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Article - Version of Record



Suggested Citation:

Willich, A. (2022). Introducing Construction Semantics (CxS): a frame-semantic extension of Construction Grammar and constructicography. *Linguistics Vanguard*, 8(1), 139–149.
<https://doi.org/10.1515/lingvan-2022-0082>

Wissen, wo das Wissen ist.



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Introducing Construction Semantics (CxS): a frame-semantic extension of Construction Grammar and constructicography

<https://doi.org/10.1515/lingvan-2022-0082>

Received February 4, 2022; accepted October 4, 2022; published online December 13, 2022

Abstract: Construction Semantics (CxS) uses FrameNet frames to capture the semantic properties of grammatical constructions. It closes a gap between Frame Semantics and usage-based Construction Grammar as well as providing a uniform format to implement frames into constructicographic work. This article provides an overview of three core features of CxS. Starting point is (i) the modeling of semantic properties associated with constructions in terms of three types of frames. This makes possible (ii) the analysis of structural parallels between constructions and frames, in particular the semantic motivation of elements of a construct by frame elements. Lastly, (iii) an inventory of semantic parameters of constructions serves as a toolkit for generalizing over semantic properties of single constructs. A driving force behind CxS is the concept of frame proximity: a network of frames which allows one to distinguish lexically evoked frames that are related or unrelated to a frame associated with a construction.

Keywords: constructicography; Construction Grammar; Construction Semantics; Frame Semantics; German reflexive constructions

1 Background

Frame Semantics and Construction Grammar are two major theories in cognitive linguistics. They are often considered “sister theories” (Boas and Dux 2017: 1), the former being the “semantic complement” (Östman and Fried 2005: 4) to the latter. The same holds for constructicography, the practical application of Construction Grammar for lexicographic purposes, and its close relationship to applied Frame Semantics in the form of FrameNet projects in a variety of languages (cf. Boas et al. 2019). For example, Goldberg (1995, 2002, 2010) claims that frames, the descriptive format in Frame Semantics, are integral to the semantic description of grammatical constructions, and they even can be included into formal representations (e.g., Michaelis 2010).

However, many questions still remain unanswered, among those the following, which are to be discussed in this article:

- (1) How can the semantic impact of a grammatical construction (in the broad sense of Goldberg 2006: 5) be modeled using frames, both at type and token level?
- (2) How is it possible to generalize over analyses of single instances of a construction (constructs) in order to achieve frame-semantic descriptions to be used in a constructicographic repository?

Existing work in this regard (e.g., Fillmore et al. 2012; Lee-Goldman and Petrucci 2018; Ohara 2018) lacks important conceptual foundations and a broad sense of which semantic aspects of a construction can be captured using frames. Construction Semantics (CxS) aims to tackle this issue. This article provides an overview over basic concepts of CxS that qualify it as a frame-semantic extension of Construction Grammar and constructicography.

CxS uses frames at the lexical level, at the level of an (abstract) construction, as well as at the level of constructs of that construction. For the structural representation of a construction, it is segmented into

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construction elements (CEs), which are slots to be productively filled with lexical material, and construction-evoking elements (CEEs), which are lexically fixed elements that often uniquely characterize the construction (Fillmore et al. 2012; Lee-Goldman and Petruck 2018). In CxS, it becomes possible to align the instances of those elements with corresponding frame elements (FEs) – at constructional level (cf. also Laviola et al. 2017: 194; Ziem 2020a: 26) as well as at the lexical level. These analyses help uncover semantic parameters of constructions, which then may form the backbone of construction entries as the results of constructicographic work.¹

The outline of this article is as follows. Section 2 is concerned with the first research question and introduces the basic CxS model that postulates three types of frames: lexical frames, constructional frames and construct frames. Section 3 discusses the notion of *frame proximity*, a driving force behind CxS, that makes it possible to identify lexical frames that are closely related to a constructional frame and distinguish them from those which are unrelated to it. Section 4, referring to the second research question, deals with the interplay between the structures of constructions and frames, distinguishing three types of ways that a given instance of a CE or CEE corresponds to FEs of a lexical and/or constructional frame. Subsequently, Section 5 briefly touches on the need for semantic parameters of constructions that can be derived from and analyzed based on the findings of the previous features of CxS. Section 6 raises further issues and perspectives to be dealt with in future research.

To illustrate the empirical potential of CxS, corpus data for the *reflexive motion construction* (Mortelmans and Smirnova 2020; Oya 1999; Smirnova 2018), the German equivalent to the English *way-construction* (Goldberg 1995: Ch. 9), drawn from the *Kernkorpus 21* of the *Digitales Wörterbuch der deutschen Sprache* (DWDS),² will be used throughout this article. Annotation of a sample of 1,011 example sentences (true positives) for the construction forms the basis for the analyses presented here, retrieved out of 13,416 hits for a string of a finite verb and a reflexive pronoun, followed by a preposition within a maximum distance of 10 words. The reflexive motion construction is particularly well suited for CxS because, as an argument structure construction that is centered around a verbal predicate, it is easy to find frames evoked within its constructs through FrameNet's lexical unit index.³ CxS, in its current state, therefore works best with argument structure constructions, but to apply (and even modify) it to fit other types of constructions is a task for future research.⁴

2 A Construction Semantics model: lexical frames, constructional frames, construct frames

CxS uses Frame Semantics in the sense of FrameNet (Boas 2021; Fillmore et al. 2003; Fillmore and Baker 2010; Ruppenhofer et al. 2016) to analyze the meanings of grammatical constructions. Frames can be seen as scaffolds for the meanings of words and other linguistic units: linguistic units that have similar meanings usually evoke the same frame. Frames are structured through frame elements (FEs), which are semantic roles defined specific for each frame. FEs are divided into two groups: Core FEs are seen to be conceptually necessary for the event depicted by the frame, whereas Non-Core FEs specify more general circumstances such as *MANNER*, *MEANS*, *PLACE* and *TIME*.⁵ Frame Semantics, as it is applied in FrameNet, is primarily a lexical approach, i.e., the primary target units eligible to evoke a frame are words and multi-word expressions (cf. Ruppenhofer et al. 2016: 7–10). Hence, those are called *lexical units* (LUs) in the sense of Cruse (1986: 49). Consider (1), a construct of the reflexive motion construction.

1 A more detailed account of CxS (in German), including further aspects that cannot be discussed in this article, can be found in Willich (2022), on which this article is based.

2 <https://www.dwds.de/d/korpora/korpus21> (last access: 3 February 2022).

3 <https://framenet.icsi.berkeley.edu/fndrupal/luIndex> (last access: 28 June 2022).

4 These would include word-formation constructions, idioms, conditional constructions and passive constructions, among many others (for some examples, see Goldberg 2006: 5).

5 Following the conventions of the FrameNet literature, frame names are typeset in a monospaced font, whereas FE names are typeset in small caps.

- (1) *Er kämpfte sich durch das Dickicht.*
 he fight.PST.3SG SELF through DET.ACC thicket
 ‘He fought his way through the thicket.’
 (Glavinic, Thomas: *Die Arbeit der Nacht*, München & Wien: Carl Hanser Verlag, p. 273)

The relevant LU is the verb *kämpfen* (‘fight’). It evokes the *Hostile_encounter*⁶ frame. This frame consists of five Core FEs (ISSUE, PURPOSE, SIDE_1, SIDE_2, SIDES) as well as 12 Non-Core FEs. In CxS, a frame evoked by a LU is called a *lexical frame*. In argument structure constructions like the reflexive motion construction, which are combinations of a verbal predicate with a series of grammatical functions (Goldberg 1995, 2002, 2006), lexical frames are typically evoked by the verbal predicate around which the construction is centered. Therefore, lexical frames generalize over the semantic valencies of those verbs (cf. Fillmore et al. 2003: 237).

However, for most constructs, lexical frames are not the only source of their semantic properties. Since constructions are form-meaning pairings (Goldberg 1995: 4; Lakoff 1987: 467), they can also be considered to evoke frames. In fact, a lexical frame like *Hostile_encounter* is not sufficient to capture all semantic properties of a construct like (1). Since a construction has a meaning in its own right, a lexical frame has to be accompanied by a *constructional frame*, which is not evoked by a LU but by the construction as a whole. For the reflexive motion construction, this frame is most likely *Motion*,⁷ because “[i]nstances of this construction imply that the subject referent moves along the path designated by the prepositional phrase” (Goldberg 1995: 199). *Motion* consists of seven Core FEs: AREA, DIRECTION, DISTANCE, GOAL, PATH, SOURCE and THEME, along with 14 Non-Core FEs.

Whereas lexical frames vary depending on the verb that is instantiated in the construct, constructional frames might stay the same throughout the constructs of a construction (or at least, in case of a polysemous construction, throughout one of its senses), through their nature of being associated with the construction itself.

The need for a constructional frame becomes apparent when looking at (1). The reflexive motion construction consists of three CEs (the subject, a slot for the verbal predicate, and an oblique PP) and one CEE (the reflexive pronoun). The CE instantiated by the PP *durch das Dickicht* (‘through the thicket’) cannot be interpreted as an instance of any FE of the lexical frame *Hostile_encounter*. The constructional frame *Motion*, however, does feature a relevant FE: *PATH*. The same holds for the CEE, the reflexive pronoun (in this case: *sich*), which appears in all constructs and characterizes the construction as a reflexive construction. The verb *kämpfen* (‘fight’) usually does not qualify as reflexive – the reflexive pronoun therefore is only licensed by the reflexive motion construction. Because of that, it cannot be semantically traced back to the lexical frame but to the constructional frame. It is an instance of the FE *THEME* of *Motion*. The only CE whose instance corresponds to an FE of the lexical frame is the subject, in the case of (1), *Er* (‘He’), which serves as an instance of the FE *SIDE_1* of *Hostile_encounter*.⁸

As a result, both lexical and constructional frames are involved in (1). At the level of this single token, they together form a third type of frame, a *construct frame*, following Kay and Fillmore (1999: 2–3) in calling the instance of a construction a *construct*. Construct frames therefore represent “novel events that do not evoke any pre-existing semantic frame” (Goldberg 2010: 58). The process of building up construct frames from both lexical and constructional frames can be understood as conceptual integration (Fauconnier and Turner 1996, 1998, 2002), the blending of two input concepts to a new token-level concept (the blend). A typical example in Construction Grammar is the blending between an argument structure construction (including its meaning) and an event denoted by a valency-bearing predicate to form an utterance that qualifies as a construct of that construction (Mandelblit 1997: Ch. 2). Focusing on frames, in CxS, a lexical frame serves as input 1, whereas the constructional frame serves as input 2. The construct frame, then, is a blend of these two inputs, selecting FEs from both frames to form a new frame only existing for a given construct.

6 https://framenet2.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Hostile_encounter (last access: 3 February 2022).

7 <https://framenet2.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Motion> (last access: 3 February 2022). For a full account on why *Motion* is the constructional frame for the reflexive motion construction, see Willich (2022: Ch. 8).

8 Since almost every verb in German (as well as in English) needs a subject, most lexical frames feature a FE that instantiates as that subject. Therefore, it is likely that the subject is already contributed by the valency of the LU and qualifies as an instance of a FE of the lexical frame.

3 Frame proximity

Frames are related to each other via frame-to-frame relations. FrameNet distinguishes nine types of frame-to-frame-relations (Ruppenhofer et al. 2016: 79–85). CxS can make use of these relations to capture the closeness of a lexical frame to a given constructional frame. Building on the notion of *frame distance* (Čulo 2013), a system of lexical frames that hold a certain *frame proximity* to a constructional frame may be identified.

Take, as an example, the Inheritance relation. Motion, the constructional frame for the reflexive motion construction, is inherited by five frames, meaning that those frames are more specific than Motion while inheriting all of its FEs and narrowing their definitions (cf. Ruppenhofer et al. 2016: 80). Among those five frames is Self_motion.⁹ Self_motion is attested as a lexical frame for the reflexive motion construction, evoked by LUs like *schleichen* (‘sneak’), as in (2):

- (2) Katharina schlich sich oben durch den Flur und kletterte
 Katharina sneak.PST.3SG SELF upstairs through DET.ACC hallway and climb.PST.3SG
 die Leiter zum Dachboden hinauf
 DET.ACC ladder to=ART attic to.up
 ‘Katharina sneaked her way through the hallway upstairs and climbed up the ladder to the attic.’
 (Dölling, Beate: Hör auf zu trommeln, Herz, Weinheim: Beltz & Gelberg 2003, p. 28)

The amount of frame proximity of a lexical frame can now be counted based on the frame-to-frame relations in FrameNet. Because Self_motion directly inherits from Motion, we can assign Self_motion a frame proximity of +1, meaning that it is located one step downward in the frame hierarchy below the constructional frame Motion. To distinguish frame proximity for downward and upward relations, the former are marked with a plus sign, whereas the latter are marked with a minus sign.

Self_motion in turn is inherited by four frames. One of those is Fleeing.¹⁰ This frame is also attested as a lexical frame for the reflexive motion construction, cf. (3), where it is evoked by the LU *flüchten* (‘flee’).

- (3) Die flüchtet sich in eine Affäre mit ihrem Maklervorbild dem noch
 she flee.PRS.3SG SELF in DET.ACC affair with her.DAT role.model.of.a.broker DET.DAT even
 größeren Fassadenkünstler Buddy Kane (Peter Gallagher)
 bigger.DAT facade.artist Buddy Kane Peter Gallagher
 ‘She flees her way into an affair with her role model of a broker, even bigger facade artist Buddy Kane (Peter Gallagher).’
 (Die Zeit, 20.01.2000, No. 4)

From the perspective of Motion, Fleeing can be assigned a frame proximity of +2, because it is located two steps downward in the frame hierarchy below Motion.

Of course, the notion of frame proximity does not only apply to frames below the constructional frame, but also to frames above it. FrameNet documents one frame that Motion inherits from: Event. Therefore, Event holds a frame proximity of –1 with respect to Motion, since it is located one step above Motion. However, in the corpus data for the reflexive motion construction, Event is not attested as a lexical frame.

Frames that hold a certain frame proximity (of any degree) to a given constructional frame are called *related frames*. Hence, a related frame that might occur as a lexical frame for the construction in question is a *related lexical frame*. Taking all types of frame-to-frame relations together, a network of 51 related frames can be identified for Motion.¹¹ Related lexical frames closer to Motion appear to be more prototypical than those that are more distantly related. Unsurprisingly, the majority of example sentences in the sample (600 out of 1,011: 59.35%) contains lexical frames with a frame proximity of +1 or –1. Consequently, there are only seven example sentences

⁹ https://framenet2.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Self_motion (last access: 3 February 2022).

¹⁰ <https://framenet2.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Fleeing> (last access: 3 February 2022).

¹¹ Some frames appear within multiple frame-to-frame relation types. Those frames are only counted once.

(0.69%) containing lexical frames with a frame proximity of +2 or +3. There are no related lexical frames with a frame proximity of –2 or –3 (or lower), +3 being the lowest frame proximity in the network for Motion.

But the network of related frames is not the only source for potential lexical frames. Frames that do not hold a frame-to-frame relation to the constructional frame and hence do not have frame proximity are also possible lexical frames. I call these *unrelated frames*. If they are attested for the construction, they are *unrelated lexical frames*. A prime example for an unrelated lexical frame with respect to Motion was already seen in (1): *Hos-tile_encounter* is a frequently attested unrelated lexical frame for the reflexive motion construction. However, not every lexical frame that qualifies as an unrelated frame is eligible to occur in a construct – in other words: it is not arbitrary which unrelated lexical frames occur with a construction.

4 Structural parallels between constructions and frames: semantic motivation of constructs

A CxS analysis does not stop at identifying a constructional frame and related as well as unrelated lexical frames. A next step is the analysis of construct frames, i.e. the semantic motivation of the instances of CEs and CEEs of a construction by way of combination of FEs of both lexical and constructional frames. This motivation is based on morphological and syntactic iconicity (Haiman 1980, 1983, 1985): additional morphemes or phrases point to additional semantic content. Here, the appearance of a reflexive pronoun in collocation with a verb that usually does not classify as reflexive is an indicator for an additional constructional frame that together with a lexical frame constitutes a construct frame. In other words, the appearance of the reflexive pronoun in the reflexive motion construction is semantically motivated by the constructional frame, because it overtly expresses one of its FEs.

It is important to note that not only are CEs and CEEs motivated through FEs, but also (at least for argument structure constructions) their instances, i.e. the constituent parts of a *construct*. To reflect this terminologically, instances of CEs are called *construct elements* (CtEs) in CxS. Since CEEs are (more or less) lexically specific anyway, no further distinction is necessary to account for them.

For the reflexive motion construction, three types of semantic motivation of CtEs and the CEE can be identified.¹²

- (1) The motivation of all CtEs and the CEE by FEs of a lexical frame.
- (2) The motivation of a CtE and/or the CEE by FEs of the constructional frame.
- (3) The motivation of a CtE and/or the CEE by FEs of both a lexical and the constructional frame.

These three types are now discussed in turn.

4.1 Motivation of all CtEs and the CEE by FEs of a lexical frame

In cases where all CtEs and the CEE are motivated by FEs of a lexical frame, the construct frame only consists of FEs of that lexical frame. Hence, no additional FEs from a distinct constructional frame come into play. In fact, no additional FEs are necessary since all lexical frames that are capable of motivating all CtEs and the CEE are inherently tied to the constructional frame: they are related lexical frames. Conversely, the constructional frame itself might appear as a lexical frame if it is evoked by a respective verb in the construct. In essence, the motivation

¹² This approach differs from the observations made by Goldberg (2002: 344–346), who distinguishes four types of possible alignments between the arguments of a construction and that of a verb. CxS utilizes frames, not just individual verbs, to account for generalizations that hold for all verbs within a frame. Also, for the case that certain arguments of the construction and a verb match, Goldberg does not account for the differences between an elaboration of the construction's arguments (Section 4.1 in this article) and an enrichment by a semantically distinct but relatable argument of the verb (Section 4.3).

of all CtEs and the CEE by FEs of a lexical frame appears to be a case of *elaboration* in the sense of Goldberg (1997: 386): a related lexical frame elaborates the constructional frame.

As an example, recall the related lexical frame *Self_motion*. An annotation of its FEs for the two CtEs *Ich* ('I') and *zu dem Gewürzregal* ('to the spice rack') is provided in (4).

- (4) [SELF_MOVER *Ich*] *schlich mich vorsichtig an ihm vorbei* [GOAL *zu dem Gewürzregal*,] *ließ ihn aber nicht aus den Augen*.
 I sneak.PST.1SG SELF carefully on him.DAT past to DET.DAT
 spice.rack let him.ACC but not out.of DET.DAT eyes
 'I carefully sneaked my way past him to the spice rack, but did not take my eyes off of him.'
 (Düffel, John von: Vom Wasser, München: dtv, 2006, p. 260)

Both CtEs are motivated by FEs from *Self_motion* with no need for an additional frame. Note that the CEE, the reflexive pronoun *sich*, is not annotated for a FE of *Self_motion*. This is only because the verb *schleichen* ('sneak') does not classify as reflexive in English, so no respective FE for a reflexive pronoun is included in the English frame, but may well be in a German version of *Self_motion*.

Out of the 1,011 example sentences for the construction in the sample, 712 (70.43%) are attested for a motivation of all CtEs and the CEE by FEs of a lexical frame.

These immediate structural parallels between a related lexical frame (*Self_motion* in this case) and the constructional frame (*Motion*) show the importance of the notion of frame proximity. If a lexical frame is related to the constructional frame, all CtEs as well as the CEE are motivated by FEs of this very lexical frame. Conversely, it is only possible for a lexical frame to motivate all CtEs and the CEE if it is a related lexical frame. Even though there is no separate constructional frame at work, the relatedness of the lexical frame to a constructional frame qualifies cases like (4) as instances of the construction and not just a realization of the valency of a verb like *schleichen*.

4.2 Motivation of a CtE and/or the CEE through FEs of the constructional frame

When a CtE cannot be motivated by a FE of the lexical frame, the constructional frame comes into play. This is only relevant for unrelated lexical frames, since annotation of the data for the reflexive motion construction shows that related lexical frames are almost always able to motivate all CtEs. With unrelated lexical frames, annotation makes clear that the construct frame has to consist of FEs of both frames, hence its constitution might be modeled as a process of conceptual integration in the sense of Fauconnier and Turner (1996, 1998, 2002).

Motivation via FEs of the constructional frame can be attested for CtEs as well as for instances of the CEE. For example, in (5), with the unrelated lexical frame *Cause_to_experience*,¹³ the CtE *durch ein briefbogensgroßes, verdrecktes Fenster* ('through a letterhead-sized, dirty window') must be interpreted as being motivated only by the FE *PATH* of the constructional frame *Motion*.¹⁴

- (5) *Eine Ahnung von Licht quält sich [durch ein briefbogensgroßes, verdrecktes Fenster] Path*.
 DET.NOM hint of light torment.PRS.3SG SELF through DET.ACC letterhead-sized.ACC
 dirty.ACC window
 'A hint of light torments its way through a letterhead-sized, dirty window.'
 (Die Zeit, 24.02.2000, No. 9)

This type of motivation is found in 91 sentences (9%) in the sample.

¹³ https://framenet2.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Cause_to_experience (last access: 3 February 2022).

¹⁴ In all remaining examples, subscript annotation marks FEs of the lexical frame, while superscript annotation marks FEs of the constructional frame.

A motivation of the CEE, the reflexive pronoun *sich*, via the FE THEME of the constructional frame can be seen in (6). The lexical frame *Ingestion*¹⁵ is unrelated to the constructional frame *Motion*.

- (6) *Auch wenn ich als Kind die Inhalte der Angst nicht kapierte,*
 even.though when I as child DET.ACC contents DET.GEN fear not understand.PST.1SG
fraß [sich ^{THEME}] das Gefühl der Angst in den Kopf.
 eat.PST.3SG SELF DET.NOM feeling DET.GEN fear in DET.ACC head
 ‘Even though I did not understand the fear’s topic as a child, the feeling of fear ate its way into the head.’
 (Müller, Herta: *Der König verneigt sich und tötet*, München: Carl Hanser Verlag 2003, p. 161)

This motivation of an instance of the CEE licenses the occurrence of the reflexive pronoun *sich* with a verb like *fressen* (‘eat’), which usually does not categorize as a reflexive verb. The reflexive pronoun is recruited to overtly express the FE THEME of *Motion*, since the subject CtE *das Gefühl der Angst* (‘the feeling of fear’) is already an instance of a different FE, i.e. *INGESTOR* of the lexical frame *Ingestion*. Motivation of the CEE via the FE THEME of the constructional frame is attested for 104 sentences (10.29%) in the sample.

Of course, the motivation of both a CtE and the CEE can also be attested in the same construct, as shown in (7) with the unrelated lexical frame *Make_noise*:¹⁶ PATH and THEME from the constructional frame *Motion* motivate the PP CtE and the CEE respectively. For the reflexive motion construction, this is the highest possible contribution of the constructional frame to a construct frame.

- (7) *Sie klickten [sich ^{THEME}] [durch Portale ^{PATH}], orientierten sich an Sitemaps,*
 they click.PST.3PL SELF through portals orient.PST.3PL SELF by sitemaps
immer auf der Suche nach der besten Adresse.
 always on DET.DAT search after DET.DAT best.DAT address
 ‘They clicked their way through portals, oriented themselves by sitemaps, always looking for the best address.’
 (Die Zeit, 03.02.2000, No. 6)

4.3 Motivation of a CtE and/or the CEE through FEs of both a lexical and the constructional frame

Not only is it possible for CtEs or instances of a CEE to be motivated by either a FE of the lexical or the constructional frame, FEs of both frame are able to motivate one single CtE or instance of a CEE together. In terms of conceptual integration, this can be seen as a fusion of the two FEs within the construct frame.¹⁷ In CxS, it is called *double motivation*. Consider (8) as an example for the double motivation of the CtE *durch ein kompliziertes Kreuzworträtsel* (‘through a complicated crossword puzzle’) with the lexical frame *Work*,¹⁸ contributing the FE SALIENT_ENTITY, whereas the constructional frame *Motion* contributes the FE PATH.

- (8) *Er arbeitete sich [SALIENT_ENTITY durch ein kompliziertes Kreuzworträtsel,*
 he work.PST.3SG SELF through DET.ACC complicated.ACC crossword.puzzle
^{PATH}] *hatte ein Bier aufgemacht und sich auf einen beschaulichen*
 have.PST.3SG DET.ACC beer open.up.PTCP and SELF for DET.ACC contemplative.ACC
Abend eingestellt, als das Telefon läutete.
 evening set.up.PTCP when DET.NOM telephone ring.PST.3SG

¹⁵ <https://framenet2.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Ingestion> (last access: 3 February 2022).

¹⁶ https://framenet2.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Make_noise (last access: 3 February 2022).

¹⁷ This is not to be confused with the mechanism of *fusion* discussed by Goldberg (1995: 50–52). In her account, both FEs would need to be semantically compatible, but it is questionable whether this compatibility is required.

¹⁸ <https://framenet2.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Work> (last access: 3 February 2022).

‘He worked his way through a complicated crossword puzzle, had opened up a beer and and set up for a contemplative evening, when the telephone rang.’

(Glavinic, Thomas: *Die Arbeit der Nacht*, München & Wien: Carl Hanser Verlag, p. 381)

Double motivation of a respective CtE is found in 91 sentences (9%) in the sample.

An example of double motivation for the instance of a CEE (again, *sich*) can be seen in (9). The unrelated lexical frame is *Rescuing*,¹⁹ contributing the FE *PATIENT*. As with all unrelated lexical frames, the constructional frame *Motion* contributes the FE *THEME*.

- (9) *Mommsen rettete [PATIENT sich THEME] aus der Welt der Tatsachen in Mommsen rescue.PST.3SG SELF out DET.DAT world DET.GEN facts into die der Gefühle. that DET.GEN feelings*
 ‘Mommsen rescued his way out of the world of facts into that of feelings.’
 (de Bruyn, Günter: *Preußens Luise*, Siedler 2001, p. 87)

Double motivation of an instance of the CEE is attested for 74 sentences (7.32%) in the sample.

Just as with the single motivation of both a CtE and the instance of a CEE in the same construct (Section 4.2), double motivation of both elements is also attested. See (10), which features the unrelated lexical frame *Grinding*,²⁰ contributing the FEs *GOAL* for the CtE and *PATIENT* for the CEE (along with *GOAL* and *THEME* from the constructional *Motion*, respectively).

- (10) *Ein Motor dröhnt von der Straße herüber, und diese dröhnende Straße DET.NOM engine roar.PRS.3SG from DET.DAT street over and this roaring.NOM street fräst [PATIENT sich THEME] [GOAL in mein Gedächtnis GOAL] ein. mill.PRS.3SG SELF into my memory in*
 ‘An engine roars over from the street, and this roaring street mills its way into my memory.’
 (Riedel, Susanne: *Eine Frau aus Amerika*, Berlin: Berlin Verlag 2003, p. 95)

5 Some semantic parameters of constructions

With the identification of the network of frame proximity and the analysis of structural parallels between the construction at hand and its constructional frame as well as all attested lexical frames, it becomes possible to abstract away from single constructs and even single lexical frames to come up with a description of the semantic properties of the construction as a type unit. For this purpose, CxS distinguishes between seven semantic parameters of constructions. As such, semantic parameters might be an important part of a construction entry in a constructicographic repository (Ziem et al. 2019: Ch. 4), along with other information on the construction, such as its formal structure or relations to other constructions. The three most important parameters are discussed briefly in the remainder of this section (see Willich 2022: Ch. 5 for a full account on all seven parameters).

5.1 Constructional polysemy

In some Construction Grammar approaches, constructions are treated as being polysemous, i.e. as having different senses that can be observed in their constructs (e.g., Goldberg 1995: 75–77).²¹ In CxS, the polysemy of a

¹⁹ <https://framenet2.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Rescuing> (last access: 3 February 2022).

²⁰ <https://framenet2.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Grinding> (last access: 3 February 2022). Note that both *Motion* and *Grinding* feature a FE *GOAL*, with no intention of having a similar definition (cf. Baker et al. 2003: 283–284). In this case, however, both FEs refer to different but still relatable matters, making it possible for them to be fused to motivate a single CtE.

²¹ Whether constructions should be treated as polysemous or divided into separate lower-level constructions is controversial. For a critique on the concept of constructional polysemy, cf. Nemoto (2005) and Iwata (2008), among others. The task for CxS is not to argue for or against constructional polysemy but to offer ways to model (potential) constructional polysemy in different ways.

construction can be captured in two ways, either (i) through multiple constructional frames associated with the same construction, or, (ii) if there is only one plausible constructional frame, with subtler meaning differences throughout the constructs, primarily differences in lexical frames and lexical meanings of LUs.²² The latter is the case for the reflexive motion construction if we assume that it is indeed a polysemous construction, which previous research suggests.

Based on research on the English *way*-construction, four different senses might be identified for the reflexive motion construction: ‘manner’, ‘means’ and ‘incidental activity’ (see Goldberg 1995: 202; Israel 1996: 218; McColm 2019: 39; Perek 2018: 68–69) as well as a ‘neutral’ sense, as is documented in the FrameNet construction and which implies none of the other interpretations.²³ Those senses correlate for the most part with certain lexical frames: examples for the ‘neutral’ sense include related lexical frames like *Body_movement* with LUs like *beugen* (‘flex’) or *Placing* with LUs like *legen* (‘lay’). These LUs do not imply any ‘manner’ or ‘means’ interpretation and because they evoke related lexical frames, there is no separate constructional frame at work that might be ‘incidentally’ blended with a lexical frame. The ‘manner’ sense occurs with those lexical frames as well, but is triggered by verbs denoting a manner of motion, like *rollen* (‘roll’) or *schlingen* (‘wrap’) respectively, which specify the manner in which the action is carried out.

The ‘means’ sense, which expresses the means under which the motion takes place, is attested primarily with unrelated lexical frames, including *Grinding* (evoked by LUs like *fräsen* ‘mill’) and *Manipulation* (*quetschen* ‘squeeze’). In comparison to the ‘incidental activity’ sense, which requires an unrelated lexical frame that imposes no obvious similarity with the constructional frame (hence ‘incidental activity’), fewer frames overlap between the two senses, the latter being attested for unrelated lexical frames such as *Chatting* (*reden* ‘talk’) or *Hunting* (*jagen* ‘hunt’).

5.2 Productivity

Based on the annotation of lexical frames for a given argument structure construction, CxS provides a way to measure the productivity of this construction in semantic terms. According to Barðdal (2008), the productivity of a construction can be measured through two components: its *type frequency* and its *semantic coherence*. CxS employs this method by examining the ratio between the frequencies of related and unrelated lexical frames for a given construction. While all constructs with related lexical frames can be considered semantically coherent, a high number (type frequency) of attested unrelated lexical frames indicates a high productivity.

For the reflexive motion construction, 16 of all attested lexical frames are related, whereas 34 are unrelated, which gives a ratio of 1:2.13. Since there are more than twice as many unrelated lexical frames as related lexical frames, the construction can be considered fairly productive.

5.3 Emergent structure

The term *emergent structure* is adopted from conceptual integration theory (Fauconnier and Turner 1996, 1998, 2002), where it is used for semantic aspects that arise in the blend but are not present in the inputs. Accordingly, in CxS, this parameter is necessary to capture semantic aspects that are characteristic for certain constructs of a construction but are not to be found in the individual lexical and constructional frames.

For the reflexive motion construction, as well as for its English counterpart, the *way*-construction, such meaning aspects concern a certain degree of ‘difficulty’ under which the motion of a theme proceeds (cf. Goldberg 1995: 203–204; Smirnova 2018: 36). For example, if one is to ‘work his/her way through a complicated crossword puzzle’ (cf. example 8 above), this implies that the metaphorical motion through the crossword puzzle is not possible without overcoming certain obstacles. This aspect, however, is neither part of the lexical frame *Work* nor

²² Here, it is important to note that the frame a LU evokes is not the same as its lexical meaning, the frame only providing the background for a further distinction between semantically adjacent, but not synonymous LUs (cf. Ziem 2020b).

²³ <http://sato.fm.senshu-u.ac.jp/frameSQL/cxn/CxNeng/cxn00/21colorTag/index.html> (last access: 3 February 2022).

the constructional frame Motion. Even though the interpretation of ‘difficulty’ emerges in the constructs, it can be seen as a characteristic of the construction as a whole (for similar arguments see Bybee 2010: 109; Finkbeiner 2019: 182–183; Schmid 2020: 269).

6 Further issues and perspectives

Construction Semantics (CxS) aims to extend Construction Grammar and constructicography by implementing a powerful frame-semantic methodology that captures the semantic properties of constructions and their constructs with recourse to FrameNet frames. It provides methods to investigate the semantic motivation of constructs through frame elements (FEs) of both lexical and constructional frames, which in turn makes it possible to generalize these fine-grained analyses to semantic parameters of constructions.

Of course, the principles discussed in this article and the current version of CxS in general only scrape the very tip of the iceberg. It is up to future research to apply CxS to a much wider range of grammatical constructions, not only argument structure constructions like the reflexive motion construction, but also constructions different enough to reveal further gaps to be closed in the theoretical, methodological and empirical scope of CxS.

An important issue to be addressed in future research is the relationship between constructions and frames. Specifically, the mechanisms with which constructions evoke their constructional frames (which may be different from those of LUs) as well as the methods for identifying constructional frames need further exploration (see Willich 2022: Ch. 8 for first findings). A single construction like the reflexive motion construction only serves as a starting point for further analyses on many different types of other constructions yet to be investigated.

Acknowledgments: I am grateful to two anonymous reviewers as well as Rebecca Lee for many helpful comments that greatly improved this article.

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