The ‘productive’ vs. ‘thematic’ prefix distinction in Tetsǫ́ t’ıné: an LFG formalization

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Abstract

In Tetsǫ́t'ıné (ethnologue: CHP), the causative prefix *ɬ* has both productive and thematic uses. When *ɬ* is used productively, it adds an argument to the PRED it modifies, and also participates in selection and blocking relations with other prefixes. When *ɬ* is used thematically—that is, as part of the basic lexical entry of a verb—it appears to be semantically empty, and yet its selection and blocking properties are retained. This paper proposes a unified treatment of both occurrences of *ɬ*, using *D*-mapping theory (Dalrymple 2015). The *D*-mapping function, by which changes in the f-structure/a-structure mapping are projected from m-structure, is formulated as a violable constraint in OT-LFG. The result is that when *ɬ* is compatible with the argument structure of the PRED, as in its productive uses, the output of the *D*-mapping function is realized, whereas when *ɬ* is incompatible with the argument structure of the PRED, as in its thematic uses, *ɬ* is bleached of its semantic content.

1 Introduction

Tetsǫ́t'ıné is a dialect of Dëne Sųłıné (ethnologue: CHP) spoken in Canada's Northwest Territories. It belongs to the Dene (Athapaskan) language family. In the Dene linguistics literature, a distinction is often made between 'productive' and 'thematic' uses of the same prefixes (Rice 2000: 126-170). Briefly, when a prefix is used productively, it contributes to the semantics and morphosyntactic representation of the verb, and also engages in selection and blocking relationships with other prefixes. When a prefix is used thematically, however—that is, as part of a larger morphological construction—it appears to be semantically empty, and yet its selection and blocking properties are retained.

This paper will focus on a single prefix, the causative voice/valence marker *ɬ*, which can be used either thematically or productively in Tetsǫ́t'ıné. I will propose a single representation which accounts for both productive and thematic uses of this prefix, and I will propose a mechanism by which this prefix is semantically bleached in its thematic uses. My analysis will rely crucially upon the distinction, made possible in LFG, between f-structure, the level at which morphosyntactic features are realized (Bresnan 2001, Dalrymple 2001), and m-structure, the level at which morphological selection and blocking restrictions are stated (Frank & Zaenen 2004). Data are taken from Jaker & Cardinal's (2020) *Tetsǫ́t'ıné Verb Grammar* (TVG), unless otherwise specified.

1.1 Productive vs. thematic uses of the prefix *ɬ*

The prefix *ɬ* is a causative voice/valence prefix which adds an argument to the verb stem it modifies. It is one of three voice/valence prefixes in Dene languages; the others are *d* 'middle voice' and *l* 'causative middle' (Rice 2000: 126-170). Some surface verb forms do not have an overt voice/valence prefix, and such forms are described as 'Ø classifier' in the Dene linguistics literature. These verbs may be either transitive or intransitive. The prefixes *d* and *ɬ* are productive in that, in my experience, *d* can be added to any transitive verb as part of the reflexive construction, while *ɬ* can be added to any intransitive verb to make it transitive, provided that the lexical semantics of the verb are compatible. Where the prefixes *d*, *l*, and *ɬ* do surface, they always occur immediately preceding the verbal root. Some examples of the prefix *ɬ* used productively are given in (1), where we can contrast the intransitive verbs in (1.1) (without *ɬ*) with their corresponding transitive verbs in (1.2) (with *ɬ*). The subscript numbers in the underlying forms refer to template position numbers (to be explained in §1.2).

(1) Examples of *ɬ* prefix used productively (changes argument structure)

(1.1) Intransitive verbs, without *ɬ*

Tetsǫ́t'ıné	**English gloss**
a. /łaH$_0$-ñe$_{10}$-ñe$_{11}$-dhër/ → łaį́dhër	'he/she/it died'
b. /ne$_8$-ye/ → neye	'he/she/it grows'
c. /bes/ → hebes	'it is boiling'
d. /t'éth/ → het'éth	'it is cooking'

(1.2) Transitive verbs, with *ɬ*

Tetsǫ́t'ıné	**English gloss**
a. /łaH$_0$-ñe$_{10}$-ñe$_{11}$-**ɬ$_{13}$**-dhër/ → łaį́**ɬ**thër	'he/she killed (O)'
b. /ne$_8$-**ɬ$_{13}$**-ye/ → ne**ɬ**she	'he/she grows (O)'
c. /ł-bes/ → he**ɬ**bes	'he/she is boiling (O)'
d. /ł-t'éth/ → he**ɬ**t'éth	'he/she is cooking (O)'

ref: TVG §4.5.1, 5.2.3, author's fieldnotes

In (1), the causative prefix *ɬ* is added to all of the intransitive forms in (1.1), to generate the corresponding transitive forms in (1.2). The function of *ɬ* is not always so transparent, however. Indeed, in many cases, this prefix seems to be synchronically meaningless. Consider the examples in (2).

(2) Examples of *ɬ*-classifier used thematically (i.e. semantically empty)

Underlying form	Surface form	English gloss
a. /ya$_{4}$-**ɬ$_{13}$**-tı/	ya**ɬ**tı	‘he/she speaks’
b. /the$_{10}$-**ɬ$_{13}$**-tą/	the**ɬ**tą	‘a round container filled with liquid is sitting’
c. /the$_{10}$-**ɬ$_{13}$**-chúth/	the**ɬ**chúth	‘a clothlike object is sitting’
d. /the$_{10}$-**ɬ$_{13}$**-tsı̨/	the**ɬ**tsı̨	‘he/she made (O)’
e. /ná$_{1}$-the$_{10}$-**ɬ$_{13}$**-t’us/	náthe**ɬ**t’us	‘he/she punched (O)’
f. /ná$_{1}$-the$_{10}$-**ɬ$_{13}$**-tthel/	náthe**ɬ**tthel	‘he/she chopped (O)’

ref: TVG § 6.6.2, 8.2, 8.7.

All of the verbs in (2) exhibit what appears to be causative morphology; however, in none of these examples does there exist an independent morphological base form from which these morphological causatives are derived. Indeed, in many cases—such as with the verbs meaning ‘speak’ and ‘sit’—it is difficult to imagine how these verbs could be derived from a more basic verb with one less argument. In these cases, *ɬ* is part of the basic lexical entry of these verbs, which in the Dene linguistics literature is called the VERB THEME (see §2). For this reason, the *ɬ* classifier is said to be THEMATIC in examples such as in (2).

1.2 Morpheme identity and template position

Given that the prefix *ɬ* sometimes clearly functions as a causative prefix, as in (1) and is sometimes semantically meaningless, as in (2), the question arises as to whether these are both instances of the same prefix, or rather two different (but homophonous) prefixes. In my opinion, there are two arguments as to why these are indeed the same prefix: template position and selectional restrictions. In this section (§1.2) I will discuss template position, while in the next section (§1.3) I will discuss selectional restrictions.

Dene languages are traditionally described as templatic languages. A template is an abstract set of positions or ‘slots’. Under the template model, every prefix contains, as part of its lexical entry, a position number, which assigns it a position within the template (Rice 2000: 9; Jaker, Welch & Rice 2020). The template for Tetsǫ́t’ıné consists of 13 template positions as shown in (3) below.

(3) Tetsǫ̨t'ıné verbal template (TVG: 35)

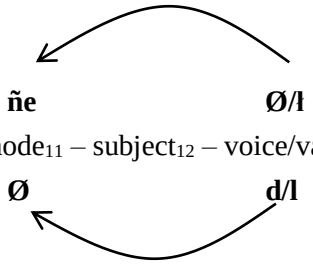
Name	Preverb	Distributive	Iterative	Incorporate	Areal	Object	Deictic Subject	Qualifier	Aspect	Conjugation	Mode	Subject	Classifier	Stem
Position #	1	2	3	4	5	6	7	8	9	10	11	12	13	
Examples	ná	dá	na	shé	ha	se	he	ne	te	ghe	ñe	s	d	t'éth
	xá			ya	ho	ne	ts'e	de	ne	the	ghu	ı	l	k'éth
	xa			gór		ye				hí		ñe	ɬ	tthél
	ní					nuhe				ñe		híd		tsıl
	nı					hube						uh		tı
						ʔe								zé
						ʔede								ya
						ʔele								

In the template in (3), all three voice/valence markers *d*, *l*, and *ɬ* (called 'classifiers' in the Dene linguistics literature) occur in position 13, immediately preceding the stem. The template model thus predicts that no other prefixes can intervene between the voice/valence markers and the stem. Accordingly, note that in the examples where *ɬ* used productively in (1.2), as well as the examples where *ɬ* is used thematically in (2), it always occurs immediately preceding the verb stem. Thus, one argument that both productive and thematic uses of *ɬ* are instances of the same prefix is that they occur in the same linear position.

1.3 Selectional properties are unchanged

Tetsǫ̨t'ıné morphology contains numerous discontinuous dependencies, across different template positions, which take the form of selectional and blocking restrictions (TVG: 33-64). In this section, we will discuss one particular set of selectional relations: the relation between the voice/valence marker (in position 13) and the choice of perfective marker (in position 11). Briefly, when the voice/valence marker is absent (so-called 'zero-classifier verbs'), or when the voice/valence marker is *ɬ*, the perfective prefix is /ñe/. Due to the morphophonemic rules of the language, this usually results in the front high nasal vowel *ı̨* on the surface. On the other hand, when the voice/valence marker is either *d* ('middle voice') or *l* ('causative middle'), /Ø/, a zero allomorph of the perfective marker occurs instead (TVG: 39-40). This is illustrated in (4).

(4) Voice/valence prefixes select perfective allomorph (based on Jaker 2014)



Rice (2000: 169), following earlier work by Hopper & Thompson (1980) suggests that this pattern may be due to a restriction on overtly marking perfectivity in the middle voice. For the purposes of this paper, what is important to note is that, for all three of the voice/valence markers (plus 'zero'), their selectional properties are unchanged whether they are used productively or thematically. This is illustrated in (5)-(7) below.

(5) *ł* classifier selects *ñe* perfective when used productively

Underlying form	Surface form	English gloss
a. /łaH$_0$-ñe$_{10}$-**ñe$_{11}$**-ł$_{13}$-thër/	łaį́łthër	'he/she killed (O)'
b. /łaH$_0$-he$_7$-ñe$_{10}$-**ñe$_{11}$**-ł$_{13}$-thër/	łáh**ı̨ı̨**łthër	'they killed (O)'

ref: TVG §6.5.4

(6) *ł* classifier selects *ñe* perfective when used thematically

Underlying form	Surface form	English gloss
a. /ya$_4$-ghe$_{10}$-**ñe$_{11}$**-ł$_{13}$-tı/	yaı̨łtı	'he/she spoke'
b. /ya$_4$-he$_7$-ghe$_{10}$-**ñe$_{11}$**-ł$_{13}$-tı/	yah**ı̨ı̨**łtı	'they spoke'

ref: TVG §4.7.1

(7) *d* and *l* classifiers select Ø perfective (used thematically)

Underlying form	Surface form	English gloss
/shé$_4$-he$_7$-ghe$_{10}$-**Ø$_{11}$**-d$_{13}$-tı̨/	shéh**ee**tı̨	'they (2) ate'
/se$_6$-he$_7$-ghe$_{10}$-**Ø$_{11}$**-l$_{13}$-ts'ün/	seh**ee**lts'ün	'they kissed me'

ref: TVG §6.3.2, 6.3.3

In both lexical-incremental as well as realizational theories of morphology, it is problematic that a semantically empty prefix should be able to select or block other prefixes. This is because the prefix which does the selecting presumably does so by virtue of the inflectional features which it

contributes or expresses, respectively. The fact that semantically empty prefixes can have selectional properties, therefore, suggests that selectional restrictions ought to be stated at a different level of representation than the level at which morphosyntactic features are encoded. For present purposes, however, it is sufficient to note that the *ɬ* voice/valence marker has the same selectional properties whether it is used productively, as in (5), or thematically, as in (6). The fact that selectional properties are unchanged whether *ɬ* is used productively or thematically thus provides a second argument that, in both cases, we are dealing with the same prefix.

1.4 Overview of proposal

If both thematic and productive uses of *ɬ* are instances of the same prefix, we are faced with the following basic problem: how can the same prefix sometimes change the argument structure of the verb, and sometimes be semantically empty? I propose that LFG provides a set of formal tools with which to address this problem, by distinguishing two levels of representation: f-structure (Bresnan 2001, Dalrymple 2001), where morphosyntactic features are encoded, and m-structure (Frank & Zaenen 2004), where morphological selectional and blocking restrictions can be stated. In the remainder of this paper, I will assume a morpheme-based or 'lexical-incremental' model of morphology, since I believe that the issues can be described most transparently in such a framework. Specifically, I will claim that the *ɬ* voice/valence marker has a single lexical entry, whether it is used productively or thematically. However, when the *ɬ* prefix is part of a larger morphological construction, such as a verb theme or derivational string (see §2), sometimes a clash of features arises at the level of the f-structure/a-structure mapping. When the argument structure projected by the *ɬ* prefix is in conflict with the argument structure projected by the PRED, the *ɬ* prefix is bleached of its semantic content. This process of semantic bleaching is formalized in OT-LFG.

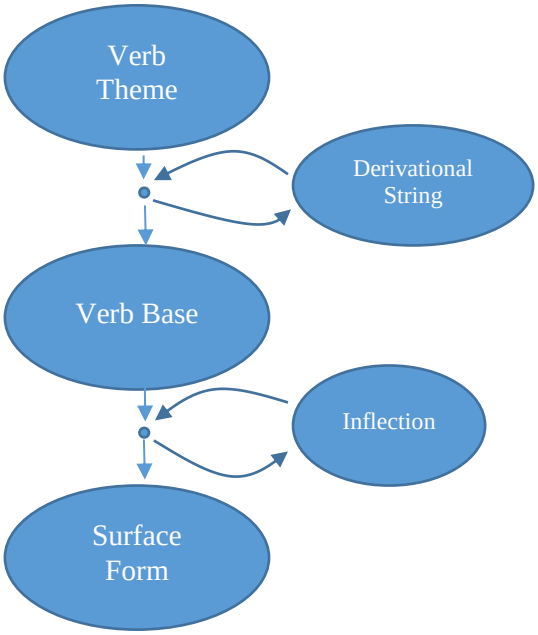
2 Interrupted synthesis and word formation

As mentioned earlier, when the prefix *ɬ* is used thematically—as part of the basic lexical entry of the verb—it is almost always used as part of a larger morphological construction called the VERB THEME (hence the term 'thematic'). In this section, I will provide background on the three main constituent parts involved in Dene word formation: the verb theme, DERIVATIONAL STRING, and INFLECTION.

According to the traditional model of Dene word formation (Whorf 1932; Kari 1979, 1989), which I will call 'Interrupted Synthesis', word formation consists of the recursive interfixation of discontinous strings into other discontinuous strings. Word formation begins with the verb theme, which constitutes the basic lexical entry of the verb. Verb themes always contain a

verbal root, and frequently contain an adverbial prefix and voice/valence marker as well. In the next stage of word formation, a derivational string is added to the verb theme, to make the VERB BASE. Derivational strings can be aspectual or non-aspectual (Kari 1979, 1989); often, derivational strings will consist of an adverbial prefix plus a conjugation marker, although other combinations of prefixes as possible. Finally, inflectional prefixes, including subject and object agreement, are added to the verb base, to make a SURFACE FORM. A flow chart illustrating the process of word formation, under this model, is given in (8), while some Tetsǫ́t'ıné examples illustrating the terminative derivational string (which means 'stop doing X') are given in (9).

(8) Interrupted Synthesis model (simplified), based on Kari (1992: 111)



(9) Illustration of the terminative derivational string (TVG: 128-139)

(9)(a)

Inflection **Verb Theme**

ní$_{1}$ ya$_{4}$ he$_{7}$ ñe$_{10}$ ñe$_{11}$ ɬ$_{13}$ tı

Derivational String

níyahɥɬtı 'they stopped speaking'

(9)(b)

Inflection **Verb Theme**

ní$_{1}$ she$_{4}$ he$_{7}$ ñe$_{10}$ Ø$_{11}$ d$_{13}$ tı

Derivational String

níshehɥɬtɥ 'they (DU) stopped eating'

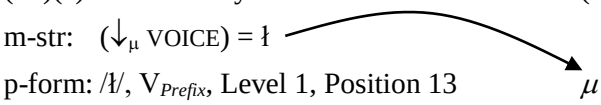
In (9), we see two verb themes /ya$_{4}$…ɬ$_{13}$-tɪ/ ‘speak’ and /shé$_{4}$…d$_{13}$-tı̨/ ‘eat’, which carry the main lexical meanings of these verbs. To both of these verbs is added the TERMINATIVE derivational string /ní$_{1}$…ñe$_{10}$/ ‘stop doing X’. Finally, inflectional prefixes are added, such as /he$_{7}$/ ‘3plS’, and /ñe$_{11}$/ or /Ø$_{11}$/ ‘PERF’. The main point of (9) is that verb themes and derivational strings are discontinuous within the word, but must nevertheless be treated as morphological ‘constructions’ in some sense, which are more than the sum of their parts, in terms of their semantic content.

To summarize, under this model it is assumed that word formation begins with the verb theme, to which derivational strings are added to make the verb base, to which finally inflectional prefixes are added. This is relevant in that the behavior of *ɬ* may be correlated with the stage of word formation at which it is added. When the prefix *ɬ* is semantically empty—that is, ‘thematic’—that is because it belongs to the verb theme, which is the basic lexical entry of the verb. When, on the other hand, *ɬ* used productively, it is added at a later stage of word formation. Therefore, when the thematic use of *ɬ* leads to a clash of features at the level of f-structure, this clash of features arises within the verb theme itself, as we will see in the following sections.

3 An LFG formalization using *D*-mapping

As mentioned earlier, my analysis will rely crucially upon the distinction, available in LFG, between f-structure (Bresnan 2001, Dalrymple 2001), the level at which morphosyntactic features are expressed, and m-structure (Frank & Zaenen 2004), the level at which morphological selectional and blocking restrictions are stated. Following Dalrymple (2015), I will assume that f-structure is projected from m-structure via the *D*-mapping function. This means that in most cases, as in (10) below, it is not necessary to specify f-descriptions as part of the lexical entry of prefixes. Rather, the f-description can be projected by *D*-rules. Based on information specified in the lexical entry of the *ɬ* voice/valence marker, an m-structure is projected, as illustrated in (10). In (10), I have labeled the m-structure attribute for *ɬ* ‘VOICE’, although here this term is used in a broad sense, in that the voice/valence prefixes actually contribute a combination of information about both voice and valence.

(10)(a) Lexical entry for *ɬ*-classifier (10)(b) m-structure



Based on the information contained in the m-structure, the m-structure will project an f-structure via the *D*-mapping function. More precisely, in this particular case, I assume that the *ɬ* classifier introduces changes at the level of f-structure/a-structure mapping (Dione 2013), as shown in (11).

(11) *D*-mapping rule for causatives

M-VOICE: ɬ ⇒ {'caus < ARG, 'pred < ARG >' >'
AG PT/THM

The rule in (11) introduces an argument which is an agent, and also requires that the internal argument of the PRED be a patient or theme. I assume that the former will be interpreted as a subject and the latter as an object according to Lexical Mapping Theory (LMT) (Bresnan & Zaenen 1990). Crucially, this means that the rule in (11) will be compatible with the lexical entry of unaccusative verbs such as 'die' in (12), but not with unergative verbs such as 'speak' in (13). I further assume that the lexical entry for a verb theme contains a PRED value, which specifies the semantic role(s) of its argument(s), but which is unspecified for grammatical functions, which are filled in according to LMT.

(12) Lexical entry for *łąą́dhır* 'die'

(↑ PRED) = 'die < ARG >'
PATIENT

łaH: p-form: /łaH/, V*Prefix*, Level 5, Position 1
thır: p-form: /thır/ ~ /thër/, V*Root*, Level 1
m-str:

$$\begin{pmatrix} \text{p-form} = /\text{thır}/ \Rightarrow {}_{\mu}[\text{ASPECT}] =_c \text{IMP} \vee \text{OPT} \\ \text{p-form} = /\text{thër}/ \Rightarrow {}_{\mu}[\text{ASPECT}] =_c \text{PERF} \end{pmatrix}$$

(13) Lexical entry for *yałtı* ‘speak’

(↑ PRED) = ‘speak < ARG >’
AGENT

ya: p-form: /ya/, V_{Prefix}, Level 5, Position 4
ł: p-form: /ł/, V_{Prefix}, Level 1, Position 13
m-str: ($\downarrow_{\mu}$ VOICE) = ł
tı: p-form: /tı/, V_{Root}, Level 1

The lexical entry for ‘die’ in (12) specifies a patient as its argument, and is thus compatible with the rule in (11). The entry for ‘speak’ in (13), however specifies an agent. Applying the *D*-mapping rule in (11) to (13) would therefore violate coherence—specifically, it would generate a clash at the level of a-structure. In the next section, I will propose a mechanism by which such potential violations of coherence are repaired, resulting in semantic bleaching of the prefix *ł* when it is used thematically.

4 An OT account of semantic bleaching

Strictly speaking, applying the *D*-mapping rule in (11) to a PRED with a pre-specified agent argument does not predict semantic bleaching—rather, it predicts a clash of features at the level of a-structure. Therefore, an additional step of the analysis is necessary. Specifically, using OT-LFG (e.g. Lee 2001) I propose that the *D*-mapping function in (11) can be re-formulated as a violable constraint. Under this analysis, the *D*-mapping function is in conflict with both coherence as well as the information specified in the lexical entry of the PRED. The three constraints I will use are formalized in (14).

(14) Constraints used in OT-LFG analysis

a) MAX(*D*): The output of every *D*-mapping function must be realized in f-structure and a-structure.
b) MAX(PRED-ARG): For every PRED, every semantic role specified in the lexical entry of the PRED must be realized in the a-structure of the output.
c) COHERENCE(ARG): Every argument is specified for at most one semantic role.

If there were evidence that the f-structures and a-structures projected by different prefixes were ranked differently with respect to faithfulness, the constraint in (14)(a) could be further specified as MAX(*D*-[μ-VOICE: ł]). The interaction of these constraints is illustrated in the tableau in (15).

(15) Semantic bleaching where *D*-mapping function is outranked

(↑ PRED) = 'speak <ARG>' (ARG: AG) (↓$_{\mu}$ VOICE) = ł	COHERENCE (ARG)	MAX (PRED-ARG)	MAX(*D*)
a. (↑ PRED) = 'speak <ARG>' (SUBJ; ARG: AG, PT)	*!		
b. (↑ PRED) = 'speak <ARG>' (SUBJ; ARG: PT)		*!	
☞c. (↑ PRED) = 'speak <ARG>' (SUBJ; ARG: AG)			*

The tableau in (15) illustrates the mechanism by which some prefixes can be bleached of their meaning, when that meaning would clash with the meaning of the PRED. Specifically, the semantic role projected by the m-structure of *ł* via the *D*-mapping function, that of patient, is not realized in the output, because it conflicts with the agent role specified in the lexical entry of the PRED. However, even when the output of the *D*-mapping function is unrealized, the m-structure information specified in (10) is still available to be used for the purposes of defining morphological selection and blocking relations. In this way, the f-structure/m-structure distinction in LFG enables us to account for how a prefix can be bleached of its semantic content, yet still retain its selectional properties.

In contrast, (16) illustrates how the *ł* prefix functions in unaccusative verbs. Recall that, in unaccusative verbs, the internal argument of the PRED is a patient, and thus there is no conflict between the lexical specification of the PRED and the output of the *D*-mapping rule. Thus, in (16) we see how the prefix *ł* renders the change from 'die' to 'kill'.

(16) No conflict between *D*-mapping function and PRED in unaccusative verbs

(↑ PRED) = ‘die <ARG>’ (PT) (↓$_{\mu}$ VOICE) = ł	COHERENCE (ARG)	MAX (PRED-ARG)	MAX (*D*)
a.(↑ PRED) = ‘caus <ARG, die <ARG>’>’ (SUBJ–AG; OBJ–AG, PT)	*!		
☞b.(↑ PRED) = ‘caus <ARG, die <ARG>’>’ (SUBJ–AG; OBJ–PT)			
c.(↑ PRED) = ‘caus <ARG, die <ARG>’>’ (SUBJ–AG; OBJ–AG)		*!	*

As shown in (16), because the internal PRED of this verb is unaccusative, the winning candidate (b) satisfies all three constraints simultaneously: it satisfies coherence, it realizes the lexically specified argument of the internal pred ‘die’, which is a patient, as well as the arguments specified by the *D*-mapping function, which are a patient or theme as the internal argument, and an agent as the external argument. To summarize, in unaccusative verbs such as ‘die’, the voice/valence prefix *ɬ* renders the change from ‘die’ to ‘kill’ ultimately as a result of its lexical entry in m-structure: lexical entry projects the attribute-value pair [VOICE ɬ] at m-structure, which in turn activates the *D*-mapping function in (11), which ultimately results in the change in f-structure/a-structure mapping as shown in (16).

5 Summary and conclusion

Like other prefixes in Tetsǫ́t’ıné, the *ɬ* voice/valence marker has both productive and thematic uses. In its productive uses, it acts as a causative prefix, introducing changes to the f-structure/a-structure mapping, and selects a particular form of the perfective marker—*ñe* or Ø. In its thematic uses, on the other hand, it appears to be semantically empty, and yet its selectional properties are retained.

LFG provides a way to describe this pattern by distinguishing f-structure from m-structure. Causativity is stated in terms of changes to the f-

structure/a-structure mapping (Dione 2013), while morphological selection is stated at m-structure (Frank & Zaenen 2004). Under this view, both productive and thematic uses of *ɬ* involve the same lexical entry. When *ɬ* is compatible with the argument structure of a verb, the causative meaning is realized; when *ɬ* is semantically incompatible with a verb's argument structure, it is bleached of its semantic content. Finally, I suggested a formal mechanism by which to model this semantic bleaching, which is to formulate the *D*-mapping function as a violable constraint, within OT-LFG.

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