Complex predicates: The case of serial verbs in Dagaare and Akan

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1. Introduction

Serial verb constructions (SVCs) represent an interesting case of mismatch between syntax and semantics. These are constructions in which two or more different verbs share identical arguments within a single clause. They typically lexicalize actions that are regarded to be within a single event, comprising any number of subevents. In this paper, I propose an analysis of SVCs couched in a parallel and relational architecture of grammar, where grammatical information processing is factored into category, role and function at parallel but related levels. Such a model is represented by Bresnan (1994, 1996). I claim that SVCs should be analyzed as complex predicates allowing for a complex structure at one level of the information processing to be (mis)matched with a simple structure at other levels such as the functional structure. This allows us to conveniently factor out differing syntactic information on different levels of grammatical representation (Bresnan 1996, Matsumoto 1992, Mohanan 1993 and Ackerman 1987).

The paper is organized as follows: In section 2, we introduce the concept of complex predicates and show that SVCs have similar characteristics as complex predicates. In section 3 and 4 we provide a series of syntactic and semantic tests on two types of SVCs in Dagaare and Akan, arguing that the various verbs do indeed behave as a unit, as a complex predicate. In section 5, we then attempt to represent SVCs at another level of grammar, the functional level, with a discussion on the consequences of this proposal.

2. Defining Complex Predicates

Various types of complex constructions including verbal extensions, verbal compounds, serial verbs, etc. are often lumped together under the designation complex predicates. As such, it is difficult to arrive at a definition that covers all these types. Attempts exist in the literature. Butt (1995:230), for instance, defines a complex predicate as "... a construction in which two or more semantic heads combine to function as a single unit in terms of grammatical relations that are predicated (no embedded grammatical relations)." In Bodomo (1993:53) we define a complex predicate as a construction in which two or more predicates share a common subject within the same clause. The following constraints on most serial verb constructions in some languages of West Africa are reflective of the above descriptions of complex predicates.

(1)   Constraints on serialization (in Mabia[1]):
        i. **The subject sameness constraint**: All the verbs in an SVC do share a single structural or functional subject.
        ii. **The TAP constraint:** In an SVC there is only a single TAP (tense, aspect and polarity) node.
        iii. **The connector constraint**: There is an absence of conjunctions or complementizers within the string of verbs.
        iv. **The object sharing constraint**: Besides the case of instrumental serialization, dyadic verbs must share direct internal arguments.

All these constraints are based on data in the Mabia languages of West Africa. However, they are, to a large extent, compatible with the array of characteristics as described in Sebba's (1987) work on Creole languages and also to some extent in Durie's (1993) work on Austronesian languages. The following examples in Dagaare (2) and Akan (3) are illustrative of SVCs:

(2)   a.   *Bayuo da ngmE-ø la Ayuo lOO-ø*
           Bayuo past beat-perf fact. Ayuo caus+fall-perf
           'Bayuo knocked Ayuo down' [Bayuo knocks Ayuo, B. 'fells' Ayuo]

       b.   *O da de la a bie zegle bare*
           he past take fact. def. child seat leave
           'He seated away the child'

(3)   *Kofi fa-a ntoma ma-a me* [2]
    Kofi take-perf cloth give-perf me
    "Kofi took a cloth for me"[Kofi takes cloth, Kofi gives me cloth]

As can be seen from the above data it is not necessary to limit serial verb constructions (which I refer to as complex verbal predicates) to only two verbs as we often see in Romance (Alsina 1993) and Dravidian (Butt 1995) complex predicate examples where one of the verbs must necessarily be 'light' or 'incomplete'. In (2b) for instance, we have more than two verbal predicates and it is not easy to say if any of them is 'lighter' or more 'incomplete' than the others.

       These can be represented on tree structures which derive from and are constrained by universal principles of endocentricity and predicate argument locality as contained in Bresnan (1996). The endocentric principle of c-structure is embodied in X' theory and postulates that phrases are projected from heads in a uniform way. This is shown below:

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[1] The Mabia languages include Dagaare, Dagbane, Gurenne, Mampruli, Kusaal and many other languages which have been known as Western Oti-Volta languages. These are all members of the Gur language family of West Africa.

[2] Notice that in benefactive serialization, as in this data, the theme, cloth, is shared by both verbs but the benefactive, me, does not have to be shared by the first verb.

(4)a.   X' -------------> X0, YP   (YP is the complement)
  b.   XP -------------> YP, X'   (YP is the specifier)
  c.   X'---------------> X', YP (recursive treatment of (a) to maintain binarity
                                  even with multiple complements)
  d.   X'---------------> X0 , YP* (a flat structure for multiple complements)

While phrasal endocentricity creates highly hierarchical binary branching structures (4a), such as in English, predicate argument locality allows flat c-structures (4d). Many languages have a mixture of both types of structures.

        In the next two sections I shall subject some types of serial verb constructions, exhibiting the above characteristics, to several syntactic and semantic tests, giving more substantive evidence that the various verbs in an SVC do in fact form a single unit and must be regarded a complex predicates.

3. 0. SVCs in Dagaare

        There are many types of SVCs in Dagaare but in this section I will concentrate on analyzing a particular kind where the second of two verbs has a causative reading with the first being a manner of causativization. I shall use the term "serial verb causativization" as a working definition. This type of SVCs is shown below:

(5)   *Bayuo da ngmE-ø   la   Ayuo lOO-ø*
       Bayuo past beat-perf fact. Ayuo caus+fall-perf
       "Bayuo knocked Ayuo down" [Bayuo knocks Ayuo, Bayuo 'fells' Ayuo]

With this example we can now test for the complex predicate nature of SVCs. One way would be to test whether the different verbs in the series do indeed behave as a single unit in various syntactic alternations.

3.1. Negation in the Dagaare SVC
        One of the clearest tests on the unitary and cohesive nature or otherwise of the verbs in an SVC is negation. If the claim is that the two or more verbs in an SVC are complex predicates and not separate predicates as one would find in, for instance, a coordinate construction, then it should not be possible to negate one verb and not the other(s). It turns out that this prediction is right. All the verbs in the complex must be within the scope of one negative marker or instances of the same negative marker. This is clearly the case for Dagaare serial verb causativization. There is a neat contrast between SVCs on the one hand where all the verbs must be either positive or negative and coordinate structures on the other where it is possible to negate only one or other of the verbs in the coordinate construction. These syntactico-semantic facts may be illustrated as follows in (6):

(6)a.   *Bayuo da ba ngmE Ayuo*
       Bayuo past neg knock Ayuo
       "Bayuo did not knock Ayuo"

b. *Bayuo da ba lOO Ayuo*
Bayuo past neg caus+fall Ayuo
"Bayuo did not cause Ayuo to fall"

c. *Bayuo da ngmE-ø la Ayuo lOO-ø*
Bayuo past beat-perf fact. Ayuo caus+fall-perf
"Bayuo knocked Ayuo down" [Bayuo knocks Ayuo, Ayuo falls]

d. *Bayuo da ba ngmE-ø Ayuo lOO-ø*
Bayuo past neg beat-perf Ayuo caus+fall-perf
"Bayuo did not knock Ayuo down"

e. **Bayuo da ngmE-ø la Ayuo ba lOO-ø*
Bayuo past beat-perf fact Ayuo neg. caus+fall-perf

Sentences (6a-b) illustrate negation in simple predicate constructions while the rest of (6) illustrate the syntax of negation in complex predicates. To negate the SVC in (c), both verbs must be within the scope of a particular negative marker for the construction to be acceptable. This is shown in (d). None of the verbs in (c) can be negated on their own without the others participating. That is why (e) is out.

Now, let us take a look at the coordinate construction in (7). The facts of negation vis-à-vis coordination is shown to be quite different from those of serialization in (6).

(7)a. *Bayuo ngmE-ø la a bOl kyE zo-ø*
Bayuo kick-perf fact. def. ball and run-perf
Bayuo kicked the ball and ran [Bayuo kicks the ball, Bayuo runs]

b. *Bayuo ba ngmE-ø a bOl kyE zo-ø*
Bayuo neg kick-perf def. ball and run-perf
Bayuo did not kick the ball and ran [he didn't kick the ball, he either ran
or did not run]

c. *Bayuo ngmE-ø la a bOl kyE ba zo-ø*
Bayuo kick-perf fact. def. ball and neg. run-perf
Bayuo kicked the ball and did not run [he did kick the ball, he didn't run]

Clearly, each of the verbs in (a) can be negated and this is demonstrated in the (b) and (c) constructions in (7).

3. 2. Questioning Dagaare SVCs
It is however not always easy to distinguish between complex predicates and non-complex predicates on the basis of constituent structure alone. I will illustrate this point with 'wh' questioning phenomena involving both SVCs and coordinations.

The facts of Dagaare 'wh' or 'bong' questioning phenomena are parallel in many respects with those of their counterparts in English. There is usually a 'wh' or a 'bong' word , such as *bong, boluu, ang, wolO* (Bodomo 1996). This is followed by the

factitive marker, lá , and the subsequent structure then varies depending on which part of the declarative construction we are questioning. The following data illustrate the questioning of different parts of a declarative sentence.

(8)a *Ayuo lOO-ø la a bie*
      Ayuo caus+fall-perf fact. def. child
      "Ayuo threw the child down"

  b *Ang la lOO-ø a bie* ?
      wh- fact caus+fall-perf def. child
      "Who threw the child down ?"

  c *Bong la ka Ayuo e-ø a bie* ?
      wh- fact that Ayuo do-perf def. child
      "What did Ayuo do to the child"

  d *Bong la ka Ayuo e-perf* ?
      wh- fact that Ayuo do-perf
      "What did Ayuo do ?"

The (b) sentence questions the subject of the declarative sentence in (a). The (c) questions a verb while the (d) questions the whole VP.
      Let us now apply the facts of 'bong' questions to SVCs and coordination. We first consider the following SVC sentences in (9)

(9)a. *Ayuo da za-ø la a bie lOO-ø* ?
      Ayuo past throw-perf fact. def. child cause+fall-perf
      "Ayuo threw the child down"

  b. **Bong la ka Ayuo e-ø a bie lOO-ø* ?
      What fact. that Ayuo do-perf def. child cause+fall-perf

  c. **Bong la ka Ayuo za-ø a bie e-ø* ?
      What fact. that Ayuo throw-perf def. child cause+fall-perf

  d. *Bong la ka Ayuo e a bie* ?
      What fact that Ayuo do def. child
      "What did Ayuo do to the child ?"

As the ungrammaticality of the (b) and (c) sentences testify, in SVCs you cannot question one of the verbs to the exclusion of the others. It is only when both or all are questioned that we get a well-formed sentence. This is a clear manifestation that the two verbs in the above SVCs do indeed form one cohesive unit, albeit being a complex unit, a complex predicate.
      Now, let us consider coordinate phenomena vis-à-vis the facts of 'bong' questioning. While it is possible to question each of the verbs in a coordinate

construction, unlike the SVC, it is also equally correct to question all the verbs, all the coordinate parts in the construction at a go, just like the SVC. These may be instances of across the board phenomena (distributionality). Consider the constructions in (10):

(10)a *Bayuo ngmE-ø   la   bOl kyE nyu -ø   daa*
        Bayuo kick-perf fact.   ball and drink-perf pito
        "Bayuo played soccer and drank pito"

  b.   *Bong la   ka Bayuo e-ø   kyE   nyu-ø   daa* ?
        What fact. that Bayuo do-perf and drink-perf pito
        "What did Bayuo do and drink pito ?"

  c.   *Bong la   ka Bayuo ngmE-ø   bOl   kyE   e-ø* ?
        What fact. that Bayuo play-perf   ball and do-perf
        "What did Bayuo play soccer and do ?"

  d.   *Bong la   ka   Bayuo e-ø* ?
        What fact. that Bayuo do-perf
        "What did Bayuo do?"

As indicated in (b) we can question the first verb phrase (the first coordinate) in (a) and we can also question the second part of the coordination, i.e. the second verb phrase.

3.3. Summary

        Other syntactic phenomena through which one can test and discuss the complex predicate nature of serialization and non-complex predicate nature of coordination in Dagaare is nominalization (or even clefting), topicalization and imperative constructions. However, the above tests as have been done are enough to tell us that the verbs in SVCs do in fact act together as a single unit, a clear evidence that we are dealing with complex predicates. There were also comparable examples of coordinate constructions which are prototypical examples of non-complex predicates which showed that the verbs in these constructions had a tendency not to behave as a single unit. We could thus say that from this evidence, coordinate constructions are non-complex predicates while serial verb constructions count as a type of complex predicates.
        Having demonstrated that SVCs are complex predicates with the facts of Dagaare causative serialization and coordination we now move on to pursue the same agenda with the facts of Akan benefactive serialization constructions.

4 . 0 Akan benefactive SVCs
        In this section we shall consider a different kind of serial verb constructions in another Ghanaian language of the Kwa branch of Niger-Congo languages. Considering another kind of SVCs in another language would permit us to have a quite varied manifestation of the phenomenon.

4. 1. Negation in Akan benefactive serialization.

It was argued in section 3 that if SVCs are complex predicates and the various verbs work together to lexicalize one event then it should be impossible to single out only one of the verbs in the series and negate it. This is because such verbs behave in many respects as if they were a single lexical item. Both or all the verbs in such constructions must be within the scope of the same negative marker or instances of the same negative marker. We can further demonstrate this evidence with the syntax of Akan benefactive serialization as shown below in (11). The construction in (11a) illustrates a typical case of benefactive serialization in Akan. This involves, among others, a verb of taking or lifting and a verb of giving. In such constructions both types of verbs and any others present must carry the same prefixal instances of the negation marker for the constructions to be grammatically correct. In (11b) the first verb carries this marker but not the second and therefore the sentence is out. The same is true of (11c), where the second, but not the first, verb carries the negation marker, thus rendering the construction ungrammatical.

(11)a. *Kofi fa-a   ntoma ma-a   me .³*
     Kofi take-perf cloth give-perf me
     "Kofi took a cloth for me"

  b. **Kofi a-m-fa   ntoma ma m .e*
     Kofi past-neg-take cloth give me

  c. **Kofi fa-a   ntoma a-m-ma   me .*
     Kofi take-perf cloth past-neg-give me

  d. *Kofi a-m-fa   ntoma a-m-ma   me*
     Kofi past-neg-take cloth past-neg-give me

It is when both verbs carry the same instances of negation, as we witness in (11d), that the construction is grammatical. The facts of (11) then again show that, SVCs represent a cohesive syntactic unit with respect to negation. This constitutes further evidence in support of SVCs as complex predicates. Let us now compare SVCs to another type of complex sentences with respect to the facts of negation.

While coordination constructions, like SVCs are complex constructions they seem not to be complex predicates. This is evidenced by the fact that the various verbs in coordinated constructions are far less cohesive as compared to those in SVCs. Verbs in coordinate constructions do not behave as a single syntactic unit. For a clear instance, it is possible to negate one verb to the exclusion of the others without rendering the construction ungrammatical. An examination of (12) below shows that each of the verbs in this coordinate construction can be independently negated without altering the grammatical status of the sentence. In (12b) only the first verb is negated

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³ I thank Mary Bodomo, Paul Opoku-Mensah and Kofi Agyekum for lending me their native speaker intuitions for the Akan data in this work.

while only the second is negated in (12c). This could not have been done with SVCs as we confirmed above. This difference in syntactic behavior translates a difference in complex predicate status: while serialization triggers complex predicate formation, coordination does not.

(12)a   *Kofi fa-a   ntoma E   na   O kO-O   kurom* .
        Kofi take-perf cloth and then he go-perf town
        "Kofi took the cloth and then he went to town"

   b.   *Kofi a-m-fa   ntoma E na   O kO-O   kurom*
        Kofi past-neg-take cloth and then he go-perf town
        "Kofi didn't take the cloth and he went to town"

   c.   *Kofi fa-a   ntoma E   na   O-a-n-kO   kurom*
        Kofi take-perf cloth and then he-past-neg-go town

   d.   *Kofi a-m-fa   ntoma E na   O-a-n-kO   kurom*
        Kofi past-neg-take cloth and then he-past-neg-go town
        "Kofi didn't take the cloth and he didn't go to town"

There is a similarity however between the two constructions with respect to the facts of negation: all the verbs in Akan benefactive serial constructions on the one hand must be within the scope of the same instances of negation markers and all the verbs in Akan coordinations can be within such a scope on the other. This, of course, does not destroy our claim that SVCs are complex predicates while coordinations are not. On the contrary, it gives us an important clue that it is not always possible to completely distinguish between complex and non-complex predicates at constituent structure levels of the grammar, thereby inviting us to pursue this comparison at a more appropriate level of the grammatical architecture, as is done in section 5.

4. 2. Questioning Akan benefactives
      Further evidence of treating SVCs as complex predicates can be deduced from the facts of questioning phenomena applied to Akan benefactive serialization. Questioning phenomena often involve asking for information about various parts of the declarative constructions. Verbs are one such constituents. Again the two verbs in an Akan benefactive construction do not lend themselves to separate and independent questioning. The data in (13) clearly illustrate this. The ungrammaticality of (13b) confirms that the first verb cannot be questioned to the exclusion of the second, while (13c) confirms that we could not negate the second verb to the exclusion of the first without altering grammaticality.

(13)a   *Kofi fa-a   ntoma ma-a   me*
        Kofi take-perf cloth give-perf me
        "Kofi took a cloth for me"

   b.   **EdeEn   na O-a-yE   ntoma   ma-a   me* ?

What that he-past-do cloth give-perf me

c.　*EdeEn　na　O-a-fa　ntoma　yE-E　me ?
　　What that he-past-take cloth do-perf me

d.　EdeEn　na　O--yE -yE?
　　What that　he do-perf
　　"What did he do ?"

It is only when both are jointly questioned that we arrive at a well-formed syntactic construction. This behavior of Akan benefactive constructions constitutes further evidence for analyzing them as complex predicates.

　　　　Let us again compare the above questioning phenomena involving SVCs to those involving coordinations. Unlike the cases above, it is possible to question each of the verbs in a coordinate construction independently of the other verb without rendering the ensuing construction ungrammatical. This is exhibited in (14) where the first and second verbs in (14b) and (14c) are respectively questioned without altering grammaticality. This is yet another syntactic difference between SVCs and coordinations and leaves no doubt that even though both are similar syntactic constructions in that they are complex constructions they are profoundly different with respect to their complex predicate status: SVCs are more cohesive, behaving as a single syntactic unit. They are complex predicates while coordinated constructions are not complex predicates.

(14)a　Kofi fa-a　ntoma E　na　O kO-O　kurom
　　　Kofi take-perf cloth and then he go-perf town
　　　"Kofi took the cloth and then he went to town"

　b.　EdeEn　na O-yE-E　yE　E　na　O-kO-O　kurom ?
　　　What that he-do-perf that　and then he-go-perf town
　　　"What did he do and he went to town ?"

　c.　?* EdeEn　na O-fa-a　ntoma yE-E　yE ?[4]
　　　What that he-take-perf cloth do-perf that
　　　"What did he take cloth and do"

　d.　EdEn　na　O-yE -E?
　　　What that he-do-perf
　　　"What did he do ?"

Even so, we cannot always cleanly distinguish between these two constructions by constituent structure differences alone. This is clearly the case above in (14d) where, like the SVCs, we can question both verbs. At this level of the grammar we just may

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[4] but EdeEn　na O-de-a　ntoma yE-E　making the unacceptability of the previous sentence more of lexical semantic issue.

not be able to clearly distinguish between the two phenomena. While this in no way negates our claim that SVCs are complex predicates and similar types of constructions, such as coordinations, are not, this last evidence invites us to search for further formal differences between the two constructions, not at the rather variable constituent structure level, but at a more stable syntactic level. This means that we must develop a grammatical structure that provides for such a level. In section 5, we take up issues about such an architecture.

4. 3   Summary
        The discussion in the last section may be summarized as follows:
First, verbs in Akan benefactive SVCs behave as a single unit in various syntactic transformations. Examples from negation and question formation confirm that the two or more verbs in the construction underwent negation and questioning transformations as a single unit. This is further evidence of treating SVCs as complex predicates.
        Second, while the above is the case with serialization we established the fact that this was not so with coordinations. Verbs in a coordinate construction underwent negation and question transformation separately and independently. This is evidence for treating coordinations as non-complex predicates.

5. 0. The Architecture of Grammar
        Having established serial verb constructions as complex predicates we now proceed to show how we can analyze them in a formal syntactic framework. Evidence from Dagaare SVCs, and Romance and Bantu causative constructions as illustrated below in (15) - (17) are among evidences such as movement paradoxes and category mismatches that have necessitated the evolution of an alternative relational grammatical model:

Dagaare:
(15)   *Bayuo ngmE-ø   ma la   lOO-ø*
        Bayuo knock-perf me fact. cause+fall-perf
        "Bayuo knocked me down"

French:
(16)   *Il   m-a   fait tomb-er*
        He me-aux   make fall-inf.
        "He made me fall"

Chichewa (Alsina 1994):
(17)   *Njovu   i-na-sek-ets-a   afisi*
        IXelephant IXS-PA-laugh-CAUS-FV IIhyenas
        "The elephant made the hyenas laugh"

 In particular, complex predicates and most especially serial verbs, pose one of the most compelling challenges to all theories of grammatical representation: how to represent complex predicates both as different, separate entities at one level and as

simple, single entities at another level. In the section below I shall indicate how a relational model of grammar attempts to solve the problem.

5.1. LFG: A Parallel, Relational Architecture of Grammar

Bresnan (1994, 1996) anticipates such issues as category mismatches, proposing an alternative architecture of grammar based on parallel structures: a(rgument), f(unctional) structure and c(ategorial) structure. Each of these levels is meant to model a different dimension of the grammatical structure at stake. These dimensions are ROLE, FUNCTION and CATEGORY. According to Bresnan (ibid) "roles correspond to the grammatically expressible participants of eventualities (modeled by a-structure), functions belong to the inner or 'covert' grammatical relations (modeled by f-structure) and categories belong to the outer structure of forms of expression (modeled by c-structure)." Each of these parallel levels of grammatical information has its own prominence relations. And these define the logical subject (at a-structure), the functional subject (at f-structure) and the structural subject (at c-structure). But what is even more important is the way in which these parallel structures are related. The various parallel structures as delineated above are related or associated by principles of mapping correspondence also called linking or mapping principles. It is these which clearly replace the transformations in alternative architectures. More detailed descriptions of the theory and model can be found in Bresnan (1996).

5.2. Dagaare serialization in LFG

Having given a synopsis of LFG as a parallel and relational model of grammar we begin to show how we can formalize Dagaare serialization as a special kind of complex predicates. We again draw attention to the fact that an important appeal for complex predicates is that they represent a classical case of mismatch between syntax ad semantics. How does LFG approach this ?

Our example sentence as shown below captures all the characteristics of SVCs and most of the features of a complex predicate as shown in (1) above

(18)   *Bayuo da ngmE-ø   la   a   gan   lOO-ø*
       Bayuo past knock-perf fact. def   book caus+fall-perf
       "Bayuo knocked the book down" [he knocks the book, he makes it
                                                   fall]

5. 2. 1 Argument Structure

Illustrating with our example sentence in (18) we say that a complex predicate *ngmE - lOO* forms from the merger of identical arguments and we now have the following a-structure[5].

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[5] In the LFG formalism, it is usual to underspecify argument roles using [±o] and [±r], which stand for objective and non-objective roles and restricted and nonrestricted roles respectively. This information provides indications as to how these a-structure phenomena would interface with f-structure phenomena(see Bresnan 1996). This argument structure representation may look like a simple a-structure. It should however be noted that each of the Ag and Pt notations represents two roles, Agi, Agj and Pti, Ptj of the two predicates.

(19)   a-structure: NgmE - lOO   <Ag   Pt>
                                                [-o]   [-r]
                                                  | |
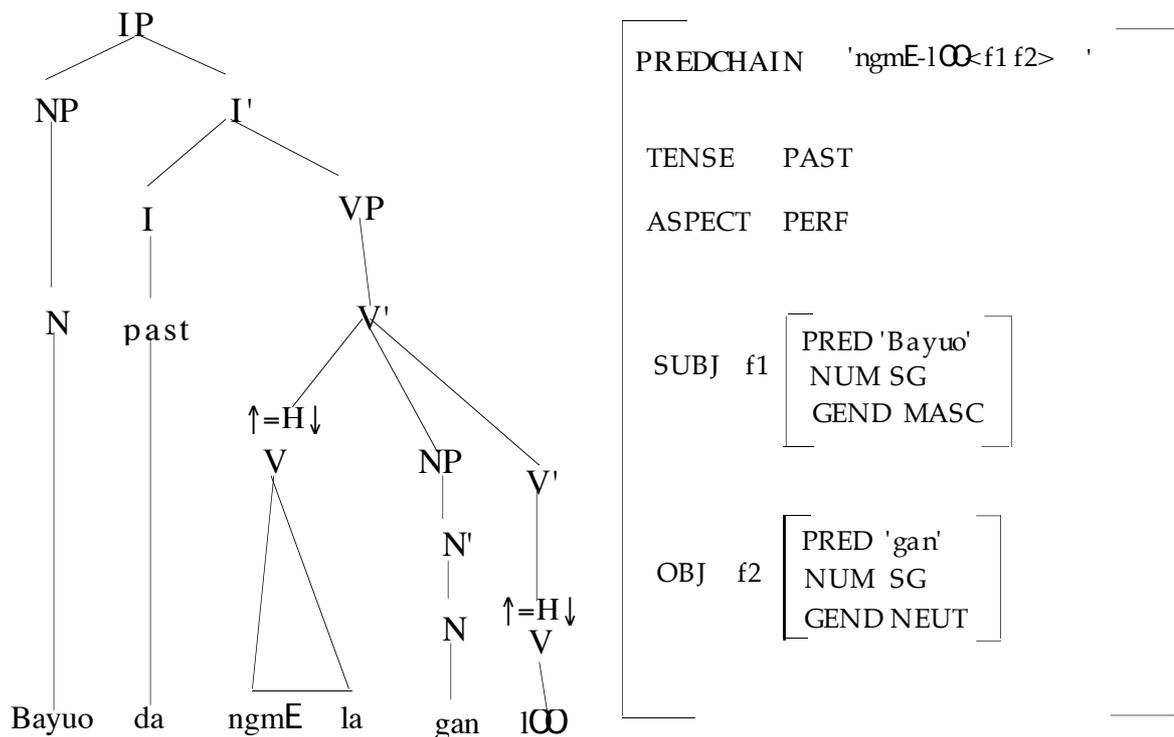   S   O

       We started out with the aim of not only interpreting SVCs as complex predicates but also showing how they can be represented in a relational, multi-dimensional architecture of grammar where there is correspondence between role, category and function. The representation in (19) indicates how we can factor the role information of SVCs and other complex predicates. It is the structures in this level which will interface with other parallel structures in c- and f-structures below.

5. 2. 2   The Categorial and Functional Information of Complex Predicates

       We now begin our second stage in this parallel formalization of SVCs. The diagram in (21) is our proposal for the factoring apart of categorial and functional information contained in complex serial verbal predicates. The functional annotations found within the LFG formalism (Kaplan and Bresnan 1982) can be predicted from general principles of structure-function correspondence, as shown in (20), and need not be stipulated. Bresnan (1994: 67) indicates that the rule annotations may be derived from the following proposed universal principles of endocentric structure-function association:

(20)a.   C-structure heads are f-structure heads
   b.   Specifiers of functional categories are the syntacticized discourse
      functions or absent
   c.   Complements of functional categories are f-structure co-heads
   d.   Specifiers of lexical categories are the non-discourse argument functions
   e.   Complements of lexical categories are the non-discourse argument   functions
   f. Constituents adjoined to maximal projections are non-argument
      functions

(21)

```
                    IP
                   /  \
                 NP    I'
                  |   /  \
                  N  I     VP
                  |  |      |
                  N past    V'
                          /  |  \
                      ↑=H↓   NP   V'
                       V     |    |
                       |     N'   |
                       |     |   ↑=H↓
                       |     N    V
   Bayuo   da      ngmE la     gan   lOO
```

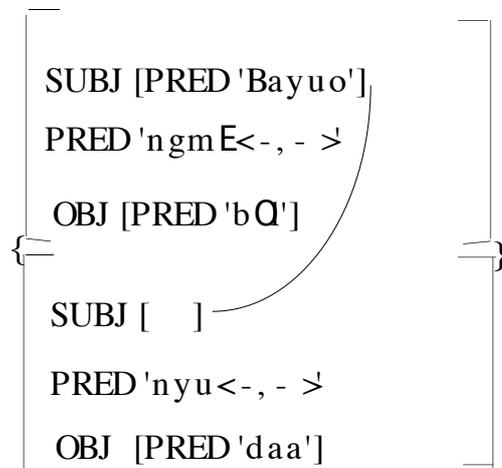|	
PREDCHAIN	'ngmE-lOO<f1 f2> '
TENSE	PAST
ASPECT	PERF
SUBJ f1	PRED 'Bayuo' NUM SG GEND MASC
OBJ f2	PRED 'gan' NUM SG GEND NEUT

By principle (20a) we know that the heads in the VPs at c-structure are functional heads. Indeed, a pertinent point here is that we have two discontinuous heads at c-structure which correspond to one f-structure head, Predchain. This raises some theoretical problems which we will soon address. By (20b), the NP 'Bayuo' is the structural subject and corresponds to the functional subject at f-structure. By principle (20e), the other NP becomes a structural object and a functional object. The argument-taking properties of the verbs are satisfied by a process of unification of identical arguments.

The above representation makes us get a clear distinction between complex and non-complex predicates at the level of f-structure: while complex predicates such as SVCs could be represented with a single, flat f-structure, non-complex predicates such as coordination could not be represented with a flat f-structure: they are better represented with a bracketing f-structure. Consider the coordinate construction in (22a). It 's (incomplete) f-structure may be represented as follows in (22b):

(22)a *Bayuo da ngmE-ø la   bOl kyE nyu -ø   daa*
    Bayuo past kick-perf fact.   ball and drink-perf pito
    "Bayuo played soccer and drank pito"

(22)b

$$
\left\{
\begin{array}{l}
\text{SUBJ [PRED 'Bayuo']} \\
\text{PRED 'ngmE} \langle -, - \rangle \\
\text{OBJ [PRED 'bɔ']} \\
\\
\text{SUBJ [\quad]} \\
\text{PRED 'nyu} \langle -, - \rangle \\
\text{OBJ [PRED 'daa']}
\end{array}
\right\}
$$

In this analytical representation however we have a problem of explaining how it is that we can combine two predicates *ngmE* and *lOO* to get the complex predicate *ngmE-lOO* since in classical LFG discontinuous heads are not allowed to unify into one PRED at f-structure. We shall here adapt and extend Alsina's idea of predicate composition to license our idea of Predchain. To show that unification is not possible with PRED values, Alsina replaces the annotation, ↑ = ↓, found on heads with the annotation, ↑ = H↓ , which will then show that the PRED values have composed and not unified. According to Alsina (1994: 33) this "...annotation on a node C signifies that (unifiable) f-structure values of the mother unify with those of C, while the PRED value of the mother is the function of the composition of the PRED value of C with that of its head sister constituents." He defines the meaning of this annotation more formally as follows:

(23)   ↑ = H↓ ≡def   (↑ \PRED) = (↓\PRED)
                        (↑ PRED) = F(↓PRED), (→H PRED))

What the definition says is that if a c-structure node has the head equation, its features are identical to the features of its mother node M except for PRED, and its PRED feature composes with that of its head sister node to yield the PRED feature of M.

Alsina however builds his extension of the classical LFG notation on the assumption that one of the PREDs which compose must be incomplete. As mentioned earlier, however, it is difficult to consider any of the verbs in the SVC data as any less complete than the others. A solution here would be to consider, as does Baker 1989, a distinction of the notion of head into secondary and primary heads. Some of the predicates in the SVC would then be secondary to others in terms of headedness. It is these secondary predicates which count as the equivalents of the incomplete predicates in the sense Alsina uses them. In this way predicate composition is possible with SVCs and thus licenses the existence of Predchain.

6 . 0. Summary and Conclusions

This paper has argued for the analysis of serial verb constructions (SVCs) as complex predicates with a proposal as to how they should be represented in LFG. The facts of negation and wh-question formation show that the various verbs in Dagaare and Akan serialization behave as a single, cohesive unit. They are complex predicates. These were contrasted with the case of coordination which showed that coordinations cannot be complex predicates since they did not behave as a single unit. There was however no clean distinction between serialization and coordination on the basis of categorial structure alone and this was manifested by the syntax of questioning phenomena. This formal distinction was best represented at a more stable level of the grammar, the f-structure.

We also showed that the structure of SVCs, as a type of complex predicates, illustrates a case of mismatch between syntax and semantics. Our proposed solution here is to attempt to factor the complex information of complex predicates into parallel but related levels of grammatical representation. This is the relational paradigm and LFG is a typical example. Grammatical roles are represented at argument structure. Grammatical category is modeled at categorial structure. And functional information is placed at functional structure. In the case of complex predicates, a complex argument structure may link up to a complex or simple categorial structure and to a flat functional structure. This is a neat mechanism for indicating this syntax-semantics mismatch. SVCs in Dagaare and Akan therefore provide further cross-linguistic evidence and motivations for a parallel and relational architecture of grammar.

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