1. Introduction

In Igbo, a Kwa language spoken in southeastern Nigeria, monosyllabic CV verb stems are usually fairly simple semantically. The polysyllabic verb stems, generally more complex semantically, are usually relatable to a series of simple CV verbs, or verbs plus CV suffixes. For example, the polysyllabic verb

(1) t͡ʃú 'throw away, discard, lose'

can be considered a compound made up of the component verbs t͡ʃú 'throw' and ú 'be lost'. In general, the compound verb refers to an event; the first component indicates an action, and the second component indicates the goal or result of that action. The first component can be just about any action verb; the second component can be a stative or an action verb, or a suffix. Other than this, the only restriction on verbs eligible for compound formation seems to be the pragmatic one of limiting compounds to representing events conceivable in terms of action and result, given the speaker's intellectual and cultural experience.

It might be expected that this phenomenon can be accounted for in a rather straightforward fashion in terms of a conventional transformational statement deriving the compound from a multi-sentential source.

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1 I would like to thank Edward Okwu for sharing with me his native speaker's perspectives on Igbo, Sandy Thompson for sharing her ideas about the nature of the lexicon in general and resultative verb compounds in particular, and George Bedell, Talmy Givón, Larry Hyman, J. O. Robinson, and William Welmers for commenting on an earlier treatment.

2 Dialects of Igbo differ with respect to (among other things) phonological inventory and tone patterns. I have for the most part followed the representation of Central Igbo used in Welmers and Welmers [1968a]. Tone markings are high ' downstepped high ' and low '. Monosyllabic verbs are cited with infinitive tone; since the tone patterns of polysyllabic verbs in the various verb constructions are for the most part predictable from the inherent tones of the individual components, polysyllabic verbs are cited with these inherent tones.
Although I have not seen such a proposal advanced for Igbo, a transformational account has been proposed for a strikingly similar set of words, called resultative verb compounds, in Mandarin Chinese. This approach is considered and rejected by Thompson [1973]; she concludes that productive processes in a language are not necessarily best represented in a grammar as transformational processes, and proposes accounting for resultative verb compounds as two sets, one set derived by lexical rules and one set listed in the lexicon. Carrell's [1970] transformational description of Igbo takes a different approach; the phrase structure rules generate adverbials which are later incorporated into the verb, producing polysyllabic verbs.

I will consider a transformational derivation for Igbo verb compounds; such a derivation is found to be inadequate because of the idiosyncrasies of compounds with respect to their components, and because of the action-result meaning of compounds. Lexical listings for all compounds are proposed, but with combinatory rules in the lexicon to account for the productivity of the compound-formation process. The action-result meaning is represented as integral to the meaning of the compound. A phrase structure account is rejected as inadequate. I will discuss a transformational account in sections 2 and 3, a lexical account in sections 4 and 5, and a phrase structure account in section 6.

2. Deriving Verb-Verb Compounds Transformationally

Since transformations map phrase markers into phrase markers, we can consider the derivation of a verb like (1) tʃufu 'throw away' as the result of a process combining (2) and (3) to produce (4).

(2) ɗ tʃufu ɗkwu ꙣwọ

he throw-TNS³ paper

'He threw the paper.'

(3) ɗkwu ꙣwọ fùrù

paper be-lost-TNS

'The paper got lost.'

³TNS here refers to the -rV tense-aspect suffix termed 'factative' by Welmers and Welmers [1968b], having a roughly 'past' meaning.
We can come up with a statement representing the process transformationally according to a formulation roughly like (5).

\[
\begin{align*}
S_1 & \left[ \begin{array}{ccc} NP & V & TNS & NP \end{array} \right] \text{ CONJ } S_2 \left[ \begin{array}{ccc} NP & V & TNS \end{array} \right] =\Rightarrow \nonumber \\
& \begin{array}{cccc}
\text{\textual{he}} & \text{\textual{t\text{\text{\text{-}}}u\text{\text{-}}}f\text{\text{\text{\text{-}}}u\text{\text{-}}}f} & \text{\textual{\text{\text{\text{-}}}ak\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}u\text{\text{-}}}k\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}f}}}} & \text{\textual{\text{\text{\text{-}}}ak\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}u\text{\text{-}}}k\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}f}} \ f\text{\text{-}}}u} \\
\text{\textual{he}} & \text{\textual{t\text{\text{-}}}u\text{\text{-}}} & \text{\textual{\text{\text{-}}}ak\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}u\text{\text{-}}}k\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}f}} & \text{\textual{\text{\text{-}}}ak\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}u\text{\text{-}}}k\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}f}} \ f\text{\text{-}}}u} \\
\end{array} \right] \\
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\
1 & 2+7 & 3 & 4 \\
\text{\textual{he}} & \text{\textual{t\text{\text{-}}}u\text{\text{-}}} & \text{\textual{TNS} & \text{\textual{\text{\text{-}}}ak\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}u\text{\text{-}}}k\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}f}}}} & \text{\textual{\text{\text{-}}}ak\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}u\text{\text{-}}}k\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}f}}} \\
\text{\textual{he}} & \text{\textual{t\text{\text{-}}}u\text{\text{-}}} & \text{\textual{TNS} & \text{\textual{\text{\text{-}}}ak\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}u\text{\text{-}}}k\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}f}}}} & \text{\textual{\text{\text{-}}}ak\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}u\text{\text{-}}}k\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}f}}} \\
\end{align*}
\]

Conditions: (i) 3=8
(ii) 4=6

A statement like (5) will give us the desired output for compounds like (1) \text{\textual{t\text{\text{-}}}u\text{\text{-}}}f\text{\text{\text{-}}}u 'throw away', as in (4). Here \text{\textual{\text{\text{-}}}ak\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}u\text{\text{-}}}k\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}f}} 'paper' is the understood object of the first verb component \text{\textual{t\text{\text{-}}}u\text{\text{-}}} 'throw', and \text{\textual{\text{\text{-}}}ak\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}u\text{\text{-}}}k\text{\text{\text{\text{-}}}w\text{\text{\text{\text{-}}}f}} 'paper' is also the understood subject of the second verb component \text{\textual{\text{-}}}f\text{\text{-}}}u 'be lost'. Other compounds with this causative interpretation include (6)-(9).

(6) \text{\textual{f\text{\text{-}}}u\text{\text{-}}}n\text{\text{-}}}y\text{\text{-}}}u 'blow out' \text{\textual{f\text{\text{-}}}u 'blow' \text{\textual{n\text{\text{-}}}y\text{\text{-}}}u 'be off'
(7) \text{\textual{c\text{\text{-}}}p\text{\text{-}}}u 'drive out' \text{\textual{c\text{\text{-}}}u 'pursue' \text{\textual{p\text{\text{-}}}u 'exit'
(8) \text{\textual{t\text{\text{\text{-}}}w\text{\text{\text{-}}}a 'shatter (tr.)' \text{\textual{t\text{\text{-}}}f 'hit, beat' \text{\textual{w\text{\text{-}}}a 'split open (intr.)'
(9) \text{\textual{k\text{\text{-}}}w\text{\text{-}}}c\text{\text{-}}}f 'push shut' \text{\textual{k\text{\text{-}}}w 'push' \text{\textual{c\text{\text{-}}}f 'be shut, be blocked'

In a transformational statement deriving sentences with such verb compounds from multi-sentential sources, the identity of the object of \(S_1\) and the subject of \(S_2\) must be stipulated, as in condition (ii) of (5). However, not all sentences with verb compounds have this sort of causative interpretation. For example, a compound like (10)
(10) gbáfu
    'run away, escape'

has the components gbá 'run' and fu 'be lost', and, in a sentence like
(11), gb 'he' is the understood subject of both components of the compound.

(11) gbáfu
    he run-away-TNS
    'He escaped.'

Other compounds with this same-subject interpretation include (12)-(16). In
sentences with these compounds, both components of the compound share
the same understood subject.

(12) gafè : gá  
    'go across, go past'  
    'go'  
    fè  
    'cross, pass over'

(13) týgbú : tý  
    'beat to death'  
    gbú  
    'hit, beat'  
    'kill'

(14) bólá : bú  
    'carry home'  
    lá  
    'go home'

(15) gbába : gbá  
    'run into'  
    bà  
    'carry'  
    'enter'

(16) gbápù : gbá  
    'run out from'  
    pù  
    'run'  
    'exit'

For same-subject compounds like these, a statement like condition (ii)
of (5) is inappropriate; an alternative condition like '1=6' would be
required to allow for the identity of the subjects of $S_1$ and $S_2$.

But even with this alternative, a transformational generalization is
not always possible because of the unpredictable behavior of many compounds.
For example, the compound (12) gafè 'go across, go past' occurs in (17);
its components gá 'go' and fè 'cross, pass' appear in (18) and (19),
respectively.

(17) gb. gáfèrè  ìlo  åkwúkwọ
    he go-past-TNS school
    'He went past the school.'

(18) gb. gârâ  ìlo  åkwúkwọ
    he go-TNS school
    'He went to the school.'
(19) *ọ fèrè ụọ ụkwụkwọ
he pass-TNS school
'He passed the school.'

A multi-sentential source for (17) would presumably include (18) and (19), but (19) is not an acceptable Igbo sentence. The verb fè 'cross, pass' can take as objects words glossed as 'bridge', 'boundary', 'us', but not 'school'. Yet the compound gáfè 'go across, go past' can take 'school' as an object. This difference in selectional restrictions (i.e., difference in meaning) between fè as an independent verb and fè as a component of a compound appears to be idiosyncratic.

Similar selectional irregularities are encountered when we attempt to use a generalization like (5) to derive (8) tïwå 'shatter (tr.)', with components tî 'hit, beat' and wå 'split open'. If we give the compound verb in (20) a same-subject interpretation, we find that the plausible underlying sentences, (21) and (22), are not well-formed in Igbo.

(20) ọ tïwådá ọfèrè ạ
he shatter-TNS plate the
'He shattered the plate.'

(21) *ọ tîrî ọfèrè ạ
he hit-TNS plate the
'He hit the plate.'

(22) *ọ wárdá ọfèrè ạ
he split-open-TNS plate the
'He broke the plate.'

A sentence like (21) is odd in Igbo. The verb tî 'hit, beat' can be used in sentences glossed literally as 'He hit the man a blow' or 'He hit his hand on the chair,' but (21) is semantically odd in a way that (20) is not; anyone might shatter a plate, but only a lunatic would try to beat a plate. Thus 'plate' can not serve as the object of the independent verb tî, but it can serve as the object of a compound having tî as a component. This fact reflects a meaning difference between tî as an independent verb and tî in combination with another verb in a compound.
In sentence (22) the noun éféré 'plate' as an object is unacceptable. The verb wa 'split open' can be transitive in some environments, but not with éféré 'plate' as an object. The situation is improved somewhat if we give the compound a causative interpretation (i.e., interpret it as meeting condition (ii) as stated in (5)); the second underlying sentence would then be (23) instead of (22).

(23) éféré a wárá
    plate the split-open-TNS
    'The plate broke.'

But (21) is still not acceptable as a partial source for (20). Meaning differences such as these appear to be idiosyncratic and unpredictable, making transformational generalizations difficult to maintain.

The structural description in (5) was given as $S_1$ CONJ $S_2$; this configuration does not occur as a surface structure in Igbo. There is a "consecutive" construction, however, in which the verb of the first sentence sets the tense, and the verb of the second sentence takes a vowel prefix and suffix of predictable quality and tone. For example, the consecutive construction corresponding to (24) and (25) is (26).

(24) ọ tìrl nwoọké ọhụ ọkpọ
    he hit-TNS man that blow
    'He hit that man.'

(25) ọ gbùrù nwoọké ọhụ
    he kill-TNS man that
    'He killed that man.'

(26) ọ tìrl nwoọké ọhụ ọkpọ, gbùn ya
    he hit-TNS man that blow kill-CONSEC him
    'He hit that man and killed him.' (He could have killed him by some means other than hitting.)

The sentence with a compound corresponding to (24) and (25) is (27).

(27) ọ ịgbùrù nwoọké ọhụ
    he beat-fatally-TNS man that
    'He beat that man to death.'
It might be suggested that the consecutive construction (26) could serve as a synchronic source for the compound in (27). However, (26) and (27) differ considerably in meaning. The consecutive construction "expresses an action following another action in sequence, or an action independent of another action" [Welmers and Welmers 1968b:139]. In contrast, the components in a compound verb do not express actions independent of each other. The compound indicates an event; the first component refers to an action, and the second component refers to the goal or result of that action.

In sentence (27), with a compound verb, the man's being killed was a direct result of his being hit; in (26), with a consecutive construction, the man's death was not necessarily a result of his being hit. Thus any transformational statement deriving (27) from (26) would involve a significant change in meaning. Deriving (27) from (24) and (25) by means of a transformational statement like (5) would involve a similar meaning change, unless the abstract entity CONJ were given semantic content like 'and as a direct result'.

An English speaker, hearing a sentence like 'He hit the man and killed him,' might ordinarily assume that the man's being killed was a result of his being hit; however, it should be noted that the use of a coordinate structure with 'and' by no means requires such an assumption on the part of the hearer; the killing could have been carried out by other means.

Similarly, an Igbo speaker hearing the consecutive construction in (26) might assume an action-result connection between the hitting and the killing, but the use of this construction does not require an action-result interpretation. Such an interpretation on the part of the hearer might be a plausible inference in a given context; however, possible inferences should be differentiated from actual meaning inherent in a grammatical

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4 When a speaker intends no action-result message for a consecutive construction like (26), to ensure that the listener does not make the wrong inference, the speaker may separate the two clauses with another verb, mês!", literally 'finish', in the consecutive form translated as 'and then'. For example,

(i) ọ ọrị nwọkọ ọhụ ọkpọ, mês! gbọọ ụdị
he hit-TNS man that blow finish-CONSEC kill-CONSEC him

'He hit that man, and then killed him.'
construction. An Igbo verb compound, as in (27), requires an action-result interpretation; a consecutive construction, as in (26), does not.

It is doubtful that transformational derivations should be employed when they involve such a degree of meaning change. Furthermore, for some compounds there are no corresponding consecutive constructions. That is, corresponding to the compound verb in (17) (repeated here) we might expect a consecutive construction like that in (28), but (26) is unacceptable in Igbo.

(17) ọ gáférà ọ̀kà ìkwúkwe
      he go-past-TNS school
      'He went past the school.'

(28) ọ gèrdà ọ̀kà ìkwúkwe, fèè yà
      he go-TNS school pass-CONSEC it
      '?He went to the school and passed it.'

We are unable to justify, then, a transformational derivation of verb compounds from a multi-sentential source or from the consecutive construction in Igbo.

3. Deriving verb-suffix compounds transformationally

In the compounds discussed so far, both components occur elsewhere as independent verbs. However, there are also polysyllabic verbs in which the second component does not occur elsewhere as an independent verb. These verb-suffix compounds behave like the verb-verb compounds, and the occurrence of most suffixes is extensive enough so that a meaning and inherent tone can be assigned. These suffixes are described by Ward [1936], Green [1964], and Welmers [1970], among others. For a number of suffixes there are homophonous verbs, or phonologically similar verbs, with related meanings. This situation poses a problem for the Igbo dictionary-maker. For example, Williamson [1972] notes that in some cases there is great difficulty in determining whether a particular element is a verb or a suffix. For example, she lists the suffix -ká 'apart, asunder', but notes that it is probably better regarded as a specialized meaning of the verb ká 'be torn'. From their form and behavior we can infer that many, if not all, of these suffixes have evolved from verbs historically.
Like verb-verb compounds, the verb-suffix compounds occur with causative and same-subject interpretations. For example, causative verb-suffix compounds include (29)-(33).

(29) bèká : bè -ká
'cut up' 'cut' 'apart'

(30) sèká : sè -ká
'tear by pulling' 'pull' 'apart'

(31) tàká : tá -ká
'spoil by biting' 'bite' 'apart'

(32) rífcá : rí -cá
'eat up' 'eat' 'be finished'

(33) tífú : tíf -lú
'bruise' 'hit' 'be spoiled'

The suffix -cá 'be finished' in (32) is homophonous with the verb cá 'be ripe, be reddish or light-colored'. The verb and suffix are related semantically; a ripe fruit is in some sense completed or finished. But here the meaning relationship between suffix and homophonous verb is not as direct as in the case of the suffix -ká 'apart, asunder' and the verb ká 'be torn'.

The suffix -lú 'be spoiled' occurs in (33). There is a semantically similar verb lú 'be faulty, be defective', but the suffix and verb are not completely homophonous since the suffix is low tone and the verb is high tone. For many suffixes there is no phonologically similar verb with relatable meaning.

Verb-suffix compounds with same-subject interpretation include (34)-(36).

(34) nòsí : nò -sí
'finish staying' 'be at (a place)' 'finish'

(35) félárf : fél -lárf
'fly away from' 'fly' 'away from'

(36) kwúgídé : kwú -gídé
'speak against' 'speak' 'against'

Some suffixes are disyllabic, as illustrated by (35) and (36). Williamson [1972] lists these as disyllabic suffixes, but the history of the suffix -gídé 'against' in (36) is suggested by the Onitsha dialect form -jídé, the verbs jí 'hold' and dé 'put, place', and the compound jídé 'hold, grasp'.
Most suffixes appear to be attachable to just about any verb, as long as the resulting meaning combination makes sense. This degree of productivity, plus predictability of meaning of the resulting compound, might suggest that a transformational derivation from a bi-sentential source as outlined in (5) would be appropriate. However, deriving, say, (32) ríćá 'eat up', in (37), according to (5), would require as input (38) and (39).

(37) ści ríćárdá ónèrè ądù
     he eat-up-TNS banana that
     'He ate up that banana.'

(38) ści rí̄r̄í ónèrè ądù
     he eat-TNS banana that
     'He ate that banana.'

(39) ónèrè ądù cárá
     banana that be-ripe-TNS
     'That banana is ripe.'

But the meaning of -ćá as a suffix is 'be completed, be finished'; it does not occur as an independent verb with this meaning. The meaning of cá as an independent verb is 'be ripe'. Deriving a verb-suffix compound transformationally would require us to set up an underlying sentence with a suffix instead of a verb; since such sentences never occur, that degree of abstraction would be difficult to justify. Verb-suffix compounds parallel verb-verb compounds (as noted above, the distinction between verbs and suffixes is not a sharp one). Formation of both types of compound should be accounted for in the same component of the grammar. Therefore, the implausibility of deriving verb-suffix compounds transformationally constitutes one more argument against deriving verb-verb compounds transformationally.

To summarize at this point: the meaning of a verb-verb compound may differ from the combined meanings of its components; this may result in different selectional restrictions on objects. A sentence with a verb-verb compound requires an action-result interpretation for the subparts of the event represented by the components, and in this respect it differs from the consecutive construction and from two simplex sentences in juxtaposition. The meaning discrepancies argue against a transformational derivation. Verb-suffix compounds do not lend themselves to transformational derivation; they are similar to verb-verb compounds and have
probably evolved from them historically.

A few related facts deserve mention. Further meaning differences sometimes result in different strict subcategorization frames for compounds and their components. Sometimes the strict subcategorization and selectional features of the component verbs are retained in the compound. For example, the verb \textit{lù} 'fight' requires an object noun like \textit{àgbû} 'fight' or \textit{àghá} 'battle'. The verb \textit{sò} 'follow, accompany' takes an object noun, for example, \textit{ànyì} 'us'. When these two verbs form a compound, both obligatorily retain their objects, as in (40).

\begin{align*}
\text{(40) hà lùsóòò ògù \quad \text{anyì \, ògù} } \\
\text{they fight-against-TNS \, us \, fight} \\
\text{They fought against us.}
\end{align*}

Corresponding to Central Igbo \textit{lù} 'fight' is the Onitsha dialect verb \textit{nụ} 'fight'. Williamson [1972] lists the Onitsha compound \textit{nụsò} 'fight against' in three ways—as taking \textit{àgbû} 'fight', or \textit{àghá} 'battle', or neither (the objectless form may be a dialect variant, or even an option within an idiolect). Welmers and Welmers [1968a] list the verb \textit{lù} 'fight' and the compound \textit{lùsò} 'fight against' as requiring the object noun \textit{ògù} 'fight', but they list the compounds \textit{lụgídé} 'fight against' and \textit{lụgbú} 'defeat in a fight' without it, as in (41) and (42).

\begin{align*}
\text{(41) ògù \, lụgídé \, hà} \\
\text{we \, fight-against-TNS \, them} \\
\text{'We fought against them.'}
\end{align*}

\begin{align*}
\text{(42) òkọ́yé \, lụgbúrù \, yà} \\
\text{defeat-in-a-fight-TNS \, him} \\
\text{'Okoye beat him.'}
\end{align*}

One informant regards (42) as a marginal usage. The verb \textit{lù} 'fight' always requires an object when it occurs independently; it does not always require an object when it occurs as part of a compound. Historically, it is possible that the objectless versions represent examples of semantic incorporation where the compound verb has acquired the meaning of the object. The verb \textit{lù} 'fight' occurring independently has not participated in this semantic incorporation, and this semantic and syntactic non-equivalence argues further against a transformational derivation.
The verb ṣẹ 'fight' is not an exception in this respect. For example, the verb ṣẹ 'hit' requires two objects when it occurs alone as in (24) or in a consecutive construction as in (26), but not when it occurs in a compound as in (27) or (20). Another example, the transitive verb gbá, has the basic meaning 'participate in'. It occurs in combination with many different objects. When it occurs with the object noun ṣọọ 'race, speed', it is translated as 'run'. When it occurs with the object noun ẹgbẹ 'gun' or ọtẹ 'bow', it is translated as 'shoot'. Thus, we find:

(43) gbàrà ṣọọ
    he run-TNS race
    'He ran.'

(44) gbàrà ṣọọ gbà ẹgbẹ n'agbọh
    he shoot-TNS friend his gun accidentally
    'He shot at his friend by accident.'

(45) *gbàrà
    he participate-in-TNS

The verb gbá occurs in compounds like

(10) gbafù
    'run away'

and

(46) gbágbú
    'shoot fatally' (literally, 'shoot-kill')

but in these compounds it does not take the noun objects required above; we find:

(11) gbafù
    he run-away-TNS
    'He escaped.'

(47) *gbafù ṣọọ
    he run-away-TNS race

(48) gbágbú gbà ṣọọ gbà gbafù
    he shoot-fatally-TNS friend his accidentally
    'He fatally shot his friend by accident.'

The meaning of a compound is not altogether predictable. As these examples illustrate, the strict subcategorization frame of a compound does not always correspond to those of its components. A sentence
containing a verb compound lacks equivalence, at several levels, with sen-
tences containing the compound's component verbs. Derivation by trans-
formational rule is not a viable option.

4. Accounting for Compounds Within the Lexicon

Since Igbo verb compounds are not regular enough for a transformation-
al derivation, they will presumably have to be listed individually in the
lexicon. But to merely list each verb compound separately in the lexicon, and
stop there, would be to ignore the obvious morphological and semantic/
syntactic similarities between a compound and its component verbs; also,
the special action-result relationship between the components would go
unrecognized. How might these facts be accounted for within the lexicon?

If we apply a proposal by Halle [1973] to the facts of Igbo, the
grammar would contain a list of verbs and suffixes; a rule of word for-
modation would produce all potential compounds of the language. Then a
"special filter" would add idiosyncratic information such as unpredictable
meaning for a given compound. If the lexicon contains a list of CV verbs
and suffixes, the morphological shape of most compounds can be derived
by simple compound-forming rules. To a certain extent, the semantic/
syntactic properties of the resulting compounds can be predicted from a
knowledge of the components plus a knowledge of the rules combining them.
But Halle's proposal is difficult to evaluate, because his sketch does
not spell out just what kinds of information the combining rule may or
may not contain, or the nature of the mechanisms inside the filter.
Adding a new component to the grammar is a rather large step, particularly
when other components of the grammar are capable of fulfilling the func-
tions of such a filter.

Under the general approach proposed by Starosta [1971a, 1971b] and
Thompson [1973, 1974], completely productive word-formation processes
would be represented by lexical derivation rules. But it appears that
many such rules make use of much the same sort of information as "trans-
formational" rules, and the basis for distinguishing between a transform-
ational and a lexical process is not always clear. Compounds with meaning
idiosyncrasies would be listed separately in the lexicon, and similar items
would be related through lexical redundancy rules. The form and meaning of Igbo compounds is to a large extent predictable, and the action-result meaning is always present. The process appears to be productive; new words can be formed according to the basic model. We can, following Thompson's formulation, write simple combinatory rules saying that a verb can be combined with a verb (V) or with a suffix (S) to produce a resultative verb compound (RV).

\[(49) V + V \rightarrow [V-V]_{RV}\]
\[(50) V + S \rightarrow [V-S]_{RV}\]

The RV label on the compound indicates the fact that the second component represents the goal or result of the first component. As noted in section 1, the first component can be just about any action verb, and the second component can represent a state or an action; this is an unsurprising consequence of the meaning relationship between the two components. Also, as pointed out to me by Larry Hyman [personal communication], the fact that an affix can be the second component but not the first component is what one would expect, given the meaning relationship: the second component represents the result, which is semantically secondary to the action represented by the first component. Or, put another way, the element that was less significant semantically became relegated to affix status morphologically.

The actual verbs and suffixes which can join to form compounds according to the combinatory processes (49) and (50) are otherwise limited only by the possible lack of a situation in the speaker's intellectual or cultural experience that would be appropriate to the meaning of the compound. We could add generalizations to (49) and (50). For example, a compound made

\[5\] It appears that the only compounds that don't occur are ones that don't make sense in terms of the language-user's experience. However, a few suffixes appear to have quite limited distributions, and it is difficult to determine whether this is due to highly restricted meaning. It is possible that some of these have become non-productive suffixes (cf. -th in English warmth); in this case, the word would be a frozen form. The suffix would no longer be listed in the lexicon, and the words with the suffix would each have separate lexical listings.
up of an action verb followed by a stative verb (or suffix) tends to have a causative interpretation (as in (1), (6)-(9), and (29)-(33)) where the same referent is the object of the first component and also the subject of the second component. But exceptions to this generalization occur (for example, (10)). Another possible generalization is that a compound comprised of two action verbs tends to have a same-subject interpretation (as in (12)-(16), and (46)); but not all same-subject compounds have action verbs (for example, (34)). It is debatable whether such near-generalizations should be built into combinatory rules like (49) and (50) in a synchronic account, although they probably reflect the original principles of compound-formation historically. The speaker, given the meanings of the components and the combinatory rules, probably perceives relations like these through inference based on his understanding of the world he lives in.

According to Thompson [1973], compound verbs in Mandarin Chinese are made up of two parts, the first indicating an action and the second the result of that action. The first component is a verb, and the second component can be a verb or a suffix. Thus, Mandarin verb compounds closely parallel Igbo verb compounds in both form and meaning. In stating combinatory rules for productive formation of resultative verb compounds in Mandarin, Thompson [1974] labels the components as, for example, "action", "state", "motion", "direction", and does not explicitly specify the action-result meaning relationship. Although Mandarin and Igbo compounds are alike in that the second component is understood as being the direct result of the first, she claims that this is not something which is specified by the grammar; rather, it is inferred by the language-user on the basis of his understanding of causes and results in the world he lives in.

I would argue that the specification of the action-result relationship is a necessary part of the meaning of the compound and is not merely an inference based on the speaker's experience. A comparison of the meaning of serial verb constructions in other Kwa languages and Mandarin provides an interesting perspective. Within the Kwa grouping, serial verb constructions are found in many languages but not in Igbo. The action-result meanings expressed by verbs in compounds in Igbo are expressed by verbs
in serial verb constructions in other Kwa languages—for example, Yoruba. In Mandarin we find serial verb constructions in addition to verb compounds. However, serial verb constructions in a language like Yoruba require an action-result interpretation, while in Mandarin the interpretation of serial verb constructions is not specified; in Mandarin they are used in a range of contexts, and possible inferences include consecutive actions, simultaneous actions, alternating actions, or purposive action. In this respect the Mandarin serial verb construction differs from its Kwa counterpart. The action-result interpretation of serial verb constructions in Yoruba must be stated as a part of the grammar, as it must for resultative verb compounds in Igbo and Mandarin. In comparing the three languages, we note that Igbo uses verb compounds for action-result meaning, and consecutive constructions for unspecified meaning relationships; Yoruba uses serial verb constructions for action-result meaning, and so-called coordinate (s1) constructions for unspecified meaning relationships; Mandarin uses verb compounds for action-result meaning, and serial verb constructions for unspecified meaning relationships. This is summarized in chart (51).

<table>
<thead>
<tr>
<th></th>
<th>A action-result interpretation required</th>
<th>B interpretation left to pragmatic inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Igbo</td>
<td>verb compounds</td>
<td>consecutive constructions</td>
</tr>
<tr>
<td>Yoruba</td>
<td>serial verb constructions</td>
<td>coordinate constructions</td>
</tr>
<tr>
<td>Mandarin Chinese</td>
<td>verb compounds</td>
<td>serial verb constructions</td>
</tr>
</tbody>
</table>

6 The requirement of an action-result interpretation for serial verb constructions in Yoruba is discussed in Lord [1974]; the meaning of serial verb constructions in Mandarin is discussed in Li and Thompson [1973].

7 Yoruba serial verb constructions have same-subject as well as causative readings, as described in Lord [1974]. Both readings occur for all the structures listed in chart (51), except that in Mandarin the causative reading for serial verb constructions has become archaic, according to Li and Thompson [1974].
As chart (51) illustrates, an action-result interpretation is of course by no means universally associated with a given syntactic configuration. For all three languages, the grammar must state this relationship for the constructions in column (A).\footnote{Elsewhere, Li and Thompson [1974] define causative verb compounds as a sub-class of resultative verb compounds, thus excluding those resultative verb compounds like verb-’finish’in which the meaning is not clearly causative. But among the large number of forms cited in Thompson [1973], there are only a handful for which the action-result interpretation does not seem to fit well. These contain suffixes with modality meanings like 'continue to', 'can', 'succeed in', 'afford to', 'come to', and 'finish'. Suffixes with similar meanings occur in compounds in Igbo, and their meanings are not altogether incompatible with the action-result relationship between the components of other verb compounds. For example, the suffix -cà 'be completed' can be glossed as (a) or (b):}

\begin{enumerate}
\item \texttt{ẹ rícáà rúnré ónụ}
\begin{enumerate}
\item 'He ate up that banana', i.e., 'He ate that banana, with the result that the banana is finished.'
\item 'He finished eating that banana', i.e., 'He ate that banana, with the result that his banana-eating is finished.'
\end{enumerate}
\end{enumerate}

\textit{The compound rícà 'eat up' was formed according to the generalization expressed in rule (50). The sentence can be translated as (a), and from this reading it takes only a slight semantic shift to get the reading (b). In most real-life situations, the need for a distinction between readings (a) and (b) is not crucial. It may well be that the historical development of modality interpretation for -cà 'be completed' occurred in just this way, originating with (a) and gradually shifting to (b) (rather than necessarily developing as a verb with an embedded sentence complement). Viewed from this perspective, the compounds with modality meanings are essentially causative as well as resultative, but have undergone a slight semantic shift.}
columns (A) and (B) in (51) suggests a similar "reason" for Igbo verb compounds and Yoruba serial verb constructions. There is no evidence to support the view that Igbo verb compounds developed historically from consecutive constructions, as a result of transformation-like movements of elements in sentences. Rather, it is likely that they developed in addition to consecutive constructions, to share the "semantic space" and meet the need for a construction to denote action-result relationships.

Combinatory rules like (49) and (50) make only modest claims. But, importantly, they do provide for the formation of compounds composed of more than one component. For example, the verbs gbú 'cut' and jì 'snap off' are combined according to (49) to produce the compound gbújì 'cut down'. This new compound is a lexical unit, a verb which can itself participate in the formation of new words according to (49) and (50).

For example, the verb gbújì 'cut down' can combine with the suffix -cà 'be finished' according to (50) to produce gbújìcà 'cut down completely, finish felling'. The verb dà 'fall' plus the suffix -lár! 'away from' produces the compound dálár! 'fall away from' according to (50), and this verb in turn plus the verb ká 'exceed' produces dálár!ká 'fall out of grasp' according to (49). In this way a compound produced by rule (49) or (50) can participate again as a verb in the formation of a new compound according to (49) or (50). Verb compounds of four and five components do exist, but they do not occur frequently.

Rules like (49) and (50) represent how compounds are interpreted by the language-user. The hearer understands a compound in terms of components in an action-result relationship. The rules reflect the hearer's ability to correctly interpret a compound that he has not heard before, as long as he is familiar with the components. For example, if the hearer is familiar with the meanings of (52)-(54), he will probably interpret (55) correctly.

\[
\begin{align*}
(52) & \text{ nú} \quad : \quad \text{nútù} \\
& \quad \text{'push'} \quad \text{push down'} \\
(53) & \text{wè} \quad : \quad \text{wètù} \\
& \quad \text{'take'} \quad \text{'bring down'} \\
(54) & \text{cú} \\
& \quad \text{'pursue'}
\end{align*}
\]
(55)  cútù
'drive down'

Also, if he is familiar with (52)-(54) but has not heard (55), it is not surprising that he produces it in an appropriate context. The speaker's production of (55) as a novel (for him) utterance illustrates rule (50) as a generalization about word formation; his understanding of (55) illustrates rule (50) as a generalization about word interpretation.

5. Providing Lexical Entries for Compounds

For some compounds the full meaning of the word is not apparent, even if the hearer is familiar with the individual components and the nature of the action-result relationship underlying compounds as represented in (49) and (50). For example, given the verb components kà 'say' and sà 'answer', along with rule (49), the meaning of the compound

(56)  kàsà
'complain to'

is not fully predictable. Similar instances are (57)-(61), in which the meaning of the compound involves slightly more than the combined meaning of the individual components.

(57)  kàsà
'spread information, spread open'

(58)  cèfù
'forget'

(59)  cètá
'find'

(60)  mègbú
'oppress'

(61)  gáhú
'go again, go back'

(Examples (56) to (61) are from Igwe and Green [1970].)

Some compounds take on more pronounced idiomatic meanings, such as (62)-(65).

(62)  zgógbú
'cheat in marketing'

(63)  sògbú
'harass, persecute; worry (intr.)'

(Examples (62)-(65) are from Igwe and Green [1970].)
The compound (65) also has a more literal meaning, 'gnaw, eat up'. The hearer may know all the individual morphemes in compounds (66)-(65) as well as the generalizations in rules (49) and (50), yet this will not enable him to correctly interpret these compounds; it will give him part, but not all, of the meaning.

Ward [1936] cites a few two-syllable verbs which do not appear to be relatable to verb or suffix components, for example, (66)-(68).

(66) gbó
   'keep'

(67) gbó
   'stand still'

(68) gbó
   'show'

The components of (66) might be plausibly related to the verbs gbó 'put, place' and gbó 'stop', but for (67) and (68) no such relationships are apparent. The lexical entries for (67) and (68) are not relatable to entries for any component verbs or suffixes which might provide clues as to their meanings. Therefore, remembering the meaning of a verb like (67) or (68) is more taxing than remembering the meaning of, say (66)-(65) when the individual components are already familiar. And, in terms of an overall evaluation metric for the grammar, verbs like (67) and (68) should "cost more".

Models of the lexicon that account for facts like these are proposed

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9 It can be argued that -gbó should be listed as a suffix meaning 'decisively' or 'to an extreme result'; this makes it possible to predict the meanings of (16) t'gbó, 'beat to death' and similar compounds meaning 'stone to death', 'stomp to death', 'shoot to death', 'squeeze to death', etc., as well as (63) sògbó, 'smear'. This also accounts for the alternative interpretation of (27) as either 'he beat that man to death' or 'he defeated that man in a fight'. However, idiosyncracies of meaning remain for compounds like (60) n'góbó 'oppress' and (62) gbó 'cheat'.

by Gruber [1967] and by Jackendoff [1974]. Each compound and component would be listed in the lexicon, with complete morphological, syntactic and semantic information. Compounds would be related to their component morphemes by redundancy rules, and the redundant information in the entry for the compound would be recognized and reflected in a lower economy measure. Thus, (13) tfgbu 'beat to death' is cheaper than (67) gudog 'stand still', because it is relatable to tf 'hit' and gb 'kill'. Somewhere between these two in terms of cost is (56) kadsa 'complain to', because it is relatable to ka 'say' and sa 'answer', yet its entry must contain the added information that its meaning involves complaining as well as saying and answering.

Clearly, then, independent lexical entries are required for disyllabic verbs like (67) and (68). And the best way to represent the unpredictable semantic content of compounds like (56)-(65) is to include it as part of a separate lexical entry for each compound. Likewise, compounds with unpredictable strict subcategorization frames and selectional restrictions require their own lexical entries. We might choose to list all these compounds in the lexicon and derive all other compounds by means of lexical rules like (49) and (50); this solution would be analogous to that proposed by Thompson and by Starosta. Such a treatment makes a sharp division between the representation of predictable combinations as opposed to that of idiosyncratic combinations; a compound does not have its own lexical entry until it begins to deviate semantically from its components. For Igbo verb compounds the line separating listed compounds from derived ones seems to be fuzzy at best. Once a word is formed, it is immediately subject to use in special ways in special contexts, and the information in its lexical entry is subject to alteration. Among the compounds with lexical listings, at least, there appears to be a continuum: some compounds are more idiosyncratic than others—that is, their listings contain more unpredictable information—and some are totally "frozen". Since separate listings are required for many compounds, why not set up lexical entries for all compounds? The entries for predictable combinations would then differ from the others only in lacking idiosyncratic information. This would be consistent with the description of what appears to be the historical
development of these compounds: formation is by means of rules which may be to some extent transformational, resulting in a fully redundant lexical entry. When the meaning of the compound and that of its components begin to diverge, the entries are no longer equivalent. As the meanings diverge even more, speakers begin to lose sight of the historical relationship, and assimilatory phonological processes are allowed to apply, obscuring the relationship further. The redundancy between the entries diminishes, resulting in polysyllabic verbs with no redundancy relationships to component entries.

The lexicalization process affects vowel harmony in Igbo. Monomorphemic words ordinarily reflect a vowel harmony pattern; the vowels i o ø u comprise one set and i a ø y comprise another (although dialects vary), and all the vowels in a given word will come from one set. When the components of a compound come from different sets, the compound may violate the pattern. Speakers sometimes impose harmony on a compound, resulting in predictable inconsistency among different dialects and sometimes within a single idiolect. For example, Green [1964] notes that when the verb cå 'be ripe' occurs as a suffix meaning 'be completed', it harmonizes with the vowel of the verb in one dialect but not in Qhuyhù.

It appears that as long as speakers still relate an independent verb and a homophonous suffix semantically, the verb vowel is retained; when speakers lose sight of the semantic relationship, they permit assimilation of the value of the feature that distinguishes the two harmonic sets, and the suffix harmonizes with the preceding component. Again, this is what we would expect, given that the first component is the heavier component semantically in the action-result meaning relationship.

When a component moves from verb to suffix status, the semantic shift probably comes before the phonological assimilation; the shifted semantics are what allows the phonological assimilation to take place. But the process is a gradual one, and an individual speaker sometimes varies in his pronunciation of a given compound, producing both harmonized and non-harmonized versions, the latter in careful speech. The general diachronic development is discernible and reasonable. But a semantic shift is difficult to pinpoint in time, and in a synchronic account the point at which
separate lexical listings are required (for suffixes and for compounds) is fuzzy. At any rate, we would expect to find no violations of vowel harmony in unanalyzable polysyllabic verbs like (67) and (68), and we indeed find none.

6. Generating compounds by phrase structure rules

In Carrell's [1970] transformational description of Igbo, verb suffixes are generated by phrase structure rules; the category AUX is expanded by a branching rule to a number of categories including "meaning modifying suffix" (hereafter MMS). The category MMS is expanded, in turn, to three lexical categories of adverbials, Adv₁, Adv₂, and Adv₃. According to Carrell, these are used frequently to modify or make more precise the basic meaning of a verb. Included in the sample lexicon are

(69) Adv₁: ƙÁ [+MOTION TOWARDS]
    Adv₂: ƙwÁ [+REPEETITION]
    Adv₃: r [+BENEFACITIVE]
    cÁ [+COMPLETIVE]
    sÍ [+DISTRIBUTIVE]

Carrell's grammar generates these suffixes as part of AUX, and a transformation later removes them from domination by AUX to domination by the node V, transposing them to a position following the main verb. According to Carrell, as a result, the V is either a simple verb stem, or a verb stem plus any MMS's. She would presumably consider (29)-(33) and (34)-(36) as cases of verb stem plus MMS. Since all the verb stems in Carrell's lexicon are monosyllabic, Carrell leaves unaddressed the question of the source of disyllabic verbs in which the second syllable occurs as an independent verb, as in (6)-(9) and (12)-(16), as well as disyllabic verbs like (66)-(68) which are apparently not analyzable into components. It is possible that she considers what I have called verb-verb compounds to be cases of verb stem plus MMS, but this would require verbs to have parallel lexical listings as MMS's; e.g., ƙbú 'kill' occurring alone would be a verb, but as a component of ƙịgbú 'beat to death' it would be a MMS. Such extensive duplicate listings for verbs would be hard to justify.
In the case of apparent disyllabic verbs like (67) and (68), analysis as verb stem plus MMS would be unmotivated, since the individual syllable components would have no identifiable semantic content.

Since the syntactic behavior of verb-verb compounds parallels that of verb-suffix compounds, a treatment of verb-suffix forms that does not also account satisfactorily for verb-verb forms leaves something to be desired. These verb suffixes are not best represented as elements of phrase structure. Since phrase structure rules define and reflect constituent structure within a sentence, the implication of Carrell's rule is that each MMS is a constituent. However, there is nothing to indicate that this is the case. The verb-suffix combination occurs in sentences as an inseparable unit; nothing else ever occurs between the verb and the suffix. Speakers appear to regard the resulting compound as a word and can give a definition of it. A phrase structure account like Carrell's suggests that the verb stem can optionally occur with one member from one or more of the categories Adv₁, Adv₂, and Adv₃, implying a maximum of four components per V, despite the fact that verbs of five components do exist. In contrast, combinatory rules such as (49) and (50) imply no such inherent limit, since the result is a new V that can be recycled back through the rule. Carrell's phrase structure rule provides for a fixed order of suffixal elements, i.e., members of Adv₁ always precede members of Adv₂, which in turn always precede those of Adv₃. However, this does not seem to be borne out; in fact, Welmers [1970] has demonstrated that the suffix cited by Carrell as Adv₂, kwa [ + REPEITION], in (69), even occurs after certain inflectional suffixes and therefore should be assigned a status apart from other verb suffixes. (The question of acceptable order of suffixes is complicated by apparent variations between speakers of different dialects and within idiolects.)

I would reject, then, an analysis that generates verb compounds by means of phrase structure rules. They involve considerations of word-formation rather than constituent structure.

7. Conclusion

The previous attempt to account for compounds in Igbo within a generative grammar framework, in Carrell [1970], generated verb suffixes
by means of a phrase structure rule and formed compounds by means of a subsequent transformation; such an approach is not adequate to account for the compounding process.

The action-result meaning of Igbo verb compounds distinguishes them semantically from consecutive constructions, and the meaning of a compound has in many cases shifted away from the combined meaning of its components. Because of the special action-result meaning of compounds, plus their many idiosyncrasies, they are not derivable by transformational rule. Listing all compounds in the lexicon enables us to reflect the morphological and semantic relationships between compounds and components in terms of lexical redundancy rules, effecting a lower economy measure for the grammar (as proposed by Gruber [1967] and Jackendoff [1974]).

But since the compounding process appears to be productive in Igbo, and new compounds are readily created and understood, the grammar should also account for this capacity of the language-user. This can be done by setting up combinatory rules for compound formation. Jackendoff notes that once a redundancy rule is learned, it can be used generatively, but, as Thompson [1974] points out, such a provision still fails to distinguish productive word-formation processes from non-productive forms. To account for the speaker's productive capacity, a combinatory rule needs to be stated in the grammar.

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