A Unification-based Grammar of Serial Verb Constructions

Adams B. Bodomo
University of Trondheim

0. Introduction

In many languages of West Africa and also in the African-Carribean Creoles there exists a unique and productive grammatical phenomenon involving an intricate interplay of a series of verbs and their arguments within the borders of what seems to be a monoclausal construction. Various names have been used to designate this phenomenon. Among them are serial verbs, verb serialisation, consecutive verbs, sequential verbs and serial verb constructions We, here, adopt the term serial verb constructions (hereafter, SVCs).

SVCs present a number of problems with regard to information categorisation and are therefore the subject of intense debate in current grammatical theories. The major issues are summarised in section 1.2. In section 1.3, I give a brief presentation of representative approaches currently being suggested within the various grammatical theories and formalisms.

My hypothesis in this paper lies within a computational linguistic framework where I regard SVCs as complex predicates derived from the conceptual or argument structure of two or more verbs, first by the formal process of unification and then by PS rules of the language in question. I take it that unification operates at all levels of the grammar, including the lexicon, the morphosyntactic level and the *gestalt* level (to be defined in section 2.4). In section 2.0, we briefly introduce unification, a concept popularly employed within computer science and linguistics as an information combining operation on feature structures. In subsequent sections we then begin to demonstrate the unification formalism with SVCs as they occur in Dagaare and other Voltaic languages at the various grammatical levels.

1.0 Serial Verb Constructions

1.1. Data: The structure of Voltaic SVCs

The following data (1 – 6) illustrate the structure of SVCs as they occur in some major Voltaic languages (Dagaare, Kusaal, Dagbane). Data from some Kwa languages (Akan, Ewe, Yoruba) are also added for comparative purposes.

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(1) **Dagaare** (a Voltaic language in Ghana, Burkina Faso and Côte d'Ivoire):

(i) *Bayuo daaɛ Ayuo lɔɔ*
push+p.c Ayuo fall
Bayuo pushed Ayuo down

(ii) *Bayɔɔ ŋmɛ la Ayɔɔ kʊ*
beat p.c kill
Bayor beat Ayor to death

(iii) *Bayɔɔ na dʊgɛɛ nɛn kʊɔr*
FUT boil+p.c meat sell
Bayor will boil meat and sell it

(iv) *Bayɔɔ na dʊgɛɛ nɛn a kʊɔr* (non svc)
FUT boil+p.c meat and sell
Bayor will boil meat and then sell it

(v) * *Bayɔɔ na dʊgɛɛ nɛn na kʊɔr*
FUT boil+p.c meat FUT sell
Bayor will boil meat and sell it

(2) **Kusaal** (a Voltaic language in Ghana, Burkina Faso and Togo):

(i) *O bʊɔɪ nɛ kɔ̀ɔ̀m nu*
S/he pour+PAST p.c water drink+PAST
S/he poured water and drank it

(ii) **O bʊɔɪ nɛ kɔ̀ɔ̀m o nu*
S/he pour+PAST p.c water s/he drink+PAST
S/he poured water and drank it

(iii) **O bʊɔɪ nɛ kɔ̀ɔ̀m nu o*
S/he pour+PAST p.c water drink+PAST it
S/he poured water and drank it

(3) **Dagbane** (a Voltaic language in Ghana and Togo):

(i) *O zaŋ la kpargʊ yɪ*
s/he took p.c shirt wore
S/he took a shirt and wore it

(ii) * *O zaŋ la kpargʊ yɪ la*
s/he took p.c shirt wore p.c
S/he took a shirt and wore it

(iii) *Dzemi kpaa la kpam naŋ mwali nɪ*
poured p.c oil put river inside
Dzemi poured oil into the river

(iv) **Dzemi kpaa la kpam naŋ kpam mwali nɪ*
poured p.c oil put oil river inside
Dzemi poured oil into the river

(4) **Akan** (a Kwa language in Ghana):

(i) *Kofi tɔɔ nsuo nʊmʊɪ*
buy water drink
Kofi bought water and drank it

(ii) *Kofi tɔɔ nsuo nvmvi nv
buy water drink it
Kofi bought water and drank it

(5) **Ewe** (a Kwa language in Ghana and Togo and Benin):

(i) Kɔmi fo Ami dze anyi
beat fall ground
Kɔmi knocked Ami down

(ii) Kofi fo Ama wui
beat kill+pron
Kofi beat Ama to death

(iii) ?Kɔmi fo Ama wu
beat kill
Kofi beat Ama to death

(iv) * Kofi fo Ama wu Ama
beat kill+pron
Kofi beat Ama to death

(6) **Yoruba** (a Kwa language in Togo, Benin and Nigeria):

(i) Olu gbe aso wo
took dress wear
Olu put on some clothes

These characteristics are captured by the following well-formedness conditions in (7) below:

(7)
i. All the verbs in an SVC must share a single structural subject.
ii. In an SVC there is only a single tense node
iii. SVCs have a single polarity clitic. (p.c)
iv. There is an absence of connectors or complementizers within the string of verbs.
v. Dydadic verbs must share internal arguments.

The well-formedness condition in (7i) will account for the ungrammaticality of (2ii) since there is an undesirable copy of the subject pronoun 's/he'. Similarly, the extra occurences of the future tense marker and the polarity clitic in (1v) and (3ii) respectively violate conditions (7ii) and (7iii), thereby rendering them ungrammatical. The data in (1iv) illustrate (7iv) which is actually a semantic well-formedness condition because, eventhough the construction is syntactically correct, it does not have the normal semantic reading of SVCs where the actions are intuitively more tightly related. Condition (7v) is very important in SVC constructions in Voltaic. It accounts for the fact that V2s and subsequent verbs in the SVC don't need internal arguments whether in the pronominal forms (2iii) or as copies (3iv). Notice, however, that there seems to be a difference between Voltaic and Kwa serialisation with respect to the extra occurrence of internal arguments in their pronominal forms. This difference explains why (5ii) is grammatical and (2iii) is not.

1.2 The issues

The above characteristics of SVCs pose a number of problems for the theory of grammar and the major issues being discussed include the following:

1. What are the syntactic and semantic processes involved in these complex predicates that are SVCs and at what level of the grammar do they occur?
2. How can syntactic and semantic information be categorised in these constructions?
3. Do these constructions express a single event or a series of events and, if so, is verb order in these constructions crucial to the understanding of these phenomena?
4. And why do certain languages serialise at all while others don't? In other words, can we establish a serialisation parameter?

Issue no.1 might, for instance, involve outlining the syntactic processes that are able to bring so many verbs together in one clause: but for memory failure, an unlimited number of verbs can occur in one clause. Would these be cases of complementation, coordination, adjunction or some other processes? And if so at what level of the grammar are these likely to occur: the lexicon, the d_structure, the s_structure ?

Issue no.2 is related to no.1 but, in addition, it might involve accounting for how the information for each verb and its arguments are distributed in the whole complex. What, for example, is it that enables a verb to share some of its arguments with others? This is what we are directly concerned with here and although the other issues are interesting in their own right it might not be possible to suggest solutions for them in this paper. In the next section we show how some earlier analysis have attempted to solve the problems.

1.3 Possible solutions

As a reaction to the above problems many solutions have been proposed within various grammatical theories and formalisms. There are no tight compartments between these approaches but it is possible to group them into what I will call the lexical-conceptual, the syntactico-semantic and the cognitive approaches.

1.3.1 The lexical - conceptual approach

This approach to the analysis of SVCs is currently pursued by researchers such as Déchaine (1987, 1988) and Lefebvre (1986, 1987, 1991), the main idea being that SVCs 'are derived complex predicates which are formed prior to D-structure by means of operations on the lexical conceptual structure (LCS) of verbs.'

The representative analysis from this group is Lefebvre (1991). With data from causative SVCs (what she terms 'take' serial verb constructions) in the Fon language, Lefebvre claims that the process of serialisation originates from the lexicon. The resulting complex predicate is then projected onto the syntax as a bi-headed VP. The example sentence she uses is shown below:

(8)

Kɔ̀kú	sɔ́	àsɔ̃́	yì̀wá	àxì
Koku	take	crab	go/come	market

Koku brought (direction away/ towards speaker) the crab to the market.

The LCS of (8) will then be represented as follows in (9):

(9)

a. sɔ́: [x cause [y undergo change of location]]

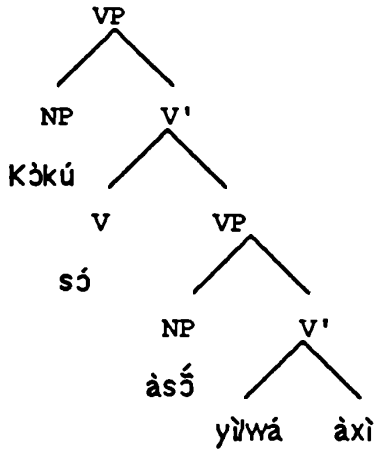
b. yì̀wá: [y undergo change of location away from/towards speaker to location z]

c. sɔ́-yì̀wá: [x cause [y undergo change of location away from/towards speaker to location z]]

The verbs sɔ́ and yì̀wá will receive the LCS as shown in (9a) and (9b) respectively. To Lefebvre, a certain process (which she fails to mention) 'conflates' the LCS to form the complex

lexical predicate in (9c). This complex predicate then projects into the syntax as a bi-headed VP in an essentially complementation configuration (as shown in (10))

(10)



by the following X-bar theory (11)

(11)

a. XP → SpecX' X'

b. X' → X YP

As Larson (1991) points out, such a theory allows heads to have at most a single complement from a maximal projection, forcing a binary branching structure in which the two heads of the complex predicate are inserted into two available V positions.

1.3.2 The syntactico-semantic approach

While the foregoing group of researchers consider SVCs to be a product of the lexicon, others such such as Baker (1989, 1991) Ayewole (1988) and Hale (1991) consider it to be a post-lexical phenomenon, taking place at the level of syntax (and possibly, other post-lexical levels). Baker (1989) is the representative analysis for this group.

The structural characteristics of the SVC that we saw earlier in (7) (section 1.2) threaten the entirety of the theta-theory, especially the Projection Principle (PP) and the theta criterion. Naturally, therefore, most analyses within the GB framework are concerned with analysing SVCs in the light of the problems posed by the threat to theta theory. One recent analysis in this direction is Baker (1989). Most of the SVCs we have seen so far seem to violate the Projection Principle as stated by Chomsky (1981) as in (13) below:

(12) *Kofi naki Amba kiri* (taken from Baker (ibid)).

hit kill

Kofi struck Amba dead

(13) The projection principle

Suppose α is a lexical category and β is a position of argument type.

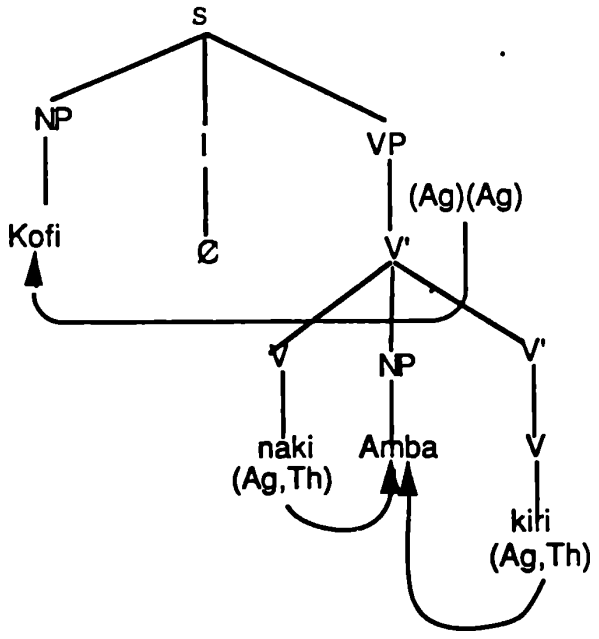
a. If β is an immediate constituent of a one-bar level projection of α at some syntactic level, then α θ-marks β in α'

b. If α θ-marks β as a lexical property, then α θ-marks β at all syntactic levels

All the V2s e.g *lɔɔ, yi, numʊi, kiri, wo* in the above examples are transitive verbs but there is no argument following them in the surface structure. The object seems to be 'deleted' at this level by identity with the object of V1, from the point of view of old-fashioned transformational grammar. This means then that the complementation properties of such verbs are not represented at all the levels of the syntax of SVCs, thereby violating the PP as stated above.

To solve this problem, Baker proposes that double-headed VPs be allowed in serialising languages, thereby making it possible for both verbs to 'share' the single object NPs in each of the constructions. Figure (14) below (also taken from Baker (ibid)) illustrates the principles for this approach with the Sranan sentence in (12). According to him, to get a double-headed VP one of the verbs must project immediately to the V' level. The VP and higher V' would then be projections of both verbs, 'naki' and 'kiri'. The arrows indicate theta-role assignments. According to the standard conditions on theta-role assignment (stated in Chomsky (1986)) 'naki' directly theta-marks 'Amba' while 'kiri' indirectly or predicationally theta-marks 'Amba'. Quoting Williams (1984), Baker again claims that the two verbs can theta-mark 'Kofi' by the fact that the external (agent) theta-roles of the verbs percolate to their maximal projections, which is the VP, thereby being assigned to the subject. In this way, according to Baker, the lexical theta-role-assigning properties of both verbs are satisfied in this structure, and the PP would then be obeyed.

(14)



The conclusions behind such an approach are that X' theory is extended in such a way that serialising languages allow V's to embed within V' to form a double-headed construction. Finally, he outlines the kind of consequences that these conclusions may have on what kind of verbs may combine in an SVC, their linear order and the structural positions of their argument NPs as follows in (15):

(15)
a. Each verb may or may not θ-mark the subject of the whole serial VP.
b. For each other argument α in the SVC:
   i. α must be θ-marked by all the verbs that follow it.
   ii. α must be θ-marked by the verb that immediately precedes it.
   iii. α is not θ-marked by any verb that precedes it other than as in (ii).
c. For each verb in the SVC, the arguments of that verb must appear in the following hierarchical order: Agent>Instrument>Patient/Theme>Goal/Location.

Baker's proposals certainly constitute an important contribution to the discussion on SVCs as long as we limit ourselves to the kind of V NP V structures that he mainly employs as the motivation for his analysis. A closer look at longer strings would reveal a number of objections to some of Baker's conclusions. As an illustration, consider (16) visa vis (15bi) repeated below:

(15bi). α must be θ-marked by all the verbs that follow it.

(16) *Zo gaa wuo haani wa ku ma*
run go collect blackberries come give me
"Go and collect some blackberries for me"

While the verb 'give' would θ-mark blackberries it cannot be said that 'come' does the same with blackberries, thereby violating (bi). In other words (16) is a counter example to Baker's characterisation of SVCs. Further still, this whole idea of abstracting double-headedness in serialising languages might introduce more problems than solutions, for it is difficult to see how three, four or five verbs may have their argument structure crunched together without getting in to conflict with some GB- theoretic issues like the θ-criterion and certain principles of word order. For example, as Awoyale (1988: p.6) points out, it might not be possible on (GB?) theoretical grounds for one verb to form part of the argument structure of another verb. As another example to one of the above reservations, the theta criterion, at least, in its classical sense would not be obeyed in Baker's proposed analysis, since in effect each of the two NPs in the configuration receives two theta roles.

However, some of these objections would only seem to reflect GB internal problems created by Baker's 'double-headed VP' approach. The contribution offers us a lot of good premises to build upon.

1.3.3 The cognitive approach

While the approaches discussed above usually concern themselves with mainly grammatical issues, the cognitive approaches would concern themselves with the *relationships* that exist between grammatical categorisation and mental categorisation i.e the 'grammatical packaging' vis-a-vis the 'cognitive packaging'. They are therefore mostly interested in issues like the clausehood and eventhood of SVCs. An example of such approaches is Givón (1991).

This study is most interested in the sense in which the series of verbs in an SVC jointly form a single event. While grammatical approaches would use structural diagnoses like the distribution of inflection and agreement, Givón employs a different method involving an elicitation of serial and non-serial constructions in discourse to see the way in which native speakers of serial and non-serial languages structure their information. The underlying principle for this investigation is the Distance Principle, an iconicity principle which relates grammatical organisation to conceptual organisation. This is stated below in (17):

(17) The temporal-physical distance between chunks of linguistically-coded information correlates directly with the conceptual distance between them.

One interpretation of this principle is that pause separations dividing finite clauses (single event domains) in non-serial languages should be comparable to those separating verb sequences in serialising languages if SVCs really define a single event.

Givón's methodolgy involved presenting speakers of serialising and non-serialising languages with a short movie which they were asked to describe orally later. Pause measurements were taken and the probabilities that were computed showed that there were no significant differences between pauses separating finite clauses in non-serialising languages and those separating SVCs in serialising languages.

2.0 Unification grammar

In this section of the study we propose our own solutions to some of the problems posed by attempts to represent the structure of SVCs. We do this from a grammar formalism that has been variously referred to as *unification grammar, unification-based grammars, informational grammars* or *information-based grammars*. A representation of grammar from this viewpoint is in consonance with the structure of SVCs outlined in (7) as highly information-sharing, the argument being that this is possible because of a unification operation which can occur at any level of the grammar.

Before embarking on the formal representation of SVCs from this information processing perspective at our three proposed levels, we present a brief characterisation of unification grammar in section 2.1. For the purpose of achieving a concise analysis we do not envisage giving a full expository account of unification and unification grammar. An adequate number of introductory references exist in the literature for the purpose e.g Shieber (1985), Carlson and Linden (1987) and Uszkoreit (1990).

2.1 The Concept

The general idea behind unification is that it is a computational (i.e. a formal) operation that merges the information of two or more feature structures if this information is consistent. In other words, it is an operation which enables two feature structures to share the same consistent information. Uszkoreit (1990) gives a much more formal definition of the concept of unification as follows in (18) and (19):

(18) A type t_0 is the unification of two types t_1 and t_2, iff t_0 is the least informative type that is subsumed by both t_1 and t_2.

or

(19) A type t_0 is the unification of two types t_1 and t_2, iff t_0 is subsumed by both t_1 and t_2 and t_0 subsumes all other types t_i that are also subsumed by t_1 and t_2.

Below in (20) is an example of unification (from Shieber (ibid)) as an operation which combines the information from two feature structures to obtain a feature structure that includes all the information of both.

(20) [cat: np]
unifies with [agreement:[number:singular]]

$$= \begin{bmatrix} \text{cat: np} \\ \text{agreement: } \begin{bmatrix} \text{number:singular} \end{bmatrix} \end{bmatrix}$$

In (21) we have an example of an attempt at unification which fails because of inconsistent information in both feature structures:

(21) [agr[per:3]] unifies [agr[per:2]] = failure

Unification is often said to be *commutative, associative* and *indempotent.*

Any grammar formalism a part of which contains unification as described above would then be termed a unification grammar or a unification-based grammar formalism. Such a formalism does not necessarily have to conform to any particular grammar theory; it could also be built just as a tool for formulating and testing theories of natural language. In this sense we would say there are basically two groups of unification-based grammar formalisms. Lexical Functional Grammar (LFG) and Generalised Phrase Structure Grammar (GPSG) are those recognised in the literature to be based on grammatical theories while the second consists of Functional Unification Grammar (FUG) and PATR which were developed as tools for evaluating grammatical theories.

What is, however, more important is that these formalisms, irrespective of whether they were developed as tools or as grammatical theories in their own right, are built on the same principles. All the current formalisms are characterised by a combination of a unification framework for processing grammatical information within complex feature structures and a context free phrase structure part.

2.2 The lexicon: LCS unification

In Lefebvre's diagrammatical representation (figure repeated below) of how complex predicates are formed in the lexicon she fails to mention the process which she says 'conflates' the predicates of the various verbs. Developing that idea further, we claim that that process is indeed a unification operation: the LCSs of the various verbs can be represented as feature structures and merged together as long as the information in both structure do not conflict. We illustrate this with the following Dagaare sentence (22) which has an almost equivalent translation as Lefebvre's example sentence (8) from Fon.

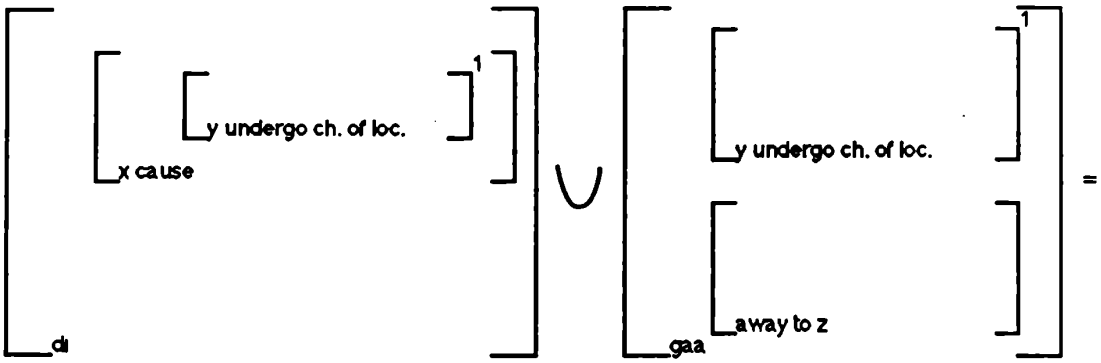
(22) *Badɛr dɪ la kyɪ gaa daa*
take p.c millet go market
Bader took some millet to the market

The verbs 'take', 'go' and their compound will have an identical LCS as in (9), repeated below:

(9)
a. *sɔ́:* [x cause [y undergo change of location]]
b. *yɪ̀ɲwá:* [y undergo change of location
away from/towards speaker to location z]
c. *sɔ́-yɪ̀ɲwá:* [x cause [y undergo change of location
away from/towards speaker to location z]]

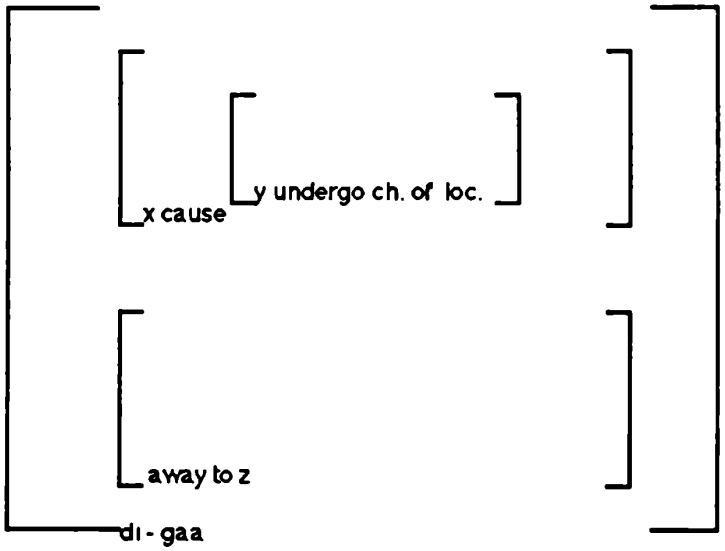
The reanalysis of this representation in a unification formalism is shown below in (23). The LCSs such as (9) are seen in terms of feature structures containing bundles of conceptual information. The conceptual feature structure of 'take' is then merged with the conceptual feature structure of 'go' through a process of unification marked by the 'U' in (23a).

(23a)



The resulting complex LCS is represented in (23b) as a feature structure which is more complex that the previous two. As will be noticed parts of the structure with similar information are marked with similar numbers (here 1). It is these parts which are merged together because they contain *consistent* information. This is the sense in which we say unification can take place also inside the lexicon.

(23b)



In the next section, we see how the unification operation would combine consistent syntactic information about arguments of two predicates together to form complex syntactic feature structures. We will also see that the result of this conceptual unification shows up in the syntax, first, as discontinuous predicates in the c-structure, and then as predchains in the f_structure.

2.3 The syntactic level: LFG unification

In section 1.3.2, we saw that Baker's analysis of SVCs is essentially at the syntactic level where he regards the two verbs in the series as sharing the internal argument. We take a much more radical approach and claim that not just only the internal argument but other units like the external

argument, tense and polarity clitics are also shared. This we claim is possible through the unification operation being discussed.

We adopt essentially Baker's approach whereby V's can be embeded within V's to form double-headed constructions. By this extension, we are able to account for the recursive nature of VPs in SVCs. (24) can be regarded as part of the PS rules of an SVO serialising language like Dagaare:

(24) S → NP, AUX, VP.
VP → V'.
V' → V, NP, V'.
V' → V.
V' → V, NP.
V' → V, PP.
NP → DET, N.
AUX → TENSE.

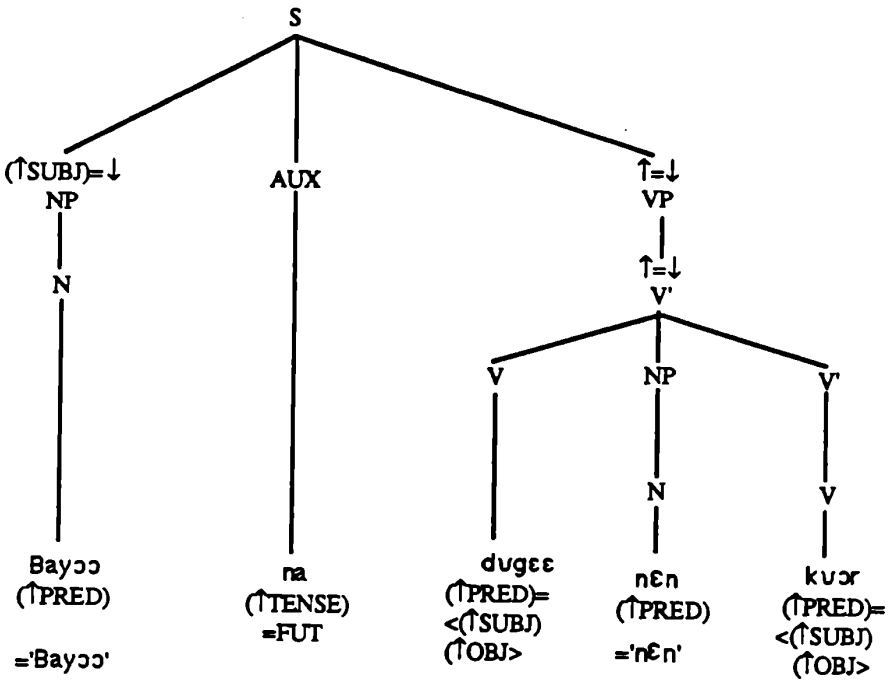
These rules can then generate the data (1iii), repeated below as (25):

(25) *Bayɔɔ na dugɛɛ nɛn kuɔr*
FUT boil+p.c meat sell
Bayor will boil meat and sell

This structure can be represented in LFG style c-structure and f-structure as shown in the diagrams below in (26a) and (26b) respectively. To indicate how unification operates within the c-structure, we use the metavariable notation of LFG in which up and down arrows are used on the NP and VP nodes, which are regarded as feature structures, to show the direction in which grammatical information flows from one feature structure to another. In the diagram below, then, the up and down arrows on the NP and VP nodes are read respectively as "ups subject is down" and "up is down". The "up" refers to the feature structure of the mother node, which in this case is S and the "down" refers to the feature structure of the node itself. So this would mean that, with respect to (↑SUBJ)=↓ all the functional information carried by the NP in (26) goes into the subject part of the mother's (i.e S's) feature structure while with respect to ↑=↓ all the functional information carried by the VP (i.e the VP's feature structure) is also direct information about the mother's feature structure. This is exactly the notion of unification we have been alluding to so far: the information of the NP is *unified* with that of S and the information of the VP is also *unified* with that of S. The = in each of these representations expresses this idea of unification much clearer: the information of the 'daughter' node indicated by ↓ is identified or unified with the information of the 'mother' node, indicated by ↑. The end result is that both mother and daughter *share* the same information. Put in a simpler way, NP is the subject of S and VP the functional head of S.

From the above explanation we may then say that the two verbs *dugɛ* and *kuɔr* share the same information, not just only about the internal argument *nɛn* but also about the future tense *na* and the polarity clitic -*e*[1]

(26a)



(26b)

SUBJ	[PRED 'Bayɔɔ']		
OBJ	[PRED 'nɛn']		
AUX	TENSE	FUT	[PRED 'na']
PREDCHAIN	PRED1	'dugɛɛ <(↑SUBJ)(↑OBJ)>'	
REST	PREDCHAIN	PRED2	'kʊɔr <(↑SUBJ)(↑OBJ)>'

As was hinted at the end of section 2.3, the predchain seen in (26b) is the result of the conceptual unification described in that section. Now, the unification at this syntactico-semantic level of the grammar involves the arguments of this complex predicate. In the next section we will see that the conceptual unification again creates a complex predicate or a 'sharing gestalt' whose 'points' are then unified due to the unification operating at that level too.

2.4 The gestalt level: Gestalt unification

The field of linguistic semantics is in a continuous and rapid state of development. Quite apart from more established theories like Montague's (logical) model theoretic semantics, Longacker's theory of cognitive grammar, Lakoff's cognitive semantics and Jackendoff's conceptual semantics, among many others, newer models are coming up quite often.

One of such theories is the Gestalt theory currently being developed at the University of Trondheim, Norway (cf Hellan and Dimitrova-Vulchanova (1991, forthcoming)). One of the main aims of the theory is to pay much closer attention to the relationship between syntactic and conceptual levels than other theories do. By the term gestalt of a sentence is meant among a couple of usages, as the idealised model of reality that any 'piece' of reality has to match in the relevant respects in order to be realised as the interpretation of that sentence. From this we realise that there is no one-to-one relationship between gestalts and the situations-in-the-world they model: there may be several ways of modeling a reality as shown below in (27):

(27)

1. He knocked John on the head
2. He knocked the head of John

The sentences 1 and 2 may be said to be two gestalts representing what is probably one situation-in-the-world. Different languages have different ways of modeling these gestalts and it is one of the aims of the theory to show how this is done and also the number of gestalts in languages of the world (gestalt language universals?) One of such attempts at extracting language universals is the establishing of the completedness parameter, which is one of the cardinal notions of the theory (Dimitrova-Vulchanova and Hellan (ibid)). According to this parameter, languages of the world model gestalts, which are essentially conceptual notions, on the basis of this parameter and they have mechanisms for adjusting constructions nearer or away from this parameter in both dimensions. As a result, we can have completed and uncompleted gestalts or better still more or less complete gestalts.

Like the Jackendofian model, this model also has three modules: the conceptual module/level, the gestalt module/level and the morphosyntactic module/level. However, in this work we will be concerned with just one level - the gestalt level, where we hope to show how the unification model we have been developing may be used to represent structures at this level.

At this level the basic unit is the gestalt, whose superordinate form is the super gestalt. A super gestalt divides into a root gestalt (RG) and a dependent gestalt (DP). The topology of the RG is made up of relations and points, the points ,in turn, dividing into centre point and limitation point. But we also have a predicate. The sentences 1 - 4 below in (28) illustrate this basic topology:

(28)

1. He walked :	Centrepoint - relation
2. He is a teacher :	Centrepoint - relation - predicate
3. He painted the house :	Centrepoint - relation - limitation point
4. He painted the house red:	Ctre.pt. - relation - limitn.pt. - pred.

There are many types of gestalts at this level but we will be most interested in a special type called *sharing gestalts*. These are instances of non-iconic gestalts in which different relations would share points. Here the world's languages divide into two main types of gestalts: dependent gestalts and serial gestalts and the claim, to be elaborated in subsequent work (Bodomo (forthcoming)), is that in the expression of sharing gestalts in causative constructions of the format (29):

(29) S → NP + VP [NP XP]

the XP of non-serialising languages like Norwegian, English and French is essentially -V while that of serialising languages like Dagaare, Ewe and Yoruba is essentially +V (serialisation parameter for gestalt formation). The two cases are exemplified by the following Norwegian and Dagaare sentences (30).

(30a)

i. *Sigurd slo Sigrid ned*
hit+PAST down
Sigurd knocked Sigrid down

ii. *Gøran sparket ballen flat*
kick+PAST ball+DEF flat
Gøran kicked the ball flat

iii. *Ingebjørg spiste kjøleskapet tomt*
eat+PAST fridge+DEF empty
Ingebjørg ate up (the contents of) the refrigerator

(30b)

i. Bayuo ŋmɛ la Ayuo lɔɔ
beat p.c down
Bayuo knocked Ayuo down

ii. Dɔɔdaa ŋmɛ la a bɔɔl pur
beat p.c DEF ball explode
Dordaa kicked the ball flat

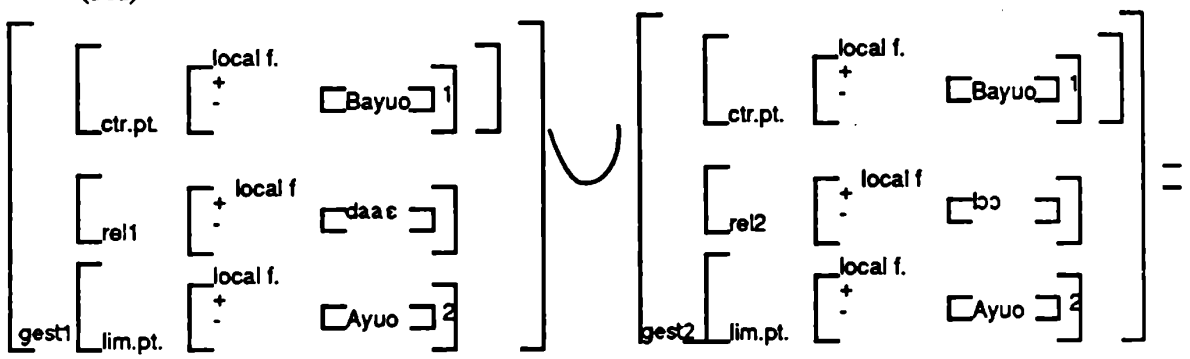
iii. Boŋlakyɛr dI la a frigyI baar
eat p.c DEF fridge finish
Bonlacher ate up (the contents of) the refrigerator

Having said this, we proceed to analyse how an SVC can be represented within the framework of what we call a gestalt unification grammar (GUG). The representative sentence here is (1i) repeated below:

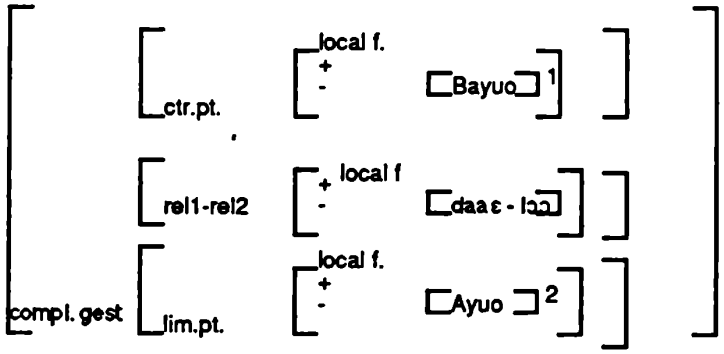
(1i) Bayuo daaɛ Ayuo lɔɔ
push+p.c Ayuo fall
Bayuo pushed Ayuo down

The verb 'push' together with its arguments expresses gest1 while 'fall' with its arguments expresses gest2. In what way then or by what mechanism do we say that the two gestalts 'share' points? Again, as was done in previous sections, we reinterpret the gestalt topology as a feature structure of the attribute value type. This situation is depicted in (31a) where structures which contain similar information about points are marked with thesame number (here 1 and 2). A unification operation, symbolised by 'U' runs over these structures, merging their information together.

(31a)



(31b)



The result of this information is (31b) above. Briefly, we say that the various local features (attributes of the component parts of the gestalt), especially those of the relations, would then combine together to specify the global features (attributes of the whole complex). As a result of the merging together of the points through the unification operation at this level, we say that the various gestalts (which have now become a complex gestalt) share points. This is how we may arrive at a complex or a 'sharing gestalt' within a unification grammar framework.

3.0 Conclusion

In conclusion, the main concerns of this paper have been to offer an alternative approach to the representation of SVCs from a computational linguistic perspective. After a brief discussion of the characteristics of SVCs within major Voltaic languages of West Africa we gave a brief exposition of some earlier treatments of SVCs. The rest of the paper then consisted of an account of SVCs using a unification grammar framework.

The unification operation, as has been shown, is a powerful tool which can be used to analyse linguistic data independent of theory. In this paper it has been shown to bring together analyses from diverse theories, including lexicalist, syntactico-semanticist and conceptualist ones. From this perspective we claim the unification grammar approach to be a clean, unifying way of representing SVCs.

The paper, which is mainly a demonstration of how information is processed between verbs and their arguments within an SVC, has, however, not accounted for many other issues concerning SVCs such as eventhood, clausehood, verb order and parametrisation and should constitute topics for future research.

Note

1 In this and many of the feature structures in this paper it has been necessary to do some representational underspecifications in order archieve simpler feature structures and thereby archieve useful generalisations. Here, it would have been necessary, for instance, to account for how the polarity clitic -ɛ, like the future tense particle, is also shared by the two verbs in the construction.

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Adam B. Bodomo
Moholt Alle 34-12
7035 Trondheim
E-mail: adams.bodomo@avh.unit.no