

Adverbs in Sanskrit Wordnet

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Abstract

IITB is spearheading the Lexical Resources front in the field of NLP activities in India with 3 Wordnets, Hindi, Marathi and the recently launched Sanskrit Wordnet. The Hindi Wordnet has served to be the source Wordnet on the basis of which using Expansion approach, Marathi and Sanskrit Wordnets are created. The present paper attempts to study the issues in storage of lexical items from the point of view of part of speech in the expansion approach of lexicon building. The paper reports the general strategies adopted for Sanskrit Wordnet as well as certain problem areas. The paper also aims to discuss the category of अव्यय in Sanskrit in this relation. It deals with the issues related to the synsets of adverbs in Sanskrit Wordnet in expansion approach.

1 Introduction

The words in the Wordnet are open-class words¹ and they are categorized in four different classes—*noun*, *verb*, *adjective* and *adverb*. We focus here on *adverb*.

¹ Words of any natural language are divided into two main classes; (1) open-class words and (2) close-class words. Word forms like “back”, “right” or “well” are interpreted as nouns in some contexts, as verbs in other contexts, and as adjectives or adverbs in some other contexts. Whereas, prepositions, pronouns and determiners

1.1 Adverbs and English WordNet

Adverb is an open-class lexical category. It is defined as “a word that modifies the meaning of verbs, adjectives (including numbers), and other adverbs — but not nouns²”. The word derives from the Latin *adverbium*, that which is added to a verb (from Latin *ad*, to + *verbum*, word)³. The Latin term was invented by Flavius Sospater Charisius who coined it to translate the Greek word *epirrHEMA*, adverb (from Greek *epi*, upon + *rHEMA*, verb)⁴. It can also modify a phrase or a clause. The category adverb indicates: (a) manner, (b) time, (c) place, (d) cause, and (e) answers to the questions as “how,” “where,” “when” and “how much”.

Since *adverb* is an important part of speech (PoS), we believe, more theoretical consideration should be given in storing them. Even the five basic papers of ‘English WordNet’ describe *noun*, *verb* and *adjective* in detail but do not discuss *adverbs* in detail. Fellbaum⁵ describes adverbs as a heterogeneous group in which not only adverbs derived from adjectives are included but phrases used adverbially are also included. Some of these phrases are included in the WordNet. These phrases are mainly frozen phrases that are used widely.

² Online Dictionary of Language Terminology
<http://www.odlt.org>

³ Online Dictionary of Language Terminology
<http://www.odlt.org>

⁴ Online Dictionary of Language Terminology
<http://www.odlt.org>

⁵ Fellbaum (1998): p. 61

There is no tree structure in the semantic organization of adverbs in the WordNet. Only synonymy and sometimes antonymy are recognized. Since most of the adverbs of English are derived from adjectives a derivational pointer “Derived-from” is established between the adjective and adverb.

We propose to present our experience of storing *adverbs* in SWN with Hindi Wordnet as a source. Naturally we are influenced by the lexicalization in Hindi Wordnet in terms of concepts as well as the structure of synset members⁶.

1.2 General Strategy adopted in Sanskrit Wordnet

Most of the concepts expressed by adverbs are seen related to the aspect of an action, temporal and special substratum.

1.3 Problems faced by Sanskrit Lexicographers

Adverbs and Indiclinables: अव्यय in Paninian grammar are “underived nominal stems” (अव्युत्पन्न-प्रातिपदिक). They convey mere प्रातिपदिकार्थ (meaning of the stem). Panini considers them as nominative words. According to Panini, each अव्यय is a separate lexical item. Therefore, establishing a link between the adjective “चिर” and अव्यय “चिरम्” is not acceptable in his system.⁷ Mostly अव्ययस (indeclinables) perform the role of adverbs in Sanskrit. But we cannot say that all अव्ययस are adverbs. The concept of adverb is not found in Panini’s rules. But later on conceptualization of adverbs took place and in the काशिका commentary on Panini’s rule 4.4.28 we find the disclosure on adverbs. It is important to decide whether to use “Adverb” as a category or retain the traditional terms अव्यय. Since Sanskrit Wordnet (SWN) is built in expansion approach, we have two options (1) retain the PoS in the expansion approach or (2) create different PoS for Sanskrit and allow cross PoS linkage in SWN.

⁶ In the appendix we have presented a sample of the creation of Sanskrit synsets of adverbs basing on the synsets of adverbs in Hindi Wordnet.

⁷ चिर is an interesting example as we find it almost in every विभक्ति and as per Paninian grammar each and every विभक्ति is a distinct adverb.

Richard Gombrich in his article “He cooks softly: Adverbs in Sanskrit Grammar” tries to find out the reason behind the absence of the category “adverb” in Panini’s Sanskrit Grammar. The absence might be because of difficulty proper and precise description. Even though, it is difficult to render equivalent Sanskrit synset for every Hindi synset of adverb category, creating and independent category अव्यय may not help in capturing all the adverbs in Sanskrit.⁸

Below we present different concepts expressed by Adverbs where Sanskrit has peculiarities.

Adverb "there": Concept: तस्मिन् स्थाने।

Example: भवतः पुस्तकं तत्र वर्तते। Synset: तत्र, तत्स्थाने, तद्देशे, तत्स्थले, तस्मिन् स्थाने, तस्मिन् देशे.

Here only “तत्र” is अव्यय. All other synset members are not अव्ययस. These multiword expressions express the same sense which the अव्यय “तत्र” expresses.

Adverbs and उपसर्गः

Sometimes उपसर्गस perform the task of adverbs. For example, “बाहर” (outside) this sense can be expressed with the prefixed verbal forms like- बहिर्गम्, निर्गम्, विनिर्गम्, अपगम् etc. MW notes that prepositions वि, अप, प्र, परि, नि, निर, अव etc. in combination with various roots like- गम्, भू, ज्ञा, काश, लभ्, नी, वुद्, वृत्, घुष् etc. denote the sense of “out”.

Meaningपीछे: उपसर्ग “प्रति” denotes the sense of backward in प्रतीक्ष meaning “looking backwards”, also in प्रतिपथम् meaning “backwards”, प्रतिगत “flying backwards”, प्रतिसंचर “going or moving backwards” So as उपसर्ग “वि” denotes the sense of backwards in विमुख meaning “having the face averted turned backwards”.

⁸ See Gombrich’s examples: (1) स शीघ्रं गच्छति। (he goes *quickly*), (2) सा विविधप्रकारं पचतति। (she cooks *in various ways*), (3) अश्वो जवेन धावति। (the horse runs *swiftly*), (4) अत्र तिष्ठामि। (*here* I stand), (5) स तूष्णीम् आस्ते। (6) स चिरं स्वपिति। (he is sleeping a long time). According to him, first three examples cannot be deduced from Panini’s rules. Whereas, last three can be.)

Meaningसावधानीपूर्वकः उपसर्ग "सम्" in संवीक्ष् to look about, look at attentively, संश्रु - attend or listen attentively to, संचक्ष् to look attentively at, समालोक् to look at attentively, inspect, समालोच् to look at attentively, समुदीक्ष् to look up at, to look at attentively, समुपलक्ष् to look at or observe attentively, and "अनु"- in अनुध्यै to consider attentively, अन्वालोच् to consider attentively

Adverbs and कान्त forms in Neuter: Some times कान्त forms in neuter are expressing the sense of some adverbs.

For example- "स्पष्ट" : SWN *स्पष्टम्, प्रकटम्, *व्यक्तम्, स्फुटम्, *परिव्यक्तम्, परिस्फुटम्, उल्वणम्, *उद्विक्तम्* marked words are कान्तरूपस.

Adverbs and पञ्चमी, सप्तमी विभक्ति:

Sometimes, पञ्चमी विभक्त्यन्त performs the role of adverbs. For example: तस्मिन् (there) = तत्र, आमूलात् or प्रारम्भात्/प्रारम्भे (in the first place) etc.

In the examples given bellow, सप्तमी विभक्ति forms are marked with star.

समीपम्, समीपतः, *सन्निधौ, *निकटे, अन्तिकम्, *उपान्ते, अभितः, आरात्, *आसन्ने, *सन्निकृष्टम्, निकषा, *अदूरे, दूरात्, अदूरतः * marked words are विभक्तिरूपास

अपेक्षाकृत, तुलना में Generally, this sense is expressed by the पञ्चमी विभक्ति.

In compounds like दुर्लभः (not easy to be met with) preposition दुर् expresses this sense.

Sometimes उपसर्गs अधि and अभि are prefixed to verbal roots in this sense

तेजी के साथ "उसने कसकर एक चाँटा मारा / झाड़वर गाड़ी तेजी से चला रहा है" {कसकर, जोरदार, तेज, तेज़, तीव्र, तेजी से, जोर से, तेजी से, जोर से, तीव्रता से}. It is difficult to find equivalent adverb in Sanskrit. If "कसकर" is something like "strike out" then it is possible to translate this synset using the expression "बाहुप्रसारणं कृत्वा". Thus corresponding Sanskrit synset will be तीव्राघातेन।"बाहुप्रसारणं कृत्वा तेन परमुखचपेटिका

दत्ता।" बाहुप्रसारणं कृत्वा, बाहुप्रहारं कृत्वा. But this does not have the sense of तेज in Sanskrit.

2 "Derived-from" Links for Adverbs in Indo-WordNet:

English adverbs are mainly derived from adjectives by adding suffixes "-ly". They share similar semantic information. Therefore, these adjectives and adverbs are linked to each other by "Derived-from" links. Similar strategy can be adopted in Indo-Wordnet, where every particular language can decide these links.

For example, adverbs "तेजीसे" can be linked to the word "तेज" in the adjective category and "विलम्बसे" can be linked to the noun "विलम्ब".

In case of अव्ययीभाव adverbs, it is possible to link two components of it. For example, यथा and काल can be linked with यथाकालम् through this "Derived-from" link.

In Sanskrit, this linkage can be very much useful. With this it will be possible to link the विभक्त्यन्त forms to their root words. Apart from this, in some cases a link "Prefixed-with" can be provided, especially in the cases of उपसर्गs. When, any उपसर्ग denotes the sense of adverb, a link can be provided to corresponding verbal roots and nouns.

3 Syntactic Rules for Adverbs

In Sanskrit, there are fixed rules for the use of adverbs. These rules are defined as expectancy rules. They tell about a particular adverb and its association with a particular विभक्ति. For example the adverb सह expects तृतीया विभक्ति of the noun associated.

Similarly, Hindi adverbs can be appended with the syntactic rules. For example, Hindi adverbs "बाहर" "अंदर" need postposition "के" after the substantive noun or pronoun to which it is associated. Similarly, adverbs like "वास्तव", "तुलना" need postposition "में" to be attached to them. This can solve the problem of lexicalization of adverbs in the form "के बाहर".

4 Conclusion

In this paper we have described the process of creating synsets of adverbs in Sanskrit Wordnet. Even though the traditional Sanskrit grammar does not speak of any part of speech categorization we decide to abide by the general framework of part of speech in a wordnet for the time being.

5. Future Work

We try to tally all the indeclinable available in Sanskrit Lexica with Hindi adverbs and to report any so far un-lexicalized item.

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[http://www.odlt.org:15-11-2010\(11 pm\)](http://www.odlt.org:15-11-2010(11 pm))

Appendix 1

HINDI SYNSET	SANSKRIT SYNSET
<p>ID :: 51</p> <p>CAT :: adverb</p> <p>CONCEPT :: एकदम से या अचानक</p> <p>EXAMPLE :: "हम ज्यों ही घर से बाहर निकले अचानक बारिश होने लगी"</p> <p>SYNSET-HINDI ::</p> <p>अचानक, एकाएक, सहसा, एकबारगी, यकायक, अकस्मात्, अकस्मात्, अनायास, दैवात्, दैववश, अप्रत्याशिततः, अचकै, अगत्या, अचक, अचांचक, अचाका, अचाक, अचान, अनागतः, अन्यास, नागहाँ</p>	<p>ID :: 51</p> <p>CAT :: ADVERB</p> <p>CONCEPT :: विना किमपि सङ्केतम्।</p> <p>EXAMPLE :: "गृहात् निर्गतेषु अस्मत्सु सहसा एव आतपवर्ष्यः प्रारभत।"</p> <p>SYNSET-SANSKRIT :: सहसा, अकस्मात्, आपाततः, अञ्जसा, मुहुः, सकृत्</p>
<p>ID :: 373</p> <p>CAT :: adverb</p> <p>CONCEPT :: कम दूरी पर</p> <p>EXAMPLE :: "श्याम के घर के पास में एक विद्यालय है"</p> <p>SYNSET-HINDI :: पास में, नज़दीक, नजदीक, निकट में, करीब में, समीप, निकट, पास, करीब, करीब, सन्निकट, नजीक, मुत्तसिल, अर्वाक, अविदूर</p>	<p>ID :: 373</p> <p>CAT :: ADVERB</p> <p>CONCEPT :: स्वल्पे अन्तरे।</p> <p>EXAMPLE :: "श्यामस्य गृहस्य समीपम् एव एकः विद्यालयः अस्ति।"</p> <p>SYNSET-SANSKRIT :: समीपम्, समीपतः, सन्निकटम्, निकटे, अन्तिकम्, उपान्ते, अभितः, आरात्, आसन्ने, सन्निकृष्टम्, निकषा, अदूरे, दूरात्, अदूरतः</p>
<p>ID :: 526</p> <p>CAT :: adverb</p> <p>CONCEPT :: वास्तव में</p> <p>EXAMPLE :: "वाकई मैं आपका नाम भूल गया था"</p> <p>SYNSET-HINDI :: वाकई, वाकई, वास्तव में, हकीकतन, हकीकतन, दरअसल, असल में, सचमुच, सच्ची-मुच्ची, सच्ची मुच्ची, सत्यतः, वस्तुतः</p>	<p>ID :: 526</p> <p>CAT :: adverb</p> <p>CONCEPT :: वास्तवम् एव।</p> <p>EXAMPLE :: भोः, विस्मृतवान् खलु भवतः नाम।</p> <p>SYNSET-SANSKRIT :: खलु, नूनम्, अर्थतः, तत्वतः, वस्तुतः, अव्यलीकम्, यथार्थम्, तत्त्वेन, यथातथम्, अनुषत्यम्, अञ्जसा, अद्वा</p>
<p>ID :: 528</p> <p>CAT :: adverb</p> <p>CONCEPT :: स्पष्ट रूप से</p> <p>EXAMPLE :: "मैं जो कुछ भी कहूँगा, स्पष्ट कहूँगा"</p> <p>SYNSET-HINDI :: स्पष्ट, स्पष्टतः, खुल कर, खुले तौर पर, खुल्लम खुल्ला, विना लाग लपेट के, साफ़ साफ़, स्पष्टतया, साफ़-साफ़, साफ-साफ</p>	<p>ID :: 528</p> <p>CAT :: adverb</p> <p>CONCEPT :: सुस्पष्टरूपेण विना किञ्चित् विभ्रमः।</p> <p>EXAMPLE :: भोः, अधुना यत् किम् अपि अहं वक्ष्यामि तेन सर्वं स्पष्टं भविष्यति।</p> <p>SYNSET-SANSKRIT :: स्पष्टम्, प्रकटम्, व्यक्तम्, स्फुटम्, परिव्यक्तम्, परिस्फुटम्, उल्वणम्, उद्विक्तम्</p>
<p>ID :: 1267</p> <p>CAT :: adverb</p> <p>CONCEPT :: पीछे की ओर या पीठ की ओर</p> <p>EXAMPLE :: "वह पीछे मुड़कर देखा / चोर धीरे-धीरे पीछे जाने लगा"</p> <p>SYNSET-HINDI ::</p>	<p>ID :: 1267</p> <p>CAT :: ADVERB</p> <p>CONCEPT :: पार्श्वे पृष्ठं प्रति वा।</p> <p>EXAMPLE :: "विमुखेन तेन पृष्ठतः दृष्टम्। / चोरः शनैः शनैः प्रतिपथम् चरितवान्।"</p> <p>SYNSET-SANSKRIT :: पृष्ठतः, पश्चात्, प्रतिपथम्, प्रत्यक्, प्रागपम्</p>

पीछे,पश्चतः,पाछे,पृष्ठतः,अर्वाक			
ID	:: 1586	ID	:: 1586
CAT	:: adverb	CAT	:: ADVERB
CONCEPT	:: विलंब से	CONCEPT	:: विलम्बात्।
EXAMPLE	:: "उसने विलंबतः यह कार्य शुरु किया/ श्याम परीक्षा भवन में विलंबतः पहुँचा"	EXAMPLE	:: "तेन चिरेण एतद् कार्यं प्रारब्धम्।/ श्यामः परीक्षा-भवने विलम्बेन अनुप्राप्तः।"
SYNSET-HINDI	:: विलंबतः,अशीघ्रतः,देरी से,विलंबपूर्वक,देर में	SYNSET-SANSKRIT	:: चिरेण, चिरे, चिरात्, विलम्बेन, विलम्बतः, पश्चात्
ID	:: 1609	ID	:: 1609
CAT	:: adverb	CAT	:: adverb
CONCEPT	:: उस जगह पर	CONCEPT	:: तस्मिन् स्थाने।
EXAMPLE	:: "आपकी पुस्तक वहाँ है"	EXAMPLE	:: भवतः पुस्तकं तत्र वर्तते।
SYNSET-HINDI	:: वहाँ,उस जगह	SYNSET-SANSKRIT	:: तत्र, तत्स्थाने, तस्मिन्_स्थाने, तस्मिन्_देशे
ID	:: 1662	ID	:: 1662
CAT	:: adverb	CAT	:: ADVERB
CONCEPT	:: किस अवधि या समय तक	CONCEPT	:: किम् समये।
EXAMPLE	:: "मुझे नहीं पता कि,राम कब तक आयेगा?"	EXAMPLE	:: "रामः कदा आगच्छति तद् अहं न जानामि।"
SYNSET-HINDI	:: कब तक,कब	SYNSET-SANSKRIT	:: कदा, कर्हि
ID	:: 1920	ID	:: 1920
CAT	:: adverb	CAT	:: ADVERB
CONCEPT	:: सावधानी के साथ	CONCEPT	:: सम्यक् अवधानेन सह विना किम् अपि प्रमादात्।
EXAMPLE	:: "कोई भी काम सावधानीपूर्वक करो"	EXAMPLE	:: "किमपि कार्यं सावधानं कुरु।"
SYNSET-HINDI	:: सावधानीपूर्वक,ध्यानपूर्वक,ध्यान से,सावधानी से,सावधानतः,सम्भालकर,संभालकर	SYNSET-SANSKRIT	:: सावधानम्, साकृतम्, अवधानात्, अवहितम्, मनःप्रवेशेन, प्रमाद-व्यतिरेकेण
ID	:: 1922	ID	:: 1922
CAT	:: adverb	CAT	:: ADVERB
CONCEPT	:: अति शीघ्रता से	CONCEPT	:: वेगेन।
EXAMPLE	:: "झटपट यह काम कर दो"	EXAMPLE	:: "शीघ्रम् एतत् कार्यं सम्पन्नतां नयतु।"
SYNSET-HINDI	:: झटपट,चटपट,फटाफट,तुरंत,तुरन्त,तत्काल,अविलंब,अविलम्ब,फौरन,फौरन,खटाक से,तत्क्षण,तडाक से,तड़ से,तपाक से,अतिशीघ्र,अतिशीघ्रतः,जल्द से जल्द,जल्दी से जल्दी,तड़ से,हाथों-हाथ,हाथों हाथ,हाथो-हाथ,हाथो हाथ,सिताब,सिताबी,बेसाख्ता,ठहाका	SYNSET-SANSKRIT	:: शीघ्रम्, त्वरया, त्वरितम्, द्रुतम्, वेगतः, तूर्णम्, आशु, सत्वरम्, सत्वरितम्, अञ्जसा, क्षिप्रम्, झटिति, द्राक्, अजिरम्, अञ्जस्, अभितः, चतुरम्, चपलम्, अम्, क्षेपणा, क्षेपीयः, द्रवत्