1 Introduction

Focus structures where the elements in the focus domain do not form a syntactic constituent are problematic for ‘traditional’ compositional approaches that assume a syntactic F-marking (see also Krifka, 1992; Büring, 2016). Such constructions are referred to as discontinuous focus or non-constituent focus. Consider (1), where the focus domain is marked by bold face.

   b. What did Pete do with the red book? Pete **gave** the red book to Kate.

It is generally accepted that focusing leads to a division of the sentence, which has a direct effect on the interpretation. Following Chomsky’s (1971) focus/presupposition distinction, Jackendoff (1972) introduced an F-marker in syntax, which gets interpreted at PF and LF. The focus assignment creates the formal objects focus and presupposition (where the focus is replaced by a variable). From here the presupposition set is defined that is a well-defined, coherent set in the discourse, which is under discussion. In English, prosody (i.e., accent placement) reflects F-marking. See, e.g., Selkirk’s (1995) approach, where the basic F-marking rule states that an element that bears the nuclear pitch accent is F-marked, and the additional F-projection rules determine in which ways F-marking is licensed on larger units, i.e., phrases. Based on the F-marking in the syntactic structure, semantic approaches derive the contribution of focusing, let it be introducing alternatives (Rooth, 1992) or structuring the sentence meaning (von Stechow, 1991; Krifka, 2001). The strength of such ‘traditional’ compositional approaches is that the semantics of the constituents is directly calculated at the given nodes, hence an F-marked constituent has a direct access to the corresponding semantic content. However, all F-marking analyses have trouble with ‘non-constituent’/discontinuous focus structures. In the answer in (1a), the subject and the verb form the focus domain, while in (1b), the focus domain contains the verb and the indirect object. None of these form a constituent within the syntactic structure (in terms of ‘traditional’ syntax). This leads to problems both for the proper representation of the focus structure, as well as for calculating the correct set of alternatives.

These problems are addressed by Büring (2016), who offers an analysis of discontinuous focus using ‘Unalternative Semantics’ (UAS; Büring, 2015, 2019). The core idea behind his approach is that focusing does not evoke, but rather restricts the alternatives at each node by determining the unalternatives, i.e., the meanings that are excluded as alternatives. Büring’s system derives the alternatives directly from prosody (the metrical structure of the sentence), without reference to F-marking in syntax. This is a crucial improvement. It eliminates the primary source of the problems with discontinuous focus, like in (1), and shows that syntactic F-marking is in general unnecessary for calculating alternatives. Nevertheless, some aspects of Büring’s UAS raise issues that we believe can be problematic. In this system, there is no representation of the focus structure at all any more. Given that IS (and hence focus structure) is orthogonal to syntax and semantics, and as Van Valin (2005) argues, it plays an important role in the linking between these levels, we consider the elimination of the representation of focus structure from the grammatical model unpreferred. Here, we seek for a grammatical model with a representation of the focus structure, but without syntactic F-marking (and in general without a primary determining role of syntax).
2 Information structure in RRG

In the analysis of non-constituent focus and discontinuous focus we adapt the approach to information structure (IS) in Role and Reference Grammar (RRG; Van Valin & LaPolla, 1997; Van Valin, 2005, 2023). RRG is a surface oriented grammar theory, developed from a strong typological and theoretical perspective. One of the theory’s main aim is to capture both the universal characteristics of natural languages and language specific features. The general architecture of RRG is modular, with various levels of representation called ‘Projections’ and well-defined linking relations between them. The syntactic representation (the layered structure of the clause) captures universal notions in terms of predicate-argument relations, as well as language-specific aspects in terms of special syntactic positions. The heart of the semantic representations is a decompositional representation based on the classification by Vendler (1967) and adapted from the decompositional system of Dowty (1979). The center of the grammatical system of RRG is the bi-directional linking algorithm between the syntactic and the semantic representations capturing both language production and comprehension.

In the architecture of RRG, the linking between syntax and semantics is affected by information structure, which is captured by the ‘Focus Structure Projection’ (Van Valin, 2005). This projection, and the way of looking at IS in RRG, is based on the theory of Lambrecht (1994). The basic building blocks of the projection are the information units (IUs), that are minimal phrasal units in the constituent structure. These IUs are the elements of the two focus domains: the potential focus domain (PFD), where the focus can fall in a sentence, and the actual focus domain (AFD), which corresponds to the focus domain in other approaches.

The architecture of RRG and the representation of IS is considerably different from ‘traditional’ accounts based on syntactic F-marking. The essence is that focus domains are sets of IUs, that are linked to syntactic domains, but they are not determined on the nodes of the constituent structure. When the basic IUs are defined, the combination of them can make up the AFD. This predicts that discontinuous focus structures are not problematic. Despite the advantages that RRG’s approach offers to our target phenomena, it still asks for a further development. The crucial missing aspect in RRG’s approach to IS is a well-defined reference to the interpretational dimension. A proper representation of IS must refer both to focus domains in syntax, and to their semantic content. The syntactic domains are important in the analysis of IS-given word order variations and the structural restrictions on the location of focus in various languages, e.g., in Italian (Bentley, 2008). Reference to the semantic content of the focus domains is essential for the analysis of focus sensitive elements (e.g., only/also/even or negation). The core issue related to a uniform analysis of the possible focus structures, including discontinuous focus, is: at which point in the derivation and how are the IUs determined and how to derive the semantic content of the focus domains.

3 Proposal

3.1 Tree-wrapping grammar: formalization of RRG

Addressing the core issues above, we propose necessary extensions to the Focus Structure Projection within the formalized version of RRG (Kallmeyer et al., 2013; Kallmeyer & Osswald, 2017, 2023). This formalism is based on the theoretical grounds of RRG, while it provides an exact, formal specification of the grammar in terms of Tree-Wrapping Grammar (TWG; Kallmeyer et al., 2013; Kallmeyer, 2016), based on LTAG (Joshi & Schabes, 1997). The current development of the formalism provides a specification of the syntax-semantics interface, where semantic representations are decompositional frames (Barsalou, 1992; Löbner, 2014), formally defined as base-labelled feature structures (Kallmeyer & Osswald, 2013). The formalism still lacks a modeling of IS, which asks for an extension. The tree templates of RRG are defined as the elementary trees of the TWG, and they are combined by the
rewriting operations of (wrapping) substitution and sister adjunction.

(2) (Wrapping) substitution: Sister adjunction:

One of the important characteristics of formalized RRG representations is that the nodes in the tree representation are illustrated with feature structures, including interface features (I) which establish a link between the syntax and the semantic representation, capturing essential aspects of the syntax-semantics interface. An important advantage of the formalization of RRG is that syntactic and semantic composition are carried out on a par. A detailed discussion of the formalized theory goes beyond the scope of this paper, so we merely provide a basic introduction to the syntactic and semantic composition here. The elementary constructions are pairs of syntactic templates (i.e., elementary trees) and semantic representations, pieces of semantic information. The semantic composition is on a par with the syntactic composition, mediated by the interface feature (I) on the nodes. The syntactic operations trigger the unification of the semantic representations, thereby deriving the semantic representation of the sentence.

(3) Derivation of Pete burned the red book in London:

3.2 Information structure in formalized RRG

The basic outline of the proposal is the following. The focus domains are taken as sets of information units, which essentially represent the focus structure of the given sentence. The PFD is given as a language specific feature, while the AFD is determined by the focus marking strategies and the local discourse context together. Given the set of IUs and the AFD, we can straightforwardly calculate the non-focus domain (NFD), as well. The semantic content of the focus domains are derived by the unification of the semantic content of their elements, i.e., the IUs within the set.

We take IUs as sub-constructions: pairs of nodes and their corresponding semantic content. Following Van Valin (2005), the syntactic domains within the IUs are the respective sub-trees of
the derived tree corresponding to the NUCLEUS, the core arguments and the core peripheries (PPs, adverbials). These sub-trees can explicitly be referred to within the derived tree, pointing to the respective nodes. However, determining the corresponding semantic contributions in the semantic representation is not straightforward. While the interface features of the argument NPs point to designated nodes in the frame, we have no such direct link to the semantic contribution of the IUs corresponding to the NUCLEUS, the argument PP and the periphery PP. For example, while the interface feature of the NUC node points to node e in the frame, the IU corresponding to the NUC only contains the information on the type of the event, and the semantic arguments without being further specified. They are indicated by their semantic macrorole information.

Despite the clear intuitions what semantic contents are contributed by the given sub-trees, i.e., the syntactic domains of the IUs, the issue that arises is: how to derive the semantic content of the IUs. This contributes to the general question of how the IUs are determined in the analysis. The basic IUs are structurally determined. As such, they are determined during the derivation of the sentence. We propose that basic IUs are defined by the derivation tree. We adapt here the derivation tree from the (L)TAG formalisms, where next to the ‘derived tree’, a ‘derivation tree’ is also given, which uniquely describes the given derivation. The derivation tree contains nodes for all elementary constructions, edges for all syntactic compositions, and edge labels indicating the target nodes of these operations. The derivation tree describes all syntactic compositions, that trigger the unification of the values of the interface features. This determines how the semantic composition is carried out.

(4) Derivation tree for the derivation in (3):

\[ \text{Derivation tree for the derivation in (3):} \]

\[
\begin{aligned}
&\text{spine} \\
&\text{pete} \\
&\text{burned} \\
&\text{book} \\
&\text{the} \\
&\text{red} \\
&\text{london}
\end{aligned}
\]

We propose that the IUs correspond to the non-operator daughters of the root node of the derivation tree, and everything below these nodes respectively. The IUs defined on the derivation tree are directly matched to syntactic domains in the derived tree, and to their respective semantic content. Determined on the derivation tree, the IUs are taken as pairs of a node (pointing to a syntactic domain in the derived tree) and their corresponding semantic content represented by a frame (5).

(5) Peter burned the red book.

\[
\{ (\text{NP}_{111}, \{ \text{person}, \text{Name, pete} \}), (\text{NUC}_{112}, \{ \text{burning}, \text{ACT}, \text{UNDG} \}), (\text{NP}_{113}, \{ \text{book}, \text{COLOR, red} \}) \}
\]

The focus domains are taken as subsets of the set of IUs, which essentially represent the focus structure of the sentence. Given the set of IUs and the AFD, we can straightforwardly calculate the non-focus domain (NFD). The sets of AFD and NFD are determined by the relation to the underlying QUD and the language specific focus marking strategies (prosody in English) together. The semantic content of these focus domains are derived by the composition (i.e., unification) of the semantic content of their elements, driven by the derivation tree. In the answer of (1a), the information content of the ‘non-constituent’ AFD is derived as follows (6), representing that the focus provides the type of the event under discussion and its actor argument.

(6) \[ \text{AFD} = \{ (\text{NP}_{111}, \text{frame}_1), (\text{NUC}_{112}, \text{frame}_e) \} \Rightarrow \begin{bmatrix} \text{burning} \\
\text{ACTOR}
\end{bmatrix} \]

\[
\begin{aligned}
&\text{pete} \\
&\text{NAME}
\end{aligned}
\]
In the same way, the information content of the discontinuous focus domain in (1b) is derived as in (7), providing the type of the event and the specification of its non-macrorole argument.

\[
(7) \quad \text{AFD} = \{ \langle \text{NUC}_{112}, \text{frame}_c \rangle, \langle \text{NP}_{113}, \text{frame}_c \rangle \} \Rightarrow \begin{array}{|c|}
\hline
\text{transfer} \\
\hline
\text{ACTOR} \quad \square \\
\hline
\text{UNDG} \quad \square \\
\hline
\text{NMR} \quad \# \\
\hline
\text{person, NAME, kate} \\
\hline
\end{array}
\]

4 Summary

The above proposal captures the basic intuitions and core insights of representing the focus structure (as part of the information structure) of a given sentence. The projection represents the set of information units determined during the derivation, and the focus domains: AFD and NFD, that are considered disjoint sets of IUs. The semantic content of these domains are calculated by the unification of the IUs within the given focus domain, which correspond to the focus-background division in other accounts (e.g., Krifka, 1992, 2001). The semantic combination of the content of the IUs is driven by the derivation tree.

The proposed grammar architecture and our representation of the focus structure via IUs is considerably different from ‘traditional’ accounts based on syntactic F-marking. In our approach, IUs play a crucial role in determining the focus domains, that are taken as sets of IUs. Crucially, the IUs are linked to syntactic domains, but the focus domains are not determined on the nodes of the constituent structure. Therefore, when the (basic) IUs are determined, any combination of them can make up the actual focus domain, and therefore discontinuous focus structures can be captured similarly to other focus constructions.

References


