

Logical polysemy, event and argument structure of some German shooting-verbs¹

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Abstract

In this paper we raise firstly inadequacies of the analysis of the verb *to shoot* by Croft (1998). Subsequently, we assign to this verb alternative configurations of base and profile according to the causal structure model (Croft, 1991, 1998) and the action chain model (Langacker, 1999). That forms the basis of a cognitive-grammatical description of a subset of the readings of the German verbs *schießen*, *abschießen*, *anschießen*, *erschießen*, *totschießen* and *niederschießen*. It will be suggested that these senses can be attributed to a large extent to functions, which are applied to verbal bases and profiles, and extend or shift these segments. Qualia structure of the verbs' complements are also considered. Aspects of the generative lexicon theory (Pustejovsky, 1995) are included in this way into the cognitive semantic analysis. Differently than proposed by Pustejovsky (1995), however, we plead for ordered rules, which erase certain arguments of a verb under certain conditions, instead of classifying these items according to their possibility of being omitted.

Cognitive Grammar (Langacker 1990, 1991, 1999) distinguishes the following notions pertaining to an expression's conceptual content: *maximal scope* ("the full array of content it evokes"), *immediate scope* or *base* ("those facets of the maximal scope that figure most directly in the characterization of the profiled entity") and

profile ("the entity it designates") (cf. Langacker 1999:7, 49).

These notions apply to the meaning of all major syntactic categories. According to Langacker (1999:7), the noun *knuckle*, for example, "evokes as its base the conception of a finger, within which it profiles (designates) a certain subpart". In the verbal domain, the variants of *open* in sentences such as *Leona opened the door with this key*, *This key opened the door* and *The door opened* are analyzed as evoking as their base the same action chain, but profiling different, increasingly shorter segments of the energetic interaction between the event participants (Langacker 1999:32). Langacker (1990:216-218) discusses similar examples of profile-base discrepancies associated with a verb's different syntactic frames, involving *break* and *hit*.

Croft's analysis of the verb *to shoot* forms the starting point of our investigation (Croft 1998:45). This approach, which shares many commonalities with Langacker's, assumes the configurations of *base* and *profile* (3) and (4) for the sentences (1) and (2), respectively:

- (1) I shot at the sheriff
- (2) I shot the sheriff

¹ In: Bouillon, Pierrette / Kanzaki, Kyoko (eds.) (2001). *First International Workshop on Generative Approaches to the Lexicon*. April 26 – 28, 2001. Geneva, Switzerland. École de Traduction et d'Interprétation, Université de Genève.

(3)
 x(x)===== (x) _____ y
 *****shoot*****..... at

(4)
 xy
 *****shoot*****

In the representations (3) and (4), Croft uses the following notational conventions: "force-dynamic (causal) relation", = = = "process", _____ "state", ***** "verb profile", "preposition profile".

According to (3), the variant of *shoot* in (1) comprises as its conceptual base an event with three subevents. The first one consists of a force-dynamic interaction between the shooter (the *x* argument) and himself. In the second subevent, the shooter undergoes some change of state. Finally, the third subevent is the resulting relation between this participant and the target (i.e. the sheriff). The verb itself designates (profiles) only the first two event segments, while the last one is profiled by the preposition.

According to (4), the variant of *shoot* in (2) consists solely of an interaction between shooter and target.

This analysis has many difficulties. First of all, a confrontation between sentences with *shoot / look at / into* suggests that the preposition *at* in (1) does not express a relation between the shooter *x* and the target *y*, but a relation between a not expressed projectile *u* and the target *y*.

- (5) John shot into the box.
- (6) John shot at the box.
- (7) John looked into the box.
- (8) John looked at the box.

Sentence (5) implies that the internal space of the box is accessible to the implicit projectile. In (6) the projectile must be directed to the box. In (7), however, it is implied that the internal space of the box is accessible to John, while in (8) it is his

attention that must be directed toward the box.

As a semantic representation of sentence (2), the configuration (4) is in as much unsatisfactory as it limits itself to a force-dynamic relation between the shooter *x* and the target *y*. However, it is a substantial characteristic of the event represented by (2) that a state of *y* results from an action of *x*. Nevertheless, we assume that this resulting state does not follow the agent's action in the causal chain directly, particularly since the forward movement of the projectile is only caused by the operation of a firearm.

It seems, then, that one must assume default arguments for sentences (1) and (2), representing, respectively, a firearm (or a similar device) and a projectile, because this is necessary for the logical well-formedness of the sentences, in the same way that we must assume, following Pustejovsky (1995:64-66), a default argument for the material (cf. (9)) in (10):

- (9) Mary built a house **with wood**.
- (10) Mary built a house.

A further problem of Croft's analysis is that the prepositional phrases in (11) and (12) cannot be derived, according to the argument linking rules he proposes (cf. Croft, 1998:24), which we formalize in (13), from the bases (3) and (4):

- (11) John shot at the sheriff with **his left hand / a pistol**
- (12) John shot the sheriff with **his left hand / a pistol / a bullet**

These difficulties of Croft's approach are overcome by our analysis.

We assume the following rules for the mapping of the semantic arguments upon syntactic relations (cf. Croft, 1991, 1998; Langacker, 1999):

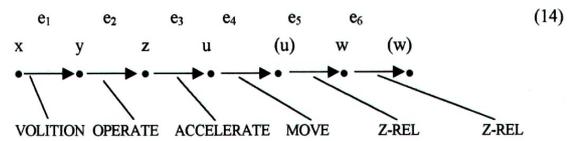
(13)

- (i) If (a_1, \dots, a_n) is the sequence of the n event participants in the profiled segment of a verb V causal chain, then
 - (ii) a_1 is the subject of V ;
 - (iii) a_n is the direct object of V (if $n > 1$);
 - (iv) a_k , $1 < k < n$, is an antecedent oblique of V ;
 - (v) antecedent oblique \rightarrow *with*-PP (by default).
- (PP = prepositional phrase)

In informal terms, (13) states that the subject corresponds to the *head* of the profiled segment of an action chain, while the direct object corresponds to this segment's *tail*, using Langacker's (1990, 1991, 1999) terminology. In other words, the subject is the first participant in the segment of an energy transmission flow denoted by a verb, while the direct object is the last one.

According to Croft (1998:40), prepositions as oblique markers fall into one of two groups: (i) antecedent prepositions and (ii) subsequent prepositions. The former introduce NPs that express participants occurring before the tail (as defined above), which surfaces as the direct object in the unmarked case, while the latter introduce NPs that express participants occurring after that participant. Croft proposes that the English antecedent prepositions are *with*, *by*, *of* and nonspatial *from* and *out of*, whilst subsequent prepositions are *to*, *for* and the spatial Path prepositions. While it is not possible to predict exactly which antecedent preposition realizes a specific antecedent function, as Croft points out, we suggest that *with* has a privileged status in the mapping rules, being the default antecedent preposition, since it seems to introduce the antecedent participant in most cases.

We assume for the verb *to shoot* in (1) and (2) the causal chain (14), which consists of the event segments $e_1 - e_6$.



Event structure (14) describes a canonical shooting event, where a person x volitionally acts upon a body part y , which in turn operates a device (typically a firearm) z . This device accelerates a projectile u , which moves towards a target w . The projectile may eventually contact the target and induce a change of state. The arrows indicate the direction of the energy transmission flow.

In (14), we have two underspecified state predicates Z-REL, which are specified either compositionally (e.g. by a prepositional phrase, a prefix, particle or an adverb) or by the lexicon entries of the verbs. The syntactic and semantic differences between (1) and (2) result mainly from the fact that the verb *to shoot* in (1) only profiles the event segments $e_1 - e_4$, while in (2) the entire chain is profiled. In (1), the segment e_5 is additionally profiled by the preposition *at*, which specifies the Z-REL(u, w) as **directed_to (u, w)**. In (2), the Z-REL of the fifth event segment is specified as **in (u, w)** and the last Z-REL is implemented as **not (living (w))**. In the present analysis, the derivation of the prepositional phrases introduced by *with* in (11) and (12) results automatically from the profile configurations via the application of the rules (13) (i)-(v). For the sentence (11), we assume an implicit direct object, which corresponds to the argument u (a_4 in the causal chain):

(15) John shot (a bullet) at the sheriff with **his left hand / a pistol**.

According to the rules (13) (iv) and (v), the arguments y and z (a_2 and a_3 in the causal chain), due to the profile configuration of sentence (11) (which

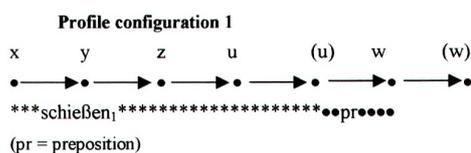
consists of the event segments $e_1 - e_4$), can only be implemented by a prepositional phrase introduced by *with*.

In sentence (12), the profile extends from argument a_1 up to argument a_5 . According to rule (13) (ii), a_1 is the subject, while a_5 is implemented as a direct object due to rule (13) (iii). Arguments a_2 , a_3 and a_4 must surface as a prepositional phrase introduced by *with* (viz. rules (13) (iv) and (v)).

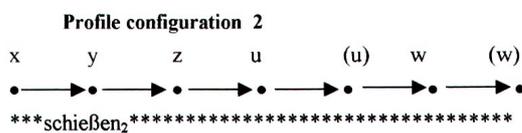
The causal chain (14) can be assumed also as the event structure of at least a subset of the readings of the German verbs *schießen*, *abschießen*, *anschießen*, *erschließen*, *totschießen* and *niederschießen*. As shown below, syntactic and semantic characteristics of these verbs can be attributed systematically to base - profile configurations. By means of the rules (13) (i) - (v), the respective argument implementations can be derived.

The verb *schießen* has the same profile configurations as the verb *to shoot* in (1) and (2):

(16) Hans hat auf den Polizisten geschossen. [Hans shot at the policeman].



(17) Hans hat einen Hasen geschossen. [Hans shot a hare.]



The configuration 2 represents the event structure of a subset of the readings of the verbs *abschießen*, *anschießen*, *erschließen*, *totschießen* and *niederschießen* as well. These readings mainly differ in their specifications of the underspecified predicates Z-REL (Table 1).

Table 1

Reading	Z-REL(u,w)	Z-REL(w)
abschießen _k	in (u,w)	damaged(w) ²
anschießen _k	in (u,w)	hurt(w)
erschließen _k	in (u,w)	not(living(w))
totschießen _k	in (u,w)	not(living(w))
niederschießen _k	in (u,w)	on the floor(w) ³

The underspecified predicate **Z-REL (w)** is specified in *anschießen_k* and *erschließen_k* by the particle *an-* and the prefix *er-*, respectively (cf. *fahren_k* "to drive" vs. *anfahen_k* "hurt by hitting with a car", *anschlagen_k* "damage by hitting" vs. *erschlagen_k* "kill by hitting", *anstechen_k* "hurt by stabbing" vs. *erstechen_k* "kill by stabbing"). In *niederschießen_k* and *totschießen_k*, this specification occurs by the adverb *nieder* "down, on the floor etc." and the adjective *tot* "dead", respectively, instantiating a productive constructional schema, which underlies, for example, lexicalized constructions such as *niederschlagen_k* "to knock down", *totschlagen_k* "to strike dead", *niederstechen_k* "to cause to fall by stabbing", *kaputtschlagen_k* "to damage by striking" and novel constructions such as *kaputtschießen_k* "to damage by shooting" and *lahmschießen_k* "to lame by shooting". As for *abschießen_k*, it seems that **Z-REL (w)** is in this case idiosyncratically specified by the verb's

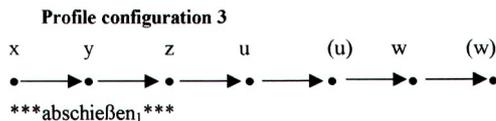
² We consider here just one possibility of specification of this verb's final state. The German particle *ab-* is in itself polysemous, cf. *aufsteigen* "ascend" vs. *absteigen* "descend" and *schneiden* "cut" vs. *abschneiden* "cut off". This situation reflects upon *abschießen*, which also means "to shoot something down" and "to shoot something off / away".

³ A reviewer has suggested that *niederschießen* "to shoot down" might also instantiate the event segment **not (living (w))**. While it is true that someone might die as a consequence of being shot down, this is certainly not an aspect of the verb's meaning. Accordingly, we do not have zeugma in the sentence *Hanna und Marga haben ihre Männer niedergeschossen* "Hanna and Marga shot down their husbands", as applied to a situation where only Hanna's husband died.

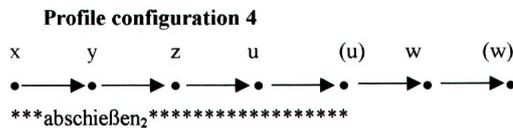
lexical entry, since the particle *ab-* apparently does not occur with the meaning in question in other constructions.

In addition to the profile configuration 2, the verb *abschießen* has the following configurations:

(18) Hans hat die Pistole abgeschossen⁴.
[Hans shot off the pistol.]



(19) Hans hat den Pfeil abgeschossen.
[Hans shot the arrow.]



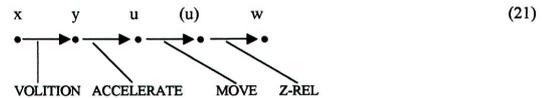
The profile configurations and the specification of underspecified state relations are not, however, the only parameters, according to which German shooting-verbs are distinguished from each other. Semantic differences result also from the type properties of the event participants. Thus the argument *w* of the verb *schießen*₂ (cf. (17)) must be an entity that belongs to the sort **animal & not_human**.

For the semantic implementation of the arguments *z* and *u* we postulate a congruence rule of the respective TELIC roles. This rule states that the TELIC role of the device *z* must match the TELIC role of the projectile *u* or the sort of the projectile must correspond to the TELIC role of the device. It is explained by this rule why one normally does not shoot a tennis ball from a bow or an arrow from a sling.

In (20) a further possibility of the differentiation of the German shooting-verbs occurs:

(20) Hans hat mit dem linken Fuß einen Fußball über das Hoftor geschossen.
[Hans shot (kicked) a football with his left foot over the yard gate.]

For (20), we assume event structure (21), in which the event segments *e*₂ and *e*₆ of (14) are missing:



The event representation (21) is related to (14) by means of a lexical rule, which extends the verbal base of the first structure and plays also an important role in the systematic polysemy of verbs such as *essen* ("to eat"), *töten* ("to kill"), *schreiben* ("to write"), *streichen* ("to paint"), *schlagen* ("to hit"), *feuern* ("to fire"), *katapultieren* ("to catapult") etc., e.g.:

- (22) (a) Hans hat den Apfel mit der Hand gegessen. [Hans ate the apple with his hand.]
(b) Hans hat den Apfel mit dem Messer gegessen. [Hans ate the apple with the knife.]
- (23) (a) Hans hat das Kind mit der Hand geschlagen. [Hans hit the child with his hand.]
(b) Hans hat das Kind mit dem Stock geschlagen. [Hans hit the child with the stick.]

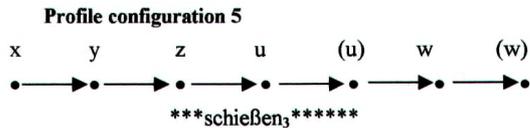
Sentences (22a) and (23a) have a shorter causal chain than the corresponding (b) sentences, because they lack the event segment **operate (y, z)**.

In a similar way, the configurations 1 - 4 can be attributed to lexical rules, which extend the verb profile. Applying to an abstract base verb *SCHIESSEN* and a basic configuration, these rules profile further segments, until the entire causal chain (14) is profiled. Not only prefix derivation, but also zero-derivation occurs in this process (cf. Copestake / Briscoe, 1996:16, 18).

⁴ Although (18) instantiates a usage of the verb *abschießen* "to shoot off" registered in many dictionaries (cf. Duden 1999), it is not acceptable for some native speakers of German, who prefer in this case the verb *abfeuern* "to fire off".

In (24) the verb profile of configuration 3 is shifted to the right:

(24) Das Gewehr schießt. [The rifle shoots.]



We have seen that profiling bears directly on the argument structure of a verb, since, according to (13), the head participant of the profiled action chain surfaces as subject and the tail participant as direct object, while any intermediate participant is realized as an antecedent oblique. What is then the semantic import of profiling? We claim that only profiled segments of a verb's base are semantically necessary, in the sense of motivating implications from sentences containing the verb. On the contrary, unprofiled segments are not implied by the verb, but just expected. Consequently, there is no implication from (18) that a projectile was fired. The *but*-test (cf. Cruse 2000:56) shows that this is only an expected feature of the verb's meaning:

- (25) (a) Hans hat die Pistole abgeschossen, aber kein Projektil ist abgefeuert worden. [Hans shot off the pistol, but no projectile was fired.]⁵
 (b) ?? Hans hat die Pistole abgeschossen, aber ein Projektil ist abgefeuert worden. [?? Hans shot off the pistol, but a projectile was fired.]

According to Pustejovsky's typology of arguments of lexical items (1995:63-64), the arguments *u* (bullet) and *w* (head) of (26a) are default arguments of the verb *schießen*, since they do not need to occur necessarily in the syntax structure:

⁵ We assume for (25a) a situation, in which the pistol was loaded with a blank cartridge, but the speaker is unaware of this fact.

- (26) (a) Hans hat dem Politiker eine Kugel in den Kopf geschossen. [Hans shot a bullet into the politician's head.]
 (b) Hans hat dem Politiker in den Kopf geschossen. [Hans shot into the politician's head.]
 (c) Hans hat geschossen. [Hans shot.]
 (d) * Hans hat eine Kugel geschossen. [Hans shot a bullet.]

How can one explain, however, that (26d) is not grammatical, while (26b) and (26c) are acceptable? We believe that one can overcome this paradox, if we do not classify the arguments of a verb according to their possibility of being omitted, but rather list the conditions on which they can be omitted. For example, the argument *w* of *schießen* (i.e. the target) may be only erased, if *u* (i.e. the projectile) has already been erased.

Unfortunately, not all aspects of the analyzed shooting-verbs fit into the sketched model. We will refer only to three difficulties. First of all, rules (13) (i) - (v) cannot predict sentence (27), because the tail of the verb profile (i.e. the arrow) is realized as an oblique instead of a direct object:

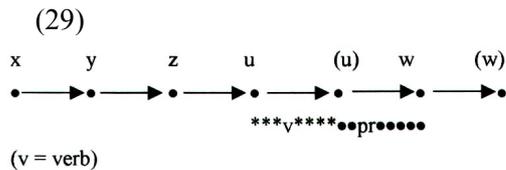
- (27) Er hat **mit** einem Pfeil auf den Polizisten geschossen. [He shot at the policeman **with** an arrow.]

Secondly, it seems that sentence (28) cannot be analyzed according to the causal structure model, since the target (i.e. the wall), although it occurs in the action chain *before* the participant that surfaces as a direct object (i.e. the hole), is realized as a subsequent oblique, instead of an antecedent oblique as predicted by rule (13) (iv):

- (28) Er hat ein Loch in die Wand geschossen. [He shot a hole into the wall.]

In connection with the difficulties of (27) and (28), it should be stressed, though, that these sentences probably instantiate very marked argument realizations, which apparently do not occur, for example, in French, Italian or Portuguese.

Lastly, unaccusative *schießen* places a further problem. At first sight one can assume the configuration (29) for this reading:



Nevertheless, sentence (30b) cannot be inferred from sentence (30a), as one can infer (31b) from (31a):

- (30) a. Der Indianer schoß den Pfeil ins Wasser. [The Indian shot the arrow into the water.]
 b. ? Der Pfeil schoß ins Wasser. [The arrow shot into the water.]
- (31) a. Das Kind zerbrach den Teller. [The child broke the plate.]
 b. Der Teller zerbrach. [The plate broke.]

Notwithstanding these problems, we think that our analysis has covered some important facts about German shooting-verbs. We believe that these difficulties can be accounted for in the near future, if the model is refined.

Conclusion

Our description of the logical polysemy, event structure and argument structure of some German shooting-verbs represents an attempt to include aspects of the generative lexicon theory into a cognitive semantic analysis. Based on Croft's (1991, 1998) and Langacker's (1999) approaches, we posited configurations of base and profile for a subset of the readings

of these verbs. The systematic polysemy of these verbs is treated by means of two generative procedures. Firstly, lexical rules extend or shift the verbal profiles or bases. The respective argument structures are derived systematically by mapping rules, which are applied to these configurations. Secondly, underspecified predicates are assumed for the verbal bases, which are partly compositionally specified. We finally referred to aspects of the group of German verbs that represent difficulties for our analysis.

Acknowledgements

This paper summarizes the partial results of an ongoing research on syntax and semantics of some German and Portuguese verbs, in the context of my doctoral dissertation project at the University of Konstanz, financed by a scholarship of CAPES Foundation in Brasilia. I am also indebted in many ways to a lot of people at the Linguistics Department of the University of Konstanz. Christoph Schwarze has my sincere gratitude for his insightful, highly constructive remarks on both analysis and underlying framework as well as for his helpful suggestions. Moreover, I have benefited greatly from stimulating discussions with his collaborators at the SFB 471 Project "Variation and Evolution in Word Formation", to whom I was pleased to present ideas of this paper in different occasions. I am grateful to Carmen Kelling, Judith Meinschaefer, Heike Necker and Katrin Lotter for carefully proof-reading and/or commenting on the manuscript. All remaining errors are, of course, my own responsibility. Thanks are also due to Peter Pause and collaborators at the SFB 471 Project "Verbal Polysemy" for their interest (and patience) in discussing earlier versions of this paper and for their penetrating criticism. Last but not least, I would like to thank the two anonymous reviewers for their valuable comments, not all of which I was able, unfortunately, to take into account.

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