Stative Locative Alternations as Type Coercion

Sebastian Bücking and Frauke Buscher

1. Introduction

Traditional projective approaches to argument structure assume a rigid mapping from a static lexicon to syntax. However, argument alternations, in particular those licensed by additional linguistic material, severely challenge this perspective, see Levin & Rappaport Hovav (2005) and Ramchand (2013) for overviews. As a case in point, we will discuss Stative Locative Alternations (= SLAs) in German. In SLAs, the locative PP of the basis appears in subject position whereas the subject of the basis is integrated via *voll mit* ('full with'), see (1), or variants thereof, see (2).

(1) a. Kühe stehen auf dem Platz. (basis)
cows stand on the square
'Cows are standing on the square'

b. Der Platz steht voll mit Kühen. (SLA)
the square stands full with cows

(2) a. Der Schrank hängt voll(er) Kleider. (SLA)
the closet hangs full clothes

b. Der Tisch liegt voll von Büchern. (SLA)
the table lies full of books

Since *voll* is the crucial licensing factor for SLAs, the complex structure results from a dynamic interaction between the components involved rather than from lexically fixed static information. However, it is controversial whether such dynamics is best captured by syntactic or lexico-semantic means: on the one hand, (neo)constructional approaches (cf. Goldberg (1995), Borer (2005)) deny projecting lexical information and instead assume that root meanings are inserted quite freely within syntactically conditioned structural units. On the other hand, Levin & Rappaport Hovav (2005:193, ch. 7.5) argue that 'free' insertion, when merely constrained by vaguely formulated compatibilities between lexical roots and structural configurations, underestimates fine-grained lexical content. Taking up this viewpoint, we will argue that Asher's (2011) dynamic approach to lexical semantics offers a fresh look at the debate by inspiring an analysis of SLAs in terms of meaning adjustments.

There are two caveats we would like to mention before getting started: first, the following discussion focuses on SLAs with *voll mit* ('full with'). In principle, the analysis is supposed to cover the other forms as well. However, a more thorough discussion of potentially fine-grained differences will not be tackled here. Second, data adduced by Zifonun (n.d.) show that SLAs are fairly regular and widespread. Nevertheless, we are aware of the fact that not all speakers of German fully accept this type of alternation; in particular, acceptability ratings seem to vary with the speaker's regional origin and / or the form of SLAs. Although these issues will not be addressed here, one may note that the lexicalist perspective underlying our proposal is well-equipped to capture fine-grained differentiations.

The paper is organized as follows. In section 2, we will briefly review Hole's (2013) analysis of SLAs that follows in spirit the neoconstructional paradigm. Section 3 develops a lexicalist alternative based on Asher's (2011) dynamic type logic: we will argue that the *voll*-XP presupposes the application to a filling state while the explicitly given locative state does not meet this typing requirement. However,

* This paper has greatly benefited from the support by the research project A1 (Maienborn) "The semantics and pragmatics of combinatory meaning variation" within the collaborative research center SFB 833, Universität Tübingen. We thank the audience at WCCFL 32, Ereignissemantik 13, and Maria Averintseva-Klisch for valuable comments. We are indebted to Janina Radó for checking the English manuscript.

 Proceedings of the 32nd West Coast Conference on Formal Linguistics, ed. Ulrike Steindl et al., 92-102. Somerville, MA: Cascadilla Proceedings Project.

the lexical information that comes along with the *voll*-XP licenses a mapping from locative states to filling states; the corresponding dynamic resolution of the type conflict yields a semantic form that captures the re-organized interpretation characteristic of SLAs. Section 4 offers a conclusion.

2. SLAs in a neoconstructional perspective: Hole (2013)

Refining previous proposals for Dutch (cf. Mulder & Wehrmann (1989), Hoekstra & Mulder (1990)), Hole (2013) argues for treating SLAs in terms of θ-related 'Knight Move Binding' as developed in Hole (2008). In his account, the SLA's subject receives a local θ-role LANDMARK that binds a possessor variable in a small clause; in turn, the possessor's neighborhood forms the target of the small clause's predication. Which part of the possessor is identified with this neighborhood region is determined by context and world knowledge. The structure and its interpretation is given in (3).

(3) a. dass [der Platz]$_{\text{LANDMARK}}$ i [[pro$_i$'s neighborhood]$_{\text{LOC}}$ [mit Kühen]$_{\text{MATERIAL}}$ voll] steht.

b. *voll* (MATERIAL) (pro$_i$'s neighborhood)(SLA-verb/locative BE)
= There is a non-atomic referent y such that pro$_i$'s neighborhood region is completely full of y in the SLA-verb posture and y has the MATERIAL property.

[cf. Hole (2013), (22)/(25)]

Hole's proposal yields an interpretation that seems by and large correct (see below for qualifications). Nevertheless, it does not settle the following key issues. First, the compositional backbone of Hole's proposal is not fully clear to us. Notably, it is not made sufficiently transparent how the locative BE and the LANDMARK are made available. This leaves open whether the alternation is due to a dynamic process (conditioned, for instance, by an interaction with the explicitly given verb and its conceptual structure), or whether it depends on a lexically fixed ambiguity. It also remains unclear why the explicit verb may interact directly with the material noun. Since the latter is deeply embedded within the small clause according to (3a), such a transparency is surprising.

Second, Hole's proposal relies on a complex syntactic structure for SLAs. However, this structure neither predicts the subject-verb agreement nor the assignment of nominative case to the LANDMARK DP. In particular, Hole builds upon his analysis of free datives in Hole (2008), which also crucially involves LANDMARK related 'Knight Move Binding', see (4) for a dativus possessivus. Hence, it is surprising that the putative LANDMARK DP in SLAs receives nominative, not dative case.

(4) Paul hat der Kuh den Fuß bandagiert.
Paul has the cow.DAT the foot bandage

Third, in our opinion, Hole does not show conclusively that the semantics of SLAs does in fact involve a landmark variable that comes along with a neighborhood region. For instance, he attributes the oddness of example (5a) to the putative neighborhood: conceptually, notes and cream do not plausibly stick to the same part of the fridge, while SLAs under Hole's analysis enforce such an identity. However, we suggest that (5a) is infelicitous not because of a required part identity, but because of the coordination of distinct types of sticking. The cream soils the fridge whereas the notes do not. Compare (5b) where both stickings soil the fridge; consequently, the salad may be inside and the mustard outside.

(5) a. Der Kühlschrank klebt voll mit Zetteln und umgekippter Sahne.
the fridge sticks full with notes and spilled cream

[cf. Hole (2013), (15b)]

b. Der Kühlschrank klebt voll mit Kartoffelsalat und Senf.
the fridge sticks full with potato salad and mustard

3. A lexicalist alternative: SLAs as type coercion

3.1. Core proposal

In contradistinction to Hole's analysis, our proposal is based on a simple, fully surface-oriented syntax where the subject directly combines with the explicit verbal structure, see (6). Thus, there

is no need for independently motivating invisible syntactic components. What is more, the proposed economical structure gives us both the subject-verb agreement and the nominative for free.[1]

(6) dass [$_{VP}$ [$_{DP}$der Platz] [$_{V}$[$_{AP}$ voll [$_{PP}$mit Kühen]] $_{V}$steht]].

However, (6) suggests a semantic composition that is at odds with the selectional requirements of its constituents. Intuitively, SLAs involve two conflicts. (i) The adverbial and the verb do not match: *voll mit Kühen* ('full with cows') cannot modify the eventuality given by *stehen* ('stand'); (ii) the subject does not comply with the verb's selectional restrictions: a square cannot stand. Before getting more precise, two clarifying comments are in order. First, the conflict between verb and adverbial appears to be the decisive one for the SLA interpretation. Compare (7) where the verb and the subject do not conflict since coats can hang. Nevertheless, the interpretation follows the SLA pattern, that is, it is not necessarily the coat that hangs but the lint.

(7) Die Jacke hängt voll mit Flusen.
the coat hangs full with lint

We conclude that the resolution of the conflict between verb and adverbial should yield a thematically special, but smooth integration of the subject.[2]

Second, Zifonun (n.d.), sect. 6, argues for treating the *voll*-XP in SLAs not as an adverbial but as a predicative complement, precisely because the *voll*-XP does not modify the (manner that comes along with the) verbal eventuality. In a sense, this is fully in line with our view. However, Zifonun (n.d.:14) explicitly leaves open how the "argument place for a predicative complement with a location verb [can be explained] in terms of valency grammar" (our translation), that is, how one may get – via productive means – from a localization to a predication. Our analysis aims at clarifying the underlying dynamics by arguing that the conflict licenses a mapping from a locative state to a predicative structure, see below for details. For the time being, we will stick to the label 'adverbial' for the *voll*-XP since the reconfiguration will be modelled purely in terms of semantics while the original syntactic relation between verb and *voll*-XP remains untouched. A more thorough discussion of syntactic details must await another occasion; we consider the structure in (6) as the simplest and most neutral one possible.

In order to specify the conflict between the *voll*-XP and the verb, we follow Maienborn's (2005) independent argument for distinguishing between Davidsonian states (= D-states) and Kimian states (= K-states). D-states behave as events in the sense of Davidson (1967); therefore, they allow, inter alia, embedding within perception contexts. By contrast, K-states are exemplifications of a property at a bearer (a conception inspired by Kim (1976)) and fail this diagnostic. As (8) illustrates, position verbs such as *stehen* ('stand') introduce D-states while copula structures with *sein* ('be') denote K-states.

(8) a. Ich sehe die Kühe auf dem Platz {stehen / liegen}.
I see the cows on the square {stand / lie}

b. * Ich sehe die Kühe auf dem Platz sein.
I see the cows on the square be

In a nutshell, our proposal is as follows: first, intuitively, the *voll*-XP describes a filling state. This renders plausible that it selects for a K-state whose bearer must be a container. A corresponding regular predication is given in (9) where the copula and *der Platz* ('the square') provide the K-state and the container, respectively.

(9) Der Platz ist voll mit Kühen.
the square is full with cows

[1] We assume here that the *voll*-XP is an AP. Zifonun (n.d.), sect. 5, considers in more detail the morphosyntactic properties that the *voll*-XPs in their different forms exhibit.

[2] Notably, this effect is expected if one follows the structure in (6) and standard composition: the *voll*-XP and the verb must be merged before the subject comes into play.

This assumption automatically yields the relevant conflict within SLAs: a simple composition fails since position verbs introduce a D-state, not a K-state as required by the *voll*-XP.

Second, following Kaufmann (1995:98-120), the conceptual structure of positional D-states consists of two components: a locative component and a position mode component that characterizes the D-state by describing the posture or orientation of the subject; see (10) for illustration.

(10) Die Kühe stehen auf dem Platz.
the cows stand on the square.

a. Locative component: the cows and the square are locally related to each other; in logical form, this relation is fixed by the local PP.

b. Position mode component: the prominent axis of the cows is vertical with respect to the reference area; the support relates to the deictic underpart of the cows.

[cf. Kaufmann (1995:101, 107f.)]

We suggest that the *voll*-XP within SLAs licenses a specific reconfiguration of these meaning components and thereby paves the way for resolving the relevant conflict: on the one hand, the *voll*-XP allows for mapping a locative D-state onto a filling K-state that is inherently related to the position mode component. This yields the coarse paraphrase for SLAs in (11).

(11) Der Platz steht voll mit Kühen.
≈ 'The square is full of cows whereupon this state inherently relates to a state of standing.'

On the other hand, the locative component is compensated for by the filling state and the container. Notably, this derivative status of the locative component is motivated by the independent observation that SLAs lack the preposition that is explicit in the basis; see (10) with *auf* ('on') as opposed to (11).

In the remainder of the paper, we will first discuss further characteristics of the SLA interpretation that provide evidence for our analysis; then, we will spell out our core proposal in formal terms.

3.2. Evidence for interpreting SLAs in terms of fine-grained typing information

SLAs and their interpretation are subject to several restrictions and show fine-grained differences compared to both the basis and the regular copula construction. As we will now illustrate, our analysis can capture these characteristics in terms of dynamic and fine-grained typing information.

The first restriction typical for SLAs concerns the verb class: SLAs are compatible with positional D-states, but ungrammatical with other verb classes like activities as (12) shows.

(12) a. * Die Halle arbeitet voll mit Menschen.
the hall works full with people

b. * Die Weide grast voll mit Kühen.
the meadow grazes full with cows

(13) a. Die Halle ist voll mit arbeitenden Menschen.
the hall is full with working people

b. Die Weide ist voll mit grasenden Kühen.
the meadow is full with grazing cows

The oddness of (12) is not due to conceptual reasons. The putative SLA interpretation of (12a) – 'The hall is full of people whereupon this state inherently relates to an activity of working.' – is conceptually plausible, see the regular predication with a copula in (13a); the same holds for (12b)/(13b). Hence, the oddness of (12) is rooted in grammatical restrictions, which our analysis can easily account for: the availability of SLAs is lexically restricted to a type conflict between the type requirements of the *voll*-XP and a positional D-state. This correctly predicts that SLAs are ungrammatical in combination with other verb classes. In these cases, the reconfiguration is not licensed and the type conflict between the adverbial and the verb cannot be resolved.

This restriction also explains the varying acceptability of SLAs in combination with ambiguous verbs like *schwimmen* ('to swim') which allow for an activity reading and a state reading ('to swim actively' vs. 'to float passively in the water'). Crucially, SLAs are only compatible with the stative variant, see (14a) which is confined to the state reading. By contrast, (14b), which makes the activity reading prominent, is ungrammatical. It is only acceptable if it receives a (dispreferred) state reading.

(14) a. Der Pool schwimmt voll mit Leichen.
the pool swims full with corpses

b. * Der Pool schwimmt voll mit Menschen.
the pool swims full with people

The following example shows that SLAs are not just a simple inversion of the relation described by the basis. Although (15a) describes an adequate positional relation between a locatum and a location, the corresponding SLA in (15b) is ungrammatical.

(15) a. Das Papier liegt auf dem Punkt.
the paper lies on the point

b. * Der Punkt liegt voll mit Papier.
the point lies full with paper

Our analysis captures this restriction in terms of fine-grained type requirements of the *voll*-XP regarding the subject: in contrast to the basis, SLAs do not integrate a location; instead, the *voll*-XP selects for a subject of the type CONTAINER. This means that the phrase of the basis denoting the location has to supply the more fine-grained type CONTAINER required by the *voll*-XP in the course of the reconfiguration. The type CONTAINER is a subtype of the type LOCATION. It is defined via the features +EXTENDED and +DELIMITED. This captures two-dimensional surfaces like *der Platz* ('the square') and three-dimensional spaces like *der Stall* ('the barn'), see (16a). It also includes abstract entities provided that they have an extension and a delimitation, see *der Text* ('the text') in (16b).

(16) a. Der Platz / der Stall steht voll mit Kühen.
the square / the barn stands full with cows

b. Der Text steckt voll mit Fehlern.
the text sticks full with mistakes

In contrast, the subject in (15b) describes a pure location that lacks the feature +EXTENDED. Therefore, it cannot fulfill the more fine-grained type requirements of a container. For (15b) to be rated as acceptable, the subject has to be reinterpreted as a container (and not as a pure location) by adding the missing feature; that is, the point has to be reinterpreted as a very expanded point.[3]

SLAs are based on verbs introducing D-states. However, within event sensitive perceptual reports, they are not as good as D-states are, cf. (17a) vs. (17c). At the same time, they do not fail the test as clearly as K-states do, cf. (17b) vs. (17c). In fact, the state involved in SLAs has an intermediate status: as a perceptual object, it is more acceptable than a K-state, but less acceptable than a D-state.

(17) a. Ich sehe Fahrräder im Keller stehen.
I see bicycles in the cellar stand

b. * Ich sehe Fahrräder im Keller sein.
I see bicycles in the cellar be

c. ?? Ich sehe den Keller voll mit Fahrrädern stehen.
I see the cellar full with bicycles stand

[3] Minimal pairs such as *Die Kühe stehen {hier / draußen}* ('The cows stand {here / outside}') vs. *{*Hier / Draußen*} *steht voll mit Kühen* ('{Here / Outside} stand full with cows') corroborate the assumption that SLAs are not pure inversions. However, the ungrammaticality of SLAs may well go back to a missing nominative here und is, thus, not primarily due to semantics, but to syntax.

Our analysis correctly predicts this intermediate status: the interpretation of SLAs involves a mapping from the compositionally available positional D-state onto a K-state that is inherently related to the position mode component of the D-state. Hence, the interpolated K-state does not correspond to a typical K-state; rather, it depends on the D-state. So, it shares characteristics with both K- and D-state. This type shift regarding the state in question explains the observable intermediate status of SLAs.[4]

Further evidence for the assumed intermediate status of SLAs arises from commonalities and differences between SLAs and the regular copula predication. To begin with the commonalities, both constructions describe a filling state. They require the interpretation of an immediate adjacency relation between the container and the locatum since the container is the bearer of the filling state, see (18).

(18) a. Das Vordach ist voll mit Menschen.
the porch roof is full with people
≠ People are under the porch roof.
≈ People are on the porch roof.

b. Das Vordach steht voll mit Menschen.
the porch roof stands full with people
≠ People are standing under the porch roof.
≈ People are standing on the porch roof.

Taking the porch roof to be a two-dimensional surface, (18a) and (18b) preclude the (conceptually most plausible) interpretation that the people are located under the porch roof: the required adjacency relation would not be fulfilled since there is no immediate contact between the container and the locatum. Therefore, both the copula construction and the SLA require that the people be located on the porch roof.[5] Likewise, the lanterns in (19a) and in (19b) cannot be located above the porch roof.

(19) a. Das Vordach ist voll mit Lampions.
the porch roof is full with lanterns
≠ Lanterns are above the porch roof.
≈ Lanterns are {under / on} the porch roof.

b. Das Vordach hängt voll mit Lampions.
the porch roof hangs full with lanterns
≠ Lanterns are hanging above the porch roof.
≈ Lanterns are hanging {under / *on} the porch roof.

The crucial difference between SLAs and the copula construction has to do with the question how the adjacency relation is determined in detail. The copula structure in (19a) allows for two readings: the lanterns can hang under the porch roof or they can lie on it. By contrast, the SLA in (19b) can only mean that the lanterns hang under the porch roof. Our analysis predicts this contrast: the copula construction does not specify the position mode component of the lanterns. Therefore, the interpretation of the adjacency relation between the container and the locatum is relatively flexible; under both interpretations, the required adjacency is fulfilled. In SLAs, the interpretation of the adjacency relation is determined by the dependency between the interpolated K-state and the D-state. Since the filling state is inherently related to the position mode of the given D-state, the lanterns are specified as 'hanging'.

Analogously, SLAs and copula constructions prompt different interpretations of the filling state. In the copula structure, the whole container provides the reference point for the evaluation of the filling state. For example, (20a) is true if the whole subway or pragmatically salient parts of the subway (seats, corridor) are full of people. SLAs, by contrast, demand the interpretation of a relative filling state: (20b) is true if the subway is full in relation to pragmatically salient seating-accommodations, more precisely,

[4] Hole does not discuss this aspect. As far as we see, his analysis predicts that SLAs are outright ungrammatical within perception contexts since the structural component of the locative BE corresponds to the matrix component.

[5] Provided that the porch roof is conceptualized as a three-dimensional space, the examples also allow for the interpretation that the people are located under the porch roof. In this case, the adjacency relation is fulfilled since there is an immediate contact between the people and (the floor of) the container.

it must be full of sitting people. Therefore, in a scenario where dozens of people are in the subway, but nobody is sitting, (20a) would be true, but (20b) would not.

(20) a. Die U-Bahn ist voll mit Menschen.
the subway is full with people

b. Die U-Bahn sitzt voll mit Menschen.
the subway sits full with people

This behavior follows from our analysis: since the filling state inherently relates to the D-state, the position mode component of the D-state determines the evaluation of the filling state. Hence, the filling state holds with regard to salient parts of the container as identified according to the position mode of the D-state. In contrast to the copula construction, the potential set of salient parts of the container in SLAs is thus narrowed down by semantics.

To sum up, the observations confirm that SLAs correspond to the reconfiguration of a positional D-state toward a specific K-state which is inherently related to the compositionally given D-state; notably, this reconfiguration is determined and restricted by dynamic and fine-grained typing information. An appropriate formal account of SLAs should capture the following key properties: (1) SLAs must be restricted to the reconfiguration of positional D-states. (2) The interpolated meaning has to correspond to a filling K-state (and not to a purely local relation); correspondingly, the location of the basis must receive the more fine-grained type CONTAINER. Furthermore, this state has to be passed on as referential argument. (3) The interpolated filling state has to establish a specific relation to the compositionally given D-state: it has to be interpreted in relation to the position mode component of the D-state.

3.3. Modeling the type adjustment in terms of Asher (2011)

The proposed perspective on SLAs calls for a compositional semantics that is sensitive to fine-grained conceptual resources. Asher's (2011) type composition logic provides a suitable framework by building on the following assumptions: besides standard intensions, semantic terms specify detailed typing information. Among these are typing presuppositions encoded within presupposition parameters π that must be met by the terms' arguments in the course of the composition. If types do not match, composition may either crash or resort to an appropriate type adjustment. Notably, such repairs are not arbitrary but dependent on lexical information. The coercive mapping from one type to another, for instance, must be licensed by so-called polymorphic types that describe dependency relations between the original type and the target type. This framework will now be put to work with regard to SLAs.

We propose the lexical entry for *voll-* in (21), yielding (22) for a *voll*-XP:[6]

(21) $[\![\text{voll-}]\!] = \lambda Q\lambda P\lambda x\lambda z\lambda\pi\exists k.P(x)(z)(\pi * \text{ARG}_1{}^{\textit{full-}}\text{:K-STATE} - \kappa\sigma\tau(\text{CONT}, \text{HEAD}(P) \sqsubseteq \text{D-STATE}_{loc}) * \text{ARG}_2{}^{\textit{full-}}\text{:CONT}) \wedge \text{full-}(z, x, k, \pi) \wedge Q(k)(\pi)$

(22) $[\![\text{voll mit Kühen}]\!] = \lambda P\lambda x\lambda z\lambda\pi\exists k\text{:COW}.P(x)(z)(\pi * \text{ARG}_1{}^{\textit{full-of}}\text{:K-STATE} - \kappa\sigma\tau(\text{CONT}, \text{HEAD}(P) \sqsubseteq \text{D-STATE}_{loc}) * \text{ARG}_2{}^{\textit{full-of}}\text{:CONT}) \wedge \text{full-of}(z, x, k, \pi) \wedge \text{cows}(k, \pi)$

According to (22), the *voll*-XP comes with type presuppositions that are amended to the presupposition parameter π (see the symbol $*$). Concretely, $\text{ARG}_2{}^{\textit{full-of}}\text{:CONT}$ says that the second argument of the predicate *full-of*, namely x, must justify the type CONTAINER; in other words: the individual going in for the variable x must be a container. Analogously, the first argument of *full-of*, namely z, is supposed to be a K-state. Crucially, however, the type presuppositions for z allow, as an alternative, for justification via polymorphic types; this is encoded by the part $\kappa\sigma\tau(\text{CONT}, \text{HEAD}(P) \sqsubseteq \text{D-STATE}_{loc})$. It reads as follows: if the compositional target going in for the variable z is not of type K-STATE (that is, the head type of the predicate P does not proffer a type compatible with K-STATE), but of a subtype of the

[6] The integration of *voll*'s internal argument is simplified. According to (21), *voll-* takes as its first argument a predicate; this may be provided by XPs of different forms, see the variants in (2) from the introduction. Since the crucial aspects of the following derivation are independent of it, we just integrate the phrase *with cows* as a simple predicate whose argument is existentially bound. It should be clear, however, that our lexicalist proposal is decidedly open for refinements. For instance, it could very well be that *mit* behaves in a slightly different way than the versions with *voll(er)*; there might be constraints with regard to the XP itself such as ±mass or ±plural; etc.

type D-STATE$_{loc}$ (that is, it proffers a locative D-state), justification may proceed via the polymorphic type $\kappa\sigma\tau(\text{CONT}, \text{HEAD}(P) \sqsubseteq \text{D-STATE}_{loc})$. This polymorphic type captures the dependency relation between the required type K-STATE and the compositionally given type D-STATE$_{loc}$. It also states that the first thematic argument of the polymorphic K-state is a container (type CONT), which is in line with the assumption that we are still dealing with a filling state. In effect, this alternative route makes accessible a K-state via a locative D-state (see below). Two aspects of this proposal are noteworthy: first, the polymorphic type lexically encodes a dynamic potential without, however, destroying any lexical information; it merely adds options under well-definable compositional conditions. Second, these conditions can be arbitrarily fine-grained. For the case at hand, we constrain the repair option to those cases where the compositional target is a locative D-state. This directly reflects our findings in the preceding sections; recall, for instance, the exclusion of SLAs based on activities.

With regard to the regular case (9), repeated in (23), the derivation proceeds smoothly.

(23) Der Platz ist voll mit Kühen.

The copula introduces a K-state, see the entry (24), and *der Platz* a container, see (25). Combining (22) with (24) and (25) yields (26); the presuppositions percolate as provided by λ-conversion of the parameters π. Notably, the polymorphic type cannot be used since the resulting $\kappa\sigma\tau(\text{CONT}, \text{K-STATE} \sqsubseteq \text{D-STATE}_{loc})$ would not be well-formed; K-STATE ist not a subtype of D-STATE$_{loc}$. Therefore, the polymorphic type is omitted here.

(24) $[\![\text{sein}]\!] = \lambda y \lambda z' \lambda \pi'.\text{be}(z', y, \pi' * \text{ARG}_1^{be}\text{:K-STATE} * \text{ARG}_2^{be}\text{:BEARER})$

(25) $[\![\text{der Platz}]\!] = \lambda Q \lambda z \lambda \pi \exists! x.\text{square}(x, \pi * \text{ARG}_1^{square}\text{:CONT}) \wedge Q(x)(z)(\pi)$

(26) $[\![\text{der Platz voll mit Kühen sein}]\!] = [\![\text{der Platz}]\!]([\![\text{voll mit Kühen}]\!]([\![\text{sein}]\!])) = \lambda z \lambda \pi \exists! x \exists k\text{:COW}.$
$\text{be}(z, x, \pi * \text{ARG}_1^{\textit{full-of}}\text{:K-STATE} * \text{ARG}_2^{\textit{full-of}}\text{:CONT} * \text{ARG}_1^{be}\text{:K-STATE} * \text{ARG}_2^{be}\text{:BEARER})$
$\wedge\ \text{full-of}(z, x, k, \pi) \wedge \text{cows}(k, \pi) \wedge \text{square}(x, \pi * \text{ARG}_1^{square}\text{:CONT})$

So-called Simple Type Accommodation – that is, the types are combined via a meet operation, see Asher (2011:117) – succeeds, see the result (27) after existential closure of the VP's referential state argument.

(27) $[\![\text{Der Platz ist voll mit Kühen}]\!]$
$= \lambda \pi \exists z\text{:K-STATE} \exists! x\text{:CONT} \exists k\text{:COW}.\text{be}(z, x, \pi) \wedge \text{full-of}(z, x, k, \pi) \wedge \text{cows}(k, \pi) \wedge \text{square}(x, \pi)$

In SLAs such as (1b), repeated in (28), the situation is different.

(28) Der Platz steht voll mit Kühen.

For *stehen*, we assume the lexical entry in (29); it introduces a D-state relating a locatum (type LOCATUM) to a location (type LOC):

(29) $[\![\text{stehen}]\!] = \lambda y \lambda e \lambda \pi' \exists v\text{:LOC}.\text{stand}(e, y, v, \pi' * \text{ARG}_1^{stand}\text{:D-STATE} * \text{ARG}_2^{stand}\text{:LOCATUM})$

Notably, the location argument is already existentially bound here and, thus, compositionally not active. We consider this the adequate input for SLAs because, as argued in section 3.1 above, SLAs assign the locative component of locative states a derivative status by withdrawing the explicit locative PP. In particular, this ties in nicely with the independent observation that regular D-state constructions without a locative PP yield a similar focus on the position mode; see the discussion in Maienborn (1991) and examples such as *Die Kuh steht* ('The cow is standing, as opposed to lying').

The application of (22) to (29) yields the representation in (30).

(30) $[\![\text{voll mit Kühen stehen}]\!] = \lambda x \lambda z \lambda \pi \exists v\text{:LOC} \exists k\text{:COW}.\text{stand}(z, x, v, \pi * \text{ARG}_1^{\textit{full-of}}\text{:K-STATE} -$
$\kappa\sigma\tau(\text{CONT}, \text{STAND}) * \text{ARG}_2^{\textit{full-of}}\text{:CONT} * \text{ARG}_1^{stand}\text{:D-STATE} * \text{ARG}_2^{stand}\text{:LOCATUM})$
$\wedge\ \text{full-of}(z, x, k, \pi) \wedge \text{cows}(k, \pi)$

For (30), Simple Type Accommodation fails: z must justify both the type K-STATE and the type D-STATE, which is impossible since these types do not have a common meet (K-STATE$\sqcap$D-STATE $= \bot$); moreover, x would have to be both a container and a locatum. However, the polymorphic type $\kappa\sigma\tau$(CONT, STAND) licenses so-called Type Accommodation with generalized polymorphic types, cited in (31); see Asher (2011:225). In particular, (31) allows for interpolating a $\mathcal{D}$-functor that introduces a K-state variable that appropriately mediates between the *full-of* modifier and the given D-state.

(31) $$\frac{\phi(v,\pi),\pi \text{ carries } \text{ARG}_i^P{:}\delta(\alpha,\beta){*}\text{ARG}_j^Q{:}\alpha/\beta,v{\in}\text{ARG}_i^P{\cap}\text{ARG}_j^Q}{\mathcal{D}(\lambda w\lambda\pi_1\phi(w,\pi_1))(v)(\pi)}$$

This leads to the following procedure:[7] the problematic term for *stand* undergoes abstraction, see (32); then, an appropriate $\mathcal{D}$ applies to the abstracted part, see (33); finally, (33) is inserted into (32), see (34).

(32) $\text{stand}(z, x, v, \pi * \text{ARG}_1{}^{\textit{full-of}}\text{:K-STATE} - \kappa\sigma\tau(\text{CONT}, \text{STAND})$
$* \text{ARG}_2{}^{\textit{full-of}}\text{:CONT} * \text{ARG}_1^{stand}\text{:D-STATE} * \text{ARG}_2^{stand}\text{:LOCATUM})$
$= [\lambda w'\lambda w\lambda\pi'.\text{stand}(w, w', v, \pi')](x)(z)(\pi * \text{ARG}_1{}^{\textit{full-of}}\text{:K-STATE} - \kappa\sigma\tau(\text{CONT}, \text{STAND})$
$* \text{ARG}_2{}^{\textit{full-of}}\text{:CONT} * \text{ARG}_1^{stand}\text{:D-STATE} * \text{ARG}_2^{stand}\text{:LOCATUM})$

(33) $[\lambda P\lambda r'\lambda r\lambda\pi''\exists s{:}\text{D-STATE}\exists u{:}\text{LOCATUM}.\phi_{\kappa\sigma\tau(\text{CONT},\text{STAND})}(r, r', s, \pi'') \wedge P(u)(s)(\pi'')]$
$(\lambda w'\lambda w\lambda\pi'.\text{stand}(w, w', v, \pi'))$
$= \lambda r'\lambda r\lambda\pi''\exists s{:}\text{D-STATE}\exists u{:}\text{LOCATUM}.\phi_{\kappa\sigma\tau(\text{CONT},\text{STAND})}(r, r', s, \pi'') \wedge \text{stand}(s, u, v, \pi'')$

(34) $[\lambda r'\lambda r\lambda\pi''\exists s{:}\text{D-STATE}\exists u{:}\text{LOCATUM}.\phi_{\kappa\sigma\tau(\text{CONT},\text{STAND})}(r, r', s, \pi'') \wedge \text{stand}(s, u, v, \pi'')]$
$(x)(z)(\pi * \text{ARG}_1{}^{\textit{full-of}}\text{:K-STATE} - \kappa\sigma\tau(\text{CONT}, \text{STAND})$
$* \text{ARG}_2{}^{\textit{full-of}}\text{:CONT} * \text{ARG}_1^{stand}\text{:D-STATE} * \text{ARG}_2^{stand}\text{:LOCATUM})$
$= \exists s{:}\text{D-STATE}\exists u{:}\text{LOCATUM}.\phi_{\kappa\sigma\tau(\text{CONT},\text{STAND})}(z, x, s, \pi * \text{ARG}_1{}^{\textit{full-of}}\text{:K-STATE} -$
$\kappa\sigma\tau(\text{CONT}, \text{STAND}) * \text{ARG}_2{}^{\textit{full-of}}\text{:CONT} * \text{ARG}_1^{stand}\text{:D-STATE} * \text{ARG}_2^{stand}\text{:LOCATUM})$
$\wedge \text{stand}(s, u, v, \pi * \text{ARG}_1{}^{\textit{full-of}}\text{:K-STATE} - \kappa\sigma\tau(\text{CONT}, \text{STAND})$
$* \text{ARG}_2{}^{\textit{full-of}}\text{:CONT} * \text{ARG}_1^{stand}\text{:D-STATE} * \text{ARG}_2^{stand}\text{:LOCATUM})$

The result in (34) now replaces the original term within (30), which yields the revised logical form in (35). (36) follows from applying (35) to the subject and existentially closing the VP's referential argument.

(35) $[\![\text{voll mit Kühen stehen}]\!] = \lambda x\lambda z\lambda\pi\exists s{:}\text{D-STATE}\exists u{:}\text{LOCATUM}\exists v{:}\text{LOC}\exists k{:}\text{COW}.$
$\phi_{\kappa\sigma\tau(\text{CONT},\text{STAND})}(z, x, s, \pi * \text{ARG}_1{}^{\textit{full-of}}\text{:K-STATE} - \kappa\sigma\tau(\text{CONT}, \text{STAND})$
$* \text{ARG}_2{}^{\textit{full-of}}\text{:CONT} * \text{ARG}_1^{stand}\text{:D-STATE} * \text{ARG}_2^{stand}\text{:LOCATUM})$
$\wedge \text{stand}(s, u, v, \pi * \text{ARG}_1{}^{\textit{full-of}}\text{:K-STATE} - \kappa\sigma\tau(\text{CONT}, \text{STAND}) * \text{ARG}_2{}^{\textit{full-of}}\text{:CONT}$
$* \text{ARG}_1^{stand}\text{:D-STATE} * \text{ARG}_2^{stand}\text{:LOCATUM}) \wedge \text{full-of}(z, x, k, \pi) \wedge \text{cows}(k, \pi)$

(36) $[\![\text{Der Platz steht voll mit Kühen}]\!] = \lambda\pi\exists z\exists!x\exists s{:}\text{D-STATE}\exists u{:}\text{LOCATUM}\exists v{:}\text{LOC}\exists k{:}\text{COW}.$
$\phi_{\kappa\sigma\tau(\text{CONT},\text{STAND})}(z, x, s, \pi * \text{ARG}_1{}^{\textit{full-of}}\text{:K-STATE} - \kappa\sigma\tau(\text{CONT}, \text{STAND})$
$* \text{ARG}_2{}^{\textit{full-of}}\text{:CONT} * \text{ARG}_1^{stand}\text{:D-STATE} * \text{ARG}_2^{stand}\text{:LOCATUM})$
$\wedge \text{stand}(s, u, v, \pi * \text{ARG}_1{}^{\textit{full-of}}\text{:K-STATE} - \kappa\sigma\tau(\text{CONT}, \text{STAND}) * \text{ARG}_2{}^{\textit{full-of}}\text{:CONT}$
$* \text{ARG}_1^{stand}\text{:D-STATE} * \text{ARG}_2^{stand}\text{:LOCATUM}) \wedge \text{full-of}(z, x, k, \pi) \wedge \text{cows}(k, \pi)$
$\wedge \text{square}(x, \pi * \text{ARG}_1^{square}\text{:CONT})$

Clearly, the variables for the K-state and the D-state now differ. This renders their independent justification successful. The revision has another welcome side-effect: the subject referent need not be both a container and a locatum anymore, but must only justify the type CONT. As a result after justification, the SLA receives the representation in (37):

[7] The attentive reader will notice that the deduction rule in (31) does not fit one-to-one to the case at hand; notably, we abstract over two variables here (besides π'), see (32), whereas (31) allots just one. However, we consider this a natural extension for cases where the interpolation ranges over two variables to be passed on for further computation. Exactly this is true of SLAs: the new K-state is accompanied by its bearer, namely a container.

(37) $[\![$Der Platz steht voll mit Kühen$]\!] = \lambda\pi\exists z{:}\kappa\sigma\tau(\text{CONT}, \text{STAND})\exists!x{:}\text{CONT}\exists s{:}\text{STAND}\exists u{:}\text{LOCATUM}\exists v{:}\text{LOC}\exists k{:}\text{COW}.\phi_{\kappa\sigma\tau(\text{CONT},\text{STAND})}(z, x, s, \pi) \wedge \text{stand}(s, u, v, \pi) \wedge \text{full-of}(z, x, k, \pi) \wedge \text{cows}(k, \pi) \wedge \text{square}(x, \pi)$

In prose, (37) is true iff the following holds: there is a state z which exemplifies the property to be full of cows at a unique square, there is a state s, a locatum u and a location v so that u stands relative to v, and, finally, z depends on s.

(37) amounts to the logical form of the SLA as derived via compositional means, amended by a lexically based dynamic justification process. On top, pragmatic principles guide further specifications. For (37), the following inference is plausible: due to its polymorphic type, z must depend on the D-state s; this enforces an identification of the state's locatum u with the cows and of its location v with the square, see the resulting conceptual structure in (38):

(38) $[\![$Der Platz steht voll mit Kühen$]\!] = \lambda\pi\exists z{:}\kappa\sigma\tau(\text{CONT}, \text{STAND})\exists!x{:}\text{CONT}\exists s{:}\text{STAND}\exists k{:}\text{COW}.$
$\phi_{\kappa\sigma\tau(\text{CONT},\text{STAND})}(z, x, s, \pi) \wedge \text{stand}(s, k, x, \pi) \wedge \text{full-of}(z, x, k, \pi) \wedge \text{cows}(k, \pi) \wedge \text{square}(x, \pi)$

Notably, this specification explains why the internal argument of *voll mit* appears to fill in the subject position of the D-state verb despite its structurally embedded position. Similarly, it follows that the location argument of locative states is identified with the explicit subject of SLAs.

4. Conclusion

There is no consensus as to whether the dynamics of argument alternations should be captured by syntactic or lexico-semantic means. In this paper, we claimed that a dynamic approach to lexical semantics which is sensitive to conceptual knowledge offers a new perspective on relevant phenomena. More precisely, as we argued on the basis of Stative Locative Alternations (= SLAs) in German, argument alternations can be the result of meaning adjustments. Under this approach, SLAs evolve from a type conflict between a positional state verb and an adverbial *voll*-XP which is resolved by adaptive mechanisms; these mechanisms are constrained by lexical information and operate at the interface between semantic and conceptual knowledge. Concretely, a polymorphic type supplied by the *voll*-XP licenses the mapping from the given positional state to a filling state. Thereby, a more complex event structure is composed resulting in a reconfiguration of arguments.

Our analysis rests upon a crucial assumption regarding the architecture of language: lexical information is neither destructible nor radically underspecified; instead, it is part and parcel of the compositional meaning constitution and interacts with conceptual knowledge. Furthermore, this makes it possible to reformulate Hole's (2013) neoconstructional assumption of a structural locative BE in terms of a lexically operative meaning adaptation. The resulting composition is complex; however, we argued that it covers the data better than a complex syntax can.

References

Asher, Nicholas (2011). *Lexical Meaning in Context. A Web of Words*. Cambridge University Press, New York.

Borer, Hagit (2005). *Structuring Sense: An Exo-Skeletal Trilogy*. Oxford University Press, New York.

Davidson, Donald (1967). The logical form of action sentences. Resher, Nicholas (ed.), *The Logic of Decision and Action*, University of Pittsburgh Press, Pittsburgh, 81–95.

Goldberg, Adele (1995). *Constructions: A Construction Grammar Approach to Argument Structure*. University of Chicago Press, Chicago.

Hoekstra, Teun & Ren Mulder (1990). Unergatives as copular verbs. *The Linguistic Review* 7, 1–79.

Hole, Daniel (2008). Dativ, Bindung und Diathese. Habilitationsschrift, HU Berlin.

Hole, Daniel (2013). *Der Himmel hängt voller Geigen* – The German Stative Locative Alternation. Handout; DGfS workshop "Perspectives on Argument Alternations", Potsdam 2013.

Kaufmann, Ingrid (1995). *Konzeptuelle Grundlagen semantischer Dekompositionsstrukturen: Die Kombinatorik lokaler Verben und prädikativer Komplemente*. Niemeyer, Tübingen.

Kim, Jaegwon (1976). Events as property exemplifications. Brand, Myles & Douglas Walton (eds.), *Action Theory. Proceedings of the Winnipeg Conference on Human Action*, Reidel, Dordrecht, 159–177.

Levin, Beth & Malka Rappaport Hovav (2005). *Argument Realization*. Cambridge University Press, Cambridge.

Maienborn, Claudia (1991). Bewegungs- und Positionsverben: Zur Fakultativität des lokalen Arguments. Klein, Eberhard, Françoise Pouradier Duteil & Karl Heinz Wagner (eds.), *Betriebslinguistik und Linguistikbetrieb. Akten des 24. Linguistischen Kolloquiums, Universität Bremen, 4.-6. 9. 1989*, Niemeyer, Tübingen, vol. 2, 95–106.

Maienborn, Claudia (2005). On the limits of the Davidsonian approach: The case of copula sentences. *Theoretical Linguistics* 31, 275–316.

Mulder, Ren & Pim Wehrmann (1989). Locational verbs as unaccusatives. Bennis, Hans & Ans van Kemenade (eds.), *Linguistics in the Netherlands 1989*, Foris, Dordrecht, 111–122.

Ramchand, Gillian (2013). Argument structure and argument structure alternations. den Dikken, Marcel (ed.), *The Cambridge Handbook of Generative Syntax*, Kluwer, Dordrecht, 265–321.

Zifonun, Gisela (n.d.). *Voll Energie stecken* und *voller Geigen hängen* - seltsame Phrasentypen und ungewöhnliche Valenzmuster. Vázquez, María José Domínguez & Ludwig M. Eichinger (eds.), *Valenz im Fokus: Grammatische und lexikographische Studien zu Ehren von Jacqueline Kubczak*, IDS Mannheim, Mannheim, 1–15.

Proceedings of the 32nd West Coast Conference on Formal Linguistics

edited by Ulrike Steindl, Thomas Borer, Huilin Fang, Alfredo García Pardo, Peter Guekguezian, Brian Hsu, Charlie O'Hara, and Iris Chuoying Ouyang

Cascadilla Proceedings Project Somerville, MA 2015

Copyright information

ISBN 978-1-57473-466-9 library binding

Ordering information

Orders for the library binding edition are handled by Cascadilla Press.
To place an order, go to www.lingref.com or contact:

Cascadilla Press, P.O. Box 440355, Somerville, MA 02144, USA
phone: 1-617-776-2370, fax: 1-617-776-2271, sales@cascadilla.com

Web access and citation information

This entire proceedings can also be viewed on the web at www.lingref.com. Each paper has a unique document # which can be added to citations to facilitate access. The document # should not replace the full citation.

This paper can be cited as:

Bücking, Sebastian and Frauke Buscher. 2015. Stative Locative Alternations as Type Coercion. In *Proceedings of the 32nd West Coast Conference on Formal Linguistics*, ed. Ulrike Steindl et al., 92-102. Somerville, MA: Cascadilla Proceedings Project. www.lingref.com, document #3160.