

# **A conceptual mapping theory for serial verbs**

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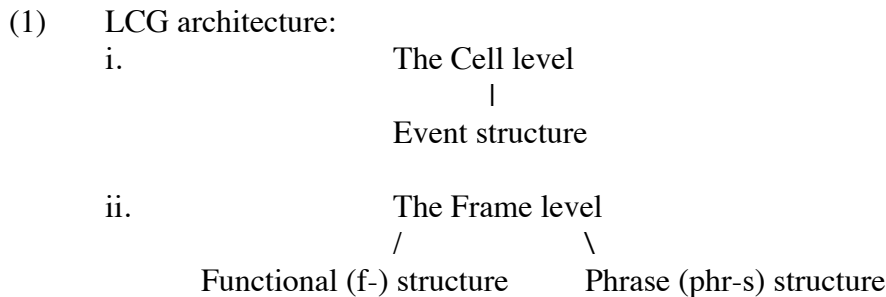
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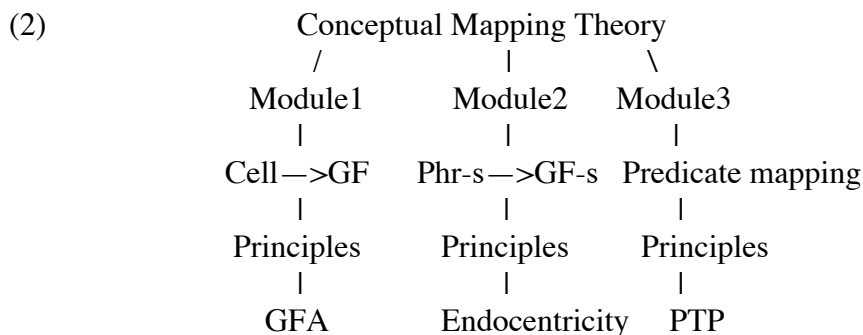
## 1. Introduction\*

Some of the defining characteristics of a multi-level, non-derivational grammatical architecture include theories, principles and constraints that facilitate the interface of information between the various levels. Within LFG, the Lexical Mapping Theory (LMT) has been developed (Bresnan and Kanerva 1989). Alsina (1994) has also suggested the Functional Mapping Theory (FMT). In this paper, we propose a mapping theory for serial verb constructions based on a lexical semantic framework we call Lexical Conceptual Grammar (LCG). LCG is a hybrid grammatical architecture based on LFG and the Sign Model (Hellan and Dimitrova-Vulchanova, forthcoming). This architecture, as shown in (1), has three main structures: the event structure (at the cell level), the functional structure, and the phrase structure (at the frame level).



The last two are largely synonymous with the f- and c- structures of LFG. The cell is a conceptual semantic level where the meaning of linguistic items are finely decomposed into various conceptual features. Since this model is based on a conceptual semantic representation, we call our linking theory the *Conceptual Mapping Theory* (CMT). We develop principles such as the principle of temporal precedence (PTP), grammatical functional assignment (GFA) and adopt structure-function associations (SFA) to show how semantic participants of the cell level link on to the syntax.

The Conceptual Mapping Theory (CMT) proposed here has three components or modules, as shown in (2). Module1 deals with how to realize grammatical functions such as SUBJECT and OBJECT from cell level participants. The main principle operating in this module is the principle of grammatical function assignment (GFA).



Module2 deals with mapping relations between the two tiers at the frame level, the phr-structure and the GF-structure. Here, we base our correspondence rules on the endocentric principles of

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structure argument correspondence as proposed in Bresnan (1996). Module3 constitutes a proposal we make for handling multiple predicates in constraint-based parallel grammatical architectures. In such grammars, the main concerns in developing linking theories are how to realize grammatical functions from grammatical roles or semantic participants. However, our findings are that, in the case of multi-headed structures such as SVCs which have complex event structures at the conceptual level, we have to develop principles for determining what subsections of the complex ‘resurrect’ as what predicate and in what order. We develop the principle of temporal precedence (PTP) as the main constraint operating in this module.

Having now given a synopsis of CMT, we proceed to provide in section 2, a brief conceptual semantic representation of a type of serial verb construction (SVC) in Dagaare we term inceptive serialization. Subsequent sections then illustrate the various parts of CMT with inceptive serialization in Dagaare.

## 2. A conceptual semantics for serial verbs

In this part of the paper we briefly outline a conceptual semantic representation of SVCs based mainly on the formal idea of the Sign Model (SM). A fuller illustration is found in Bodomo (1997a). The conceptual structure of SM is termed the Cell. We first present an account of the cell structure before we show how a conceptual structure representation can be developed for inceptive serialization.

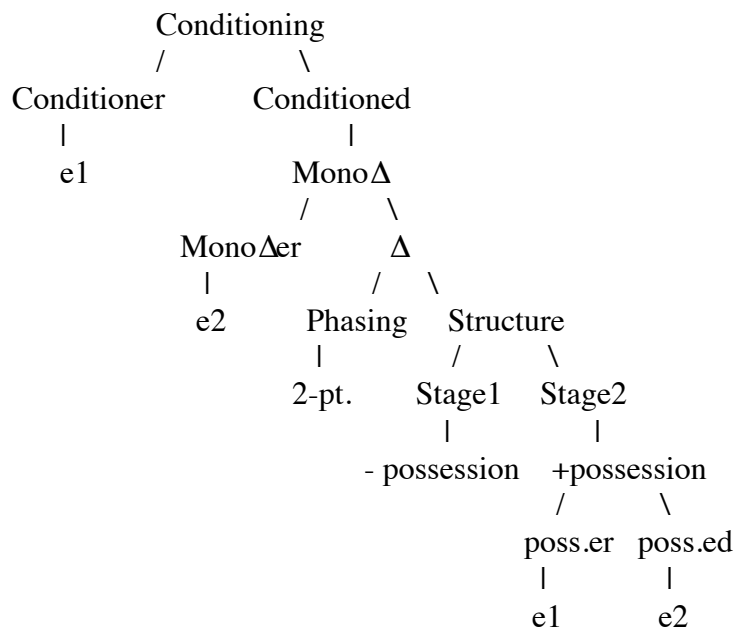
As Hellan and Dimitrova-Vulchanova (1995) show, the cell structure has two broad entities: global properties and element specifications. The global properties refer to aspectual properties which are a function of the whole construction while the element specifications refer to various parts of the construction, including participant properties. These global or aktionsart properties include  $\pm$ temporal,  $\pm$ dynamic,  $\pm$ monotonic and  $\pm$ durational values. These aspectual features can be explained briefly as follows: The sign is *temporal* or non-temporal depending on whether it is situated in time or not, by which we mean whether there is a time dimension specified or not in the conceptual interpretation of the verb. Verbs such as ‘comprise’ and ‘imply’ are non-temporal. Most of the verbs forming the complex predicates in this paper are temporal. Temporal verbs may be *dynamic* or *static* and by that we imply whether the source of the act involves some force or not. The Dagaare verb *zeng* ‘sit’ is static while a verb like *ngmE* ‘knock, kick’ is dynamic. *Monotonic* signs involve actions which change a participant persistently and constantly in one direction. The Dagaare verb *moO* ‘ripen’ is monotonic while a verb like *zeng* ‘sit’ is non-monotonic. As a final aktionsart property, we have *durational* (protracted) and non-durational (non-protracted) predicates. A verb like *ngmare* ‘break’ is non-durational while one like *zo* ‘run’ is durational.

Besides these global properties, cells, especially the complex ones, which are termed *molecular* in Hellan and Dimitrova-Vulchanova (1996), may have other internal finer-grained properties in dimensions which may be dynamic (including monotonic change, conditioning, force, control, inception, core and termination) or static (including location, possession, posture and prevalence). Like the global properties, these dimension specifications need explanation. One dimension in which the semantic features of aspect can be stated is what may be termed monotonicity or monotonic change. This has already been mentioned above under global aspectual features. Any entity that behaves monotonically or is subject to the conditions of monotonicity is termed a monotonic participant (Tonne 1993) or focal participant (Bodomo 1993). In a sentence like *a Oraa moO-E la* ‘the berry is ripe’, *a Oraa* is the monotonic or focal participant. In the course of our semantic characterization of constructions, we shall refer to such a change as monotonic change, abbreviated as ‘mono $\Delta$ ’. Another dimension in which semantic properties of participants within a construction may be stated is the conditioning dimension. Hellan and Dimitrova-Vulchanova (1995) describe this dimension as follows: conditioning

covers the case where a situation comes about due to some event E or an individual I outside S. The element I/E is called a *Sufficient Condition* or simply a *Conditioner*, and the element S is called the *Conditioned*. The reader is referred to Hellan and Dimitrova-Vulchanova (1996) for more extensive expositions of this and other dimensions listed above. However, most of the other dimensions and features as listed above, especially those which are our own additions and/or modifications to the array of dimensions (such as inception, core, termination and possession), will be succinctly described at relevant points in the paper.

We can now illustrate the structure of the cell with two Dagaare verbs *de* ‘take’ and *zagle* ‘seat’ as follows in (3) and (4):

(3) *de* ‘take’:

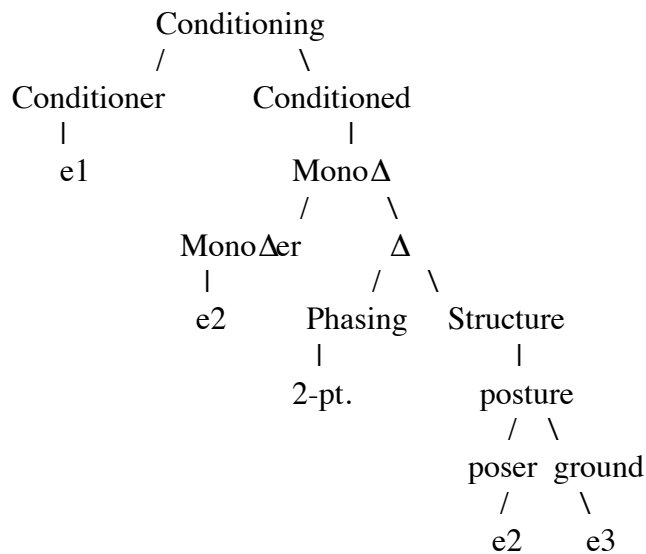


Each of these cell tree structures represents what may be termed the lexical conceptual structure or event structure of the Dagaare verbal signs *de* ‘take’ and *zagle* ‘seat’. These aspectual semantic features are accounted for in various dimensions as listed above. The meaning of the verb *de* ‘take’ in its neutral lexical entry involves *conditioning* i.e. the coming about of something facilitated by an entity. In this case, element 1 (e1) is the *conditioner* of the act of taking. This is the first dimension in accounting for the aspectual conceptual semantics of *de* ‘take’. The act itself involves some monotonic change, *monoΔ*. There are several types of monotonic changes, including change of state, change of integrity status and change of location. I consider transfer of ownership or *possession* status to be a type of monotonic change and that is the case here. So the entity that comes into the possession of e1 is e2 and this is the monotonic changer, *monoΔer* or, better still, the monotonic changing element. The change involved here may be described as having a *phase* and *structure*. These describe the procedure which leads to the monochanger ending up in the possession of the conditioner. In the case of the verb *de* ‘take’, the procedure involves two phases, *point1* and *point2*. The change then has a two stage structure, *Stage1* and *Stage2*. At stage1 possession status is not yet changed. At stage2, however, the *monoΔer* is possessed. We can then talk of a *possessor* and a *possessed* relation with respect to this

possession dimension. These have as values, e1 and e2 respectively. The whole cell tree then is an attribute value tree system which describes the conditions in which the Dagaare speaker-hearer conceives of a situation as involving taking possession or control of something.

The cell tree of *zēgle* ‘seat’ is similar in many respects to that of *de* ‘take’ with regards to the conditioning, phasing and monotonic change dimensions<sup>1</sup>. However, differences begin to set in as we describe dimensions involving the various phases and structure of this monotonic change. The structure attribute of *zēgle* ‘seat’ has a *posture* value, which, in turn, can be described as having a *poser* and *ground* dimensions. These attributes are instantiated by the e2 and e3 values. The value e3 may be left empty if the ground object on which the poser rests is not mentioned explicitly. In the case of the verbal sign *zēgle* ‘seat’ however, a ground object ‘seat’ is inherent in the semantics and has to be a part of its lexical conceptual structure, even if not overtly expressed.

(4) *zēgle* ‘seat’:



Basically then, these two verbs illustrate a finer-grained approach to the characterization of verb semantics. It involves a systematic characterization of the parts of the construction, in this case the verbal items, which permit us to give an alternative account of the nature of word and sentence meaning. This approach enables the linguist to capture as far as possible how speaker-hearers conceptualize situations they interpret by the use of linguistic items.

Having indicated how the conceptual semantic structure of individual verbs can be represented in the Sign Model, we now indicate how the various individual predicates are combined to get an integrated whole in the serial construction. Extending ideas in Bodomo (1993), we describe the nature of complex events as a conceptual level of analysis before we give a treatment of Dagaare inceptive SVCs in the aspectual semantic model of SM.

<sup>1</sup> Indeed, a generalization can be made about Dagaare verbs: all +causative and +transitive verbs are + conditioning.

## 2. 1. The structure of complex events

We begin an exposition of the notion of complex event structure with a definition of this and allied notions as follows:

- (5) i. *Event*: A basic unit of thought or conceptualization corresponding to natural acts or states, including causation, inception, state, deixis and termination (accomplishment) which may be interrelated.  
ii. *Complex event*: Two or more basic units of thought comprising an obligatory core and optional one(s) including any of the above natural acts.  
iii. *Complex predicates*: Constructions in which two or more verbal predicates semantically lexicalize a complex event structure and have a tendency to function as a single grammatical unit. These are the linguistic realizations of the cognitive notion of complex events.

From the above definitions, we notice that several of the elements within a complex event include three main parts: one obligatory - the core; the other two optional - the inceptive and terminative parts. For complex events of serial verbs, at least one of the optional parts must be realized syntactically or conceptually.

The core is the obligatory part of the event and the other optional parts of the complex tend to modify or extend the meaning of the core in various ways. To illustrate, consider the construction in (6).

- (6) core: *Ayuo maale la a bie zegle*  
Ayuo make.PERF FACT DEF. child seat.PERF  
'Ayuo seated the child the well/ Ayuo made the child sit well'

Here, there are two acts. One is the act of seating a child, which is the prime aspect of the situation being described. The other act, 'make', is simply modificational, a preparatory act of seating or getting the child in a good posture. It is optional. These optional acts will be described under inception and termination. The mono $\Delta$ er is in the limelight of the act of seating. It is the one that undergoes the action or on which the effect of the action falls.

Some natural acts/actions are not independent. They occur as preparatory steps towards a major act. These are connected together and are better seen as constituting a single, cohesive event. But it sometimes happens that the expression of these facts of the event varies from language to language. For instance, in serializing languages, in expressing the event of cutting something with a knife, not only is the act of cutting expressed with verbal predicates, the acts preceding the cutting are also expressed with verbal predicates, namely, that of grabbing/taking the knife to perform the major act. This act could be encoded in an SVC as one event, though this could be encoded as two events in non serializing languages with the presence of a coordinating conjunction. To consider the case of our example sentence above, if the child were lying down, for instance, the event of seating the child would have to be started off by first lifting/taking the child. This would be expressed as in (7).

- (7) inception-core : *Ayuo de la a bie zegle*  
Ayuo take.PERF FACT. DEF child seat.PERF  
'Ayuo seated the child'

We term this preliminary act an inceptive act or an inception. This act constitutes the inceptive stage of the event.

The third component of the complex event is what we term terminative. While some acts within an event may be said to be inceptive or constituting an inception of the core act of the event, others may also be said to be terminative. They represent the result, the purpose or the consequences of the major act of the event. To illustrate with our example sentence, the event of seating a child may be completed by adding a terminative act to show the end point of the event. This is shown in (8).

- (8) inception-core-term.: *Ayuo de la a bie zegle bare*  
 Ayuo take-PERF FACT. DEF child seat leave  
 ‘Ayuo has seated the child there’

These three elements constitute the main parts of a complex event. They are therefore an integral part of our proposed model of event structure. But of course, there are other finer-grained categorizations as indicated above in the definitions. It is these various parts that the contributing verbal signs in the complex predicate attempt to express by readjusting their lexical semantic structures. We illustrate this with inceptive serialization in the next subsection.

## 2. 2. Inceptive serialization and predicate integration

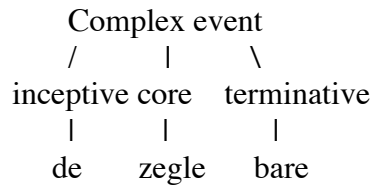
Consider the following Dagaare SVC:

- (9) *Ayuo da de la a bie zegle kyE*  
 Ayuo PAST INCEP-take FACT. DEF child seat here  
 ‘Ayuo seated the child here’

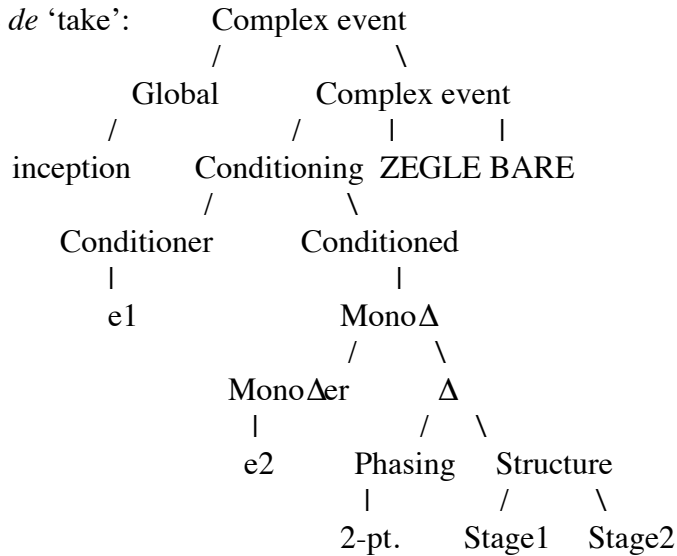
The act of seating a participant is being expressed and this is preceded by an act of taking but as has been described in earlier expositions it does not necessarily involve physically grabbing the child. For instance, the seater of the child could already have been in possession of the child, thereby making the act of physically grabbing the child or lifting it redundant. Yet a speaker of Dagaare would still employ *de* ‘take’ in this situation. The function of *de* ‘take’ must therefore be seen in a different perspective from the normal semantics of getting hold of something and being in possession of it, as described by the cell tree of *de* ‘take’.

It is clear from this interpretation that *de* ‘take’ in this construction is employed to mark the beginning of a certain phase in the event of seating the child. This is the incipient stage of the event. The verb *de* ‘take’ has therefore readjusted its semantics from that of expressing getting hold of something and being in possession of it to that of expressing an inceptive act within an event, much in consonance with the theory of *predicate integration* (developed in Bodomo 1997a) which entertains the idea that two or more verbal predicates forming a grammatical unit do contribute and even often modify their individual semantics in such a way as to determine a unique defining semantic and morphosyntactic identity of the whole construction; that is, parts of lexical semantics *can* be modified or readjusted to determine construction syntax and semantics. The modification or readjustment is not *sine qua non*. The predicates, so to speak, *integrate* into one complex whole. This inceptive act is shown on the complex event structure diagram below in which we also have the core and terminative aspects.

- (10) Inceptive take-serialization: de-zegle-bare:

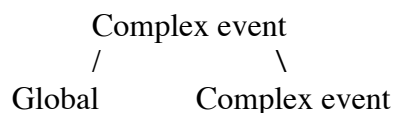


(11) Inceptive *de* ‘take’:

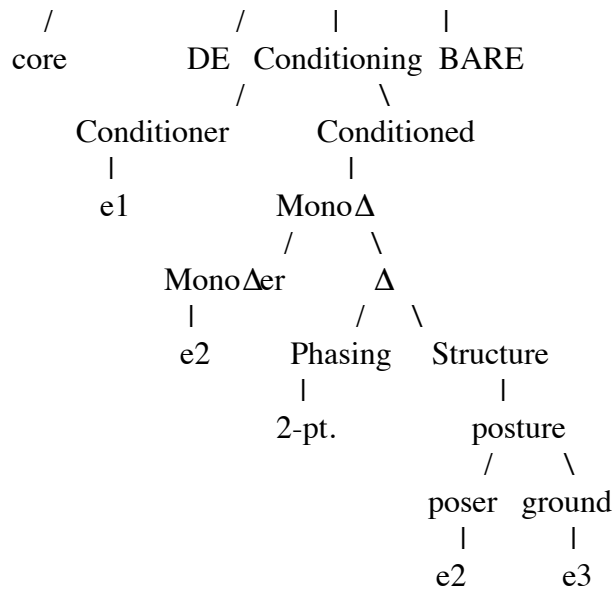


The diagram in (10) shows the instantiation of the inceptive, core and terminative parts by *de*, *zegle* and *bare* to form the complex event of inceptive serialization. Each of these verbs can be substituted for by their cell tree structures as shown in (3) and (4). For now, we consider only *de* and *zegle*. Again the cell structure of *de* ‘take’ as seen earlier begins with a conditioning dimension in which an entity causes something to happen. Every happening or the beginning of every subevent in our complex seems to trigger a monotonic change, i.e. a transition. The cell tree is identical in all respects with the initial *de* ‘take’ cell tree as seen earlier. However, further down, the possession dimension is no more expressed. We are no more dealing with possession but this time with inception. This inception is a global or construction level feature contributed by the *de* ‘take’ predicate to the entire construction. The *de* ‘take’ predicate seems to have ‘bleached’ off its semantics of possession in favor of a semantics of inception, control or instantaneity. In this sense then we may say that it has modified or readjusted its semantics to suit the whole complex.

(12) Core *zegle* ‘seat’:



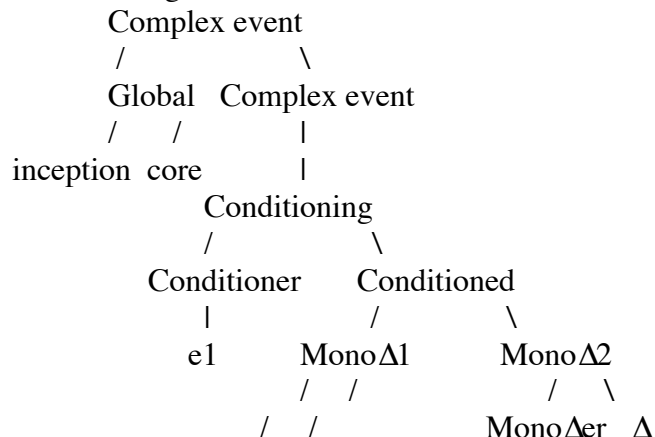


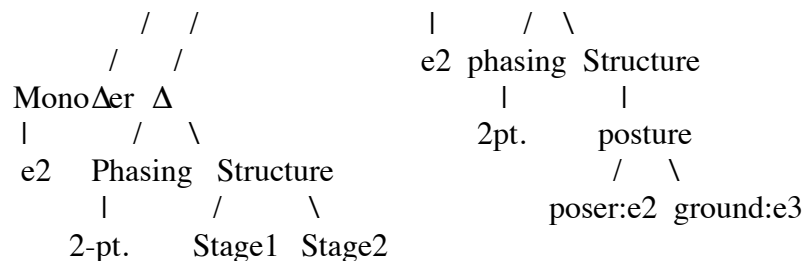


The *zagle* ‘seat’ cell tree on its part serves to express the core of the event. Like the *de* ‘take’ cell trees, dimensions of aspectual semantic descriptions include conditioning and  $\text{mono}\Delta$  and these are similar in all respects. However, there is an attribute of posture for *zagle* ‘seat’, contrary to what obtains for *de* ‘take’. This signals that the act involves putting one entity on a certain locational posture, in this case any kind of seat which is inherently specified by the verbal sign. The child (e2) is the poser and the seat is the ground. This description shows that, unlike in the case of *de* ‘take’ the cell structure of *zagle* ‘seat’ fits into this complex event structure in its entirety. It may be the case that verbs which express the core of the event do not need to readjust their meanings to express the identity of the whole construction, as much as those expressing ancillary parts.

The diagram in (13) illustrates how the cells of these two verbal predicates are integrated to express the inceptive and core aspects of the complex event. The complex is still describable in terms of the conditioning dimension. The conditioner, e1, is Ayuo. There are now two  $\text{mono}\Delta$ s,  $\text{mono}\Delta_1$  and  $\text{mono}\Delta_2$ . In most cases, the  $\text{mono}\Delta$  within the complex events will correspond to the transitional stages of inception, core, termination and other boundary marking aspects of the complex event.

(13) Inceptive SVC: *de-zagle* ‘take-seat’:





This composite cell structure now gives us the conceptual semantic representation of inceptive serialization. The monoΔ1 - 2 in (13) mark roughly the salient transitional phases of the entire complex, corresponding roughly to inception and core act (leaving out the termination of the event for now). In this structure the e1 is instantiated by the lifter of the child and the e2 is instantiated by the child, and is the entity that undergoes the various stages of monotonic change.

This subsection has provided a representation of the lexical conceptual structure of inceptive serialization and an illustration of how the theory of predicate integration works to bring two cell structures together to form a complex verbal semantic representation. This may be sketched as follows in (14).

$$(14) \quad \text{Predicate Integration (PI):} \quad \rightarrow \quad V1 \quad + \quad V2^* \quad = \quad CE$$

$$\quad \quad \quad \quad \quad \quad (\uparrow C) \quad \quad (\uparrow C)$$

A complex event (CE) forms from the integration of the cell structure of V1 and V2, etc., denoted as  $\uparrow C$ . With this conceptual structure representation of serial verbs, we now begin to consider issues of linking onto the syntax.

### 3. Mapping participants to grammatical functions

In the conceptual semantic representations of SVCs seen earlier, there are a number of elements or participants, often labeled e1, e2, etc. These are the actants in the events and situations denoted by the complex verbal predicates. These more abstract conceptual entities would have to be realized as grammatical structures in order to linguistically express these concepts in the various languages. A major task of the formal grammarian is to determine how this realization or cell element resurrection is done. Thus a number of theories or ways of thinking about this linking abound in the literature (e.g. Bresnan and Kanerva (1989), Bresnan and Zaenen (1990), Alsina (1993), Butt (1995), Wechsler (1995) and Dowty (1991)).

In our approach to this task, our point of departure is Dowty's (1991) idea of proto-roles, to be explicated soon. Having assumed this idea, we then translate proto-role characteristics into cell-level aspectual features and then use the results of this translation to formulate a mapping principle for deriving grammatical functions from cell level elements.

Contributing to earlier attempts at formulating argument selection in terms of discrete roles, Dowty suggests that there are only two types of role concepts for the purpose of linking between levels. This may be compared with Bresnan and Kanerva's (1989) version of LMT where up to seven or more roles are arranged in a hierarchy for the purpose of linking:

$$(15) \quad \text{agent} < \text{beneficiary} < \text{experiencer} < \text{goal} < \text{instrument} < \text{patient/theme} < \text{locative}.$$

The following are the properties for the Agent and Patient proto-roles as outlined in Dowty (1991:572):

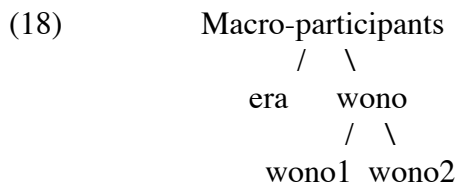
- (16)a. Contributing properties of the Agent Proto-Role:
  - i. volitional involvement in the event or state
  - ii. sentience (and/or perception)
  - iii. causing an event or change of state in another participant
  - iv. movement (relative to the position of another participant)
  - (v. exists independently of the event named by the verb)
  
- b. Contributing properties of the Patient Proto-Role:
  - i. undergoes change of state
  - ii. incremental theme
  - iii. causally affected by another participant
  - iv. stationery relative to movement of another participant
  - (v. does not exist independently of the event, or not at all)

Since these roles are proto-typical, none of these properties are essential for an argument to qualify as agent or theme. Dowty provides the following principle of argument selection which suggests that decisions between agenthood and patienthood depends on how many of these properties are present or absent in a role.

(17) Argument selection principle: In predicates with grammatical subject and object, the argument for which the predicate entails the greatest number of Proto-Agent properties will be lexicalized as the subject of the predicate; the argument having the greatest number of Proto-Patient entailments will be lexicalized as the direct object. (Dowty 1991: 576)

Rather than defining mapping relations in terms of syntactic restrictions or otherwise of roles and their objecthood as done in, for instance, Bresnan and Kanerva (1989), Bresnan and Zaenen (1990), these features are defined in terms of conceptual generalizations about meaning which are then directly mapped onto grammatical functions.

Dowty's approach is therefore relevant for a conceptual approach to linking such as we propose in this work. We first adopt and adapt the idea that, for the purpose of linking participants onto grammatical function arguments, — excluding non-arguments such as adjuncts —, there are basically two types of proto-roles, *era* 'doer, conditioner, etc.', and *wono* 'experiencer, a person who feels the action or an entity that is subjected to the action'. These Dagaare terms are meant to replace the English 'Agent' and 'Patient' which I try to avoid in order not to create a confusion by using terms that are very much associated with the argument structure approach; a syntactic valence representation we attempt to supplement with a conceptual semantic representation. These two role types are termed 'macro-participants' and they are shown below in (18).



The macro-participant *wono* is further divided into two, *wono1* and *wono2*. In cases where there are two theme-like or patient-like participants, *wono1* would be the more proto-typical of the two, having more of the cell-level aspectual dimension feature values, as shown in (19b). As Hellan and Dimitrova-Vulchanova (1996) indicates the feature *initiator* is a composite of ‘conditioner’, ‘source’ or ‘control’, all of which are terms which describe an agent-like participant causing an event to happen or a change in another participant, and which often involves volition. It might also involve a ‘launcher’ in a transmission dimension or a ‘possessor’ in a possession dimension. The property *focal* is synonymous with the *monoΔ* property, involving an action of changing state. In a transmission dimension, such as the act of giving, the *wono* is the receiver; where exertion is at play, it is the *prevailer* or the participant that is resisting the force of exertion. It may be the *poser* in a change of posture dimension and the *possessed* in a possession dimension, such as the acting of taking hold of something.

<p>(19) Properties of <i>era</i>:</p> <ul style="list-style-type: none"> <li>+ Initiator (cond. source, control)</li> <li>+launcher</li> <li>+possessor</li> </ul>	<p>Properties of <i>wono</i>:</p> <ul style="list-style-type: none"> <li>+focal (monotonic Δer)</li> <li>+receiver</li> <li>+prevailer</li> <li>+poser</li> <li>+possessed</li> </ul>
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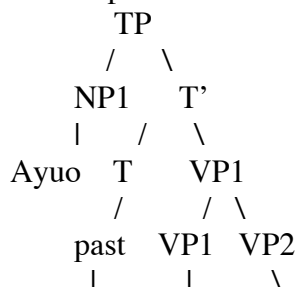
With the description of the macro-participants, *era* and *wono*, now in place, we state the grammatical function assignment as follows in (20):

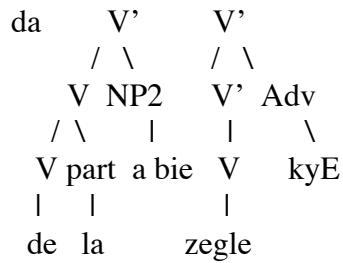
- (20) GFA
- In active sentences with realized subjects and objects:
- i. Map cell *era* onto f-structure SUBJECT
  - ii. Map cell *wono1* onto f-structure OBJECT
  - iii. Map cell *wono2* onto f-structure OBJ2 and obliques

What this mapping principle means is that in a syntactic string with subject and object, such as an entity kicking a ball, *era* would be the functional SUBJECT and *wono1* the functional OBJECT. In a string with three arguments such as in the act of giving, *era* would be the subject, the giver; *wono1* the direct object, the thing given and *wono2* the indirect object or oblique, the beneficiary of the act of giving.

- (21) a. f-structure for take-SVC

- b. The phr-structure for take-SVC





With this explanation, we can now illustrate this section of the mapping theory with our familiar inceptive serialization, as shown in (9). Conceptual (cell), grammatical functional, and phrase structural representations of the complex verbal predicate constructions are shown in (13), (21a), and (21b) respectively.

At the cell structure level, the elements e1 and e2 seen in earlier conceptual representations of take-serialization can now count respectively as the macro-participants *era* for the initiator/conditioner, which is instantiated by *Ayuo* and *wono* for mono $\Delta$ , which, in turn, is instantiated by *a bie* ‘the child’. These *correspond* to, or *map* onto, the SUBJECT and OBJECT at f-structure, which have as PREDs *Ayuo* and *a bie* respectively. The following results may now be obtained with the application of our example inceptive-serialization sentence:

(22)	cell structure:	era	wono
	f-structure:	SUBJ	OBJ
	Phr-structure:	Ayuo	a bie

For a benefactive serialization construction such as in (23a),

(23) a. *Ayuo na de la a bie ko Bayuo*  
 Ayuo FUT take FACT. DEF. child give Bayuo  
 ‘Ayuo will give the child to Bayuo’

b.	cell structure:	era	wono1	wono2
	f-structure:	SUBJ	OBJ1	OBJ2
	Phr-structure:	Ayuo	a bie	Bayuo

the result of applying the GFA will be as shown in (23b), where the participant *era* is mapped onto SUBJ, instantiated by *Ayuo*, *wono1* onto OBJ1 or the direct object, instantiated by *a bie* ‘the child’ and *wono2* is mapped onto OBJ2 or the indirect object, instantiated by *Bayuo*.

Of course, these active complex predicate sentences as illustrated above are the ideal cases. We believe, however, that even with diathetic constructions such as the medio-passive syntax in Dagaare (25), the GFA will still work with some minor reformulations as follows in (24). For instance, the GFA can be reformulated to map subjects onto *wono* in medio-passive diathetic constructions as shown below in (25).

- (24) a. The Subject Condition:  
In correspondence from semantic to syntactic structure there must always be a subject
- b. The GFA for active sentences:  
In active sentences with realized subjects and objects:  
i. Map cell *era* onto f-structure SUBJECT  
ii. Map cell *wono1* onto f-structure OBJECT  
iii. Map cell *wono2* onto f-structure OBJ2 and obliques
- c. If *era* is implicit, then by the Subject condition, *wono* is the subject
- (25) a. *a sensE kUOre baar-EE la*  
DEF cakes sell finish-PERFINTRANS FACT.  
'The cakes have been sold'
- b. [ PRED 'kUOre-baare<—,—>'  
SUBJ [Pred 'sensE'  
OBJ [Pred '—' ] ]
- c. Conceptual structure:           wono  
  |  
f-structure:                        SUBJ  
  |  
Phr-structure:                   sensE

In (25a), we have what we call a medio-passive sentence. Medio-passives are like English passives with truncated subjects and to some extent also resemble English middle constructions.

The structure in (25b) is a GF-structure diagram for this sentence, while that in (25c) shows the results of applying the GFA. This example is meant to illustrate the fact that the GFA extends beyond active sentences to other types of sentences in terms of successfully mapping conceptual (cell) structure participants to grammatical functional structure arguments.

An important claim we make in this paper and in other works (Bodomo 1996, 1997), with respect to complex verbal predicates, is that one single unit at a particular level of representation does not necessarily correspond or map onto a single unit at other levels of representation. It is an important characteristic of SVCs and other types of complex predicates that semantic units do not necessarily correspond to syntactic units. For a successful analysis of these types of construction, the grammar must allow for the possibility of a syntax-semantics mismatch.

Two aspects of the above facts of SVC linking phenomena are evidence for this mismatch. First of all, as seen in the semantic representation in (13), we have a complex event structure composed of several instances of monotonic changes including inception, core and terminative dimensions. All this complex is mapped onto a single f-structure as seen in (21a). Hence we have a situation in which complex semantic phenomena are mapped onto a simple syntactic unit, a flat, non-embedded f-structure. This is the first illustration of the syntax-semantics mismatch.

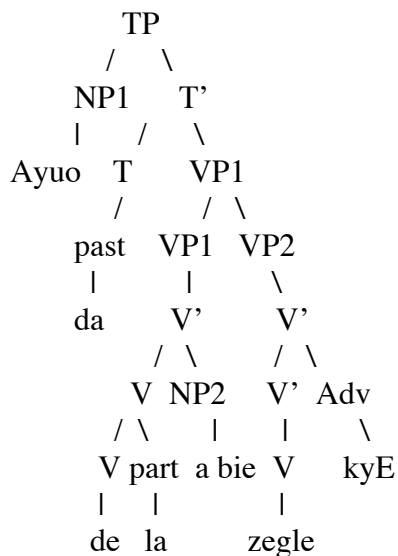
The second evidence of syntax-semantics mismatch concerns the GFA i.e. the realization of grammatical roles from cell participants. As illustrated by the mapping of the macro semantic

participants from (18) through (25), the *wono* participant can be mapped onto either an object or a subject at the frame level: semantic entities do not always interface with the same syntactic entities in a parallel grammatical architecture. Semantics-syntax disharmony should be entertained in the structural representation of some constructions. This is the second illustration of the theme of syntax-semantics mismatch. With an explanation of this important characteristic of complex predicates, we now move to the second module of the CMT.

#### 4. Mapping relations within the frame

Bresnan (1996: 94) proposes the following universal principles of endocentric structure-function association in (26) as principles relating parts of the phrase structure level to parts at the f-structure level. To the extent that some of these are relevant for the Dagaare phenomena we discuss here, we shall adopt those and interpret them as mapping rules for relating phr-structure to f-structure within the framework of our grammar. This constitutes module2 of the CMT as sketched above.

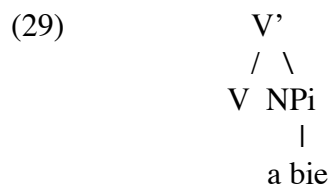
- (26) a. C-structure heads are f-structure heads  
 b. Specifiers of functional categories are the syntacticized discourse functions or absent  
 c. Complements of functional categories are f-structure co-heads  
 d. Specifiers of lexical categories are the non-discourse argument functions  
 e. Complements of lexical categories are the non-discourse argument functions  
 f. Constituents adjoined to maximal projections are non-argument functions
- (27) a. f-structure for take-SVC (see 21a)  
 b. The phr-structure for take-SVC



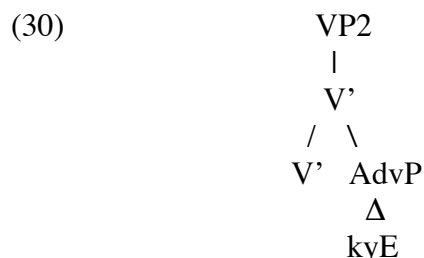
To explain these, let us consider the f-and phr-structures of (9) repeated here as (21). The first correspondence rule, (26a), asserts that each phrase structure head is also a functional structure head. For instance, the verbs *de* ‘take’ and *zege* ‘seat’ are heads of the VPs. As a result, they are also heads of the (COM)PRED function in the f- structure. The second correspondence rule, (26b) stating that specifiers of functional categories are the syntacticized discourse functions or absent, is quite simple to illustrate. The only functional projection in (21b) is TP. Its specifier is the NP, *Ayuo*. This is usually the subject position for languages such as Dagaare and English. SUBJECT, TOPIC and FOCUS are proposed as syntacticized discourse functions in Bresnan (1996) but this proposal does not concern us at this point. More important for our purpose however is the conclusion, based on this correspondence rule, that the specifiers of TP in the phrase structure representation of Dagaare complex predicates correspond to their f-structure SUBJECTS. The third correspondence rule, (26c), enables complements of functional categories to serve as co-heads in the f-structures of functional projections even if these complements are not phr-structure heads of the functional projections in question. The configuration in (28) illustrates the part of the phr-s structure of (27) in question.



Here T is the head of T' and VP1 is a complement of T'. But (26c) enables both T and the head of VP1 to be co-heads in the f-structure of T' (which incidentally is also that of VP i.e. (21a)). The fourth correspondence rule, (26d), is not applicable to our diagram and does not seem to be relevant for Dagaare. The fifth correspondence rule, (26e), serves to link phr-structure complements to f-structure OBJECTS where possible. Basically, it states that complements of lexical projections, V' in our diagram, are the complement or object-like functions, specifically in the case of Dagaare, the OBJECT functions.



In (29), extracted from (27), the NP *a bie* is the complement of the head of the lexical projection V'. By (26e), this is the non-discourse argument complement function or, simply in the case of Dagaare, the f-structure OBJECT of this serial verb construction. The last correspondence rule, (26f), which states that constituents adjoined to maximal projections are non-argument functions, enables adverbials like *kyE* ‘here’ in (30) extracted from (27)





to come out as non-argument functions such as ADJUNCTS. The adverbial in (30) is a constituent adjoined to VP. As such it is a non-argument function at f-structure. Module2 of our Conceptual Mapping Theory is basically then an adaptation of the universal principles of endocentricity as suggested in Bresnan (1996). The above has shown that most of these principles largely apply to Dagaare. Phrase structure entities are linked to f-structure functions in a principled way. From these, we predict what phr-structure phenomena would appear as heads and co-heads and what would appear as SUBJECTS and OBJECTS. We now move to an explanation of Module3, the last part of our Conceptual Mapping Theory.

## 5. Mapping semantic heads to syntactic heads

Traditional theories of linking in constraint-based parallel grammatical architectures are often mainly concerned with how to realize grammatical functions from grammatical argument roles or semantic participants. However, our findings are that, in the case of multi-headed structures such as SVCs which have complex event structures at the conceptual level, we have to develop principles for determining what subsections of the complex link on to the various verbal predicates and in what order. We propose a third module, module3, in our Conceptual Mapping Theory to address issues of mapping semantic heads to syntactic heads. So we need some principles. This also leads us to address issues about headedness.

### 5.1. The Principle of Temporal Precedence ( PTP)

The main principle operating in module3 of CMT is the Principle of Temporal Precedence (PTP). This principle, which was first developed in Bodomo (1993), is stated in (31) as follows:

- (31) Let  $S = SVC$  and  $E = Event$ ,  
 Let  $v1$  and  $v2 = Verbs$  in  $S$  and  $e1$  and  $e2 = parts$  of  $E$   
 Suppose  $S$  is a grammatical encoding of  $E$  and  
 $v1$  and  $v2$  encode  $e1$  and  $e2$  respectively,  
 If  $e1$  temporally precedes  $e2$   
 Then  $v1$  must structurally precede  $v2$ .

The PTP predicts and licenses multiple verb order in the phrase structure of serial verb constructions. This principle then forms the basis of the test for the right verb order at this phr-structure component of the representational analysis.

We now draw examples from Dagaare to demonstrate the PTP. Consider the following Dagaare structures in (32).

- (32) a. *o da mOng la saao de bing bare ko ma*  
 3.s PAST stir FACT. food take put leave give me  
 ‘S/he made food & left it there for me’
- b. \**o da mOng la saao de bare ko bing ma*  
 3.s PAST stir FACT. food take leave give put me

In (19) there are 5 verbs encoding the notions of ‘cooking food’, ‘taking it’, ‘putting it’, ‘leaving it there’ and ‘allowing someone to have it’. These are all different parts of, not just a simple event but, a complex event of ‘cooking food for the benefit of someone’. With these various

notions of ‘cooking’, ‘taking’, ‘putting’, ‘leaving’ and ‘giving’ there must be some kind of precedence relation, in this sense temporal precedence. If the precedence relation is violated, as in (32b), the sentence encoding that order is ungrammatical. With this we can explain in a principled way why the sentence is ungrammatical. Rearranging it according to our PTP will produce a correct sentence in the language. This illustration of the PTP, constituting module3, now completes our development of a conceptual mapping theory.

## 6. Conclusion

This paper has proposed a theory for mapping conceptual semantic level phenomena onto syntactic phenomena with regards to serial verb constructions. First, a conceptual semantic representation is developed for a particular kind of SVCs called inceptive serialization in the Dagaare language of northern Ghana. A linking theory is then proposed to show how syntactic level phenomena are predicted from semantic level phenomena, even in the mist of a characteristic non-uniformity of correspondence between the syntax and semantics of complex predicates.

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