is so-called because the number of formally reflected oppositions in the paradigm is not affected. The form corresponding to a specific form specification changes, however. This is what we typically find in the most widely discussed types of paradigm change, i.e., 'analogical leveling' and 'analogical extension'. Both of these processes are 'structure-preserving', as they do not lead to either syncretism or differentiation (for which see below).

Examples of analogical leveling and extension have been extensively discussed in the relevant literature (e.g. Bybee 1985, Bybee 2007, Hock and Joseph 1996 in general, and Albright 2005, Garrett 2008 on analogical leveling and extension more specifically). In analogical leveling, irregular words are 'regularized', i.e., formed according to the (productive) rules of a language. In other words, there is a generalized analogy for the relevant pair. For instance, the past tense form *wept* is 'irregular' insofar are there is no generalized analogy for it – though there are individual analogical pairs, e.g. *sleep/slept* and *keep/kept* (cf. (15)).

(15) $\frac{weep}{wept} = \frac{sleep}{slept}$

Paradigm leveling implies the innovative application of a generalized analogy to a word, and it is in this way that the new form *weeped* came to be used (cf. (16) and (17); secondary tense and aspect are disregarded here).[7]

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6 A similar distinction is made by Aikhenvald (2007), at a more general level, between 'system-preserving changes' and 'system-altering changes'.

7 I take it that analogical rules like those described above are not just descriptive generalizations; I regard them as learning mechanisms that are used as heuristics in language acquisition (cf. Gentner 1989, Gentner et al. 2001).

(16)   generalized analogy: past tense of non-3rd-person singular forms

$$\frac{\text{PF(P{\scriptsize RIM}T{\scriptsize NS}:P{\scriptsize RES} \wedge \neg[P{\scriptsize ERS}:3 \wedge N{\scriptsize UM}:S{\scriptsize G}])}}{\text{PF(P{\scriptsize RIM}T{\scriptsize NS}:P{\scriptsize AST})}} = \frac{\text{V}}{\text{V-}d}$$

(17) $\text{PF}_{weep}(\text{P{\scriptsize RIM}T{\scriptsize NS}:P{\scriptsize RES} \wedge \neg[P{\scriptsize ERS}:3 \wedge N{\scriptsize UM}:S{\scriptsize G}]}) = weep$

(18)   given (16) and (17),
       $\text{PF}_{weep}(\text{P{\scriptsize RIM}T{\scriptsize NS}:P{\scriptsize AST}}) = weep\text{-}d$

In analogical extension, a non-generalized analogy is applied. Bybee (2007: 962) mentions examples such as *string*/*strung*, which supposedly resulted from noun-to-verb conversion and acquired its past tense form in analogy to pairs such as *cling*/*clung* and *fling*/*flung*.[8]

It seems obvious that analogical leveling may be favoured by (specific types of) language contact. It is known to be pervasive in creolization (cf. for instance deGraff 2001), and the regularization of paradigms may be enhanced under contact influence even for L1-speakers. For example, Choi (2003) reports that speakers of American Korean – most of them having acquired Korean as a first language but using English as the 'primary' language – tend to regularize verbal paradigms (in Korean). In language decay, paradigm leveling has also been reported to be a common process (cf. Kehayov 2017). By contrast, analogical extension does not seem to be characteristic of language contact or language decay – at least I am not aware of any studies pointing in this direction. This difference can plausibly be related to input conditions: If language acquisition is sensitive to frequency effects (see e.g. Diessel 2007, Ambridge et al. 2015 on first language acquisition and Ellis 2002, Gass 2002, Crossley et al. 2014 on second language acquisition), specific types of language contact situations where input is (quantitatively) reduced for some reason (as in the cases mentioned above) may lead to an increased tendency towards leveling, as speakers seem to resort to the 'default rule' (generalized analogies) in case of uncertainty (see Kırkıcı 2010 for a pertinent study of Turkish learners of English).

4.2   Structural paradigm change at Level 1

When paradigm change at Level 1 is associated with neutralization (type N-1), it leads to syncretism (cf. Baerman et al. 2005 on syncretism in general): Two cells with different feature specifications are not differentiated formally. This is shown in Table 4.

Table 4: Change of type N-1: Syncretism

	a	b			a	b
I	Ia	Ib	→		Ia	I/IIb
II	IIa	IIb			IIa	

Examples of neutralization within paradigms at Level 1 abound. Case syncretism, for instance, is often triggered by phonological and/or phonetic processes of change, overlap of semantic functions, or analogical developments (Kulikov 2006, Barðdal and Kulikov 2008: 33). To provide just one example, Old Russian neutralized the opposition between the nominative and the accusative in the

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8   Note that Bybee (2007) mentions some problematic cases of analogical extension, for which no model seems to be available, e.g. *strike*/*struck*. The historical facts may be more intricate, e.g. as far as the exact pronunciations of these words are concerned (at the time the analogy was [supposedly] established).

o-type declension sometime between 11AD and 15AD, cf. Kulikov (2006: 39) and the simplified representation in Table 5.

Table 5: Case syncretism in the o-type-declension of Old Russian (simplified from Kulikov 2006: 39)

		'slave'	
		$\sim$ 11AD	$\sim$ 15AD
Nom. Pl.		rab-i	rab-y
Acc. Pl.		rab-y	
...		...	...

Even though syncretism – structural paradigm change of Type N-1 – is a pervasive phenomenon in the historical development of languages, it is certainly not unreasonable to assume that "[t]his process can be induced by language contact", as Heine and Kuteva (2005: 149) write,[9] referring to the famous textbook case of the village of Kupwar documented by Gumperz and Wilson (1971), where four languages from two families have heavily influenced each other (Urdu, Marahathi/Indo-European and Kannada, Telugu/Dravidian). Among the many instances of contact-induced change discussed by Gumperz and Wilson (1971), there is at least one that seems to be of type N-1, i.e., the neutralization of the distinction between accusative and dative case for human referents in (Kupwar) Kannada, supposedly on the model of Urdu and Marathi.

If in fact language contact may favour the emergence of syncretism – through direct 'copying' of paradigm structure from one language to another – this process could be modeled as an instance of cross-paradigm analogy (cf. (9) above): Generalized analogies from one language – say, Urdu (as spoken in Kupwar) – are applied to the morphological material of another language (Kannada as spoken in Kupwar). According to this analysis, the cognitive process – cross-paradigm analogy – would be the same in language-internal and contact-induced syncretism.

An analogy leading to syncretism has the general format in (19). I will call this type of analogy 'syncretistic'. There is one 'unmarked' category specification, *a*, which stands in the same relation to two marked specifications, *b* and *c*. If the analogy in (19) holds, *b* and *c* have the same form.

(19) syncretistic analogy

$$\frac{PF(a)}{PF(b)} = \frac{PF(a)}{PF(c)}$$

Differentiation of Type 1 leads to a split of neutralized cells in a paradigm, as illustrated in Table 6 – syncretism is resolved.

Table 6: Change of type D-1: Resolution of syncretism

	a	b			a	b
I	Ia	I/IIb	$\rightarrow$	I	Ia	Ib
II	IIa			II	IIa	IIb

Resolution of syncretism may result from 'preservative reanalysis' (cf. Harris and Campbell 1995) or 'reinforcement' (cf. Lehmann 1995, Kulikov 2006). One of the most prominent examples of this type

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9 For further discussion of the role of language contact in case syncretism, see various contributions to Barðdal and Chelliah (2009).

is perhaps the reinforcement of accusative case marking in Spanish (and other Romance languages), leading to differential object marking (e.g. Hills 1920, Bossong 1991, Heusinger and Kaiser 2005, Barðdal and Kulikov 2008, among many others). This development is shown in a simplified form in Table 7.

Table 7: Resolution of syncretism through differential object marking in Spanish

	Latin	Spanish (specific/human)
Nom. Sg.	mulier	(la/una) mujer
Acc. Sg.	mulier-em	a (la/una) mujer

Differential object marking in Spanish (and other languages) is often regarded as a matter of ambiguity resolution, cf. Brauns (1909: 68) (quoted from Hills 1920: 217): "in Spanish a time came when ... it was apparently necessary that there should be an unmistakable indication that a living being, which otherwise would have seemed to be the agent, was the object of the action." However, it has also been pointed out that analogy may have played a role in the development of differential object marking, as the 'prepositional accusative' was also used as a marker of indirect objecthood at the time it came to be used in combination with direct objects (approx. in the 11th cent.): "the preposition *a* was introduced by analogy with the dative" (Hanssen 1913: 296, quoted from Hills 1920: 217).

The resolution of syncretism sometimes seems to come about as a by-effect of some other process of contact-induced change. For example, Mithun (2005) hypothesizes that the North American language Siuslaw borrowed an ergative case marker (*q*-) from the contact language Alsea,[10] thus introducing a split into the paradigm, more or less as shown in Table 8: A special form emerged for pronominal ergatives, which were not previously differentiated from nominative/absolute forms.

Table 8: Change of type D-1: Borrowing of an ergative marker

	pronouns	nouns			pronouns	nouns
Erg	I/IIa	Ib			Ia (borrowed)	Ib
Nom-Abs		II/IIIb	⇒		IIa	II/IIIb
Acc	IIIa				IIIa	

If Siuslaw in fact borrowed the ergative prefix *q*- from Alsea, this can be regarded as a case of 'transfer of a generalized analogy'. The second person pronoun forms of Alsea and Siuslaw are idendical, according to Mithun (2005), and in Alsea ergative forms can be transparently derived from accusative forms through prefixation of *qa*-, e.g. *nɪ́:x̣* (2SG.ACC) → *qa-nɪ́:x̣* (2SG.ERG). Mithun (2005: 83) hypothesizes that "Siuslaw apparently borrowed the second-person pronouns from Alsea in both basic and ergative forms, and the Alsea ergative prefix *q*- rode into Siuslaw with them". This process may have been supported by a generalized analogy of the form shown in (20).

(20)   for any category specification *a*:

$$\frac{\mathrm{PF}_{Prn}(\text{CASE:ACC} \wedge a)}{\mathrm{PF}_{Prn}(\text{CASE:ERG} \wedge a)} = \frac{\mathrm{Prn}}{q\text{-Prn}}$$

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10 The borrowing of ergative case markers seems to be comparatively common, e.g. in Australian languages (see for instance Heath 1978 and Meakins 2011); cf. Baerman et al. (2005) on split ergativity and syncretism more generally.

A particularly interesting, and therefore widely discussed, case of paradigm change of Type D-1 under contact influence is presented by Cappadocian, a variety of Greek that is spoken in central Anatolia and has been heavily influenced by Turkish (Thomason and Kaufman's 1988 'Asia Minor Greek'; cf. also Dawkins 1916, Janse 2009a, Janse 2009b). A partial paradigm is shown in Table 9 (cf. Janse 2009b: Sect. 3). The variety of Delmesó represents the more conservative state, with considerable syncretism. The Ulağaç dialect changed under influence from Turkish (as it seems), thus developing agglutinative morphology, and resolving syncretisms (in this particular paradigm).

Table 9: Partial paradigm of Cappadocian (adapted from Janse 2009b: Sect. 3)

		Delmesó	Ulağaç	Turkish
sg	NOM	áθrop-os	átropos-∅	adam-∅
	GEN	aθróp-∅ (aθrop-jú)	átropoz-ju (atrop-jú)	adam-ın
pl	NOM	aθróp-∅	átropoz-ja-∅	adam-lar-∅
	GEN	aθróp-∅ (aθrop-jú)	átropoz-ja-ju (atrop-jú)	adam-lar-ın

The situation in Ulağaç seems to have resulted from both cross-paradigmatic and intra-paradigmatic analogy (note that the following scenario, based on Janse 2009b, obviously involves a fair amount of speculation). First, the Greek nominative singular suffix was reanalysed as a part of the stem: *átrop-os* → *átropos-∅*. The (neuter) plural suffix *-ja* (e.g. *mát-ja* 'eye-NOM/ACC.PL') and the genitive singular suffix *-ju/jú* (e.g. *mat-jú* 'eye-GEN.SG') came to be used on *átropos* (and other nouns of its declension class) as a result of the cross-paradigm analogies in (21) and (23), represented in a more general format in (22) and (24).

(21) $\dfrac{\text{átropos}}{x} = \dfrac{\text{mát}}{\text{mát-ja}}$, $x = $ átropoz-ja

(22) $\dfrac{\text{PF}_{N1}(\textsc{Case:Nom} \wedge \textsc{Num:Sg})}{\text{PF}_{N1}(\textsc{Case:Nom} \wedge \textsc{Num:Pl})} = \dfrac{\text{PF}_{N2}(\textsc{Case:Nom} \wedge \textsc{Num:Sg})}{\text{PF}_{N2}(\textsc{Case:Nom} \wedge \textsc{Num:Pl})}$

(23) $\dfrac{\text{átropos}}{x} = \dfrac{\text{mát}}{\text{mat-jú}}$, $x = $ átropos-ju

(24) $\dfrac{\text{PF}_{N1}(\textsc{Case:Nom} \wedge \textsc{Num:Sg})}{\text{PF}_{N1}(\textsc{Case:Gen} \wedge \textsc{Num:Sg})} = \dfrac{\text{PF}_{N2}(\textsc{Case:Nom} \wedge \textsc{Num:Sg})}{\text{PF}_{N2}(\textsc{Case:Gen} \wedge \textsc{Num:Sg})}$

In a second step, an intra-paradigmatic analogical rule of Turkish was applied to the Cappadocian data, leading to agglutination. The rule of Turkish is shown in (25). It can be represented in a general way as shown in (26), and it can be applied to the Cappadocian data as shown in (27).

(25) $\dfrac{\text{adam}}{\text{adam-ın}} = \dfrac{\text{adam-lar}}{\text{adam-lar-ın}}$

(26) $\dfrac{\text{PF}_{N1}(\textsc{Case:Nom} \wedge \textsc{Num:Sg})}{\text{PF}_{N1}(\textsc{Case:Gen} \wedge \textsc{Num:Sg})} = \dfrac{\text{PF}_{N1}(\textsc{Case:Nom} \wedge \textsc{Num:Pl})}{\text{PF}_{N1}(\textsc{Case:Gen} \wedge \textsc{Num:Pl})}$

(27) $\dfrac{\text{átropos}}{\text{átropoz-ju}} = \dfrac{\text{átropoz-ja}}{x}$, $x = $ átropoz-ja-ju

If the descriptions provided in this section are more or less correct, changes at Level 1 often seem to imply analogy. There do not seem to be any major qualitative differences between internal and

contact-induced processes of change, except that under conditions of bilingualism, analogical rules may also be applied across languages – cf. the analyses sketched above for Siuslaw/Alsea and Cappadocian. If this is right, language contact would increase the probability of changes at Level 1, as it introduces further potential analogical models. This assumption is compatible with claims regarding the 'strengthening' effect of language contact on changes such as syncretism (as made by Heine and Kuteva 2005: 149, for instance) and paradigm leveling (cf. Sect. 4.1).

4.3   Structural paradigm change at Level 2

In paradigm change at Level 2, the number of columns or rows in a paradigm changes – in the case of N-2-changes, a column is removed because a category is lost, e.g. a number category or case – cf. Table 10.

Table 10: Paradigm change of type N-2

	a	b	c		a	b
I	Ia	Ib	Ic	→	Ia	Ib
II	IIa	IIb	IIc		IIa	IIb

The loss of case is of course a pervasive phenomenon in languages across the world (cf. Kulikov 2006, Barðdal and Kulikov 2008). One way of loosing a case is through cumulative changes at Level 1: When all the cells in the row of a case C_1 are identical to the corresponding cells of another case C_2, one case is lost.

Cases may also be lost (more or less) abruptly, however, and such changes have been related to language contact or, more specifically, second language acquisition. Bentz and Winter (2013) have shown that there is a large-scale correlation between the ratio of second language learners and the loss of case. They relate this finding to "the difficulty of acquiring morphological case in second language acquisition", and "the idea that languages adapt to the cognitive constraints of their speakers" (Bentz and Winter 2013: 1). Plausible as this may sound, in individual cases the exact contribution made by language contact to the loss of case is of course not easy to determine. Evidence for an accelerating role of language contact could be provided by a comparison of developments in closely related high-contact and low-contact varieties of a language. Creolization could provide good evidence here if most of the lexifier languages (e.g. English, French, Portuguese) had not shed their case systems before creolization started. Some correlation between degrees of exposure to language contact and the loss of case might be provided by the Slavonic family: While most (major) West and East Slavic languages have retained a relatively high number of cases, case inventories have been reduced most in Balkan Slavic, most notably in Bulgarian and Macedonian, where case has been lost entirely (except for the vocative, which is not a morphosyntactic case, however). While being cautious about this connection, Wahlström (2015: 99) takes it that the loss of case in Bulgarian and Macedonian is related to the relatively high ratio of L2-speakers: "Balkan Slavic, because of its status in the middle of the prestige scale, had more L2 speakers than either Romani or Greek. In accordance with the hypothesis about the role of L2 speakers, both Romani and Greek have retained their case inflections, unlike Balkan Slavic."

Case inventories may of course also be affected without a significant ratio of L2-learners, e.g. in heritage languages. Texas German might be a case in point (Boas 2009). While Standard German has retained a four-case system, Texas German, starting in the 1960s, has reduced the number of

cases to two. Note, however, that Boas (2009: 361) points out that "[w]hether case loss in German *Sprachinseln* is triggered by internal or external factors is perhaps one of the most studied questions in German dialectology", and it is not clear what role language contact has played. Boas analyses the situation in terms of Trudgill's (2004) model of new-dialect formation, i.e., as a matter of dialect contact within the underlying German varieties.

As was mentioned in Section 4.1, language acquisition is widely assumed to be sensitive to input frequencies, and input frequencies vary with conditions of bilingualism. Both second language learners and first language heritage language learners may be exposed to reduced input frequencies. This, in turn, may lead to the loss of rare or unproductive structures, as Barðdal and Kulikov (2008), among others, have argued:

> It is a well-known fact that languages have a tendency to abate synonymous grammatical forms over time. For case and argument structure, this can take place in two ways: (i) the morphological case distinctions disappear with a subsequent merging of the argument structure constructions; (ii) productive case and argument structure constructions attract new verbs and verbs from non-productive constructions, thereby gradually causing non-productive constructions to fall into disuse. Given a definition of productivity based on type frequency, semantic coherence, and an inverse correlation between the two, the productivity of case and argument structure constructions is, at least in part, derived from the size/type frequency of each case construction (cf. Bardal 2006). Hence, the case construction lowest in type frequency is expected to disappear first, then the one next lowest in type frequency, etc., until only the productive case constructions are left in the language.
> (Barðdal and Kulikov 2008)

Differentiation at Level 2 (D-2) implies the addition of a row or column to a paradigm. This situation is illustrated in Table 11. The extension of paradigms as shown here may result from common processes of grammaticalization (cf. Heine 2008), e.g. when 'semantic' cases become grammatical. Kulikov (2006) has used the term 'case-increasing' for languages where this is pervasive, and Finnic languages provide a prominent example of this type.

Table 11: Paradigm change of type D-2

	a	b			a	b	c
I	Ia	Ib	→	I	Ia	Ib	Ic
II	IIa	IIb		II	IIa	IIb	IIc

Changes of type D-2 may also be contact-induced, and they seem to constitute particularly typical cases of 'contact-induced grammaticalization' (Heine and Kuteva 2003, Heine and Kuteva 2005). A frequently discussed example of this type is the emergence of a dual in the pronominal system of the French-based creole Tayo spoken in New Caledonia (cf. Aikhenvald 2002, Heine and Kuteva 2003, Gast and van der Auwera 2012). Tayo supposedly developed a dual under influence from (the Austronesian languages) Drúbea and Cèmuhî. A partial paradigm of Tayo pronouns is shown in Table 12 (note that there are further variants for the dual forms which I disregard here; what matters at this point is that the Tayo paradigm contains an additional column in comparison to the lexifier language, French; for more details, see Ehrhardt 1993: 137–139).[11]

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11 Interestingly, Ehrhardt (1993: 137) mentions that the dual system is being generalized to a single contrast between singular and plural. In other words, a change of type N-2 is going on.

Table 12: The pronominal paradigm of Tayo (Ehrhardt 1993: 137–139)

	sg	du	pl
1	ma	nude/nud	nu
2	ta	ude/ud	uso
3	la	lede/led	sola/sa/lesot

As argued in Gast and van der Auwera (2012), changes of type D-2, such as the introduction of a dual into a minimal (sg. vs. pl.) number system, may be motivated by (conversational) 'routines': Speakers are simply used to expressing a given meaning. Such routines may be partly driven by Gricean reasoning, specifically, the avoidance of a quantity implicature. Speakers of a language with a dual have the routine of indicating duality, and a plural form may be felt to be under-informative or even misleading under specific circumstances. Such 'routines' are obviously also sensitive to frequency of use.

All instances of paradigm change discussed in this section seem to be related to 'linguistic habits', and thus to frequency of use in some way. The loss of case may be driven by low input frequencies or *rare* use. The addition of categories to a paradigm, e.g. cases or number categories, may be driven by the habitual and, hence, relatively *frequent* expression of the categories in question in a contact language. Ultimately both types of processes – the loss of grammatical categories and the emergence of new categories (grammaticalization) – thus seem to be frequency-driven. The main difference between internal and contact-induced change at Level 3 could consist in differential frequencies of use: If speakers have the habit of expressing a given meaning (or using a specific argument structure construction etc.) in one of their languages, they may transfer this habit to one of their other languages, as sketched above for the case of the dual in Tayo.

4.4   Structural paradigm change at Level 3

At Level 3, a new linguistic dimension is either removed from, or introduced into, a paradigm. As we have been dealing with two-dimensional paradigms only (for the sake of simplicity), neutralization – paradigm change of type N-3 – implies the change of a two-dimensional paradigm into a one-dimensional paradigm, cf. Table 13. Paradigm change of type N-3 is quite common and widely attested in Indo-European languages, which have lost some of their original grammatical dimensions, e.g. mood. Just like neutralization at Level 2 can be a result of cumulative neutralizations at Level 1, neutralization at Level 3 can be a result of cumulative neutralization at Level 2 (e.g. subsequent loss of all mood oppositions).

Table 13: Paradigm change of Type N-3

	a	b			
I	Ia	Ib	→	I
II	IIa	IIb		II

There are many examples of the loss of entire grammatical dimensions. For instance, in Section 4.3 it was mentioned that Bulgarian and Macedonian have lost their case systems (Wahlström 2015). Many Indo-European languages have shed their gender systems (e.g. English), and the inventories of

verbal dimensions have been severely reduced in most languages (e.g. insofar as mood and aspectual distinctions have been given up).

Just like neutralization at Level 2, neutralization at Level 3 may of course also be abrupt, specifically under contact influence. In the most extreme case, pidginization, this process can be regarded as an instance of simplification (Mühlhäusler 2001). Just like in the case of neutralization at Level 2, the most important reason for this type of paradigm change is imperfect second language learning, resulting from both reduced input – 'reduced' not just in quantitative terms but also qualitatively – and non-target-like processing of this input on the part of the speaker.

In change of type D-3, a new dimension is added to a paradigm. This is illustrated in Table 14.

Table 14: Paradigm change of Type D-3

		a	b
I	→	Ia	Ib
II		IIa	IIb

The emergence of new grammatical dimensions can, obviously, result from grammaticalization, a process that does not require any external stimulus. Still, as has been shown in the relevant literature (e.g. Aikhenvald 2002, Heine and Kuteva 2005, Matras and Sakel 2009), the emergence of new paradigm dimensions under contact influence is a relatively common phenomenon. Heine and Kuteva (2005: Sect. 4.2) speak of 'Introducing a new conceptual domain' (referring to Aikhenvald 2002 for more examples), and discuss "some cases where language contact had the effect that a conceptual domain for which there existed virtually no grammatical distinctions came to be associated with a detailed system of grammatical categorization" (Heine and Kuteva 2005: 144). A pertinent example from the domain of tense and aspect is provided by Sɛkpɛlé (also called 'Lipke'):

> Likpe, like its closest genetic relatives, marks tense, aspect and mood categories by prefixes on the verb (including for example past progressive). However, it has developed a present progressive periphrastic construction similar to the one found in Ewe. (Ameka 2009: 112)

Sɛkpɛlé uses a verbal root *lɛ́* meaning 'hold' to express the progressive aspect. As pointed out in the above quotation, this is probably an instance of contact-induced grammaticaliztion under influence from Ewe. The parallelism (and phonological similarity) between the constructions from the two languages can be seen in (28) and (29).

(28) Ewe

é-le   mɔ́lu dzráx-m̄
3SG-be.at:PRES rice   sell-PROG
'She is selling rice.' (Ameka 2009: 112)

(29) Sɛkpɛlé

a. *o-té   ka-mɔ́.*
   3SG-sell CM-rice
   'She sold rice'

b. *ɔ-lɛ́   ka-mɔ́   bo-té.*
   3SG-hold CM-rice CM-sell
   'She is seeling rice.' (Ameka 2009: 112)

On the assumption that the new aspectual category 'progressive' is orthogonal to the other tense/aspect-categories of Sɛkpɛlé, a new dimension was added to the verbal paradigm of this language.[12]

From the perspective of bilingual cognition, the emergence of new paradigm dimensions – or 'conceptual domains', as Heine and Kuteva (2005) put it – may partially be driven by conversational routines like those assumed for Level 2 (cf. Section 4.3). If a speaker is used to expressing 'ongo-ingness' in one of her languages, she may transfer this routine to another language. In the light of recent findings of lexical typology, as well as research into (weak) relativity[13] and its connections to bilingual cognition (e.g. Paradis 1980, Pavlenko 2002, Jarvis 2010, Bylund and Anathopoulos 2015), another scenario, not incompatible with the 'routine hypothesis', seems to be conceivable as well: If "words partition semantic domains by breaking up reality into cognitively relevant frag-ments" (Koptjevskaja-Tamm et al. 2016: 443), the 'partitions' of one language may be transfered to another, in the lexical as well as grammatical domain. According to the "NeoWhorfian hypothesis", the "acquisition of an additional language in adulthood may lead to changes in one's conceptual representations" (Pavlenko 2002: 69). Some authors make a distinction between 'linguistic relativity' and 'conceptual transfer', both of which concern the relationship between language and thought: "linguistic relativity focuses more on the effects of language on cognition, whereas conceptual transfer focuses more on the effects of cognition on language use – particularly the effects of patterns of cognition acquired through one language on the receptive or productive use of another languages" (Jarvis 2010: 3).

In the introduction of a progressive aspect as illustrated for Lipke above, the 'conceptual transfer' hypothesis would imply that speakers view the world in terms of specific conceptualizations, and describe a given situation under a specific 'mode of presentation' (Frege 1892) – for instance, insofar as an event is not just seen in relation to the moment of utterance, but also in relation to some other event, or some 'Topic Time' (Klein 1994).[14] This would not (primarily) be a frequency effect of language use (cf. Sect. 4.3), but a 'conceptual' weak relativity effect.

The 'conceptual transfer' hypothesis is of course hard to falsify or substantiate and requires solid empirical evidence, an endeavour that is currently tackled by "a thriving SLA research move-ment ... that has started to explore how L2 users think – bilingual cognition – primarily through psycholinguistic experiments and techniques" (Cook 2015: 154). Until such solid evidence becomes available, the idea of some language L_1 shaping the thought of its speakers, which in turn may shape some L_2 spoken by the speakers in question, is certainly speculative, but not inconceivable or even unreasonable. At any rate it seems to be compatible with evidence from typological studies such as Aikhenvald (2002) and Heine and Kuteva (2005).

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12 A more familiar example might be provided by English, which also developed a new aspectual opposition between a progressive and a non-progressive aspect. It has been speculated that the English progressive developed under contact influence, e.g. from Celtic (Hickey 2013).

13 Boroditsky (2003: 917) formulates this 'weak relativity' hypothesis in the form or a question: "Languages differ dramatically from one another in terms of how they describe the world. Does having different ways of describing the world lead speakers of different languages also to have different ways of thinking about the world?"

14 While the strong relativity hypothesis has long been given up, there has been some recent empirical research into weak relativity, showing, for instance, that speakers of different languages may focus on different aspects of a situation. To mention just one example, Fausey and Boroditsky (2011) could show that native speakers of English remembered agents of events better than native speakers of Spanish, supposedly because of the conventional ways of describing intentional as well as accidental events in these languages. Similar effects are well known from other domains, e.g. spatial orientation (cf. contributions to Gumperz and Levinson 1996).

5 Summary and outlook

The main objective of this contribution has been to provide a framework for the analysis of cognitive processes underlying contact-induced change in paradigm make-up. I have distinguished three levels of linguistic organization at which paradigm change may operate, the sign, the grammatical category and the grammatical dimension. On this basis I have proposed a typology of paradigm change. As paradigm change may imply neutralization as well as differentiation, there are six possible types of structural change, plus 'structure-preserving' paradigm change. These types were discussed and exemplified with prominent examples from the literature on contact-induced language change.

In analogy to the three levels of linguistic change I have proposed three types of cognitive processes underlying paradigm change, each of them (primarily) associated with one level of linguistic organization. At Level 1, processes of analogy seem to figure prominently; at Level 2, frequency-related mechanisms of change have been argued to play a central role; and at Level 3, I have adopted assumptions made in research on 'conceptual transfer' (e.g. Jarvis 2010), assuming that specific ways of conceptualizing or 'partitioning' (Koptjevskaja-Tamm et al. 2016) the world may underlie instances of language transfer.

I hope that the exploratory character of the study has been made clear enough. The amount of exemplification has been rather limited, and the speculative nature of assumptions about bilingual cognition should be obvious. While it is of course difficult to gain solid evidence about cognitive processes underlying paradigm change under conditions of bilingualism, recent developments in SLA (such as experimental studies on the role of linguistic relativity, as in Bylund and Anathopoulos 2015) are promising not only from the perspective of language acquisition, but also carry a significant potential for a better understanding of processes of language change under contact influence.

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