Lexicographic Potential of the Syntactic Properties of Verbs: The Case of Reciprocity in Czech

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Abstract

Reciprocity has been the focus in much theoretical research in recent years. It has been primarily studied as a grammatical property, which is not of high relevance for the description of the lexical stock of a language. At the same time, however, it has been widely accepted that languages substantially differ with respect to the inventory of words allowing for reciprocity, and that the applicability of reciprocity is rarely derivable from the semantic and/or syntactic properties of these words. The integration of the information on reciprocity into lexicons would thus be highly beneficial for both human users (esp. for foreign speakers) and for natural language processing tasks. In this paper, we demonstrate how the reciprocity of Czech verbs can be represented in a lexicon in a comprehensive and systematic way. Czech represents a language where reciprocity is a highly productive phenomenon. We show which semantic and syntactic properties are relevant for the description of reciprocal verbs, and based on this a user (be it human or computer) can acquire their reciprocal constructions.

Keywords: reciprocity, reciprocal verbs, valency structure of verbs, lexicon, syntax, Czech

1   Introduction

In the last century, linguistic research had a strong tendency to disassociate meaning from form. Particularly in the tradition of transformational generative grammar, many linguistic studies adopted the unchallenged view that the form exhibited by a word is independent from its meaning. Under this view, a lexicon serves as an inventory of separate words bearing some meanings, while a grammar provides grammatically correct combinations of these words. However, the development of corpus linguistics has revealed that semantically similar words exhibit similar grammatical patterns, indicating that there are many interdependencies between the grammatical properties of words and their meaning (Sinclair 1991; Levin 1993). In this paper, we demonstrate how a primarily grammatical property of words, namely reciprocity, can contribute to a better description of the vocabulary of a language. We focus on Czech reciprocal verbs and their representation in a valency lexicon of Czech verbs, VALLEX (Lopatková et al. 2016).[1]

Reciprocity is generally understood as a complex of forms and patterns of mutuality and exchange. In line with König and Kokutani (1996) and Haspelmath (2007), among others, we distinguish between symmetry as a semantic property of a word and reciprocity as a grammatical or lexical coding of the given property. Let us repeat a notorious description of *symmetric predicates* as predicates that denote binary (or *n*-ary, where $n \geq 2$) relations R among members of a set A of semantic participants with the following semantic property:

(i)   " x, y Î A ($x \neq y \rightarrow R(x, y)$) (König & Kokutani 2006);

as a consequence, for two particular a, b Î A it holds ($R(a,b) \leftrightarrow R(b,a)$).

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1   http://ufal.mff.cuni.cz/vallex/3.0

Reciprocal constructions are then grammatical means for the expression of symmetrical relations for an *n*-ary predicate and for set of participants *A* with a cardinality of at least 2 ($|A| \geq 2$). For example, in (1a) the predicate *hádat se* 'quarrel' denoting relation *R* among semantic participants from the set *A* = {Petr, Pavel} is a symmetric predicate, as the participants from the set *A* (*Petr* 'Peter' and *Pavel* 'Paul') are distinct and related to each other by the relation *R*, as required by (i). A typical reciprocal construction is then instantiated in (1a).

(1a) Petr se hádá s Pavlem a zároveň Pavel se hádá s Petrem.
       Peter REFL quarrels with Paul and at the same time Paul REFL quarrels with Peter
       'Peter is quarreling with Paul and at the same time Paul is quarreling with Peter.'

(1b) Petr a Pavel se hádají.
       Peter and Paul REFL quarrel
       'Peter and Paul are quarreling.'

(2)   Petr a Pavel se na sebe dívají.
       Peter and Paul REFL at REFL look
       'Peter and Paul are looking at each other.'

Let us stress, however, that reciprocals are not associated with a uniform meaning – on the contrary, their meaning varies, as discussed in detail by Dalrymple et al. (1998). The above attempt to formally describe symmetry and reciprocity is relevant for the so-called strong reciprocity when each member of the set *A* is related by the relation *R* to every other member (Langendoen 1978). Formula (i) holds for most reciprocal structures in which two participants are involved, as in (1b) and (2). Reciprocity can, however, be associated with different semantic facets; as these facets are not linguistically structured and they typically remain vague, we leave them aside here.[2]

Reciprocity represents the linguistic means for encoding symmetry. It can be characterized as an operation resulting in the fact that two (sometimes more)[3] valency complementations of a predicate stand in symmetry. In Czech, verbs (1a,b) and (2), nouns (3), adjectives (4) or even some adverbs (5) can be used as reciprocal predicates. In reciprocal constructions, one valency complementation of these predicates is typically occupied by the whole set *A*, while the second is either reduced on the surface (1b), (3), and (5), or filled by coreferential expressions (2) and (4). As a result, dual thematic roles (in an unreciprocal structure mapped onto two complementations separately) are then associated with both valency complementations involved in symmetry, see Figure 1, displaying double mapping of thematic roles Agent and Patient onto valency complementations ACT and PAT with the verb *políbit* 'to kiss'.

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2   For example, if more than two participants are involved, a weaker condition on symmetry may be applied:
     $\$ \, x, y \, Î \, A \, (x \neq y \rightarrow (R(x, y) \leftrightarrow R(y, x)))$
     The weaker condition is a more probable interpretation for, for example, *Petr, Pavel a Hanka se na sebe dívají.* 'Peter, Paul and Hannah are looking at each other.', which can be interpreted as, for example, *Petr a Pavel se dívají na Hanku, Hanka se dívá jen na Petra.* 'Both Peter and Paul are looking at Hannah, Hannah is looking at Peter only.'
     Such semantic nuances are primarily associated with ways of how a particular action can be performed. For example, in *Pytle s pískem jsou naskládány na sebe.* 'Sandbags are stacked on top of each other.', if sandbags should effectively function as a flood barrier, they must be arranged on top of each other in an overlapping way. In other situations, as there are on building sites, such an arrangement is not necessary and the sandbags can be put in piles without overlapping. Although the truth conditions are different, both these situations can be described by the same reciprocal sentence.

3   Although reciprocity involving two participants prevails in a language, reciprocity of three participants is not excluded. See example of the Czech verb *představovat* 'to introduce' in the following reciprocal structure with the interpretation that each child introduced another child to every other children:
     Děti se představovaly (navzájem).
     children REFL introduced (mutually)
     'Children were introducing each other.'

(3)   vyostřená hádka mezi Petrem a Pavlem
'escalated quarrel between Peter and Paul'

(4)   Petr a Marie si byli věrní.
Peter and Mary REFL were faithful
'Peter and Mary were faithful to each other.'

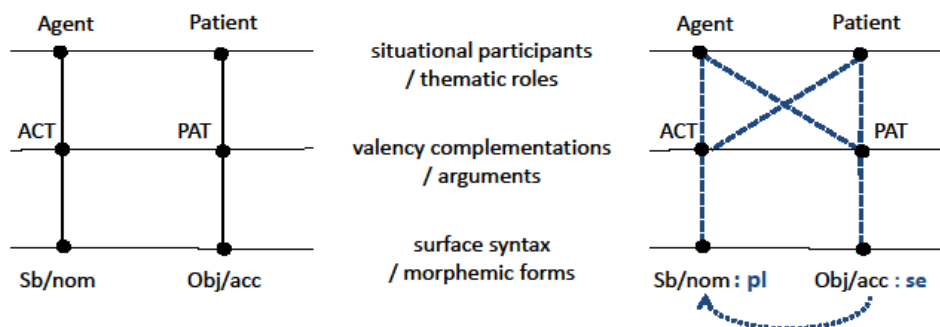(5)   Domy jsou orientovány rovnoběžně.
'Houses are oriented in parallel.'

Figure 1: Schematic representation of the sentences *Jan políbil Marii.* 'John kissed Mary.' (left) and *Jan a Marie se políbili (navzájem).* 'John and Mary kissed each other.' (right). For the reciprocal construction, the scheme models doubling the thematic roles of the situational participants, their plurality, and symmetrical correspondence to valency complementations, as well as their morphemic forms.

Reciprocity did not attract much attention in either theoretical or computational linguistics until the turn of the century. Since then, reciprocity has been gradually gaining interest among theoretical linguists, the focus being on both syntactic and semantic analyses and cross-linguistic typological studies (König & Kokutani 2006; Heim et al. 1991; Dalrymple et al. 1998; Siloni 2001; Frajzyngier & Curl 2000; Nedjalkov 2007; König & Gast 2008; Evans et al. 2011). As reciprocity is expressed mostly by regular grammatical means, it is predominantly treated as a grammatical phenomenon. However, as Siloni (2002) and Reinhart and Siloni (2005) argue, reciprocity is of high relevance to both grammar and lexicon in many languages. Czech is one of the languages where reciprocity is reflected in both lexicon and grammar, thus representing a prototypical phenomenon at the lexical-grammar interface. As such, in this paper we attempt to provide a comprehensive and systematic representation of reciprocal verbs, making use of both parts of the language description. As reciprocity is lexically conditioned and its applicability to verbs cross-linguistically varies, the theoretical results achieved here can be further made use of in practical lexicography in building both monolingual and bilingual dictionaries. In other words, reciprocity as a lexically determined characteristic of verbs can greatly assist in an adequate description of their meaning, and thus also in better word-sense disambiguation. The lexicographic description of reciprocity can be beneficial for exploring which strategies verbs adopt for encoding mutuality.

The rest of this paper is structured as follows. First, two basic types of Czech reciprocal verbs are distinguished according to whether they encode symmetry in their lexical meaning or not. Further, their representation in the valency lexicon of Czech verbs, VALLEX, is proposed (Section 2). Second, a theoretically adequate and economical representation of their reciprocal constructions is provided for the given valency lexicon (Section 3).

2   Czech Reciprocal Verbs in VALLEX

In Czech reciprocity is expressed by the verbs that either denote a mutual situation, or can potentially denote such a situation (Panevová & Mikulová 2007). The former group of verbs – the so-called inherent or lexical reciprocal verbs, as symmetry is an inherent part of their lexical meaning – is semantically restricted (see Section 2.1). The latter group of verbs is semantically very broad; their semantic interpretation is primarily asymmetrical (e.g., *podezírat* 'to suspect', *klamat* 'to deceive'), but they denote events which can be on certain conditions – primarily lexical –conceived as mutual. This group is referred to as syntactic reciprocal verbs (see Section 2.2).

2.1   Inherent Reciprocal Verbs in Czech

Inherent reciprocal verbs are those that bear the semantic feature of symmetry in their lexical meaning (Evans, 2008), as discussed for Czech in Panevová and Mikulová (2007). Their various types are described below, with emphasis on different functions of the reflexive clitics *se* and *si*, which represent (besides their other functions) one of main grammatical ways of encoding reciprocity in Czech. The reflexive clitics in Czech, as in other European languages, are highly polysemous, marking some word formation processes, reflexivity, middle voice, and reciprocity, see e.g. (Medová 2009). In Czech reciprocal constructions, the reflexive clitics represent either a part of verb lemmas, or the inflected forms of the reflexive pronoun; the latter can be substituted – depending on word order and topic-focus articulation – by their long forms *sebe* and *sobě*, respectively. While the reflexive clitics of the first type are associated with verb lemmas (and not with any valency position of a verb), the clitics of the latter type fill one of their valency positions, just like nouns and other pronouns, as we show below.

2.1.1 Types of Inherent Reciprocal Verbs

Inherent reciprocal verbs encompass symmetry in their lexical meanings: they especially express social actions or relations (e.g., *hádat se*, 'to quarrel', *spolupracovat* 'to cooperate', *vyjednávat* 'to negotiate'), spatial relations (e.g., *sousedit* 'to adjoin', *oddělit* 'to separate'), and relations of (non-) identity (e.g., *rozlišit* 'to distinguish'), e.g. (Haspelmath 2007). From the point of view of syntactic properties, Czech inherent reciprocal verbs can be either intransitive (6) and (8), or ditransitive (7) and (9). One participant involved in symmetry is typically mapped either onto the subject position, or onto the direct object position, while the other is expressed in the indirect object position, typically in the form of the comitative prepositional group *s*+Instr 'with+Instr', see examples (6b) and (9b). A limited number of inherent reciprocal verbs are characterized by the form *od*+Gen 'from+Gen' (e.g., *oddělit* 'to separate', *izolovat* 'to isolate', *rozlišit* 'to distinguish', *rozpoznat* 'to recognize', etc.).

In reciprocal constructions of inherent reciprocal verbs, participants can be reciprocalized, i.e., expressed in a single syntactic position. Inherent reciprocal verbs predominantly exhibit subject-oriented reciprocity, where the reciprocalized participants of an event denoted by a verb are expressed in the subject position (6a), (7a), (8). Object-oriented reciprocity, where reciprocalized participants occupy the direct object position, is rather limited in its number (9a). For further information on the reciprocal constructions of these verbs, see Section 3.1.

(6a) Petr a Pavel (si) korespondovali.

　　　Peter$_{nom.sg.masc}$ and Paul$_{nom.sg.masc}$ (REFL$_{verblemma}$) corresponded
　　　'Peter and Paul corresponded with each other.'

(6b) Petr (si) korespondoval s Pavlem. ≈ Pavel (si) korespondoval s Petrem.
Peter$_{nom.sg.masc}$ (REFL$_{verblemma}$) corresponded with Paul$_{s+instr.sg.masc}$. ≈ Paul$_{nom.sg.masc}$ (REFL$_{verblemma}$) corresponded with Peter$_{s+instr.sg.masc}$.
'Peter corresponded with Paul. ≈ Paul corresponded with Peter.'

(7a) Kolegové (spolu) diskutovali všechna rozhodnutí.
colleagues$_{nom.pl.masc}$ (together) discussed all decisions
'Colleagues discussed all decisions with each other.'

(7b) Kolega diskutoval všechna rozhodnutí s kolegou.
colleague$_{nom.sg.masc}$ discussed all decisions with colleague$_{s+instr.sg.masc}$
'The colleague discussed all decisions with his colleague.'

(8)   Kamarádi se (spolu) sázeli o pivo, kdo bude rychlejší.
friends$_{nom.pl.masc}$ REFL$_{verblemma}$ (together) bet about beer who will be faster
'Friends were betting about beer who would be faster.'

(9a) Kriminalisté porovnávali otisk prstu A a otisk B.
criminal investigators compared print$_{acc.sg.masc}$ of finger A and print$_{acc.sg.masc}$ B
'Criminal investigators were comparing fingerprint A and fingerprint B.'

(9b) Kriminalisté porovnávali otisk prstu A s otiskem B. ≈ Kriminalisté porovnávali otisk prstu B s otiskem A.
criminal investigators compared print$_{acc.sg.masc}$ of finger A with print$_{s+instr.sg.masc}$ B. ≈ Criminal investigators compared print$_{acc.sg.masc}$ of finger B with print$_{s+instr.sg.masc}$ A
'Criminal investigators were comparing fingerprint A with fingerprint B. ≈ Criminal investigators were comparing fingerprint B with fingerprint A.'

In contrast to syntactically reciprocal verbs (see Section 2.2), inherent reciprocal verbs express symmetry even when the participants of the events denoted by these verbs are not reciprocalized. See examples (6b) and (9b), where the participants are expressed in separate syntactic positions provided by their valency complementation. Due to the symmetry as an inherent part of the meaning of these verbs, the participants expressed in separate syntactic positions can be switched without any change in meaning.[4]

(A) *Irreflexive inherent reciprocal verbs.* Some inherent reciprocal verbs are characterized by irreflexive lemmas, like *diskutovat* 'to discuss' in (7) or *porovnávat* 'to compare' in (9). In reciprocal constructions with these verbs – regardless of whether the participants involved in symmetry are reciprocalized (7a) and (9a), or not (7b) and (9b) – no reflexive clitic *se* or *si* is present.

Many constructions with inherent reciprocal verbs, however, contain the reflexive clitic *se* or *si*. As this reflexive clitic is present in all instances of these verbs, it is usually classified as a part of their verb lemmas.[5] The reflexive inherent reciprocal verbs in Czech can be further subclassified

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4   We disregard changes in topic-focus articulation here.

5   The classification of the clitic *se* or *si* as a part of verb lemmas with inherent reciprocal verbs is supported by the fact that their presence in such constructions is not associated with any valency position of these verbs, as the following constructions of the verb *sázet se* 'to bet' show: if the clitic *se* is replaced (i) by the long form of the reflexive pronoun *sebe*, (ii) by the pronoun *je* 'them', or (iii) by the noun *kolegové* 'colleagues', it necessarily adds an extra valency position of the verb *sázet se* 'to bet', which results in ungrammatical structures:

(i)   **Kamarádi sebe sázeli o pivo, kdo bude rychlejší. / *Sebe kamarádi sázeli o pivo, kdo bude rychlejší.*
       friends REFL-long bet about beer who will be faster / REFL-long friends bet about beer who will be faster

(ii)   **Kamarádi je sázeli o pivo, kdo bude rychlejší. / *Je kamarádi sázeli o pivo, kdo bude rychlejší.*
       friends them bet about beer who will be faster / them friends bet about beer who will be faster

(iii) **Kamarádi kolegy sázeli o pivo, kdo bude rychlejší. / *Kolegy kamarádi sázeli o pivo, kdo bude rychlejší.*
       friends colleagues bet about beer who will be faster / colleagues friends bet about beer who will be faster

into reflexive tantum verbs, decausative verbs, and the so-called derived inherent reciprocal verbs.

(B) *Reflexive tantum reciprocal verbs*. These verbs have no irreflexive counterparts (e.g., *poprat se* 'to brawl' and *poprat) or they have only a seeming counterpart, which has, however, a completely unrelated meaning (e.g., *sázet se* 'to bet' (8) and *sázet* 'to plant'). The clitic with reflexive tantum reciprocal verbs has no overt semantic and/or syntactic function.

In rare cases, inherent reciprocal verbs can be either irreflexive or reflexive, without any substantial shift in their semantics or syntax, see the verb *korespondovat (si)* 'to correspond' in (6a,b), which can be used either with or without the reflexive clitic *si*, without any change in its meaning and/or syntactic behavior.

(C) *Decausative reciprocal verbs*. With some inherent reciprocal verbs, the clitic *se* can function as a verbal intransitivizing operator, as exemplified in (10a). These reciprocal verbs are systematically related to irreflexive inherent reciprocal verbs, representing their causative transitive counterparts, by the lexical operation of decausativization; this operation drops a causator of an event denoted by the irreflexive transitive verb. Consequently, while the causative irreflexive verbs represent object-oriented inherent reciprocal verbs (10c), decausative reflexive reciprocal verbs are subject-oriented (10b).

(10a) Déšť se mísil se sněhem.
      rain$_{nom.sg.masc}$ REFL$_{verblemma}$ mixed with snow$_{s+instr.sg.masc}$
      'Rain mixed with snow.'

(10b) Déšť a sníh se mísily (dohromady).
      rain$_{nom.sg.masc}$ and snow$_{nom.sg.masc}$ REFL$_{verblemma}$ mixed (together)
      'Rain and snow mixed (together).'

(10c) Maminka mísila vajíčka s cukrem.
      mother mixed eggs$_{acc.pl.neutr}$ with sugar$_{s+instr.sg.masc}$
      'Mother mixed eggs with sugar.'

(D) *Derived inherent reciprocal verbs.* These verbs represent a specific type of inherent reciprocal verbs, as discussed by Dimitriadis (2004), Siloni (2001) and Evans (2008) under the term *discontinuous reciprocal verbs*. In Czech they can be derived from both transitive and ditransitive verbs without the feature of symmetry in their lexical meaning by the lexical operation of reciprocalization; this operation consists in the use of the derivational morphemes *se* or *si*, which intransitivize the respective verbs. See, for example, the reciprocal verbs *políbit se* 'to kiss' in (11b) derived by the clitic *se* from the transitive verb *políbit* 'to kiss' (11a) and *vyprávět si* 'to tell (something to each other)' in (12b) derived by the clitic *si* from the ditransitive verb *vyprávět* 'to tell (something to somebody)' (12a).[6] As discussed in Dimitriadis (2004), derived inherent reciprocal verbs exhibit specific syntactic properties. The participants of these verbs – despite being involved in symmetry – always remain expressed in separate syntactic positions determined by the respective complementations: one participant is always mapped onto valency complementation expressed in the subject position, while the other corresponds to the complementation which has the comitative prepositional form *s*+Instr 'with+Instr', see (11b) and (12b). Dimitriadis (2004) argues that the meaning of derived inherent reciprocals is necessarily symmetrical.

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6   Neither of the base verbs *políbit* 'to kiss' (11a) and *vyprávět* 'to tell (something to somebody)' (12a) express symmetry in their lexical meaning, but allow their participants to stand in symmetry as a result of the syntactic operation of reciprocalization, see Section 2.2.1.

(11a) Petr políbil Marii.

Petr$_{nom.sg.masc}$ kissed Mary$_{acc.sg.fem}$

'Peter kissed Mary.'

(11b) Petr se políbil s Marií.

Peter$_{nom.sg.masc}$ REFL$_{verblemma}$ kissed with Mary$_{s+instr.sg.fem}$

'Peter kissed with Mary.'

(12a) Jan vyprávěl Pavlovi strašidelné history.

John$_{nom.sg.masc}$ told Paul$_{dat.sg.masc}$ spooky stories

'John was telling Paul spooky stories.'

(12b) Jan si vyprávěl s Pavlem strašidelné historky.

John$_{nom.sg.masc}$ REFL$_{verblemma}$ told with Paul$_{s+instr.sg.masc}$ spooky stories

'John and Paul were telling spooky stories to each other.'

2.1.2 Representation of Inherent Reciprocal Verbs in the VALLEX Lexicon

Inherent reciprocal verbs are represented in the lexicon by lexical units contained in separate lexemes introduced by their respective lemmas; if a verb is cliticized, its lemma includes the respective clitic *se* or *si*. As discussed in Section 2.1.1, the cliticization of inherent reciprocal verbs is either characteristic of reflexive tantum verbs (B), or it can be a result of lexical operations deriving either decausative verbs (C), or inherent reciprocal verbs (D).

A specific attribute "reciprverb" attached to lexical units corresponding to reciprocal verbs provides information on their type. In case of inherent reciprocal verbs of all types (A)-(D), this attribute has the value "inherent". To each inherent reciprocal verb where the clitic *se* or *si* functions as a derivational means, the specific attribute "derived" is attached, recording information as to whether the given verb is derived by the lexical operation of decausativization (the value "decaus"), or by lexical reciprocalization resulting in derived inherent reciprocal verbs (the value "lex-reciprocal"). In the VALLEX lexicon, 201 lexical units of verbs in total are annotated as inherent reciprocal verbs (109 out of them have irreflexive lemmas, 33 represent reflexive tantum verbs, 29 verbs with derived reflexive lemmas are decausative verbs, and 30 represent derived inherent reciprocal verbs), see Table 1.

Table 1. Reciprocity in VALLEX – basic statistics (LUs stands for lexical units).

Reciprocal verbs in VALLEX			joint LUs (subject/ object-oriented)	distributed LUs (subject/ object-oriented)
Inherent reciprocal verbs	201 LUs (281 verb lexemes)	all types	197 (137 / 60)	4 (4 / 0)
		(A) irreflexive verbs	103 (47 / 56)	0
		(B) reflexive tantum verbs	33 (32 / 1)	0
		verbs with ir/reflexive	6 (3 / 3)	0
		(C) refl. decausative verbs	29 (29 / 0)	0
		(D) derived inherent reciprocal verbs	26 (26 / 0)	4 / 0
Syntactic reciprocal verbs	1,923 LUs (2,017 verb lemmas)	all types	613 (31.9%)	1,310 (68.1%)
TOTAL	2,124 LUs		810 (38.1%)	1,314 (61.9%)

In addition, the attribute "reciprevent" describes whether reciprocal verbs refer to a joint action in which the participants involved act symmetrically (the value "joint", e.g. *vyjednávat* 'to negotiate', *mluvit (s někým)* 'to talk (with somebody)', *oddělit* 'to separate'), or to a plurality of actions where each single action is asymmetrical (the value "distributed", e.g. *udávat* 'to report each other'). The annotation of inherent reciprocal verbs reveals that these predominantly express joint actions. Surprisingly, reciprocal events that are denoted by a small number of derived inherent reciprocal verbs in the annotated data can be interpreted as a series of asymmetrical actions (e.g., *navštěvovat se* 'to visit' and *vyprávět si* 'to tell'), c.f. (Dimitriadis 2004).

Finally, each relevant lexical unit is assigned a specific attribute "recipr" providing pairs of those valency complementations that are involved in reciprocity and which can be thus reciprocalized, as is discussed in more detail in Section 3. See Figure 2, displaying the lexical entry of the derived inherent reciprocal verb *políbit se* 'to kiss' (right).

políbit^{pf}

(1) dát někomu polibek   'to kiss somebody'
-frame: **ACT$_1$ PAT$_4$** LOC BEN
-example: *Jan políbil Marii na tvář. Políbil ji na ruku. Políbil tvář krásné dívky.*
         'John kissed Mary on her cheek. He kissed her on her hand.
                                      He kissed a cheek of a nice girl.'
-reflex: ACT-PAT *Políbila se na ruku.*   'She kissed herself on her hand.'
         ACT-BEN *Políbila si ruku.*   'She kissed a hand to herself.'
-recipr: **ACT-PAT** *Jan a Marie se políbili na tvář.*
         John and Mary REFL kissed on cheek
         'John and Mary kissed each other (on their cheeks)'
-reciprevent: distributed
-reciprverb: gram
-class: contact
-diat: deagent, passive-být

políbit se^{pf}

(1) dávat si s někým polibek; líbat se s někým (navzájem)
                                      'to kiss each other'
-frame: **ACT$_1$ PAT$_{5+7}$** LOC
-example: *Jan se políbil s Marií.*
         John REFL kissed with Mary
         'John kissed with Mary.'
-recipr: **ACT-PAT**
-reciprevent: joint
-reciprverb: inherent
-derived: lex-reciprocal
-class: contact

Figure 2. Two lexical entries of the verbs *políbit* 'to kiss' and *políbit se* 'to kiss', representing different types of reciprocal verbs, as they are described in the VALLEX lexicon.

2.2 Syntactic Reciprocal Verbs

2.2.1 Types of Syntactic Reciprocal Verbs

Syntactic reciprocal verbs are those for which the lexical meaning does not imply symmetry; however, they allow their participants to be put into symmetry (e.g., the verbs *podezírat* 'to suspect', *řadit* 'to arrange' and *políbit* 'to kiss') (Panevová & Mikulová 2007; Siloni 2008; Evans 2008). This symmetry is achieved by the syntactic operation of reciprocalization which, when applied to the given verbs, results in reciprocal constructions. In contrast to inherent reciprocal verbs (Section 2.1), Czech syntactic reciprocal verbs represent an open group of verbs with various semantic and syntactic properties, comprising intransitive (13), transititive (14) and ditransitive verbs (15). Similar to in the case of inherent reciprocal verbs, one participant which can be involved in symmetry is expressed in the subject position in the nominative, and the other participant occupies either the direct object position expressed in the accusative (14), or the indirect object position (13), which can have various forms. In rare cases, syntactic reciprocal verbs realize reciprocity between participants when one of them is mapped onto the direct object position in the accusative and the other corresponds to the indirect object position expressed in various forms (16).

(13) Petr se dívá na Marii.
     Peter$_{nom.sg.masc}$ REFL$_{verblemma}$ looks at Mary$_{na+acc.sg.fem}$
     'Peter is looking at Mary.'

(14) Petr políbil Marii.
      Petr$_{nom.sg.masc}$ kissed Mary$_{acc.sg.fem}$
      'Peter kissed Mary.'

(15) Petr podezíral manželku z nevěry.
      Peter$_{nom.sg.masc}$ suspected wife$_{acc.sg.fem}$ from infidelity.
      'Peter is suspecting his wife of infidelity.'

(16) Musíte konfrontovat sen s realitou.
      (you) have to confront dream$_{acc.sg.masc}$ with reality$_{s+instr.sg.fem}$
      'You have to confront your dream with the reality.'

(A) Most syntactic reciprocal verbs are characterized by *irreflexive* lemmas.

(B) Those syntactic reciprocal verbs that have reflexive lemmas can first represent *reflexive tantum verbs*, verbs without irreflexive counterparts (e.g., *podívat se* 'to look', *postěžovat si* 'to complain', *hledět si* 'mind'), or verbs with semantically unrelated irreflexive counterparts (e.g., *chovat se* 'to behave'), with which the clitics *se* or *si* represent an obligatory part of their verb lemmas. Second, with a small number of verbs, the reflexive clitic *se* or *si* is an optional part of their verb lemmas, the use of which does not bring about any changes in meaning and/or syntactic behavior (e.g., *pamatovat (si)* 'to remember').

(C) Finally, the clitic *se* functions as a derivational means of *decausative* syntactic reciprocal verbs, which are derived by the lexical operation of decausativization from transitive or ditransitive syntactic reciprocal verbs (e.g., *nakazit se* 'be infected' ← *nakazit* 'to infect', *opřít se* 'lean' ← *opřít* 'lean', *stáhnout se* 'to retreat' ← *stáhnout* 'to withdraw'). With decausative syntactic reciprocal verbs, the given clitic has the same function as with inherent reciprocal verbs (as discussed in Section 2.1.1.)

2.2.2 Representation of Syntactic Reciprocal Verbs in the VALLEX Lexicon

Syntactic reciprocal verbs are represented in the lexicon by the respective lexical units of verbs in lexemes headed by their respective (irreflexive or reflexive) lemmas. Syntactic reciprocal verbs of all types (A)-(C) are identified by the value "gram" of the attribute "reciprverb".

The attribute "reciprevent" describes whether a syntactic reciprocal verb – when its participants are reciprocalized – refers to a joint action (the value "joint", e.g. *cítit spolu* 'to sympathize (with each other)', *bojovat* 'to fight', *skoncovat spolu* 'to finish (with each other)'), or to a series of actions where each single action is asymmetrical (the value "distributed", e.g. *kritizovat* 'to criticize', *nazývat* 'to call', *pamatovat* 'to remember').

In the VALLEX lexicon, out of 2,124 lexical units corresponding to reciprocal verbs, 1,923 (90.54%) represent syntactic reciprocal verbs. As the annotation revealed, syntactic reciprocal verbs predominantly express distributed reciprocal events (almost 70%), while joint reciprocal events with syntactic reciprocal verbs are rather rare. See Table 1, above.

The valency frames of syntactic reciprocal verbs stored in the VALLEX lexicon describe the usage of these verbs in unreciprocal constructions. Their reciprocal constructions can be obtained by application of rules, as described in Section 3.2 – these rules make use of further subclassification of syntactic reciprocal verbs, based on information about which pair (or triplet in rare cases) of valency complementations are involved in reciprocity. Similar as for inherent reciprocal verbs, this information is provided by the attribute "recipr".

See the left lexical entry displaying the syntactic reciprocal verb *políbit* 'to kiss' in Figure 2, above.

3   Reciprocal Constructions in VALLEX

This section thoroughly describes the operation of syntactic reciprocalization. This operation is systematic enough to be captured by formal rules operating over the information stored in the lexicon. On the basis of these rules, all possible morpho-syntactic manifestations of both inherent and syntactic reciprocal verbs can be obtained. As these rules represent an economic and systematic way of language description, they are included in the lexicon.

3.1   Reciprocal Constructions of Inherent Reciprocal Verbs

Inherent reciprocal verbs express symmetry in each of their instances (see Section 2.1), whether syntactic reciprocalization is applied to them or not. In case this syntactic operation is used, the participants involved in symmetry are not expressed in separate syntactic positions, but instead fill a single syntactic position of either subject (with subject-oriented inherent reciprocal verbs), or direct object (with object-oriented verbs of the given type) (derived inherent reciprocal verbs being the only exception, see Section 2.1.1, type (D)). As a result, the given syntactic position is plural, expressed either by coordinating (17b) or subordinating coordination (17c), or by morphological (18b), or semantic plural (17d).

The less prominent syntactic position determined by the other valency complementation involved in reciprocity, typically the position of indirect object, is either deleted from the surface, or is filled with the reflexive pronoun, depending on the form of the given complementation. Two forms are typical of this complemenation with inherent reciprocal verbs: the comitative form *s*+Instr 'with+Instr' and the prepositional form *od*+Gen 'form+Gen'. In the first case, the indirect position is removed, compare (17a) with (17b), while in the latter case the indirect object is occupied by the respective form of the reflexive pronoun *sebe*, compare (18a) and (18b). Alternatively, in both cases the less prominent position can be filled with the quantifier-like bipartite expression *jeden druhý* 'each other, lit. one other', see e.g. (Evans 2008) – here the first part *jeden* 'each', usually referred to as "range argument" (Heim et al. 1991), has the form of the nominative (with subject-oriented verbs) (17e), or the accusative (with object-oriented verbs) (18c), while the second part *druhý*, referred to as "contrast argument", is inflected for the case (prepositionless or prepositional) as the given complementation prescribes; both parts have the singular form and exhibit the agreement in gender with the reciprocalized participants, compare (17e) with (17a) on the one hand and (18c) with (18a) on the other.

Further, reciprocity can be optionally emphasized by the adverbial modifiers *navzájem, vzájemně*, 'mutually'. Moreover, with inherent reciprocal verbs with the indirect object in the form *s*+Instr 'with+Instr', the modifiers *spolu* 'together' or *mezi sebou* 'between each other' can be used as well.

See Figure 3, exemplifying the rules capturing morpho-syntactic properties of reciprocal constructions.

(17a) Petr se hádá s Pavlem.

Peter$_{nom.sg.masc}$ REFL$_{verblemma}$ quarrels with Paul$_{s+instr.sg.masc}$
'Petr is quarreling with Paul.'

(17b) Petr a Pavel se (spolu) hádají.

Peter$_{nom.sg.masc}$ and Paul$_{nom.sg.masc}$ REFL$_{verblemma}$ (together) quarrel
'Petr and Paul are quarreling (together).'

(17c) Petr s Pavlem se (spolu) hádají.

Peter$_{nom.sg.masc}$ with Paul$_{s+inst.sg.masc}$ REFL$_{verblemma}$ (together) quarrel
'Petr with Paul is quarreling (together).'

(17d) Družstvo se hádá.

Team$_{nom.sg.masc}$ REFL$_{verblemma}$ quarrels
'The team is quarreling.'

(17e) Petr a Pavel se hádají jeden s druhým.

Peter$_{nom.sg.masc}$ and Paul$_{nom.sg.masc}$ REFL$_{verblemma}$ quarrel one$_{nom.sg.masc}$ with other$_{s+instr.sg.masc}$
'Peter and Paul are quarreling.'

(18a) Lékaři oddělili dvojče od dvojčete.

surgeons separated twin$_{acc.sg.neutr}$ from twin$_{od+gen.sg.neutr}$
'Surgeons separated a twin from the other twin.'

(18b) Lékaři oddělili dvojčata od sebe.

surgeons separated twins$_{acc.pl.neutr}$ from REFL-long$_{od+gen}$
'Surgeons separated twins from each other.'

(18c) Lékaři oddělili dvojčata jedno od druhého.

surgeons separated twins one$_{acc.sg.neutr}$ from other$_{od+gen.sg.neutr}$
'Surgeons separated twins from each other.'

Basic rule for subject-oriented reciprocity (change of verb form, agreement, form for ACT)		
conditions:	recipr: **ACT-X** form: ACT(nom)	
actions:	agreement: number+gender+person, ACT change form of ACT: * → nom : plural	
Basic rule for object-oriented reciprocity (change of form for PAT)		
conditions:	recipr: **PAT-X** or **X-PAT** form: PAT(acc)	
actions:	change form of PAT: 4 → acc : plural	

Additional rules for all types of reciprocity (form of the reflexive pronoun)			
original form		**reciprocal form(s)**	**reflexive pronoun**
dat		*si / sobě* *sobě / ∅*	for irreflexive verbs: clitic / long form, dative for reflexive verbs: long form / unexpressed, dative
acc	→	*se / sebe*	clitic / long form, accusative
gen		*sebe / ∅*	long form, genitive / unexpressed
s+instr 'with'		∅	unexpressed
preposition + case		long form of the reflexive pronoun in the respective prepositional case	

Figure 3. Examples of the simplified rules capturing the morpho-syntactic properties of reciprocal constructions for both inherent and syntactic reciprocal verbs in the VALLEX lexicon (two rules are successively applied to the relevant valency frames).

3.2   Reciprocal Constructions of Syntactic Reciprocal Verbs

Syntactic reciprocalization with syntactic reciprocal verbs is a productive process. In Czech, there are only few restrictions for its application concerning the semantic homogeneity of participants and their status with respect to topic-focus articulation (Panevová 1999).

In reciprocal constructions of syntactic reciprocal verbs, the participants involved in symmetry are obligatorily reciprocalized. The reciprocal structure is thus characterized by a plural subject (with

subject-oriented syntactic reciprocal verbs) (19b), or plural object (with object-oriented syntactic verbs) (20b). The less prominent syntactic position of the complementation involved in reciprocity is filled with the reflexive pronoun, which can have either the clitic or long form, the morphemic case of which is determined by the given complementation, compare (19a) with (19b). In rare cases, if this complementation has the comitative form *s*+Instr 'with+Instr', it is not expressed on the surface. Moreover, the less prominent position can also be filled with the quantifier-like bipartite expression *jeden druhý* 'each other', and the same morphological marking as in reciprocal structures with inherent reciprocal verbs applies (see Section 3.1).

In reciprocal constructions marked by the reflexive pronoun, the adverbial modifiers *vzájemně*, *navzájem* 'mutually', or in a limited cases also the modifiers *spolu* and *dohromady* 'together', can further emphasize the reciprocal meaning. In case of ambiguity with reflexive constructions, these modifiers have a disambiguating function. See, for example, the construction with the verb *obviňovat* 'to accuse' (21a), which can have either reciprocal interpretation (21b), or reflexive interpretation (21c).

See Figure 3 above, exemplifying the rules capturing morpho-syntactic properties of reciprocal constructions.

(19a) Marie políbila Janu.
    Mary$_{nom.sg.fem}$ kissed Jane$_{acc.sg.fem}$
    'Mary kissed Jane.'

(19b) Marie a Jana se políbily. ≈ Sebe Marie a Jana políbily.
    Mary$_{nom.sg.fem}$ and Jane$_{nom.sg.fem}$ REFL-clitic$_{acc}$ kissed ≈ REFL-long$_{acc}$ Mary$_{nom.sg.fem}$ and Jane$_{nom.sg.fem}$ kissed
    'Mary and Jane kissed each other.'

(20a) Dítě řadí obrázek k obrázku.
    child arranges picture$_{acc.sg.masc}$ to picture$_{k+dat.sg.masc}$
    'The child arranges a picture with another picture.'

(20b) Dítě řadí obrázky k sobě.
    child arranges pictures$_{acc.pl.masc}$ to REFL-long$_{k+Dat}$
    'The child arranges pictures with each other.'

(21a) Hráči se obviňují.
    players REFL-clitic$_{acc}$ accuse
    'The players accuse each other/themselves.'

(21b) Hráči se obviňují navzájem.
    players$_{nom.pl.masc}$ REFL-clitic$_{acc}$ accuse mutually
    'The players accuse each other.'

(21c) Hráči obviňují sami sebe.
    players$_{nom.pl.masc}$ accuse alone$_{acc.pl.masc}$ REFL-long$_{acc}$
    'The players accuse themselves.'

Haplology with Czech reciprocal verbs. In reciprocal constructions formed by syntactic reciprocal verbs with reflexive lemmas, both the clitics *se* and *si* are subject to haplology in cases when reciprocity is marked by the clitic form of the reflexive pronoun (Petkevič 2013; Rosen 2014). In the case of haplology, the single occurrence of the reflexive clitic *se* or *si* is associated with both the reflexive pronoun and the reflexive morpheme representing a part of a verb lemma. For example, in the reciprocal construction of the reflexive tantum verb *stěžovat si* 'to complain' in (22), a single occurrence

of the clitic *si* represents both the verb lemma and the reflexive pronoun. In the case of haplology, reciprocity is obligatorily marked by the adverbs.

(22) Otec a matka si navzájem stěžují na synovo chování.
      father and mother REFL-clitic$_{verblemma/reflpron}$ mutually complain about son's behavior
      'Father and mother are complaining to each other about their son's behavior.'

4   Conclusion

In this paper, we have proposed a theoretically adequate and economical description of Czech reciprocal verbs in the valency lexicon of Czech verbs, VALLEX. We have demonstrated that, for this purpose, three-fold information on the type of reciprocal verbs, on the type of reciprocal events they denote, and on valency complementations that are involved in reciprocity, is sufficient for their adequate description. Such a formalized representation of reciprocity allows the user (being it a human or computer) to generate well-formed reciprocal structures of the relevant lexical units of Czech verbs.

5   References

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Acknowledgements