Locality Constraints on the Interpretation of Roots and the Three-Layered VP Structure: Evidence from Verbal Nouns and Deverbal Nominalizations in Japanese[*]

1. Arad's (2003, 2005) Locality Constraint on the Interpretation of Roots

In her recent study on Hebrew denominal verb formation, Arad (2003, 2005) observes that in Hebrew, root-derived words receive a variety of semantic interpretations in the environment of the first-category defining head with which they are merged whereas word-derived words have compositional meanings predictable from existing input words. This observation is illustrated in (1a-g).

(1) √sgr

a.	CaCaC (v)	*sagar*	v, 'close'
b.	hiCCiC (v)	*hisgir*	v, 'extradite'
c.	hitCaCCeC (v)	*histager*	v, 'cocoon oneself'
d.	CeCeC (n)	*seger*	n, 'closure'
e.	CoCCayim (n)	*sograyim*	v, 'parentheses'
f.	miCCeCet (n)	*misgeret*	n, 'frame'
g.	CiCCeC	*misger*	v, 'to frame' (Arad 2003: 746)

(1a-f) illustrate the wide range of possible semantic interpretations assigned to the single root √sgr in a variety of verbal and nominal environments (known in the Hebrew literature as *Binyan*) within which it is realized as an actual word.[1] In these cases, it is very difficult, if not impossible, to predict this diversity of meanings associated with the root. Compare this paradigm with (1g). In this example, a new verb *misger* is derived from the existing noun *misgeret* (1f). This is evidenced by the fact that the verb shares with the base noun not only the consonantal root but also the nominal prefix *mi−*. Importantly, the derived verb here has a meaning entirely predictable from the combination of the meaning of the nominal base and the binyan (CiCCeC). Based on her detailed study on this and other similar cases of word formation in Hebrew, Russian, English, and Georgian, Arad establishes the generalization that root-based words may pick up various interpretations depending on their surrounding environments whereas the meaning of word-based words must be semantically tied to the meaning of their base and cannot have access to the interpretations that otherwise would be available to the root in the other environments. Arad dubs this generalization the Locality Constraint on the Interpretation of Roots as in (2).

[*] I am very grateful to XX for suggesting the analysis in section 4 to me as well as very helpful discussions on Arad's (2003, 2005)/Volpe's (2005) locality theory of word formation.

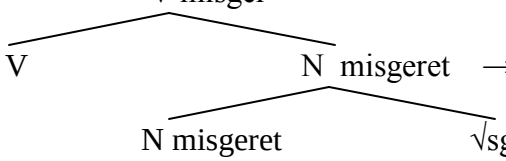
[1] Hebrew is traditionally characterized as a language with the non-concatenative templatic morphology. In this language, semantically related words is assumed to share a common tri-consonantal root as in √sgr, with actual words being formed by putting the root into a fixed array of vowels and consonant patterns. Since McCarthy (1979), the morphological status of tri-consonantal roots in Hebrew has been commonly expressed through a multi-tiered, non-linear representation that posits discontinuous segments of the root in a separate tier. However, this view has been challenged by work as in Bat-El (1994) and Ussishkin (1999, 2000).

(2) Locality constraint on the interpretation of roots: Roots are assigned an interpretation in the environment of the first category-assigning head with which they are merged. Once this interpretation is assigned, it is carried along throughout the derivation. (Arad 2003:747).

This constraint does not exclude the possibility that the meaning of the root combined with a category-defining head can be predicted from the semantic function of the head and a certain common semantic thread of the tri-consonantal root; there are many words composed of a root and a functional head whose meaning seems almost completely predictable. The point that (2) makes, however, is that an appreciable difference exists between root-derived words and word-derived words that prohibits the latter from being associated with a variety of interpretations that are freely available to the root.

Arad attempts to derive this constraint from certain assumptions of Phase Theory (Chomsky 2000, 2001, 2004) and Distributed Morphology (Halle and Marantz 1993; Harley and Noyer 1999; Marantz 1997, 2000, 2007; Embick and Noyer 2007). Marantz (2000, 2007) argues that all the category-defining heads (*n/v/a*) constitute phases. Then, once the root has merged with one of these heads, the resulting object is shipped to PF and LF, where its semantic and phonological interpretation is cashed out and fixed mid-derivationally. Thus, the next element that merges with this complex object cannot have access to the inner information within this object. As a result, the only possible semantic and phonological change is that contributed by additional (functional) heads. This analysis is illustrated in (3).

(3)



→ V merges with the noun *misgeret* 'frame', and has no access to √sgr

→ first category head N defines a phase. Interpretation is assigned to the noun at LF

(Arad 2003: 749)

Arad's analysis of (2) bears crucially on the issue of the universality of roots (Marantz 1997, 2000, 2007); if roots form a primitive in the feature pool of Universal Grammar, then all languages should obey (2). This point is explicitly stated by Arad as follows: "This locality constraint [(2)] is universal and holds across languages." (Arad 2003: 740). As noted above, Arad argues that (2) holds in Georgian, English, and Russian. In this regard, Japanese, as a typologically different language from Hebrew, English, Georgian, and Russian, presents an important testing ground for the universal root hypothesis. This squib presents supporting evidence for locality constraints on the interpretation of roots from verbal nouns and deverbal nominalizations in Japanese. In the next section, I present a novel observation, based on examples from verbal nouns of the Chinese origin, that of the two types of verbal nouns/VNs (*VN-suru* and *VN-o suru*), only the former is susceptible to idiomatic interpretation. I argue that this distinction is straightforwardly derived by Arad's theory; a VN-*suru* variant is formed by merging the light verb –*suru* with an acategorial root whereas a VN-*o suru* variant is formed by merging the verb with an already existing noun/*n*P.

In section 3, I examine deverbal nominalizations in Japanese discussed in Volpe (2005) that indicate (2) is too strong. I argue that the Three-Layered VP Hypothesis (Voice-*v*-√), recently proposed by Pylkkänen (2002) and Harley (2007, 2008), allows us to identify the structural domain for non-compositional interpretation below Voice. Section 4 is the conclusion.

2. Idiomatic Evidence for Arad's Theory from Verbal Nouns in Japanese

Japanese has a large number of verbal nouns/VNs that originate from Chinese (Martin 1975). The syntax and morphology of verbal nouns has been one of the most intensely investigated areas of the Japanese grammar (Grimshaw and Mester 1988; Miyagawa 1989; Tsujimura 1990; Kageyama 1993; Saito and Hoshi 2000). Like the tri-consonantal root in Hebrew, a verbal noun in Japanese is a bound root and must be supported for by the semantically vacuous light verb –*suru* 'do', as shown by the contrast between (4a) and (4b).[2]

(4) a. *Sachiko-ga benkyoo-ta.
Sachiko-Nom study-Past
'Sachiko studied.'
b. Sachiko-ga benkyo-si-ta.
Sachiko-Nom study-do-Past
'Sachiko studied.'
c. Sachiko-ga benkyoo-o si-ta.
Sachiko-Nom study-Acc do-Past
'Sachiko studied.'

As widely acknowledged in the literature (see the above-mentioned references), a verbal noun can occur either as a VN-*suru*, as shown in (4b), or as a VN-*o suru* with the accusative case, as shown in (4c). All VNs can occur in the VN-form, but not in the VN-*o* form. Drawing on the Argument Transfer Theory of Grimshaw and Mester (1988), Miyagawa (1989) shows that whether or not a given VN can occur with the accusative marker is determined by the (volitional) external argument-taking ability of the VN. Thus, *benkyoo* 'study' or *rikon* 'divorce' can occur in either variant whereas *tootyaku* 'arrival' can only occur as a bare VN. This is shown by the contrast between (5a, b) and (5c).

(5) a. Sachiko-ga **benkyoo(-o)** si-ta. (Transitive VN)
Sachiko-Nom study-Acc do-Past
'Sachiko studied.'
b. Sachiko-ga **rikon(-o)** si-ta. (Unergative VN)
Sachiko-Nom divorce-Acc do-Past
'Sachiko got divorced.'

[2] The following abbreviations are used in the data in this paper: Acc, accusative case; Cause, causative morpheme; Cont, continuative morpheme; Gen, genitive case; Neg, negation; Nmlz, nominalizer; Nom, nominative case; Pol, politeness marker; Past, past tense; Prog, progressive marker; Top, topic marker.

c. Sachiko-ga Tokyo-ni **toochaku(*-o)** si-ta. (Unaccusative VN)
Sachiko-Nom Tokyo-to arrival-Acc do-Past
'Sachiko arrived in Tokyo.'

Though the VN-*suru* and VN-*o suru* forms are synonymous in (4b, c) and (5a, b), there is one dimension in which the two variants show a divergent pattern: idiomaticization. Specifically, the accusative-less VN sometimes gives rises to an idiomatic meaning that is not related in any obvious way to the other (core) meaning(s) of the VN. The accusative-marked VN, on the other hand, is not susceptible to such idiomaticization; it *always* inherits the core meaning(s) that is (are) independently available from the bare VN. This observation is illustrated below by ten VNs (6-15) that can occur in the VN-form and the VN-*o* form. For ease of exposition, I indicate the idiomatic meanings of a VN in boldface.

(6)a. 勉強する 'to study'
benkyoo-suru **'to discount'**

b. 勉強を する 'to study'
benkyoo-o suru

(7)a. 料理する 'to cook'
ryoori-suru **'to handle**

b. 料理を する 'to cook'
ryoori-o suru

(8)a. 暴走する 'to burn up'
boosoo-suru **'to go out of control'**

b. 暴走を する 'to burn up'
boosoo-o suru

(9)a. 計算する 'to count up'
keisan-suru **'to meticulously plan'**

b. 計算を する 'to count up
keisan-o suru

(10)a. 処分する 'to cast away'
shobun-suru 'to clean up'
'to get rid of a trouble'

b. 処分を する 'to cast away'
shobun-o suru 'to clean up'

(11)a. 自爆する 'to detonate oneself'
zibaku-suru **'to screw up'**

b. 自爆を する 'to detonate oneself'
zibaku-o suru

(12)a. 失敬する 'to say goodbye
sikkei-suru **'to knock off'**

b. 失敬を する 'to say goodbye'
sikkei-o suru

(13)a. 独走する 'to run far ahead of'
dokusoo-suru 'to run alone'
'to ignore others' opinions'

b. 独走を する 'to run far ahead of'
dokusoo-o suru 'to run alone'

(14)a. 借金する 'to borrow money'
shakkin-suru 'to run into debt'
'to lose over win'
(in the Japanese baseball)

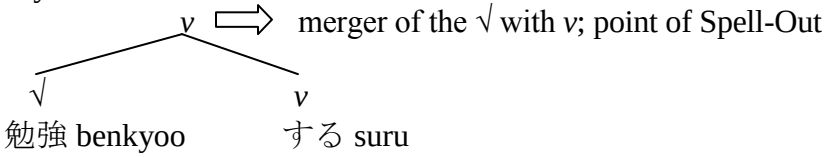
b. 借金を する 'to borrow money'
shakkin-o suru 'to run into debt'

(15)a. 精進する　‘to devote oneself’　　b. 精進を　する ‘to devote oneself’
shoozin-suru **‘to abstain from fish and meat’**　*shoozin-o suru*

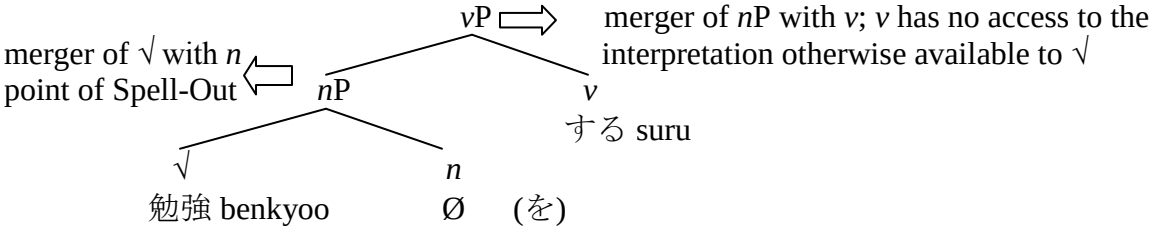
To take one example, the VN *benkyoo*, when combined with the light verb, means not only ‘to study’ (the core meaning that native speakers of Japanese most commonly associates it with) but also means ‘to discount’, a meaning that is impossible to relate in any obvious way to the core meaning. This suggests the VN is subject to a certain degree of idiomaticization. Now, compare this situation with the same VN marked with the accusative case *–o*. As shown in (6b), this VN-*o* variant can only be associated with the core meaning available to the bare VN in (6a) (namely, ‘to study’). This observation also holds for the other nine pairs of VN-*suru* vs. VN-*o suru* pairs given in (6-15).

The idiomaticization pattern described above is explained if the syntactic derivations for the bare VN and the accusative-marked VN are different. Let us suppose that the former is derived from merging the acategorial root directly with the verb-deriving head *–suru* whereas the latter is derived by merging the already existing nominal VN/*n*P with *–su*. The two derivations are shown in (16) and (17). (See section 3, where I argue that the *v* in (17) corresponds to the Agent-introducing Voice head.)

(16) The Syntactic Derivation for the Bare VN-*suru*



(17) The Syntactic Derivation for the Accusative-Marked VN-*o suru*



In (16), the acategorial root 勉強√*benkyoo* merges with the first category-defining light verb head -*suru*. The whole object then undergoes Spell-Out to LF. In (17), on the other hand, the same root merges with the noun-creating functional head *n*. The nominal nature of *benkyoo-o* is supported by the presence of the accusative case marker, which can only attach to nouns in Japanese. The *n*P is Spelled-Out to LF, where its meaning is cashed out. Example (18) shows that the *n*P is fixed to mean only ‘to study’.

(18) Seerusuman-ga　saikin　bukken-no　**benkyoo-o**　hajimeta.
salesperson-Nom　recently　real estate-Gen　study/*discount-Acc　start
‘A salesperson started studying about the real estate recently.’
‘*A salesperson started discounting the real estate recently.’

The *n*P is further merged with a second category-defining head *–suru*. The resulting word cannot access the idiomatic reading of the root below the *n*P (namely, 'to discount') because its interpretation is fixed as 'to study' at the point where the *n*P is Spelled-Out. As a result, the whole word can only inherit the core meaning previously assigned to the *n*P.

3. Deverbal Nominalizations in Japanese and the Three-Layered VP Structure

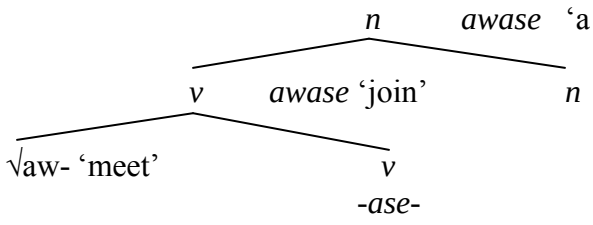
In this section, I consider deverbal nominalizations in Japanese that pose a challenge to (2). I argue that the Three-Layered VP Hypothesis, recently proposed by Pylkkänen (2002) and Harley (2007, 2008), provides the right structural domain for non-compositional semantic interpretation, allowing for a unified account of the idiomaticization observed in deverbal nominals and VNs in Japanese. I also address why VoiceP, not other projections such as *v*P, must serve to close off the domain for idiomatic interpretation and seek an answer to this question in Krazter's (1996) proposal that VoiceP is computed by Event Identification.

There are a large number of nominalizations in Japanese that are homophonous to the so-called *renyookei*/continuative form and that are typically analyzed as deverbal (Nishio 1977; Kageyama 1999). Consider examples in (19a-d).

(19)a.	√aw-	→	aw-asu	→	aw-ase-Ø	
			meet-Cause		meet-Cause-Nmlz	
			'join'		'a lined kimono'	
b.	√chir-	→	chir-asu	→	chir-as-i	
			scatter-Cause		scatter-Cause-Nmlz	
			'scatter'		'a leaflet'	
c.	√d-	→	d-asu	→	d-as-i	
			come out-Cause		come out-Cause-Nmlz	
			'expel'		'soup stock'	
d.	√nag-	→	nag-asu	→	nag-as-i	
			flow-Cause		flow-Cause-Nmlz	
			'wash away'		'a sink'	(Volpe 2005: 43, 44)

To take (19a), the verb *awasu* 'to join' is derived by combining the causative affix *–asu* to the root √*aw*-. Volpe observes that the nominal *awase* 'a lined kimono', derived from the verb *awasu* 'join', has an idiomatic reading that is not predictable from the meaning of the verbal base. This idiomaticization process is also observed for the other deverbal nominals in (19b-d). This pattern poses a challenge to Arad's locality principle under the most standard assumption in the Japanese literature that *–asu* is the head of the category-defining head *v* (Miyagawa 1998, 2001; Harley 1995, 2008; Pylkkänen 2002). To see why, consider the derivation for *awase* 'a leaflet' shown in (20).

(20)

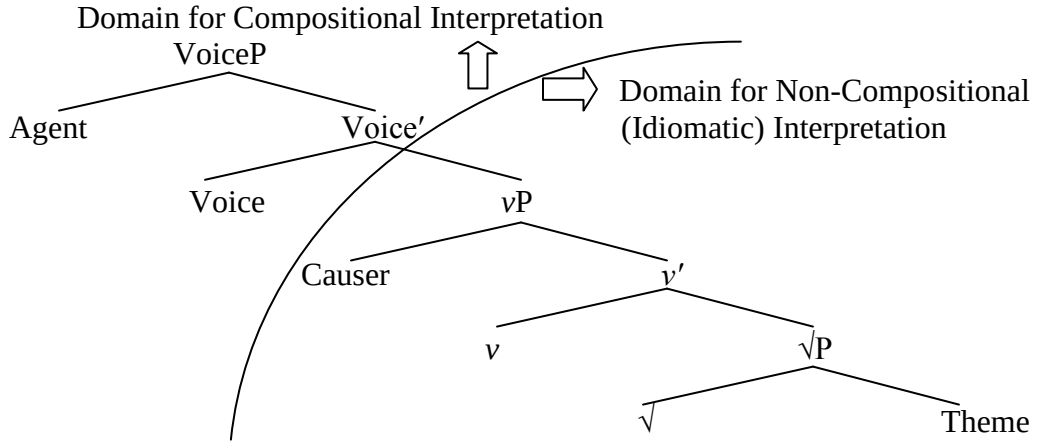


(Volpe 2005: 43)

In this derivation, *-ase-* is the first category-defining phase head. Thus, its interpretation (namely, ‘to join’) should be carried upward in the derivation under the locality principle in (2). The result, however, does not bear out this prediction, because the deverbal nominal *awase* ‘a lined kimono’ has the idiomatic reading. Volpe (2005) himself attempts to maintain Arad’s principle by arguing that *-ase-* is located below the category-defining phase head *v* that plays the role of affixal particle in the sense of den Dikken (1995). However, this move not only gives up a uniform treatment of the causative marker but also means disregarding otherwise solid empirical results achieved in the literature on Japanese causatives (see the above-mentioned references). Rather, it is more natural to view the idiomatic pattern in (19a-d) as virtually disproving Arad’s locality constraint as originally stated in (2). Is there a way out to reconcile the idiomaticization in (19a-d) with our results from section 2?

Following the recent idea on the licensing of external arguments proposed by Pylkkänen (2002) and Harley (2007, 2008) (see also Fujita (1993, 1996) for the earliest proposal to this effect), let us decompose the so-called *v* into two separate functional heads, *v* and Voice; the former licenses the Agent argument in its specifier whereas the latter licenses the non-agentive, Causer argument in its specifier, as shown in (21). Let us further suppose, following Pylkkänen (2002) and Harley (2008: note 25), that the Voice head demarcates the boundary for non-compositional semantic interpretation.

(21) The Domain for Non-Compositional Interpretation under the Three-Layered VP



Our analysis correctly captures the two types of idiomaticization under investigation in a unified fashion. First, Volpe’s paradigm nicely falls out from (21) because all the causative verbs in (19a-d) do not necessarily require a volitional Agent as the subject of the clause, as the acceptability of (22a-d) shows.

(22)a. Sono kikai-ga juunenburini hutari-o Tokyo-de **aw-ase-ta.**
that opportunity-Nom after 10 years two-Acc Tokyo-in meet-Cause-Past
'That opportunity let the two meet in Tokyo for the first time in 10 years.'

b. Sono kosame-ga utukusii hana-o yuuguredokini **chir-ase-ta.**
that gentle rain-Nom beautiful flower-Acc at dark scatter-Cause-Past
'That gentle rain scattered beautiful flowers at dark.'

c. Sono karyokuhatudensho-wa CO2-o **da-si-mas-en.**
that heat power plant-Top CO2-Acc come out-Cause-Pol-Neg
'That heat power plant does not emit CO2.'

d. Sono kissaten-wa subarasii BGM-o ohiruni **nag-asi-mas.**
that coffee house-Top excellent BGM-Acc at lunch time play-Cause-Pol
'That coffee house plays an excellent BGM at lunchtime.'

This means that the deverbal nominals in (19a-d) are within the domain for non-compositional interpretation (namely, below the VoiceP). Consider now the idiomaticization pattern observed in two types of VNs. Just like the causative verbs in (19a-d), some of the bare VN-*suru* in (6-15) do not require an Agent argument, as in (23a-d).[3]

(23)a. Bureeki-no koshoo-de, kuruma-ga koosokudooro-o **boosoo-si-ta.**
brake-Gen trouble-due to car-Nom highway-Acc burn up-do-Past
'Due to the brake trouble, a car burned up in the highway.'

b. Ano torakku-ga kinoo sodaigomi-o **shobun-si-ta.**
that truck-Nom yesterday bulk trash-Acc clean up-do-Past
'That truck cleaned up the bulk trash yesterday.'

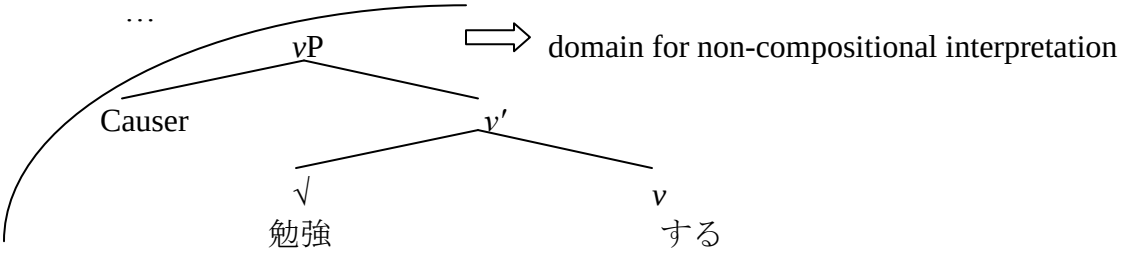
c. Ano kaisha-wa kambu-no misu-de **zibaku-si-ta.**
that company-Top executive-Gen mistake-for screw up-do-Past
'That company screwed up due to an executive's mistake.

d. Foto fureemu-sizyoo-de-wa Sony-ga **dokusoo-si-te-iru.**
photo frame-market-in-Top Sony-Nom run far ahead-do-Cont-Prog
'In the photo frame market, Sony is running far ahead.'

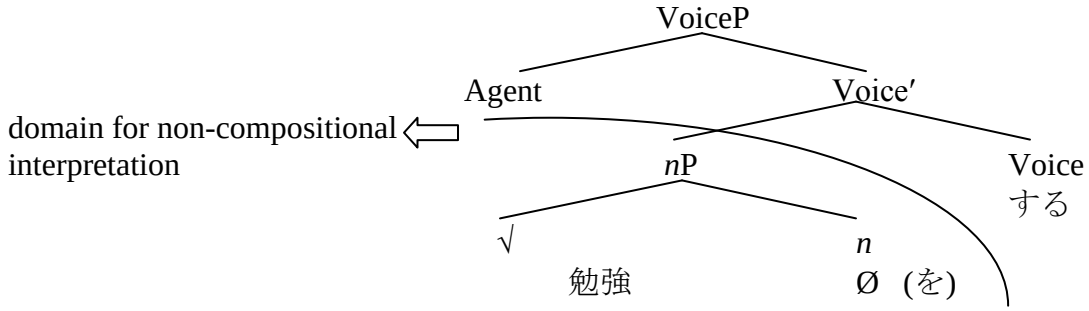
Thus, the VN-*suru*'s in (23a-d) are composed within the *v*P domain in (21), which is susceptible for idiomatic interpretation. This type of VN contrasts with the VN-*o*, which necessarily enforces the agentive reading. This is evidenced by the fact that (23a-d) become all ungrammatical when the VN is marked with *–o*. This pattern falls out since the accusative VN involves VoiceP, which closes off the domain for non-compositional interpretation. The derivations for the two types of VNs are shown in (24) and (25).

[3] I have been unsuccessful at finding examples where *benkyoo-suru* 'to study, to discount', *ryoori-suru* 'to cook, to handle', *keisan-suru* 'to count up', *sikkei-suru* 'say goodbye, knock off', *shakkin-suru* 'borrow money, lose more than win', and *shoojin-suru* 'devote oneself, abstain from fish and meat' occur with a non-agentive, Causer argument. I believe, however, that this is simply due to our encyclopedia knowledge of the way an each event unfolds and the nature of participants involved in the event. For example, only human beings can study, count up, say goodbye, knock off somebody's belonging, borrow money, and abstain from fish and meat. I assume that agentive force, if any, for the VN-*suru* arises from this extra-linguistic knowledge.

(24) The Derivation for the Bare VN



(25) The Derivation for the Accusative VN



One important question becomes, then, why it is that the agent-introducing voice head, not other heads such as *v*, must close off the domain for non-compositional interpretation. I hypothesize that an answer is found within Krazter's (1996) analysis of the semantics of VoiceP and other heads.[4] Krazter proposes that the external argument-introducing Voice head and the VP are combined by Event Identification (26a, b) whereas other arguments and the verb are combined by Functional Application (27a, b).

(26)a. Event Identification

f	g	→	h
<e, <s, t>>	<s, t>		<e, <s, t>>

b. Example of Event Identification

f	g	→	h
<e, <s, t>>	<s, t>		<e, <s, t>>

$\lambda x_e.\lambda e_s.[f(x, e) \& g(e)]$ (Krazter 1996: 121, 122)

(27)a. Functional Application
If α is a branching node, {β, γ} is the set of α's daughters, and [| β |] is a function whose domain contains [| γ |], then [|α |] = [|β |] ([|γ |]).(Heim and Krazter 1998: 44)

b. Example of Functional Application
[| smoke |] = $\lambda x \in D_e$. x smoke
[| Ann |] = Ann
[| smoke |] ([| Ann |]) = 1 iff Ann smokes (Heim and Krazter 1998: 44)

[4] I owe the analysis suggested in this paragraph to XX (personal communication, January 2006).

In (26a), an event involving an Agent is co-identified and combined with another event denoted by the VP, as illustrated in (26b). (27a) is simply a process that assigns a semantic interpretation to the object created by the merger of a predicate and its internal argument, as illustrated in (27b). Suppose that the latter process governs the semantic composition of all functor-argument pairs except the VoiceP. It follows then that the Voice phase head can only yield a compositional interpretation because the head and the *v*P are combined with what is essentially a conjunctive procedure. Conversely, the interpretation of the root and the predicators below Voice is governed by Functional Application, whose actual semantic output crucially depends on their meanings. Since a root is the acategorial, underspecified semantic core that can only be realized by being merged with a category-defining head, it comes as no surprise that the merger of the two elements gives the appearance of yielding non-compositional interpretation. In this way, our analysis for the domain for idiomaticization receives independent conceptual support from a formal-semantic perspective.

4. Conclusions

In this paper, I have proposed a new structural domain for the non-compositional interpretation on roots based on two phenomena in Japanese: verbal nouns and deverbal nominalizations. Specifically, drawing on recent proposals on the licensing of external arguments by Pylkkänen (2002) and Harley (2007, 2008), I have argued that the Voice head closes off the relevant domain. This analysis not only overcomes the conceptual problem with Volpe's (2005) treatment of the causative affix as a non-phase-defining affixal particle but also maintains the insight behind Arad's (2003, 2005) locality constraint on the interpretation of roots with a modification that is independently motivated. Given the universality hypothesis on the existence of roots in the Distributed Morphology, one important task is to see whether the suggested revision to Arad's constraint along the lines of the Three-Layered VP Hypothesis is also necessary on the basis of idiomatic expressions from many other languages with complex predicate formations (English, Persian, etc). A cursory look at complex verbs in English suffices to show that our suggested revision is indeed in order. Consider *naturalize*.[5] At least in American and British Englishes, *naturalize* includes a component of meaning (i.e. to confer upon an alien the rights and privileges of a citizen) that does not entail the meaning of its base word *natural*. While this reading is problematic for Arad's (2003, 2005) theory, it is not for our proposed revision; *naturalize* does not necessarily require a volitional Agent in its specifier. Thus, this word is formed within the *v*P domain, and hence is subject to non-compositional interpretation.

The theory of Distributed Morphology proposes that all words are created within the syntax by independent generative procedures in exactly the same way phrases are. Thus, we expect the null hypothesis to be that our proposed domain for non-compositional interpretation for "words" should also serve to demarcate the domain for phrasal idioms (e.g. *kick the bucket, burn the bridge*). This possibility is worth investigating further in light of the fact that there seem to be no verbal idioms in English that consist exclusively of an Agent argument, the verb, and its internal argument(s). For reasons of space, however, I leave this important investigation for another occasion.

[5] Thanks to XX (personal communication, September 2007) for suggesting this word in this context.

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