

# Complex Verb Predicates in Sanskrit from Machine Translation Point of View

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## Abstract

This paper addresses challenges in Sanskrit constructions involving auxiliaries and light verbs, crucial for Machine Translation. We explore syntactic and semantic complexities, raising questions about parser design. Sanskrit employs infinitive suffixes based on the presence of auxiliary verbs, leading to questions on subject agreement and predicate structure. Additionally, light verb constructions in Sanskrit present unique challenges. We categorize these constructions into metaphorical, causative, and lexical divergence cases. We draw on Indian theories of verbal cognition to propose solutions, bridging linguistic gaps for an effective Machine Translation point of view.

## 1 Introduction

Complex verb predicates are prevalent in South Asian languages, as extensively discussed by scholars such as Hook[?], Mohanan[?], Verma[?], Alsina et al.[?] and Ramachand[?]. Sanskrit, a classical language with a rich linguistic tradition, is no exception to the abundance of these constructions. Such structures manifest in the form of V+V combinations, referred to as compound verbs, and N+V combinations, known as conjunct verbs.

This paper delves into the intricacies of these two types of constructions. The first category involves auxiliaries, contributing to the V+V combinations, while the second category encompasses light verbs, contributing to the N+V combinations. It is within the realm of these constructions, especially those involving auxiliaries and light verbs, that challenges emerge from the perspective of machine translation.

In the case of V+V constructions, a notable feature in Sanskrit grammar is the transformation of a verb into an infinitive form (marked by the suffix ‘*tumun*’) in the presence of specific verbs<sup>1</sup>. Semantically, the verb in its infinitive form assumes the role of the main verb, while the accompanying verb serves

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<sup>1</sup>*śakadhṛṣajñāglāghaṭarabhalabhakramasahārḥāstyartheṣu tumun* (P.3.4.65)

as an auxiliary, imparting modal or aspectual information. However, syntactically, the subject exhibits agreement with the auxiliary verb, giving rise to fundamental questions in parser design, viz.

- Should the noun showing agreement with the auxiliary be considered its argument?
- Is it appropriate to treat the auxiliary and main verbs as distinct entities, each possessing its own argument structure, or should they be viewed as components of a unified complex predicate?

In this paper, we discuss solutions to these problems from the point of view of the design of the parser, seeking answers to the above questions from the Indian theories of verbal cognition.

In the second category, the focus is on light verbs in Sanskrit, involving N+V complex predicates with the verb being light. Our observations categorize this construction into three types: Light Verb Constructions (LVC)s with metaphorical meaning, natural extensions through productive causative constructs in Sanskrit, and constructs related to how a language names an activity. When computationally handling the meaning of LVCs, challenges arise, especially when other languages fail to convey the desired meaning. Indian grammatical traditions remain silent on these constructions. This paper concludes by discussing solutions to these challenges, providing a machine translation perspective on such constructions.

## 2 Complex Predicates involving Auxiliaries

In the aphorism ‘*tumunṇvulau kriyāyāṇ kriyārthāyām*’ (P.3.3.10), Pāṇini states that when one action serves as the purpose of another action, the action indicating the purpose is marked with a ‘*tumun*’ suffix.

However, in the aphorism ‘*śakadhṛṣajñāglāghaṭarabhalabhakramasahārḥā - styartheṣu tumun*’ (P.3.4.65), Pāṇini prescribes employing the affix *tumun* following a verb root when the action conveyed by that verb root is associated with actions conveyed by verbs like ‘*śak*’ used in the same structure.<sup>2</sup> This requirement is purely morphological, and Pāṇini’s grammar does not delve into the semantics associated with such morphological requirement. It merely serves as a statement regarding the introduction of a ‘*tumun*’ suffix when certain specified verbs are present. Here is an example -

- (1) Skt: *rāmaḥ śālām gantum śaknoti*.  
Gloss: Rama{sg,nom} school{sg,acc} go{inf} can{pres,sg,3p}.

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<sup>2</sup>Translation by Madhav Deshpande in ‘Evolution of Syntactic Theory in Sanskrit Grammar: Syntax of the Sanskrit Infinitive

Eng: Rama can go to school.

In the above sentence, the verb *śaknoti* functions as an auxiliary verb, indicating the ability or capability of the subject, *Rāma*, to perform the action expressed by the infinitive verb *gantum* (to go). Syntactically, there is an agreement between the noun *Rāma* which is in nominative case and the auxiliary verb *śaknoti*. The infinitive verb *gantum* acts as the main verb of the sentence, representing the action to be performed. The sentence may be analyzed as shown in Fig. 1, with the infinitive verb as the head.

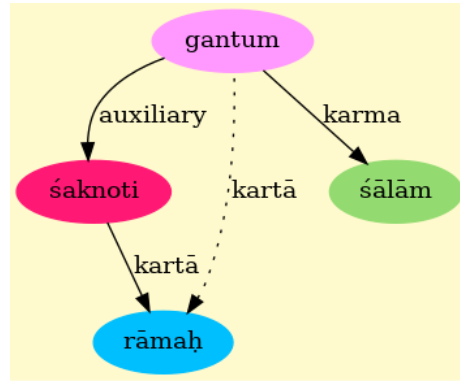


Figure 1: Representation of the infinitive as the head

In this analysis, the agreement between the noun in nominative case and the auxiliary verb marks the *kartā* relation. The infinitive verb is identified as the main verb of the sentence. This raises fundamental questions in the design of a parser for complex verb predicates in Sanskrit :

- Does the noun that shows an agreement with the auxiliary serve as its argument?
- Should the auxiliary and main verb be treated as two different verbs with their own argument structure or as a single complex predicate?

Addressing these questions is crucial in understanding the intricate nature of complex verb predicates in Sanskrit.

## 2.1 Clues from Pāṇini's Grammar for handling the transitive *śakādi*

In the context of complex verb predicates in Sanskrit, Pāṇini's grammatical clues provide valuable insights for handling verbs listed in P.3.4.65 when combined with infinitives. One such clue is derived from the verb '*iṣ*', which means 'to desire'. A commentary on the aphorism '*dhātoḥ karmaṇaḥ samānakarṭṛkādicchā-*

*yāṃ vā*’ (P.3.1.7) elaborates on this, stating that ‘The affix is optionally attached in the sense of ‘wishing’ after a root expressing the object wished and having the same agent of the action as the wisher thereof.’ An illustrative example is ‘*paṭhitum icchati - pipathīṣati*’ (He wishes to study). In Sanskrit an affix ‘*san*’ is used to indicate the desire and one can express ‘*paṭhitum icchati*’ alternatively as ‘*pipathīṣati*’ with the ‘*san*’ affix. The rule (P.3.1.7) states that the suffix ‘*san*’ is used after the root of the object of the verb ‘desire’. Here the object of the verb desire is ‘*paṭhitum*’, whose root is ‘*paṭh*’. Hence, in such cases, the infinitive ‘*paṭhitum*’ functions as the *karma*<sup>3</sup> of the verbal form of ‘*iṣ*’, thereby treating ‘*iṣ*’ as the main verb in this context. See Fig. 2.

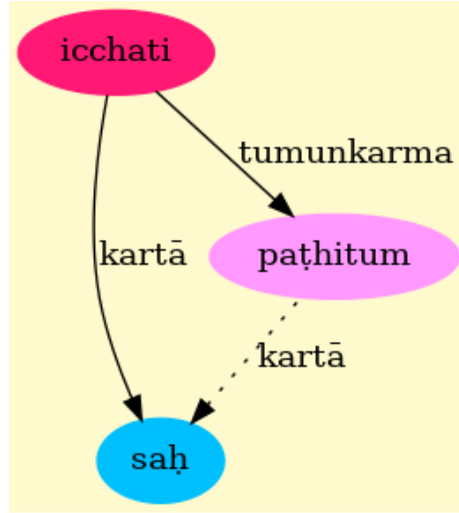


Figure 2: Representation of ‘*iṣ*’ with Infinitive

Madhav Deshpande [?] has extended the aforementioned clue from the verb ‘*iṣ*’ to transitive verbs listed in (P.3.4.65). He marks infinitives as objects of transitive verbs such as *jñā*, *rabha*, *labha*, *krama*, *saha*, and *arh*, following the pattern established by ‘*iṣ*’. As an example of such an extension let us consider the following sentence:

- (2) Skt: *rāmaḥ śālām gantum jānāti*.  
 Gloss: Rama{sg,nom} school{sg,acc} go{inf} know{p,sg,3p}.  
 Eng: Rama knows (how) to go to the school.

<sup>3</sup>Since this *karma* has *tumun* suffix, we call it ‘*tumunkarma*’

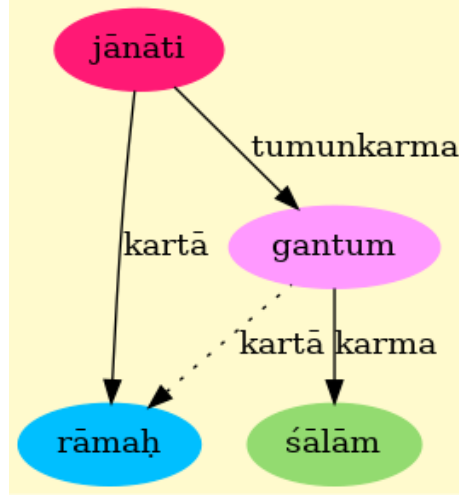


Figure 3: Representation of Transitive *śakādi* as a head

In this example, following a similar pattern to the ‘*iṣ*’ construction, Madhav Deshpande treats ‘*gantum*’ as the object (*karma*) of the verb ‘*jñā*’. See Fig. 3

## 2.2 Passivization of transitive *śakādi*

If ‘*jñā*’ is treated as a transitive verb, then what is the passive construction of (2)? We get a clue from *Mahābhāṣyam* (P.3.1.7)<sup>4</sup>. In the discussion of the sentence ‘*grāmaṃ gantum icchati*’ (He wants to go to the village), the question regarding the association of karma arises. The answer lies in considering both the noun ‘*grāmaṃ*’ and the infinitive ‘*gantum*’ as objects of the verb ‘*iṣ*’. Therefore it would be appropriate to mark the sentential analysis as in Fig. 4 showing *śālām* as directly related to *jānāti* and indirectly with *gantum*.

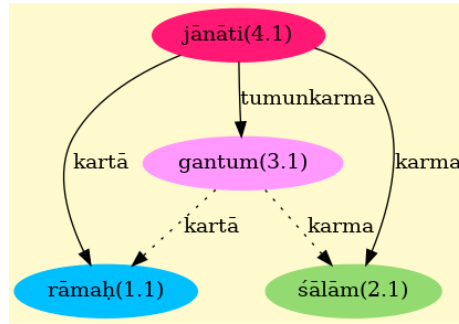


Figure 4: Representation of Transitive *śakādi*

<sup>4</sup> *atheha grāmaṃ ganatumicchatīti kasya kiṃ karma? iṣerubhe karmaṇi.*

We mark the relation between the *tumunanta* verb with the auxiliary verb as ‘*tumunkarma*’ and not ‘*karma*’ in order to distinguish it from the ‘*karma*’ which plays an important role in passivization.

### 2.3 Intransitive śakādi verbs

However, this explanatory framework encounters challenges when dealing with intransitive verbs like ‘*śak*’ in the list of P.3.4.65. For instance,

- (3) Skt: *rāmaḥ śālām gantum śaknoti*.  
 Gloss: Rama{sg,nom} school{sg,acc} go{inf} can{p,sg,3p}.  
 Eng: Rama can go to school.

Here, the noun ‘*śālām*’ and the infinitive ‘*gantum*’ can’t be termed an object (*karma*) of the verb ‘*śak*’ since ‘*śak*’ is inherently intransitive.

In this context, a second clue is found in *Mādhavīyadhātuvṛtti*<sup>5</sup> regarding the verb ‘*śak*’. It states that even though ‘*śak*’ is intransitive, in the presence of an infinitive verb (a verb in the form of (‘*tumun*’)), it should be treated similar to a transitive verb, with ‘*tumun*’ serving as its object (*karma*). As a result, we analyze the sentence as shown in Fig.5.

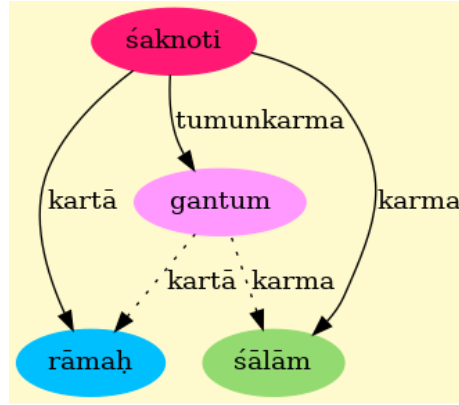


Figure 5: Representation of the auxiliary as the head

### 2.4 Passivization of intransitive śakādi

*Mādhavīyadhātuvṛtti* treats ‘*śak*’ as transitive in the presence of an infinitive. Consequently, a similar question arises here regarding the association of objects. As discussed earlier, we can extrapolate the clue from *Mahābhāṣyam* regarding ‘*iṣ*’ to ‘*śak*’.

<sup>5</sup> *yadyapi śakiḥ kevalo ’karmakastathāpi tumunantavācyakriyāviṣayatve sakarmako bhavati*

Now the questions are why *Mādhavīyadhātuvṛtti* states the non-finite verbal form with ‘*tumun* suffix’ as an object (*karma*) of the intransitive verb such as ‘*śak*’ and why are we extrapolating the clue from *Mahābhāṣyam* regarding the ‘*iṣ*’ to ‘*śak*’? The answer lies in the passivization of such constructs. This treatment becomes clear when we consider the process of passivization. This linguistic phenomenon is observed in early texts like *Mahābhāṣyam*. Over time, this usage is disappeared. An example from *Mahābhāṣyam* illustrates this:

- (4) Skt: *sarvaiḥ laghunā upāyena śabdāḥ śakyāḥ jñātum*.  
 Gloss: All{m,ins} small{adj} way{ins} word{pl,nom} can{ger} know{inf}.  
 Eng: Words can be learned by all in a simple way.

Here, the main verbal form ‘*śakyāḥ*’ is not finite but a gerundive form derived from the verbal root ‘*śak*’. Forms like ‘*śakyāḥ*’ are obtained through the application of ‘*ḥṛtya*’ suffixes in Pāṇini’s grammar, specifically governed by the rule P.3.1.99. These ‘*ḥṛtya*’ affixes serve to indicate either ‘*bhāva*’ (action) or ‘*karma*’ (object).

In active constructions, the *kartā* aligns with the matrix verb in terms of number, and person. In passive constructions, however, it is the *karma* that agrees with the matrix verb in terms of number, and person.

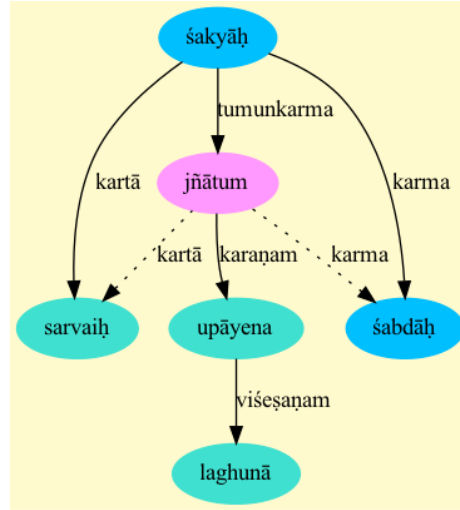


Figure 6: Representation of the Passive Constructs

In sentence (4), we consider, ‘*śakyāḥ*’ is the main verb in the *karmavācya* (passive), and through the affix ‘*yat*’, the object (*karma*) is expressed. The word *śabdāḥ* agrees with the main verb in gender and number. Thus it is the object (*karma*) of the matrix verb ‘*śakyāḥ*’. This analysis is represented in Fig. 6. The thick line indicates the explicit relations marked through vibhaktis

whereas the dotted lines mark the implicit or inferred relations. Throughout Mahābhāṣyam, we encounter numerous passive uses of ‘śak’, where the object (*karma*) is expressed by the verbal root ‘śak’, aligning with the statement found in *Mādhavīyadhātuvṛtti*. Consequently, we consider the verbal root ‘śak’ as transitive in the presence of the infinitive ‘*tumun*’. This grammatical understanding is applied during sentential parsing to establish relationships between infinitive and the verb in a given sentence.

## 2.5 Answer to the questions

In addressing the inquiries raised at the outset of this section, where the infinitive assumes the role of the main verb and the verb ‘śaknoti’ is designated as the auxiliary for the infinitive, a pivotal question emerges: Does the subject, which aligns in agreement with the auxiliary, function as its argument? The elucidation lies in Bhartṛhari’s *kārikā*, specifically in the verses:

*pradhānetarayoryatra dravyasya kriyayoḥ pṛthak |*  
*śaktirguṇāśrayā tatra pradhānamanurudhyate ||*  
*pradhānaviśayā śaktiḥ pratyayenābhidhīyate |*  
*yadā guṇe tadā tadavadanuktāpi prakāśate ||*  
 (Vākyapadīyam 3.7.81-82)

In essence, these verses posit that when two verbs share an argument, the suffix explicitly marks the relation with the matrix verb and the relation of the noun with respect to the sub-ordinate verb gets manifested even without any explicit marking. Although semantically the *karma* is related to the infinitival verb in the given examples, the syntactic analysis derived from Vākyapadīyam underscores the primacy of the main verb at the syntax level. Consequently, we conclude from the previous discussion that the verbs such as ‘śak’, ‘*dhṛṣa*’, ‘*jñā*’ etc. in the above sentences in association with the verbs with *tumun* suffix, act as main verbs.

This conclusion is supported by Bhartṛhari’s linguistic philosophy, which delves into the complexities of subject-verb relationships within a sentence. According to this philosophy, the main verb takes precedence in syntax, emphasizing the subject’s alignment with the auxiliary despite its involvement in secondary actions. Thus, the subject, by agreeing with the auxiliary, effectively functions as an argument within the sentence structure.

The second question involves whether the auxiliary and main verb should be treated as two distinct verbs with individual argument structures or as a single complex predicate. Evidence from sentence components agreeing differently with the auxiliary and main verb supports the former view. Referring to Indian theories of verbal cognition reinforces the conclusion that these should be considered as separate verbs with their respective argument structures, not as a unified complex predicate.

Thus, the constructions with a verb in *tumun* followed by the finite form of certain verbs (*śakādi*), which appear to be auxiliaries, in Pāṇinian grammar these are not treated as complex verb predicates.

### 3 Light Verb Constructions and their classification in Sanskrit

Jespersen (1965) [?] introduced the term ‘light verbs’ to describe verbs that, while possessing fuller semantic meanings in other contexts, are used in combination with nouns or verbs, where their contribution to the overall meaning is reduced. For instance:

1. I took a bath.
2. I give him a bath.

Analyzing these sentences reveals that the verbs ‘take’ and ‘give’ do not strictly imply physical actions of taking and giving. In the first sentence, the meaning is ‘I bathed (myself)’, and in the second, it is ‘I bathed him’. However, these verbs retain some semblance of their original meanings. Such instances, where verbs maintain partial lexical meanings yet lack complete semantic content, are referred to as light verbs. These verbs are not entirely devoid of meaning, but they appear to be semantically light in certain contexts.

Historically the origin of light verbs is traced back to the gerunds in Sanskrit (Butt[?]) and also the fall of use in pre-verbs (Deo [?] and Butt [?]). In these discussions, the main focus was with those constructions which are semantically complex, which are syntactically monoclausal, which have joint predication and which are form identical with their main verb usages. Recently Date [?] has revisited the light verb constructions in Sanskrit and has presented several examples of N+V type of complex predicates from Sanskrit literature where V is a light verb.

The Indian grammatical tradition, to the best of our knowledge, is silent on such constructions. This led us to further investigation from the semantic point of view, and we found that these constructions fall under three categories. The first type involves those constructions where the noun of the N+V predicate is used in the metaphoric sense. The second type involves causative constructions where the meaning of the causative verb needs to be extended and finally the third one is specific to how a language ‘perceives’ a specific activity.

(a) LVC which involves Metaphoric Meaning

In Sanskrit, light verb constructions (LVCs) encompass a diverse range of linguistic phenomena. One category involves metaphorical usages where a word’s function extends beyond its primary meaning through a concept called ‘lakṣaṇā’. In these LVCs, the noun in the Noun+Verb (N+V) construction takes on a metaphorical interpretation, effectively serving as an argument for the verb. This type of construction is found in various Sanskrit literary works, and it is interesting to examine how the primary meaning of the noun evolves into a related, extended meaning. For instance, consider the following example:

- (5) Skt: *tvam karṇam dadātu.*  
 Gloss: You{sg,nom} ear{sg,acc} give{p,sg,2p}  
 Eng : You give me an ear.  
 ⇒ You listen.

In this example, the word ‘karṇam’ primarily means an ‘ear’, which is an instrument for listening, and while listening one has to be attentive. Thus ‘give somebody an ear’ means ‘be attentive’ or ‘listen’. In the above construction, it takes on the meaning of ‘listen’. This connection between ‘listen’ and ‘ear’ serves as an argument for the verb. So, ‘You give me an ear’ implies ‘You listen/pay attention’.

Another example that illustrates this type of LVC construction is:

- (6) Skt: *sugrīvaḥ sarvataḥ cakṣuḥ apātayat.*  
 Gloss: Sugriva{nom} all{ind} eye{acc} fall{caus,p,sg,3p}  
 Eng : Sugriva threw eye everywhere.  
 ⇒ Sugriva looked everywhere.

In this case, the literal meaning of ‘cakṣuḥ apātayat’ does not refer to the act of throwing eyes literally but rather symbolizes a visual action where vision spreads everywhere. The extended meaning implies that Sugriva was actively looking everywhere. The metaphorical connection between ‘fall’ and ‘eye’ in this LVC showcases how Sanskrit employs metaphorical usages to convey more intricate ideas.

These extended usages of nouns in LVCs are not unique to Sanskrit; similar linguistic patterns exist cross-linguistically i.e. in Marathi we found similar usages like *kāna deṇe*, *najara ṭākane* and in Hindi *kāna denā*, *najara dālanā* corresponding to the Sanskrit usages *karṇam dadātu* and *cakṣuḥ apātayat* respectively. These being semantic extensions, typically, get carried over in other languages as well. In such case, the machine translation would not face any serious problems. However, if the target language does not allow such extensions of the meaning due to cultural or any other differences, we treat them as exceptional cases which, we guess, would be very limited in number.

- (b) LVC which involves the productive causative constructs  
 In the second type of Sanskrit Light Verb Constructions, the extended meaning arises through productive causative constructs. In simple terms, causative constructs involve making someone do an action. Sanskrit uses a suffix to turn a verb into a causative form. However, when translating these constructions into languages that don’t have such productive causative forms, it may sound unnatural. To understand this, let’s look

at the following example:

- (7) Skt: *eṣā priyeṇa vinā rajanīm gamayati.*  
Gloss: She{nom} lover{ins} without{ind} night{acc} go{caus,p,sg,3p}  
Eng : She is causing the night to go without her lover.  
⇒ She is spending the night without her lover.

In this example, the verb ‘gamayati’ is a causative construction, which literally means ‘making or causing to go.’ However, it is essential to note that in this specific sentence, there is no clear destination for the action. The causer is not making *rajanī* (night) physically or psychologically move. Instead, it suggests an abstract movement of time.

This construction works seamlessly in Sanskrit, but it can be challenging to convey the same meaning in languages that do not have productive causative constructions. In many other languages, the direct translation of this productive causative doesn’t quite fit, especially when dealing with objects related to time.

To address this challenge, when working with machine translation, we need to apply well-defined rules to handle such constructions. We may need to adapt the structure of the sentence to make it more natural in the target language while retaining the intended meaning. For instance, in English, we might rephrase it as ‘She is spending the night without her lover’, which captures the abstract sense of the action without the need for a direct causative verb. Typically the clue in such cases lies with the object-verb combination as in *rajanīm gamaya.*

- (c) The constructions related to the way a language names an activity  
The third type of LVCs deal with the meanings associated with the verbs. A verb typically represents a series of sub-activities. All the sub-activities together is given a name. This name typically corresponds to or highlights one of the sub-activities. For example, consider the activity of cooking the rice. Here the sub-activities involved range from taking the rice, washing it with water, putting it into a vessel that can hold it, pouring sufficient water in it, lighting the stove, stirring etc. till the rice turns soft. The same verb is used to indicate the sub-activities also. For example,
- (a) Ram cooks rice.
  - (b) This cooker can cook rice for 5 persons.
  - (c) This rice cooks soft.

In the first sentence, the cook refers to all the sub-activities mentioned above, while in the second sentence, the focus is on the capacity of the vessel, and the third one focuses on the quality of the rice.

When the two languages differ in naming the event, it results into a divergence and then there is a tendency to treat such constructions as special. This is the situation in the case of some LVCs. We illustrate this with an example. Consider the sentence ‘He smokes’. Smoking, as an activity, is quite complex. It involves various sub-activities like inhaling, exhaling, and holding the cigarette in mouth, etc. Different languages might emphasize different aspects of this complex activity when naming it.

For instance, in Hindi, smoking is described as ‘sigāreta pīnā’ which might be considered as an LVC, which literally translates to ‘drinking a cigarette’. Here, the emphasis is on the action of inhaling the smoke which is considered to be equivalent to drinking, which is one of the sub-activities involved in smoking.

In Marathi, on the other hand, smoking can be expressed as ‘sigāreta oḍhaṇe’, again an LVC which literally translates to ‘pulling a cigarette’. In this case, the focus is on the action of extracting or pulling the smoke from a lighted cigarette, another sub-activity associated with smoking.

These examples show how different languages pick up specific aspects of a complex activity, which can lead to variations in translation. Such constructions when they involve a N+V, as in the case of translation of English ‘smoking’ into Hindi or Marathi, result into LVC constructions. Here is an example from Sanskrit.

- (8) Skt: *saḥ maharṣiḥ mṛdutām agacchat* (*Raghu.* 1.33)  
 Gloss: He{sg,nom} sage{sg,nom} softness{sg,acc} go{pst,sg,3p}  
 Eng: The sage went to softness. ⇒ The sage became soft.

The verb ‘go’ typically refers to the physical movement of a thing from one place to the other. However, it may refer to a transition from one mental state to another, as in ‘he went into meditation’, and as an extension, it is not difficult to imagine its use for ‘becoming’, as illustrated by the above example.

Here, the activity of ‘going’ is complex and involves sub-activities such as moving from one place to another, or reaching a destination, or moving from one state to another, attaining a particular state, and so on. In this example, the entity performing the action, ‘maharṣi’ (the sage), moves towards an abstract state ‘mṛdutā’ (softness). When translating such sentences into other languages like English, a direct translation of the verb ‘go’ doesn’t capture all its shades and different verbs are used to express these different shades. Instead, the translation focuses on the sub-activity ‘become’, resulting in the natural translation, ‘The sage became soft’/‘The sage turned into a soft-natured person’.

## 4 Solution to handle the LVC from Computational Perspective

The semantics of LVCs involves primarily an extended meaning (*lakṣaṇā*) of either the noun or verb involved in N+V construction. The cases involving the extended sense of N typically go well across languages. LVC also involves cases having complex activities where there is a choice of verbs that can be used to express the semantics. The problem mainly arises during translation when different languages pick up different verbs in such cases.

In this paper, we explore strategies for computationally handling N+V Light Verb Constructions (LVCs). Our analysis reveals a consistent pattern: in N+V LVC constructions, the noun that agrees with the verb predominantly functions as the object of that verb. To address this, we devised rules to interpret the meaning of LVCs computationally.

Upon observing N-V constructions involving the Sanskrit verbal roots ‘*gam*’ (to go) and ‘*nī*’ (to carry), we noted that when the object noun indicating time is paired with these verbs, the combined meaning signifies an action of spending time. To systematize this observation, we compiled a list of ‘*kālavācī* words’—terms denoting time. When a noun from this list is used with the verbs ‘*gam*’ or ‘*nī*’, our algorithm interprets the meaning of the verb is ‘to spent’.

Additionally, we identified specific patterns within N-V constructions. For instance, when an object noun ending in the suffix ‘*tal*’ signifies quality and is paired with the verb ‘*gam*’, the resulting meaning denotes attainment. For instance, in the example, ‘*upahāsyatāṃ gamiṣyāmi*’ which translates to ‘I will attain the ridicule’, the noun ‘ridicule’ signifies a quality, which is ending with ‘*tal*’ suffix in Sanskrit and the verb ‘*gam*’ indicates attainment.

When the object represents a tangible entity and is used with the verb ‘*kr*’, the meaning translates to ‘to make’. For example ‘*kaṭam karoti*’ means ‘(He) makes a mat’ and ‘*ghaṭam karoti*’ means ‘(He) makes a pot’. Here, the tangible nature of the objects aligns with the action of creation or construction denoted by the verb ‘*kr*’. Conversely, when the object pertains to an abstract concept in conjunction with the same verb, the interpretation aligns with ‘to do’. For example, ‘*kāryam karoti*’ means ‘(He) is doing the work’, and ‘*pūjām karoti*’ means ‘(He) is doing worship’. In these cases, the abstract nature of the objects corresponds to the action of performing or executing denoted by the verb ‘*kr*’.

While our algorithm provided consistent interpretations for most cases, we encountered exceptions. To address these outliers, we established a dictionary cataloging object-verb pairs. By referencing this dictionary, we effectively handle the meanings of exceptional N+V LVCs, ensuring a comprehensive and accurate computational analysis.

## 5 Conclusion

In conclusion, our research has delved into the intricate world of constructions with auxiliary verbs and Sanskrit light verbs. We have taken a stand asserting

that there are no complex predicates in Sanskrit, and throughout our exploration, we have found compelling evidence to support this perspective.

One key aspect we've uncovered is that the instances where auxiliary verbs are employed can be effectively treated with the infinitive verb as the object of the finite verb. This observation underscores the simplicity of Sanskrit sentence structures, highlighting the semantic and syntactic compositionality. That even when auxiliary verbs are present, they do not give rise to complex predicates as seen in other languages, and the meaning is compositional.

Furthermore, our analysis has shown that in cases where the meaning is conveyed through extended or metaphoric interpretations, Sanskrit's approach aligns with languages across the spectrum. This observation underscores the universality of semantic expressions and how Sanskrit employs them without resorting to complex predicate structures.

While Sanskrit's causative constructions may pose challenges in translation to languages lacking similar structures, machine translation can address these complexities with the help of a specialized dictionary providing the meanings of causative verbs with special nouns.

In the light of these findings, we maintain that the notion of complex predicates, as commonly understood in linguistic studies, does not apply to Sanskrit. While there may be cases that initially appear complex due to specific linguistic features, such as the use of light verbs, our research has shown that these complexities can be effectively explained within the framework of Sanskrit's grammar and semantics.