A metagrammar of three-argument constructions with morphological causatives: general design and first implementations

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Overview

Constructions in question

Narrowing the scope

The present talk deals only with constructions derived from transitive verbs by means of an affix

These constructions must include

- a transitive verb with a specific CAUS marker
- the Causer – a participant that intends the situation to happen
- the Causee – a participant that is caused to act
- the Theme – a participant that is influenced by the action

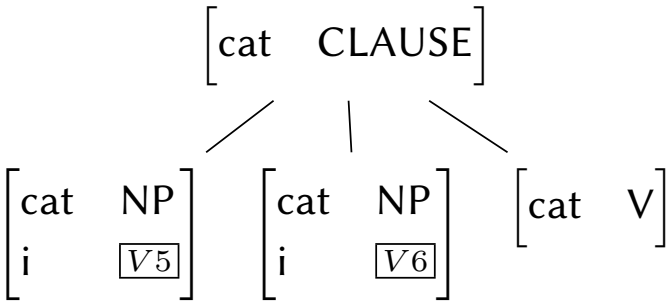
(1) *Bala besäj-***gä** *höt-tö es-er-ä* BASHKIR
child cat-**DAT** milk-ACC drink-CAUS-IPFV
'The child feeds the cat with the milk.' Perekhval'skaya 2017, p. 241, (10b)

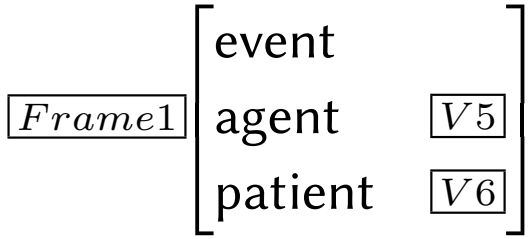
Goal of the talk

To suggest a solution that

- presents linguistic analyses of several dimensions
- operates on surface structures
- describes cross-linguistic generalizations
- works with individual languages
- covers typologically varied constructions
- can easily cover more data

XMG: declarative, expressive, extensible






```
class SampleClass                                   variables   variables as feature values
declare ?Clause ?V ?Np1 ?Np2 ?I1 ?I2 ?LanguageFeatures ?F0 ?F1 ?F2
{<syn>{node ?Clause [cat=clause];
        node ?V [cat=v];
        node ?Np1 [cat=np, i=?F1];
        node ?Np2 [cat=np, i=?F2];
        ?Clause -> ?V; ?Clause -> ?Np1; ?Clause -> ?Np2;
        {?LanguageFeatures=[wordOrder=svo]; ?Np1>>?V; ?V>>?Np2} |
        {?LanguageFeatures=[wordOrder=sov]; ?Np1>>?Np2; ?Np2>>?V}};
<frame>{?F0[event,                          features  feature values      operators
dimensions   agent: ?F1,
             patient: ?F2]}}
```

General architecture

class **Construction**

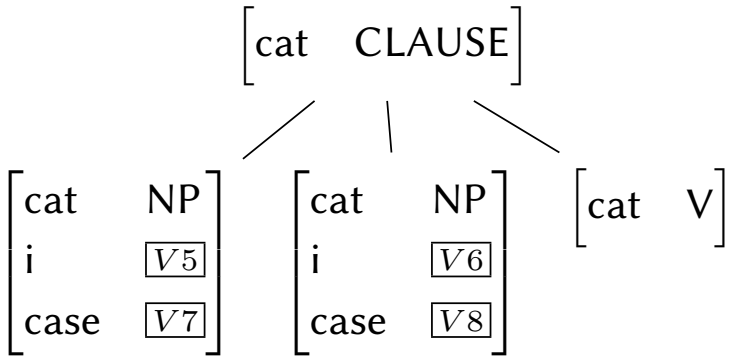
- nodes with features for syntactic constituents
- linking to universal semantic representations
- all varieties encountered in world languages
- relationship between constructions tracked

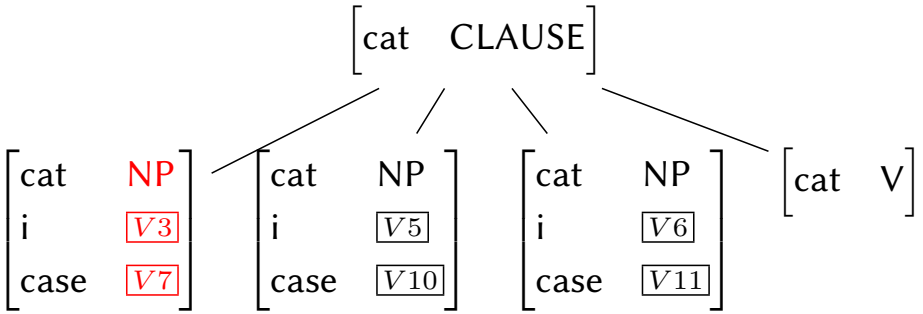
class **Language**

- morphology encoded as feature structure
- list of features applicable to any construction
- available constructions listed as boolean variables
- can be nested and inherit features from each other

While parsing, a sentence is matched against the intersection of a Construction class with a Language plugin

Syntax of causative derivation





- label $\boxed{V7}$ refers to the case normally used for the PSA (=syntactic subject)
- label $\boxed{V8}$ refers to the case normally used for coding the Undergoer
- in a causative construction, the added argument will always receive the PSA case
- other cases depend on the language and type of construction and thus are assigned later

Universal semantic structure

$$\boxed{Frame1}\begin{bmatrix} \text{event} & \\ \text{agent} & \boxed{V5} \\ \text{patient} & \boxed{V6} \end{bmatrix}$$

$$\boxed{Frame1}\begin{bmatrix} \text{causation} & \\ \text{cause} & \boxed{Frame2}\begin{bmatrix} \text{activity} & \\ \text{effector} & \boxed{V3} \end{bmatrix} \\ \text{effect} & \boxed{Frame4}\begin{bmatrix} \text{event} & \\ \text{agent} & \boxed{V5} \\ \text{patient} & \boxed{V6} \end{bmatrix} \end{bmatrix}$$

Deriving the causative frame

```
1  class CausAffix
2  (...)
3  {<frame>{?eAff[activity,
4          effector:?F0]}}
5
6  class Root
7  (...)
8  {<frame>{?Trans=tr;
9          ?eRoot[event,
10             agent:?F1,
11             patient:?F2]}}
```

```
1  class Verb
2  import Root[]
3  declare ?Caus ?eVerb ?Affix ?eAffNew
4  {<frame>{{?Caus=no;
5          ?eVerb=?eRoot}|
6          {?Caus=yes;
7          ?Affix = CausAffix[];
8          ?eAffNew = ?Affix.eAff;
9          ?eVerb[causation,
10         cause:?eAffNew,
11         effect:?eRoot]}}}
```

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8          ?eAffNew = ?Affix.eAff;
9          ?eVerb[causation,
10         cause:?eAffNew,
11         effect:?eRoot]}}}
```

One language – several constructions

(2) a.

Babaj	*ul-ə-***nan**	*xat-tə*	*uqə-t-tər-a*	BASHKIR
old.man	son-POSS.3-**ABL**	letter-ACC	read-CAUS-CAUS-IPFV	

'The grandfather asks his son to read the letter.'
Lit: 'The grandfather makes the son read the letter.'

b.

Babaj	*ul-ə-***na**	*xat-tə*	*uqə-t-tər-a*
old.man	son-POSS.3-**DAT**	letter-ACC	read-CAUS-CAUS-IPFV

'The grandfather lets his son read the letter.'
Lit: 'The grandfather has the son read the letter.'

Perekhval'skaya 2017, p. 244, (16a-16b)

Language plugins must tell whether a certain construction is allowed

Boolean variables in language plugins

```
1  class Plugin_Bashkir
2  {?LanguageFeatures=[ (...)
3  ConstrCauseeLikeRecip = yes,
4  ConstrCauseeLikeTheme = no,
5  ConstrCauseeLikeDemAg = yes,
6  ConstrCauseeLikePatient = no,
7  ConstrCauseeLikeAgent = no,
8  ConstrCauseeLikeLoc = no,
9  ConstrCauseeSpecial = no]}
```

Disjunction of conjunctions as implication

```
1  class CausativeConstruction
2  (...)
3  {<syn>{(...);
4      node NpCausee [case=?VarCauseeCase]; (...);
5
6      {?LanguageFeatures.ConstrCauseeLikeRecip = yes;
7      ?VarCauseeCase=?LanguageFeatures.recipCase}
8
9      | {?LanguageFeatures.ConstrCauseeLikeDemAg = yes;
10     ?VarCauseeCase=?LanguageFeatures.demAgCase}
11
12     | {?LanguageFeatures.ConstrCauseeSpecial = yes;
13     ?VarCauseeCase=?LanguageFeatures.causeeCase};
14     (...) }}
```

Morphological part of language plugins

```
1 class Plugin_Bashkir
2 {?LanguageFeatures=[ (...)
3 psaCase = nom,
4 ugCase = acc,
5 recipCase = dat,
6 demAgCase = abl (...)]}
```

```
1 class Plugin_Kalmyk
2 {?LanguageFeatures=[ (...)
3 psaCase = nom,
4 ugCase = acc,
5 recipCase = dat,
6 demAgCase = ins (...)]}
```

Features are unified by name allowing different morphological devices to appear in the same construction cross-linguistically

Language plugin for Nivkh

(3) *ytyk p'-oγla-aχ pityy ama-gu-d* NIVKH
father POSS-child-DAT/ACC book see-CAUS-FIN
'The father showed his son the book.'

Nedyalkov, Otaina, and Kholodovich 1969, p. 192

```
1  class Plugin_Nivkh
2  {?LanguageFeatures=[ (...)
3  psaCase = nom,
4  ugCase = nom,
5  recipCase = nom,
6  demAgCase = n/a,
7  causeeCase = dat/acc,
8  (...)
9  ConstrCauseeLikeRecip = no,
10 ConstrCauseeLikeTheme = no,
11 ConstrCauseeLikeDemAg = no,
12 ConstrCauseeLikePatient = no,
13 ConstrCauseeLikeAgent = no,
14 ConstrCauseeLikeLoc = no,
15 ConstrCauseeSpecial = yes]}
```

Summary

What one needs to know in order to describe constructions with morphological causatives:

- a new PSA can be added to the syntactic structure,
- the semantic structure of causation is universal,
- syntactic and semantic structures can be derived from each other,
- strategies of marking in causative constructions are related to ditransitive, passive and, perhaps, some other constructions,
- there is a (closed) list of patterns for marking arguments in the constructions in question across languages,
- the exact realization of a strategy depends on the morphology of a language.

Expansion: other constructions

The suggested solution can be modified to cover the following constructions:

- active intransitive and ditransitive,
- passive,
- applicative,
- other verbal derivations.

The complete code for the latest stable version of the metagrammar can be made available upon personal request

Thank you!

Your feedback is very welcome:
generalo@hhu.de

Glossary

3	third person
ABL	ablative
ACC	accusative
CAUS	causative
DAT	dative
FIN	finite
IPFV	imperfective
POSS	possessive

Bibliography I

Bender, Emily M, Dan Flickinger, and Stephan Oepen (2002). "The grammar matrix: An open-source starter-kit for the rapid development of cross-linguistically consistent broad-coverage precision grammars". In: *Proceedings of the Workshop on Grammar Engineering and Evaluation at the 19th International Conference on Computational Linguistics*. Ed. by J Carroll, N Oostdijk, and R Sutcliffe. Taipei, Taiwan, pp. 8–14.

Cole, Peter (1976). "A causative construction in Modern Hebrew: theoretical implications". In: *Studies in Modern Hebrew syntax and semantics*, pp. 99–128.

Comrie, Bernard (1974). "Causatives and universal grammar". In: *Transactions of the philological society* 73.1, pp. 1–32.

Comrie, Bernard (1976). "The syntax of causative constructions: cross-language similarities and divergences". In: *Syntax and semantics: The grammar of causative constructions*. Ed. by Masayoshi Shibatani. Academic Press, pp. 261–312.

Crabbé, Benoit et al. (2013). "XMG: extensible metagrammar". In: *Computational Linguistics* 39.3, pp. 591–629.

Curtis, Christian Michael (2018). "A parametric implementation of valence-changing morphology in the LinGO Grammar Matrix". MA thesis. University of Washington.

Dixon, Robert M. W. (2000). "A typology of causatives: form, syntax and meaning". In: *Changing valency: Case studies in transitivity*. Ed. by Robert M. W. Dixon and Alexandra Y. Aikhenvald. Cambridge: Cambridge University Press. Chap. 2, pp. 30–83.

Dmitriev, N. K. (2008). *Grammar of Bashkir (Published in Russian)*. Moscow: Nauka.

Foley, William and Robert D. Van Valin Jr. (1984). *Functional syntax and universal grammar*. Cambridge University Press.

Gerdts, Donna (2010). "Ditransitive constructions in Halkomelem Salish: A direct object/oblique object language". In: *Studies in ditransitive constructions: A comparative handbook*, pp. 563–610.

Bibliography II

Gerdts, Donna B and Thomas E Hukari (2006). "Classifying Halkomelem causatives". In: *41st International Conference on Salish and Neighbouring Languages, University of British Columbia Working Papers in Linguistics*. Vol. 18, pp. 129–145.

Glinert, Lewis (1989). *The Grammar of Modern Hebrew*. New York: Cambridge University Press.

Gruzdeva, Ekaterina (1998). *Nivkh*. Vol. 111. Languages of the World/Materials. München and Newcastle: Lincom Europa.

Guirardello, Raquel (1999). "A reference grammar of Trumai". PhD thesis. Houston, Texas: Rice University.

Haspelmath, Martin (2010). "Comparative concepts and descriptive categories in crosslinguistic studies". In: *Language* 86.3, pp. 663–687.

Haspelmath, Martin (2016). "Universals of causative and anticausative verb formation and the spontaneity scale". In: *Lingua Posnaniensis* 58.2, pp. 33–63.

Kallmeyer, Laura et al. (2016). "Argument linking in LTAG: A constraint-based implementation with XMG". In: *Proceedings of the 12th International Workshop on Tree Adjoining Grammars and Related Formalisms (TAG+ 12)*, pp. 48–57.

Kinyon, Alexandra et al. (2006). "The metagrammar goes multilingual: A cross-linguistic look at the V2-phenomenon". In: *Proceedings of the Eighth International Workshop on Tree Adjoining Grammar and Related Formalisms*, pp. 17–24.

Kozinsky, Isaac and Maria Polinsky (1993). "Causee and patient in the causative of transitive: Coding conflict or doubling of grammatical relations". In: *Causatives and transitivity*. Ed. by Bernard Comrie and Maria Polinsky. John Benjamins Publishing, pp. 177–240.

Lichte, Timm and Simon Petitjean (2015). "Implementing semantic frames as typed feature structures with XMG". In: *Journal of Language Modelling* 3.1, pp. 185–228.

Nedyalkov, V. P., G. A. Otaina, and A. A. Kholodovich (1969). "Morphological and lexical causatives in Nivkh (published in Russian)". In: *Typology of causative constructions: Morphological causative*. Ed. by A. A. Kholodovich. Nauka, Leningrad, pp. 179–199.

Bibliography III

Osswald, Rainer and Laura Kallmeyer (2018). "Towards a formalization of Role and Reference Grammar". In: *Applying and expanding Role and Reference Grammar (NIHIN Studies)*. Ed. by Rolf Kailuweit, Eva Staudinger, and Lisann Künkel. Freiburg: Albert-Ludwigs-Universität, Universitätsbibliothek, pp. 355–378.

Perekhval'skaya, E. V. (2017). "Causative constructions in Bashkir (Published in Russian)". In: *Acta Linguistica Petropolitana. Works by Institute of Linguistic Studies* 13.1.

Say, Sergey (2009). "Argument structure of Kalmyk causative constructions (Published in Russian)". In: *Acta Linguistica Petropolitana. Works by Institute of Linguistic Studies* 2, pp. 387–464.

Song, Jae Jung (2013). "Nonperiphrastic Causative Constructions". In: *The World Atlas of Language Structures Online*. Ed. by Matthew S. Dryer and Martin Haspelmath. Leipzig: Max Planck Institute for Evolutionary Anthropology.

Van Valin Jr., Robert D. (2005). *Exploring the syntax-semantics interface*. Cambridge University Press.

Van Valin Jr., Robert D. (2018). "Dative case and oblique subjects". In: *Non-Canonically Case-Marked Subjects. The Reykjavík-Eyjafjallajökull papers*. Ed. by Jóhanna Barðdal, Na'ama Pat-El, and Stephen Mark Carey. John Benjamins Publishing Company. Chap. 5, pp. 115–131.

Van Valin Jr., Robert D. and Randy J. LaPolla (1997). *Syntax: Structure, meaning, and function*. Cambridge University Press.

Vydrina, Alexandra (2009). "Usage of passive marker in Kalmyk (Published in Russian)". In: *Acta Linguistica Petropolitana. Works by Institute of Linguistic Studies* 2, pp. 347–386.