

# E-Teaching Capsule for Srimad-Bhagavad-Gita

*by* Preeti Patel

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*A dissertation submitted to the University of Hyderabad  
for the award of the degree of*

**Doctor of Philosophy**

*in*

**Sanskrit Studies**

*by*

**Patel Preeti Khimji**

**10HSPH01**



**Department of Sanskrit Studies**

**School of Humanities**

**University of Hyderabad**

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**2018**

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*under the guidance of*

**Prof. Amba Kulkarni**

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**Department of Sanskrit Studies**

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**University of Hyderabad**

**Hyderabad**

**2018**

## Declaration

I, **Patel Preeti Khimji**, hereby declare that the work embodied in this dissertation entitled “**E-Teaching Capsule for Śrīmad-Bhagavad-Gītā**” is carried out by me under the supervision of Prof. Amba P. Kulkarni, Professor, Department of Sanskrit Studies, University of Hyderabad, Hyderabad and has not been submitted for any degree in part or in full to this university or any other university. I hereby agree that my thesis can be deposited in Shodhganga/INFLIBNET.

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1. **The Sanskrit Library**, ISBN-10: 1943135002 - 2015

and has made presentation in the following conferences:

1. **How free is 'free' word order in Sanskrit?**, Sanskrit syntax and discourse structures, Université Paris Diderot - 2013
2. **Geeta: Gold Standard Annotated Data, Analysis and its Application**, 10<sup>th</sup> International Conference on Natural Language Processing (ICON), Noida, Delhi - 2013

3. **Revival of Ancient Sanskrit Teaching methods using Computational Platforms,**  
Workshop on - Bridging the gap between Sanskrit Computational Linguistics  
tools and management of Sanskrit Digital Libraries, BHU, Varanasi - 2016

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॥ वन्दे महापुरुष ते चरणारविन्दम् ॥

---

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# CONTENTS

Acknowledgements	i
Contents	iii
List of Figures	vii
List of Tables	xi
List of Abbreviations	xv
Dissertation related papers presented at Conferences	xvi
<b>1 Introduction</b>	<b>1</b>
1.1 Historical Background of Śrīmad-Bhagavad-Gītā . . . . .	1
1.2 Summary of each chapter of Śrīmad-Bhagavad-Gītā . . . . .	5
1.3 Śrīmad-Bhagavad-Gītā and its commentators . . . . .	9
1.4 Aim and Methodology . . . . .	12
1.4.1 Aim . . . . .	12
1.4.2 Methodology . . . . .	14
1.5 Organisation of Thesis . . . . .	15

<b>I</b>	<b>Linguistic Analysis: Building the Foundation</b>	<b>18</b>
2	Linguistic Analysis of Śrīmad-Bhagavad-Gītā	19
2.1	Clues from Commentary tradition . . . . .	19
2.2	Procedure . . . . .	24
2.3	An Illustration . . . . .	25
2.4	Summary . . . . .	31
<b>II</b>	<b>Pedagogy and Interface Description</b>	<b>32</b>
3	Pedagogy and Interface Description of Śrīmad-Bhagavad-Gītā	33
3.1	Teaching Methodology . . . . .	33
3.2	Ancient Indian Methods . . . . .	34
3.2.1	Comparison of Both Methods . . . . .	35
3.2.2	Utility of Indian Methods . . . . .	36
3.3	Influence of Western Methods . . . . .	36
3.3.1	New Western Methods . . . . .	37
3.4	Current Trends in Sanskrit Teaching . . . . .	38
3.5	Effective Use of Language Technology . . . . .	39
3.5.1	E-reader . . . . .	40
3.6	Śrīmad-Bhagavad-Gītā Interface Description . . . . .	41
3.6.1	Features of Śrīmad-Bhagavad-Gītā Interface . . . . .	41
3.6.2	Utility of Interface . . . . .	51
3.7	Summary . . . . .	53
<b>III</b>	<b>Teaching Module for Śrīmad-Bhagavad-Gītā</b>	<b>54</b>
4	Statistical Analysis and Grammar Kit for Śrīmad-Bhagavad-Gītā	55
4.1	Utility of Statistical Analysis . . . . .	55
4.1.1	Visual Aids . . . . .	56
4.2	Importance of Statistics in Śrīmad-Bhagavad-Gītā . . . . .	56
4.3	Domain Specific Teaching Capsules . . . . .	57
4.3.1	Domain specific Teaching Material . . . . .	58

4.3.2	Śrīmad-Bhagavad-Gītā Teaching Module . . . . .	58
4.4	Verse Distribution . . . . .	59
4.5	Summary . . . . .	61
<b>5</b>	<b>Prosodic Analysis</b>	<b>62</b>
5.1	Features of Metre . . . . .	62
5.2	Description of metres . . . . .	64
5.2.1	Anuṣṭup . . . . .	64
5.2.2	Triṣṭup . . . . .	65
5.3	Observation . . . . .	78
5.4	Summary . . . . .	78
<b>6</b>	<b>Morphological Analysis</b>	<b>80</b>
6.1	Statistical Analysis . . . . .	81
6.2	Word Formation in Śrīmad-Bhagavad-Gītā . . . . .	83
6.2.1	Subanta Word Formation . . . . .	84
6.2.2	Tiñanta Word Formation . . . . .	104
6.3	Summary . . . . .	128
<b>7</b>	<b>Sandhi Analysis</b>	<b>129</b>
7.1	Ac-sandhi . . . . .	131
7.2	Hal-sandhi . . . . .	139
7.3	Visarga-sandhi . . . . .	151
7.4	Summary . . . . .	163
<b>8</b>	<b>Compound Analysis</b>	<b>165</b>
8.1	Statistical Analysis . . . . .	165
8.2	Syntactic Classification . . . . .	166
8.3	Semantic Classification . . . . .	172
8.4	Relevant Pāṇinian Grammar Rules . . . . .	173
8.4.1	Tatpuruṣa . . . . .	173
8.4.2	Bahuvrīhi . . . . .	180
8.4.3	Dvandva . . . . .	183
8.4.4	Avyayībhāva . . . . .	184

8.4.5	Garbhit Samāśas . . . . .	185
8.5	Summary . . . . .	185
<b>9</b>	<b>Sentential Analysis</b>	<b>187</b>
9.1	Statistical Analysis . . . . .	188
9.2	Teaching Module . . . . .	189
9.2.1	Kāraka Relations . . . . .	190
9.2.2	Kāraketara Relations . . . . .	194
9.2.3	Inter-sentential Relations . . . . .	202
9.3	Summary . . . . .	204
<b>10</b>	<b>Future Implementation</b>	<b>205</b>
10.1	Conclusion . . . . .	205
10.2	Future Research . . . . .	206
	<b>Appendices</b>	<b>208</b>
	<b>A - List of Pāṇinian Sūtras for Sandhi</b>	<b>209</b>
	<b>B - List of Pāṇinian Sūtras for Samāsa</b>	<b>213</b>
	<b>C - List of Pāṇinian Sūtras for Sentential analysis</b>	<b>218</b>
	<b>D - <i>Dhātu-wise</i> (including the upasargas) Kāraka expectancy</b>	<b>220</b>
	<b>Bibliography</b>	<b>228</b>

---

## LIST OF FIGURES

2.1	BhG 2.47 . . . . .	26
2.2	BhG 2.47 . . . . .	27
2.3	BhG 2.47 . . . . .	28
3.1	BhG - Main . . . . .	42
3.2	Padapāṭha . . . . .	44
3.3	Row-wise Information . . . . .	45
3.4	Anvaya . . . . .	46
3.5	Morphological Analysis . . . . .	46
3.6	Dictionary Link . . . . .	47
3.7	Constituency analysis of a compound . . . . .	48
3.8	Possible relations among words . . . . .	49
3.9	Kāraka information . . . . .	50
3.10	Hindi and English Glosses . . . . .	50
3.11	Miscellaneous Information . . . . .	51
6.1	Mascl. Akārānta Vibhakti Distribution . . . . .	86
6.2	Mascl. Akārānta Percentage Distribution . . . . .	86
6.3	Mascl. Nakārānta Vibhakti Distribution . . . . .	87
6.4	Mascl. Nakārānta Percentage Distribution . . . . .	87
6.5	Mascl. Ikārānta Vibhakti Distribution . . . . .	88

6.6	Mascl. Ikārānta Percentage Distribution . . . . .	88
6.7	Mascl. Ukārānta Vibhakti Distribution . . . . .	89
6.8	Mascl. Ukārānta Percentage Distribution . . . . .	89
6.9	Mascl. Takārānta Vibhakti Distribution . . . . .	90
6.10	Mascl. Takārānta Percentage Distribution . . . . .	90
6.11	Mascl. Sakārānta Vibhakti Distribution . . . . .	91
6.12	Mascl. Sakārānta Percentage Distribution . . . . .	91
6.13	Mascl. Ṛkārānta Vibhakti Distribution . . . . .	92
6.14	Mascl. Ṛkārānta Percentage Distribution . . . . .	92
6.15	Mascl. Dakārānta Vibhakti Distribution . . . . .	93
6.16	Mascl. Dakārānta Percentage Distribution . . . . .	93
6.17	Neuter Akārānta Vibhakti Distribution . . . . .	95
6.18	Neuter Akārānta Percentage Distribution . . . . .	95
6.19	Neuter Sakārānta Vibhakti Distribution . . . . .	96
6.20	Neuter Sakārānta Percentage Distribution . . . . .	96
6.21	Neuter Nakārānta Vibhakti Distribution . . . . .	97
6.22	Neuter Nakārānta Percentage Distribution . . . . .	97
6.23	Neuter Takārānta Vibhakti Distribution . . . . .	98
6.24	Neuter Takārānta Percentage Distribution . . . . .	98
6.25	Fem. Ākārānta Vibhakti Distribution . . . . .	100
6.26	Fem. Ākārānta Percentage Distribution . . . . .	100
6.27	Fem. Ikārānta Vibhakti Distribution . . . . .	101
6.28	Fem. Ikārānta Percentage Distribution . . . . .	101
6.29	Fem. Īkārānta Vibhakti Distribution . . . . .	102
6.30	Fem. Īkārānta Percentage Distribution . . . . .	102
6.31	Prayoga Distribution . . . . .	105
6.32	Kartari-Gaṇa Distribution . . . . .	106
6.33	Bhvādi-Gaṇa Distribution . . . . .	107
6.34	Adādi-Gaṇa Distribution . . . . .	108
6.35	Divādi-Gaṇa Distribution . . . . .	110
6.36	Tudādi-Gaṇa Distribution . . . . .	111
6.37	Kryādi-Gaṇa Distribution . . . . .	112

6.38 Svādi-Gaṇa Distribution . . . . .	114
6.39 Tanādi-Gaṇa Distribution . . . . .	115
6.40 Juhotyādi-Gaṇa Distribution . . . . .	116
6.41 Rudhādi-Gaṇa Distribution . . . . .	117
6.42 Curādi-Gaṇa Distribution . . . . .	119
6.43 Karmaṇi-Gaṇa Distribution . . . . .	120
7.1 Sandhi Distribution . . . . .	130
8.1 Possible Parses . . . . .	167
8.2 Tatpuruṣa Compound . . . . .	174
8.3 Karmadhāraya Compound . . . . .	178
8.4 Samānādhikaraṇa-Bahuvrīhiḥ Compound . . . . .	181
8.5 Vyadhikaraṇa-Bahuvrīhiḥ Compound . . . . .	182
8.6 Samāsa Distribution . . . . .	185
9.1 Kartā . . . . .	190
9.2 Kartā1 . . . . .	191
9.3 Karma and Adhikaraṇam . . . . .	191
9.4 Karaṇam . . . . .	192
9.5 Apādānam . . . . .	193
9.6 Sampradānam . . . . .	193
9.7 Viśeṣaṇam . . . . .	194
9.8 Ṣaṣṭhīsambandhaḥ . . . . .	195
9.9 Sambodhyaḥ . . . . .	195
9.10 Kriyāviśeṣaṇam . . . . .	196
9.11 Hetuḥ . . . . .	197
9.12 Prayojanam . . . . .	197
9.13 Nirdhāraṇam1 . . . . .	198
9.14 Nirdhāraṇam2 . . . . .	198
9.15 Vīpsā1 . . . . .	198
9.16 Vīpsā2 . . . . .	199
9.17 Upapadasambandhaḥ . . . . .	199
9.18 Vibhaktam . . . . .	200

9.19	Sambandhaḥ . . . . .	200
9.20	Pūrvakālaḥ and Samānakālaḥ . . . . .	201
9.21	Bhāvalakṣaṇasaptamī_pūrvakālaḥ . . . . .	202
9.22	Connectors . . . . .	203
9.23	Co-relative Pronouns . . . . .	204

---

## LIST OF TABLES

3.1	Colour Codes . . . . .	43
4.1	Verse-wise distribution . . . . .	60
5.1	Gaṇa-distribution . . . . .	63
5.2	Anuṣṭup-Metre . . . . .	65
5.3	Indravajrā-Metre . . . . .	66
5.4	Upendravajrā-Metre . . . . .	67
5.5	Distribution of Upajāti Metres1 . . . . .	68
5.6	Distribution of Upajāti Metres2 . . . . .	69
5.7	Śālinī-Metre . . . . .	70
5.8	Śāradā-Metre . . . . .	70
5.9	Guṇāṅgī-Metre . . . . .	71
5.10	Lalitā-Metre . . . . .	71
5.11	ihāmṛgī-Metre . . . . .	72
5.12	Prākārabandha-Metre . . . . .	72
5.13	Viśākhā-Metre . . . . .	73
5.14	Yaśodā-Metre . . . . .	73
5.15	Vātormī-Metre . . . . .	74
5.16	Rādhā-Metre . . . . .	74
5.17	Gaṅgā-Metre . . . . .	74

5.18	Ratiḥ-Metre . . . . .	75
5.19	Samśrayaśrī-Metre . . . . .	75
5.20	Iṣṭa-Metre . . . . .	76
5.21	iṣa-Metre . . . . .	76
5.22	Gatiḥ-Metre . . . . .	77
5.23	Citrā-Metre . . . . .	77
5.24	Vamśastha-Metre . . . . .	77
5.25	Frequency-Table of thirty-four metres . . . . .	78
6.1	Morph level ambiguity . . . . .	82
6.2	Masculine-ending . . . . .	85
6.3	Masculine-endings . . . . .	94
6.4	Neuter-ending . . . . .	94
6.5	Neuter-endings . . . . .	99
6.6	Feminine-ending . . . . .	99
6.7	Feminine-endings <sup>1</sup> . . . . .	103
6.8	Feminine-endings <sup>2</sup> . . . . .	103
6.9	Bhvādi Parasmaipadī . . . . .	107
6.10	Bhvādi Ātmanepadī . . . . .	108
6.11	Adādi Parasmaipadī . . . . .	109
6.12	Adādi Ātmanepadī . . . . .	109
6.13	Divādi Parasmaipadī . . . . .	110
6.14	Divādi Ātmanepadī . . . . .	110
6.15	Tudādi Parasmaipadī . . . . .	111
6.16	Tudādi Ātmanepadī . . . . .	112
6.17	Kryādi Parasmaipadī . . . . .	113
6.18	Svādi Parasmaipadī . . . . .	113
6.19	Svādi Ātmanepadī . . . . .	114
6.20	Tanādi Parasmaipadī . . . . .	115
6.21	Tanādi Ātmanepadī . . . . .	115
6.22	Juhotyādi Parasmaipadī . . . . .	116
6.23	Juhotyādi Ātmanepadī . . . . .	117
6.24	Rudhādi Parasmaipadī . . . . .	118

6.25	Rudhādi Ātmanepadī . . . . .	118
6.26	Curādi Parasmaipadī . . . . .	118
6.27	Dhātu distribution . . . . .	122
6.28	Bhvādi distribution . . . . .	123
6.29	Sthā1 Dhātu . . . . .	124
6.30	Adādi distribution . . . . .	124
6.31	Divādi distribution . . . . .	124
6.32	Tudādi distribution . . . . .	125
6.33	Kryādi distribution . . . . .	125
6.34	Svādi distribution . . . . .	125
6.35	Juhotyādi distribution . . . . .	125
6.36	Rudhādi distribution . . . . .	126
6.37	Tanādi distribution . . . . .	126
6.38	High frequency distribution . . . . .	126
6.39	Kṛt-Pratyayas . . . . .	127
6.40	Avyayas . . . . .	128
7.1	Ac-sandhi . . . . .	131
7.2	Savarṇa-sandhi . . . . .	132
7.3	Yaṇ-sandhi . . . . .	133
7.4	Vṛddhi-sandhi . . . . .	134
7.5	Guṇa-sandhi . . . . .	135
7.6	Yāntavānta-sandhi . . . . .	136
7.7	Yāntavānta and Lopa-sandhi . . . . .	137
7.8	Hal-sandhi . . . . .	139
7.9	Hal-sandhi (Combo.) . . . . .	140
7.11	Jaśtva-sandhi . . . . .	141
7.13	Jaśtva and Cartva-sandhi . . . . .	143
7.14	Satva and Ścutva-sandhi . . . . .	144
7.15	Jaśtva and Anunāsika-sandhi . . . . .	145
7.16	Ñamuḍāgama-sandhi . . . . .	147
7.17	Ścutva-sandhi . . . . .	149
7.18	Visarga-sandhi . . . . .	152

7.19	Visarga-sandhi (Combo.) . . . . .	152
7.21	Visarga-sandhi . . . . .	154
7.23	Rutva, Utva and Guṇa-sandhi . . . . .	156
7.25	Repha-sandhi . . . . .	157
7.27	Rutva, Yatva and Lopa-sandhi . . . . .	160
7.28	Rutva, Yatva and Lopa-sandhi . . . . .	161
7.29	Rutva-sandhi . . . . .	163
8.1	Component Statistics . . . . .	167
8.2	Compounds with 4 constituents . . . . .	170
8.3	Two Component Statistics . . . . .	172
8.4	Upapada-Tatpuruṣa Compound . . . . .	177
9.1	Kāraka Relations . . . . .	188
9.2	Kāraṅketara Relations . . . . .	189
9.3	Kṛdanta-Kriyā Relations . . . . .	189
1	Kāraka Tags . . . . .	220
2	Ākāṅkṣā for Bhvādi Dhātu distribution . . . . .	223
3	Ākāṅkṣā for Adādi Dhātu distribution . . . . .	224
4	Ākāṅkṣā for Juhotyādi Dhātu distribution . . . . .	224
5	Ākāṅkṣā for Divādi Dhātu distribution . . . . .	225
6	Ākāṅkṣā for Tanādi Dhātu distribution . . . . .	225
7	Ākāṅkṣā for Svādi Dhātu distribution . . . . .	226
8	Ākāṅkṣā for Tudādi Dhātu distribution . . . . .	226
9	Ākāṅkṣā for Rudhādi Dhātu distribution . . . . .	227
10	Ākāṅkṣā for Kryādi Dhātu distribution . . . . .	227

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## LIST OF ABBREVIATIONS

A	Aṣṭādhyāyī
BhG	Bhagavad-Gītā
Ch.sū	Chanda-Sūtra
Sid. Kau.	Siddhānta-Kaumudī
Vṛ	Vṛttaratnākara

---

## DISSERTATION RELATED PAPERS PRESENTED AT CONFERENCES

- Preeti Shukla, Amba Kulkarni and Devanand Shukl, “Revival of Ancient Sanskrit Teaching methods using Computational Platforms”. (Accepted for publication in *Prof. Muraleemadhavan Felicitation Volume*, Kalady, 2018)
- Amba Kulkarni, Preeti Shukla, Pavan Satuluri and Devanand Shukl, “How ‘free’ is the word order in Sanskrit”. In *Sanskrit Syntax*, The Sanskrit Library, 2015.
- Preeti Shukla, Amba Kulkarni and Devanand Shukl, “Geeta: Gold Standard Annotated Data, Analysis and its Application”. *The 10th International Conference on NLP*. Noida, India, 2013.

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# CHAPTER 1

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## INTRODUCTION

### 1.1 Historical Background of Śrīmad-Bhagavad-Gītā

The most ancient epic poem in Indian history besides *The Rāmāyaṇa* is *The Mahābhārata* authored by sage Vyāsa. It is a part of *Smṛti* texts which is divided into eighteen sections known as *parvans*, each of which is further organised by sub-parvans and chapters. The main theme of this epic is the legendary fratricidal battle for regal succession and supremacy in India fought between paternal cousins, the Pāṇḍavas and the Kauravas, on the plains of Kurukṣetra. Almost all the kings with their troops from all over ancient India were involved in this catastrophic battle. The *Mahābhārata* has in total eighteen *parvans* viz., Ādi, Sabhā, Araṇya (Vana), Virāṭa, Udyoga, Bhīṣma, Droṇa, Karṇa, Śalya, Sauṣuptika (Sauptika), Strī, Śānti, Ānuśāsanika, Aśvamedha, Āśramavāsika, Mausala, Mahāprasthāna and Svargārohaṇa adding upto approximately one lakh verses.

It is in this very epic at the most dramatic moment we find the divine song of the lord, *Śrīmad-Bhagavad-Gītā* (henceforth BhG) included in the Bhīṣma Parva (chapters 25 to

42). It consists of eighteen chapters and has approximately 700 verses.<sup>1</sup> The complete epic is in narrative form in the order leading to the innermost frame till BhG viz.—

1. Ugrasravas and the seers at sage Śaunaka's twelve-year ritualistic sacrifice,
2. Vaiśampāyana and Janamejaya's snake sacrifice,
3. Sañjaya and Dhṛtarāṣṭra,
4. Kṛṣṇa and Arjuna.

The main characters in BhG are Lord Kṛṣṇa, Arjuna, Sañjaya and Dhṛtarāṣṭra. The principal dialogue between Arjuna and Kṛṣṇa is included in the course of narration by Sañjaya. BhG starts with the question put forth by King of Hastināpur, Dhṛtarāṣṭra inquiring the details of battlefield to his loyal secretary Sañjaya who was gifted divine vision by sage Vyāsa enabling him to see the past, present and future.

The question as to how did BhG occur in the midst of such a catastrophic battle is answered when looked at the thirteenth chapter of **Bhīṣma Parvan** known as *Śrī-madbhagavadgītā parvan*. Ten days of the total eighteen days had passed since the start of the battle and King Dhṛtarāṣṭra's minister Sañjaya upon his return from the battlefield conveys the sad message of Commander Bhīṣma's defeat to Dhṛtarāṣṭra.<sup>2</sup>

As mentioned before Sañjaya had been granted the divine vision by sage Vyāsa through which he could clearly see the ongoings of the battlefield and even read the minds of those present there.<sup>3</sup> Furthermore, on Dhṛtarāṣṭra's request he describes in detail the scenes of the battlefield to him in this and the subsequent chapters of **Bhīṣma Parvan**.

In the first chapter of BhG, Arjuna is depicted as being delusional and dejected before the onset of battle just by looking at the opposing party who are his kith and kin and brooding over the consequences of the battle. The seed of his dejection is planted by the talks that took place between Sañjaya (who acted as an ambassador on behalf of Dhṛtarāṣṭra) and Yudhiṣṭhira at a place called *Upaplavya* (in Pāncāla) in **Udyoga Parvan** (chapters 23 to 31). Renowned Scholar Śrīpāda Dāmodara Sātawālekara (1930)

<sup>1</sup> There is a debate regarding the number of verses, some say there are 700 verses while others opine there are 701 or 750 verses. For our work we have followed the standard version of Geeta Press (Goyandka, 2016) consisting of 700 verses.

<sup>2</sup> सञ्जयोऽहं महाराज नमस्ते भरतर्षभ। हतो भीष्मः शान्तनवो भरतानां पितामहः॥ — 6.13.3

<sup>3</sup> चक्षुषा सञ्जयो राजन् युद्धमेतद् वदिष्यति। एतस्य सर्वसङ्ग्रामे न परोक्षं भविष्यति॥ — 6.2.10

प्रकाशं वाप्रकाशं वा दिवा वा यदि वा निशि। मनसा चिन्तितमपि सर्वं वेत्स्यति सञ्जयः॥ — 6.2.11

noted parallels between the verses in the above-mentioned parvan and the following **Bhīṣma Parvan** as shown below:

Sañjaya had cautioned Yudhiṣṭhira in **Udyoga Parvan**:

सर्वक्षयो दृश्यते यत्र कृत्स्नः पापोदयो निरयोऽभावसंस्थः ।  
कस्तत् कुर्याज्जातु कर्म प्रजानन् पराजयो यत्र समो जयश्च॥ — 5.25.7

**Eng. Tr.:** Who could knowingly be ever guilty of an act, which would result in universal slaughter, which would be sinful and lead to hell, an act consisting in the destruction (of men), an act the result of which, whether it be victory or defeat, is or the self-same value?<sup>4</sup>

ते चेत् कुरूनुशिष्याय पार्था निर्णयि सर्वान् द्विषतो निगृह्य ।  
समं वस्तज्जीवितं मृत्युना स्याद् यज्जीवध्वं ज्ञातिवधे न साधु॥ — 5.25.9

**Eng. Tr.:** If you, ye sons of Pritha, chastise the Kurus, by defeating and slaying all your foes, that subsequent life of yours would be equivalent to death, for what, in sooth, is life after having killed all your kinsfolk?

कथं हि नीचा इव दौष्कुलेया निर्धर्मार्थं कर्म कुर्युश्च पार्थाः । — 5.25.13

**Eng. Tr.:** How can the sons of Pritha, like base persons of low lineage, commit an act of unrighteousness?

The above dialogues were mirrored by Arjuna who repeats those very words in **Bhīṣma Parvan**:

निमित्तानि च पश्यामि विपरीतानि केशव ।  
न च श्रेयोऽनुपश्यामि हत्वा स्वजनमाहवे॥ — BhG 1.31

**Eng. Tr.:** These signs bode evil for us. I do not see that any good can come from killing our relations in battle.

किम् नः राज्येन गोविन्द किम् भोगैः जीवितेन वा॥ — BhG 1.32

**Eng. Tr.:** Govind, of what use will the kingdom or luxuries or even life be to us.

एतान्न हन्तुमिच्छामि घ्नतोऽपि मधुसूदन ।  
अपि त्रैलोक्यराजस्य हेतोः किम् नु महीकृते॥ — BhG 1.35

<sup>4</sup> English translation is by Ganguli (1993)

Eng. Tr.: O Slayer of demon Madhu, I do not wish to kill them, even though they slay me, even for the sovereignty over the three worlds; how much the less for the kingdom here on earth.

निहत्य धार्तराष्ट्रान्नः का प्रीतिः स्याज्जनार्दन।

पापमेवाश्रयेदस्मान्हत्वैतानाततायिनः ॥ — BhG 1.36

Eng. Tr.: O Krishna, what satisfaction could we find in killing Dhritarashtra's sons? We would become sinners by slaying these men, even though they are evil.

अहो बत महत्पापं कर्तुं व्यवसिता वयम्।

यद्राज्यसुखलोभेन हन्तुं स्वजनमुद्यताः ॥ — BhG 1.45

Eng. Tr.: This is a great sin! We are prepared to kill our own relations out of greed for the pleasures of a kingdom.

Saṅjaya cautions again in **Udyoga Parvan**:

न चेद् भागं कुरवोऽन्यत्र युद्धात् प्रयच्छेरंस्तुभ्यमजातशत्रो।

भैक्षचर्यामन्धकवृष्णिराज्ये श्रेयोमन्ये न तु युद्धेन राज्यम् ॥ — 5.27.2

Eng. Tr.: Life is transient, that may end in great infamy; considering this, thou shouldst not perish. O Ajatasatru, if without war, the Kurus will not yield thy share, I think, it is far better for thee to live upon alms in the kingdom of the Andhakas and the Vrishnis than obtain sovereignty by war.

कृपः शल्यः सौमदत्तिर्विकर्णो विविंशतिः कर्णदुर्योधनौ च।

एतान् हत्वा कीदृशं तत् सुखं स्याद् यद् विन्देयास्तदनु ब्रूहि पार्थ ॥ — 5.27.25

Eng. Tr.: Forbearance would be more beneficial to you than love of enjoyments where Bhishma would be slain, and Drona with his son, and Kripa, and Somadatta's son, and Vikarna and Vivingsati, and Karna and Duryodhana. Having slain all these, what bliss may that be, O Pritha's son, which you will get? Tell me that! Even having won the entire sea-girt earth, you will never be free from decrepitude and death, pleasure and pain, bliss and misery. Knowing all this, do not be engaged in war.

Compared with the verse below in **Bhīṣma Parvan**:

गुरुनहत्वा हि महानुभावान् श्रेयो भोक्तुं भैक्ष्यमपीह लोके।  
हत्वार्थकामांस्तु गुरुनिहैव भुञ्जीय भोगान् रुधिरप्रदिग्धान्॥ – BhG 2.5

Eng. Tr.: Surely it would be better to spend my life begging than to kill these great and worthy souls! If I killed them, every pleasure I found would be tainted.

Observing the above comparison, it becomes evident that Arjuna had the nagging thoughts of the evil consequences of the battle which were further fueled when he saw his opposing kith and kin. He realised that the battle was sinful and would ultimately lead to destruction and hence the dejection. But this dejection was not just battle related, on the contrary, it concerned the ultimate welfare of one's being which was more philosophical in nature. This conflict of mind in Arjuna was resolved by Kṛṣṇa. Thus in BhG we find Arjuna asking several welfare related and philosophical questions and Kṛṣṇa elaborately answering each of these questions to Arjuna's satisfaction. In the next section we present a summary of each chapter of BhG.

## 1.2 Summary of each chapter of Śrīmad-Bhagavad-Gītā

Most peculiar is that each of the eighteen chapters in BhG is designated as an independent particular form of yoga at the close of the chapter<sup>5</sup> but these chapter-titles do not seem to appear in the sanskrit edition (Pandeya, 1955) of the *Mahābhārata*. Hence based on their understanding of the contents of the chapter, later editors added chapter-titles to aid the reader towards the contents of each chapter. This is the reason why the title of chapter in BhG varies from one printed version or editor to the other. For instance, the title of the eighteenth chapter is *Mokṣasannyāsa Yoga* which is also known as *Mokṣa Yoga* by some scholars and *Sannyāsa Yoga* by others.

As mentioned before, we have followed *Śrīmad-Bhagavad-Gītā* (Goyandka, 2016) of *Gītā Press* and so the title of each chapter is retained *per se*. We give below a brief content of each chapter. We have retained the original Sanskrit terms without translating them since we did not find a suitable equivalent in English.

(1) **Arjuna-Viṣāda Yoga** The first chapter known as *Arjuna-Viṣāda Yoga* contains 47 verses. Arjuna is horrified by the very thought of disastrous war consequences on

<sup>5</sup> इति श्रीमद्भगवद्गीतासु उपनिषत्सु ब्रह्मविद्यायां योगशास्त्रे श्रीकृष्णार्जुनसंवादे [... नाम] अध्यायः ॥

observing all his relatives and friends at war.<sup>6</sup> He seeks the help and advice from Kṛṣṇa for removal of this delusion. This relation of Arjuna with delusion which would ultimately lead to supreme truth is aptly known as **Arjuna-Viṣāda Yoga**.

Many scholars consider this chapter and the first ten verses of the second chapter as the prologue. For instance, *Ādi Śaṅkarācārya* has not commented on this chapter.

**(2) Sāṃkhya Yoga** The second chapter is known as *Sāṃkhya Yoga* and it contains 72 verses. Kṛṣṇa imparts knowledge of immortal nature of the Soul, *Sāṃkhya Yoga*, *Buddhi Yoga*, *Karma Yoga*, the nature of *Stithaprajña* (steadfast seer) and *Brāhmīsthiti* to Arjuna. The word ‘*śocyānanvaśocastvaṃ*’ in verse 11 is considered the *bīja* as it is considered the start of divine discourse by Kṛṣṇa. Major discussion in this chapter is regarding *Sāṃkhya* (samyak khyānam i.e. proper enumeration of the twenty-five tattvas or true principles) and hence the title **Sāṃkhya Yoga**.

**(3) Karma Yoga** The third chapter titled *Karma Yoga* contains 43 verses. Here elaboration of *Jñāna* and *Karma Yoga* is made.<sup>7</sup> *Karma* basically means performance of one’s *dharma* without any attachment to results. The key to performance of *karma* i.e. appropriate course of action is the main theme here, hence the title **Karma Yoga**.

**(4) Jñāna-Karma-Sannyāsa Yoga** The fourth chapter is known as *Jñāna Yoga* and it contains 42 verses. Here various types of *Yajñas* is described but *Jñāna Yajña* is superior among them. Consciously renouncing *karma* (and the fruits of *karma*) is the safest way to be free from the taints of *karma*.<sup>8</sup> Hence the knowledge of *karma* is given in detail.

**(5) Karma-Sannyāsa Yoga** The fifth chapter titled *Sannyāsa Yoga* contains 29 verses. Here distinction is made between performance of *karma* and renunciation of *karma*. More emphasis is put on performance of *karma* and detachment from its effects as given in verse 13.<sup>9</sup> Many similarities are noted in the fourth and fifth chapters.

<sup>6</sup> कृपया परयाविष्टो विषीदन्निदमब्रवीत्। — BhG 1.28

<sup>7</sup> ज्ञानयोगेन साङ्ख्यानां कर्मयोगेन योगिनाम्। — BhG 3.3

<sup>8</sup> ब्रह्मार्पणं ब्रह्म हविर्ब्रह्माग्नौ ब्रह्मणा हुतम्। ब्रह्मैव तेन गन्तव्यं ब्रह्मकर्मसमाधिना॥ — BhG 4.24

<sup>9</sup> सर्वकर्माणि मनसा सन्न्यस्यास्ते सुखं वशी। — BhG 5.13

(6) **Ātmasaṃyama Yoga** The sixth chapter also known as *Dhyāna Yoga* contains 47 verses. The main theme is self-restraint and concentration of mind through *āsanas*.<sup>10</sup> Which form to meditate upon through *Dhyāna Yoga* is described in this chapter.

(7) **Jñāna-Vijñāna Yoga** The seventh chapter titled *Jñāna-Vijñāna Yoga* contains 30 verses.<sup>11</sup> Here ‘*jñāna*’ means the knowledge of Absolute (*Brahman*) while ‘*vijñāna*’ means worldly knowledge.

(8) **Akṣarabrahma Yoga** The eighth chapter is known as *Akṣarabrahma Yoga* and it contains 28 verses. It contains the description of union with the indestructible spirit (*Brahman*).<sup>12</sup> Hence the title **Akṣarabrahma Yoga**.

(9) **Rājavidyārājaguhya Yoga** The ninth chapter titled *Rājavidyārājaguhya Yoga* contains 34 verses. The way to lead a spiritual life is the main theme here.<sup>13</sup> Divine knowledge is openly described here but there is an undertone of knowledge of royal policy.

(10) **Vibhūti Yoga** The tenth chapter known as *Vibhūti Yoga* contains 42 verses. Here the magnificence of the Supreme Being who pervades all beings and how to realise the Lord is described.<sup>14</sup> The manifested form of the Supreme Being is emphasised upon.

(11) **Viśvarūpadarśana Yoga** The eleventh chapter titled *Viśvarūpadarśana Yoga* contains 55 verses. After the description of micro-cosmic form, Kṛṣṇa on Arjuna’s request displays macro-cosmic or universal form encompassing all beings in existence.<sup>15</sup>

(12) **Bhakti Yoga** The twelfth chapter is known as *Bhakti Yoga* and it contains 20 verses. Kṛṣṇa describes the qualities of devotee and emphasises on the glory of devotion.<sup>16</sup>

(13) **Kṣetrakṣetrajña Yoga** The thirteenth chapter titled *Kṣetrakṣetrajña Yoga* contains 34 verses. The word ‘*kṣetra*’ means the material cause (*prakṛti*) or the body as

<sup>10</sup> सर्वसङ्कल्पसन्त्रासी योगारूढस्तदोच्यते।। — BhG 6.4

<sup>11</sup> ज्ञानं तेऽहं सविज्ञानमिदं वक्ष्याम्यशेषतः। — BhG 7.2

<sup>12</sup> अक्षरं ब्रह्म परमं स्वभावोऽध्यात्ममुच्यते। — BhG 8.3

<sup>13</sup> राजविद्या राजगुह्यं पवित्रमिदमुत्तमम्। — BhG 9.2

<sup>14</sup> एतां विभूतिं योगं च मम यो वेत्ति तत्त्वतः। — BhG 10.7

<sup>15</sup> मन्यसे यदि तच्छक्यं मया द्रष्टुमिति प्रभो। योगेश्वर ततो मे त्वं दर्शयात्मानमव्ययम्।। — BhG 11.4

<sup>16</sup> मय्यावेश्य मनो ये मां नित्ययुक्ता उपासते। श्रद्धया परयोपेतास्ते मे युक्ततमा मताः।। — BhG 12.2

the sphere of action while 'kṣetrajña' means the soul. In this chapter the difference between the two is described.<sup>17</sup>

**(14) Guṇatrayavibhāga Yoga** The fourteenth chapter known as *Guṇatrayavibhāga Yoga* contains 27 verses. Elaboration of three *guṇas* viz., *sāttvic*, *rājasic* and *tāmasic*, their causes, characteristics, and influence on a living being are also described.<sup>18</sup>

**(15) Puruṣottama Yoga** The fifteenth chapter titled *Puruṣottama Yoga* contains 20 verses. In this chapter the nature of the world and how to transcend it is described. The main theme is the ultimate union of the individual soul with the absolute. Here the word 'kṣara' is a combination of *pañcabhūta* (five elements), mind, intellect and ego while 'akṣara' is individual soul.<sup>19</sup>

**(16) Daivāsurasam-padvibhāga Yoga** The sixteenth chapter is known as *Daivāsurasam-padvibhāga Yoga* and it contains 24 verses. Each and every individual has two traits i.e. the divine (*daiva*) and the demonic (*āśura*) in them and there is a constant conflict regarding the dominance of the one over the other.<sup>20</sup>

**(17) Śraddhātrayavibhāga Yoga** The seventeenth chapter titled *Śraddhātrayavibhāga Yoga* contains 28 verses. The word 'śraddhā' means faith or belief which like the three *guṇas* are classified into three divisions viz., *sāttvic*, *rājasic* and *tāmasic*.<sup>21</sup>

**(18) Mokṣasannyāsa Yoga** The eighteenth chapter known as *Mokṣasannyāsa yoga* contains 78 verses. In this concluding chapter, distinction is made between *sannyāsa* which is renunciation of actions born of desire and *tyāga* which is renunciation of fruits of actions.<sup>22</sup> Ultimately Arjuna, free from all kinds of doubts surrenders unto Kṛṣṇa and performs his duties.

<sup>17</sup> क्षेत्रक्षेत्रज्ञयोर्ज्ञानं यत्तज्ज्ञानं मतं मम॥ — BhG 13.2

<sup>18</sup> सत्त्वं रजस्तम इति गुणाः प्रकृतिसम्भवाः । — BhG 14.5

<sup>19</sup> क्षरः सर्वाणि भूतानि कूटस्थोऽक्षर उच्यते॥ — BhG 15.16

<sup>20</sup> द्वौ भूतसर्गौ लोकेऽस्मिन्दैव आसुर एव च । — BhG 16.6

<sup>21</sup> त्रिविधा भवति श्रद्धा देहिनां सा स्वभावजा । — BhG 17.2

<sup>22</sup> काम्यानां कर्मणां न्यासं सन्न्यासं कवयो विदुः । सर्वकर्मफलत्यागं प्राहुस्त्यागं विचक्षणाः॥ — BhG 18.2

### 1.3 Śrīmad-Bhagavad-Gītā and its commentators

This small enigmatic portion BhG which summarizes the Upaniṣadic teachings is a part of the colossal work *The Mahābhārata* and is interpreted by scholars from various angles such as philosophical, theological, psychological, spiritual, metaphysical, moral, social, as well as cultural interpretation. This enables each to understand it and interpret it in one's own way thus attracting the attention of many scholars for centuries making it one of the most popularly translated and commented upon scripture in the world. We have broadly distinguished three phases in the history of commentaries (Sādhale, 1935) viz.,

#### 1. Pre-nineteenth century

Various schools of thought like Vedānta, Sāṃkhya, Yoga, and other theistic schools had creative and systematic thinkers who interpreted BhG according to their tradition. All schools of Vedānta accepted the authority of the Upaniṣads, Brahmasūtra, and BhG (known as *prasthānatraya*) as the foundations of their tradition. However, there were differences in opinion in at least one essential point or the other. Many ancient commentaries were written during this period as listed below:

- (a) The earliest extant commentary is that of Ādi-Śaṅkarācārya, an expounder of *Kevalādvaita* philosophy. According to him, *mokṣa* is the only path attainable by *jñānayoga*. Those who followed his theory in commenting on BhG are as follows with the author name followed by their work:

- i. Ānandagiri: *Bhāṣya-Vyākhyānam*
- ii. Nīlakaṇṭha Bhaṭṭa: *Bhāva-Pradīpa*
- iii. Madhusūdana Sarasvatī: *Gūḍhārtha-Dīpikā*
- iv. Śaṅkarānanda: *Tātparyā-Bodhinī*
- v. Śrīdhara: *Subodhinī*
- vi. Sadānanda: *Bhāva-Prakāśa*
- vii. Dhanapatisūri: *Bhāṣyotkarṣa-Dīpikā*
- viii. Śrī Sūrya Daivadnya: *Paramārtha-Prāpa*
- ix. Dhūpakara Śāstrī: *Avi-Gītā*

x. Hanumat: *Paiśāca-Bhāṣya*

- (b) Rāmānujācārya, an expounder of *Viśiṣṭādvaita* philosophy wrote a commentary on BhG. According to him, BhG is mainly about *Bhaktiyoga* supported by knowledge. He was followed by Vedānta-Deśika (Veṅkaṭanātha) who wrote *Artha-Saṅgraha-Rakṣā* or *Tātparya-Candrikā*.
- (c) Madhvācārya, an expounder of *Dvaita* philosophy too wrote a commentary. According to him, *Buddhiyoga* is the primary meaning of *yoga* and the essential condition of *mokṣa*. He was followed by:
  - i. Jayatīrtha: *Prameya-Dīpikā*
  - ii. Rāghavendra: *Artha-Saṅgraha*
- (d) Vallabhācārya, an expounder of *Śuddhādvaita* philosophy did not write any commentary on BhG himself but expressed his opinion on BhG in the *Tattva-Dīpa Nibandha*. According to him, BhG expounds chiefly *Bhaktiyoga*. He was followed by Puruṣottamajī whose work is *Amṛta-Taraṅginī*.
- (e) Nimbarkācārya, an expounder of *Dvaitādvaita* philosophy too did not write any commentary on BhG himself but his follower did. Nimbarkācārya like Ramanujācārya recognises *Bhaktiyoga* as the essence of BhG. His disciple Keśava Kāśmirī Bhaṭṭācārya wrote *Tattva-Prakāśikā*.
- (f) Jñāneśvara, a Maharashtrian reformer wrote a commentary on BhG called *Jñāneśvarī* (also known as *Bhāvārthabodhini*).

2. Nineteenth century

During the era of British rule, Sanskrit language became a subject of interest and many works were translated in English and other western languages. Charles Wilkins was the first to translate BhG in English. Western philosophers and thinkers like Schopenhauer, Humboldt and Emerson were greatly influenced by this poem. It was during this period that saw the riot of Indian revolutionary freedom fighters who were greatly inspired by BhG and wrote independently on BhG, some of who are mentioned below viz.

- (a) B. G. Tilak (1856 - 1920): *Śrīmad-Bhagavad-Gītā-Rahasya*

- (b) M. K. Gandhi (1869 - 1948): *Discourses on the Gitā*
- (c) Sri Aurobindo Ghose (1872 - 1950): *Essays on the Gitā*
- (d) S. Radhakrishnan (1888 - 1975): *The Bhagavadgītā*
- (e) Vinoba Bhave (1895 - 1982): *Talks on the Gitā*
- (f) S. D. Satwalekar (1867 - 1968): *Puruṣārtha-Bodhinī-Bhāṣā-Ṭīkā*

Post-Indian Independence saw a resurgence in the work of BhG with many organisations and individuals publishing vast volumes and conducting discourses on BhG. The list is inexhaustive. It is noted that various interpretators have taken different approaches to suit their theories. Some approaches are discussed below:

- Some like Aurobindo Ghose (Ghose, 2000), Radhakrishnan (1971) and Chinmayananda (1998) took a syncretistic approach to the text.
- Others like Divanji (1945) prepared a concordance for easy understanding.
- Some like Rāmasukhadāsa (1985), Besant and Dās (1905) and Śrī Dīvanacandra Śāstrī (2017) have given Sanskrit grammar inputs giving BhG examples.
- While others like Easwaran (2007) examines the applicability of the principles of Gita to the problems of modern life.
- Some others like Prof. Mahadevan (2013) are of the opinion that BhG amply demonstrates the fundamental requirements of good management.

### 3. Post-nineteenth century

With the rapid development and advancement of technology, works on BhG are being made available in various modern media of communication. Various websites promoting and teaching BhG has lead to easy accessibility of the text. There are a few websites like *Gita Supersite*<sup>23</sup> developed by IIT-Kanpur which have uploaded electronic texts of ancient Sanskrit, Hindi and English commentaries and translations of BhG. Bloggers like *Śrīpāda Abhyāṅkara*<sup>24</sup> have shared their thoughts regarding BhG. Various applications for reading BhG are also easily available. Some organisations like Rāshtriya Sanskrita Sansthāna (Mishra, 2016; Sharma, 2016) and *Samskṛita Bhārati* (Viswas et al., 2009a,b, 2010, 2012a,b)

<sup>23</sup> <https://www.gitasupersite.iitk.ac.in>

<sup>24</sup> <https://study1geetaa2sanskrit.wordpress.com>

have developed study-books for correspondence courses giving the grammatical information of BhG. Various well-known and prominent religious institutions like Chinmaya Foundation, ISKON, Sri Ramkrishna Math, Aurobindo Society, etc. too have been conducting various discourses and classes as well as home-study kits for teaching BhG.

In the next section we present our main aim and the methodology adopted for our work.

## 1.4 Aim and Methodology

There is a class of people who wish to gain access to the original source but are unable to do so due to lack of grammatical background. The previous commentaries, though helpful to a reader to understand the text, are but only secondary sources. Even the ancient commentaries which were entirely written in Sanskrit poses difficulty for those who couldn't understand the intricacies of the language. In order to have direct access to the original Sanskrit text, one needs to have good background of Sanskrit grammar especially of *Aṣṭādhyāyī* or *Siddhānta-Kaumudī* which is both time-consuming and tedious. Since majority of Sanskrit literature are in verse style, sufficient knowledge of *chandas* (metres) is also necessary. Additionally, for understanding the primary word meanings of each word, one needs the help of dictionary. But that too has its drawbacks, since to search a dictionary manually is again time-consuming and it does not cover all the compounds too. The current technology now makes it possible to reduce the learning time (Bharati et al., 2000; Kulkarni, 2009). It is possible to build accessors that can provide complete help, both at grammatical level as well as lexical level, at the click of a button.

### 1.4.1 Aim

Our main aim is:

- To provide an interactive platform for the user where s/he can access the original Sanskrit text of BhG with—
  - Anvaya of each śloka (verse),

- Morphological analysis for each word,
  - Information on sandhi and samāsa, which includes sandhi splitting with the sūtra information and compound analysis showing the components, constituency analysis, the type of the compound and its paraphrase.
  - Sentential analysis showing the relations between various words in a sentence,
  - Online dictionary access for each word from Sanskrit-Hindi Apte’s Practical dictionary, Sanskrit-English Monier-William’s dictionary and the synonymous words from **Amarakośa** wherever available, and
  - Hindi as well as English word-to-word gloss of each verse.
- To provide information on the metrical division of BhG.
  - To provide grammar lessons ‘just enough’ to understand BhG, in the form of e-lessons.

The basic intention behind this work is threefold,

1. When suitable e-lessons are carefully planned out, this work would be useful for those who are interested and earnest in learning and understanding the original text of BhG with / without the help of secondary sources and are also willing to undertake appropriate grammar e-lessons as a tool / means towards the central focus of the intended experience. Once a reader has gained the required exposure to key grammatical information, s/he is capable of interpreting the text independently. Additionally this study helps in cultivating and promoting the feeling of understanding and appreciation for various aspects of BhG. In this process the reader can also appreciate the original commentaries by various ācārayas and the differences in their interpretations which mainly attribute to the underlying philosophical doctrines but at times also due to the differences in linguistic analysis of the ślokas.
2. Furthermore, BhG being coherent and complete in itself, such a word level and sentence level analysis of BhG can be used for higher level computational analysis such as discourse analysis, topic identification, anaphora resolution, word sense disambiguation and so on.

3. Additionally, this also being part of the *Mahābhārata*, later on if necessary, it can be used as an initial training data for boot-strapping for automatic annotation of complete critical edition of *Mahābhārata* (with around hundred thousand verses).

### 1.4.2 Methodology

Our work may broadly be classified into three phases viz., Linguistic Analysis, Pedagogy and Interface Description and Preparation of teaching module for BhG.

**Linguistic Analysis** The first phase of our work involves complete linguistic analysis of BhG. There are various Sanskrit computational tools.<sup>25</sup> These are available for online analysis of the Sanskrit texts such as sandhi splitting, morphological analysis and sentential parsing. We used *Samśādhani* tools<sup>26</sup> extensively to do the linguistic analysis of BhG. At the time of carrying out this analysis, the parser was in developing stage and hence we carried out the sentential analysis manually. The compound analyser was also not available then and hence the compound analysis also had to be carried out manually. The guidelines of SHMT Consortium<sup>27</sup> for representing morph analysis, parser analysis and compound analysis were followed throughout. This first phase is the foundation for preparing the interface for BhG.

**Pedagogy and Interface Description** In the second phase we discuss the various approaches i.e. Ancient Indian as well Western, for teaching Sanskrit language effectively. With the onset of digital age, how the digital technology and computational tools could be utilized in pedagogical as well as andragogical teaching are discussed with the help of an interactive platform for BhG. The man-machine ‘eclectic mix’ i.e. the combination of human’s world knowledge and computational tools would create a positive impact on the current as well as future generation. A step-by-step layout of BhG interface has been explained in addition to its utility in today’s scenario.

<sup>25</sup> <https://sanskrit.uohyd.ac.in/scl>  
<https://sanskrit.inria.fr>  
<https://sanskrit.jnu.ac.in/index.jsp>  
<https://kjc-fs-cluster.kjc.uni-heidelberg.de/dcs>

<sup>26</sup> <https://sanskrit.uohyd.ac.in/scl>

<sup>27</sup> <https://sanskrit.uohyd.ac.in/scl/Corpus/TaggingGuidelines/>

**Preparation of Teaching Module for Śrīmad-Bhagavad-Gītā** After carrying out the linguistic analysis, in the third and final phase we use the statistical analysis to develop a strategy for deciding what to teach, among the thousands of rules in the grammar. The selection of the relevant part of the grammar is driven by the choice of the text. The rules that are to be taught are also ordered based on the frequency of their occurrence. For understanding BhG we use this strategy for various aspects of learning grammar such as word formation (inflectional (*sup and tiñ*) and derivational morphology (*kṛt and taddhita*)), *sandhi*, *samāsa* and *kāraka*. Based on these grammar aspects we prepared a Grammar Kit that would be used for Teaching and/or Learning BhG, along with the statistical reasoning for choosing the specific rules.

## 1.5 Organisation of Thesis

Our work is classified in three main parts as mentioned above and is structured as follows:

**Chapter One** (*current chapter*) initially presents a brief historical account of BhG followed by a brief summary of each chapter of BhG. A survey of ancient as well as modern commentators of BhG is given. We have discussed the various approaches by interpretators to suit their theories and the problems faced by those who wish to independently read and understand the original text of BhG. We have concluded this chapter by stating our basic aim which is to provide an e-learning environment for understanding BhG with the help of various Sanskrit computational tools and the methodology followed under three headings.

### Part One - Linguistic Analysis: Building the Foundation

**Chapter Two** consists of one chapter, viz. chapter two which describes the first phase i.e. *Linguistic analysis of BhG*. In this chapter we describe the various clues from ancient Indian commentary tradition from which we adopted the methodology for linguistic analysis. This helped us further in preparing the base for interactive interface for BhG. Eventually, these analyses provided us the data necessary for planning a detailed course required for teaching.

## **Part Two - Pedagogy and Interface Description:**

### **Utilisation of Digital Technology and Computational Tools**

In this part we discuss the utilisation of digital technology and computational tools in pedagogy.

**Chapter Three** examines and describes the various approaches for teaching Sanskrit starting with traditional Indian methods namely '*Daṇḍānvaya and Khaṇḍānvaya*' comparing both the methods and discussing their importance. How the western methods influenced the teaching of Sanskrit is discussed followed by the current trends in teaching. With the advent of digital language technology, we propose to develop effective methods of teaching with the help of this technology. We have developed ready-to-use BhG interface and provide a detailed description of its features along with the illustrated examples and how it can be utilised by the reader.

## **Part Three - Preparation of teaching module for Śrīmad-Bhagavad-Gītā: Preparation for Course Planning**

This part consists of major part of the dissertation where we discuss the methodology we followed to arrive at the course content for various linguistic analysis such as inflectional and derivational morphology, sandhi, compound formation and syntax of BhG.

**Chapter Four** discusses the utility of statistical analysis in general and its twofold importance that is, how it is helpful in both course planning as well as computational purpose. This chapter also features the concept of domain specific teaching capsule along with teaching material following the strategy of *Vedanta Samskrita* by Kulkarni (2015). Then we discuss and compare related works in BhG. This is followed by the character-wise distribution of the verses giving the frequency count of the speakers in BhG.

**Chapter Five** gives a brief summary of the features of metre followed by the prosodic analysis giving brief characteristics of each metre along with the statistics and an example from BhG by providing a syllabic pattern.

**Chapter Six** provides the morphological analysis focusing mainly on the statistical classification of various forms of ‘*Subanta*’, ‘*Tiñanta*’, ‘*Kṛdanta*’ and ‘*Avyaya*’.

**Chapter Seven** presents the three types of sandhi namely ‘*Ac, Hal and Visarga*’ along with their sub-types discussing only those which are found in BhG. Each sub-type starts with the relevant ‘*Pāṇinian Sūtra*’ followed by ‘*Vṛtti*’, English translation, statistics and an example from BhG for each type and sub-type.

**Chapter Eight** initially starts with brief feature of samāsa (compound) followed by statistical analysis after which the syntactic as well as semantic classification is discussed providing the features, relevant ‘*Pāṇinian sūtras*’ and an example from BhG for each type and sub-type.

**Chapter Nine** discusses the various kāraka as well as non-kāraka relations with the statistics, brief description with relevant ‘*Pāṇinian sūtras*’ and an illustrated example from BhG.

One may find the listing of the sūtras, their translation, etc. unnecessary, loosing the focus of the statistics and its analysis. But since the aim of our work is also to produce a teaching / self-learning capsule, at the cost of being repetitive, we have included all this data in these respective chapters.

**Chapter Ten** which is the final chapter, concludes with a discussion on potential future work where the word level and sentence level analysis of BhG can be used for higher level computational analysis such as discourse analysis, topic identification, anaphora resolution, word sense disambiguation and so on. BhG can be taken as a guideline for preparing similar Sanskrit texts which would help eventually build ‘*Sanskrit Digital Repository*’. Additionally, this also being part of the *Mahābhārata*, later on if necessary, it can be used as an initial training data for boot-strapping for automatic annotation of complete critical edition of *Mahābhārata* (with around hundred thousand verses).

## **Part I**

# **Linguistic Analysis: Building the Foundation**

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## CHAPTER 2

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# LINGUISTIC ANALYSIS OF ŚRĪMAD-BHAGAVAD-GĪTĀ

In this chapter we first describe the clues from the Indian commentary tradition for analysing the verses, followed by the steps we followed with an illustrative example from BhG.

### 2.1 Clues from Commentary tradition

For linguistic analysis, the methodology we have adopted is roughly based on an ancient couplet which enumerates five core steps to be followed while expounding a literary subject:

padacchedaḥ padārthoktirvighraho vākyayojanā |  
ākṣepasya samādhānaṁ vyākhyānaṁ pañcalakṣaṇam || (Huparikar, 1949)

These five steps are:

1. *Padacchedaḥ* i.e. separation of *sandhi* in words.
2. *Padārthoktiḥ* i.e. explanation of meaning of words.
3. *Vighrahaḥ* i.e. dissolution of compounds.

4. *Vākyayojanā* i.e. parsing of a sentence.
5. *Ākṣepasya samādhānam* i.e. clearing any doubts to an objection.

1. **Padacchedaḥ** (Word Splitting):

Sanskrit is largely influenced by the oral tradition and this is reflected in its writing style as well. As a result we come across Sanskrit texts as a continuous string of characters without any space in between the word boundaries. The words at the word boundaries undergo euphonic changes (called *sandhi*) as well. Thus the first level of tagging needed for Sanskrit is the marking of word boundaries undoing the sandhi. At this level we split two types of sandhis – sandhi between two words and also sandhi between the components of a compound. We indicate these two sandhis by two different symbols. The sandhi between two words is indicated by a ‘+’ sign while the sandhi between the components of a compound is indicated by a ‘-’ sign. For example, the fortieth verse from the second chapter of BhG is:

**nehābhikramanāśo’asti pratyavāyo na vidyate |**  
**svalpamapyasya dharmasya trāyate mahato bhayāt ||— BhG. 2.40**

**Eng. Tr.:** In this path there is no loss of effort, nor is there any adverse result. Even a little practice of this discipline protects one from great fear (of birth and death).

This verse is tokenized as shown highlighted below –

**na+iha+abhikrama-nāśaḥ+asti pratyavāyaḥ+na vidyate |**  
**svalpam+api+asya dharmasya trāyate mahataḥ+bhayāt ||**

In this verse, there is one compound word *abhikrama-nāśaḥ*, which is joined with other words *na*, *iha*, and *asti* by sandhi to form a single word *nehābhikramanāśo’asti*, similarly *svalpamapyasya* is formed by joining three consecutive words *svalpam+api+asya*. Also there are instances where the last character of the previous word undergoes some phonetic change due to the presence of certain set of characters in the beginning of the following word as in *pratyavāyo* and *mahato*.

## 2. Padārthoktiḥ (Meaning of *padas*):

To get the meaning of the words, we have to first analyse them.

- **Padaviśleṣaṇa** (Morphological Analysis):

Sanskrit is rich in morphology both at inflectional level as well as derivational level. The morphological information has been obtained from the **Anusāraka Interface**<sup>1</sup> which gives all possible analyses for each word providing linguistic information such as *liṅgam* (gender), *vibhakti* (case marker), *vacanam* (number), etc. in the case of *subanta* and *prayoga* (voice), *lakāra* (tenses and moods), *puruṣa* (person), *vacanam* (number), *padī*, *dhātu* (root-form) and *gaṇa* in the case of *tiṅanta*. Then the correct morphological analysis in the context is chosen manually. For instance the possible morphological analyses for the word *mahataḥ* from the above verse are –  
mahat{pum}{2;bahu}/mahat{pum}{5;eka}/mahat{pum}{6;eka}  
/mahat{napum}{5;eka}/mahat{napum}{6;eka}  
/mah1{kartari;laṭ;pra;dvi;parasmaipadī;mahaz;bhvādiḥ}

Upon looking at the context, we chose manually the correct morphological analysis which is –

**mahat{napum}{5;eka}**

where *mahat* is in *napuṃsakaliṅga* (neuter gender), has fifth *vibhakti* (case marker) and *ekavacana* (singular number).

## 3. Samāsavigrahaḥ (Dissolution of Compounds):

Kumar et al. (2010) describe various stages involved in the analysis of a compound which also form the natural modules of a compound processor<sup>2</sup> viz.,

- (a) Segmentation (*Samāsapadacchedaḥ*)

At the first stage a compound is split into its components. For example, the compound *abhikramanāśaḥ* from the above verse is split into two components viz. *abhikrama* and *nāśaḥ* indicated by a ‘-’ sign.

- (b) Constituency Parsing (*Samāsapadānvayaḥ*)

Sanskrit compounds with an exception of *dvandva* and *bahupada bahuvrīhi*

<sup>1</sup> <https://sanskrit.uohyd.ac.in/scl>

<sup>2</sup> <https://sanskrit.uohyd.ac.in/samAsa/frame.html>

(conjunctive) are binary. So when a compound consists of more than one component, it is not enough to show the constituent components alone. For, the way the components combine together decides the meaning of a compound. A compound with 3 components a-b-c may be combined in two different ways viz., <<a-b>-c> and <a-<b-c>>. The task of constituency parser is to parse the segmented compound syntactically by pairing up the constituents in a certain order two at a time. So for example, in forty-seventh verse of second chapter of BhG, the compound word *karma-phala-hetuḥ* is parsed as <<karma-phala>-hetuḥ>.

(c) Compound Type Identification (*Samastapadapariṣāyakaḥ*)

In addition, one also needs to know what type of compound it is — whether a copulative (*karmadhārayaḥ*) or an endo-centric (*tatpuruṣaḥ* / *avyayībhāvaḥ*) or an exo-centric (*bahuvrīhiḥ*) or a conjunctive (*dvandvaḥ*). A tag is assigned to specify the relation between the components because the semantics of the components involved determines this relation. Hence the compound word ‘*rājapuruṣaḥ*’ when split in two components *rājñāḥ* and *puruṣaḥ* conveys the relation of a master and his servant expressed by the sixth case suffix. For determining the semantic classification of compounds, one takes the help of *Pāṇinian sūtras* which provides a lot of semantic clues. The coarse grain distinction of compounds into four major types was insufficient and hence fine grain distinction was needed for better clarity and to avoid misinterpretation. For instance, the compounds *āditya-gaṭam* (BhG. 15.12) and *abhikrama-nāśaḥ* (BhG. 2.40) belong to the same class of *tatpuruṣa* but the paraphrases of both are different due to semantic differences. The paraphrase of the compound words *ādityagaṭam* is *ādityam gaṭam* and *abhikrama-nāśaḥ* is *abhikramasya nāśaḥ*. This kind of analysis is followed for all types of compounds. Based on those clues a hierarchical tagset of 55 tags has been designed to tag the Sanskrit compounds following the guidelines of SHMT Consortium<sup>3</sup>. The above parsed example <*abhikramanāśaḥ*> is tagged as <**abhikrama-nāśaḥ**>T6 where the tag T6 stands for the compound of type *ṣaṣṭī-tatpuruṣa*.

<sup>3</sup> <https://sanskrit.uohyd.ac.in/scl/Corpus/TaggingGuidelines/>

(d) Paraphrasing (*Vigraha-vākyam*)

At the final stage, upon the assignment of the suitable tag, a paraphrase is generated for the compound by paraphrase generator. For the above example the paraphrase is generated as

*abhikramanāśaḥ* = **abhikramasya nāśaḥ**

4. **Vākyayojanā** (Parsing a sentence):

Sanskrit literature is majorly dominated by poetic style. In order to understand a text in verse style, two different methods have been followed in Indian commentary tradition and education system viz.,

- *Daṇḍānvaya* (also known as *anvayamukhī*):

All the words are arranged in prose order according to their grammatical function and syntactical relation for easy understanding of a verse. The default word order or the ‘canonical form’ is governed roughly by the following verse:

**viśeṣaṇam puraskṛtya viśeṣyam tad-anantaram |  
kartṛ-karma-kriyā-yuktam etad anvaya-lakṣaṇam ||<sup>4</sup>**

**Eng. Tr.:** Starting with the adjectives, targeting the headword, in the order of kartṛ-karma-kriyā (subject-object-verb) gives an anvaya.

- *Khaṇḍānvaya* (also known as *kathambhūtinī* (Tubb and Boose, 2007)):

The basic skeleton of a sentence is given and other details are filled in by asking questions. These questions are centered around the heads seeking their various modifiers. So the construing of word-order (similar to the first approach) is carried on in sections (*khaṇḍas*). Here it is essential to have prior knowledge of expectancy (*ākāṅkshā*), consistency (*yogyatā*) and contiguity (*sannidhi*).

For our work we decided to combine both the approaches by providing prose order according to their grammatical function and syntactical relation (*daṇḍānvaya* method) and giving the *kāraka* analysis following the *khaṇḍānvaya* method.

<sup>4</sup> samāsacakram kā — verse 10 (Bhagirath, 1901)

The methodology we followed for tagging is semi-automatic due to following reasons:

- BhG being a popular text, a learned Sanskrit scholar could easily split the sandhi and compound just by looking at the verse content.
- A proper user interface for tagging using the existing tools were under development.
- The existing segmenter<sup>5</sup> produced multiple segments which needed much time and effort to select the correct split in comparison to splitting the text manually.

## 2.2 Procedure

In what follows, we describe the process we followed for getting the linguistic analysis of BhG:

- (a) The verse form is converted into prose form.
- (b) Initially the sandhi and compound in the verse are segmented manually, following the guidelines developed by the SHMT consortium<sup>6</sup>.
- (c) Then each compound is tagged for its type, along with the complete constituency mark-up. Finally for each compound, its paraphrase is provided.
- (d) The segmented words are run in the **Anusārika Interface**<sup>7</sup> for obtaining the multiple morphological analyses. The output generated as an xml file, is then manually pruned for choosing the correct morph analysis in the context.
- (e) The syntactico-semantic relations (*kāravīṣṭeṣaṇa*) includes *kārika* as well as *non-kārika* analysis. Sanskrit grammar texts discuss various relations among words necessary to interpret the meaning of a sentence. Ramakrishnamacharyulu (2009) compiled and classified all these relations which

<sup>5</sup> <https://sanskrit.inria.fr>

<sup>6</sup> This is the Consortium of 7 institutes, for ‘Development of Sanskrit-Hindi Machine Translation System (sampark)’ funded by *DIT, Govt. of India*

<sup>7</sup> <https://sanskrit.uohyd.ac.in/scl>

are tagged manually, following the guidelines developed by the SHMT consortium<sup>8</sup>. Out of around 90 relations listed there, only those relations which one can predict based on the syntactico-semantic information available in a sentence are considered for automatic tagging (Ramakrishnamacharyulu et al., 2011). There are around 35 of them. Complete BhG has been tagged at syntactic level using this tag set.

- (f) The Hindi and English glosses for each word are given manually.
- (g) Extra linguistic information such as etymological information, etc. are also provided.

## 2.3 An Illustration

The above methodology is illustrated by taking the forty-seventh verse of second chapter from BhG.

karmaṇyevādhikāraṣṭe mā phaleṣu kadācana |  
mā karmaphalaheturbhūrmā te saṅgo'stvakarmaṇi ||— BhG 2.47

Eng. Tr.: It is your right to work only but never towards the fruit thereof. Do not be the cause of the fruit of action; nor be attached to inaction.

The above verse is analysed as follows:

- The complete information is first compiled in an excel sheet. For each verse we mention the verse number, numbers according to the anvaya, sandhi and samāsa split words, original words, multiple morphological analyses, morphology in context, samāsa padachheda, samāsa vighraha-vākyam, kāraṇa information, numbering according to anvaya number, Hindi meaning, English meaning and other additional information such as etymology etc.

<sup>8</sup> <https://sanskrit.uohyd.ac.in/scl/Corpus/TaggingGuidelines/kaaraka-tagging-guidelines>

Untitled 2 - LibreOffice Calc					
File Edit View Insert Format Tools Data Window Help					
Arial 10					
E18 f(x) Σ =					
A	B	C	D	E	F
1 S47	1	कर्मण्येवाधिकारस्ते	कर्मणि	कर्मन्{नपुं॥7; एक}	कर्मन्{नपुं॥7; एक}
2 S47	2		एव	एव{अव्य}	एव{अव्य}
3 S47	3		अधिकारः	अधिकार{पुं॥1; एक}/अधिकार{पुं॥1; एक}	अधिकार{पुं॥1; एक}
4 S47	4		ते	तद्{पुं॥1; बहु}/तद्{स्त्री॥1; द्वि}/तद्{स्त्री॥2; द्वि}/तद्{नपुं॥1; द्वि}/तद्{नपुं॥2; द्वि}/तद्{नपुं॥4; एक}/तद्{नपुं॥6; एक}	तद्{नपुं॥6; एक}
5 S47	5	मा	मा	मा{अव्य}/मा{स्त्री॥1; एक}/अस्मद्{2; एक}	मा{अव्य}
6 S47	6	फलेषु	फलेषु	फल{नपुं॥7; बहु}	फल{नपुं॥7; बहु}
7 S47	7	कदाचन	कदाचन	कदाचन{अव्य}	कदाचन{अव्य}
8 S47	8	मा	मा	मा{अव्य}/मा{स्त्री॥1; एक}/अस्मद्{2; एक}	मा{अव्य}
9 S47	9	कर्मफलहेतुर्भूमि	कर्म-फल-हेतुः	कर्मन्-फल-हेतु{पुं॥1; एक}	कर्मन्-फल-हेतु{पुं॥1; एक}
10 S47	10		भूः	भू1{कर्तरि; लुङ्; म; एक; परस्मैपदी; असं; अदादि;}/भू1{कर्तरि; लुङ्; म; एक; परस्मैपदी; भू; भ्वादि;}	भू1{कर्तरि; लुङ्; म; एक; परस्मैपदी; भू; भ्वादि;}
11 S47	11		मा	मा{अव्य}/मा{स्त्री॥1; एक}/अस्मद्{2; एक}	मा{अव्य}
12 S47	12	ते	ते	तद्{पुं॥1; बहु}/तद्{स्त्री॥1; द्वि}/तद्{स्त्री॥2; द्वि}/तद्{नपुं॥1; द्वि}/तद्{नपुं॥2; द्वि}/तद्{नपुं॥4; एक}/तद्{नपुं॥6; एक}	तद्{नपुं॥6; एक}
13 S47	13	सङ्गोऽस्त्वकर्मणि	सङ्गः	सङ्ग{पुं॥1; एक}	सङ्ग{पुं॥1; एक}
14 S47	14		अस्तु	अस्तु{अव्य}/अस्2{कर्तरि; लोट्; प्र; एक; परस्मैपदी; असं; अदादि;}	अस्2{कर्तरि; लोट्; प्र; एक; परस्मैपदी; असं; अदादि;}
15 S47	15		अ-कर्मणि	अकर्मन्{पुं॥7; एक}	अ-कर्मन्{नपुं॥7; एक}
16					
17					
18					
19					
20					
Sheet1/Sheet2/Sheet3/...					
Find				Sum=0	196%
Sheet 1 / 3				Default	

Figure 2.1: BhG 2.47

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Arial 10					
E16 f(x) =					
A	B	C	D	E	F
1	S47	1	कर्मण्येवाधिकारस्ते	कर्मणि	
2	S47	2		एव	
3	S47	3		अधिकारः	
4	S47	4		ते	
5	S47	5	मा	मा	
6	S47	6	फलेषु	फलेषु	
7	S47	7	कदाचन	कदाचन	
8	S47	8	मा	मा	
9	S47	9	कर्मफलहेतुर्भूमा	कर्म-फल-हेतुः	कर्मणः फलम् = कर्मफलम्, कर्मफलस्य हेतुः = कर्मफलहेतुः
10	S47	10		भूः	
11	S47	11		मा	
12	S47	12	ते	ते	
13	S47	13	सङ्गोऽस्त्वकर्मणि	सङ्गः	
14	S47	14		अस्तु	
15	S47	15	अ-कर्मणि	<न-कर्मणि>Tn	न कर्म = अकर्म तस्मिन् अकर्मणि
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231%					

Figure 2.2: BhG 2.47

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Arial 10

	A	B	C	D	E	F	G
1	S47	4	1	ते	षष्ठीसम्बन्धः 2	तुम्हारा	your
2	S47	3	2	अधिकारः	कर्ता 5	अधिकार	right
3	S47	1	3	कर्मणि	अधिकरणम् 5	कर्म करने में	in prescribed duties
4	S47	2	4	एव	सम्बन्धः 3	ही	certainly
5	S47	0	5	(अस्ति)		(है)	is
6	S47	6	6	फलेषु	अधिकरणम् 10	फलों में	in the fruits (of action)
7	S47	0	7	(अधिकारः)	कर्ता 10	(अधिकार)	right
8	S47	7	8	कदाचन	क्रियाविशेषणम् 10	कभी	at any time
9	S47	5	9	मा	सम्बन्धः 10	नहीं	never
10	S47	0	10	(अस्ति)		(है)	is
11	S47	0	11	(त्वम्)	कर्ता 14	(तुम)	you
12	S47	9	12	कर्म-फल-हेतुः	कर्तृसमानाधिकरणम् 14	कर्मों के फल का हेतु	cause in the result of the work
13	S47	8	13	मा	सम्बन्धः 14	मत	never
14	S47	10	14	(आभूः)		हो	become
15	S47	12	15	ते	षष्ठीसम्बन्धः 16	तुम्हारी	your
16	S47	13	16	सङ्गः	कर्ता 19	आसक्ति	attachment
17	S47	15	17	अ-कर्मणि	अधिकरणम् 19	अकर्म में	in inaction
18	S47	11	18	मा	सम्बन्धः 19	नहीं	never
19	S47	14	19	अस्तु		हो	be there

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As is shown in Figure 2.1, Column A gives the *verse number*, B gives the *original word sequences* followed by the *sandhied words* in Column C, D gives the *sandhi as well as samāsa split words*, E gives *multiple morphological analysis* and Column F gives the *morphology in context*.

In Figure 2.2, we have the *verse number* in Column A followed by the *original word sequences* in B, then the *sandhied words* in Column C, D gives the *sandhi as well as samāsa split words*, while Column E gives *samāsa padachheda* and H gives *samāsa vighraha vākyam*.

As seen in Figure 2.3, Column A gives the *verse number*, B gives the *original word sequences*, Column C gives the *numbers according to the anvaya* and D gives the *anvita words including adhyāhārita words in parentheses*, various *kāraka as well non-kāraka relations* are given in Column E while F gives the *Hindi gloss* and G gives *English gloss*.

- The *sandhi* split has been marked by ‘+’ sign and the *samāsa* dissolution is indicated by a ‘-’ sign as shown below –

*karmaṇi+eva+adhikāraḥ+te mā phaleṣu kadācana |*  
*mā karma-phala-hetuḥ+bhūḥ+mā te saṅgaḥ+astu+a-karmaṇi ||*

It is noted from above tagged example, that there are only two compounds viz., ‘*karma-phala-hetuḥ*’ and ‘*a-karmaṇi*’ while the sandhis are marked by ‘+’ sign.

- The compound analysis of the compound word ‘*karma-phala-hetuḥ*’ is represented with suitable tags as shown below.

<<karma-phala>T6-hetuḥ>Bs6

The paraphrase for the above compound is –

karmaṇaḥ phalam = *karmaphalam*,

karmaṇi phalam hetuḥ yasya saḥ = *karmaphalahetuḥ*.

- The verse is then transformed to prose, split into sentences and wherever necessary, an *adhyāhāra* (supplement of necessary word for completion of meaning) has been provided shown in parentheses, in order to complete the sentences. Since we followed the *Vaiyākaraṇa-śābdabodha*, we have also supplied the ex-

istential verbs such as *as*, *bhū*, etc. to complete the sentence and provide the *kāraka* analysis as follows:

- *te adhikāraḥ karmaṇi eva (asti) |*
- *phaleṣu (adhikāraḥ) kadācana mā (asti) |*
- *(tvam) karma-phala-hetuḥ mā bhūḥ |*
- *te saṅgaḥ a-karmaṇi mā astu |*

In the above example of *kāraka* analysis we have provided four *adhyāhāras* in parentheses.

- The *kāraka* analysis is represented as –

1.	te	ṣaṣṭhīsambandhaḥ 2
2.	adhikāraḥ	kartā 5
3.	karmaṇi	adhikaraṇam 5
4.	eva	sambandhaḥ 3
5.	(asti)	
6.	phaleṣu	adhikaraṇam 10
7.	(adhikāraḥ)	kartā 10
8.	kadācana	kriyāviśeṣaṇam 10
9.	mā	sambandhaḥ 10
10.	(asti)	
11.	(tvam)	kartā 14
12.	karma-phala-hetuḥ	kartṛsamānādhikaraṇam 14
13.	mā	sambandhaḥ 14
14.	bhūḥ	
15.	te	ṣaṣṭhīsambandhaḥ 16
16.	saṅgaḥ	kartā 19
17.	a-karmaṇi	adhikaraṇam 19
18.	mā	sambandhaḥ 19
19.	astu	

The numbering to the left gives us the word number followed by the word. Then the *kāraka* as well as *non-kāraka* relations are given with the numbers to the

right denoting the relation to the numbering to the left. The *adhyāhārīta* words are shown in parentheses. So for example, in the first row above viz. the first number indicates the first word ‘*te*’ which is related to the second word ‘*adhikārah*’ by *ṣaṣṭhīsambandhaḥ* while the second word ‘*adhikārah*’ is related to the *adhyāhārīta* fifth word which is a verb (‘*asti*’) through *kartā kāraka* relation and so on.

## 2.4 Summary

In this chapter which is a part of ‘*Phase One*’, we have discussed the methodology adopted for linguistic analysis taking the clues from ancient Indian commentary tradition. We have given a step-by-step procedure explaining each step with an example from BhG along with the illustrations. These steps helped us in preparing a systematic database with which we could conduct various analyses such as statistical, prosodic, morphological, sandhi, samāsa and sentential. Based on these analyses we could develop a teaching kit as well for BhG. Thus ‘*Phase One*’ becomes the base for ‘*Phase Two*’.

## **Part II**

# **Pedagogy and Interface Description: Utilization of Digital Technology and Computational Tools**

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## CHAPTER 3

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# PEDAGOGY AND INTERFACE DESCRIPTION OF ŚRĪMAD-BHAGAVAD-GĪTĀ

### 3.1 Teaching Methodology

During ancient times, each Indian discipline had its own distinct style of interpretation of Sanskrit texts and employed various methods, critical as well as scientific, for teaching these texts. Our main focus is on two methods namely *Daṇḍānvaya* and *Khaṇḍānvaya*. These Indian methods were forgotten in the course of time with the advent and dominance of Western methods. However the latter methods were found to be insufficient for teaching Sanskrit. We will first describe briefly the two ancient Indian methods of teaching, comparing both the methods and highlighting their importance. In the next section, we will examine only those Western methods which were applied for teaching Sanskrit followed by the recent trends in this teaching. In the third section, we present an interactive interface for BhG and describe in detail the various features of this interface with illustrative examples and then we discuss

how language technology becomes useful in the revival of the two ancient methods of teaching Sanskrit.

### 3.2 Ancient Indian Methods

The study of original Sanskrit works reveals to us illuminating ideas on methods of teaching. Two traditional methods viz. *Daṇḍānvaya* and *Khaṇḍānvaya* were employed for effective teaching of Sanskrit (Huparikar, 1949).

**Daṇḍānvaya Method** (also known as *Anvayamukhī*)

In this method, all the words are arranged in prose order according to their grammatical function and syntactical relation for easy understanding of a verse. The default word order (*anvaya*) or the ‘canonical form’ is governed roughly by the following verse:

viśeṣaṇam puraskṛtya viśeṣyam tad-anantaram |  
kartṛ-karma-kriyā-yuktam etad anvaya-lakṣaṇam ||<sup>1</sup>

Gloss: Starting with the adjectives, targeting the headword, in the order of kartṛ-karma-kriyā (subject-object-verb) gives an anvaya (natural order of words in a sentence).

Through the *anvaya* a student could be able to determine the desired (*abhihita*) meaning.

**Khaṇḍānvaya Method** (also known as *Dialogue / Dialectic Method* or *Method of Questions and Answers*)

It resembles *Daṇḍānvaya* method in first picking out the principal sentence, but differs from it regarding the construing of remaining words of the whole sentence which is carried on in sections (*khaṇḍas*) by framing questions on individual words or phrases. In other words, the basic skeleton of a sentence is given and other details are filled in by asking questions. Thus it is also called *Kathambhūtinī* (Tubb and Boose, 2007) due to the use of Sanskrit question words such as *kathambhūta*, *kim*, *kadā*, *kimartham*, etc. These questions are centered around

<sup>1</sup> samāsacakram - kā.verse 10 (Bhagirath, 1901)

the heads seeking their various modifiers. This approach is close to parsing a sentence showing various dependency (*kāraka*) relations.

### 3.2.1 Comparison of Both Methods

Both methods are analytico-synthetic processes in which several analysed units of a sentence are combined through comprehension of the inter-relations of words by means of the principles of mutual expectancy (*ākāṅkṣā*), congruity (*yogyatā*) and proximity (*sannidhi*) and finally, the students are led to the unified and comprehensive meaning or purport (*tātparya*) of a sentence or passage as a whole. *Daṇḍānvaya* method focuses on questions based on grammatical function which is helpful for quick understanding, but in the process, the poetic charm / aesthetic beauty is lost; while in the *Khaṇḍānvaya* method, the questions are principally based on the subject-matter. In the former, the subject is generally picked up first followed by other arguments of the verbs and finally the verb; while in the latter, the verb is first picked up followed by its arguments. The *Khaṇḍānvaya* approach gains an upper-hand over the *Daṇḍānvaya* in many respects as explained below:

1. Huparikar (1949) aptly puts it – “Prose order or the regular construing in the *Daṇḍānvaya* mars the beauty of a poem instead of enhancing it; while questions in the *Khaṇḍānvaya* can be so framed as to bring the emotional content of a poem into prominence and lead the pupils to understand automatically the relations of different words in a sentence. Thus the *Khaṇḍānvaya* helps us to bring out the hidden charm of a poem, heightens our sentiments and creates living poetic atmosphere which is most desirable for the real appreciation of that poem.”
2. *Khaṇḍānvaya* method appeals to the student’s instincts, since predominance of questioning in it is expected to arouse their curiosity through expectancy (*ut-thāpyākāṅkṣhā*) to the fullest extent and thus constant interest is maintained in the classroom.
3. Since there is direct interaction in the form of questions and answers, this method is more suitable for larger classes ensuring co-operation between the teacher and the taught where both of them are equal participants in contrast to the lecture

method of *Daṇḍānvaya*. This increases the alertness and activeness among the students.

4. The commentaries following this method helps an individual in every minute detail regarding the inter-relations of words and ideas. This greatly improves the observational and analytical skills.
5. The method of *Khaṇḍānvaya* and the function of *Tātparya* combined create the unified impression of a subject, aid memory by making assimilation of what is taught and lead to the mastery of the subject learnt.

### 3.2.2 Utility of Indian Methods

Huparikar (1949) observes that generally, students trained in modern schools were incapable of analysing Sanskrit texts and resort to translations rather than the original works for understanding, which is often unsatisfactory. On the contrary students trained in traditional methods were more apt at grasping the subtle shades of meanings of words in the texts. In both the above mentioned Indian traditional methods, it is essential to have prior knowledge of minimum set of grammar rules for *sandhi*, *samāsa* and *kāraka* along with the theories of verbal cognition (*śābdabodha*). The essential factors that help in *śābdabodha* such as mutual expectancy (*ākāṅkṣā*), congruity (*yogyatā*), proximity (*sannidhi*) and purport (*tātparya*) also play an important role in the process of verbal cognition. The *Khaṇḍānvaya* method helps a student understand the process of verbal cognition through worked out examples. The concept of *ākāṅkṣā* teaches a student *where* to look for clues for establishing relations between the words in a sentence, *yogyatā* teaches *which* meaning to look for among the *abhidhā*, *lakṣaṇā* and *vyañjanā*, while *sannidhi* puts some constraints on possible combinations of relations between the words, and *tātparya* helps in disambiguation of ambiguous words and understanding the whole purport of the utterance.

### 3.3 Influence of Western Methods

With the onset of British rule in India, gradually Western methods of teaching and learning were introduced in schools for teaching not only the modern sciences but also

to teach modern languages and even classical language like Sanskrit. The *Grammar-Translation Method* which was popular in Europe for teaching classical languages such as Latin and Greek was adopted for teaching Sanskrit by many. Westerners adopted this method for learning and understanding Sanskrit language and Indians followed this trend till now. Many Sanskrit teaching books were written based on this methodology starting with *R. G. Bhandarkar's First and Second Book of Sanskrit*, *K. P. Trivedi's The Sanskrit Teacher* in two volumes, *M. M. Deshpande's Saṃskṛtasubodhini*, *Thomas Egene's Introduction to Sanskrit* in two parts, *Michael Coulson's Teach Yourself Sanskrit*, *Robert and Sally Goldmans' Devavāṇīpraveśikā*, etc. to name a few. In *Grammar-translation* method, sentence constructions corresponding to different grammar rules are taught and are also taught to translate them into their source language. Students are to memorize a long list of declensions and conjugations along with the translation equivalents of target language vocabulary words. In this method, major emphasis is on grammar and vocabulary but speaking and listening received much less attention. It is assumed that students learn how to understand the source language text and express it in the target language. Hence though historically this was the first structural method, later it was found to be ineffective by itself and new methods such as Functional and Interactive ones were introduced. In both Functional as well as Interactive methods, more focus was on communication aspect and grammatical aspect was made subordinate or eliminated altogether which again was ineffective in teaching Sanskrit. The reason being mere practice of conversation without knowledge of how a language works intricately would be a shortcoming.

### 3.3.1 New Western Methods

As discussed above, when *Grammar-Translation Method* was found to be ineffective, modern methods were introduced. For example various *Functional Methods* such as 'Oral approach and situational language teaching, Directed practice' were tried. Among the *Interactive Methods*, 'Direct method, Series method, Communicative language teaching (CLT), Language immersion, Silent way, Community language learning, Suggestopedia, Natural approach, Total physical response, Teaching Proficiency through Reading and Storytelling, Dogme language teaching', etc. were introduced. Apart from these, there are approaches not used in mainstream teaching viz., 'Pimsleur method,

Michel Thomas method, Appropediam, Computer Assisted Language Learning (CALL), Learning by Teaching, etc. In the current scenario of Sanskrit teaching, a few of these western methods have been adopted, namely *Oral Method* and *Direct Method*.

**Oral Method** In this method, the target language is taught orally before handing out the written matter. Grammar is gradually introduced with the most basic forms being taught first and later the complex ones. Emphasis is on vocabulary training which aids the reading skills followed by grammatical skills through mapping of grammatical structures with sentence patterns. This assists learners to internalise the rules and sentence structures.

**Direct Method** In this method, the target language vocabulary is taught with the help of demonstration and visual aids. The oral communication skills are built on question-and-answer sessions. Students learn grammatical rules from the examples and practice them. Here speaking and listening is given more emphasis over reading and writing.

### 3.4 Current Trends in Sanskrit Teaching

Several government as well as non-government institutes have combined both the ancient Indian methods and Western methods (mostly Oral method and Direct method) for effectively teaching Sanskrit language. These institutes provide lessons in printed form through distance education. Some institutes may provide contact-classes or an instructor for clarification of various doubts where the mode of instruction is generally the source language. Institutes like *Rāṣṭriya Sanskrita Sansthān* (Mishra, 2016; Sharma, 2016) and *Samskṛita Bhārati* (Viswas et al., 2009a,b, 2010, 2012a,b) conduct correspondence courses and provide an instructor who conducts classes in target language. Both the institutes' study-books have similar method of teaching with slight variation as follows-

In *Śrīmadbhagavadgītā-saṅgrahaḥ*, the main ślokaḥ is given followed by padacchedaḥ, padaparicayaḥ, ākāṅkṣā, anvayaḥ, pratipadārthaḥ (in three languages i.e. Sanskrit, Hindi and English), bhāvārthaḥ (also in three languages), nidarśanam which includes vyākaraṇa topics such as sandhi, samāsa, kṛdanta, taddhita, kāraka, koṣa and chandaḥ. In this book only few ślokaḥ from the chapters are given.

In *Gītāśopānam*, basic vocabulary and grammatical lessons are provided through pictures and small stories followed by exercises, points to remember and read-aloud sentences and passages. Word and verb-root paradigms are given in the appendix at the end of the book. In *Gītāpraveśaḥ*, the method is the same as in *Śrīmadbhagavadgītā-saṅgrahaḥ* except the complete mode of instruction is in Sanskrit and all the ślokaḥ of BhG are covered. However, the kāraka, koṣa and chandaḥ points are not discussed in this book.

Both *Śrīmadbhagavadgītā-saṅgrahaḥ* and *Gītāpraveśaḥ* have given *Daṇḍānvaya* and *Khaṇḍānvaya* (through ākāṅkṣā) methods alongwith vocabulary list with translation followed by grammar lessons and exercises. The students are first taught to recite the ślokaḥ and attention is given on correct pronunciation. Then the anvayaḥ is given and they are taught to identify the principal verb in the sentence and once the verb is identified, other relations are simultaneously taught.

Except *Gītāpraveśaḥ* other above mentioned books are not comprehensive. Furthermore, all these books lack in statistical approach which provides a certain degree of accuracy and helps identify the focal points in terms of frequency of usage. The *Pāṇinian* rules related to various grammatical aspects are also lacking in these books. However, we had the unique opportunity to cover these aspects in addition to providing the features mentioned in these books and more such as graphical rendering of compounds and sentential relations, etc. through the help of an interactive interface. Additionally in this digital age, blending technology with traditional teaching approaches is an added advantage for learners which is discussed in the next section.

### 3.5 Effective Use of Language Technology

Today's generation is more technology savvy and frequently use the internet/web for socialising, working as well as learning. In recent years there has been rapid advancement of several computational tools for Sanskrit.<sup>2</sup> Is it possible to use these computational platforms to reduce the burden of learning Sanskrit? Bharati et al. (2000)

<sup>2</sup> <https://sanskrit.uohyd.ac.in/scl>  
<https://sanskrit.inria.fr>  
<https://sanskrit.jnu.ac.in/index.jsp>  
<https://kjc-fs-cluster.kjc.uni-heidelberg.de/dcs>  
<https://sanskritlibrary.org>

discusses how the *Anusāraka*, a language accessor, helps in overcoming the language barrier by sharing the load of language learning between man and machine. Tasks which are difficult for human being are handled by machine and human being takes the load of the tasks that are difficult for a machine. The man-machine ‘eclectic mix’ i.e. the combination of human’s world knowledge and computational tools would create a positive impact on the current as well as future generation.

Both these scenarios demand domain specific teaching / learning capsules. These capsules can be in two different formats namely as ‘*E-Reader*’ and ‘*Domain Specific Teaching Material*’. We will discuss the latter in chapter four. Here we will discuss the former.

### 3.5.1 E-reader

The need for domain specific teaching / learning capsules was felt in earlier days too. We come across a plethora of commentaries on various popular as well as important works. These commentaries, follow either the *Daṇḍānvaya* or *Khaṇḍānvaya* method and explain each and every verse of the selected text providing the segmented text with synonymns, etymological details, philosophical descriptions, exceptional grammar rules, etc. sometimes combining both the methods. With the available computational platforms now it is possible to analyse any Sanskrit text semi-automatically with all these possible nuances of commentary tradition and present the same analyses in a more compact and user-friendly way. The user interfaces can be tailored to the needs of a reader. Such E-readers for various texts such as *Sankṣepa Rāmāyaṇam*, *ŚrīmadBhagvadGītā*, *Śīsupālavadham*, etc. are available.<sup>3</sup> The benefits of an E-reader are as follows:

1. The E-reader provides an access to the original text alongwith the *anvaya* for better understanding.
2. Morphological analysis of each word in the text is provided.
3. Visualisation helps build strong association. Graphical representation of complex concepts like *kāraka* and *samāsa* makes the task easier for a reader.

<sup>3</sup> <https://sanskrit.uohyd.ac.in/scl>

4. Link with thesaurus and bilingual dictionaries are an added advantage for those who want to have a detailed knowledge of a word in the text.
5. For better clarity a reader can resort to Hindi as well as English word glosses.
6. Additional information such as etymological information, etc. information is provided.

We have built *Śrīmad-Bhagavad-Gītā Interface* with the above mentioned features and give a detailed description of the interface in the next section.

### 3.6 Śrīmad-Bhagavad-Gītā Interface Description

The main-page of BhG interface which is a *Graphic User Interface* (GUI) as shown in Figure 3.1 gives the main title of the e-page that is ‘*Bhagavadgītā*’ and the sub-title ‘*geetā sugeetā kartvyā kimanyaiḥ sāstravistaraiḥ*’<sup>4</sup> (once the geetā has been properly studied, other elaborate scriptures fall short). The feature information is provided on the left-hand of the display-screen while on the right-hand is the display of each chapter number in tabular form. Selecting and clicking on the icon indicating chapter number will open a new e-page with the features of that chapter. In the next sub-section, we discuss the features of the interface.

#### 3.6.1 Features of Śrīmad-Bhagavad-Gītā Interface

As mentioned above, for accessing a chapter, one has to click on that particular chapter number and that e-page opens with the full name of the chapter in bold on the right-hand of display screen. For example, the second chapter on the screen is displayed as ‘**Sāṅkhya-yogaḥ Nāma Dvītīyo’dhyāyaḥ**’. On the left-hand of the screen are the verses of that chapter. When clicked on a particular verse, it will be displayed on the right-hand. The BhG Interface provides an access to the original text following the traditional method of learning Sanskrit. Just as the commentaries present any text with *saṃhitā pāṭha*, followed by the analysis of *sandhi* and *padapāṭha*, followed by the word analysis providing the etymology wherever necessary, grammatical rules, analysis of compounds explaining its constituency structure and the type of compounds and its

<sup>4</sup> *Geetāmāhātmyam* – Bhīṣma Parvan 43.1

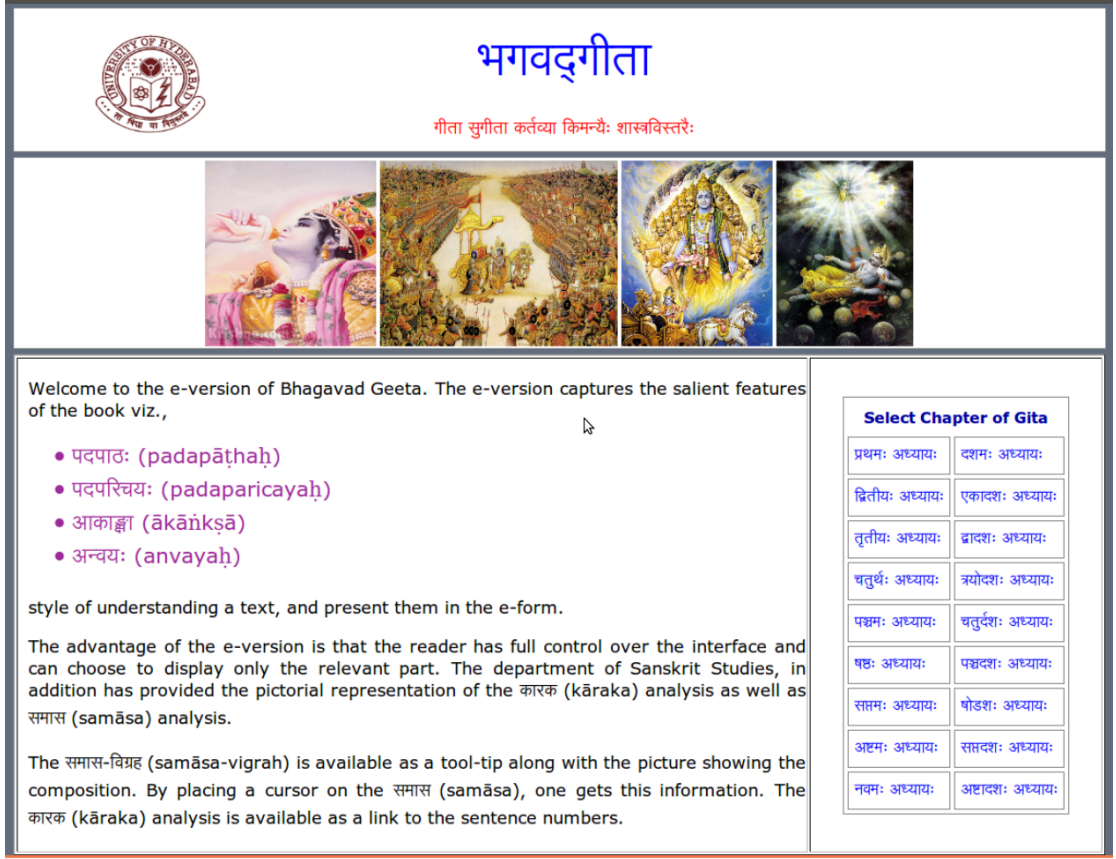


Figure 3.1: BhG - Main

paraphrase, and then the word meanings and finally the anvaya between the words, similarly the interface also provides the e-text with the following features:

1. The following information is displayed in foldable tables.

- *Samhitā pāṭha* (original continuous text),
- *Padapāṭha* (segmented text),
- *Anvaya* (parsed structure),
- *Pada-viśleṣaṇa* (morphological analysis),
- Dictionary help for each word,
- *Samasta-pada-viśleṣaṇa* (compound word analysis),
- *Kāraḥ-viśleṣaṇa* (syntactico-semantic analysis),
- *Hindi and English Translations*,
- Other miscellaneous information such as etymology, *taddhita-forms*, etc.

2. The above information is also provided in a Hide/Show facility which will pop up on clicking. This facility allows the user to control what s/he would like to see and hide the remaining information.
3. There are links leading to pop-up windows for dictionary meanings.
4. Graphical rendering of compound structure and word relations in a sentence.
5. Distinct colour codes are provided for *vibhaktis*, *kriyā* and *avyaya* for concise understanding as given in Table 3.1.


Item	Colour Code	Colour
prathamā	Deep Sky Blue	
dvitīyā	Green Yellow	
ṛtīyā	Turquoise	
caturthī	Light Skyblue	
pañcamī	Light Green	
ṣaṣṭhī	Sky Blue	
saptamī	Slate Gray	
aṣṭamī	Aquamarine	
kriyā	Cadmium Red Light	
avyaya	Mauve	

Table 3.1: Colour Codes

We discuss in detail each information below:

**Padaccheda** Original Sanskrit texts were generally written as a continuous text (*saṃhitā* form) being influenced largely by the oral tradition. In order to split such a text into words (*padas*), one needs to be familiar with the word forms in Sanskrit, and also the *sandhi* rules that result into the euphonic changes at the word boundaries. For example, the *saṃhitā* form of BhG. 2.13 is shown as:

dehino'sminyathā dehe kaumāraṃ yauvanaṃ jarā |  
tathā dehāntaraprāptirdhīrastatra na muhyati ||

Eng. Tr.: Just as the embodied goes through the stages of childhood, youth and old age, similarly it attains another body. The wise person is not deluded thereupon.

After splitting the words based on *sandhi* rules, the segmented form of BhG. 2.13 looks like this in the interface in Figure 3.2.

dehinaḥ asmin yathā dehe  
kaumāram yauvanam jarā |  
tathā deha-antara-prāptiḥ  
dhīraḥ tatra na muhyati ||

शीतोष्णसुखदुःखदाः  
आगमापायिनो नित्यास्तास्तितिक्षस्व  
भारत ।।2.14।।  
  
यं हि न व्यथयन्त्येते पुरुषम्पुरुषर्षभ  
समदुःखसुखन्धीरं सोमूतत्वाय कल्पते  
।।2.15।।  
  
नासतो विद्यते भावो नाभावो विद्यते  
सतः  
उभयोरपि  
दृष्टोन्तस्त्वनयोस्तत्त्वदर्शिभिः  
।।2.16।।  
  
अविनाशि तु तद्विद्धि येन  
सर्वमिदन्ततम्  
विनाशमव्ययस्य न कश्चित्कर्तुमर्हति

2.13.A देहिनः  
2.13.B देहिनोऽस्मिन्यथा  
2.13.D देहिनः (पुं) {6; एक}  
2.13.I जीवात्मा\_की  
2.13.J of\_the\_embodied

अस्मिन्  
-  
इदम् (नपुं) {7; एक}  
इस  
in\_this

यथा  
-  
यथा {अव्य}  
जैसे  
as

देहे  
देहे  
देह {नपुं} {7; एक}  
देह\_में  
in\_the\_body

कौमारम्  
कौमारं  
कौमार {नपुं} {2; एक}  
बचपन  
childhood

यौवनम्  
यौवनं  
यौवन {नपुं} {2; एक}  
युवावस्था  
youth

जरा  
जरा  
जरा {स्त्री} {1; एक}  
वृद्धावस्था  
old\_age

तथा  
तथा  
तथा {अव्य}  
वैसे\_ही  
similarly

देहान्तर-प्राप्तिः  
देहान्तरप्राप्तिर्धैरस्तत्र  
प्राप्ति {स्त्री} {1; एक}  
अन्य\_शरीर\_की\_प्राप्ति  
achievement\_of\_another\_body

धीरः  
-  
धीर {पुं} {1; एक}  
धीर\_पुरुष  
the\_wise\_man

तत्र  
-  
तत्र {अव्य}  
उसमें {विषय\_में}  
thereupon

न  
न  
न {अव्य}  
नहीं  
never

मुह्यति  
मुह्यति  
मह {कर्तरि लट् पृथक् परस्मैपदी मर्द्धे द्विवचिः}

Figure 3.2: Padapāṭha

There is a 'Show/Hide Rows' link at the bottom left of the interface. When one clicks on this link, a new small window pops out giving the information of each rows as shown in Figure 3.3.

The first row (2.13 A) presents the segmented text. The second row (2.13 B) shows the original text with sandhi. The third row (2.13 C) shows all possible word analyses for every word. The fourth row (2.13 D) shows the analysis of a word after choosing the correct parse. The fifth row (2.13 E) shows the samāsa structural analysis. The sixth row (2.13 F) shows samāsa vigraha (compound paraphrase). The seventh row (2.13 G) shows the kāraka relation. The ninth

row (2.13 I) gives the Hindi gloss of the Sanskrit word and the tenth row (2.13 J) shows the English gloss. The eleventh row (2.13 K) gives the derivational meaning. All these rows are collapsible. So the reader has freedom to show / hide any of these rows. Thus the reader has a choice over which information to display and which to hide. Words with different case markers have different colors. Thus a student once gets familiar with the color-case marker association, can always hide the morph analysis row, and open it only when in doubt.

The screenshot shows the 'श्रीमद्भगवद्गीता सुगीता कर्तव्या' interface. The main content area displays a table with rows for Sanskrit text, morphological analysis, and meanings. The table is color-coded by case markers. The sidebar menu allows users to toggle the visibility of various rows, including Sanskrit (A), Sanskrit without sandhi (B), Multiple Morphology (C), Morph in Context (D), samaasa structural analysis (E), samaasa vigraha (F), kaaraka relation (G), Category (H), Hindi Meaning (I), English Meaning (J), Derivational Meaning (K), and undefined.

Figure 3.3: Row-wise Information

**Anvaya** The interface displays two forms that is the *mūlakramaḥ* (*saṃhitā* form) which is shown above and *anvayakramaḥ* (*anvita* form). The anvaya is done according to the *Daṇḍānvaya* method (Figure 3.4).

From Figure 3.4, it is to be noted that in order to semantically complete the sentence, we provided supplementary words (*adhyāhāra*) in parentheses. From a single verse, now we have two sentences.

- Yathā dehinaḥ asmin dehe kaumāram yauvanam (ca) jarā (bhavati) tathā dehāntara-prāptiḥ (bhavati)
- Tatra dhīraḥ na muhyati



dehin{pum}{1;bahu}/dehin{pum}{2;bahu}/dehin{pum}{5;eka}  
 / dehin{pum}{6;eka}/dehin{pum}{8;bahu}/dehin{napum}{5;eka}  
 /dehin{napum}{6;eka}

But in the given context, the correct morphological analysis is **dehin{pum}{6;eka}**.

**Dictionary help** In order to instill the correct and original meaning of Sanskrit words, the computational tools also provide a direct link to the bilingual dictionaries such as **Apte's Sanskrit-Hindi dictionary**, or **Monier-William's Sanskrit-English dictionary**, or thesaurus such as *Amarakośa*. Bilingual dictionary entries provide the meaning in other languages and the thesaurus provides a paraphrase in Sanskrit. They provide citations and example usages and also provide the explanation if needed and collocations. Thus now a student acquires the meaning of each word either by correlating the meaning of Sanskrit words through his mother tongue or directly through the thesaurus.

The screenshot displays a web application interface for Sanskrit dictionary lookup. The sidebar on the left lists various Sanskrit words and their meanings, such as 'देहिनोस्मिन्यथा देहे कौमारं यौवनं जरा' and 'तथा देहान्तरप्राप्तिः धीरस्तत्र न मुह्यति'. The central panel shows a table with columns for word forms and their meanings, including 'देहिनः' and 'देहिनः (पुं)'. The right panel contains detailed dictionary entries for 'देहिन' and 'देहिनी' from Apte's Sanskrit-Hindi dictionary and Monier-William's Sanskrit-English dictionary. The Apte entry includes the word's meaning in Hindi and its usage in Sanskrit. The Monier-William entry provides the word's meaning in English and its usage in Sanskrit. The interface also includes a search bar and a 'Show/Hide Rows...' button.

Figure 3.6: Dictionary Link

Figure 3.6 displays the dictionary help for the prātīpadikam 'dehin' from **Apte's Sanskrit-Hindi dictionary**, and **Monier-William's Sanskrit-English dictionary**.

**Samasta-pada-viśleṣaṇa** The compound word is tagged using the suitable tag<sup>5</sup> and the *vigraha-vākya* (paraphrase) is also provided. The analysis is graphically represented for optimum retention and recollection of information as shown in Figure 3.7:

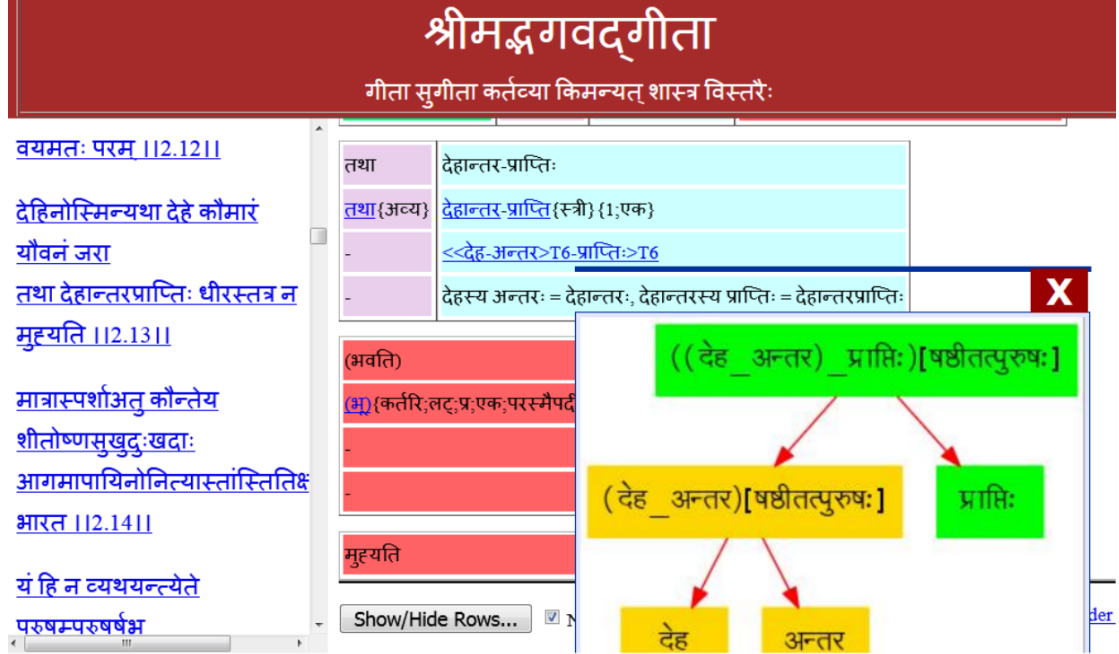


Figure 3.7: Constituency analysis of a compound

For example, the components of the compound word ‘*dehantara-prāptiḥ*’ is indicated by a ‘-’ sign. It is tagged as

<<deha-antara>T6-prāptiḥ>T6

where the tag ‘T6’ indicates ‘*ṣaṣṭhī-tatpuruṣa*’. The paraphrase for the above compound is –

dehasya antaraḥ = **dehāntaraḥ**,

dehāntarasya prāptiḥ = **dehantara-prāptiḥ**.

**Kāraka-viśleṣaṇa** In order to understand now the sentence meaning, one needs to understand how the words in a sentence are mutually related. *Pāṇini*’s grammar provides various clues to understand the relations between words. Sentential parser in SCL uses these rules and the *ākāṅkṣā* (expectancy) of words to propose possible relations between words. It also uses the constraint of *sannidhi* (proximity) to rule out those combinations of relations which do not satisfy the

<sup>5</sup> <https://sanskrit.uohyd.ac.in/scl/Corpus/TaggingGuidelines/>

constraint of proximity. Now in order to have proper verbal cognition, a reader should check whether the meanings of the words thus related are congruous (*yogyatā*) and also use the contextual knowledge to decide the intended meaning (*tātparya*) of ambiguous words. This is the second stage where there is a sharing of load between a man and a machine (See Figure 3.8). While machine remembers all the grammar rules of sentence formation and using it analyses a sentence, a human being using the context and the compatibility of word meanings, chooses appropriate relations leading to the *anvaya* of a sentence. With this interface, now a teacher can follow the process of *Khaṇḍānavaya* to make student understand the sentential meaning. The interface acts like a puzzle-solver where teacher and students have a dialogue with *kathambhūti* kind of question-answering sessions, and based on the clues now a student selects the correct answer, and machine then removes all other answers conflicting with the choice made. A good teacher, then, can also take this opportunity to tell students why the filtered out relations were conflicting, and so on. This game continues till a student resolves all ambiguities of choices in relations. This method thus not only brings back traditionally well tested teaching method of *Khaṇḍānavaya* but also greatly improves the observational and analytical skills of a student.

**Summary of Possible Relations**  
Undo 250 filtered trees

अस्वा(1)	स्वस्वा(2)	स्वस्वा(3)	अस्वा(4)	भस्वा(5)	स्वस्वा(6)	स्वस्वा(7)
<ul style="list-style-type: none"> <li>1/ इत्तम ५/ 6 एक</li> <li>2/ इत्तम ५/ 6 एक</li> </ul>	<ul style="list-style-type: none"> <li>1/ इत्तम ५/ 6 एक</li> </ul>	<ul style="list-style-type: none"> <li>1/ इत्तम ५/ 2 एक</li> <li>2/ इत्तम ५/ 3 एक</li> <li>3/ इत्तम ५/ 2 एक</li> </ul>	<ul style="list-style-type: none"> <li>1/ अस्वा अस्वा</li> </ul>	<ul style="list-style-type: none"> <li>1/ भस्वा ५/ 2 एक</li> <li>2/ भस्वा ५/ 5 एक</li> <li>3/ भस्वा ५/ 6 एक</li> <li>4/ भस्वा ५/ 5 एक</li> <li>5/ भस्वा ५/ 6 एक</li> </ul>	<ul style="list-style-type: none"> <li>1/ भस्वा ५/ 5 एक</li> </ul>	<ul style="list-style-type: none"> <li>1/ ५/ 1 कास्वा अस्वा ५/ 6 एक अस्वाभस्वा, ५/ 6 एक</li> <li>2/ ५/ 1 कास्वा अस्वा ५/ 6 एक अस्वाभस्वा, ५/ 6 एक</li> </ul>
<ol style="list-style-type: none"> <li>1/ इत्तम ५/ 2, 1</li> <li>2/ इत्तम ५/ 2, 1</li> <li>3/ इत्तम ५/ 2, 1</li> <li>4/ इत्तम ५/ 3, 2</li> <li>5/ इत्तम ५/ 3, 2</li> <li>6/ इत्तम ५/ 3, 1</li> <li>7/ इत्तम ५/ 3, 3</li> <li>8/ इत्तम ५/ 3, 1</li> <li>9/ इत्तम ५/ 3, 3</li> </ol>	<ol style="list-style-type: none"> <li>1/ इत्तम ५/ 3, 2</li> <li>2/ इत्तम ५/ 3, 1</li> <li>3/ इत्तम ५/ 3, 3</li> </ol>	<ol style="list-style-type: none"> <li>1/ इत्तम ५/ 7, 1</li> <li>2/ इत्तम ५/ 7, 1</li> <li>3/ इत्तम ५/ 7, 2</li> <li>4/ इत्तम ५/ 7, 1</li> </ol>	<ol style="list-style-type: none"> <li>1/ इत्तम ५/ 3, 2</li> <li>2/ इत्तम ५/ 3, 1</li> <li>3/ इत्तम ५/ 3, 3</li> </ol>	<ol style="list-style-type: none"> <li>1/ इत्तम ५/ 7, 1</li> <li>2/ इत्तम ५/ 6, 1</li> <li>3/ इत्तम ५/ 6, 1</li> <li>4/ इत्तम ५/ 6, 3</li> <li>5/ इत्तम ५/ 7, 1</li> <li>6/ इत्तम ५/ 7, 1</li> <li>7/ इत्तम ५/ 7, 1</li> <li>8/ इत्तम ५/ 7, 1</li> <li>9/ इत्तम ५/ 7, 2</li> <li>10/ इत्तम ५/ 7, 2</li> <li>11/ इत्तम ५/ 7, 2</li> <li>12/ इत्तम ५/ 7, 2</li> </ol>	<ol style="list-style-type: none"> <li>1/ इत्तम ५/ 7, 1</li> <li>2/ इत्तम ५/ 7, 1</li> <li>3/ इत्तम ५/ 7, 2</li> <li>4/ इत्तम ५/ 7, 2</li> </ol>	

Figure 3.8: Possible relations among words

We have supplied *adhyāhāra* (supplementary) words required for completing the sentence (Figure 3.9).

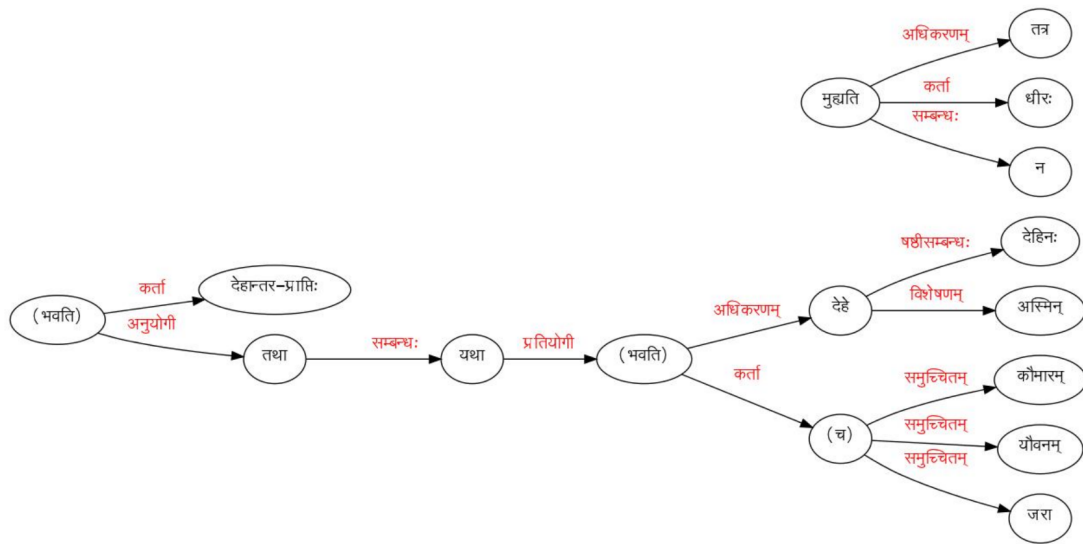


Figure 3.9: Kāraka information

**Hindi and English Glosses** Both Hindi and English glosses are provided in the interface which could be useful for the user to resort to when in doubt regarding the complete meaning of the verse as shown in Figure 3.10.

**श्रीमद्भगवद्गीता**  
गीता सुगीता कर्तव्या किमन्यत् शास्त्र विस्तरैः

शीतोष्णसुखदुःखदाः  
आगमापायिनो नित्यास्तांस्तितिक्षस्व  
भारत ॥2.14॥

यं हि न व्यथयन्त्येते पुरुषम्पुरुषर्षभ  
समदुःखसुखन्धीरं सोमृतत्वाय कल्पते  
॥2.15॥

नासतो विद्यते भावो नाभावो विद्यते  
सतः  
उभयोरपि  
दृष्टोन्तस्त्वनयोस्तत्त्वदर्शिभिः  
॥2.16॥

अविनाशि तु तद्विद्धि येन  
सर्वमिदन्ततम्  
विनाशमव्ययस्य न कश्चित्कर्तुमर्हति  
॥2.17॥

2.13.A	देहिनः	अस्मिन्	यथा	देहे	कौमारम्	यौवनम्
2.13.D	देहिनः (पुं) {6, एक}	इदम् (नपुं) {7, एक}	यथा (अव्य)	देह (नपुं) {7, एक}	कौमार (नपुं) {2, एक}	यौवन (नपुं) {2, एक}
2.13.I	जीवात्मा_की	इस	जैसे	देह_में	बचपन	युवावस्था
2.13.J	of the embodied	in this	as	in the body	childhood	youth

जरा	तथा	देहान्तर-प्राप्तिः	धीरः	तत्र	न
जरा (स्त्री) {1, एक}	तथा (अव्य)	प्राप्ति (स्त्री) {1, एक}	धीर (पुं) {1, एक}	तत्र (अव्य)	न (अव्य)
वृद्धावस्था	वैसे_ही	अन्य_शरीर_की_प्राप्ति	धीर_पुरुष	उसमें_(विषय_में)	नहीं
old_age	similarly	achievement_of_another_body	the_wise_man	thereupon	never

मुह्यति

मुह (कर्तरि, लट्, प्र, एक, परस्मैपदी, मुह्, दिवादिः)

मोहित\_होता\_है

is\_perplexed

Show/Hide Rows ☒ Numbers ☐ Borders [anvaya order](#)

Figure 3.10: Hindi and English Glosses

**Miscellaneous Information** Other miscellaneous information such as *taddhita* form (derivational meaning), etymology, etc. is also provided in the interface as shown below in Figure 3.11.

# श्रीमद्भगवद्गीता

गीता सुगीता कर्तव्या किमन्यत् शास्त्र विस्तरैः

[प्रजावादाश्च भाषस](#)

[गतासूनागतासूच नानुशोचन्ति](#)

[पण्डिताः ॥2.11॥](#)

[न त्वेवाहं जानु नासं न त्वं नेमे](#)

[जनाधिपाः](#)

[न चैव न भविष्यामः सर्वे](#)

[वयमतः परम ॥2.12॥](#)

[देहिनोस्मिन्यथा देहे कौमारं](#)

[यौवनं जरा](#)

[तथा देहान्तरप्राप्तिः धीरस्तत्र न](#)

[मुह्यति ॥2.13॥](#)

2.13.A	यथा	देहिनः	अस्मिन्	देहे
2.13.D	यथा {अव्य}	देहिन {पुं} {6;एक}	इदम् {नपुं} {7;एक}	देह {नपुं} {7;एक}
देहः अस्यास्तीति देही तस्य देहिनः				
			कौमारम्	
			कौमार {नपुं} {2;एक}	
			कुमारस्य भावः कौमारं बाल्यं	

यौवनम्	(च)	जरा	(भवति)	
यौवन {नपुं} {2;एक}	(च) {अव्य}	जरा {स्त्री} {1;एक}	(अ) {कर्तरि;लट्;प्र;एक;परस्मैपदी;भू;भ्वादि;}	
यूनः भावः यौवनं तारुण्यं				
	तथा	देहान्तर-प्राप्तिः		
	तथा {अव्य}	देहान्तर-प्राप्ति {स्त्री} {1;एक}		

Show/Hide Rows...
☒ Numbers ☐ Borders

[shloka order](#)

Figure 3.11: Miscellaneous Information

### 3.6.2 Utility of Interface

This work and interface can be beneficial to both the student as well as teacher.

#### Utility to a student

The interface contributes directly to student learning in following ways:

- A student can have access to first-hand knowledge of original Sanskrit text.
- By effective use of tools and technology, s/he can be better motivated to understand a given text and actively engage in exploring the language. With a variety of language resources at one click, a student has the opportunity to examine a given task from different perspectives thereby enhancing their creativity skills.
- A student can have easy access to different tools in order to meet her / his personal needs and preferences thereby improving on the weaker areas of learning.
- S/he is greatly benefited by having the opportunity of personal learning space. This way s/he could gradually improve and hone ones learning skills at her / his own individual pace.

- Through constant practice, development and refinement, a student can gain confidence in comprehending, learning and retaining any new information in a text.

### **Utility to a teacher**

Blending technology with teaching practices could be a challenge for teachers. By recognizing the potential of interface in ones' practice, a teacher can gain confidence in utilizing the educational tools and technology.

- Teacher can ensure active student participation once s/he has understood a text with the help of interface and determine what linguistic expressions should be more stressed. In this way a teacher can engage students in learning by combining technology with teaching methodology.
- A teacher could devise good application exercises and assignments for the self-study of students. This could be a contributing factor in their personal development supporting personal reflection and collaboration.
- Once the subject matter is clearly understood by the students, teacher could then provide for and encourage multiple perspectives and representations of a content.
- Effective management of time and energy is required for teaching lengthy and tedious word-formations. This could be reduced considerably by engaging the students in using the tools.
- Those teachers who are inclined in improving the quality of teaching, raising standards and gaining better standing in further education could explore, model and experiment with new approaches of lesson planning and preparation with the help of interface. Thus making their teaching more interesting, appealing and motivating, as well as providing opportunities for learning success.
- Teacher could easily develop similar domain specific interface or even create virtual courses by adopting similar methodology.

Hence teachers and students can build on their own past learning and on each others' ideas with teachers taking the role of mentor and facilitators of learning and not just as instructors.

### 3.7 Summary

In this chapter we have discussed Indian as well as Western teaching methodologies with their utilities and shortcomings followed by detailed and illustrated discussion on BhG interface. In the the concluding portion of this phase two we discussed the utility to both student and instructor. In the next section we have prepared a teaching module exclusively for learning BhG taking into account only those *Pāṇinian Sūtras* necessary for understanding the text with the help of statistical results.

## **Part III**

# **Teaching Module for Śrīmad-Bhagavad-Gītā: Preparation for Course Planning**

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## CHAPTER 4

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# STATISTICAL ANALYSIS AND GRAMMAR KIT FOR ŚRĪMAD-BHAGAVAD-GĪTĀ

After completing the linguistic analysis, we move on to statistical analysis and preparation of relevant grammar kit for BhG. In this chapter we begin with the utility of statistical analysis in general followed by its specific importance in our work. In the next section we will discuss how statistics is helpful in preparing teaching capsule for a particular text.

### 4.1 Utility of Statistical Analysis

Statistical analysis refers to the science of collecting, analysing and presenting vast amount of data in order to discover the underlying patterns and trends as well as the relationships. As such, this analysis is useful for:

- Collecting, presenting and interpreting the data in a systematic manner.
- Classifying data in order to get a clear idea about distribution.

- Understanding the complex data by simplifying it.
- Providing basis and techniques for making comparison.
- Studying the relationship between different phenomena.
- Identifying and developing a coherent pattern.
- Formulating the hypothesis and testing it.
- Drawing rational conclusions represented through visual aids such as different graphs.

#### 4.1.1 Visual Aids

Statistical data is represented with the help of visual aids such as graphs. Graphs not only provide visual display of data but also highlights the salient features of the data. This helps in systematic analysis and presentation of data. The different types of graphs are Line graphs, Pie charts, Bar graphs, Histograms, etc. We have made use of different graphs in our work to display the statistical analyses as well as to summarise the conclusion. For instance we have provided different classes and their frequencies in *tabular forms* as well as *vertical bar graphs* while the percentage distribution is represented through the *pie charts*.

## 4.2 Importance of Statistics in Śrīmad-Bhagavad-Gītā

For our work, statistical analysis is important in two ways as follows:

#### In Teaching

- Through statistical analysis we know the distribution of various salient features of Sanskrit language in this specific text. This increases the accuracy and reliability of various aspects.
- This distribution further helps us in identifying the prosodic and grammatical aspects that are necessary to concentrate upon while teaching. For instance it helps in identifying areas for improvement and areas of strength.
- As a result we could easily develop a domain specific teaching capsule which is discussed in the next section.

### For Computational purpose

Current tools are developed following the grammar rules. In order to use statistical or machine learning or neural networks for the development / improvement of the tools further, this data would be useful.

## 4.3 Domain Specific Teaching Capsules

Sanskrit has a vast repertoire of literature and each discipline has its own set of terminology. There are several disciplines which require moderate knowledge of Sanskrit in order to understand the texts in their disciplines. For example, a historian needs to refer to the original Sanskrit texts to make a point. Disciplines such as *Ayurveda* insist that students should have good knowledge of Sanskrit in order to read and understand the original Sanskrit texts in *Ayurveda* with its terminology. However, all these students fail to gain the needed expertise in Sanskrit within a short span of time available with them for studying Sanskrit.

In another scenario, in recent years in India, there is a growing trend among certain age-group of people to understand Sanskrit philosophical texts such as *Upaniṣadas*, *Gītā* etc. For studying these texts, one either takes recourse to available commentaries and translations or learn Sanskrit grammar. If one takes up reading ancient commentaries, that poses a problem since these are entirely written in Sanskrit too. Various translations are readily available. However, these are usually from a writer's individual perspective which may or may not agree with the reader's own perspective. The only resort left is learning Sanskrit grammar but then one may ask a question as to '*how much grammar is required for understanding a text in a short span of time-period*'. Traditional methods of teaching required minimum eight to twelve years of dedicated study which seems impractical in today's fast-paced scenario. Additionally, teaching or learning of Sanskrit unlike other modern languages requires lots of memorization in the form of word-formations and various grammatical rules involving lexical, syntactic and semantic information. The students of this generation shy away from this kind of memorization as it is a lengthy and time-consuming process. Since the students want to gain maximum knowledge in a limited time constraint, it is necessary to

develop a domain specific teaching material which would cater to all the requirements of the students in a given time-period.

#### 4.3.1 Domain specific Teaching Material

Kulkarni (2015) used the computational platforms for analysing texts on *Vedānta* and gathered statistical data pertaining to these texts. He collected statistics for *sandhi* rules needed for understanding the text, and various noun and verb paradigm tables a student should know before reading the texts. Based on this information, he then developed a course material (*Vedanta Samskrita*) for teaching just essential aspects of Sanskrit in order to gain confidence in reading *Vedānta* texts independently. His experiments show that with the teaching capsules he developed, a reader gains confidence in reading original Sanskrit *Vedānta* texts with a training of just 10-15 hours. Following similar strategy, we prepared teaching material for BhG focusing mainly on grammatical information such as *sandhi*, *samāsa* and *kāraka* and guidelines for prosody and morphology based on statistical analyses.

#### 4.3.2 Śrīmad-Bhagavad-Gītā Teaching Module

Previous efforts for developing grammar kit specifically for BhG had been undertaken by Swami Rāmsukhdas who wrote '*Geetā Darpaṇa*', Annie Besant and Bhagavān Dās who jointly wrote '*The Bhagavad-Gītā*' and Śrī Dīvānacandra Śāstrī who wrote '*Geetāvyākaraṇam*'. '*The Bhagavad-Gītā*' has just basic grammar introduction giving the salient features with few BhG examples. On the other hand, '*Geetā Darpaṇa*' has explained the grammar in detail covering all the major aspects pertaining to BhG with suitable examples. Similarly '*Geetāvyākaraṇam*' is composed loosely based on '*Laghu Siddhānta Kaumudī*' of Varadarājācārya giving examples from BhG. The word formation and derivational processes (*prakriyas*) are discussed in this book which we have set aside for the later stage. Moreover, we have not discussed the specific rules for rare instances in BhG. However, what is lacking in above mentioned texts is the morphological as well as statistical analysis of grammar which we have covered in our work. Furthermore, these texts did not have the digital support which has become a necessity in today's digital age. We are in a position to overcome these shortcomings

with the development of an interactive interface which features grammatical information such as morphology, sandhi, samāsa and kāraka in a systematic format for better convenience and accessibility of the user. Additionally, the graphical rendering of compounds and sentential relations are provided so that complex relationships can be easily demonstrated. However these texts were helpful in developing the grammar base for our work. In addition to these works there are study materials developed by *Rashtriya Sanskrit Sansthan* and *Sanskrit Bharati* which are mentioned in chapter three. Thus, in a way all these texts discussed above are complementary to our present work. In the next section, we begin with the statistical analysis of verse distribution in each chapter of BhG.

#### 4.4 Verse Distribution

We begin with the character-wise distribution of the verses in BhG in Table 4.1. There are four speakers in BhG which are explicitly marked by the word ‘*uvāca*’ as in *Saṅjaya uvāca*. The very first verse of first chapter in BhG is the only verse spoken by *Dhṛtarāṣṭra*. *Saṅjaya* assumes the role of narrator narrating those verses including the dialogues between *Arjuna* and *Kṛṣṇa* embedded in the narration. The distribution of the verses among them is shown below:

Chp.	Saṅjaya	Freq.	Arjuna	Freq.	Kṛṣṇa	Freq.	Total
1.	1.2-1.21	19	1.21-1.23	3			
	1.24-1.28	5	1.28-1.45	18			
	1.47	1					46
2.	2.1	1	2.4-2.8	5	2.2-2.3	2	
	2.9-2.10	2	2.54	1	2.11-2.53	43	
					2.55-2.72	18	72
3.			3.1-3.2	2	3.3-3.35	33	
			3.36	1	3.37-3.43	7	43
4.			4.4	1	4.1-4.3	3	
					4.5-4.42	38	42
5.			5.1	1	5.2-5.29	28	29

*continued on the next page*

Chp.	Sañjaya	Freq.	Arjuna	Freq.	Kṛṣṇa	Freq.	Total
6.			6.33-6.34 6.37-6.39	2 3	6.1-6.32 6.35-6.36 6.40-6.47	32 2 8	47
7.					7.1-7.30	30	30
8.			8.1-8.2	2	8.3-8.28	26	28
9.					9.1-9.34	34	34
10.			10.12-10.18	7	10.1-10.11 10.19-10.42	11 24	42
11.	11.9-11.14 11.35 11.50	6 1 1	11.1-11.4 11.15-11.31 11.36-11.46 11.51	4 17 11 1	11.5-11.8 11.32-11.34 11.47-11.49 11.52-11.55	4 3 3 4	55
12.			12.1	1	12.2-12.20	19	20
13.					13.1-13.34	34	34
14.			14.21	1	14.1-14.20 14.22-14.27	20 6	27
15.					15.1-15.20	20	20
16.					16.1-16.24	24	24
17.			17.1	1	17.2-17.28	27	28
18.	18.74-18.78	5	18.1 18.73	1 1	18.2-18.72	71	78
<b>Total</b>		<b>41</b>		<b>84</b>		<b>574</b>	<b>699</b>

Table 4.1: Verse-wise distribution

It has been noted from the above distribution that majority of verses (82%) are spoken by Kṛṣṇa followed by those verses spoken by Arjuna (12%) who mainly poses various questions and Sañjaya who is the main narrator in BhG has in total 41 verses (only 6%) to his credit.

## 4.5 Summary

In this chapter we have discussed the general utility of statistics and graphs and its importance in our work followed by explanation on domain specific teaching capsule which includes teaching material prepared with the help of statistics as well as computational tools. We then began with the statistics of verse distribution by speakers of BhG. From this chapter until the ninth chapter, we will discuss various statistics related to linguistic aspects of BhG as well as proposed grammar kit. Both linguistic and statistical analyses helped us provide a fresh insight for planning teaching course material ‘just enough’ to access the text a person is interested in, touching upon various grammatical details useful for studying BhG. This is the main goal of ‘*Phase Three*’. In the next chapter we discuss the prosodic analysis of BhG followed by morphological analysis in chapter six, sandhi analysis in chapter seven, compound analysis in chapter eight and lastly sentential analysis in chapter ninth.

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## CHAPTER 5

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### PROSODIC ANALYSIS

Majority of Sanskrit literature are in verse style which are composed in a particular *chanda* (metre). There is a systematic and rhythmic flow of chanting these verses which aids in proper pronunciation as well as memorization. In this chapter we will discuss the basic features of a metre followed by a brief description of those metres which are noted in BhG alongwith the statistics and an example for each metre.<sup>1</sup>

#### 5.1 Features of Metre

A verse is divided into four *pādas* / *caraṇas* (quarters / feet) on the basis of metre. Metre is determined either by the number of syllables (*akṣaras*) or by syllabic instants (*mātrās*)<sup>2</sup> in a *pāda* with relative freedom in the distribution of *laghu* (light) and *guru* (heavy) syllables.<sup>3</sup> Laghu includes all the short vowels (a, i, u, ṛ and Ṍṛ) which are counted as a single unit while for distinguishing guru, there is a specific rule as given below:

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<sup>1</sup> We followed ‘*Geetā Darpaṇa*’ for the statistics as well as characteristics of the metres while the syllabic patterns of the examples are provided by us. *Geetā Darpaṇa* has cited mostly from ‘*Vṛttaratnākara*’ of Kedāra Bhaṭṭa and ‘*Vāgvallabha*’ of Śrīduḥkhabhañjanakavi.

<sup>2</sup> *Mātrā* is that unit of measurement required to utter a single short syllable.

<sup>3</sup> Laghu is represented as straight line (‘|’) and Guru as crooked line (‘S’)

sam̐yuktādyam̐ dīrgham̐ sānusvāram̐ visargasaṃmiśram̐ |  
vijñeyamakṣaram̐ guru pādāntastham̐ vikalpena ||— śrutabodha - 2

It becomes guru in the following conditions:

- A short vowel is followed by conjoined consonants.
- Long vowels (ā, ī, ū, ṛī, e, o, ai, ao).
- A syllable with either an anusvāra or visarga.
- The last syllable at the end of a pāda is optionally considered guru.

*Vṛtta* which is mainly seen in classical Sanskrit poetry is divided into three types viz.,

1. *Samavṛtta* wherein all the pādas are similar,
2. *Ardhasamavṛtta* wherein the alternate pādas are similar and
3. *Viṣamavṛtta* wherein all the pādas are dissimilar.

As Hopkins (1901) puts in, “In some cases, pairs of pādas may be scanned together as the hemistichs<sup>4</sup> of a couplet.<sup>5</sup> It is then normal for the pādas comprising a pair to have different structures, to complement each other aesthetically. Otherwise the four pādas of a stanza have the same structure”.

‘Gaṇa-chanda’ is a sequence of trisyllabic pādas<sup>6</sup> treated as a single unit. Piṅgala<sup>7</sup> has given eight types of gaṇas based on the syllabic pattern of *laghu* and *guru*<sup>8</sup> as shown in Table 5.1:

No.	Gaṇa	Sign	Lakṣaṇa
1	Yagaṇa	SS	First laghu, two guru
2	Ragaṇa	S S	Middle laghu, two guru
3	Tagaṇa	SS	Last laghu, two guru
4	Bhagaṇa	S	First guru, two laghu
5	Jagaṇa	S	Middle guru, two laghu
6	Sagaṇa	S	Last guru, two laghu
7	Magāṇa	SSS	All guru
8	Nagaṇa		All laghu

Table 5.1: Gaṇa-distribution

<sup>4</sup> half-verse

<sup>5</sup> two constituent pādas

<sup>6</sup> Triplets of syllables

<sup>7</sup> Noted prosodist and author of ‘Chandassūtra’

<sup>8</sup> ādimadhyāvasāneṣu ya-ra-tā yānti lāghavam |  
bha-ja-sā gauravam̐ yānti ma-nau tu gurulāghavam ||— Ch.sū.1.9

Another interesting and one of the most essential feature in metre is ‘yati’ which is the rhythmic pause (caesura) taken while reciting a pāda. According to Deo (2007), ‘A caesura is standardly understood to be a line-internal break which may be realized as an audible pause in the performance of a meter and which is associated with obligatory word boundaries’.

We analysed all the 700 verses of BhG metrically. Majority of these verses (645) are composed in *Anuṣṭup* metre and the remaining 55 verses are in *Triṣṭup* metre (Rāmasukhadāsa, 1985). This distribution is justified by Mitra (1989), “The great Epics present following groups of specimens based on syllable: the free syllabic rhythm in the form of *Triṣṭup* and *Anuṣṭup* - the latter of which is the principal metre as has been chosen by the Epic versifier because of its inherent quality of easy felicity of narrating the heroic tale. The *Triṣṭup* on the other hand, in the early composition has been arranged with very little restriction - consequently committing a variety of verse norms in the MB...”.

In the next section we discuss the characteristics of the metres that are found in BhG. Each metre is briefly explained beginning with the characteristics followed by short explanation alongwith the syllabic pattern after which the statistics are given and lastly an example from BhG is represented in their respective syllabic patterns.

## 5.2 Description of metres

### 5.2.1 Anuṣṭup

The metre wherein each pāda has eight syllables ( $8 * 4 = 32$ ) in the same pattern of *laghu* and *guru* is known as *Anuṣṭup* (also known as *śloka* or *padya*). This metre comes under the genre *akṣara-chanda* (syllabic), in the sense, each pāda has the same syllabic sequence. The characteristics of this metre is given in the following definition.

śloke ṣaṣṭhaṃ guruṃ geyam sarvatra laghu pañcamam |  
dvicatuṣpādayorhrasvaṃ saptamaṃ dirghamanvayoḥ || (Rāmasukhadāsa,  
1985)

Each ‘pāda’ has eight syllables. The first four syllables can be of any *mātrā*. The sixth syllable is ‘guru’ while the fifth is ‘laghu’. The seventh syllable is ‘hrasva’ in even ‘foot’

and ‘guru’ in odd ‘foot’. For example, taking the forty-seventh verse of second chapter from BhG:

karmaṇyevādhikāraṣṭe  
mā phaleṣu kadācana |  
mā karmaphalaheturbhūr-  
mā te saṅgo’stvakarmaṇi ||— BhG 2.47

Eng. Tr.: It is your right to work only but never towards the fruit thereof. Do not be the cause of the fruit of action; nor be attached to inaction.

This is represented in Table 5.2.

ka S	rmaṇ S	ye S	vā S	dhi 	kā S	ra S	ste S	(a)
mā S	pha 	le S	ṣu 	ka 	dā S	ca 	na 	(b)
mā S	ka S	rma 	pha 	la 	he S	tu S	rbhūr S	(c)
mā S	te S	saṅ S	go S	stva 	ka S	rma 	ṇi 	(d)

Table 5.2: Anuṣṭup-Metre

### 5.2.2 Triṣṭup

The metre wherein each pāda has eleven syllables (11 \* 4 = 44) in the same pattern of *laghu* and *guru* is known as *Triṣṭup*. There are three types of *Triṣṭup* metres which come under the genre *gaṇa-chanda* (trisyllabic) and are characterized by different structures in BhG viz. *Indravajrā*, *Upendravajrā* and *Upajāti*.

- **Indravajrā** is characterised as:

syādiṇdravajrā yadi tau jagau gaḥ — Vṛ. 3.30

In this metre, the syllables in each pāda is in the sequence of two ‘tagaṇa’, one ‘jagaṇa’ and two ‘guru’ as in —

SS | SS | |S | SS

The yati comes at the end of the pāda. There are three instances of *Indravajrā* in BhG viz. 8.28, 15.5 and 15.15. For example, verse twenty-eight of eight chapter from BhG:

vedeṣu yajñeṣu tapaḥsu caiva  
dāneṣu yatpuṇyaphalaṃ pradiṣṭam |  
atyeti tatsarvamidam viditvā  
yogī paraṃ sthānamupaiti cādyam ||— BhG 8.28

Eng. Tr.: The yogī on realizing the Supreme truth attains peace, surpassing all the results of the directed pious works such as study of the Vedas as well as performance of sacrifices, austerities and charities.

This is represented in Table 5.3.

ve S	de S	ṣu 	ya S	jñe S	ṣu 	ta 	paḥ S	su 	cai S	va S	(a)
dā S	ne S	ṣu 	yat S	puṇ S	ya 	pha 	lam S	pra 	diṣ S	ṭam S	(b)
a S	tye S	ti 	tat S	sar S	vam 	i 	dam S	vi 	di S	tvā S	(c)
yo S	gī S	pa 	ram S	sthā S	nam 	u 	pai S	ti 	cā S	dyam S	(d)

Table 5.3: Indravajrā-Metre

- *Upendravanajrā* is characterised as:

upendravanajrā jatajāstato gau — Vṛ. 3.31

In this metre, the syllables in each pāda is in the order of ‘jagaṇa’, ‘tagaṇa’, ‘jagaṇa’ and two ‘guru’ as in —

|S | SS | |S | SS

Both *Indravajrā* and *Upendravanajrā* are the same except for the first syllable which is *guru* in the former and *laghu* in the latter. Here too the yati comes at the end of pāda. There are three instances of *Upendravanajrā* in BhG viz. 11.28, 11.29 and 11.45. For example, verse twenty-eight of eleventh chapter from BhG:

yathā nadīnām bahavaḥ ambuvegāḥ  
samudram eva abhimukhāḥ dravanti |  
tathā tavāmī naralokavīrāḥ  
viśanti vaktrāṇi abhivijvalanti ||— BhG 11.28

Eng. Tr.: As streams of river glide towards the ocean alone, similarly the warriors of human society enter your blazing mouth.

This is represented in Table 5.4.

ya 	thā S	na 	dī S	nām S	ba 	havaḥ 	am S	bu 	ve S	gāḥ S	(a)
sa 	mu S	dra 	me S	vā S	bhi 	mu 	khāḥ S	dra 	va S	nti S	(b)
ta 	thā S	ta 	vā S	mī S	na 	ra 	lo S	ka 	vī S	rāḥ S	(c)
vi 	śanti S	va 	ktrā S	ṇi S	a 	bhi 	vi S	jva 	la S	nti S	(d)

Table 5.4: Upendravajrā-Metre

- Upajāti is characterised as:

anantarodīritalakṣmabhājau pāda  
yadiyāvupajātayastāḥ |  
itthaṃ kilānyāsvapi miśritāsu  
smaranti jātiṣvidameva nāma ||— Vṛ. 3.31

When each pāda shows the characteristics of both *Indravajrā* and *Upendravajrā* metres, it is known as *Upajāti*. Similarly admixture of characteristics of several metres in each pāda is also called *Upajāti*. This metre is further classified in two types:

- Combination of syllables between *Indravajrā* and *Upendravajrā*. There are fifteen instances in BhG. The distribution is shown in Table 5.5.

Chp.	Verse	First caraṇa	Second caraṇa	Third caraṇa	Fourth caraṇa
2	8	upendravajrā	indravajrā	upendravajrā	indravajrā
2	22	indravajrā	upendravajrā	indravajrā	upendravajrā
11	15	indravajrā	indravajrā	indravajrā	upendravajrā

*continued on the next page*

Chp.	Verse	First caraṇa	Second caraṇa	Third caraṇa	Fourth caraṇa
11	19	upendravrājā	upendravrājā	upendravrājā	indravrājā
11	24	upendravrājā	indravrājā	indravrājā	upendravrājā
11	25	indravrājā	indravrājā	upendravrājā	upendravrājā
11	34	indravrājā	indravrājā	upendravrājā	indravrājā
11	36	indravrājā	upendravrājā	indravrājā	indravrājā
11	38	upendravrājā	upendravrājā	indravrājā	upendravrājā
11	39	indravrājā	upendravrājā	upendravrājā	upendravrājā
11	40	upendravrājā	upendravrājā	upendravrājā	indravrājā
11	42	indravrājā	upendravrājā	indravrājā	indravrājā
11	43	upendravrājā	upendravrājā	indravrājā	indravrājā
11	44	indravrājā	upendravrājā	upendravrājā	upendravrājā
11	47	upendravrājā	indravrājā	indravrājā	indravrājā

Table 5.5: Distribution of Upajāti Metres1

Regarding the combination of both the metres according to the text *Śrutabodha*, if first two *caraṇas* or first and third *caraṇas* are *Indravajrā* and last two *caraṇas* or second and fourth *caraṇas* are *Upendravrājā*, it is called ‘*Ākhyānakī*’. There are eight instances of this type found in BhG. The reverse of the above type that is, if first two *caraṇas* or first and third *caraṇas* are *Upendravrājā* and last two *caraṇas* or second and fourth *caraṇas* are *Indravajrā*, it is called ‘*Viparītākhyānakī*’. There are seven instances of this type found in BhG.

- Combination of syllables between different metres. There are 34 such instances in BhG. The distribution of these combinations is given in Table 5.6.

Chp.	Verse	First caraṇa	Second caraṇa	Third caraṇa	Fourth caraṇa
2	5	upendravrājā	guṇāṅgī	indravrājā	indravrājā
2	6	rādhā	gaṅgā	indravrājā	ihāmṛgī
2	7	indravrājā	śālinī	śālinī	śālinī
2	20	śāradā	vātermī	viśākhā	yaśodā

*continued on the next page*

Chp.	Verse	First caraṇa	Second caraṇa	Third caraṇa	Fourth caraṇa
2	29	indravajrā	rati	saṃśrayaśrī	guṇāṅgī
2	70	iṣṭa	upendravajrā	guṇāṅgī	upendravajrā
8	9	iṣa	upendravajrā	indravajrā	indravajrā
8	10	upendravajrā	guṇāṅgī	viśākhā	gati
8	11	upendravajrā	śāradā	viśākhā	prākārabandha
9	20	śālinī	śālinī	indravajrā	indravajrā
9	21	śālinī	śālinī	indravajrā	yaśodā
11	16	upendravajrā	śālinī	indravajrā	indravajrā
11	17	śāradā	śāradā	śālinī	indravajrā
11	18	śāradā	upendravajrā	upendravajrā	upendravajrā
11	20	indravajrā	indravajrā	prākārabandha	indravajrā
11	21	lalitā	guṇāṅgī	citrā	lalitā
11	22	vātormī	ihāmṛgī	indravajrā	śālinī
11	23	indravajrā	lalitā	śāradā	guṇāṅgī
11	26	lalitā	indravajrā	śālinī	upendravajrā
11	27	ihāmṛgī	indravajrā	indravajrā	śālinī
11	30	ihāmṛgī	indravajrā	indravajrā	indravajrā
11	31	prākārabandha	upendravajrā	indravajrā	upendravajrā
11	32	indravajrā	indravajrā	lalitā	prākārabandha
11	33	indravajrā	śālinī	lalitā	upendravajrā
11	35	vātormī	yaśodā	viśākhā	yaśodā
11	37	ihāmṛgī	yaśodā	upendravajrā	śāradā
11	41	upendravajrā	indravajrā	śāradā	upendravajrā
11	46	śāradā	indravajrā	indravajrā	upendravajrā
11	48	upendravajrā	upendravajrā	guṇāṅgī	indravajrā
11	49	indravajrā	śālinī	upendravajrā	upendravajrā
11	50	prākārabandha	viśākhā	indravajrā	indravajrā
15	2	lalitā	upendravajrā	upendravajrā	indravajrā
15	3	vaṃśastha	indravajrā	indravajrā	upendravajrā
15	4	upendravajrā	ihāmṛgī	upendravajrā	upendravajrā

Table 5.6: Distribution of Upajāti Metres<sup>2</sup>

Below we give the syllabic patterns of the eighteen metres that occur in Table 5.6:

1. *Śālinī* is characterised as:

**śāliniyuktā mtau tagau go’bdhilokaiḥ — Vṛ. 3.35**

When a pāda has one ‘magaṇa’, two ‘tagaṇa’ and two ‘guru’, the metre is called *Śālinī*. This is represented as:

SSS SS | SS | SS

The Yati comes after fourth and seventh syllables. There are fourteen instances in BhG. For example, the first pāda of verse twentieth of ninth chapter from BhG is represented in Table 5.7.

**te puṇyam āsādyā surendralokam — BhG 9.20.1**

Eng. Tr.: They enjoy the result of virtuous deeds (and attain) Indra’s abode.

te	puṇ	yam	ā	sā	dya	su	re	ndra	lo	kam
S	S	S	S	S		S	S		S	S

Table 5.7: *Śālinī*-Metre

2. *Śāradā* is characterised as:

**jabhau tagau ga-yutā śāradā ca**

When a pāda has one ‘jagaṇa’, one ‘bhagaṇa’, one ‘tagaṇa’ and two ‘guru’, the metre is called *Śāradā*. This is represented as:

|S | S || SS | SS

The Yati comes after ninth syllable. There are nine instances in BhG. For instance, the third pāda of forty-first verse of eleventh chapter is represented in Table 5.8.

**ajānatā mahimānam tavedam — BhG 11.41.3**

Eng. Tr.: Unaware of your glories.

a	jā	na	tā	ma	hi	mā	nam	ta	ve	dam
	S		S			S	S		S	S

Table 5.8: *Śāradā*-Metre

3. **Guṇāṅgī** is characterised as:

**mtau jgau gaḥ syādabdhirṇagaguṇāṅgī**

When a pāda has one ‘magaṇa’, one ‘tagaṇa’, one ‘jagaṇa’ and two ‘guru’, the metre is called *Guṇāṅgī*. This is represented as:

SSS SS | |S| SS

There are seven instances in BhG. For example, the second pāda of twenty-first verse of eleventh chapter is represented in Table 5.9.

**kecit bhītāḥ prāñjalayaḥ grṇanti — BhG 11.21.2**

Eng. Tr.: Some, out of fear, offer prayers with folded palms.

ke	cit	bhī	tāḥ	prāñ	ja	la	yo	gr	ṇa	nti
S	S	S	S	S			S		S	S

Table 5.9: Guṇāṅgī-Metre

4. **Lalitā** is characterised as:

**yabhau tgau go lalitā sā’bdhilokaiḥ**

When a pāda has one ‘yagaṇa’, one ‘bhagaṇa’, one ‘tagaṇa’ and two ‘guru’, the metre is called *Lalitā*. This is represented as:

|SS S || SS | SS

The Yati comes after the fifth syllable. There are seven instances in BhG. For example the first pāda of second verse of fifteenth chapter is represented in Table 5.10.

**adhaśca ūrdhvam prasṛtāḥ tasya śākhāḥ — BhG 15.2.1**

Eng. Tr.: The branches (of the tree) extend downwards and upwards.

a	dhaś	cor	dhvam	pra	sṛ	tās	tas	ya	śā	khāḥ
	S	S	S			S	S		S	S

Table 5.10: Lalitā-Metre

5. **īhāmṛgī** is characterised as:

**īhāmṛgī kila cetto bhatau gau**

When a pāda has one ‘tagaṇa’, one ‘bhagaṇa’, one ‘tagaṇa’ and two ‘guru’, the metre is called *ihāmrgī*. This is represented as:

SS | S || SS | SS

There are six instances in BhG. For instance the second pāda of twenty-second verse of eleventh chapter is represented in Table 5.11.

**yasmin gatāḥ na nivartanti bhūyaḥ — BhG 15.4.2**

Eng. Tr.: Having attained which, (they) never again return.

yas	min	ga	tāḥ	na	ni	var	tan	ti	bhū	yaḥ
S	S		S			S	S		S	S

Table 5.11: *ihāmrgī*-Metre

6. **Prākārabandha** is characterised as:

**prākārabandhastakāratrayaṃ gau**

When a pāda has three ‘tagaṇa’ and two ‘guru’, the metre is called *Prākārabandha*. This is represented as:

SS | SS | SS | SS

There are five instances in BhG. For instance, the fourth pāda of eleventh verse of eight chapter is represented in Table 5.12.

**tatte padam saṅgraheṇa pravakṣye — BhG 8.11.4**

Eng. Tr.: (I) shall explain briefly about that Supreme goal.

tat	te	pa	dam	saṅ	gra	he	ṇa	pra	va	kṣye
S	S		S	S		S	S		S	S

Table 5.12: *Prākārabandha*-Metre

7. **Viśākhā** is characterised as:

**viśākhoktā yatau tagau go’bdhilokaiḥ**

When a pāda has one ‘yagaṇa’, two ‘tagaṇa’ and two ‘guru’, the metre is called *Viśākhā*. This is represented as:

|SS SS | SS | SS

There are five instances in BhG. For example the third pāda of twentieth verse of second chapter is represented in Table 5.13.

**ajo nityaḥ śāśvato'ayam purāṇaḥ — BhG 2.20.3**

Eng. Tr.: It (soul) is unborn, eternal, permanent and primeval.

a	jo	ni	tyaḥ	śāś	va	to	yam	pu	rā	ṇo
	ṣ	ṣ	ṣ	ṣ		ṣ	ṣ		ṣ	ṣ

Table 5.13: Viśākhā-Metre

8. **Yaśodā** is characterised as:

**jatau tagau go'bdhikairyaśodā**

When a pāda has one 'jagaṇa', two 'tagaṇa' and two 'guru', the metre is called *Viśākhā*. This is represented as:

|ṣ | ṣṣ | ṣṣ | ṣṣ

There are five instances in BhG. For example the fourth pāda of twentieth verse of second chapter is represented in Table 5.14.

**na hanyate hanyamāne śarīre — BhG 2.20.4**

Eng. Tr.: It (soul) is not slain even though the body is slain.

na	han	ya	te	han	ya	mā	ne	śa	rī	re
	ṣ		ṣ	ṣ		ṣ	ṣ		ṣ	ṣ

Table 5.14: Yaśodā-Metre

9. **Vāṭormī** is characterised as:

**vāṭormīyaṃ kathitāmbhau tagau gaḥ — Vṛ. 3.36**

When a pāda has one 'magaṇa', one 'bhagaṇa', one 'tagaṇa' and two 'guru', the metre is called *Vāṭormī*. This is represented as:

ṣṣṣ ṣ || ṣṣ | ṣṣ

The Yati comes after fourth and seventh syllables. There are three instances in BhG. For example the second pāda of twentieth verse of second chapter is represented in Table 5.15.

**nāyam bhūtvā bhavitā vā na bhūyaḥ — BhG 2.20.2**

Eng. Tr.: Nor does it (soul) come into existence after being born.

10. **Rādhā** is characterised as:

nā	yam	bhū	tvā	bha	vi	tā	vā	na	bhū	yaḥ
ṣ	ṣ	ṣ	ṣ			ṣ	ṣ		ṣ	ṣ

Table 5.15: Vātormī-Metre

**yatau yau rādhā śaralokairyaṭiḥ syāt**

When a pāda has one ‘yagaṇa’, one ‘tagaṇa’ and two ‘yagaṇa’, the metre is called *Rādhā*. This is represented as:

|SS SS | |SS |SS

The Yati comes after eight and fifth syllables. Only one instance is found in first pāda of sixth verse in second chapter of BhG. This is represented in Table 5.16.

**na caitat vidmaḥ kataranno garīyo — BhG 2.6.1**

Eng. Tr.: We do not know which is better for us.

na	cai	tat	vi	dmaḥ	ka	ta	ran	no	ga	rī	yo
	ṣ	ṣ	ṣ	ṣ			ṣ	ṣ		ṣ	ṣ

Table 5.16: Rādhā-Metre

11. **Gaṅgā** is characterised as:

**gaṅgā tabhau yayugalā pūrvavat syāt**

When a pāda has one ‘tagaṇa’, one ‘bhagaṇa’ and two ‘yagaṇa’, the metre is called *Gaṅgā*. This is represented as:

SS | ṣ || |SS |SS

There is just one instance in BhG that is, the second pāda of sixth verse in second chapter. This is represented in Table 5.17.

**yat vā jayema yadi vā no jayeyuḥ — BhG 2.6.2**

Eng. Tr.: Whether we shall win or they will conquer us.

yat	vā	ja	ye	ma	ya	di	vā	no	ja	ye	yuḥ
ṣ	ṣ		ṣ				ṣ	ṣ		ṣ	ṣ

Table 5.17: Gaṅgā-Metre

12. **Ratiḥ** is characterised as:

**vedoragaistabhasayayug ratiḥ syāt**

When a pāda has one ‘tagaṇa’, one ‘bhagaṇa’, one ‘sagaṇa’ and one ‘yagaṇa’, the metre is called *Ratiḥ*. This is represented as:

SS | S || ||S |SS

Only one such example is found in the second pāda in twenty-ninth verse in second chapter. This is represented in Table 5.18.

**āścaryavat vadati tathāiva cānyaḥ — BhG 2.29.2**

Eng. Tr.: Another likewise speaks (of the soul) as marvellous.

āś	car	ya	vat	va	da	ti	ta	thāi	va	cā	nyaḥ
S	S		S					S		S	S

Table 5.18: Ratiḥ-Metre

13. **Samśrayaśrī** is characterised as:

**tāḥ syustrayaḥ samśrayaśrīrgalau ca**

When a pāda has three ‘tagaṇa’ followed by one ‘guru’ and one ‘laghu’, the metre is called *Samśrayaśrī*. This is represented as:

SS | SS | SS | S |

Just one instance is found in the third pāda of twenty-ninth verse in second chapter. This is represented in Table 5.19.

**āścaryavat cainam anyaḥ śṛṇoti — BhG 2.29.3**

Eng. Tr.: Another hears (of the soul) as marvellous.

āś	car	ya	vat	cai	na	man	yaḥ	śṛ	ṇo	ti
S	S		S	S		S	S		S	

Table 5.19: Samśrayaśrī-Metre

14. **Iṣṭa** is characterised as:

**bāṇartubhistabhajagā ga iṣṭam**

When a pāda has one ‘tagaṇa’, one ‘bhagaṇa’, one ‘jagaṇa’ and two ‘guru’, the metre is called *Iṣṭa*. This is represented as:

SS | S || |S | SS

Only one instance is found in BhG in the first pāda in seventieth verse in second chapter. This represented in Table 5.20.

**āpūryamāṇam acalapraṭiṣṭham — BhG 2.70.1**

Eng. Tr.: Always full on all sides (and) steadily situated.

ā	pūr	ya	mā	ṇam	a	ca	la	pra	tiṣ	ṭham
ṣ	ṣ		ṣ				ṣ		ṣ	ṣ

Table 5.20: Iṣṭa-Metre

15. *īṣa* is characterised as:

**śarartubhirjabhajagā ga īṣam**

When a pāda has one ‘jagaṇa’, one ‘bhagaṇa’, one ‘jagaṇa’ and two ‘guru’, the metre is called *īṣa*. This is represented as:

|ṣ | ṣ || |ṣ | ṣṣ

Here too, just one instance is found in BhG in the first pāda in ninth verse in eight chapter. This is represented in Table 5.21.

**kavim purāṇam anuśāsītāram — BhG 8.9.1**

Eng. Tr.: All-knower, ageless (and) the controller.

ka	vim	pu	rā	ṇam	a	nu	śā	si	tā	ram
	ṣ		ṣ				ṣ		ṣ	ṣ

Table 5.21: *īṣa*-Metre

16. *Gatiḥ* is characterised as:

**yugoragairjabhasayayug gatiḥ syāt**

When a pāda has one ‘jagaṇa’, one ‘bhagaṇa’, one ‘sagaṇa’ and one ‘yagaṇa’, the metre is called *Gatiḥ*. This is represented as:

|ṣ | ṣ || ||ṣ | ṣṣ

Only one instance is found in BhG that is in fourth pāda in tenth verse in chapter eight. This is represented in Table 5.22.

**sa tam param puruṣam upaiti divyam — BhG 8.10.4**

Eng. Tr.: He achieves that supreme divine Purusa.

sa	tam	pa	ram	pu	ru	ṣam	u	pai	ti	div	yam
	ṣ		ṣ					ṣ		ṣ	ṣ

Table 5.22: Gatiḥ-Metre

17. **Citrā** is characterised as:

**citrā proktāḥ marau jagau ga-yuktā**

When a pāda has one ‘magaṇa’, one ‘ragaṇa’, one ‘jagaṇa’ and two ‘guru’, the metre is called *Citrā*. This is represented as:

SSS ṣ |ṣ |ṣ | SS

Just one instance is found in the third pāda in twenty-first verse in eleventh chapter. This is represented in Table 5.23.

**svastīyuktvā maharṣisiddhasaṅghāḥ — BhG 11.21.3**

Eng. Tr.: Many great Maharṣis and Siddhas saying ‘Let there be peace’.

sva	stī	tyu	ktvā	ma	har	ṣi	si	ddha	saṅ	ghāḥ
ṣ	ṣ	ṣ	ṣ		ṣ		ṣ		ṣ	ṣ

Table 5.23: Citrā-Metre

18. **Vaṃśastha** is characterised as:

**jatau tu vaṃśasthamudīritaṃ jarau — Vṛ. 3.47**

When a pāda has one ‘jagaṇa’, one ‘tagaṇa’, one ‘jagaṇa’ and one ‘ragaṇa’, the metre is called *Vaṃśastha*. This is represented as:

|ṣ | SS | |ṣ | ṣ |ṣ

Only one instance is found in BhG that is in the first pāda in third verse in fifteenth chapter. This is represented in Table 5.24.

**na rūpamasyeha tathopalabhyate — BhG 15.3.1**

Eng. Tr.: The form of this (tree) cannot be perceived by thought form too.

na	rū	pa	mas	ye	ha	ta	tho	pa	labh	ya	te
	ṣ		ṣ	ṣ			ṣ		ṣ		ṣ

Table 5.24: Vaṃśastha-Metre

The frequency table of the above mentioned metres is given in Table 5.25.

Metres	Frequency	Metres	Frequency
indravajrā	38	vātermī	3
upendravajrā	28	rādhā	1
śālinī	14	gaṅgā	1
śāradā	9	rati	1
guṇāṅgī	7	saṁśrayaśrī	1
lalitā	7	iṣṭa	1
ihāmrgī	6	iṣa	1
prākārabandha	5	gati	1
viśākhā	5	citrā	1
yaśodā	5	vaṁśastha	1

Table 5.25: Frequency-Table of thirty-four metres

### 5.3 Observation

The knowledge of the metre is very useful in the correct recitation which in turn facilitates the task of memorisation. The method of recitation varies with the metre. From the distribution in Table 5.6, it is noted that only five chapters out of eighteen in BhG namely second, eighth, ninth, eleventh and fifteenth have metres with admixtures. The maximum instances of *Upajāti metres* are found in the eleventh chapter with around 24 verses (i.e. 44%) spoken by Arjuna which interestingly indicates his heightened sentiments on experiencing the divine universal form of Kṛṣṇa. From Table 5.25, it is noted that only three metres namely *Indravajrā*, *Upendravajrā* and *Śālinī* are prominent while other metres have frequency count below ten, some with just a single instance.

### 5.4 Summary

In this chapter we have discussed the features of metre in general followed by the description of those metres occurring in BhG starting with the most frequent metre i.e. *Anuṣṭup* under the genre *akṣara-chanda* (syllabic). However *Triṣṭup* metre has the most diverse classification which has been explained by giving the characteristics of each metre with a brief description and an illustration from BhG marked with syllabic patterns. The tables show the frequency distribution of these metres. Main focus

is on *Upajāti metre* which is admixture of different metres in each pāda of a verse. One admixture is between *Indravajrā* and *Upendravajrā* which has 15 instances while the other admixture has various metres combined. There are 20 metres which are combined and distributed in each pāda of a verse. There are 34 instances in BhG. Their frequency distribution is given in Table 5.25. In the next chapter we discuss the morphological analyses of all the words tagged in BhG.

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## CHAPTER 6

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### MORPHOLOGICAL ANALYSIS

In this chapter we look at the statistics of the morphological analyses of all the words in BhG. The morphological analyser provides the grammatical analyses showing the *prātipadika* and *dhātu* with its suffix. This suffix encodes the information of various grammatical features such as gender, number, person, case, lakāra, etc. Many a times words are also ambiguous, for example the word ‘*rāmaḥ*’ has two analyses namely *rāma{pum}{1;eka}* and *rā1{kartari;laṭ;u;bahu;parasmaipadī;rā;adādi}*. The former analyses the word as a *subanta* (noun), while the latter analyses it as a *tiñanta* (verb). But in a given context only one of them is valid.

This information then is useful for deciding the meaning of the word in a context. Such statistics is also useful for deciding which word forms are to be memorised / taught to the students for better understanding of BhG. After proper scrutiny of the statistics of morphological analysis, we suggest the learning / teaching strategy for the selection of the model words and their forms for memorising.

## 6.1 Statistical Analysis

According to Pāṇinian terminology, a *pada* is defined as ‘*suptiñantaṃ padam*’<sup>1</sup>. These are the words which can be analysed showing the stem (*prakṛti*) and the suffix (*pratyaya*) resulting into the inflected form. The total number of words in BhG are 8977. Their classification into different parts of speech is as follows:

- **Subantas** = 5627
  - *Masculine* = 2543
  - *Neuter* = 1225
  - *Feminine* = 430
  - *Sarvanaman* = 1429
- **Tiñantas** = 983
  - *Kartari* = 922
  - *Karmaṇi* = 57
  - *Bhāve* = 4
- **Kṛdantas** = 678
- **Avyayas**<sup>2</sup> = 1689

Though *sarvanaman* (pronouns) come under *subanta*, Pāṇini has given separate rules for them<sup>3</sup> and essentially because their morphology differs slightly from the morphology of other nouns, we have considered them as a separate category. Moreover we have not analysed the *taddhitas* since the *taddhita* analyser is not available and manually analysing these was time-consuming as well.

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<sup>1</sup> A – 1.4.14

<sup>2</sup> Including *Tasil* pratyayas.

<sup>3</sup> sarvāḍiṇi sarvanāmāni – A - 1.1.27

pūrvaparāvaradakṣiṇottarāparādharaṇivavasthāyāmasaṃjñāyām – A - 1.1.34

svamajñātidhanākhyāyām – A - 1.1.35

antaraṃ bahiryogopasaṃvyānayoḥ – A - 1.1.36

The morphological analyser<sup>4</sup> gives the analysis of each word. Then we selected the correct analysis in the context manually. Around 10% of the words were not recognized by the morphological analyser. The reasons for non-recognition were two. While for some, the stems were missing in the lexical dictionary, and for the others, the words were exceptions to Pāṇini's system, and hence could not be analysed. For all such words, we provided the morphological analysis manually.

We found that there were quite a few words with as many as 10 or more possible analyses. Table 6.1 gives the frequency of words with multiple analyses.

analysis count	words	analysis count	words
1	5117	8	23
2	1681	9	27
3	1150	10	18
4	371	11	10
5	333	12	7
6	103	13	3
7	128	14	7
Total words			8978
Average			1.90

Table 6.1: Morph level ambiguity

The average number of analyses also (= 1.90) seems to be a bit on higher size. These different forms do not belong to different Part of Speech categories but typically fall within the same 'Part Of Speech' (POS) category. For example, a neuter noun in singular has the same form in nominative as well as accusative case. There are many such instances of regular clashes of forms in different case-number combination. This statistics as a side product, provides an important insight, especially for building a POS tagger.

In Machine Translation as well as other NLP applications, POS tagger plays an important role. It helps in removing / reducing the ambiguity in the morphological analyses. The above observations that the regular clashes in Sanskrit morphology are within a

<sup>4</sup> <https://sanskrit.uohyd.ac.in/scl>

noun category and not across the categories, hints that POS tagger based purely on the category information for disambiguation is of very little use in Sanskrit. On the other hand a hierarchical tagger with information of various associated features makes sense.

In the next section we describe various word formations with the help of statistical graphs and pie charts.

## 6.2 Word Formation in Śrīmad-Bhagavad-Gītā

In this section we describe the general word formation in Sanskrit that is needed to understand BhG. For each category of inflectional word forms viz. *subanta* and *tiñanta*, we list various paradigms a student needs to learn for understanding BhG. Additionally we enumerate the cases of derivational morphology focussing on the *kṛdantas* which are available in computational tools. The same goes true for *avyayas* as well. We have not explicitly marked *taddhitas* mainly due to its complexity and unavailability of an automatic tool. Manually analysing these was time-consuming and due to its semantic intricacies, it was best thought to retain it for advanced stage. However, wherever possible we have provided *taddhita* information in the interface.

Sanskrit is a flexional language. In order to understand a Sanskrit text, understanding the word formation is the basic step. The words, called *padas* are of two types viz. *subanta* (nominal form) and *tiñanta* (verbal form)<sup>5</sup> which represents the inflectional morphology. The *subanta* and *tiñanta* are formed from two kinds of bases viz. *prātipadika*<sup>6</sup> and *dhātu*<sup>7</sup> respectively by adding *sup* and *tiñ* inflectional suffixes to the bases respectively. Similarly the derivational suffixes viz. *kṛt*<sup>8</sup> and *taddhita*<sup>9</sup> are added to the bases for producing new nominal bases.

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<sup>5</sup> *suptiñantaṃ padam* — A - 1.4.14

<sup>6</sup> *arthavat adhātuḥ apratyayaḥ prātipadikam* — A - 1.2.45

<sup>7</sup> *bhūvādayoḥ dhātavaḥ* — A - 1.3.1

<sup>8</sup> *kṛt atin* — A - 3.1.93

<sup>9</sup> *taddhitāḥ* — A - 4.1.76

### 6.2.1 Subanta Word Formation

A word ending in a nominal suffix (*sup-anta*) is called *Subanta*. There are 21 case-endings (*vibhakti pratyayas*) with additional three forms corresponding to the vocative case counting 24 word forms corresponding to each nominal base (*prātipadika*). The 21 *vibhakti pratyayas* in each word-class, correspond to seven cases viz. nominative, accusative, instrumental, dative, ablative, genitive and locative, with three numbers viz. singular, dual and plural each. When one looks at *Rūpa-Candrikā* which is a popular guide for students to memorize word-forms, there are around 182 word-classes including all exceptions. Calculating 182 word-classes with 21 forms, we have around 3822 forms. It is found to be quite intimidating to memorize such a vast list, so naturally students shy away from memorizing. When analysing BhG, it was found that one doesn't need to go through such an exhaustive list of nominal forms but can concentrate only on those which are prominent.

To know which word-classes are to be memorized, we classified all the *prātipadikas* further according to gender and their endings. The classes relevant to BhG are reported below:

- Masculine:

*Ajanta* = *a, i, ī, u, r*

*Halanta* = *j, t, d, n, ś, s*

There are 11 word-classes.

- Neuter:

*Ajanta* = *a, i, u*

*Halanta* = *t, d, n, s*

There are 7 word-classes.

- Feminine:

*Ajanta* = *ā, i, ī, u, ū, r, o, au*

*Halanta* = *k, c, d, dh, p, r, v, ś, s*

There are 17 word-classes.

Thus, as against 182, a student, in order to understand BhG needs to know the forms of only 35 (11 + 7 + 17) word classes. For each of these classes we noticed that forms in

all vibhaktis are not found. In fact the use of dual forms across almost all endings was rare. Forms in some vibhaktis were also rare or in some cases even totally missing.

We have listed the word-classes in each gender in descending order alongwith the statistics. This would give the reader an advantage to have an overview of the most frequently occurring forms so that one may develop a habit of routinely learning atleast one paradigm conveniently. We have included *innantaḥ* in *nakārānta* word-forms. We have excluded *sarvanāman*, *saṅkhyā*, *kvasu* and *matup-pratyayānta* words from the list. After exclusion, there are around 2684 *subantas* in BhG. Of these, 1681 words are masculine, 729 words are neuter and 274 words are feminine.

### Masculine

Table 6.2 gives the statistics of masculine words (around 1681) in BhG according to their ending.

Ajanta (6)	Freq.	Halanta (6)	Freq.
a	1276	n	156
i	79	t	31
u	68	s	28
ṛ	22	d	15
ī	3	ś	2
		j	1
<b>Total</b>	<b>1448</b>	<b>Total</b>	<b>233</b>

Table 6.2: Masculine-ending

It is noted from above distribution that majority of words in masculine-ending are *akārānta* (76%) followed by *nakārānta*, *ikārānta*, *ukārānta*, *takārānta*, *sakārānta*, *ṛkārānta*, *dakārānta* while *ikārānta*, *śakārānta* and *jakārānta* words are minimum with frequency less than ten. Further distribution is made according to *vacana* (number) and *vibhakti* (case-ending) for each masculine word.

## 1. Akārānta

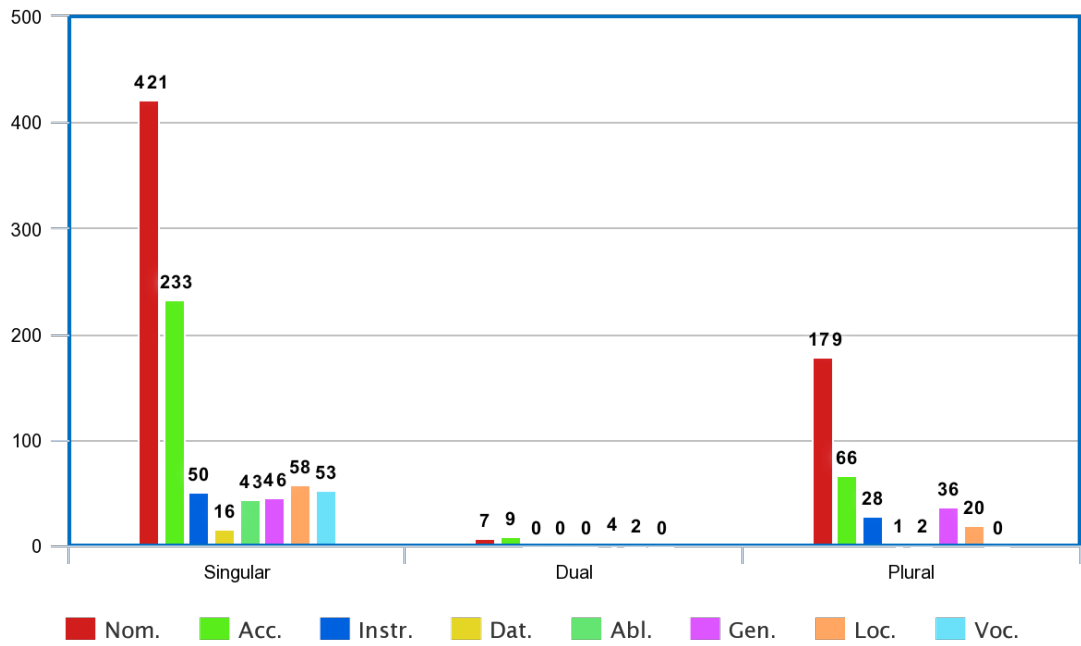


Figure 6.1: Mascl. Akārānta Vibhakti Distribution

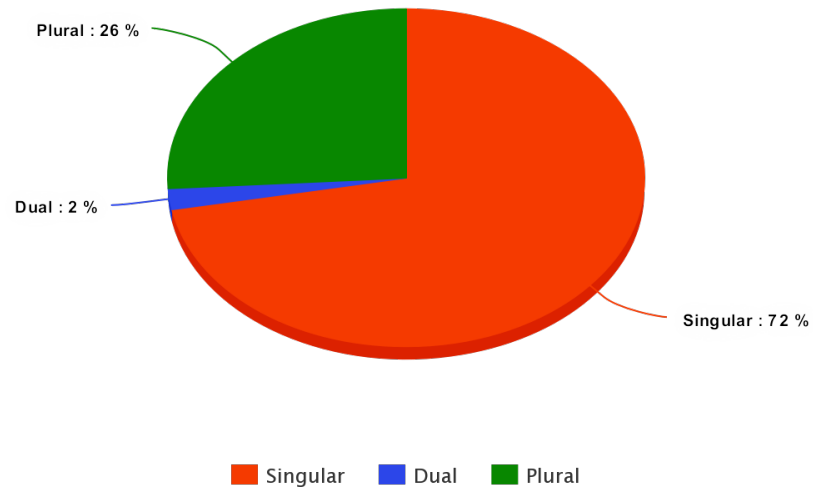


Figure 6.2: Mascl. Akārānta Percentage Distribution

From Figure 6.1, it is noted that much emphasis is on the nominative case-ending followed by accusative while dative is minimum. From Figure 6.2, it is summarised that out of 1274 words, majority (72%) are in singular followed by plural (26%) with as little as two percent are in dual.

## 2. Nakārānta

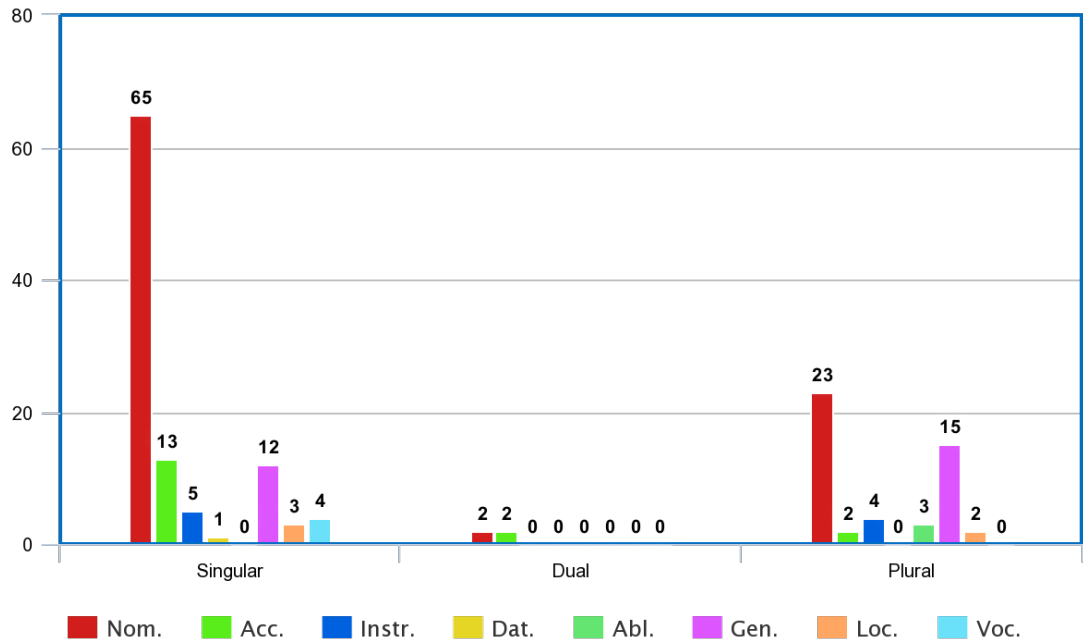


Figure 6.3: Mascl. Nakārānta Vibhakti Distribution

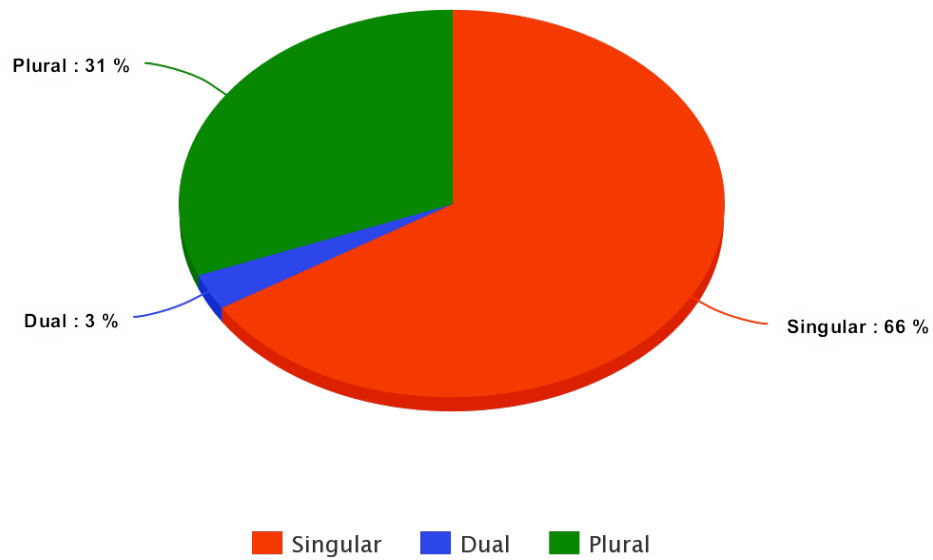


Figure 6.4: Mascl. Nakārānta Percentage Distribution

It is noted from Figure 6.3 that much emphasis is on the nominative case-ending followed by genitive and accusative while there is only one instance of dative case-ending. From Figure 6.4, it is summarised that out of 156 words, around 66% are singular and 31% plural with only three percent dual.

### 3. Ikārānta

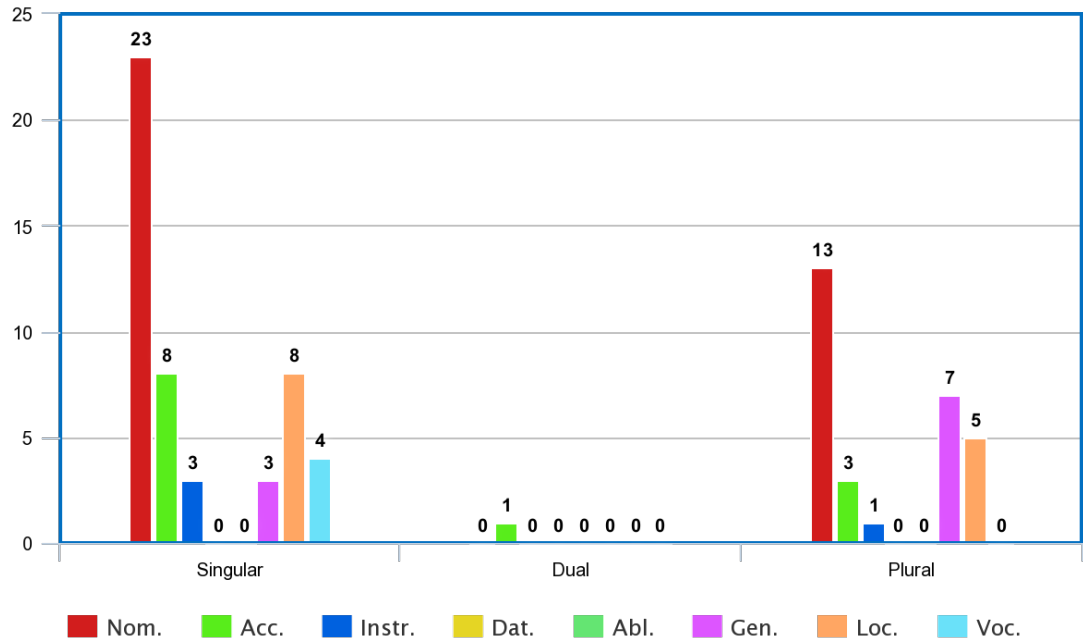


Figure 6.5: Mascl. Ikārānta Vibhakti Distribution

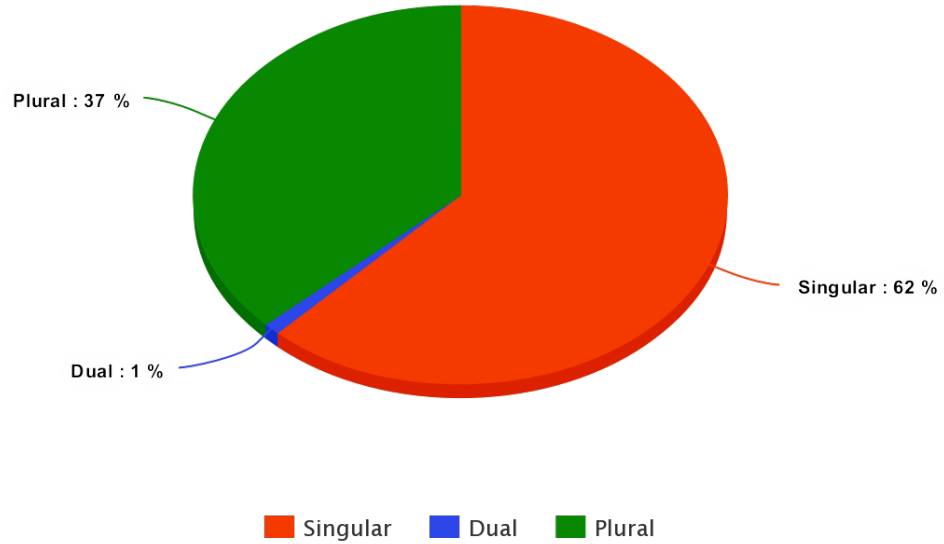


Figure 6.6: Mascl. Ikārānta Percentage Distribution

From Figure 6.5, it is noted that emphasis is on the nominative case-ending while there are no instances of dative and ablative case-endings. From Figure 6.6, it is summarised that out of 79 words, around 62% are singular and 37% plural with merely one percent dual.

#### 4. Ukārānta

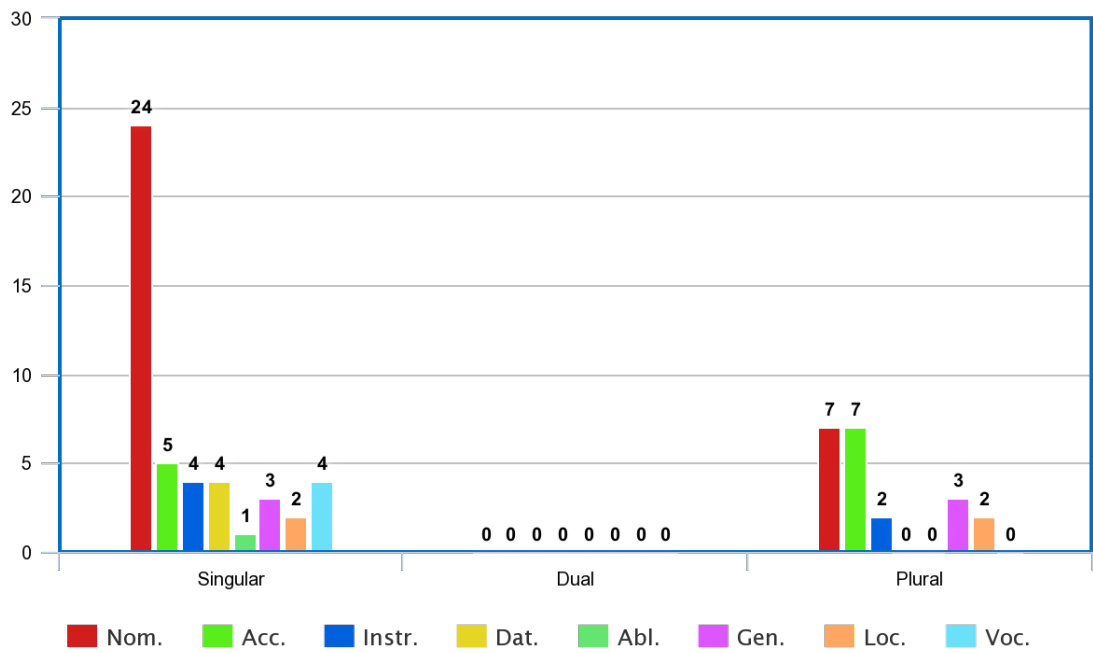


Figure 6.7: Mascl. Ukārānta Vibhakti Distribution

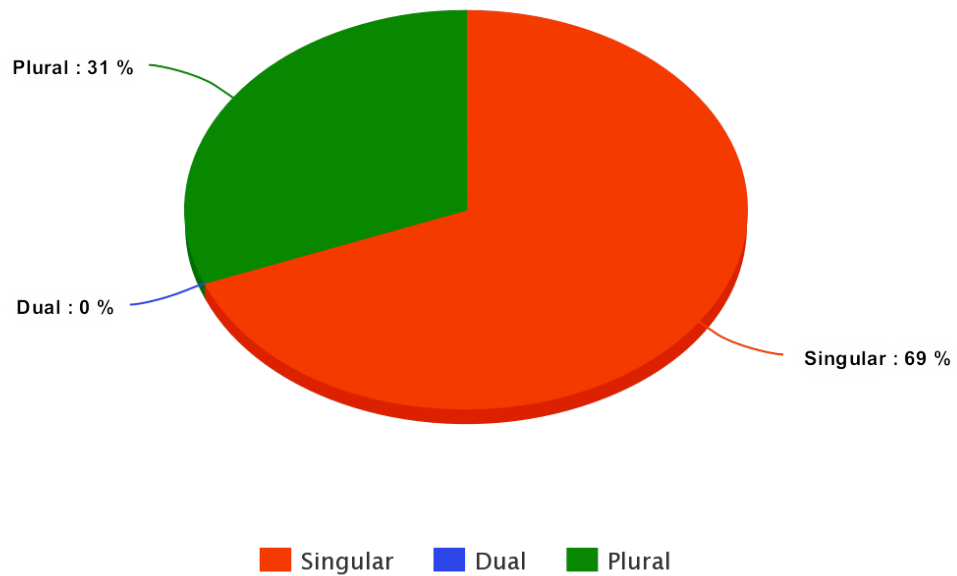


Figure 6.8: Mascl. Ukārānta Percentage Distribution

It is noted from Figure 6.7 that much emphasis is on the nominative case-ending followed by accusative while other case-endings are minimum. From Figure 6.8, it is summarised that out of 68 words, around 69% are singular and 31% plural with no instance of dual.

## 5. Takārānta

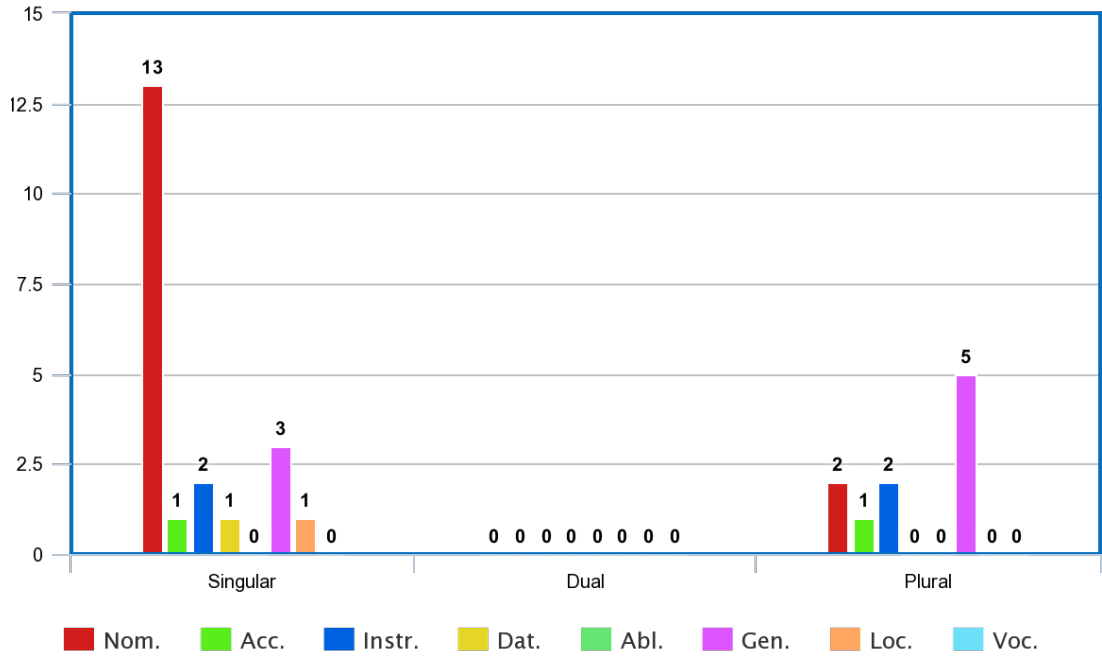


Figure 6.9: Mascl. Takārānta Vibhakti Distribution

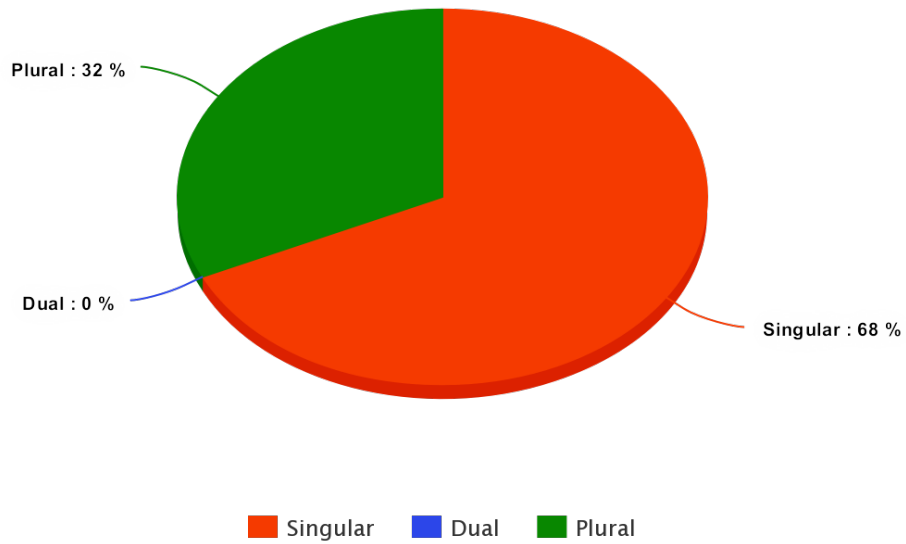


Figure 6.10: Mascl. Takārānta Percentage Distribution

From Figure 6.9, it is noted that much emphasis is on the nominative case-ending followed by genitive while there are no words with dative case-ending. From Figure 6.10, it is summarised that out of 31 words, around 68% are singular and 32% plural with no instance of dual.

## 6. Sakārānta

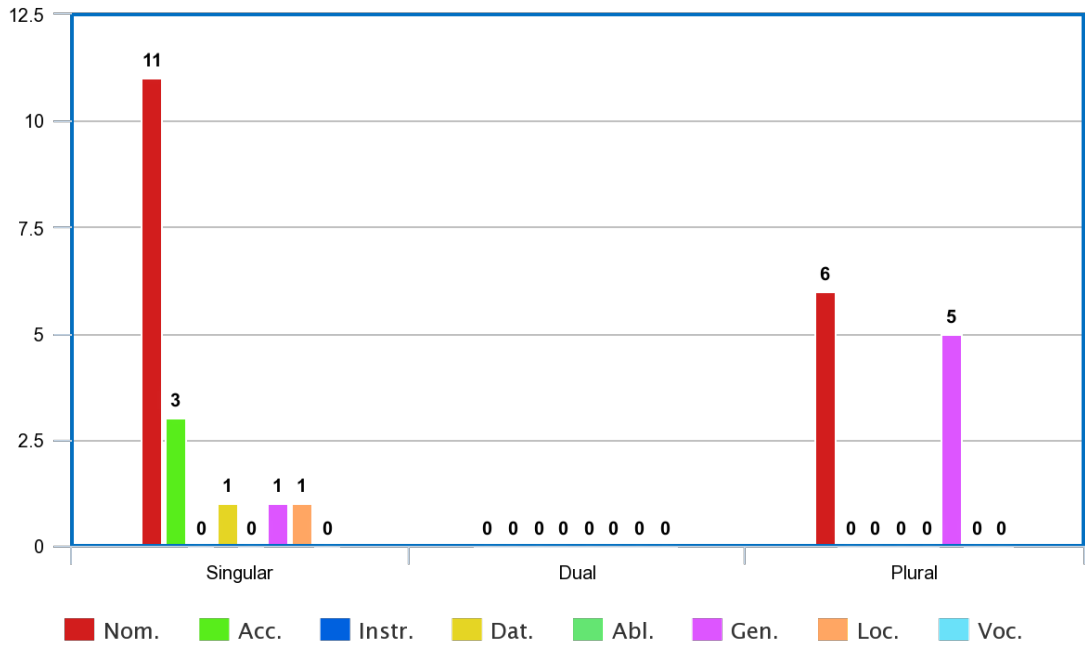


Figure 6.11: Mascl. Sakārānta Vibhakti Distribution

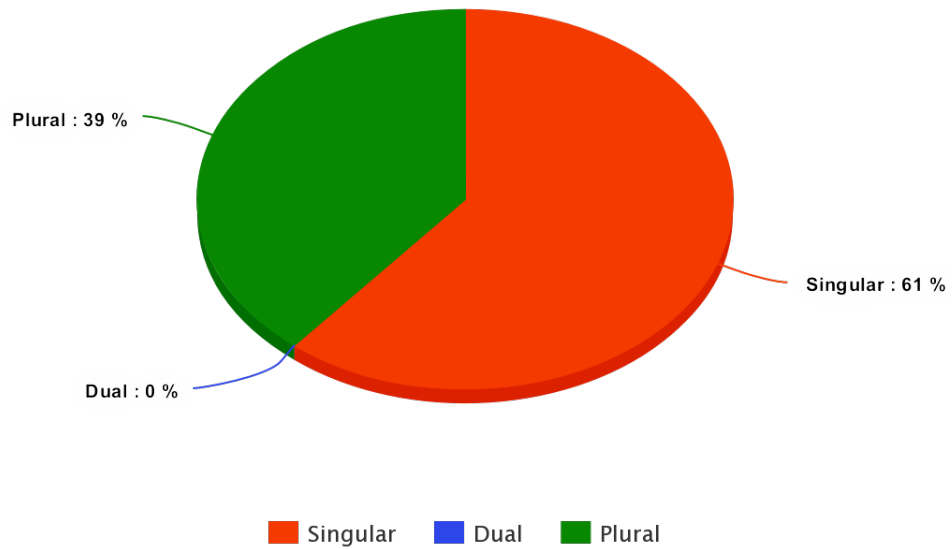


Figure 6.12: Mascl. Sakārānta Percentage Distribution

It is noted from Figure 6.11 that much emphasis is on the nominative case-ending followed by genitive while there are no instrumental and ablative case-ending words. From Figure 6.12, it is summarised that out of 28 words, around 61% are singular and 39% plural with no instance of dual.

## 7. Ṛkārānta

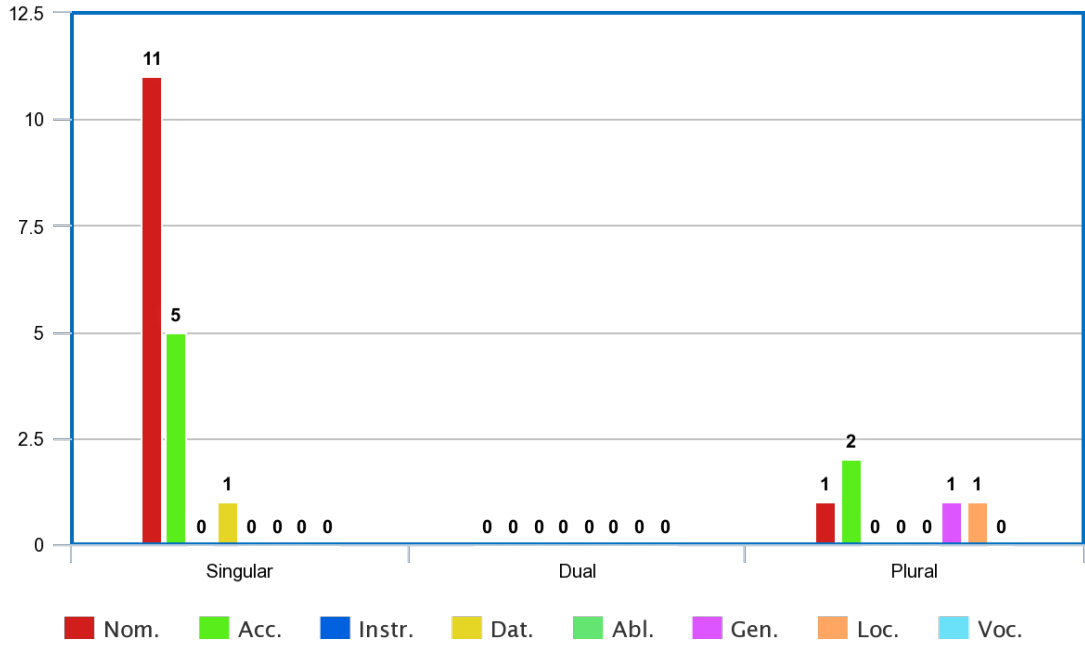


Figure 6.13: Mascl. Ṛkārānta Vibhakti Distribution

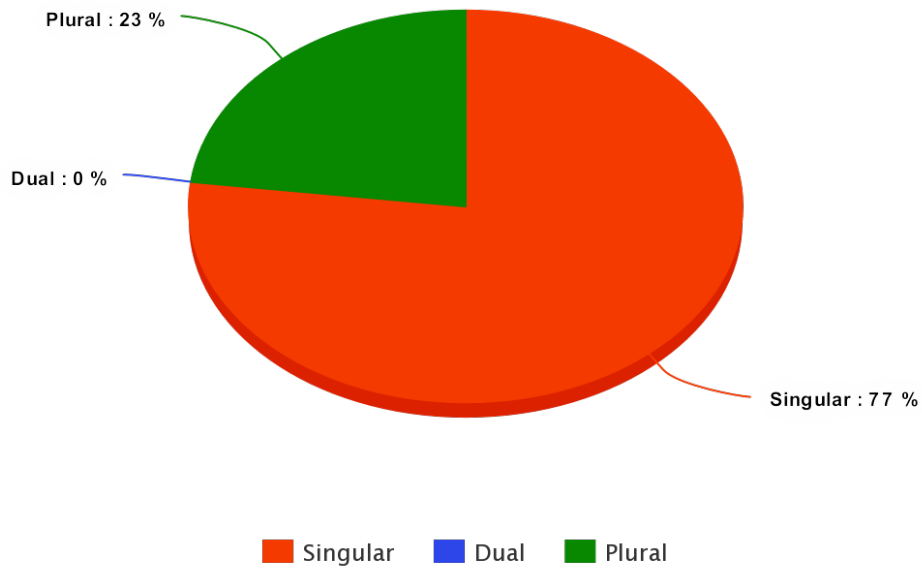


Figure 6.14: Mascl. Ṛkārānta Percentage Distribution

From Figure 6.13, it is noted that much emphasis is on the nominative case-ending followed by accusative while there are no instrumental and ablative case-ending words. From Figure 6.14, it is summarised that out of 22 words, around 77% are singular and 23% plural with no instance of dual.

## 8. Dakārānta

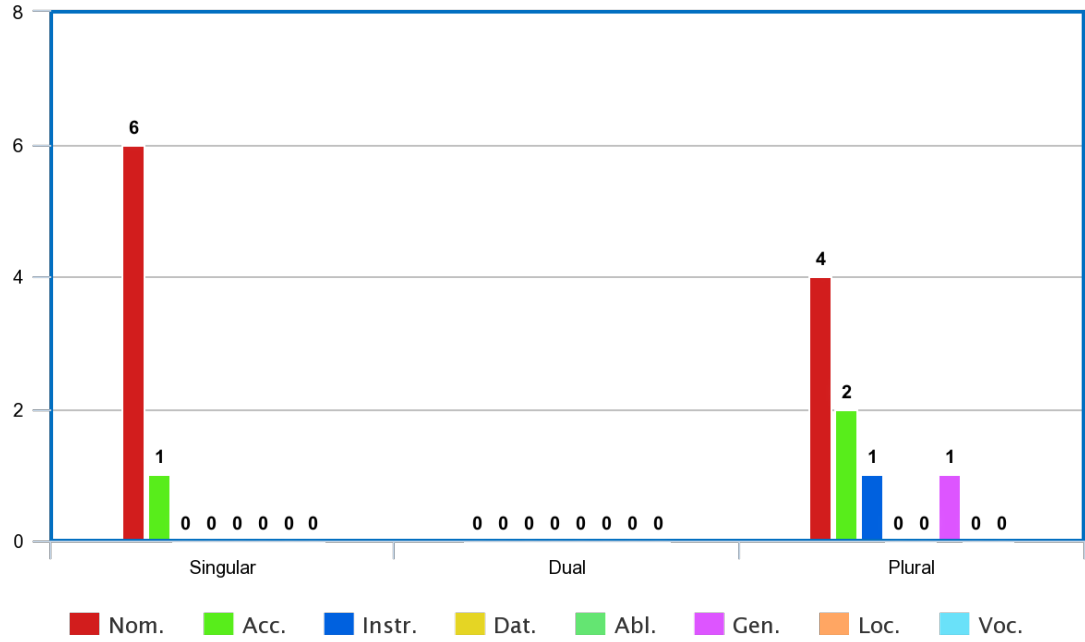


Figure 6.15: Mascl. Dakārānta Vibhakti Distribution

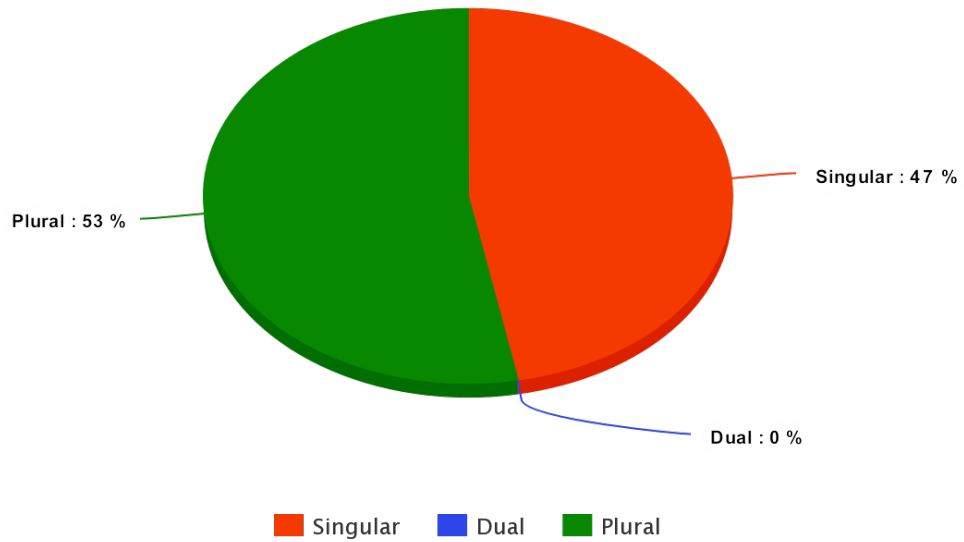


Figure 6.16: Mascl. Dakārānta Percentage Distribution

It is noted from Figure 6.15 that much emphasis is on the nominative case-ending while there are no words with dative, ablative and locative case-endings. From Figure 6.16, it is summarised that out of 15 words, around 47% are singular and 53% plural with no instance of dual.

Masculine words ending in *ī, ā, ś and j* are low-frequency words with count as low as one to four instances. They are shown in Table 6.3.

	Case	Singular	Dual	Plural
<b>īkārānta</b>	nom.	3	0	0
<b>Śakārānta</b>	acc.	1	0	0
	gen.	0	0	1
<b>Jakārānta</b>	nom.	1	0	0

Table 6.3: Masculine-endings

## Neuter

Table 6.4 shows the statistics of neuter gender words (around 729) in BhG.

Ajanta (3)	Freq.	Halanta (4)	Freq.
a	585	s	70
i	1	n	59
u	1	t	11
		d	2
<b>Total</b>	<b>587</b>	<b>Total</b>	<b>142</b>

Table 6.4: Neuter-ending

It is noted from above distribution that majority of words in neuter-ending are *akārānta* (80%) followed by *sakārānta*, *nakārānta*, *takārānta* while *dakārānta*, *ikārānta* and *ukārānta* words are minimum with frequency below ten. Further distribution is made according to *vacana* (number) and *vibhakti* (case-ending) for each neuter gender word.

## 1. Akārānta

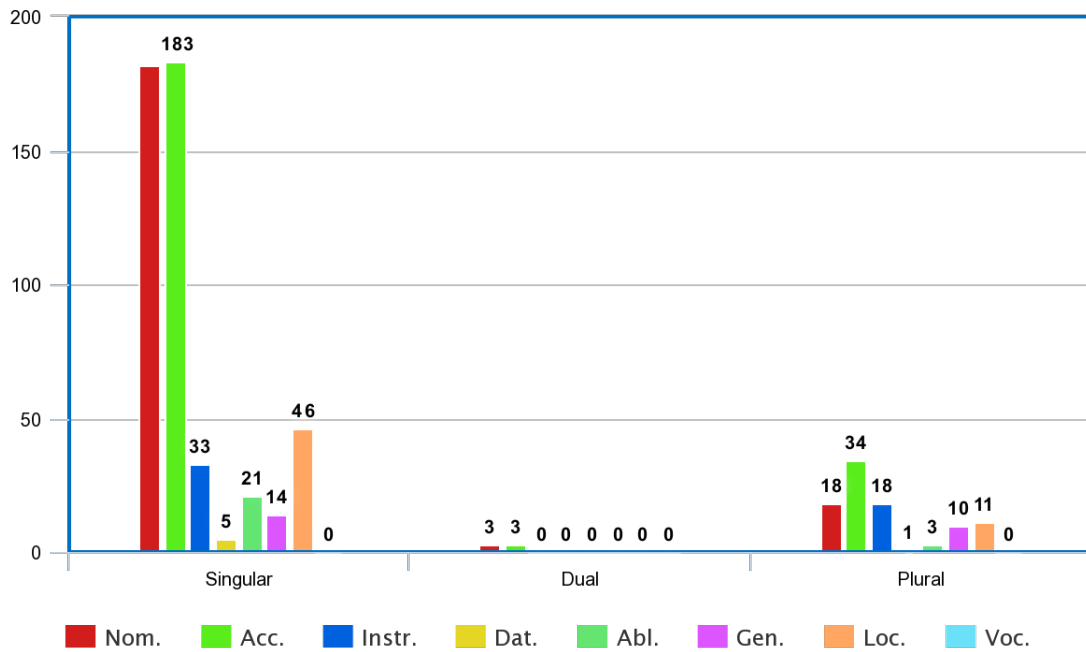


Figure 6.17: Neuter Akārānta Vibhakti Distribution

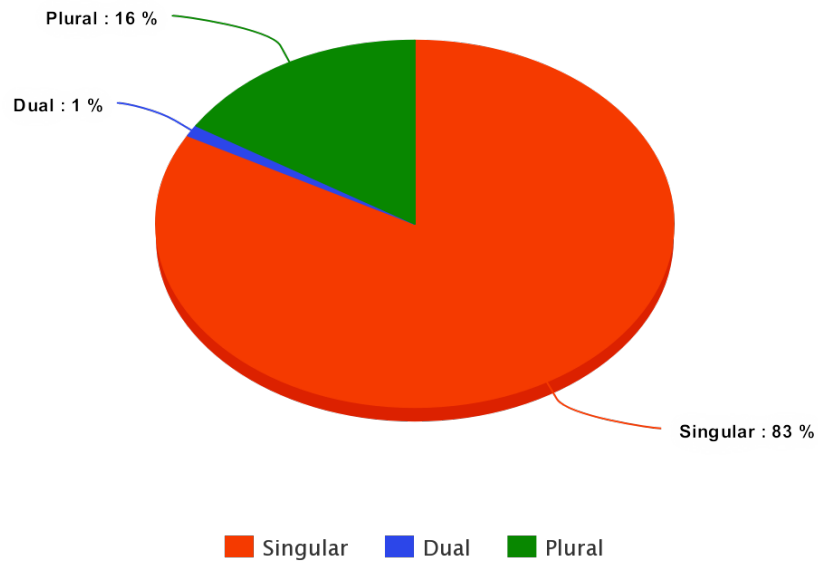


Figure 6.18: Neuter Akārānta Percentage Distribution

From Figure 6.17, it is noted that much emphasis is on the accusative case-ending followed by nominative, locative and instrumental case-endings while dative case-ending is minimum. From Figure 6.18, it is summarised that out of 585 words, around 83% are singular, 16% plural but just one percent are dual.

## 2. Sakārānta

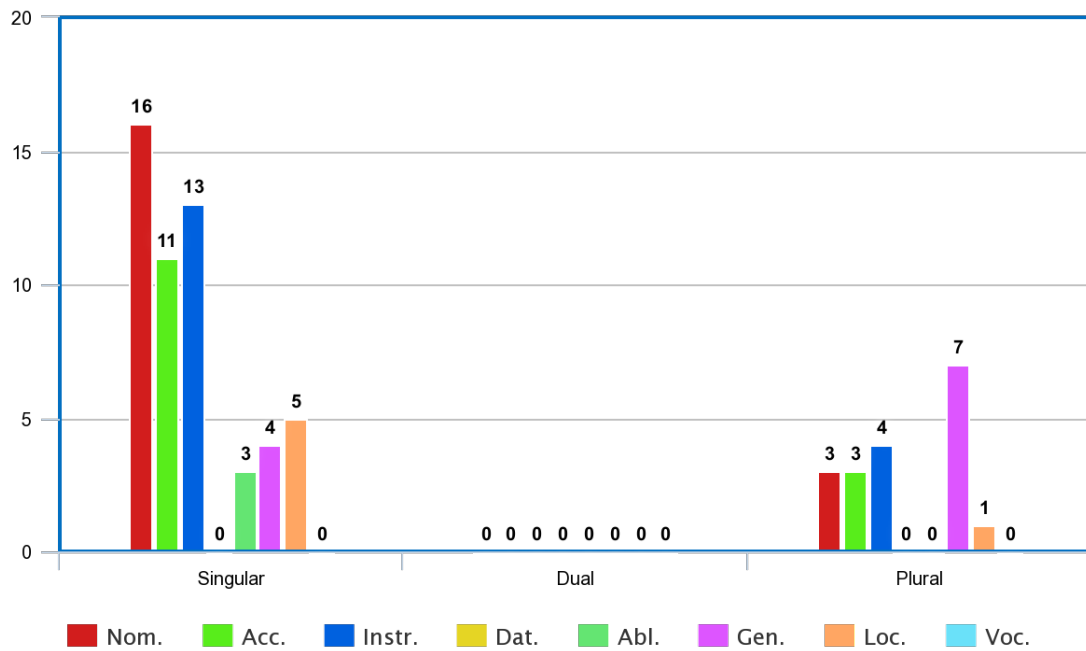


Figure 6.19: Neuter Sakārānta Vibhakti Distribution

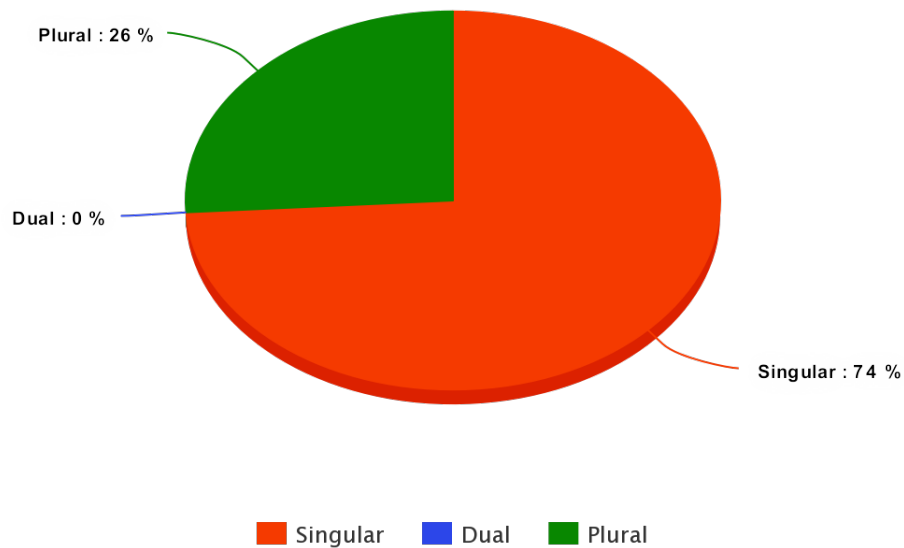


Figure 6.20: Neuter Sakārānta Percentage Distribution

It is noted from Figure 6.19 that much emphasis is on the nominative case-ending followed by instrumental, accusative and genitive case-endings while there is no instance of dative case-ending. From Figure 6.20, it is summarised that out of 70 words, around 74% are singular and 26% plural with no instance of dual.

### 3. Nakārānta

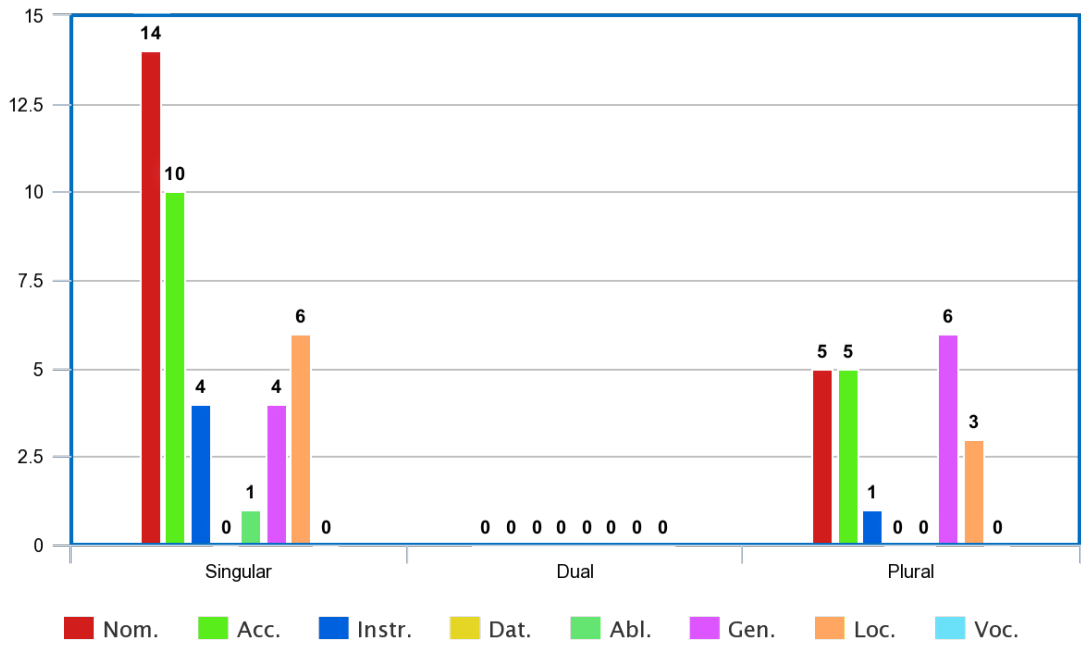


Figure 6.21: Neuter Nakārānta Vibhakti Distribution

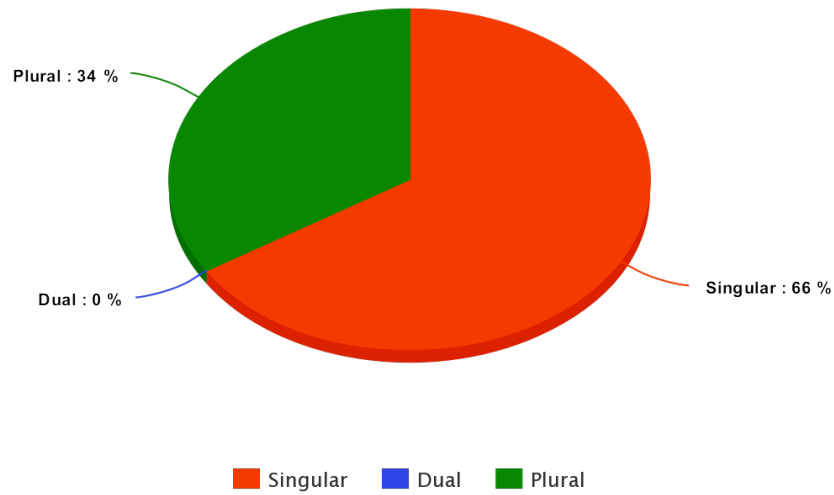


Figure 6.22: Neuter Nakārānta Percentage Distribution

From Figure 6.21, it is noted that much emphasis is on the nominative case-ending followed by accusative, genitive and locative case-endings with only one instance of ablative case-ending while there is no instance of dative case-ending. From Figure 6.22, it is summarised that out of 59 words, around 66% are singular and 34% plural with no instance of dual.

#### 4. Takārānta

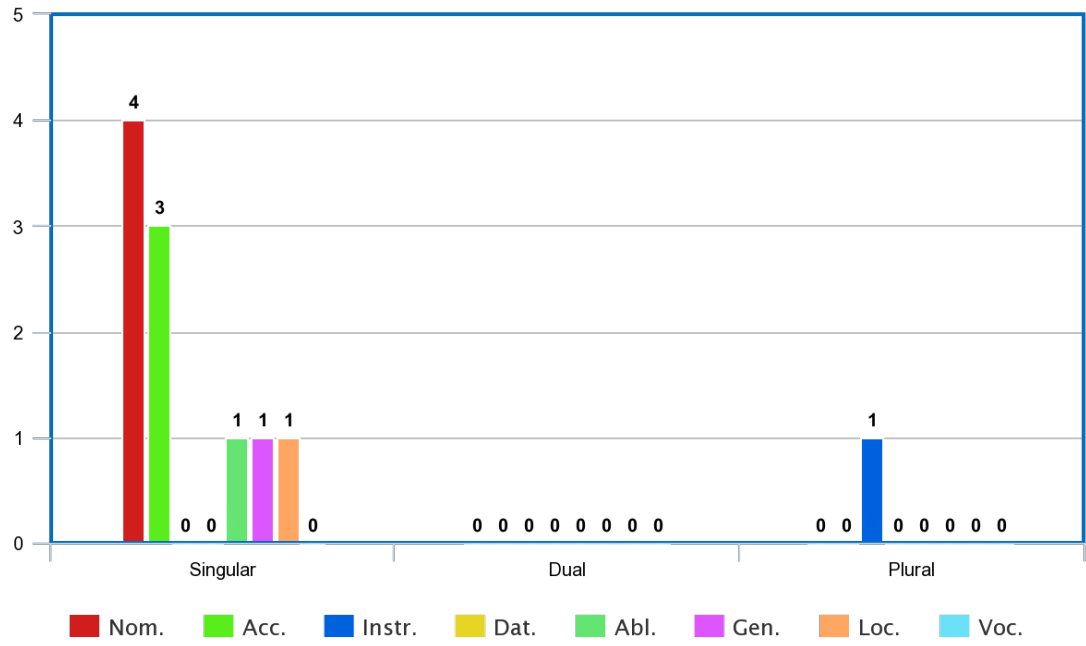


Figure 6.23: Neuter Takārānta Vibhakti Distribution

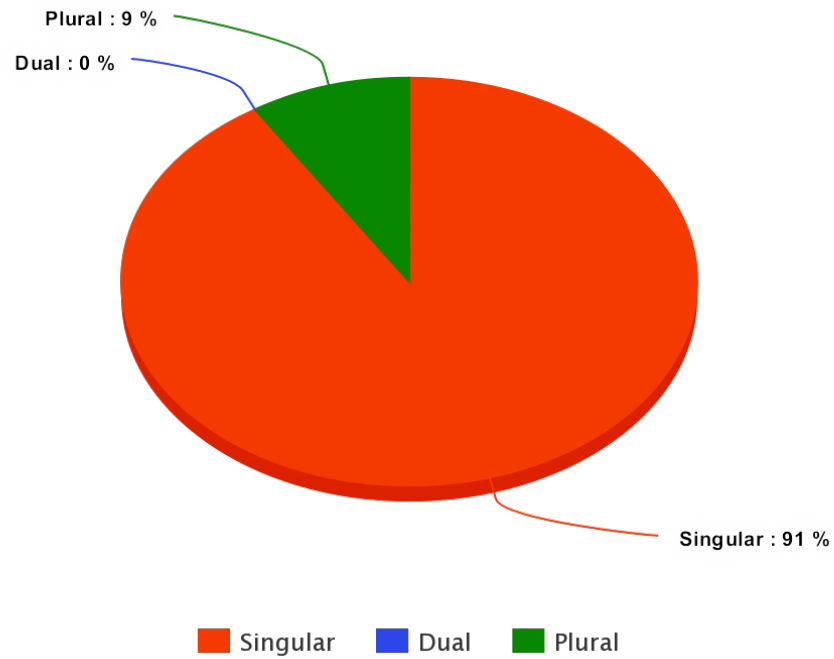


Figure 6.24: Neuter Takārānta Percentage Distribution

It is noted from Figure 6.23 that emphasis is on the nominative case-ending followed by accusative case-ending with no instance of dative case-ending. From

Figure 6.24, it is summarised that out of 11 words, 91% are singular while only 9% are plural with no instance of dual.

The neuter words ending in *d*, *i*, and *u* with frequency less than ten are shown in Table 6.5 below.

	Case	Singular	Dual	Plural
<b>Dakārānta</b>	nom.	1	0	0
	loc.	1	0	0
<b>Ikārānta</b>	nom.	1	0	0
<b>Ukārānta</b>	nom.	1	0	0

Table 6.5: Neuter-endings

### Feminine

Table 6.6 gives the statistics of feminine word forms (around 274) in BhG.

Ajanta (8)	Freq.	Halanta (9)	Freq.
ā	107	s	4
i	102	c	3
ī	35	d	3
ū	3	ś	3
u	2	k	3
o	2	p	2
au	1	dh	1
ṛ	1	r	1
		v	1
<b>Total</b>	<b>253</b>	<b>Total</b>	<b>21</b>

Table 6.6: Feminine-ending

It is noted from above distribution that majority of words in feminine-ending are *ākārānta* (39%) followed by *ikārānta* (37%), *īkārānta* while *sakārānta*, *ūkārānta*, *cakārānta*, *dakārānta*, *śakārānta*, *kakārānta*, *ukārānta*, *okārānta*, *pakārānta*, *aukārānta*, *ṛkārānta*, *dhakārānta*, *rakārānta* and *vakārānta* words are minimum with frequency below ten. Further distribution is made according to *vacana* (number) and *vibhakti* (case-ending) for each feminine word.

## 1. Ākārānta

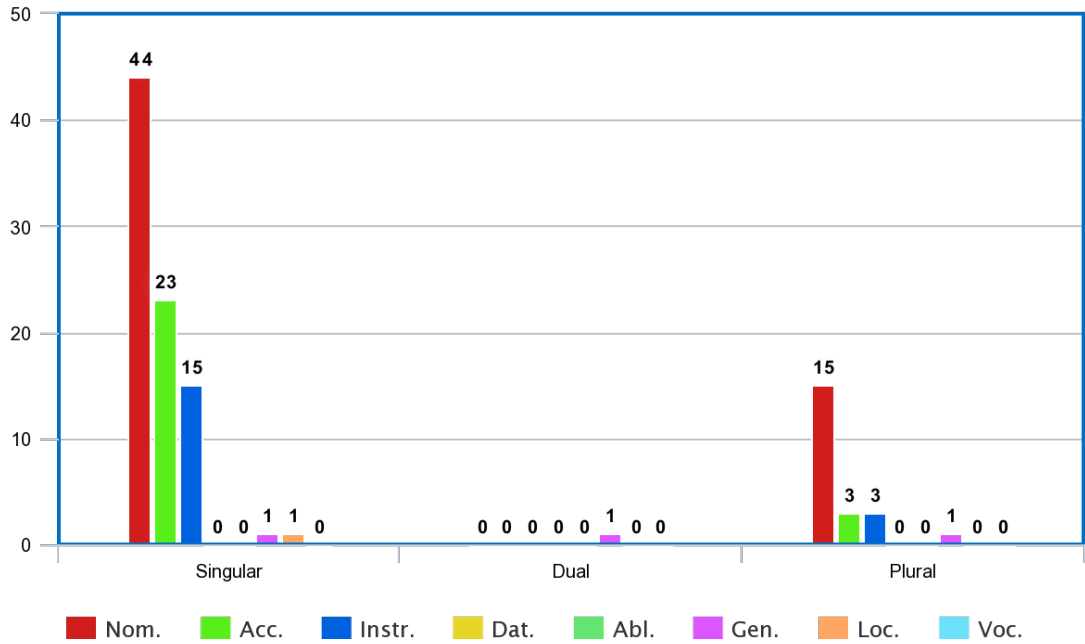


Figure 6.25: Fem. Ākārānta Vibhakti Distribution

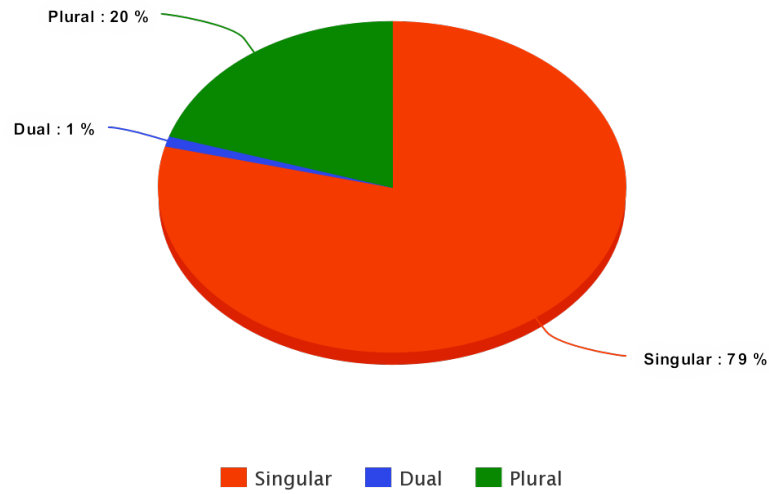


Figure 6.26: Fem. Ākārānta Percentage Distribution

From Figure 6.25, it is noted that much emphasis is on the nominative case-ending followed by accusative and instrumental case-endings while there are no instances dative and ablative case-endings. From Figure 6.26, it is summarised that out of 107 words, around 79% are singular and 20% plural with only one percent dual.

## 2. Ikārānta

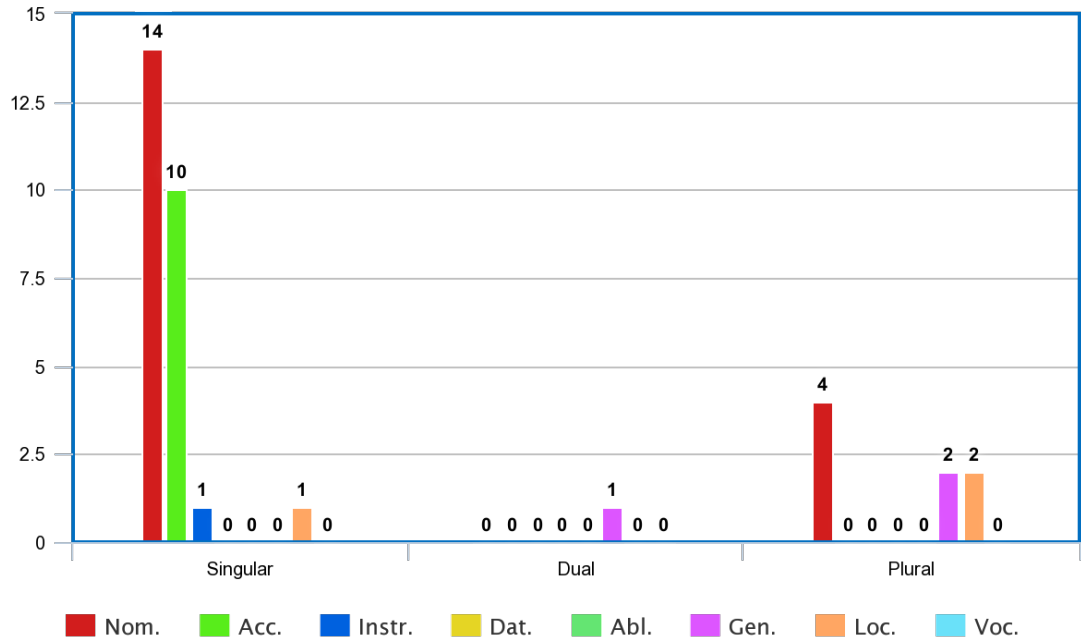


Figure 6.27: Fem. Ikārānta Vibhakti Distribution

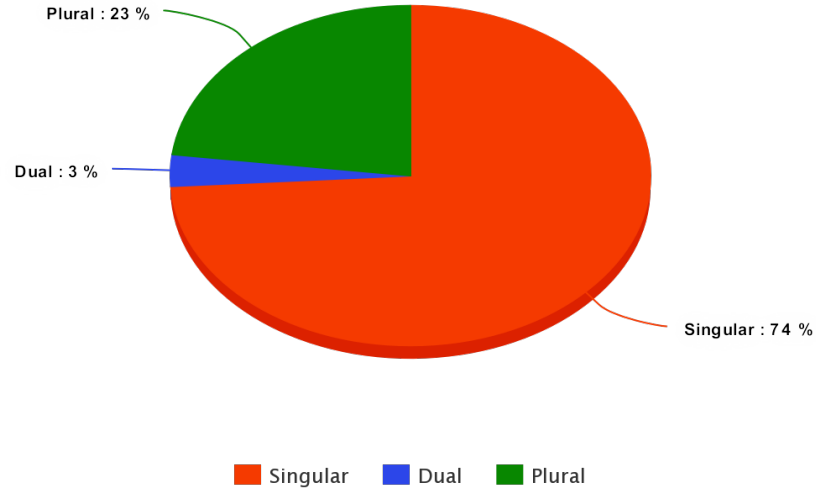


Figure 6.28: Fem. Ikārānta Percentage Distribution

It is noted from Figure 6.27 that much emphasis is on nominative case-ending followed by accusative while other case-endings are minimum. From Figure 6.28, it is summarised that out of 102 words, around 85% are singular and 11% plural with 4% dual.

### 3. Īkārānta

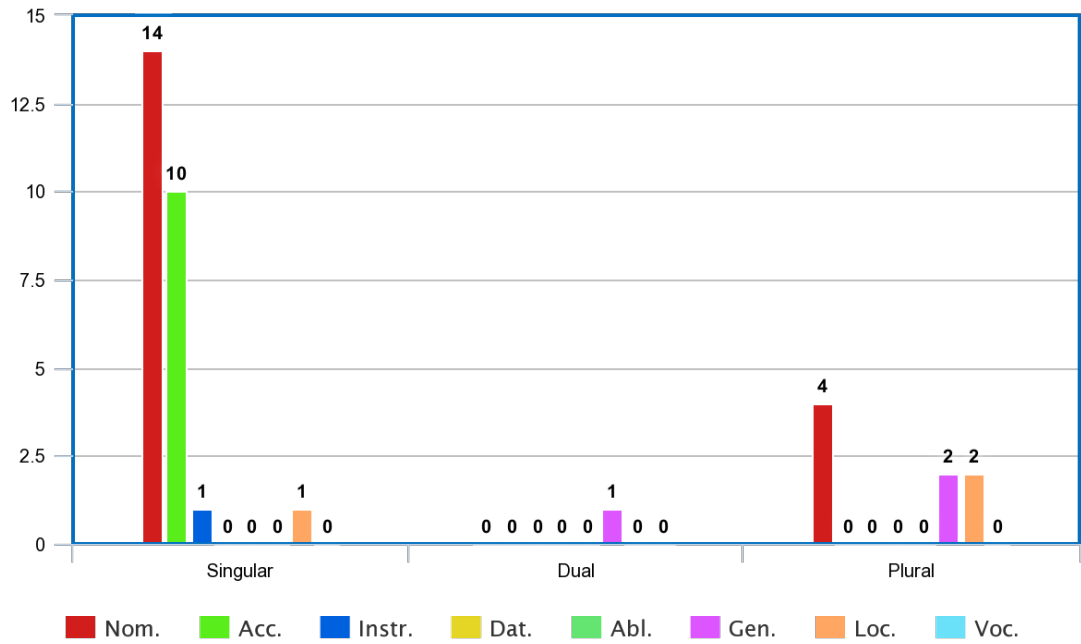


Figure 6.29: Fem. Īkārānta Vibhakti Distribution

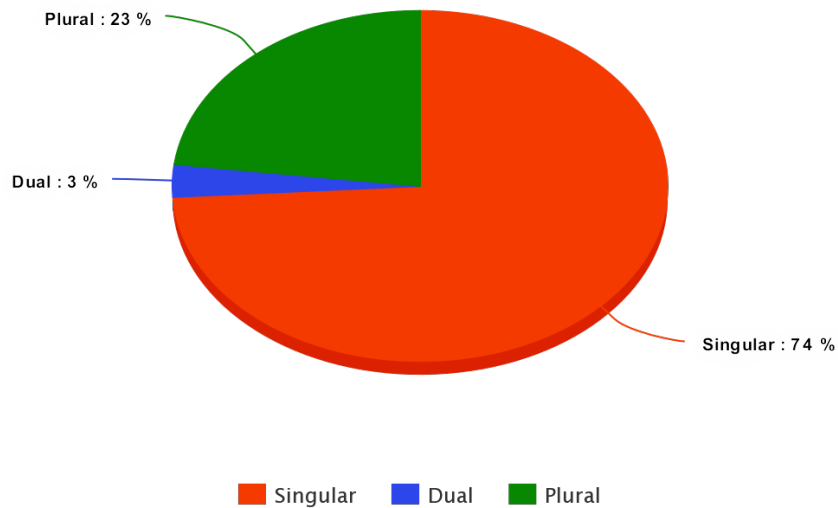


Figure 6.30: Fem. Īkārānta Percentage Distribution

From Figure 6.29, it is noted that emphasis is on the nominative case-ending followed by accusative case-ending while there are no instances of dative and ablative case-endings. From Figure 6.30, it is summarised that out of 35 words, around 74% are singular and 23% plural with three percent dual.

The feminine words ending in *s, ū, c, d, ś, k, u, o, p, au, ri, dh, r* and *v* with frequency less than ten are displayed below in Table 6.7 and Table 6.8:

	Case	Singular	Dual	Plural
<b>Sakārānta</b>	nom.	2	0	1
	gen.	1	0	0
<b>Cakārānta</b>	nom.	2	0	0
	acc.	1	0	0
<b>Ūkārānta</b>	acc.	1	0	0
	gen.	0	1	0
	loc.	1	0	0
<b>Dakārānta</b>	nom.	1	0	0
	acc.	1	0	0
	loc.	1	0	0
<b>Śakārānta</b>	nom.	0	0	1
	acc.	0	0	1
	gen.	1	0	0
<b>Kakārānta</b>	nom.	3	0	0

Table 6.7: Feminine-endings1

	Case	Singular	Dual	Plural
<b>Ukārānta</b>	acc.	1	0	0
	gen.	0	0	1
<b>Okārānta</b>	acc.	1	0	0
	loc.	1	0	0
<b>Pakārānta</b>	nom.	0	0	1
	loc.	0	0	1
<b>Aukārānta</b>	acc.	1	0	0
<b>Ṛkārānta</b>	nom.	1	0	0
<b>Dhakārānta</b>	loc.	1	0	0
<b>Rakārānta</b>	gen.	0	0	1
<b>Vakārānta</b>	loc.	1	0	0

Table 6.8: Feminine-endings2

**Conclusion:** Based on the statistics and *vibhakti* and *percentage* distribution of all three genders, it is summarised as follows:

### 1. Masculine

- (a) Of the 11 word classes mentioned before, eight viz., *akārānta*, *nakārānta*, *ikārānta*, *ukārānta*, *takārānta*, *sakārānta*, *ṛkārānta* and *dakārānta* have majority of instances.
- (b) Majority of words are in singular followed by plural. Dual instances are minimum.
- (c) More emphasis is on *nominative* followed by *accusative and genitive* while *dative and ablative* are minimum or none.

### 2. Neuter

- (a) Of the 7 word classes, four viz., *akārānta*, *sakārānta*, *nakārānta* and *takārānta* have majority of instances.
- (b) Majority of words are in singular followed by plural. Dual instances are minimum.
- (c) More emphasis is on *nominative* followed by *accusative, genitive and instrumental*. Here too *dative and ablative* are minimum or none.

### 3. Feminine

- (a) Of the 17 word classes only three viz., *ākārānta*, *ikārānta* and *īkārānta* have majority of instances.
- (b) Majority of words are in singular followed by plural. Dual instances are minimum.
- (c) More emphasis is on *nominative* followed by *accusative, genitive and locative*. Here too *dative and ablative* are minimum or none.

## 6.2.2 Tiñanta Word Formation

A word ending in a verbal suffix (*tiñ-anta*) is known as *Tiñanta*. There are three broad ways of classifying verbal roots (*dhātus*) viz. *Kartari* (active), *Karmaṇi* (passive) and *Bhāve* (impersonal). The *Dhātupāṭha* has listed a little less than 2000 *dhātus* which are

divided into ten verb-classes known as *Gaṇas*<sup>10</sup>. There are ten *gaṇas* (verb classes) viz. *Bhvādi*, *Adādi*, *Juhotyādi*, *Divādi*, *Svādi*, *Tudādi*, *Rudhādi*, *Tanādi*, *Kryādi* and *Curādi*. Each verbal forms are divided into ten *lakāras* (tenses and moods) namely *laṭ*, *liṭ*, *luṭ*, *lṛṭ*, *loṭ*, *laṇ*, *vidhiliṇ*, *āśīrlīṇ*, *luṇ* and *lṛṇ*<sup>11</sup>, each of which is in three persons viz. first person (*uttama puruṣa*), second person (*madhyama puruṣa*) and third person (*prathama puruṣa*) and three numbers viz. singular (*eka-vacana*), dual (*dvi-vacana*) and plural (*bahu-vacana*). The verbal suffixes of these *lakāras* are classified into different categories based on *parasmaipadī*, *ātmanepadī* and *ubhayapadī*. Kartari prayogas are in *parasmaipadī*, *ātmanepadī* and *ubhayapadī* while Karmaṇi and Bhāve prayogas are always in *ātmanepadī*. The three prayogas are summarized by Figure 6.31.

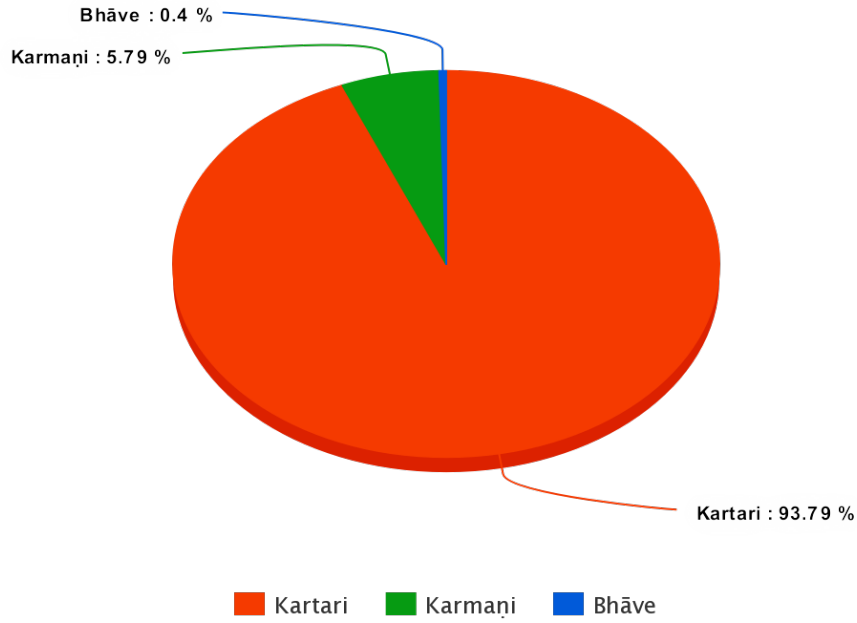


Figure 6.31: Prayoga Distribution

It is noted that maximum instances are in Kartari prayoga (94%) while Karmaṇi prayoga (6%) and Bhāve prayoga (0.4%) have the lowest frequency.

### Kartari Prayoga

In BhG, there are 922 instances of this prayoga. This is summarized in Figure 6.32.

<sup>10</sup> *bhūvādayoḥ dhātavaḥ* – A. 1.3.1

<sup>11</sup> *leṭ* is applied only for the vedas and hence is not included here.

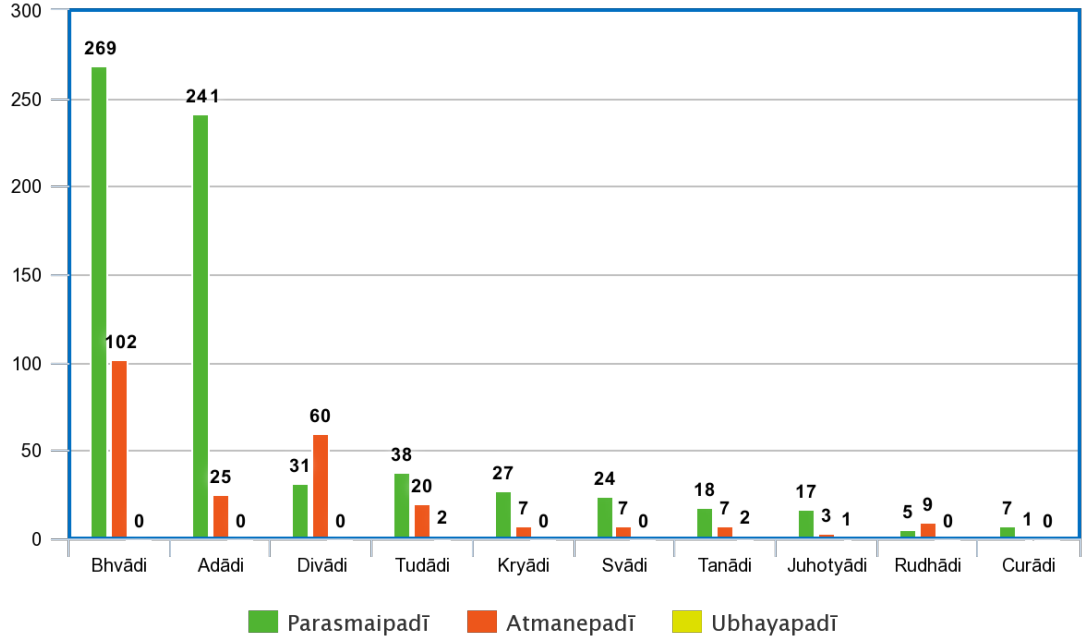


Figure 6.32: Kartari-Gaṇa Distribution

It is noted that Bhvādi and Adādi gaṇas have the maximum frequency while Rudhādi and Curādi gaṇas have the lowest frequency. We discuss below each gaṇa and their lakāra frequency distribution based on *parasmaipadī*, *ātmanepadī* and *ubhayapadī*.

### 1. Bhvādi-gaṇa

This verb class is the most prominent amongst the nine verb classes with around 1059 *dhātus* listed herein. The first dhātu in this class is *bhū* (to be) and hence the name *Bhvādi-gaṇa*. In BhG, there are 66 dhātus of this *gaṇa*. The lakāra frequency distribution is summarized in Figure 6.33.

It has been noted in *parasmaipadī*, of ten lakāras, eight are found while in *ātmanepadī*, six lakāras are found. Highest frequency is in *laṭ-lakāra* followed by *loṭ-lakāra*. Remaining lakāras have low frequency.

It is noted from Table 6.9, in *parasmaipadī* there are many instances of third person singular and plural, followed by first person singular only and second person singular and plural. There are four instances of dual all in third person.

In Table 6.10 in *ātmanepadī*, many instances of third person singular and plural, followed by first person singular only and very few instances of second person singular only are found. There are no instances of dual here.

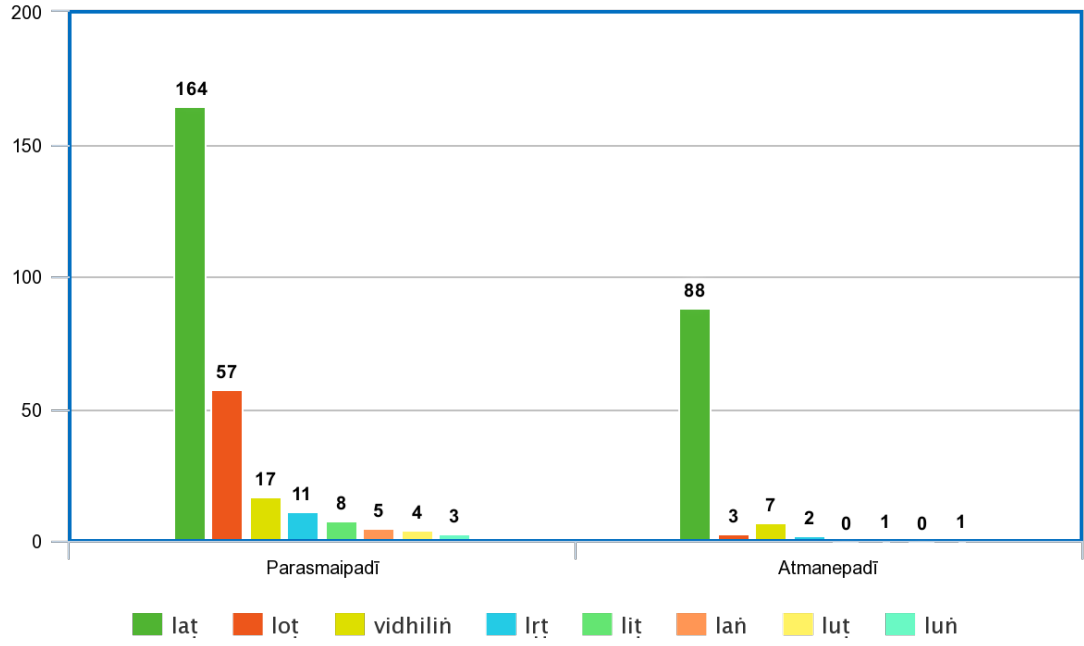


Figure 6.33: Bhvādi-Gaṇa Distribution

Lakāra		Sg.	Dual	Plural
laṭ = 164	First	17	0	1
	Second	13	0	0
	Third	85	2	46
loṭ = 57	First	53	0	1
	Third	0	1	2
vidhiliṅ = 17	First	0	0	1
	Second	0	0	1
	Third	13	0	2
lṛṭ = 11	First	0	0	1
	Second	5	0	0
	Third	3	0	2
liṭ = 8	First	0	0	1
	Third	5	1	1
laṅ = 5	Third	4	0	1
luṭ = 4	Second	2	0	0
	Third	2	0	0
luṅ = 3	First	1	0	0
	Second	2	0	0

Table 6.9: Bhvādi Parasmaipadī

Lakāra		Sg.	Dual	Plural
laṭ = 88	First	7	0	0
	Second	1	0	0
	Third	52	0	28
vidhiliṅ = 7	First	1	0	0
	Third	5	0	1
loṭ = 3	Second	3	0	0
lṛṭ = 2	First	2	0	0
laṅ = 1	Third	1	0	0
luṅ = 1	Second	1	0	0

Table 6.10: Bhvādi Ātmanepadī

## 2. Adādi-gaṇa

The first dhātu in this class is *ad* (to eat) and hence the name *Adādi-gaṇa*. There are around 72 *dhātus* in this class but in BhG there are 16 dhātus of this *gaṇa*. The lakāra frequency distribution is summarized in Figure 6.34.

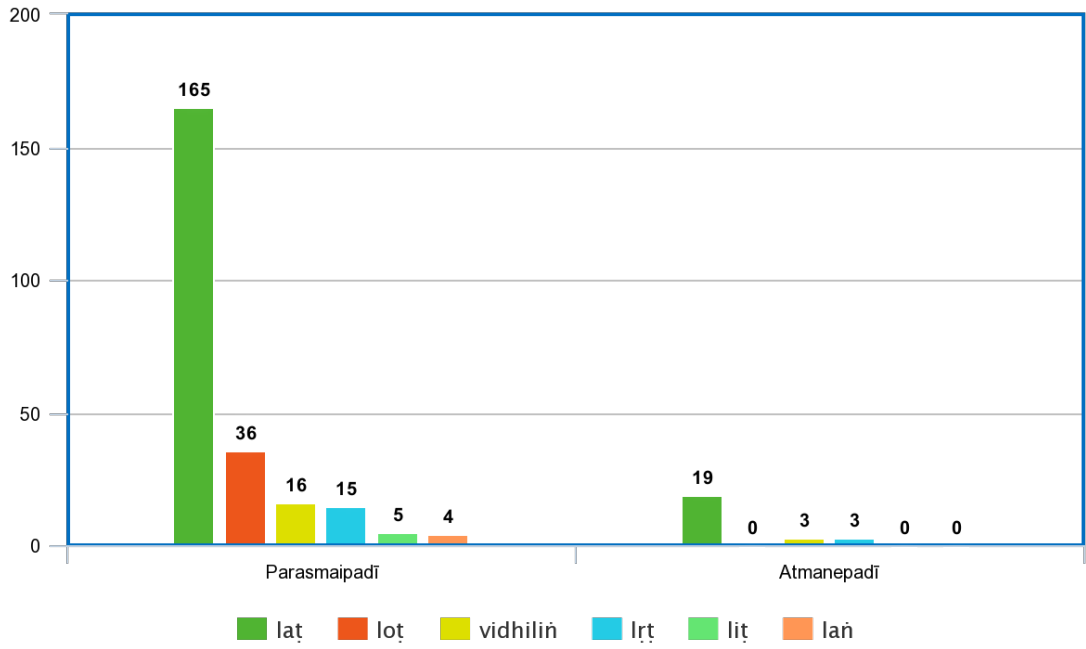


Figure 6.34: Adādi-Gaṇa Distribution

It has been noted in *parasmaipadī*, six lakāras are found while in *ātmanepadī*, three lakāras are found.

Lakāra		Sg.	Dual	Plural
laṭ = 165	First	45	0	1
	Second	19	0	0
	Third	63	0	37
loṭ = 36	Second	31	0	0
	Third	5	0	0
vidhiliṅ = 16	First	4	0	1
	Third	9	0	2
lṛṭ = 15	First	8	0	0
	Second	6	0	0
	Third	1	0	0
liṭ = 5	Third	5	0	0
laṅ = 4	First	1	0	0
	Third	3	0	0

Table 6.11: Adādi Parasmaipadī

In Table 6.11 in *parasmaipadī* many instances of third person singular and plural followed by second person singular only and first person singular and plural are found. There is no instance of dual.

Lakāra		Sg.	Dual	Plural
laṭ = 19	Third	7	0	12
vidhiliṅ = 3	Third	3	0	0
lṛṭ = 3	First	2	0	0
	Third	1	0	0

Table 6.12: Adādi Ātmanepadī

In Table 6.12 in *ātmanepadī*, many instances of third person singular and plural are found and only two instances of first person singular are found. There are no cases of second person and dual.

### 3. Divādi-gaṇa

The first dhātu in this class is *div* (to play, etc.) and hence the name *Divādi-gaṇa*. There are around 137 *dhātus* in this class but in BhG there are 16 *dhātus*. The lakāra frequency distribution is summarized in Figure 6.35.

It has been noted in *parasmaipadī* and *ātmanepadī*, four lakāras each are found.

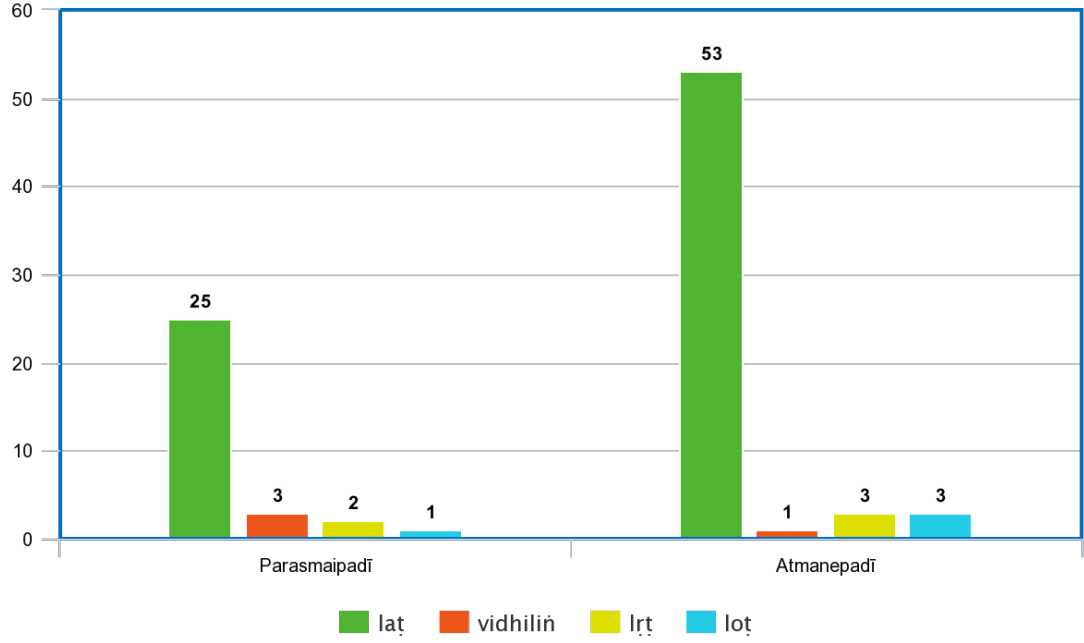


Figure 6.35: Divādi-Gaṇa Distribution

Lakāra		Sg.	Dual	Plural
laṭ = 25	First	4	0	0
	Second	1	0	0
	Third	15	0	5
vidhiliṇ = 3	Third	3	0	0
lṛṭ = 2	First	1	0	0
	Second	1	0	0
loṭ = 1	Second	1	0	0

Table 6.13: Divādi Parasmaipadī

In Table 6.13 in *parasmaipadī* most instances are of third person singular and plural, followed by few instances of first person singular only and three instances of second person singular. There is no instance of dual.

Lakāra		Sg.	Dual	Plural
laṭ = 53	First	3	0	0
	Second	3	0	0
	Third	38	0	9
lṛṭ = 3	First	2	0	0
	Third	0	0	1
loṭ = 3	Second	3	0	0
vidhiliṇ = 1	Third	1	0	0

Table 6.14: Divādi Ātmanepadī

In Table 6.14 in *ātmanepadī*, most frequent instances are of third person singular and plural, with few instances of second person singular and first person singular. Here too, there is no instance of dual.

#### 4. Tudādi-gaṇa

The first dhātu in this class is *tud* (to inflict pain) and hence the name *Tudādi-gaṇa*. There are around 143 *dhātus* in this class but in BhG there are 13 *dhātus*. The lakāra frequency distribution is summarized in Figure 6.36.

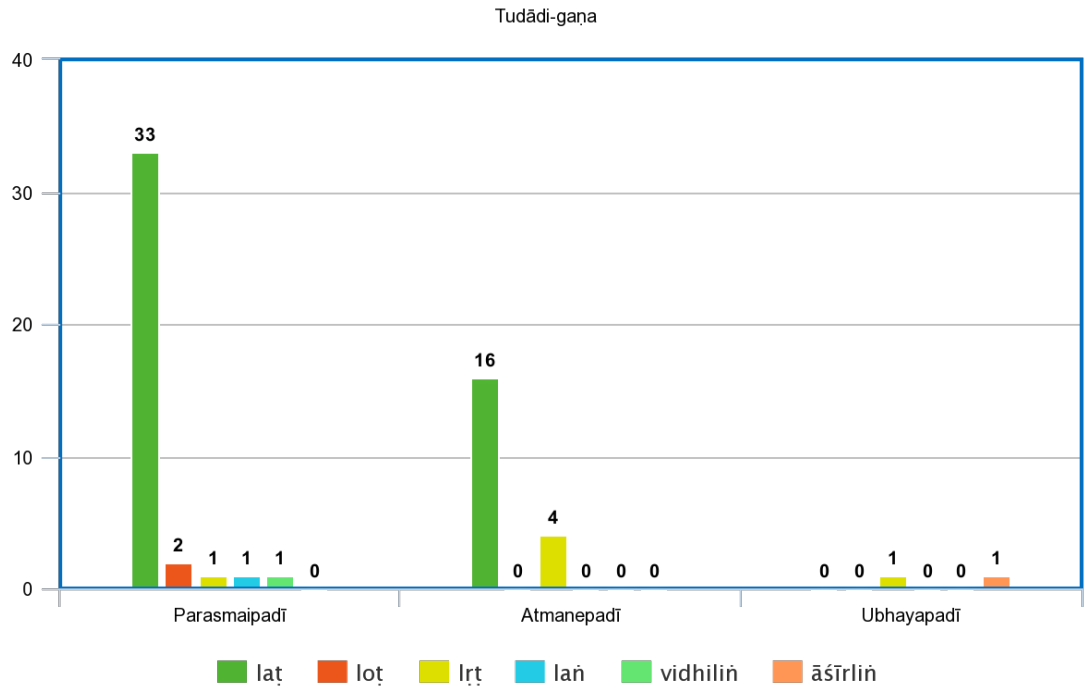


Figure 6.36: Tudādi-Gaṇa Distribution

It has been noted in *parasmaipadī*, five lakāras are found and in *ātmanepadī* just two lakāras are found.

Lakāra		Sg.	Dual	Plural
laṭ = 33	First	12	0	0
	Second	3	0	0
	Third	8	0	10
loṭ = 2	Second	2	0	0
lṛṭ = 1	First	1	0	0
lañ = 1	Third	1	0	0
vidhiliñ = 1	Third	1	0	0

Table 6.15: Tudādi Parasmaipadī

In Table 6.15 in *parasmaipadī* maximum instances of first person singular are found followed by third person singular and plural and few instances of second person singular. There is no instance of dual.

Lakāra		Sg.	Dual	Plural
laṭ = 16	Third	13	0	3
lṛṭ = 4	Second	4	0	0

Table 6.16: Tudādi Ātmanepadī

In Table 6.16 in *ātmanepadī*, there are two lakāras with more instances of third person singular and plural and only four instances of second person singular. Here too, there is no instance of dual.

In *ubhayapadī*, two lakāras are found. One instance of lṛṭ-lakāra in third person plural and one of āśīrliṅ-lakāra in third person singular is found.

## 5. Kryādi-gaṇa

The first dhātu in this class is *krī* (to purchase) and hence the name *Kryādi-gaṇa*. There are around 61 *dhātus* in this class but in BhG there are 7 *dhātus*. The lakāra frequency distribution is summarized in Figure 6.37.

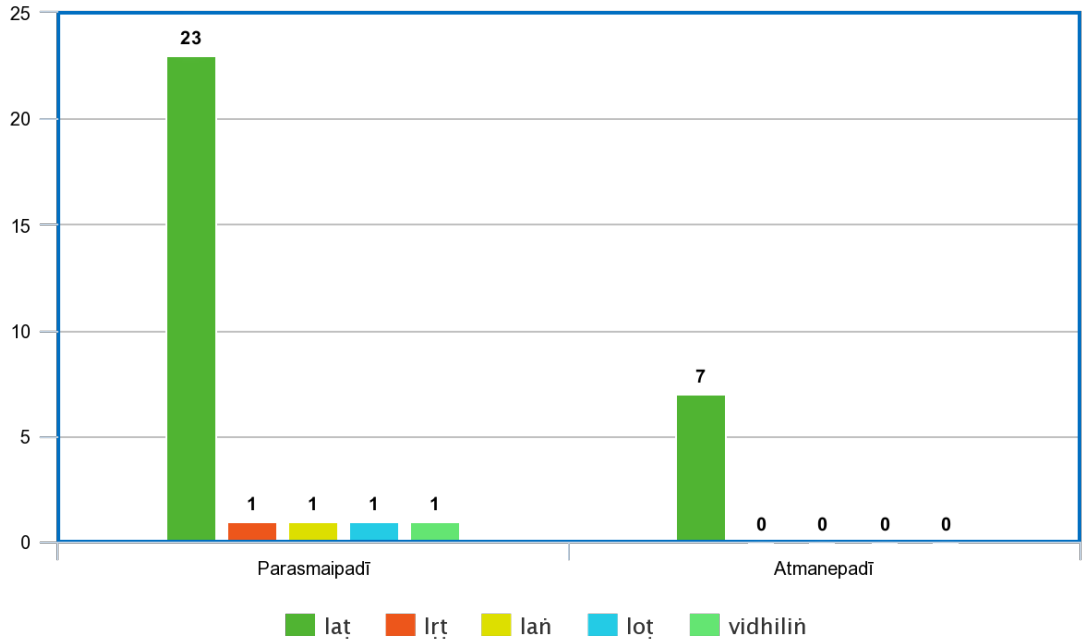


Figure 6.37: Kryādi-Gaṇa Distribution

It has been noted in *parasmaipadī*, five lakāras are found while in *ātmanepadī* just one lakāra i.e. laṭ-lakāra is found.

Lakāra		Sg.	Dual	Plural
laṭ = 23	First	4	0	0
	Second	1	0	0
	Third	10	1	7
lṛṭ = 1	Second	1	0	0
lañ = 1	Third	1	0	0
loṭ = 1	Second	1	0	0
vidhiliñ = 1	First	1	0	0

Table 6.17: Kryādi Parasmaipadī

In Table 6.17 in *parasmaipadī* frequent instances of third person singular and plural are found followed by first person singular and second person singular. There is just one instance of dual found in third person.

In *ātmanepadī*, there are seven instances in laṭ-lakāra, two in first person singular and five in third person singular.

## 6. Svādi-gaṇa

The first dhātu in this class is *su* (to extract juice) and hence the name *Svādi-gaṇa*. There are around 34 *dhātus* in this class but in BhG there are 5 *dhātus*. The lakāra frequency distribution is summarized in Figure 6.38.

It has been noted in *parasmaipadī*, three lakāras are found and in *ātmanepadī* two lakāras are found.

Lakāra		Sg.	Dual	Plural
laṭ = 15	First	1	0	0
	Second	2	0	0
	Third	10	0	2
lṛṭ = 7	Second	6	0	1
vidhiliñ = 2	First	1	0	0
	Third	1	0	0

Table 6.18: Svādi Parasmaipadī

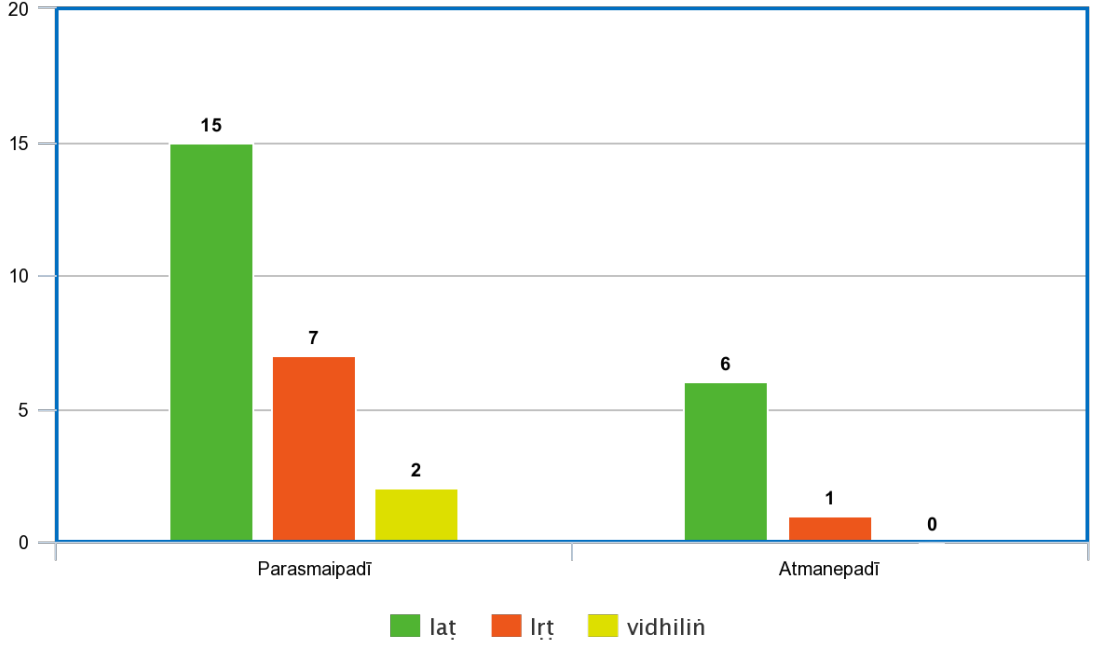


Figure 6.38: Svādi-Gaṇa Distribution

In Table 6.18 in *parasmaipadī* most instances of third person singular and plural are found followed closely by second person singular and plural. There are two instances of first person singular only with no instance of dual.

Lakāra		Sg.	Dual	Plural
laṭ = 6	Third	6	0	0
lṛṭ = 1	Second	0	0	1

Table 6.19: Svādi Ātmanepadī

In Table 6.19 in *ātmanepadī*, six instances of third person singular and just one instance of second person plural is found.

## 7. Tanādi-gaṇa

The first dhātu in this class is *tan* (to spread) and hence the name *Tanādi-gaṇa*. There are around 10 *dhātus* in this class but in BhG there is just one *dhātu*. The lakāra frequency distribution is summarized in Figure 6.39.

It has been noted in *parasmaipadī* and *ātmanepadī*, four lakāras each are found.

In Table 6.20 in *parasmaipadī* most frequent instances are of second person singular followed closely by third person singular and plural. There are just two instances of first person singular. There is no instance of dual.

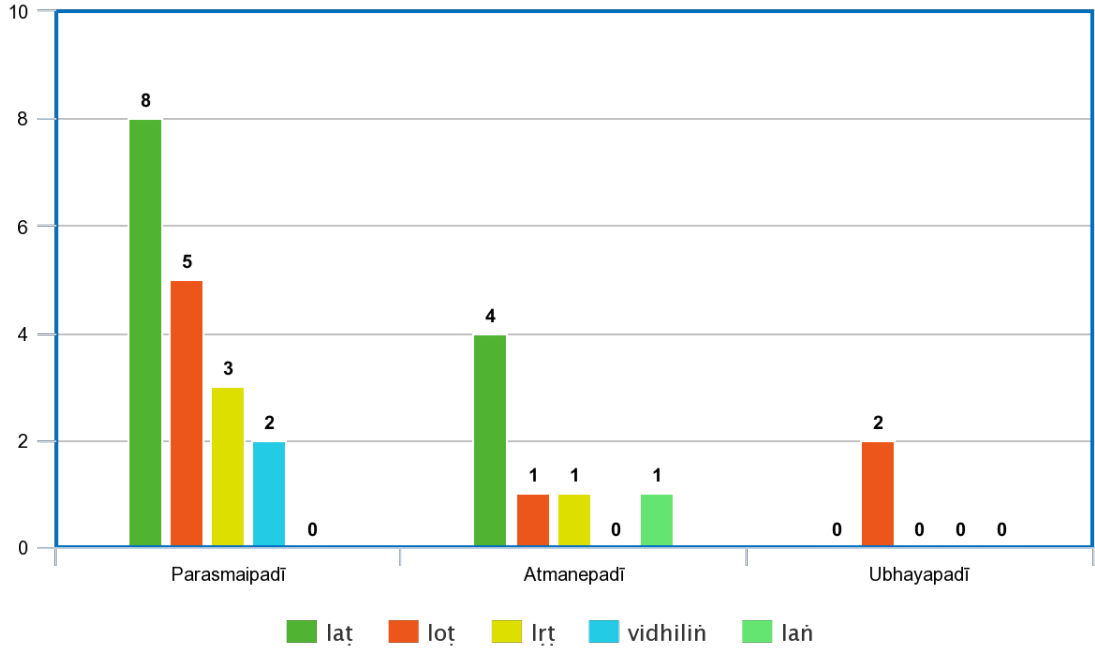


Figure 6.39: Tanādi-Gaṇa Distribution

Lakāra		Sg.	Dual	Plural
laṭ = 8	First	1	0	0
	Second	1	0	0
	Third	4	0	2
loṭ = 5	Second	5	0	0
lṛṭ = 3	Second	2	0	0
	Third	1	0	0
vidhiliṇ = 2	First	1	0	0
	Third	1	0	0

Table 6.20: Tanādi Parasmaipadī

In *ubhayapadī* only loṭ-lakāra is found with two instances in second person singular.

Lakāra		Sg.	Dual	Plural
laṭ = 4	Third	4	0	0
loṭ = 1	Second	1	0	0
lṛṭ = 1	First	1	0	0
laṇ = 1	Third	0	0	1

Table 6.21: Tanādi Ātmanepadī

In Table 6.21 in *ātmanepadī* more instances are of third person singular and plural while just one instance each is of first person singular and second person singular. Here too, there is no instance of dual. Similarly in *ubhayapadī*, just one instance of second person singular is found in *loṭ-lakāra*.

## 8. Juhotyādi-gaṇa

The first dhātu in this class is *hu* (to sacrifice) and hence the name *Juhotyādi-gaṇa*. There are around 25 *dhātus* in this class but in BhG there are five *dhātus*. The lakāra frequency distribution is summarized in Figure 6.40.

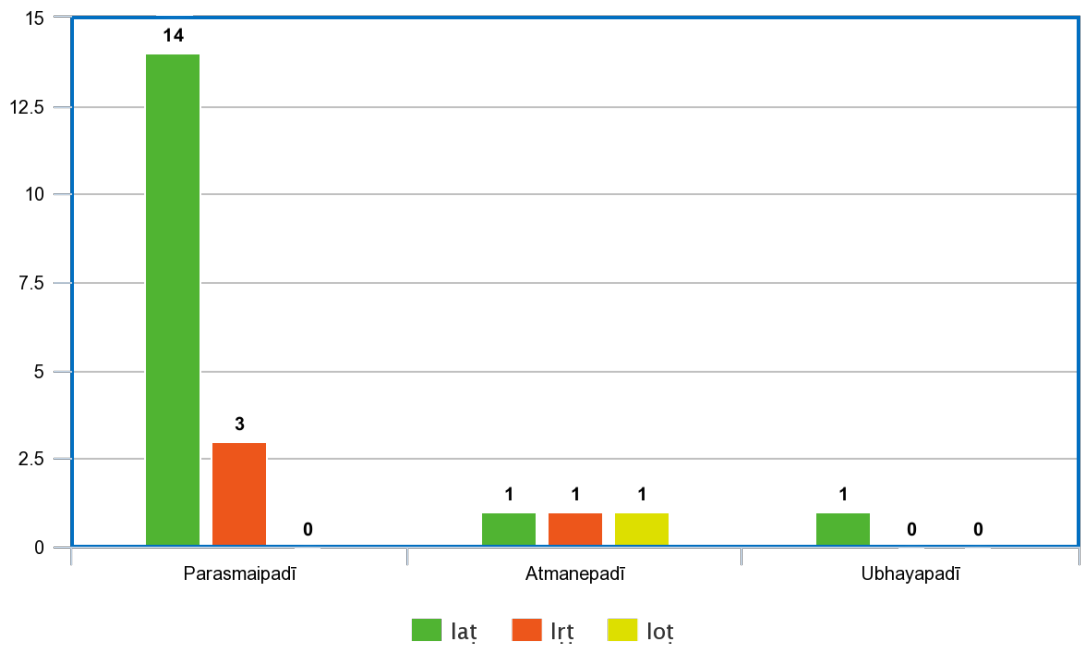


Figure 6.40: Juhotyādi-Gaṇa Distribution

It has been noted in *parasmaipadī*, only two lakāras are found while in *ātmanepadī*, three lakāras are found.

Lakāra		Sg.	Dual	Plural
laṭ = 14	First	3	0	0
	Second	2	0	0
	Third	3	0	6
lṛṭ = 3	First	1	0	0
	Second	1	0	0
	Third	1	0	0

Table 6.22: Juhotyādi Parasmaipadī

In Table 6.22 in *parasmaipadī* more instances are in third person singular and plural followed closely by first person singular and only three instances of second person singular are found. There is no instance of dual.

Lakāra		Sg.	Dual	Plural
laṭ = 1	Third	1	0	0
lṛṭ = 1	Third	0	0	1
loṭ = 1	Second	1	0	0

Table 6.23: Juhotyādi Ātmanepadī

In Table 6.23 in *ātmanepadī*, two instances are of third person singular and plural and just instance is of second person singular. There are no instances of third person or dual.

In *ubhayapadī*, only laṭ-lakāra is found in first person singular.

## 9. Rudhādi-gaṇa

The first dhātu in this class is *rudh* (to obstruct) and hence the name *Rudhādi-gaṇa*. There are around 25 *dhātus* in this class but in BhG there are six *dhātus*. The lakāra frequency distribution is summarized in Figure 6.41.

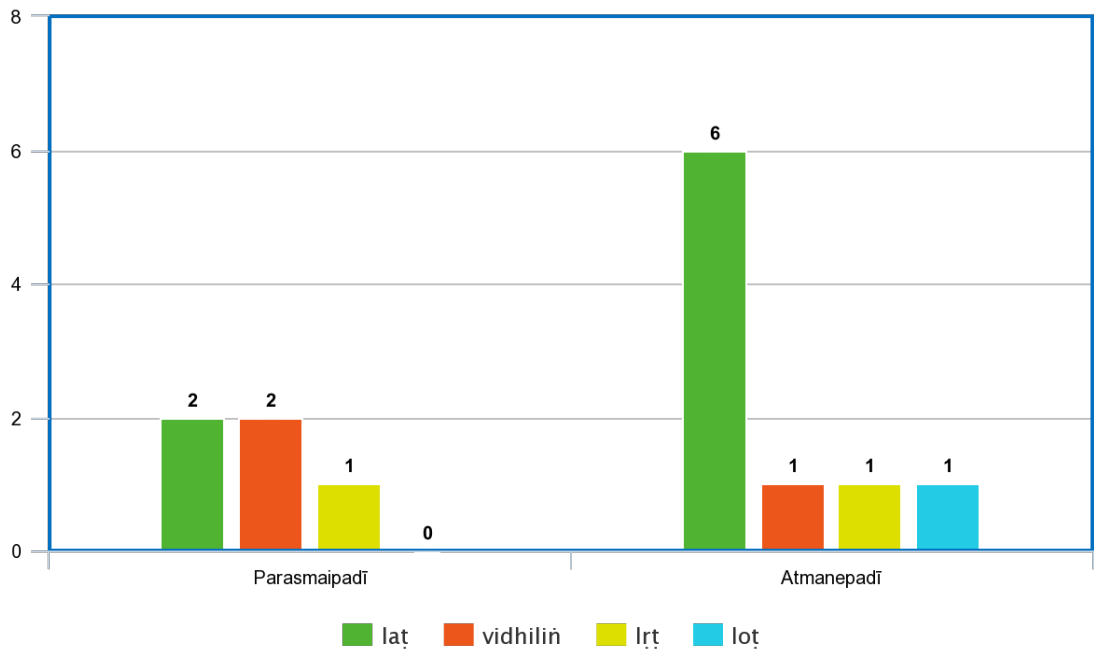


Figure 6.41: Rudhādi-Gaṇa Distribution

It has been noted in *parasmaipadī*, two lakāras are found and in *ātmanepadī*, four lakāras are found.

Lakāra		Sg.	Dual	Plural
laṭ = 2	Third	1	0	1
vidhiliṇ = 2	Third	2	0	0
lṛṭ = 1	Third	1	0	0

Table 6.24: Rudhādi Parasmaipadī

In Table 6.24 in *parasmaipadī* all five instances are of third person singular and plural. There is no instance of dual.

Lakāra		Sg.	Dual	Plural
laṭ = 6	Third	5	0	1
vidhiliṇ = 1	First	1	0	0
lṛṭ = 1	Second	1	0	0
loṭ = 1	Second	1	0	0

Table 6.25: Rudhādi Ātmanepadī

In Table 6.25 in *ātmanepadī*, five instances of third person singular and plural and two of second person singular are found. There is just one instance first person singular. Here too, there is no instance of dual.

#### 10. Curādi-gaṇa

The first dhātu in this class is *cur* (to steal) and hence the name *Curādi-gaṇa*. There are around 394 *dhātus* in this class but in BhG there are five *dhātus*. The lakāra frequency distribution is summarized in Figure 6.42.

It has been noted in *parasmaipadī*, four lakāras are found while in *ātmanepadī*, only laṭ-lakāra is found.

Lakāra		Sg.	Dual	Plural
lṛṭ = 2	First	1	0	0
	Third	0	0	1
vidhiliṇ = 2	Third	2	0	0
laṭ = 1	Second	1	0	0
loṭ = 1	Second	1	0	0

Table 6.26: Curādi Parasmaipadī

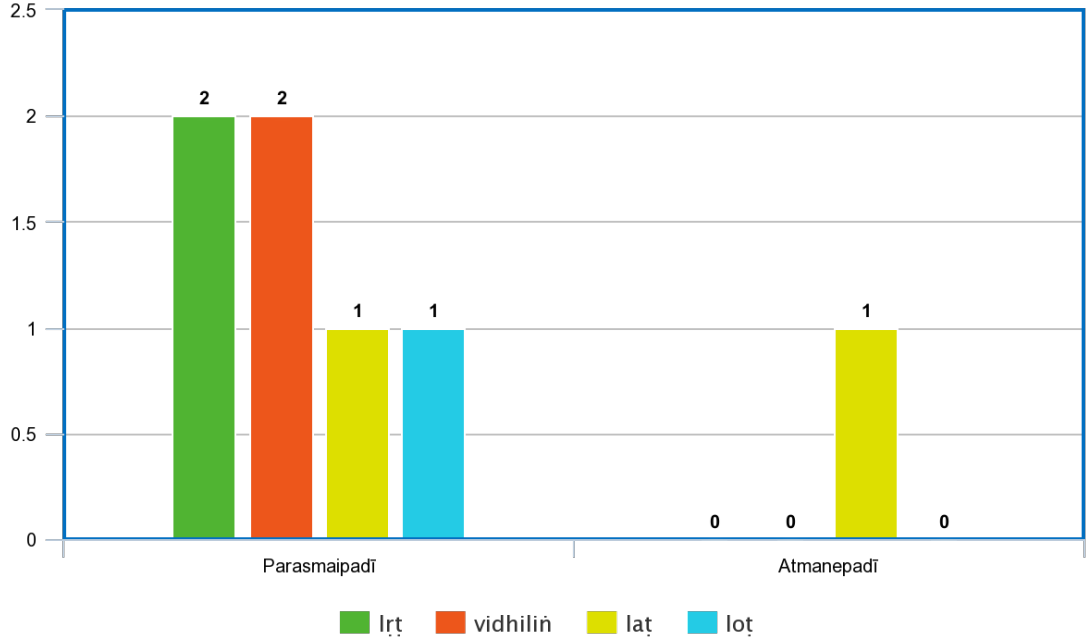


Figure 6.42: Curādi-Gaṇa Distribution

In Table 6.26 in *parasmaipadī*, three instances are of third person singular and plural and two instances are of second person singular. There is just one instance of first person singular and no instance of dual.

In *ātmanepadī*, only *laṭ-lakāra* is used in third person plural.

#### Overall Observation:

Going through the gaṇa distribution in *kartari* prayoga it has been observed that:

- *Ubhayapadī* was found only in three gaṇas viz. *Tudādi*, *Tanādi* and *Juhotyādi*.
- Leaving aside *Bhvādi* and *Adādi* gaṇas, all eight gaṇas have most frequent instances of *laṭ-lakāra* followed by *lṛṭ*, *loṭ* and *vidhiliṇ* and few instances of *laṇ*. *Bhvādi* and *Adādi* gaṇas have *laṭ-lakāra* followed by *loṭ-lakāra*.
- Only one instance of *āśirliṇ-lakāra* is found in *Tudādi* gaṇa only.
- Dual instances are found only in *Bhvādi* and *Kryādi* gaṇas with only five instances.
- Most frequent usage is in third person singular and plural followed by second person singular and first person singular and plural. There are only three instances of second person plural.

### Conclusion:

Based on the above observations, it can be concluded that one needs to concentrate only on:

1. The forms of laṭ-lakāra followed by lṛṭ, loṭ and vidhiliṇ.
2. It is essential to study forms in third person singular and plural followed by second person singular and first person singular and plural.
3. The study of dual forms could be set aside for later stage.

### Karmaṇi Prayoga

In BhG, there are only 57 instances of this prayoga. This is summarized in Figure 6.43.

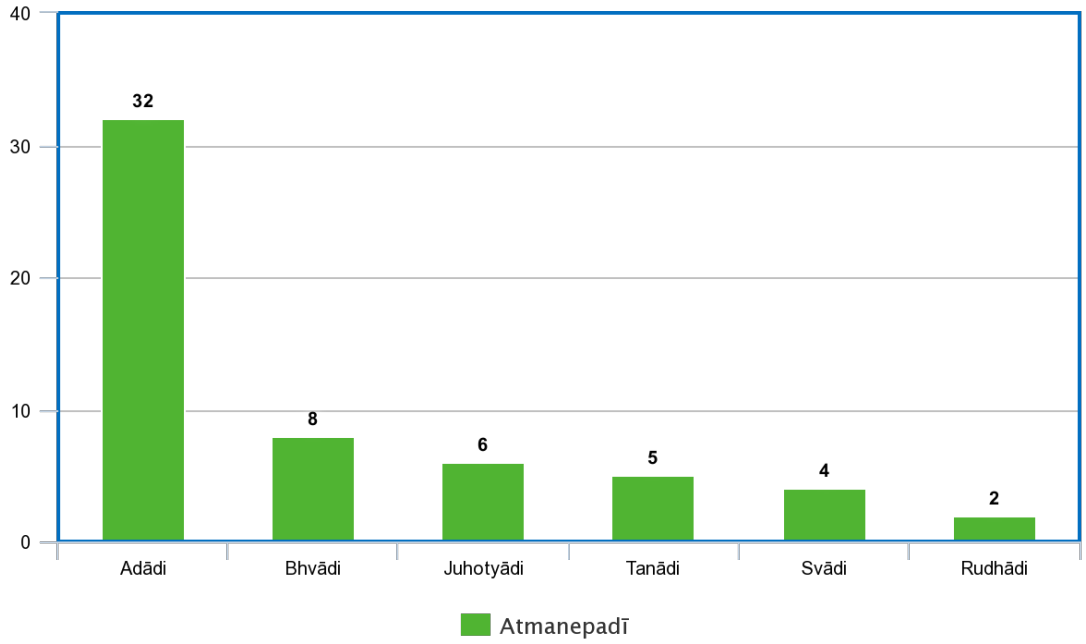


Figure 6.43: Karmaṇi-Gaṇa Distribution

#### 1. Adādi-gaṇa

There are 32 instances in only two lakāras viz. 31 instances in laṭ and just one instance in laṇ-lakāra. 31 instances are in third person singular and only one instance is in third person plural.

#### 2. Bhvādi-gaṇa

There are 8 instances in only two lakāras viz. seven instances in laṭ and only

one instance in laṭ-lakāra. Seven instances are in third person singular while just one instance is in third person plural.

### 3. Juhotyādi-gaṇa

There are six instances of third person singular in laṭ-lakāra only.

### 4. Tanādi-gaṇa

There are five instances, four in third person singular and just one in third person plural in laṭ-lakāra only.

### 5. Svādi-gaṇa

There are four instances in only two lakāras viz. laṭ and lṛṭ with three instances in third person singular and just one instance of first person singular.

### 6. Rudhādi-gaṇa

There are only two instances in third person singular in laṭ-lakāra only.

#### Overall Observation:

- There are no instances of *Divādi*, *Tudādi*, *Kryādi* and *Curādi gaṇas*.
- Only laṭ-lakāra is found in *Tanādi*, *Juhotyādi* and *Rudhādi gaṇas*.
- In all six gaṇas, laṭ-lakāra is frequently used followed by single instances of lañ, luṭ and lṛṭ lakāras.
- There are no instances of dual forms.
- Maximum usage is found in third person singular followed by third person plural, second person singular and first person singular.

**Conclusion:** Based on the above observations, it can be concluded that one has to concentrate only on:

1. The forms of laṭ-lakāra followed by lañ, luṭ and lṛṭ lakāras.
2. One have to study only the forms in third person singular and plural followed by first person singular only and second person singular.
3. Here too, the study of dual forms could be set aside for later stage.

## Bhāve Prayoga

There are only four instances found in BhG.

### 1. Divādi-gaṇa

Two instances are found in second person singular in laṭ-lakāra.

### 2. Bhvādi-gaṇa

One instance is found in third person singular in laṭ-lakāra.

### 3. Svādi-gaṇa

One instance is found in second person singular in laṭ-lakāra.

**Conclusion:** Instances of *bhāve prayoga* from only three gaṇas out of ten are found in BhG. There are only two lakāras found viz. laṭ and loṭ with three instances of second person singular and single instance of third person singular.

We have shown the statistical analyses of *gaṇa* and *lakāra* distribution of each *prayogas* above. Table 6.27 shows the *dhātu* distribution (including *kṛdantas*) of each *gaṇa*:

Gaṇa	High Freq.	Low Freq.	Total
Bhvādi	16	50	66
Adādi	8	8	16
Divādi	5	11	16
Tudādi	3	10	13
Kryādi	2	5	7
Svādi	3	2	5
Juhotyādi	2	3	5
Rudhādi	1	5	6
Tanādi	1	0	1
Curādi	0	5	5

Table 6.27: Dhātu distribution

We list each high frequency *dhātu* mentioned in Table 6.27 with its meaning, frequency and *upasarga* count in each *gaṇa*.

## 1. Bhvādi

Table 6.28 gives the statistical information of 16 *dhātus* of this *gaṇa*.

Dhātu	Meaning	Freq.	Upa. Count
Dr̥ś1	prekṣaṇe (to_see, to_know)	75	3
Bhū1	sattāyām (to_be/ to_live)	62	3
Sthā1	gatinivṛttau (to_stand, to_wait)	46	10
Vṛt1	vartane (to_exist; to_engage)	34	9
Gam1	gatau (to_go; to_achieve)	34	7
Śru1	śravaṇe (to_hear)	25	1
Tyaj1	hānau (to_abandon; give_up)	21	0
Hṛ1	haraṇe (to_take_away)	18	5
Śri1	sevāyām (to_serve)	17	6
Labh1	prāptau (to_obtain, to_be_able)	17	1
Bhaj1	sevāyām (to_honour, to_serve)	15	2
Smṛ1	ādhyaṇe (to_remember) (to_think_upon)	15	2
Arh1	pūjāyām yogyatve ca (to_worship, to_deserve)	12	0
Car1	gatyarthaḥ (to_walk; to_live)	12	3
Yaj1	devapūjāsaṅgatikaraṇadāneṣu (to_sacrifice, to_worship)	10	0
īkṣ1	darśane (to_look_at)	8	5

Table 6.28: Bhvādi distribution

It is noted from Table 6.28 that *sthā1 dhātu* has the highest count of *upasargas* followed by *vṛt dhātu*. Table 6.29 gives the frequency of each *upasarga* of *sthā1 dhātu*.

Upasarga	Freq.
Ava_sthā1	7
Ān_sthā1	7
Ud_sthā1	5
Adhi_sthā1	2
Anu_sthā1	2
Pra_sthā1	1
Prati_sthā1	1
Vi_sthā1	1
Pari_ava_sthā1	1
Sam_upa_sthā1	1

Table 6.29: Sthā1 Dhātu

## 2. Adādi

Table 6.30 gives the statistical information of 8 *dhātus* of this *gaṇa*.

Dhātu	Meaning	Freq.	Upa. Count
As2	bhuvi (to_be)	95	1
Vac1	paribhāṣaṇe (to_speak)	69	1
Vid1	jñāne (to_know, to_regard)	61	0
Yā1	prāpaṇe (to_go; to_attain)	29	3
Han1	hiṃsāgatyoḥ (to_kill, to_hurt)	26	4
I1	gatau (to_go; to_attain)	25	4
Brū1	vyaktāyāṃ vāci (to_speak)	21	1
Ās1	upaveśane (to_sit; to_remain)	16	2

Table 6.30: Adādi distribution

## 3. Divādi

Table 6.31 gives the statistical information of 5 *dhātus* of this *gaṇa*.

Dhātu	Meaning	Freq.	Upa. Count
Jan3	prādurbhāve (to_be_born, is_taking_place)	20	3
Man1	jñāne (to_know, to_think)	18	0
Naś1	adarśane (to_perish, to_be_lost)	16	2
Pad1	gatau (to_attain, befitting)	15	5
Vid2	sattāyām (to_be, to_happen; exist)	9	0

Table 6.31: Divādi distribution

#### 4. Tudādi

Table 6.32 gives the statistical information of 3 *dhātus* of this *gaṇa*.

Dhātu	Meaning	Freq.	Upa. Count
Viś1	praveśane (to_enter, to_fall)	18	4
Muc1	mokṣaṇe (to_loosen, to_set_free, be_liberated)	15	2
Iṣ2	icchāyām (to_wish)	12	1

Table 6.32: Tudādi distribution

#### 5. Kryādi

Table 6.33 gives the statistical information of 2 *dhātus* of this *gaṇa*.

Dhātu	Meaning	Freq.	Upa. Count
Jñā2	avabodhane (to_know)	32	5
Bandh1	bandhane (to_bind / to_attract)	10	1

Table 6.33: Kryādi distribution

#### 6. Svādi

Table 6.34 gives the statistical information of 3 *dhātus* of this *gaṇa*.

Dhātu	Meaning	Freq.	Upa. Count
Āp1	vyāptau (to_pervade)	39	5
Vṛ2	varaṇe (to_cover)	9	1
Śak1	śaktau (to_be_able, to_endure)	9	0

Table 6.34: Svādi distribution

#### 7. Juhotyādi

Table 6.35 gives the statistical information of 2 *dhātus* of this *gaṇa*.

Dhātu	Meaning	Freq.	Upa. Count
Dhā1	dhāraṇaṇaṇayoh (to_place, to_grant, to_produce)	17	6
Dā3	dāne (to_give / to_put)	10	1

Table 6.35: Juhotyādi distribution

## 8. Rudhādi

Table 6.36 gives the statistical information of just one *dhātu* of this *gaṇa*.

Dhātu	Meaning	Freq.	Upa. Count
Yuj2	yoge (to_unite)	18	2

Table 6.36: Rudhādi distribution

## 9. Tanādi

Table 6.37 gives the statistical information of just one *dhātu* of this *gaṇa*.

Dhātu	Meaning	Freq.	Upa. Count
Kṛ3	karāṇe (to_do)	61	1

Table 6.37: Tanādi distribution

From the above distribution it is noted that six *dhātus* have the highest frequencies in BhG as shown in Table 6.38 viz.,

Dhātu	Gaṇa	Freq.
As2	Adādi	95
Dṛś1	Bhvādi	75
Vac1	Adādi	69
Bhū1	Bhvādi	62
Vid1	Adādi	61
Kṛ3	Tanādi	61

Table 6.38: High frequency distribution

## Kṛdantas

Those *pratyayas* suffixed to a *dhātu* to form a noun, adjective or an *avyaya*, are known as *kṛt pratyayas* (derivational suffix). The new *prātipadikam* thus formed is called *kṛdanta* (*kṛt-anta*). In BhG, there are 14 *kṛt pratyayas* as shown in Table 6.39:

It is noted here that of 14 *kṛt pratyayas* seven namely *kta*, *śatr*, *lyap*, *ktvā*, *tumun*, *tavyat* and *ṇyat* have high frequencies compared to other *pratyayas*.

Kṛt Pratyayas	High Freq.	Kṛt Pratyayas	Low Freq.
kta	198	yat	9
śatṛ	83	śānac	5
lyap	59	ktavatu	3
ktvā	28	ac	2
tumun	22	tṛc	2
tavyat	15	yak	2
ṇyat	11	lyuṭ	1

Table 6.39: Kṛt-Pratyayas

## Avyayas

Those indeclinables which retain their form in all genders, cases and numbers are termed as *avyayas*.<sup>12</sup> We list the high frequency and low frequency avyayas in Table 6.40.

Avyayas	High Freq.	Avyayas	Low Freq.
ca	389	katham	9
na	251	mā	9
eva	169	atra	8
api	98	sarvatra	8
iti	67	sarvaśaḥ	8
hi	67	namaḥ	7
tu	65	yatra	7
tathā	44	satatam	7
evam	27	cet	6
tataḥ	25	tattvataḥ	6
iha	21	pṛthak	6
vā	21	yadi	6
yathā	20	sadā	6
iva	18	ataḥ	5
punaḥ	18	yataḥ	5
tatra	13	kutaḥ	4

<sup>12</sup> sadṛśaṃ triṣu liṅgeṣu sarvāsu ca vibhaktiṣu |  
vacaneṣu ca sarveṣu yanna vyeti tadavyayam||— Sid. Kau. No. 452 (under A. 2.4.82)

Avyayas	High Freq.	Avyayas	Low Freq.
tadā	12	samam	4
bhūyaḥ	12	sarvataḥ	4
yadā	12	saha	4
atha	10	svayam	4
yat	10		

Table 6.40: Avyayas

Here it is noted that of 41 avyayas listed above 21 are high frequency instances while 20 are low frequency instances.

### 6.3 Summary

In this chapter we discussed the statistical analyses of four classes viz., *subantas*, *tiñantas*, *kṛdantas* and *avyayas* each with the help of tables, *vibhakti* distribution and percentage distribution. In the next chapter we will discuss the *sandhi analysis* classifying it into types and sub-types alongwith *Pāṇinian sūtras*, *vṛtti*, English translation, statistics and example from BhG.

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## CHAPTER 7

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### SANDHI ANALYSIS

Sandhi is defined as ‘*paraḥ sannikarṣaḥ saṃhitā*’<sup>1</sup> that is, the closest proximity of syllables that occur between the words due to morphonological alterations is known as ‘*saṃhitā*’ (sandhi). As Huet (2006) aptly puts it, *Sandhi means euphony transformation of words when they are consecutively pronounced. Typically when a word  $w_1$  is followed by a word  $w_2$ , some terminal segment of  $w_1$  merges with some initial segment of  $w_2$  to be replaced by a “smoothed” phonetic interpolation, corresponding to minimising the energy necessary to reconfigure the vocal organs at the juncture between the words.*

$$w_1 + w_2 = w_3$$

where  $w_3$  is the euphonised word.

In most of the cases it is the last character of the left word and / or the first character of the right word that undergoes an euphonic change. Following couplet gives the rule for observation of sandhi:

saṃhitaikapade nityā nityā dhātūpasargayoḥ |  
nityā samāse vākye tu sāvivaḥsāmapekṣate ||<sup>2</sup>

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<sup>1</sup> A—1.4.109

<sup>2</sup> Sid. Kau. No. 2232 (under A. 8.4.18)

Sandhi or saṃhitā is mandatory under certain circumstances only, like in the case of—

- Internal structure of a *pada*.
- *Dhātu* (verbal root) and *Upasarga* (preposition).
- *Samāsa* (compound).

While in case of combination between the last letter of first word (*pūrva*) and the first letter of second word (*para*) in a sentence, it depends on the will of the speaker. Given that there are 13 vowels and 33 consonants in Sanskrit, total sandhi rules involving single letters on both sides would be approximately  $46 * 46$  (2116). There are less than hundred *sūtras* governing sandhis in *Aṣṭādhyāyī*. Each *sūtra* in turn has a set of more than one combinations of letters. However, it is not necessary for a BhG student to learn all these *sūtras*.

There is on an average around 26.77% sandhi between two words in BhG i.e. almost every fourth word is in sandhied form. It is broadly classified under three headings viz., *Ac-sandhi* (vowel), *Hal-sandhi* (consonant) and *Visarga-sandhi*. This is summarized in Figure 7.1.

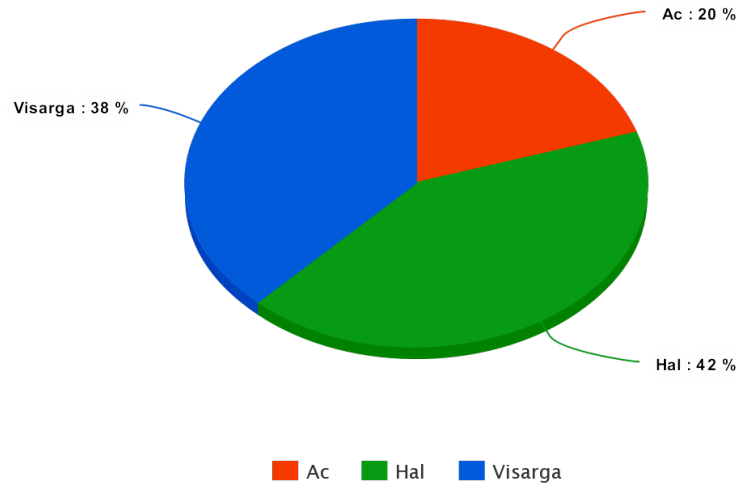


Figure 7.1: Sandhi Distribution

It is noted that maximum instances are found in Hal-sandhi (42%) followed by Visarga-sandhi (38%) and Ac-sandhi (20%). I have taken only those *Pāṇinian sūtras* for which examples have been found in BhG and have given the main classification under each of the above three headings followed by relevant *sūtra*, *vṛtti*, English translation<sup>3</sup> fol-

<sup>3</sup> English translation is taken from Rama Nath Sharma (Sharma, 2000, 2001b, 2003)

lowed by examples from BhG. At the end I have summarized the rule in a tabular form giving the frequency distribution occurring in BhG.

## 7.1 Ac-sandhi

In Sanskrit language there are 22 vowels including the *pluta* forms. After excluding *plutas* we have 13 vowels and when each of these are combined with either itself or the other, it totals to 169 possible varieties of vowel combinations. The combination of these vowels is known as ‘Ac-sandhi’ (or svar-sandhi). These are classified into eight types viz.,

1. Savarṇa-sandhi
2. Yaṇ-sandhi
3. Yāntavāntādeśa-sandhi
4. Guṇa-sandhi
5. Vṛddhi-sandhi
6. Pūrvarūpa-sandhi
7. Pararūpa-sandhi
8. Prakṛtibhāva-sandhi

Of these in the first five types there is a single substitution in place of precedent or subsequent vowel. The sixth and seventh types are exceptions to vowel changes in general. In the last type there is no substitution as such. We discuss below these sandhis starting with the high frequency sandhis which is summarised in Table 7.1.

Ac-sandhi	Freq.
Savarṇa	326
Yaṇ	205
Vṛddhi	134
Guṇa	80
Pūrvarūpa	55
Yāntavāntādeśa	23
Prakṛtibhāva	2

Table 7.1: Ac-sandhi

It has been noted that maximum instances are found in Savarṇa-sandhi followed by Yaṇ-sandhi and Vṛddhi-sandhi while Yāntavāntādeśa and Prakṛtibhāva sandhis have frequency below ten. Each type is discussed below.

- Savarṇa-sandhi

**Sūtra:** अकः सवर्णे दीर्घः (A. 6.1.101)

**Vṛtti:** अकः सवर्णे अचि परे दीर्घ एकादेशः स्यात्।

**Eng. tr.:** A single vowel comes as a replacement in place of both, a vowel denoted by the abbreviatory term *aK* and a vowel homogeneous (*savarṇa*) with it that follows, when *saṃhitā* finds its scope.

*aK* = अ, इ, उ, ऋ / ॠ, लृ

**Examples:**

1. na+arhāḥ = nārḥāḥ (BhG.1.37)
2. vā+api = vāpi (BhG.8.6)
3. na+āsam = nāsam (BhG.2.12)
4. tathā+ātmā = tathātmā (BhG.13.32)
5. asti+idam = astīdam (BhG.16.13)
6. tu+uddeśataḥ = tūddeśataḥ (BhG.10.40)
7. utkrāmati+īśvaraḥ = utkrāmatīśvaraḥ (BhG.15.8)
8. tyāgī+iti = tyāgīti (BhG.18.11)

Here eight combinations are observed in BhG. The frequency distribution of these combinations is shown in Table 7.2.

Input	Output	Count
a+a	ā	192
ā+a	ā	45
a+ā	ā	43
ā+ā	ā	21
i+i	ī	21
u+u	ū	2
i+ī	ī	1
ī+i	ī	1

Table 7.2: Savarṇa-sandhi

- Yaṇ-sandhi

Sūtra: इको यणचि (A. 6.1.77)

Vṛtti: इकः स्थाने यण् स्यात् अचि संहितायां विषये।

Eng. tr.: A sound denoted by the abbreviatory term *iK* is replaced by corresponding sounds denoted by the abbreviatory term *yaN* when a sound denoted by the abbreviatory term *aC* follows in *saṃhitā*.

*yaN* = य्, व्, र्, ल्

*iK* = इ, उ, ऋ, लृ

*aC* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ

**Examples:**

1. hi+avaram = hyavaram (BhG.2.49)
2. yadyapi+ete = yadyapyete (BhG.1.38)
3. parāṇi+āhuḥ = parāṇyāhuḥ (BhG.3.42)
4. sādhuṣu+api = sādhuṣvapi (BhG.6.9)
5. api+uktaḥ = apyuktaḥ (BhG.13.22)
6. tu+idam = tvidam (BhG.1.10)
7. tu+eva = tveva (BhG.2.12)
8. tu+ātmā = tvātmā (BhG.7.18)

Here it has been observed from above examples that only eight combinations were found in BhG. No instances of *r* or *l* were found. The frequency distribution of these eight combinations is shown in Table 7.3.

Input	Output	Count
i+a	ya	98
i+e	ye	34
i+ā	yā	23
u+a	va	21
i+u	yu	18
u+i	vi	5
u+e	ve	4
u+ā	vā	2

Table 7.3: Yaṇ-sandhi

• Vṛddhi-sandhi

1. Sūtra: वृद्धिरेचि (A. 6.1.88)

Vṛtti: आद् एचि परे वृद्धिः एकादेशः स्यात्।

Eng. tr.: A single replacement in *vṛddhi* comes in place of both, a sound denoted by the abbreviatory term *eC* (*e*, *o*, *ai*, *au*) which follows *a* and the *a* which precedes *eC*, in *saṃhitā*.

*eC* = ए, ऐ, ओ, औ

Examples:

1. *ca + eva* = *caiva* (BhG.1.1)
2. *ātmā + eva* = *ātmaiva* (BhG.6.5)
3. *sukhasya + aikāntikasya* = *sukhasyaikāntikasya* (BhG.14.27)
4. *ca + oṣadhiḥ* = *cauṣadhiḥ* (BhG.15.13)

Here four combinations are found in BhG. The distribution of these combinations is shown in Table 7.4.

Input	Output	Count
a+e	ai	101
ā+e	ai	29
a+ai	ai	1
a+o	au	1

Table 7.4: Vṛddhi-sandhi

2. Sūtra: एत्येधत्यूठसु (A. 6.1.89)

Vṛtti: अवर्णात् एजाद्योरेत्येधत्योः ऊठि च परे वृद्धिरेकादेशः स्यात्।

Eng. tr.: A single replacement in *vṛddhi* comes in place of both, the *a* which precedes a sound denoted by *eC* and the *eC* which follows this *a*, provided *saṃhitā* finds its scope.

*eC* = ए, ओ, ऐ, औ

Examples:

1. *na + eti* = *naiti* (BhG.4.9)
2. *eva + eti* = *evaiti* (BhG.8.6)

Here only one combination (*a + e = ai*) is found with just two instances in BhG.

- **Guṇa-sandhi**

**Sūtra:** आद् गुणः (A. 6.1.87)

**Vṛtti:** अवर्णात् अचि परे पूर्वपरयोः एको गुणादेशः स्यात्। संहितायाम्।

**Eng. tr.:** A single replacement in *guṇa* comes in place of both, a vowel (*aC*) which follows *a* and the *a* which precedes that vowel, in *saṃhitā*.

*aC* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ

**Examples:**

1. *ca+iti* = *ceti* (BhG.4.3)
2. *yatra+uparamate* = *yatroparamate* (BhG.6.20)
3. *tadā+ucyate* = *tadocyate* (BhG.2.55)
4. *aparā+iyam* = *apareyam* (BhG.7.5)
5. *ca+ūrdhvaṃ* = *cordhvaṃ* (BhG.15.2)

It has been observed from the above examples that the vowels *ṛ* (*long and short*) and *ḷ* do not occur in BhG. The frequency distribution of these five combinations is shown in Table 7.5.

Input	Output	Count
a+i	e	32
a+u	o	22
ā+u	o	13
ā+i	e	12
a+ū	o	1

Table 7.5: Guṇa-sandhi

- **Pūrvarūpa-sandhi**

**Sūtra:** एङः पदान्तादति (A. 6.1.109)

**Vṛtti:** पदान्तात् एङः अति परे पूर्वरूपम् एकादेशः स्यात्।

**Eng. tr.:** A single replacement similar to the preceding comes in place of both, a vowel denoted by *eN̄* and the *aT* which follows *eN̄*, when *saṃhitā* finds its scope.

*eN̄* = ए, ओ

*aT* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ, ह, य, व, र

**Example:**

*loke + asmin* = *loke'smin* (BhG.16.6)

Here the vowel *a* disappears and an *avagraha* (S) (marked by ' here) is marked in its place. In BhG, 55 instances were found but only in one combination i.e. *e* followed by short *a*.

- **Yāntavānta-sandhi**

**Sūtra:** एचोऽयवायावः (A. 6.1.78)

**Vṛtti:** एचः क्रमात् अय् अव् आय् आव् एते स्युः अचि।

**Eng. tr.:** A sound denoted by the abbreviatory term *eC* is replaced by 'ay, av, āy, āv', respectively, when a sound denoted by the abbreviatory term *aC* follows in *saṃhitā*.

*eC* = ए, ऐ, ओ, औ

*aC* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ

**Examples:**

1. ubhau+api = ubhāvapi (BhG.13.19)
2. dvau+imau = dvāvimau (BhG.15.16)
3. niḥśreyasakarau+ubhau = niḥśreyasakarāvubhau (BhG.5.2)

We found three combinations in BhG i.e. **au + a vowel = āv**. The distribution of these combinations is shown in Table 7.6.

Input	Output	Count
au+a	āv	6
au+i	āv	1
au+u	āv	1

Table 7.6: Yāntavānta-sandhi

### Yāntavānta and lopa-sandhi

**Sūtra 1:** एचोऽयवायावः (A. 6.1.78)

**Vṛtti:** एचः क्रमात् अय् अव् आय् आव् एते स्युरचि।

**Eng. tr.:** A sound denoted by the abbreviatory term *eC* is replaced by 'ay, av, āy, āv', respectively, when a sound denoted by the abbreviatory term *aC* follows in *saṃhitā*.

**Sūtra 2:** लोपः शाकल्यस्य (A. 8.3.19)

**Vṛtti:** अवर्णपूर्वयोः पदान्तयोर्यवयोः वा लोपः अशि परे।

**Eng. tr.:** A *pada*-final *v* or *y* which occurs after *a* or *ā* is, in the opinion of

*Śākalya*, replaced with *LOPA* when a sound denoted by *aś* follows and the context is that of close proximity between sounds.

*eC* = ए, ऐ, ओ, औ

*aC* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ

*aś* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ, ह्, य्, व्, र्, ल्, ज्, म्, ङ्, ण्, न्, झ्, भ्, घ्, ढ्, ध्, ज्ञ्, ब्, ग्, ङ्, द्

#### Examples:

1. *vartante* + *iti* = *vartanta iti* (BhG.14.23)

2. *varte* + *eva* = *varta eva* (BhG.3.22)

#### Example 1:

Rule 1: *vartante* + *iti* = *vartantay iti*

Rule 2: *vartantay iti* = *vartanta iti* (BhG.14.23)

To summarize the above two combinations in Table 7.7.

Input	Output	Count
e+i	a i	10
e+e	a e	5

Table 7.7: Yāntavānta and Lopa-sandhi

#### • Prakṛtibhāva-sandhi

##### Pragr̥hya

1. Sūtra: ईदूदेद् द्विवचनं प्रगृह्यम् (A. 1.1.11)

Vṛtti: ईदूदेद् अन्तं द्विवचनं प्रगृह्यसंज्ञं स्यात्।

Eng. tr.: A dual ending which terminates in *ī*, *ū*, or *e* is termed *pragr̥hya*.

##### Example:

*anādī* + *ubhau* = *anādī ubhau* (BhG.13.19)

Here the word *anādī* is in dual ending in ई and thus gets the designation 'Pragr̥hya'.

2. Sūtra: प्लुतप्रगृह्या अचि नित्यम् (A. 6.1.125)

Vṛtti: प्लुताः प्रगृह्याश्च वक्ष्यन्ते। ते अचि परे नित्यं प्रकृत्या स्युः।

Eng. tr.: Those which are termed *pluta* and *pragr̥hya* remain as are, obli-

gatorily (*nityam*), when a vowel (*aci*) follows and *saṃhitā* finds its scope.

*aC* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ (any vowel)

**Example:**

*anādi* + *ubhau* = *anādi ubhau* (BhG.13.19)

Here the word *anādi* is designated '*pragr̥hya*' by the previous *sūtra* and hence it retains its natural form when followed by a vowel. Only one instance is found in BhG.

3. *Sūtra*: चादयोऽसत्त्वे (A. 1.4.57)

*Vṛtti*: अद्रव्यार्थाश्चादयो निपातसंज्ञाः स्युः।

**Eng. tr.:** Items enumerated in the list headed by *ca* 'and' are *nipāta* when they do not denote *sattva* 'thing'.

**Example:**

*na* + *iha* = *no iha* (BhG.17.28)

Here the word *na* is termed as निपात.

– *Sūtra*: निपात एकाजनाङ् (A. 1.1.14)

*Vṛtti*: एकः अच् निपात आङवर्जः प्रगृह्यसंज्ञः स्यात्।

**Eng. tr.:** A *nipāta* (particle) which consists only of a single *aC* - except for *āN* - is termed *pragr̥hya*. *aC* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ

– *Sūtra*: ओत् (A. 1.1.15)

*Vṛtti*: ओत् अन्तो निपातः प्रगृह्यः स्यात्।

**Eng. tr.:** A *nipāta* which ends in *o* is termed *pragr̥hya*.

**Example:**

*na* + *iha* = *no iha* (BhG.17.28)

Here the word *na* termed as निपात from the previous *sūtra*, ends in ओ and is designated as प्रगृह्य. Only one instance is found in BhG.

## 7.2 Hal-sandhi

The combination of consonants or consonant as pūrva and vowel as para is known as '*Hal-sandhi*'. It is classified into following types:

1. Ścutva
2. Ṣṭutva
3. Jaśtva
4. Anunāsika
5. Pūrvasavarṇa
6. Cartva
7. Chatva
8. Anusvāra
9. Parasavarṇa
10. Kuk-ṭuk
11. Dhuṭ
12. Tuk
13. Ņamuṭ āgama
14. Anusvāra āgama
15. Visarga ādeśa
16. Ru ādeśa
17. Tugāgama

However all the above types are not found in BhG. We list below in Table 7.8 and Table 7.9 those sandhis and combination of sandhis which occur in BhG.

Hal-sandhi	Freq.
Anusvāra	1166
Jaśtva	172
Ņamuṭ āgama	16
Ścutva	3
Parasavarṇa	3

Table 7.8: Hal-sandhi

Hal-sandhi (Combo.)	Freq.
Jaśtva and Cartva	149
Satva and Ścutva	101
Jaśtva and Anunāsika	33
Jaśtva and Ścutva	19
Jaśtva, Ścutva, Cartva and Chatva	16
Jaśtva, Ścutva and Cartva	13
Jaśtva and Parasavarṇa	3
Jaśtva and Pūrvasavarṇa	2

Table 7.9: Hal-sandhi (Combo.)

We discuss these types below:

- **Jaśtva-sandhi**

**Sūtra:** झलां जशोऽन्ते (A. 8.2.39)

**Vṛtti:** पदान्ते झलां जशः स्युः।

**Eng. tr.:** A sound which is denoted by the abbreviatory term *jhaL*, and occurs at the end of a *pada*, is replaced with a sound denoted by the abbreviatory term *jaŚ*.

*jhaL* = झ, भ, घ, ढ, ध, ज, ब, ग, ङ, द, ख, फ, छ, ळ, थ, च, ट, त, क, प, श, ष, स, ह्

*jaŚ* = ज, ब, ग, ङ, द

**Examples:**

1. anyat+asti = anyadasti (BhG.2.42)
2. yat+yat = yadyat (BhG.3.21)
3. tat+viddhi = tadviddhi (BhG.4.34)
4. vedavit+eva = vedavideva (BhG.15.15)
5. etat+ātmani = etadātmani (BhG.6.26)
6. balāt+iva = balādiva (BhG.3.36)
7. anyat+draṣṭum = anyaddraṣṭum (BhG.11.7)
8. tat+brahma = tadbrahma (BhG.8.1)
9. kecit+bhītāḥ = kecidbhītāḥ (BhG.11.21)
10. yat+uktam = yaduktam (BhG.11.41)
11. tat+dhāma = taddhāma (BhG.8.21)
12. mohāt+grhītvā = mohādgrhītvā (BhG.16.10)

13. bhayāt+raṇāt = bhayādraṇāt (BhG.2.35)
14. pṛthak+vidhān = pṛthagvidhān (BhG.18.21)
15. pṛthak+bālāḥ = pṛthagbālāḥ (BhG.5.4)
16. samyak+ubhayoḥ = samyagubhayoḥ (BhG.5.4)
17. yat+īdṛśam = yadīdṛśam (BhG.6.42)
18. śrīmat+ūrjitam = śrīmadūrjitam (BhG.10.41)
19. etat+ṛtaṃ = etadṛtaṃ (BhG.10.14)
20. tasmāt+om = tasmādom (BhG.17.24)

To summarize the above 20 combinations in Table 7.11.

Input	Output	Count
t+a	da	47
t+y	dy	18
t+v	dv	17
t+e	de	14
t+ā	dā	11
t+i	dī	11
t+d	dd	10
t+b	db	9
t+bh	dbh	9
t+u	du	6
t+dh	ddh	4
t+g	dg	4
t+r	dr	4
k+v	gv	2
k+b	gb	1
k+u	gu	1
t+ī	dī	1
t+ū	dū	1
t+ṛ	dṛ	1
t+o	do	1

Table 7.11: Jāstva-sandhi

- **Jaśtva and Cartva-sandhi**

**Sūtra 1:** झलां जशोऽन्ते (A. 8.2.39)

**Vṛtti:** पदान्ते झलां जशः स्युः।

**Eng. tr.:** A sound which is denoted by the abbreviatory term *jhaL*, and occurs at the end of a *pada*, is replaced with a sound denoted by the abbreviatory term *jaŚ*.

**Sūtra 2:** खरि च (A. 8.4.55)

**Vṛtti:** खरि परे झलां चरः स्युः।

**Eng. tr.:** A sound denoted by the abbreviatory symbol *jhaL* is replaced with a sound denoted by the abbreviatory symbol *caR*, also, when a sound denoted by the abbreviatory symbol *khaR* follows and close proximity between sounds finds its scope.

*jhaL* = झ, भृ, घृ, ढृ, धृ, जृ, बृ, गृ, ङृ, दृ, खृ, फृ, छृ, तृ, थृ, चृ, टृ, कृ, पृ, शृ, षृ, सृ, हृ

*jaŚ* = ज, ब, ग, ङ, द

*khaR* = शृ, षृ, सृ

*caR* = चृ, टृ, तृ, कृ, पृ, शृ, षृ, सृ

**Examples:**

- |                          |                                   |
|--------------------------|-----------------------------------|
| 1. cet+tvam              | = cettvam (BhG.18.58)             |
| 2. kaścit+kartum         | = kaścitkartum (BhG.2.17)         |
| 3. tat+svayam            | = tatsvayam (BhG.4.38)            |
| 4. bandhāt+pramucyate    | = bandhātpramucyate (BhG.5.3)     |
| 5. vāk+ca                | = vākca (BhG.10.34)               |
| 6. prāk+śarīravimokṣaṇāt | = prākśarīravimokṣaṇāt (BhG.5.23) |
| 7. ṛk+sāma               | = ṛksāma (BhG.9.17)               |
| 8. pṛthak+keśiniṣūdana   | = pṛthakkeśiniṣūdana (BhG.18.1)   |
| 9. pṛthak+pṛthak         | = pṛthakpṛthak (BhG.1.18)         |

**Example 1:**

Rule 1: cet + tvam = ced + tvam

Rule 2: ced + tvam = cettvam (BhG.18.58)

**Example 5:**

Rule 1:  $vāk + ca = vāg + ca$

Rule 2:  $vāg + ca = vākca$  (BhG.10.34)

To summarize the above nine combinations in descending order in Table 7.13

Input	Output	Count
t+tva	ttva	47
t+ka	tka	35
t+sva	tsva	30
t+pra	tpra	29
k+ca	kca	4
k+śa	kśa	1
k+sā	ksā	1
k+ke	kke	1
k+pr	kpr	1

Table 7.13: Jāstva and Cartva-sandhi

• **Satva and Ścutva-sandhi**

Sūtra 1: विसर्जनीयस्य सः (A. 8.3.34)

Vṛtti: खरि विसर्जनीयस्य सः स्यात्।

Eng. tr.: A *visarjanīya* is replaced with a *s* when a sound denoted by *khaR* follows.

Sūtra 2: स्तोः श्चुना श्चुः (A. 8.4.40)

Vṛtti: सकारतवर्गयोः शकारचवर्गाभ्यां योगे शकारचवर्गौ स्तः।

Eng. tr.: A replacement in *ś*, and a sound denoted by *cU* as well, comes, respectively, in place of a *s*, and a sound denoted by *tU* ‘a consonant of the *t*-series’, when *ś*, and a sound denoted by *cU* ‘a consonant of the *c*-series’, occur in close proximity.

*khaR* = ख्, फ्, छ्, ठ्, थ्, च्, ट्, त्, क्, प्, श्, ष्, स्

**Examples:**

1.  $pāṇḍavāḥ + ca = pāṇḍavāśca$  (BhG.1.1)
2.  $ubhayavibhraṣṭaḥ + chinnābhram =$   
 $ubhayavibhraṣṭaśchinnābhram$  (BhG.6.38)

**Example 1:**

Rule 1: pāṇḍavāḥ + ca = pāṇḍavās + ca

Rule 2: pāṇḍavās + ca = pāṇḍavāśca (BhG.1.1)

In BhG there are more instances of first example and only one instance of the second example. To summarize both combinations in Table 7.14.

Input	Output	Count
vāḥ+ca	vāśca	100
ṭaḥ+chi	ṭaśchi	1

Table 7.14: Satva and Ścutva-sandhi

- **Jaśtva and Anunāsika-sandhi**

Sūtra 1: झलां जशोऽन्ते (A. 8.2.39)

Vṛtti: पदान्ते झलां जशः स्युः।

Eng. tr.: A sound which is denoted by the abbreviatory term *jhaL*, and occurs at the end of a *pada*, is replaced with a sound denoted by the abbreviatory term *jaŚ*.

Sūtra 2: यरोऽनुनासिकेऽनुनासिको वा (A. 8.4.45)

Vṛtti: यरः पदान्तस्य अनुनासिके परे अनुनासिको वा स्यात्।

Eng. tr.: A *pada*-final sound denoted by the abbreviatory symbol *yaR* is optionally replaced with an *anunāsika* ‘nasal’ when an *anunāsika* follows in close proximity.

*jhaL* = झ, भ, घ, ढ, ध, ज, ब, ग, ङ, द, ख, फ, छ, ट, थ, च, ट, त, क, प, श, ष, स, ह्

*jaŚ* = ज, ब, ग, ङ, द

*yaR* = य, व, र, ल, ज्ञ, म, ङ, ण, न, झ, भ, घ, ढ, ध, ज, ब, ग, ङ, द, ख, फ, छ, ट, थ, च, ट, त, क, प, श, ष, स

**Examples:**

1. tat + na = tanna (BhG.13.12)
2. etat + me = etanme (BhG.6.39)
3. īdr̥k + mama = īdr̥mama (BhG.11.49)

**Example 1:**

Rule 1: tat+na = tad+na

Rule 2: tad+na = tanna (BhG.13.12)

### Example 3:

Rule 1:  $\dot{\text{idr}}\text{k} + \text{mama} = \dot{\text{idr}}\text{g} + \text{mama}$

Rule 2:  $\dot{\text{idr}}\text{g} + \text{mama} = \dot{\text{idr}}\dot{\text{n}}\text{mama}$  (BhG.11.49)

To summarize the above three combinations in Table 7.15

Input	Output	Count
t+n	nn	17
t+m	nm	15
k+m	$\dot{\text{n}}\text{m}$	1

Table 7.15: Jaṣṭva and Anunāsika-sandhi

- Jaṣṭva and Ścutva-sandhi

Sūtra 1: झलां जशोऽन्ते (A. 8.2.39)

Vṛtti: पदान्ते झलां जशः स्युः।

Eng. tr.: A sound which is denoted by the abbreviatory term *jhaL*, and occurs at the end of a *pada*, is replaced with a sound denoted by the abbreviatory term *jaŚ*.

Sūtra 2: स्तोः श्रुना श्रुः (A. 8.4.40)

Vṛtti: सकारतवर्गयोः शकारचवर्गाभ्यां योगे शकारचवर्गौ स्तः।

Eng. tr.: A replacement in *ś*, and a sound denoted by *cU* as well, comes, respectively, in place of a *s*, and a sound denoted by *tU* ‘a consonant of the *t*-series’, when *ś*, and a sound denoted by *cU* ‘a consonant of the *c*-series’, occur in close proximity.

*jhaL* = झ, भ, घ, ढ, ध, ज, ब, ग, ङ, ढ, ख, फ, छ, ट, थ, च, ट, त, क, प, श, ष, स, ह

*jaŚ* = ज, ब, ग, ङ, द

### Example:

Rule 1:  $\text{syāt} + \text{janārdana} = \text{syād} + \text{janārdana}$

Rule 2:  $\text{syād} + \text{janārdana} = \text{syājjanārdana}$  (BhG.1.36)

There are 19 such instances in BhG.

- Jaṣṭva, Ścutva, Cartva and Chatva-sandhi

Sūtra 1: झलां जशोऽन्ते (A. 8.2.39)

Vṛtti: पदान्ते झलां जशः स्युः।

Eng. tr.: A sound which is denoted by the abbreviatory term *jhaL*, and occurs

at the end of a *pada*, is replaced with a sound denoted by the abbreviatory term *jaŚ*.

**Sūtra 2:** स्तोः श्रुना श्रुः (A. 8.4.40)

**Vṛtti:** सकारतवर्गयोः शकारचवर्गाभ्यां योगे शकारचवर्गौ स्तः।

**Eng. tr.:** A replacement in *ś*, and a sound denoted by *cU* as well, comes, respectively, in place of a *s*, and a sound denoted by *tU* ‘a consonant of the *t*-series’, when *ś*, and a sound denoted by *cU* ‘a consonant of the *c*-series’, occur in close proximity.

**Sūtra 3:** खरि च (A. 8.4.55)

**Vṛtti:** खरि परे झलां चरः स्युः।

**Eng. tr.:** A sound denoted by the abbreviatory symbol *jhaL* is replaced with a sound denoted by the abbreviatory symbol *caR*, also, when a sound denoted by the abbreviatory symbol *khaR* follows and close proximity between sounds finds its scope.

**Sūtra 4:** शश्छोऽटि (A. 8.4.63)

**Vṛtti:** पदान्तात् झयः परस्य शस्य छो वा स्यादटि।

**Eng. tr.:** A replacement in *ch* comes, optionally, in place of *ś* which, in turn, occurs after a sound denoted by *jhaY*, provided a sound denoted by *aT* (vowels and *y*, *v*, *r*) follows, and close proximity between sounds finds its scope.

*jhaL* = झ, भ, घ, ढ, ध, ज, ब, ग, ङ, ढ, ख, फ, छ, ट, थ, च, द, त, क, प, श, ष, स, ह्

*jaŚ* = ज, ब, ग, ङ, द

*khaR* = ख, फ, छ, ट, थ, च, द, त, क, प, श, ष, स

*caR* = च, द, त, क, प, श, ष, स

*jhaY* = झ, भ, घ, ढ, ध, ज, ब, ग, ङ, ढ, ख, फ, छ, ट, थ, च, द, त, क, प

*aT* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ, य, व, र

**Example:**

Rule 1: *śaśvat* + *śāntim* = *śaśvad* + *śāntim*

Rule 2: *śaśvad* + *śāntim* = *śaśvaj* + *śāntim*

Rule 3: *śaśvaj* + *śāntim* = *śaśvac* + *śāntim*

Rule 4: *śaśvac* + *śāntim* = *śaśvacchāntim* (BhG.9.31)

There are 16 such instances in BhG.

- **Namuḍāgama-sandhi**

**Sūtra:** ङमो ह्रस्वादचि ङमुण् नित्यम् (A. 8.3.32)

**Vṛtti:** ह्रस्वात् परो यो ङम् तदन्तं यत् पदं तस्मात् परस्य अचो नित्यं ङमुडागमः स्यात्।

**Eng. tr.:** An augment denoted by *ṇamut*, i.e., *ṇUT*, *ṇUT* and *nUT*, is, obligatorily, introduced to a vowel denoted by *aC* when the same occurs after a *pada* which ends in a sound denoted by *ṇaM* used after a short vowel.

*ṇaM* = ङ्, ण्, न्

**Examples:**

1. kurvan + api = kurvannapi (BhG.5.7)
2. paśyan + ātmani = paśyannātmani (BhG.6.20)
3. prahasan + iva = prahasanniva (BhG.2.10)
4. yuñjan + evam = yuñjannevam (BhG.6.15)
5. gr̥hṇan + unmiṣan = gr̥hṇannunmiṣan (BhG.5.9)

To summarize the above five combinations in Table 7.16

Input	Output	Count
n+a	nna	7
n+ā	nnā	4
n+i	nni	2
n+e	nne	2
n+u	nnu	1

Table 7.16: Namuḍāgama-sandhi

- **Jaśtva, Ścutva and Cartva-sandhi**

**Sūtra 1:** झलां जशोऽन्ते (A. 8.2.39)

**Vṛtti:** पदान्ते झलां जशः स्युः।

**Eng. tr.:** A sound which is denoted by the abbreviatory term *jhaL*, and occurs at the end of a *pada*, is replaced with a sound denoted by the abbreviatory term *jaŚ*.

**Sūtra 2:** स्तोः श्चुना श्चुः (A. 8.4.40)

**Vṛtti:** सकारतवर्गयोः शकारचवर्गाभ्यां योगे शकारचवर्गौ स्तः।

**Eng. tr.:** A replacement in ś, and a sound denoted by *cU* as well, comes, respectively, in place of a s, and a sound denoted by *tU* ‘a consonant of the *t*-series’,

when ś, and a sound denoted by *cU* ‘a consonant of the *c*-series’, occur in close proximity.

**Sūtra 3:** खरि च (A. 8.4.55)

**Vṛtti:** खरि परे झलां चरः स्युः।

**Eng. tr.:** A sound denoted by the abbreviatory symbol *jhaL* is replaced with a sound denoted by the abbreviatory symbol *caR*, also, when a sound denoted by the abbreviatory symbol *khaR* follows and close proximity between sounds finds its scope.

*jhaL* = झ, भ, घ, ढ, ध, ज, ब, ग, ङ, ढ, ख, फ, छ, ठ, थ, च, ट, त, क, प, श, ष, स, ह

*jaŚ* = ज, ब, ग, ङ, ढ

*khaR* = ख, फ, छ, ठ, थ, च, ट, त, क, प, श, ष, स

*caR* = च, ट, त, क, प, श, ष, स

**Example:**

Rule 1: sarvabhṛt + ca = sarvabhṛd + ca

Rule 2: sarvabhṛd + ca = sarvabhṛj + ca

Rule 3: sarvabhṛj + ca = sarvabhṛcca (BhG.13.14)

There are 13 similar instances in BhG.

- Ścutva-sandhi

**Sūtra:** स्तोः श्रुना श्रुः (A. 8.4.40)

**Vṛtti:** सकारतवर्गयोः शकारचवर्गाभ्यां योगे शकारचवर्गौ स्तः।

**Eng. tr.:** A replacement in ś, and a sound denoted by *cU* as well, comes, respectively, in place of a s, and a sound denoted by *tU* ‘a consonant of the *t*-series’, when ś, and a sound denoted by *cU* ‘a consonant of the *c*-series’, occur in close proximity.

**Examples:**

1. paśyan + śṛṇvan = paśyañśṛṇvan (BhG.5.8)

2. sprśan + jighran = sprśañjighran (BhG.5.8)

In BhG we have only three instances. To summarize the above two combinations in Table 7.17.

Input	Output	Count
n+śṛ	ñśṛ	2
n+ji	ñj	1

Table 7.17: Ścutva-sandhi

- **Parasavarṇa-sandhi**

Sūtra: तोर्लि (A. 8.4.60)

Vṛtti: तवर्गस्य लकारे परे परसवर्णः स्यात्। नकारस्य अनुनासिको लकारः।

Eng. tr.: A replacement, homogeneous with what follows (*parasavarṇa*), comes in place of a consonant (stop and nasal) of the *t*-series when *l* follows in close proximity.

Examples:

1. śraddhāvān + labhate = śraddhāvāmllabhate (श्रद्धावाँल्लभते) (BhG.4.39)
2. imān + lokān = imāmllokān (इमाँल्लोकान्) (BhG.18.17)
3. śubhān + lokān = śubhāmllokān (शुभाँल्लोकान्) (BhG.18.71)

There are three such instances in BhG.

- **Jaṣṭva and Parasavarṇa-sandhi**

Sūtra 1: झलां जशोऽन्ते (A. 8.2.39)

Vṛtti: पदान्ते झलां जशः स्युः।

Eng. tr.: Eng. tr.: A sound which is denoted by the abbreviatory term *jhaL*, and occurs at the end of a *pada*, is replaced with a sound denoted by the abbreviatory term *jaŚ*.

Sūtra 2: तोर्लि (A. 8.4.60)

Vṛtti: तवर्गस्य लकारे परे परसवर्णः स्यात्। नकारस्य अनुनासिको लकारः।

Eng. tr.: A replacement, homogeneous with what follows (*parasavarṇa*), comes in place of a consonant (stop and nasal) of the *t*-series when *l* follows in close proximity.

*jhaL* = झ, भ, घ, ढ, ध, ज, ब, ग, ङ, द, ख, फ, छ, ट, थ, च, ट, त, क, प, श, ष, स, ह  
*jaŚ* = ज, ब, ग, ङ, द

### Examples:

1. ābrahmabhuvanāt+lokāḥ = ābrahmabhuvanāḷlokāḥ (BhG.8.16)
2. samantāt+lokān = samantāḷlokān (BhG.11.30)
3. sarvataḥśrutimat+loke = sarvataḥśrutimalloke (BhG.13.13)

### Example 2:

Rule 1: samantāt + lokān = samantād + lokān

Rule 2: samantād + lokān = samantāḷlokān (BhG.11.30)

There are three such instances in BhG.

### • Jaṣṭva and Pūrvasavarṇa-sandhi

Sūtra 1: झलां जशोऽन्ते (A. 8.2.39)

Vṛtti: पदान्ते झलां जशः स्युः।

Eng. tr.: A sound which is denoted by the abbreviatory term *jhaL*, and occurs at the end of a *pada*, is replaced with a sound denoted by the abbreviatory term *jaṢ*.

Sūtra 2: झयो होऽन्यतरस्याम् (A. 8.4.62)

Vṛtti: झयः परस्य हस्य पूर्वसवर्णो वा स्यात्।

Eng. tr.: A replacement, homogeneous with what precedes, comes in place of *h*, optionally, when *h* occurs after a sound denoted by the abbreviatory symbol *jhaY* (non-nasal stops), and close proximity between sounds finds its scope.

*jhaL* = झ, भ, घ, ढ, ध, ज, ब, ग, ङ, द, ख, फ, छ, ट, थ, च, ट, त, क, प, श, ष, स, ह

*jaṢ* = ज, ब, ग, ङ, द

*jhaY* = झ, भ, घ, ढ, ध, ज, ब, ग, ङ, द, ख, फ, छ, ट, थ, च, ट, त, क, प

### Examples:

1. dharmyāt + hi = dharmyāddhi (BhG.2.31)
2. etat + hi = etaddhi (BhG.6.42)

### Example 1:

Rule 1: dharmyāt + hi = dharmyād + hi

Rule 2: dharmyād + hi = dharmyāddhi (BhG.2.31)

There are only two such instances in BhG.

- **Anusvāra-sandhi**

Sūtra: मोऽनुस्वारः (A. 8.3.23)

Vṛtti: मान्तस्य पदस्य अनुस्वारः स्यात् हलि।

Eng. tr.: A *pada*-final *m*, when occurring in close proximity with a following consonant, is replaced with *m̐* (*anusvāra*).

haL = य, व, र, ल, ज, म, ङ, ण, न, झ, भ, घ, ढ, ध, ज, ब, ग, ड, द, ख, फ, छ, ट, थ, च, द, त, क, प, श, ष, स, ह

Example:

mahatīm + camūm = mahatīm̐ camūm (BhG.1.3)

There are approximately 1166 instances in BhG.

- **Anusvāra and Parasavarṇa-sandhi**

Sūtra 1: मोऽनुस्वारः (A. 8.3.23)

Vṛtti: मान्तस्य पदस्य अनुस्वारः स्यात् हलि।

Eng. tr.: A *pada*-final *m*, when occurring in close proximity with a following consonant, is replaced with *m̐* (*anusvāra*).

Sūtra 2: वा पदान्तस्य (A. 8.4.59)

Vṛtti: पदान्तस्य अनुस्वारस्य ययि परे परसवर्णो वा स्यात्।

Eng. tr.: A sound, homogeneous with what follows, optionally comes in place of an *anusvāra*, when the *anusvāra* occurs at the end of a *pada* and a sound denoted by *yaY* (semivowel, stop and nasal) follows.

yaY = य, व, र, ल, ज, म, ङ, ण, न, झ, भ, घ, ढ, ध, ज, ब, ग, ड, द, ख, फ, छ, ट, थ, च, द, त, क, प

Example:

mahatīm + camūm = mahatīm̐ camūm (BhG.1.3) or

mahatīñ camūm (This option however is not found in BhG).

## 7.3 Visarga-sandhi

The combination of visarga as *pūrva* and either vowel or consonant as *para* is known as ‘Visarga-sandhi’. Those *visarga-sandhis* which occur in BhG are shown in Table 7.18 and Table 7.19.

Visarga-sandhi	Freq.
Visarga	494
Repha	206
Satva	131
Rutva	26
Sulopa	3

Table 7.18: Visarga-sandhi

Visarga-sandhi (Combo.)	Freq.
Rutva, Utva and Guṇa	310
Rutva, Utva, Guṇa and Pūrvarūpa	147
Rutva, Yatva and Lopa	103
Rutva, Yatva and Lopa	75

Table 7.19: Visarga-sandhi (Combo.)

#### • Visarga-sandhi

##### 1. Sūtra: कृष्णोः (A. 8.3.37)

**Vṛtti:** कवर्गे पवर्गे च परे विसर्जनीयस्य क्रमात् जिह्मामूलीयोपध्मानीयौ स्तः।

**Eng. tr.:** A replacement in  $\asymp k$  and  $\asymp p$ , respectively, and a *visarjanīya* as well, optionally comes in place of a *visarjanīya*, when a consonant of  $k$  ( $kU$ ) and  $p$  ( $pU$ ) group follows in close proximity of sounds.

**Examples:**

1. sacchabdas + pārtha = sacchabdaḥ pārtha (BhG.17.26)

2. maitras + karuṇaḥ = maitraḥ karuṇaḥ (BhG.12.13)

There were no instances of the above sūtra which is tagged as ‘ $\asymp$ ’, except for the optional one where the *visarga* is retained in the BhG. There are in total 217 instances, 141 instances of पवर्ग and 76 instances of कवर्ग.

##### 2. Sūtra: वा शरि (A. 8.3.36)

**Vṛtti:** शरि परे विसर्जनीयस्य विसर्जनीय एव वा स्यात्।

**Eng. tr.:** A *visarjanīya* is replaced, only optionally, with a *visarjanīya*, when a sound denoted by the abbreviatory symbol  $\acute{s}aR$  follows in close proximity of sounds.

$\acute{s}aR$  = श्, ष्, स्

### Example:

sukhinas + syāma = sukhinaḥ syāma (BhG.1.37)

There are 216 instances in BhG for this optional sūtra.

### 3. Sūtra: एतत्तदोः सुलोपोऽकोरनञ्समासे हलि (A. 6.1.132)

Vṛtti: अककारयोरेतत्तदोर्यः सुः तस्य लोपः स्यात् हलि न तु नञ्समासे।

Eng. tr.: A nominal ending, namely *sU*, when used after *etad* and *tad* not containing *k* and not being used as part of a negative compound (*nañ-samāsa*), is deleted, provided a consonant (*hali*) follows and *saṃhitā* finds its scope.

*haL* = य्, व्, र्, ल्, ज्, म्, ङ्, ण्, न्, झ्, भ्, घ्, ढ्, ध्, ज्, ब्, ग्, ङ्, द्, ख्, फ्, छ्, ट्, थ्, च्, ट्, त्, क्, प्, श्, ष्, स्, ह्

### Examples:

- |                              |                                       |
|------------------------------|---------------------------------------|
| 1. saḥ+me                    | = sa me (BhG.6.47)                    |
| 2. saḥ+paraḥ                 | = sa paraḥ (BhG.8.22)                 |
| 3. saḥ+yat                   | = sa yat (BhG.3.21)                   |
| 4. saḥ+sukhī                 | = sa sukhī (BhG.5.23)                 |
| 5. saḥ+tam                   | = sa tam (BhG.8.10)                   |
| 6. saḥ+vedavit               | = sa vedavit (BhG.15.2)               |
| 7. saḥ+ca                    | = sa ca (BhG.6.30)                    |
| 8. saḥ+kālena                | = sa kālena (BhG.4.2)                 |
| 9. saḥ+badhyate              | = sa badhyate (BhG.4.14)              |
| 10. saḥ+śabdaḥ               | = sa śabdaḥ (BhG.1.13)                |
| 11. saḥ+guṇān                | = sa guṇān (BhG.14.26)                |
| 12. saḥ+jīvati               | = sa jīvati (BhG.3.16)                |
| 13. saḥ+niścayena            | = sa niścayena (BhG.6.23)             |
| 14. saḥ+bhūyaḥ               | = sa bhūyaḥ (BhG.13.23)               |
| 15. saḥ+hi                   | = sa hi (BhG.7.18)                    |
| 16. eṣaḥ+rajoguṇasamudbhavaḥ | = eṣa rajoguṇa samudbhavaḥ (BhG.3.37) |

To summarize the above 16 combinations in Table 7.21.

Input	Output	Count
saḥ + me	sa me	9
saḥ + pa	sa pa	7
saḥ + ya	sa ya	7
saḥ + su	sa su	6
saḥ + ta	sa ta	5
saḥ + ve	sa ve	5
saḥ + ca	sa ca	4
saḥ + kā	sa kā	3
saḥ + ba	sa ba	3
saḥ + śa	sa śa	3
saḥ + gu	sa gu	2
saḥ + jī	sa jī	2
saḥ + nī	sa nī	2
saḥ + bhū	sa bhū	1
saḥ + hī	sa hī	1
eṣaḥ + ra	eṣa ra	1

Table 7.21: Visarga-sandhi

- Rutva, Utva and Guṇa-sandhi

Sūtra 1: ससजुषो रुः (A. 8.2.66)

Vṛtti: पदान्तस्य सस्य सजुष् शब्दस्य च रुः स्यात्।

Eng. tr.: The final *s* of a *pada*, which ends in *s*, and also the final *ṣ* of *sajuṣ* ‘companion, together with’, is replaced with *rU*.

Sūtra 2: हशि च (A. 6.1.114)

Vṛtti: अप्लुतादतः परस्य रोः उः स्यात् हशि।

Eng. tr.: A *rU* which occurs after *a* is replaced with *u*, when a sound denoted by the abbreviatory term *haś* follows and *saṃhitā* finds its scope.

Sūtra 3: आद् गुणः (A. 6.1.87)

Vṛtti: अवर्णादचि परे पूर्वपरयोरेको गुणादेशः स्यात्संहितायाम्।

Eng. tr.: A single replacement in *guṇa* comes in place of both, a vowel (*aC*) which follows *a* and the *a* which precedes that vowel, in *saṃhitā*.

*haś* = ज्, म्, ङ्, ण्, न्, झ्, भ्, घ्, ढ्, ध्, ज्, ब्, ग्, ङ्, द्, ह्, य्, व्, र्, ल्

*aC* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ

### Examples:

1. lokaḥ+mām = loko mām (BhG.7.25)
2. tataḥ+yāti = tato yāti (BhG.6.45)
3. yaḥ+na = yo na (BhG.5.3)
4. yaḥ+vetti = yo vetti (BhG.13.1)
5. vāsaḥ+bhavati = vāso bhavati (BhG.1.44)
6. uktaḥ+dehe = ukto dehe (BhG.13.22)
7. śreyaḥ+hi = śreya hi (BhG.12.12)
8. itaraḥ+janaḥ = itaro janaḥ (BhG.3.21)
9. yaḥ+buddheḥ = yo buddheḥ (BhG.3.42)
10. naḥ+garīyaḥ = no garīyaḥ (BhG.2.6)
11. kālaḥ+dhātā = kālo dhātā (BhG.10.33)
12. āhaḥ+rajaḥ = āho rajaḥ (BhG.17.1)
13. lokaḥ+lokāt = loko lokāt (BhG.12.15)

### Example 10:

Rule 1: nas+garīyaḥ = naru+garīyaḥ

Rule 2: naru+garīyaḥ = nau+garīyaḥ

Rule 3: nau+garīyaḥ = no garīyaḥ (BhG.2.6)

To summarize the above 13 combinations in Table 7.23.

Input	Output	Count
kaḥ+mā	ko mā	63
taḥ+yā	to yā	45
yaḥ+na	yo na	43
yaḥ+ve	yo ve	33
vaḥ+bha	vo bha	27
taḥ+de	to de	22
yaḥ+hi	yo hi	18
raḥ+ja	ro ja	17
yaḥ+bu	yo bu	14
naḥ+ga	no ga	9

Input	Output	Count
laḥ+dhā	lo dhā	7
haḥ+ra	ho ra	6
kaḥ+lo	ko lo	6

Table 7.23: Rutva, Utva and Guṇa-sandhi

• Repha-sandhi

Sūtra: ससजुषो रुः (A. 8.2.66)

Vṛtti: पदान्तस्य सस्य सजुष् शब्दस्य च रुः स्यात्।

Eng. tr.: The final *s* of a *pada*, which ends in *s*, and also the final *ṣ* of *sajuṣ* ‘companion, together with’, is replaced with *rU*.

Examples:

1. ubhayoḥ+api = ubhayorapi (BhG.1.26)
2. kaiḥ+mayā = kairmayā (BhG.1.22)
3. ahaḥ+yat = aharyad (BhG.8.17)
4. śrīḥ+vāk = śrīrvāk (BhG.10.34)
5. taiḥ+jitaḥ = tairjitaḥ (BhG.5.19)
6. ādiḥ+na = ādirna (BhG.15.3)
7. yajuḥ+eva = yajureva (BhG.9.17)
8. muniḥ+ucyate = munirucyate (BhG.2.56)
9. utsīdeyuḥ+ime = utsīdeyurime (BhG.3.24)
10. bandhuḥ+ātmā = bandhurātmā (BhG.6.5)
11. glāniḥ+bhavati = glānirbhavati (BhG.4.7)
12. vāyuḥ+gandhān = vāyurgandhān (BhG.15.8)
13. muniḥ+brahma = munirbrahma (BhG.5.6)
14. śuciḥ+dakṣaḥ = śucirdakṣaḥ (BhG.12.16)
15. smṛtiḥ+labdhā = smṛtirlabdhā (BhG.18.73)
16. ādiḥ+hi = ādirhi (BhG.10.2)
17. bhūtiḥ+dhruvā = bhūtirdhruvā (BhG.18.78)

To summarize the above 17 combinations in Table 7.25.

Input	Output	Count
yoh+a	yora	37
kaiḥ+ma	kairma	22
haḥ+ya	harya	19
śrīḥ+vā	śrīrvā	18
taiḥ+ji	tairji	13
diḥ+na	dirna	13
juh+e	jure	12
niḥ+u	niru	11
yuḥ+i	yuri	10
dhuḥ+ā	dhurā	9
niḥ+bha	nirbha	9
yuḥ+ga	yurga	8
niḥ+bra	nirbra	7
ciḥ+da	cirda	5
tiḥ+la	tirla	5
diḥ+hi	dirhi	5
tiḥ+dhru	tirdhru	3

Table 7.25: Repha-sandhi

- Rutva, Utva, Guṇa and Pūrvarūpa-sandhi

Sūtra 1: ससजुषो रुः (A. 8.2.66)

Vṛtti: पदान्तस्य सस्य सजुष् शब्दस्य च रुः स्यात्।

Eng. tr.: The final *s* of a *pada*, which ends in *s*, and also the final *ṣ* of *sajus* ‘companion, together with’, is replaced with *rU*.

Sūtra 2: अतो रोरप्लुतादप्लुते (A. 6.1.113)

Vṛtti: अप्लुतादतः परस्य रोः उः स्यात् अप्लुते अति।

Eng. tr.: An *uT* comes in place of a *rU* (*roh* which occurs after a non-*pluta* vowel, provided a non-*pluta* vowel follows and *saṃhitā* finds its scope.

Sūtra 3: आद् गुणः (A. 6.1.87)

**Vṛtti:** अवर्णादचि परे पूर्वपरयोरेको गुणादेशः स्यात्संहितायाम्।

**Eng. tr.:** A single replacement in *guṇa* comes in place of both, a vowel (*aC*) which follows *a* and the *a* which precedes that vowel, in *saṃhitā*.

**Sūtra 4:** एङः पदान्तादति (A. 6.1.109)

**Vṛtti:** पदान्तादेङोऽति परे पूर्वरूपमेकादेशः स्यात्।

**Eng. tr.:** A single replacement similar to the preceding comes in place of both, a vowel denoted by *eṆ* and the *aT* which follows *eṆ*, when *saṃhitā* finds its scope.

*aC* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ

*eṆ* = ए, ओ

*aT* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ, ह्, य्, व्, र्

**Example:**

ghnataḥ + api = ghnato'pi (BhG.1.35)

Rule 1: ghnatas + api = ghnataru + api

Rule 2: ghnataru + api = ghnatau + api

Rule 3: ghnatau + api = ghnato api

Rule 4: ghnato api = ghnato'pi (BhG.1.35)

There are 147 similar instances in BhG.

- **Satva-sandhi**

**Sūtra:** विसर्जनीयस्य सः (A. 8.3.34)

**Vṛtti:** खरि विसर्जनीयस्य सः स्यात्।

**Eng. tr.:** A *visarjanīya* is replaced with a *s* when a sound denoted by *khaR* follows.

*khaR* = ख्, फ्, छ्, ठ्, थ्, च्, ट्, त्, क्, प्, श्, ष्, स्

**Example:**

putrāḥ + tathā = putrāstathā (BhG.1.34)

There are 131 instances in BhG.

- **Rutva, Yatva and Lopa-sandhi**

**Sūtra 1:** ससजुषो रुः (A. 8.2.66)

**Vṛtti:** पदान्तस्य सस्य सजुष् शब्दस्य च रुः स्यात्।

**Eng. tr.:** The final *s* of a *pada*, which ends in *s*, and also the final *ṣ* of *sajuṣ*

‘companion, together with’, is replaced with *rU*.

**Sūtra 2:** भोभगोअघो अपूर्वस्य योऽशि (A. 8.3.17)

**Vṛtti:** एतत्पूर्वकस्य रोर्वादेशः स्यादशि परे।

**Eng. tr.:** The *r* of *rU* which occurs after *bho*, *bhago*, *agho* and *a* is replaced with *y* when a sound denoted by *aŚ* follows, and the context is that of close proximity between sounds.

**Sūtra 3:** हलि सर्वेषाम् (A. 8.3.22)

**Vṛtti:** भोभगोअघोअपूर्वस्य लध्वलघूच्चारणस्य यकारस्य लोपः स्याद्द्वलि सर्वेषां मतेन।

**Eng. tr.:** A deletion by *LOPA* comes, in the opinion of all scholars, in place of a *pada*-final *y* which occurs after *bho*, *bhago*, *agho* and *a*, provided a sound denoted by *haL* follows; and the context is that of close proximity between sounds.

*aŚ* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ, ह, य, व, र, ल, ज, म, ङ, ण, न, झ, भ, घ, ढ, ध, ज, ब, ग, ङ, द्

*haL* = य, व, र, ल, ज, म, ङ, ण, न, झ, भ, घ, ढ, ध, ज, ब, ग, ङ, द्, ख, फ, छ, ठ, थ, च, ट, त, क, प, श, ष, स, ह्

**Examples:**

- |                        |   |                              |
|------------------------|---|------------------------------|
| 1. kāmāḥ+yam           | = | kāmā yam (BhG.2.70)          |
| 2. nāyakāḥ+mama        | = | nāyakā mama (BhG.1.7)        |
| 3. arhāḥ+vayam         | = | arhā vayam (BhG.1.37)        |
| 4. sātṭvikāḥ+bhāvāḥ    | = | sātṭvikā bhāvāḥ (BhG.7.12)   |
| 5. devāḥ+dāsyante      | = | devā dāsyante (BhG.3.12)     |
| 6. dehāḥ+nityasya      | = | dehā nityasya (BhG.2.18)     |
| 7. mānasāḥ+jātāḥ       | = | mānasā jātāḥ (BhG.10.6)      |
| 8. divyāḥ+hi           | = | divyā hi (BhG.10.16)         |
| 9. guṇāḥ+guṇeṣu        | = | guṇā guṇeṣu (BhG.3.28)       |
| 10. bhāvāḥ+rājasāḥ     | = | bhāvā rājasāḥ (BhG.7.12)     |
| 11. vitatāḥ+brahmaṇaḥ  | = | vitatā brahmaṇaḥ (BhG.4.32)  |
| 12. kāmākāmāḥ+labhante | = | kāmākāmā labhante (BhG.9.21) |

**Example 9:**

Rule 1: guṇās + guṇeṣu = guṇāru + guṇeṣu

Rule 2: guṇāru + guṇeṣu = guṇāy + guṇeṣu

Rule 3: guṇāy + guṇeṣu = guṇā guṇeṣu (BhG.3.28)

To summarize the above 12 combinations in Table 7.27.

Input	Output	Count
māḥ+ya	mā ya	17
kāḥ+ma	kā ma	16
hāḥ+va	hā va	15
kāḥ+bhā	kā bhā	13
vāḥ+dā	vā dā	12
hāḥ+ni	hā ni	7
sāḥ+jā	sā jā	6
vyāḥ+hi	vyā hi	6
ṇāḥ+gu	ṇā gu	4
vāḥ+rā	vā rā	4
tāḥ+bra	tā bra	2
māḥ+la	mā la	1

Table 7.27: Rutva, Yatva and Lopa-sandhi

- **Rutva, Yatva and Lopa-sandhi**

Sūtra 1: ससजुषो रुः (A. 8.2.66)

Vṛtti: पदान्तस्य सस्य सजुष् शब्दस्य च रुः स्यात्।

Eng. tr.: The final *s* of a *pada*, which ends in *s*, and also the final *ṣ* of *sajuṣ* ‘companion, together with’, is replaced with *rU*.

Sūtra 2: भोभगोअघो अपूर्वस्य योऽशि (A. 8.3.17)

Vṛtti: एतत्पूर्वकस्य रोर्वादेशः स्यादशि परे।

Eng. tr.: The *r* of *rU* which occurs after *bho*, *bhago*, *agho* and *a* is replaced with *y* when a sound denoted by *aś* follows, and the context is that of close proximity between sounds.

Sūtra 3: लोपः शाकल्यस्य (A. 8.3.19)

Vṛtti: अवर्णपूर्वयोः पदान्तयोर्यवयोः वा लोपः अशि परे।

Eng. tr.: A *pada*-final *v* or *y* which occurs after *a* or *ā* is, in the opinion of Śākalya, replaced with *LOPA* when a sound denoted by *aś* follows and the context is that of close proximity between sounds.

*aś* = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ, ह्, य्, व्, र्, ल्, ज्, म्, ङ्, ण्, न्, झ्, भ्, घ्, ढ्, ध्, ज्, ब्, ग्, ङ्, ढ्

Examples:

1. saḥ+eva = sa eva (BhG.4.3)
2. yogaḥ+ucyate = yoga ucyate (BhG.2.48)
3. akṣaraḥ+iti = akṣara iti (BhG.8.21)
4. yuktaḥ+āsīta = yukta āsīta (BhG.2.61)
5. devāḥ+api = devā api (BhG.11.52)
6. avyayaḥ+īśvaraḥ = avyaya īśvaraḥ (BhG.15.17)
7. ataḥ+ūrdhvaṃ = ata ūrdhvaṃ (BhG.12.8)
8. onkāraḥ+ṛk = onkāra ṛk (BhG.9.17)

Example 5:

Rule 1: devās + api = devāru + api

Rule 2: devāru + api = devāy + api

Rule 3: devāy + api = devā api (BhG.11.52)

To summarize the above eight combinations in Table 7.28.

Input	Output	Count
aḥ+e	a e	30
aḥ+u	a u	16
aḥ+i	a i	13
aḥ+ā	a ā	10
āḥ+a	vā a	3
aḥ+ī	a ī	1
aḥ+ū	a ū	1
aḥ+ṛ	a ṛ	1

Table 7.28: Rutva, Yatva and Lopa-sandhi

• Rutva-sandhi

Sūtra 1: नश्छव्यप्रशान् (A. 8.3.7)

Vṛtti: अम्परे छवि नकारान्तस्य पदस्य रुः स्यात्।

Eng. tr.: A *pada*-final *n*, except for *n* of *praśān* ‘extreme tranquility’, is replaced with *rŪ* when a sound denoted by the abbreviatory term *chaV*, followed by another denoted by *aM*, follows, and the context is close proximity between sounds.

Sūtra 2: अनुनासिकात् परोऽनुस्वारः (A. 8.3.4)

Vṛtti: अनुनासिकं विहाय रोः पूर्वस्मात्परोऽनुस्वारागमः स्यात्।

Eng. tr.: An *anusvāra* comes after that which is other than an *anunāsika*, and which occurs before *rŪ*, provided close proximity between sounds finds its scope.

Sūtra 3: खरवसानयोर्विसर्जनीयः (A. 8.3.15)

Vṛtti: खरि अवसाने च परे रेफस्य विसर्जनीयः स्यात्पदान्ते।

Eng. tr.: A replacement in *visarjanīya* (*h*) comes in place of the final sound segment of a *pada* which ends in *r*, provided a sound denoted by *khaR*, or termination (of speech; *avasāna*), itself, follows and the context is that of close proximity between sounds.

Sūtra 4: विसर्जनीयस्य सः (A. 8.3.34)

Vṛtti: खरि विसर्जनीयस्य सः स्यात्।

Eng. tr.: A *visarjanīya* is replaced with a *s* when a sound denoted by *khaR* follows.

Sūtra 5: स्तोः श्चुना श्चुः (A. 8.4.40)

Vṛtti: सकारतवर्गयोः शकारचवर्गाभ्यां योगे शकारचवर्गौ स्तः।

Eng. tr.: Eng. tr.: A replacement in *ś*, and a sound denoted by *cU* as well, comes, respectively, in place of a *s*, and a sound denoted by *tU* ‘a consonant of the *t*-series’, when *ś*, and a sound denoted by *cU* ‘a consonant of the *c*-series’, occur in close proximity.

*chaV* = छ, ठ, थ, च, ट, त्

*khaR* = ख, फ, छ, ठ, थ, च, ट, त्, क्, प्, श्, ष्, स्

### Examples:

1. guṇān + ca = guṇāmśca (BhG.13.19)
2. sakhīn + tathā = sakhīmstathā (BhG.1.26)

### Example 1:

Rule 1: guṇān + ca = guṇāru + ca

Rule 2: guṇāru + ca = guṇāmru + ca

Rule 3: guṇāmru + ca = guṇāmḥ + ca

Rule 4: guṇāmḥ + ca = guṇāms + ca

Rule 5: guṇāms + ca = guṇāmśca (BhG.13.19)

For example 2, the last rule (sūtra 8.4.40) do not apply. To summarize both combinations in Table 7.29.

Input	Output	Count
n+t	m̐st	15
n+c	m̐śc	11

Table 7.29: Rutva-sandhi

### • Sulopa-sandhi

Sūtra: सोऽचि लोपे चेत्पादपूरणम् (A. 6.1.134)

Vṛtti: सस् इत्येतस्य सोर्लोपः स्यादचि पादश्चेत् लोपे सत्येव पूर्येत।

Eng. tr.: The *sU* of *saḥ* is deleted when a vowel (*aci*) follows, provided this deletion facilitates completion of the quarter of a verse (*pādapūrṇam*).

aC = अ, इ, उ, ऋ, लृ, ए, ओ, ऐ, औ

### Examples:

1. priyāyāḥ + arhasi = priyāyārhasi (BhG.11.44)
2. śakyaḥ + aham = śakya aham (BhG.11.48, 54)

There are only three instances in BhG.

## 7.4 Summary

In this chapter we have discussed the types and sub-types of *sandhi*. We noticed that out of around hundred sūtras that deal with *sandhi* in the *Aṣṭādhyāyī*, the knowledge of around thirty sūtras is sufficient to understand all instances of external sandhi

i.e. sandhi between the padas. Further, we also notice that only some of them are found to be used frequently and majority of them have occurred very rarely. Thus this study has helped us to identify the frequently used sandhi rules. Highest instances are found in *Visarga sandhi* with sub-types *Visarga*, *Repha*, *Satva*, *Rutva* and combination of sub-types *Rutva*, *Utva* and *Guṇa*; *Rutva*, *Utva*, *Guṇa* and *Pūrvarūpa* and *Rutva*, *Yatva* and *Lopa*. It is followed by *Hal sandhi* with sub-types *Anusvāra*, *Jaśtva* and *Na-muṭ āgama* and combination of sub-types *Jaśtva* and *Cartva*; *Satva* and *Ścutva*; *Jaśtva* and *Anunāsika*; *Jaśtva* and *Ścutva*; *Jaśtva*, *Ścutva*, *Cartva* and *Chatva* and *Jaśtva*, *Ścutva* and *Cartva*. Lastly high instances are found in *Ac sandhi* with sub-types *Savarṇa*, *Yaṇ*, *Vṛddhi*, *Guṇa*, *Pūrvarūpa*. In the next chapter we will discuss the compound analysis giving the syntactic as well as semantic classification alongwith the statistics and example from BhG.

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## CHAPTER 8

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### COMPOUND ANALYSIS

*Padas* which are syntactically as well as semantically linked through grammatical process are known as ‘*Samāsa*’.<sup>1</sup> In this chapter we will discuss the compound analysis starting with the statistical analysis followed by syntactic and semantic classification and conclude with our observations. In BhG, around 17% of the words are compounds. Thus one in every six words is a compound word. Each verse has approxiamtely six to seven words in it. Thus every verse has at least one compound in it. In order to understand any verse, therefore, good knowledge of compounds is necessary.

#### 8.1 Statistical Analysis

The compatibility (*sāmarthya*) of the integrated two or more than two constituents to give a single integrated (*ekārthībhāva*) and distinct meaning is known as ‘*Samāsa*’.<sup>2</sup> The component parts hold as members of a sentence, certain relations among themselves, or conjointly with some other word in the same sentence. Hence the compound word ‘*rājapuruṣaḥ*’ when split in two components *rājñāḥ* and *puruṣaḥ* conveys the relation of a master and his servant while in the latter case as seen in sentence

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<sup>1</sup> samarthaḥ padavidhiḥ — A. 2.1.1

<sup>2</sup> ekārthībhāvāpannapadasamudāyaviśeṣatvaṃ samāsatvaṃ — Bhūṣaṇasāra 28

‘*pītāmbaram harim pūjaya*’, the compound word *pītāmbara* is related to *hari* expressing qualifier-qualified relationship. Kumar et al. (2010) has listed the following features of a compound:

1. It is a single word (*ekapadam*).
2. It has a single case suffix (*ekavibhaktikam*) with an exception of (*aluk*) compounds such as (*yudhiṣṭirah*), where there is no deletion of case suffix of the first component.
3. It has a single accent (*ekasvarah*).
4. The order of components in a compound is fixed.
5. No words can be inserted in between the compounds.
6. The compound formation is binary with an exception of *dvandva* and *bahupada bahuvrīhi*.
7. *Sandhi* is a must in a compound formation.
8. Constituents of a compound may require special gender or number different from their default gender and number. e.g. *pāṇipādam*, *pācikābhāryaḥ* etc.

We repeat below the steps we followed for analysing a compound in BhG:

- Split the compound in smaller components.
- Show the constituent components and constituent compounds explicitly.
- Recognize the type of each constituting compound and the overall compound.
- Provide the *vigraha vākya* (paraphrase) of the compound.
- Accordingly tag the compound with the help of *Pāṇinian sūtras*.

In the next section we discuss the syntactic classification based on various patterns formed by grouping components ranging from two to seven. Each pattern is explained with the help of an example from BhG.

## 8.2 Syntactic Classification

The compound formation is binary which is grouped as *<a-b>* but there may be more than two components in a word and the grouping of these constituents may increase with multiple possibilities. However, only one possibility could be considered correct

in a given context. Thus there are two possible ways of grouping three components ‘a-b-c’ viz.

$\langle a-\langle b-c \rangle \rangle$  or  $\langle \langle a-b \rangle -c \rangle$  where again context plays a role in determining the correct parse.

Gupta (2010) showed five possible ways of grouping four components ‘a-b-c-d’ viz.

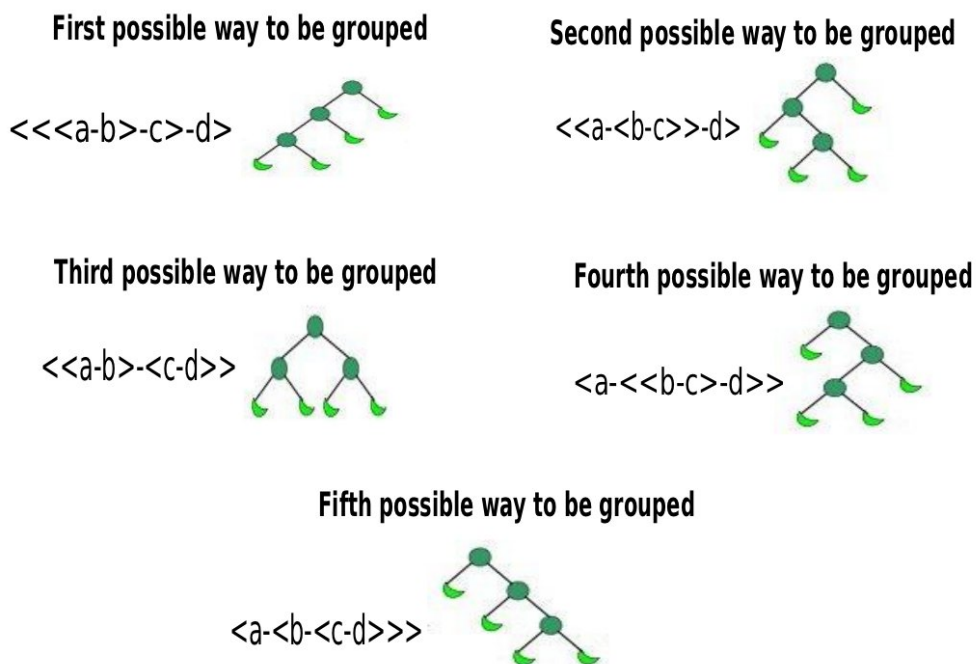


Figure 8.1: Possible Parses

In BhG we found compounds with as many as seven components. The statistics of different components in a word and their instances is given in Table 8.1.

Components	Count
7	4
6	2
5	7
4	72
3	239
2	1190
<b>Total</b>	<b>1514</b>

Table 8.1: Component Statistics

- There are three parsed patterns in compounds with seven components viz.

1. <<<a-b-c-d-e>-f>-g>

e.g. janma-mṛtyu-jarā-vyādhi-duḥkha-doṣa-anudarśanam (BhG. 13.8) is parsed as

<<<janma-mṛtyu-jarā-vyādhi-duḥkha>Di-doṣa>T7-anudarśanam>T6

(Gloss: <<<birth-death-oldage-disease-distress>Di-fault>T7-observance>T6)

2. <<a-b-c-d-e-f>-g>

e.g. āyuh-sattva-bala-ārogya-sukha-prīti-vivardhanāḥ (BhG. 17.8) is parsed as

<<āyuh-sattva-bala-ārogya-sukha-prīti>Di-vivardhanāḥ>T6

(Gloss: <<life-intelligence-strength-health-happiness-satisfaction>Di-increase>T6)

3. <a-b-c-d-e-f-g>

e.g. suhṛt-mitra-ari-udāsīna-madhyastha-dveṣya-bandhuṣu (BhG. 6.9) is parsed as

<suhṛt-mitra-ari-udāsīna-madhyastha-dveṣya-bandhuṣu>Di

(Gloss: <among\_well\_wisher-friend-enemy-one\_who\_is\_neutral- mediator-one\_who\_is\_envious-relatives>Di)

Only one instance each of first two patterns and two instances of third pattern were found in BhG.

- With compounds having six components similarly two parsed patterns were found each having only instance viz.

1. <<a-b>-<c-d-e-f>>

e.g. an-eka-bāhu-udara-vaktra-netram (BhG. 11.16) is parsed as

<<an-eka>Tn-<bāhu-udara-vaktra-netram>Ds>Bs7

(Gloss: <<infinite>Tn-<arm-belly-face-eye>Ds>Bs7)

2. <<a-<b-c>-d-e>-f>

e.g. deva-dvi-ja-guru-prājña-pūjanam (BhG. 17.14) is parsed as

<<deva-<dvi-ja>U-guru-prājña>Di-pūjanam>T6

(Gloss: <<god-<brahmana>U-perceptor-wise\_person>Di-worship>T6)

- In case of compounds with five components, we found five parsed patterns viz.

1. <<<a-b>-<c-d>>-e>

e.g. sarva-bhūta-ātma-bhūta-ātmā (BhG. 5.7) is parsed as

<<<sarva-bhūta>K1-<ātma-bhūta>K6>T6-ātmā>Bs6

(Gloss: <<<all-beings>K1-self-being>K6>T6-self>Bs6)

Two instances were found in BhG.

2. <<<a-<b-c>>-d>-e>

e.g. sat-a-sat-yoni-janmasu (BhG. 13.21) is parsed as

<<<sat-<a-sat>Tn>Di-yoni>T6-janmasu>T7

(Gloss: <<<good-<evil>Tn>Di-species>T6-in\_life>T7)

Only one instance was found in BhG.

3. <<a-b-c-d>-e>

e.g. gandharva-yakṣa-asura-siddha-saṅghāḥ (BhG. 11.22) is parsed as

<<gandharva-yakṣa-asura-siddha>Di-saṅghāḥ>T6

(Gloss: <<gandharva-yakṣa-asura-siddha>Di-assemblies>T6)

Only one instance was found in BhG.

4. <a-<<b-c>-<d-e>>>

e.g. sa-adhi-bhūta-adhi-daivam (BhG. 7.30) is parsed as

<sa-<<adhi-bhūta>A1-<adhi-daivam>A1>Di>BvS

(Gloss: <with-<<master\_of\_material-manifestation>A1-<master\_of\_celestials>A1>Di>BvS)

Two instances were found in BhG.

5. <a-<b-c>-d-e>

e.g. divya-an-eka-udyata-āyudham (BhG. 11.10) is parsed as

<divya-<<an-eka>Tn-<udyata-āyudham>K1>K1>Bs7

(Gloss: <divine-<<many>Tn-<uplifted-weapons>K1>K1>Bs7)

Only one instance was found in BhG.

There are two instances in the first and fourth pattern while other patterns have only one instance in BhG.

- Those compounds having four components, we have given the possible five parsed patterns in Figure 8.1. In Table 8.2, we give the number of instances for each pattern found in BhG.

P.No.	Pattern	Freq.
First	<<<a-b>-c>-d>	23
Second	<<a-<b-c>>-d>	10
Third	<<a-b>-<c-d>>	10
Fifth	<a-<b-<c-d>>>	3
Fourth	<a-<<b-c>-d>>	2

Table 8.2: Compounds with 4 constituents

Example of each pattern is as follows—

**First** <<<a-b>-c>-d>

e.g. aśru-pūrṇa-ākula-īkṣaṇam (BhG. 2.1) is parsed as

<<<aśru-pūrṇa>T3-ākula>Di-īkṣaṇam>Bs6

(Gloss: <<<tears-filled>T3-sad>Di-eyes>Bs6)

**Second** <<a-<b-c>>-d>

e.g. ahaṅkāra-vi-mūḍha-ātmā (BhG. 3.27) is parsed as

<<ahaṅkāra-<vi-mūḍha>Tp>T3-ātmā>Bs6

(Gloss: <<egoistic\_mind-<filled\_with\_ignorance>Tp>T3-soul>Bs6)

**Third** <<a-b>-<c-d>>

e.g. su-kṛta-duṣ-kṛte (BhG. 2.50) is parsed as

<<su-kṛta>K1-<duṣ-kṛte>K1>Di

(Gloss: <<good\_action>K1-<evil\_action>K1>Di)

**Fifth** <a-<b-<c-d>>>

e.g. sa-cara-a-caram (BhG. 11.7) is parsed as

<sa-<cara-<a-caram>Tn>Di>BvS

(Gloss: <consisting\_of-<living-<non-living>Tn>Di>BvS)

**Fourth <a-<b-c>-d>>**

e.g. yata-citta-indriya-kriyaḥ (BhG. 6.12) is parsed as

<yata-<<citta-indriya>Di-kriyaḥ>T6>Bs3

(Gloss: <control-<<mind-senses>Di-actions>T6>Bs3)

Additionally, there are three more patterns found in BhG viz.

**1. <<a-b-c>-d>**

e.g. caila-ajina-kuśa-uttaram (BhG. 6.11) is parsed as

<<caila-ajina-kuśa>Di-uttaram>Bs7

(Gloss: <<soft\_cloth-deerskin-kusa\_grass>Di-spread thereon>Bs7)

**2. <a-<b-c-d>>**

e.g. tulya-nindā-ātma-saṁstutiḥ (BhG. 14.24) is parsed as

<tulya-<nindā-ātma-saṁstutiḥ>Ds>Bs6

(Gloss: <equal-<blame-self-praise>Ds>Bs6)

**3. <a-b-c-d>**

e.g. vihāra-śayyā-āsana-bhojaneṣu (BhG. 11.42) is parsed as

<vihāra-śayyā-āsana-bhojaneṣu>Ds

(Gloss: <playing-sleeping-sitting-eating>Ds)

There are 11 instances each for the first two patterns and 2 instances for the third pattern in BhG.

- As discussed before, there are three parsed patterns in compounds with three components viz.

**1. <<a-b>-c>**

e.g. abhyāsa-yoga-yuktena (BhG. 8.8) is parsed as

<<abhyāsa-yoga>K6-yuktena>T3

(Gloss: <<form\_of\_practice-of\_yoga>K6-engaged>T3)

There are 169 instances found in BhG.

**2. <a-<b-c>>**

e.g. a-karma-kṛt (BhG. 3.5) is parsed as

<a-<karma-kṛt>U>Tn

(Gloss: <without-<action-performance>U>Tn)

There are 64 instances found in BhG.

3. <a-b-c>

e.g. kāya-śiraḥ-grīvam (BhG. 6.13) is parsed as

<kāya-śiraḥ-grīvam>Ds

(Gloss: <body-head-neck>Ds)

There are 6 instances found in BhG.

The statistics of those compounds having only two components is given in Table 8.3.

Compounds	Count
Tatpuruṣa	759
Bahuvrīhi	390
Dvandva	27
Avyayībhāva	14
<b>Total</b>	<b>1190</b>

Table 8.3: Two Component Statistics

It is noted that maximum instances are of *Tatpuruṣa* followed by *Bahuvrīhi* while *Dvandva* and *Avyayībhāva* compounds are minimum. In the next section we discuss the semantic classification of compounds.

## 8.3 Semantic Classification

Compound is semantically classified in four types<sup>3</sup> viz.,

1. Avyayībhāva

2. Tatpuruṣa

This type is further classified in ‘Karmadhāraya’ which is further sub-classified in ‘Dvigu’.

3. Bahuvrīhi

<sup>3</sup> cakārabahulo dvandvaḥ sa cāsau karmadhāraya|  
yasya yeṣāṃ bahuvrīhiḥ śeṣatatpuruṣaḥ smṛtaḥ||— samāsacakram 4

#### 4. Dvandva

It is further classified in 'Itaretarayoga' and 'Samāhāra'.

Based on the above types and sub-types, a hierarchical tagset of 55 tags has been designed to tag the Sanskrit compounds following the guidelines of SHMT Consortium.<sup>4</sup> The sub-types are classified according to Sanskrit grammar and conventional usage. We have taken into account only those tags pertaining to BhG and discuss them in the next section.

### 8.4 Relevant Pāṇinian Grammar Rules

We present below the above-mentioned types and sub-types of compounds beginning with the most frequent compound i.e. *Tatpuruṣa* followed by *Bahuvrīhi*, *Dvandva* and *Avyayībhāva*. Each compound type and its sub-type is explained further by providing the brief features, their relevant *Pāṇinian sūtras* and an example from BhG.

#### 8.4.1 Tatpuruṣa

Where the meaning of the final member is predominant is termed *Tatpuruṣa*. *Pāṇinian sūtras* governing this compound type are A. 2.1.22 — 2.2.22. Some features of this compound are as follows:

- Generally the first member determines the sense of the other and is subordinate to it.
- The gender and number of the compound is in accordance with that of the final member.<sup>5</sup>
- *Tatpuruṣa* compound is classified in seven major sub-categories namely *Tatpuruṣa*, *Karmadhāraya*, *Nañ-Prādi-Ku-Gati-Tatpuruṣa*, *Dvigu*, *Upapada-Tatpuruṣa*, *Mayūravayamsakādi-Tatpuruṣa* and *Bahupada-Tatpuruṣa*.

There are in total 973 instances in BhG. Figure 8.2 summarises the *Tatpuruṣa* statistics.

<sup>4</sup> <https://sanskrit.uohyd.ac.in/scl/Corpus/TaggingGuidelines/>

<sup>5</sup> paravallīṅgaṃ dvandvatatpuruṣayoḥ — A. 2.4.26

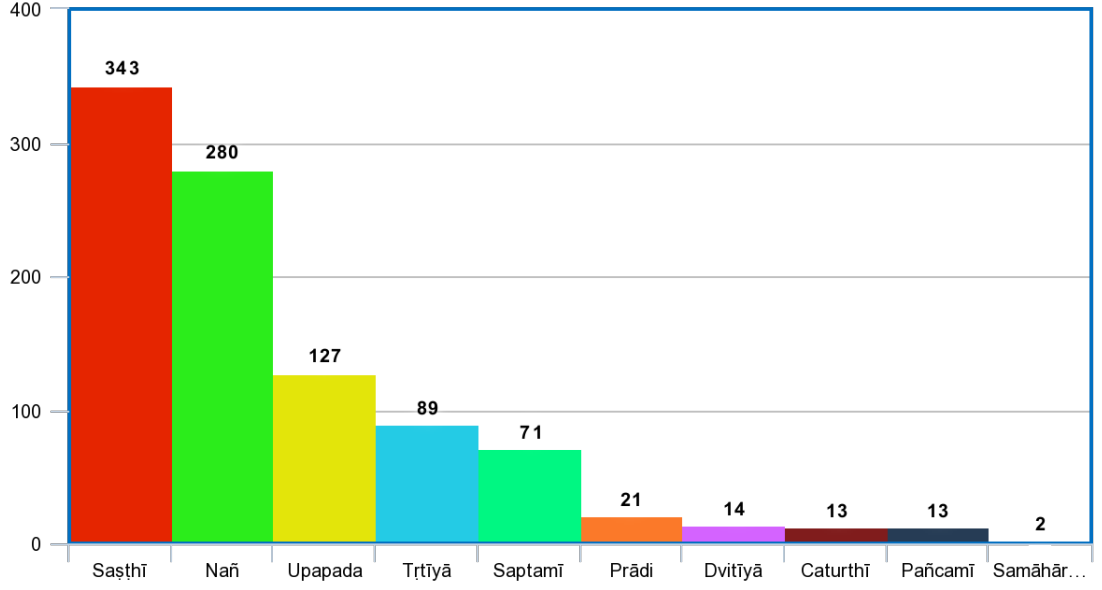


Figure 8.2: Tatpuruṣa Compound

Maximum instances of Ṣaṣṭhī-Tatpuruṣa followed by Nañ-Tatpuruṣa and Upapada-Tatpuruṣa are found. We discuss below each of the above compound sub-types starting with the most frequent.

### 1. Tatpuruṣa

It is also known as *Vyadhikaraṇa-Tatpuruṣa* in the sense different objects are referred by different *vibhaktis*. There are seven sub-varieties of this sub-category based on the *vibhakti* of the initial member namely *Prathamā-Tatpuruṣa*, *Dvītīyā-Tatpuruṣa*, *Tṛtīyā-Tatpuruṣa*, *Caturthī-Tatpuruṣa*, *Pañcamī-Tatpuruṣa*, *Ṣaṣṭhī-Tatpuruṣa* and *Saptamī-Tatpuruṣa* of which in BhG six sub-varieties were found.

- **Ṣaṣṭhī-Tatpuruṣaḥ**

Where the initial member is in sixth case-suffix is known as *Ṣaṣṭhī-Tatpuruṣaḥ*.

It is governed by *Pāṇinian sūtras* A. 2.2.8 – 2.2.10 and is given the tag ‘T6’.

e.g. *Abhikramanāśaḥ* = *abhikramasya nāśaḥ* (BhG. 2.40)

There are 343 instances in BhG.

- **Tṛtīyā-Tatpuruṣaḥ**

Where the initial member is in third case-suffix is known as *Tṛtīyā-Tatpuruṣaḥ*.

It is governed by *Pāṇinian sūtras* A. 2.1.30 – 2.1.35 and is given the tag ‘T3’.

e.g. Ātmatṛptaḥ = *ātmanā trptaḥ* (BhG. 3.17)

There are 89 instances in BhG.

- **Saptamī-Tatpuruṣaḥ**

Where the initial member is in seventh case-suffix is known as *Saptamī-Tatpuruṣaḥ*. It is governed by *Pāṇinian sūtras* A. 2.1.40 – 2.1.48 and is given the tag ‘T7’.

e.g. Yuddhaviśāradaḥ = *yuddhe viśāradaḥ* (BhG. 1.9)

There are 71 instances in BhG.

- **Dvitiyā-Tatpuruṣaḥ**

Where the initial member is in second case-suffix is known as *Dvitiyā-Tatpuruṣaḥ*. It is governed by *Pāṇinian sūtras* A. 2.1.24, 28, 29 and is given the tag ‘T2’.

e.g. Priyacikīrṣavaḥ = *priyam cikīrṣavaḥ* (BhG. 1.23)

There are 14 instances in BhG.

- **Caturthī-Tatpuruṣaḥ**

Where the initial member is in fourth case-suffix is known as *Caturthī-Tatpuruṣaḥ*. It is governed by *Pāṇinian sūtra* A. 2.1.36 and is given the tag ‘T4’.

e.g. Yajñārthāt = *yajñāya idam yajñārtham tasmāt* (BhG. 3.9)

There are 13 instances in BhG.

- **Pañcamī-Tatpuruṣaḥ**

Where the initial member is in fifth case-suffix is known as *Pañcamī-Tatpuruṣaḥ*.

It is governed by *Pāṇinian sūtras* A. 2.1.37 – 2.1.39 and is given the tag ‘T5’.

e.g. Yogabhraṣṭaḥ = *yogāt bhraṣṭaḥ* (BhG. 6.41)

There are 13 instances in BhG.

## 2. Nañ-Prādi-Tatpuruṣa

**Nañ** Where the particle ‘na’ denoting the sense of negation is prefixed to a word is called *Nañ-Tatpuruṣa*. It is governed by *Pāṇinian sūtra* A. 2.2.6 and is given the tag ‘Tn’.

e.g. Adhruvam = *na dhruvam* (BhG. 17.18)

There are 280 instances in BhG.

**Prādi** Where the prepositions including indeclinables are prefixed to a word is called *Prādi-Tatpuruṣa*. It is governed by *Pāṇinian sūtra* A. 2.2.18 and is given the tag ‘Tp’.

e.g. Vijñānam = *viśiṣṭam jñānam* (BhG. 18.42)

There are 21 instances in BhG.

There are no instances of *Ku-Tatpuruṣa* and *Gati-Tatpuruṣa* in BhG.

### 3. Upapada-Tatpuruṣa

Where the initial member contains an *upapada* and the final member contains a verbal derivative word (*kṛt*) is called *Upapada-Tatpuruṣa*. The whole compound is either an adjective or an adverb. It is governed by *Pāṇinian sūtras* A. 2.2.19, 3.1.92. There are five sub-types namely *Dvitiyopapada-Tatpuruṣa*, *Trītiyopapada-Tatpuruṣa*, *Caturthyopapada-Tatpuruṣa*, *Pañcamyopapada-Tatpuruṣa* and *Saptamyopapada-Tatpuruṣa*. All these are marked by a common tag ‘U’. Five types of *Upapada-Tatpuruṣa* are found in BhG namely,

- **Dvitiyopapada-Tatpuruṣa**

e.g. Vedavit = *vedān vetti iti* (BhG. 15.1)

There are 77 instances in BhG.

- **Saptamyopapada-Tatpuruṣa**

e.g. Yogasthaḥ = *yoge tiṣṭhati iti* (BhG. 2.48)

There are 26 instances in BhG.

- **Pañcamyopapada-Tatpuruṣa**

e.g. Prakṛtijān = *prakṛteḥ jāyate iti prakṛtijāḥ tān prakṛtijān* (BhG. 13.21)

There are 13 instances in BhG.

- **Avyayopapada-Tatpuruṣa**

e.g. Ajñāḥ = *na jānāti iti* (BhG. 4.40)

There are eight instances in BhG.

- **Tṛtīyopapada-Tatpuruṣa**

e.g. Karmajā = *karmaṇā jāyate iti* (BhG. 4.12)

There are three instances in BhG.

These compounds are summarized through Table 8.4.

Upapada-Tatpuruṣa	Freq.
Dvītiyopapada	77
Saptamyopapada	26
Pañcamyopapada	13
Avyayopapada	8
Tṛtīyopapada	3

Table 8.4: Upapada-Tatpuruṣa Compound

#### 4. Karmadhāraya

It is also known as *Samānādhikaraṇa-Tatpuruṣa*. The components of this compound sub-type could be a noun or an adjective qualifying the member. It follows the gender of qualified member. This category is further semantically subdivided into eight namely *Viśeṣaṇa-pūrvapada-Karmadhāraya*, *Viśeṣaṇa-uttarapada-Karmadhāraya*, *Viśeṣaṇa-ubhayapada-Karmadhāraya*, *Upamāna-pūrvapada-Karmadhāraya*, *Upamāna-uttarapada-Karmadhāraya*, *Avadhāraṇa-pūrvapada-Karmadhāraya*, *Sambhāvanā-pūrvapada-Karmadhāraya* and *Madhyamapadalopi-Karmadhāraya*. We found six sub-divisions in BhG having in total 207 instances which is summarized in Figure 8.3.

Maximum instances of *Viśeṣaṇa-pūrvapada-Karmadhāraya* followed by *Avadhāraṇa-pūrvapada-Karmadhāraya* are found while *Madhyamapadalopi-Karmadhāraya*, *Sambhāvanā-pūrvapada-Karmadhāraya*, *Viśeṣaṇa-ubhayapada-Karmadhāraya*, *Upamāna-uttarapada-Karmadhāraya* and *Upamāna-pūrvapada-Karmadhāraya* are minimum. Each of these compounds are discussed below.

- **Viśeṣaṇa-pūrvapada-Karmadhārayaḥ**

Where the qualifier is the initial member and the qualificand is the second member is termed as *Viśeṣaṇa-pūrvapada-Karmadhārayaḥ*. It is governed by *Pāṇinian sūtra A. 2.1.57* and is given the tag ‘K1’.

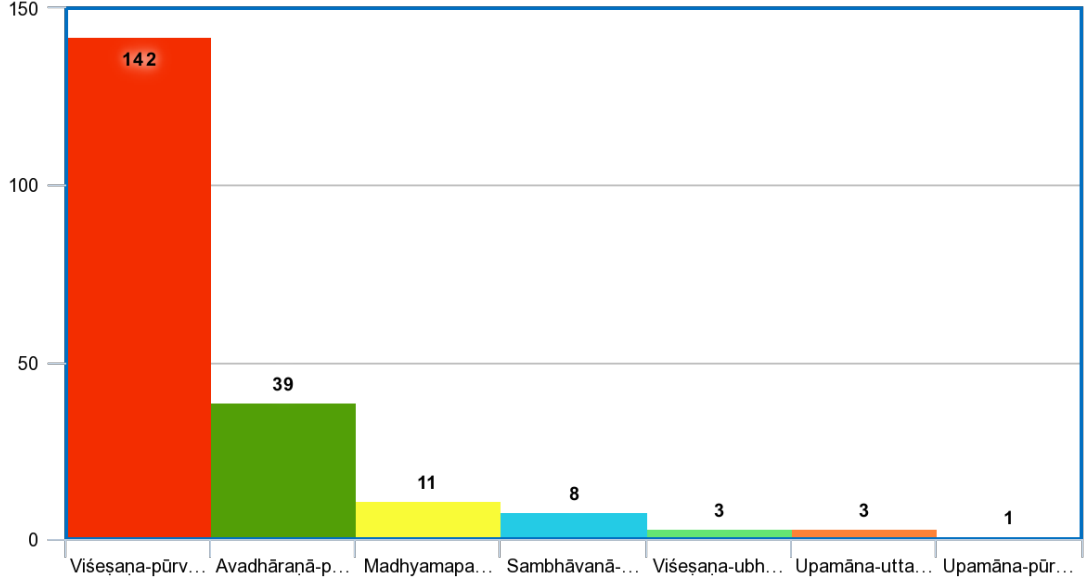


Figure 8.3: Karmadhāraya Compound

e.g. Chinnaabhram = *chinnam tat abhram ca* (BhG. 6.38)

There are 142 instances in BhG.

- **Avadhāraṇā-pūrvapada-Karmadhārayaḥ**

Where both the members having relation of *upamāna* and *upameya* are identified as a metaphor is termed *Avadhāraṇā-pūrvapada-Karmadhārayaḥ*. It is governed by *Pāṇinian sūtra* A. 2.1.57 and is given the tag 'K6'.

e.g. Abhyāsayogena = *abhyāsaḥ eva yogaḥ* (BhG. 12.9)

There are 39 instances in BhG.

- **Madhyamapadalopī-Karmadhārayaḥ**

Where the last word of the initial member vanishes is termed as *Madhyamapadalopī-Karmadhārayaḥ*. It is governed by *Pāṇinian sūtra* A. 2.1.57 and is given the tag 'Km'.

e.g. Nāmayajñaiḥ = *nāma rūpaḥ yajñaiḥ* (BhG. 16.17)

There are 11 instances in BhG.

- **Sambhāvanā-pūrvapada-Karmadhārayaḥ**

Where both the members have the relation of qualifier-qualified in the sense the first member is described by the second member is termed as *Sambhāvanā-pūrvapada-Karmadhārayaḥ*. It is governed by *Pāṇinian sūtra*

A. 2.1.57 and is given the tag ‘K7’.

e.g. *Karmasañjñitaḥ* = *karma iti sañjñā, karmaṇaḥ sañjātā* (BhG. 8.3)

There are eight instances in BhG.

- **Viśeṣaṇa-ubhayapada-Karmadhārayaḥ**

Where both the qualifier and qualificand are adjectives is termed as *Viśeṣaṇa-ubhayapada-Karmadhārayaḥ*. It is governed by *Pāṇinian sūtras* A. 2.1.60, 69 and is given the tag ‘K3’.

e.g. *Dīptahutāśaḥ* = *dīptaḥ ca asau hutāśaḥ ca* (BhG. 11.19)

There are three instances in BhG.

- **Upamāna-uttarapada-Karmadhārayaḥ**

Where the first member is *upameya* and second member is *upamāna* is termed as *Upamāna-uttarapada-Karmadhārayaḥ*. It is governed by *Pāṇinian sūtras* A. 2.1.56, 2.1.62 and is given the tag ‘K5’.

e.g. *Puruṣavyāghra* = *puruṣaḥ iva vyāghraḥ* (BhG. 18.4)

There are three instances in BhG.

- **Upamāna-pūrvapada-Karmadhārayaḥ**

Where the initial member is an *upamāna* is termed as *Upamāna-pūrvapada-Karmadhārayaḥ*. It is governed by *Pāṇinian sūtra* A. 2.1.55 and is given the tag ‘K4’.

e.g. *Kusumākaraḥ* = *kusumam iva ākaraḥ* (BhG. 10.35)

There is just one instance in BhG.

## 5. Dvigu

Where the initial member consists of numeral adjective and final member contains a noun is known as *Dvigu-Tatpuruṣa*. The whole compound is in neuter gender and singular number.<sup>6</sup> There are three sub-varieties viz. *Taddhitārtha-Dvigu*, *Uttarapada-Dvigu* and *Samāhāra-Dvigu*. These are governed by the *Pāṇinian sūtras* A. 2.1.23, 2.1.51, 2.1.52. In BhG only *Samāhāra-Dvigu* is found.

### Samāhāra-Dvigu

Where there is aggregation of a particular thing is termed as *Samāhāra-Dvigu*.

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<sup>6</sup> sa napuṃsakam — A. 2.4.17

It is in neuter indicating a single object and is marked by tag ‘Tds’.<sup>7</sup>

e.g. Cāturvarṇyam = *caturṇām varṇānām samāhāraḥ* (BhG. 4.13)

There are only two instances in BhG.

#### 8.4.2 Bahuvrīhi

Where altogether a new meaning is formed when two or more components are combined, is known as ‘Bahuvrīhi’. Pāṇinian sūtras governing this compound type are A. 2.2.24 – 2.2.28. Some features of this compound are as follows:

- The initial member contains either a noun or an adjective and the final member contains a noun.
- The whole compound becomes an adjective and gets the gender and number of the qualificand.
- On dissolution the *vigraha-vākya* includes the pronoun ‘yat’ in any one of six *vibhaktis* such as ‘yam, yena, yasmai, yasmāt, yasya, yasmin’.

This type is semantically divided into two divisions viz.

**Samānādhikaraṇa** Where the constituents are in the same *vibhakti* and refer to the same object is termed *Samānādhikaraṇa*. It is further divided into 11 sub-types namely *Dvitiyārtha-Bahuvrīhi*, *Trītiyārtha-Bahuvrīhi*, *Caturthyārtha-Bahuvrīhi*, *Pañcamyārtha-Bahuvrīhi*, *Ṣaṣṭhyārtha-Bahuvrīhi*, *Saptamyārtha-Bahuvrīhi*, *Digvācaka-Bahuvrīhi*, *Samkhyobhayapada-Bahuvrīhi*, *Upamānapūrvapada-Bahuvrīhi*, *Praharāṇaviśayaka-Bahuvrīhi* and *Grahāṇaviśayaka-Bahuvrīhi*. However, only seven sub-types are found in BhG. This is summarized in Figure 8.4.

It is noted that only the sub-type *Ṣaṣṭhyārtha-Bahuvrīhiḥ* has the maximum frequency compared to other five above-mentioned sub-types. We discuss each of these below.

- **Ṣaṣṭhyārtha-Bahuvrīhiḥ**

The compound consisting of sixth case-suffix is termed as *Ṣaṣṭhyārtha-Bahuvrīhiḥ* and is marked by tag ‘Bs6’.

<sup>7</sup> dvigurekavacanam – A. 2.4.1

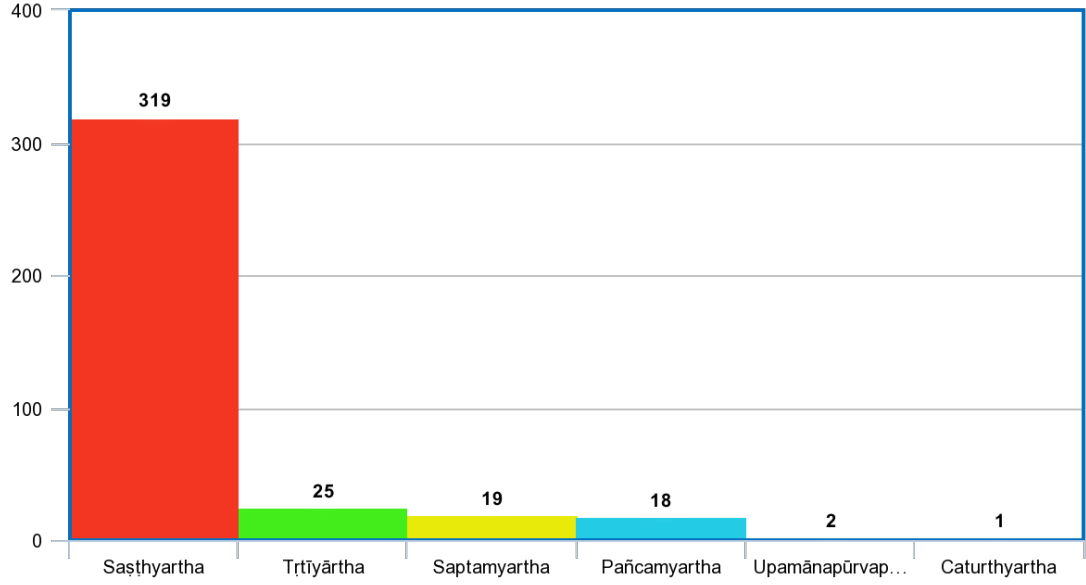


Figure 8.4: Samānādhikaraṇa-Bahuvrīhi Compound

e.g. Puṇyakarmaṇām = *puṇyāṇi karmāṇi yeṣām te* (BhG. 7.28)

There are 319 instances in BhG.

- **Tr̥tīyārtha-Bahuvrīhi**

The compound consisting of third case-suffix is termed as *Tr̥tīyārtha-Bahuvrīhi* and is marked by tag ‘Bs3’.

e.g. Jitātmanaḥ = *jitaḥ ātmā yena saḥ* (BhG 6.7)

There are 25 instances in BhG.

- **Saptamyārtha-Bahuvrīhi**

The compound consisting of seventh case-suffix is termed as *Saptamyārtha-Bahuvrīhi* and is marked by tag ‘Bs7’.

e.g. Bahuśākhāḥ = *bahvayaḥ śākhāḥ yāsām tāḥ* (BhG. 2.41)

There are 19 instances in BhG.

- **Pañcamyārtha-Bahuvrīhi**

The compound consisting of fifth case-suffix is termed as *Pañcamyārtha-Bahuvrīhi* and is marked by tag ‘Bs5’.

e.g. Vitarāgāḥ = *vītaḥ rāgaḥ yasmāt saḥ* (BhG. 8.11)

There are 18 instances in BhG.

- **Upamānapūrvapada-Bahuvrīhiḥ**

Where the initial member consists an *upamāna* is termed *Upamānapūrvapada-Bahuvrīhiḥ* and is marked by tag ‘Bsū’. e.g. *Ādityavarṇam = ādityasya iva varṇaḥ yasya saḥ* (BhG. 8.9)

There are just two instances in BhG.

- **Caturthyartha-Bahuvrīhiḥ**

The compound consisting of fourth case-suffix is termed as *Caturthyartha-Bahuvrīhiḥ* and is marked by tag ‘Bs4’.

e.g. *Maṇipuṣpakaḥ = maṇayaḥ puṣpāṇi iva yasmin saḥ* (BhG. 1.16)

There is just one instance in BhG.

**Vyadhikaraṇa** Where the constituents are in different *vibhaktis* referring to different objects is termed *Vyadhikaraṇa*. There are six sub-types namely *Saṅkhyottarapada-vyadhikaraṇa-Bahuvrīhi*, *Sahapūrvapada-vyadhikaraṇa-Bahuvrīhi*, *Prādi-vyadhikaraṇa-Bahuvrīhi*, *Upamānapūrvapada-vyadhikaraṇa-Bahuvrīhi*, *Nañ-bahuvrīhi* and *Bahupada-Bahuvrīhi*. In BhG there are four sub-types. This is summarized in Figure 8.5.

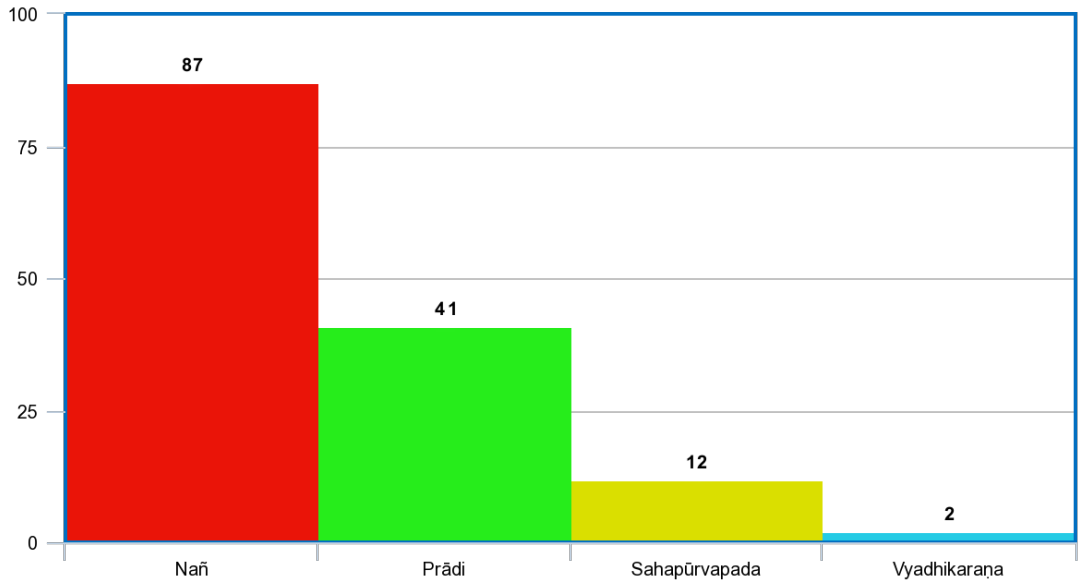


Figure 8.5: Vyadhikaraṇa-Bahuvrīhiḥ Compound

It is noted that maximum frequency is of *Nañ-Bahuvrīhiḥ* followed by *Prādi-Bahuvrīhiḥ* while the other two *Sahapūrvapada-Bahuvrīhiḥ* and *Vyadhikaraṇa-Bahuvrīhiḥ* are minimum. We discuss each of these below.

- **Astyartha-madhyamapadalopī (nañ)-Bahuvrīhiḥ**

Where the initial member consists particle ‘na’ prefixed is termed *Astyartha-madhyamapadalopī (nañ)-Bahuvrīhiḥ* and is marked by tag ‘Bsmn’.

e.g. Aparigrahaḥ = *na parigrahaḥ yena saḥ* (BhG. 6.10)

There are 87 instances in BhG.

- **Prādi-vyadhikaraṇa-Bahuvrīhiḥ**

Where the initial member consists prefixes including indeclinables is termed *Prādi-vyadhikaraṇa-Bahuvrīhiḥ* and is marked by tag ‘Bvp’.

e.g. Niḥsprhaḥ = *nirgatā sprhā yasmāt saḥ* (BhG. 2.71)

There are 41 instances in BhG.

- **Sahapūrvapada-vyadhikaraṇa-Bahuvrīhiḥ**

Where the final member is prefixed by ‘sa’ or ‘saḥ’ is termed *Sahapūrvapada-vyadhikaraṇa-Bahuvrīhiḥ* and is marked by tag ‘BvS’.

e.g. Sacetāḥ = *cetasā saha* (BhG. 11.51)

There are 12 instances in BhG.

- **Vyadhikaraṇa-Bahuvrīhiḥ**

Where both the members are in different *vibhaktis* is termed as *Vyadhikaraṇa-Bahuvrīhiḥ* and is marked by tag ‘BvU’.

e.g. Cakraḥastam = *cakraḥ haste yasya saḥ cakraḥastam tam cakraḥastam* (BhG. 11.46)

There are only two instances in BhG.

### 8.4.3 Dvandva

Where the meaning of each member is predominant is termed ‘*Dvandva*’. *Pāṇinian sūtra* governing this compound type is A. 2.2.29. Some features of this compound are as follows:

- This compound type may have two or more than two components and is formed by the aggregation of individual components.
- The components could be noun or adjective.
- The gender of whole compound is in accordance with the last component.

- ‘Ca’ signifies the connecting-attribute between the components in a *vigraha vākya*.

*Dvandva* compound is semantically sub-classified into three viz. *Itaretara*, *Samāhāra* and *Ekaśeṣa* but in BhG, only the following two sub-types are found viz.

**Itaretara-Dvandva** Where all components are analysed independently and are equally predominant, is known as *Itaretara-Dvandva*. In general, the gender of the final member is the gender of the whole<sup>8</sup> and the number is in accordance with the objects (two or more) denoted by it. This compound type is marked by tag ‘Di’. e.g. Jayājayau = *jayaḥ ca ajayaḥ ca* (BhG. 2.38)

There are 134 instances in BhG.

**Samāhāra-Dvandva** Where aggregation of components is the principal sense instead of individual constituents is known as *Samāhāra-Dvandva* and is marked by tag ‘Ds’. The whole compound is always in neuter gender and singular number. e.g. Pāṇipādam = *pāṇī ca pādau ca* (BhG. 13.13)

There are 26 instances in BhG.

#### 8.4.4 Avyayībhāva

Where often the meaning of initial member is predominant and that of the final member is subordinate is termed ‘*Avyayībhāva*’. *Pāṇinian sūtras* governing this compound type are A. 2.1.5 — 2.1.21. Some features of this compound are as follows:

- The initial member is either an *avyaya* or a *nipāta* and the final member is a noun.
- The entire compound word functions as an *avyaya*.<sup>9</sup>
- Generally the compound word is singular and in neuter gender.<sup>10</sup>

There are seven sub-types namely *Avyaya-pūrvapada-avyayībhāva*, *Avyaya-uttarapada-avyayībhāva*, *Tiṣṭhadguprabhṛti-avyayībhāva*, *Samkhyāpūrvapada-nadyuttarapada-avyayībhāva*, *Nadyuttarapada-anyapadārthasaṃjñāyām*, *Samkhyāpūrvapada-vaṃśyottarapada-avyayībhāva* and *Pāre-madhye-pūrvapadaśaṣṭhyuttarapada*. However, in BhG

<sup>8</sup> paravalliṅgaṃ dvandvatatpuruṣayoḥ — A. 2.4.26

<sup>9</sup> avyayībhāvaśca — A. 1.1.41

<sup>10</sup> avyayībhāvaśca — A. 2.4.18

only one sub-type of *Avyayībhāva* compound i.e. *Avyaya-pūrvapada-avyayībhāva* is found.

**Avyaya-pūrvapada-avyayībhāva** Where the initial member consists of an indeclinable is termed as *Avyaya-pūrvapada-avyayībhāva*. It is governed by the *Pāṇinian sūtras* A. 2.1.6, 2.1.14, 6.3.81 and is given the tag ‘A1’.

e.g. Adhyātmam = *ātmani iti* (BhG. 7.29)

There are 23 instances in BhG.

#### 8.4.5 Garbhit Samāsas

As discussed before we have broad classifications of *samāsas* and their sub-types. Additionally there are such cases wherein more than two components are integrated / embedded within other components thus forming longer compounds known as *Garbhit Samāsas*. These compounds are combination of above types and sub-types.

For example, the word *Divya-aneka-udyata-āyudham* is tagged as

<Divya-<<an-eka>Tn-<udyata-āyudham>K1>K1>Bs7 (BhG. 11.10)

In this example we come across two *Garbhit Samāsas* viz. *an-eka* and *udyata-āyudham* embedded in longer *samāsa*.

### 8.5 Summary

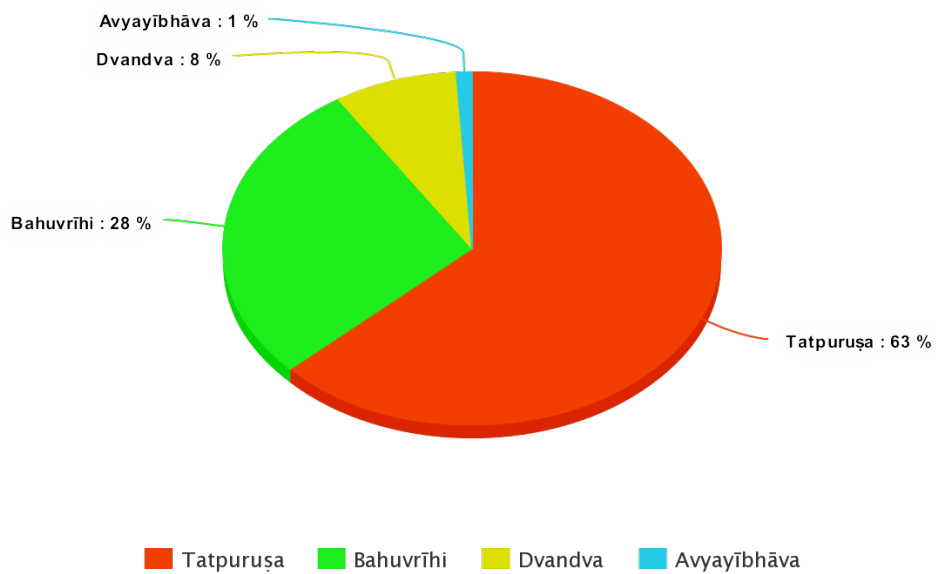


Figure 8.6: Samāsa Distribution

In this chapter the compound words were analysed both semantically as well as syntactically. There are around 78.5% compounds consisting of only two components, followed by around 15.7% words with three components and 4.7% compounds with four components. All these compounds with more than two components were found to be left-branching as expected for any head last phrase. Semantically the largest number of compounds were of *Tatpuruṣa* type. They were 63%. The *Bahuvrīhi* compounds were around 28%, followed by the *Dvandva* amounting to approximately 8% and only 1% compounds were of type *Avyayībhāva*. This is summarized in Figure 8.6.

In the next chapter which is the last portion of the second phase, we will discuss the sentential analysis of BhG giving the distribution of *kāraka* and *kāraṅketara* relations. Based on these statistics we give the relevant *Pāṇinian sūtras* along with illustrated graphical example from BhG.

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## CHAPTER 9

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### SENTENTIAL ANALYSIS

For analysing a sanskrit text, knowledge of *kāraka* (including *kāraṅketara*) analysis is the central focus. Pāṇini uses *kāraka* (which is a syntactico-semantic relation) as an intermediary step to express the semantic relations with the help of *vibhaktis*. There are six *kāraṅkas* viz., *kartā*, *karma*, *karaṇam*, *sampradānam*, *apādānam* and *adhikaraṇam*. Pāṇinian sūtras A. 1.4.23 - 1.4.54 focuses on the discussion of *kāraṅkas*. The semantic relation between a noun and a verb is expressed through *kāraka-vibhakti* while the relation between a noun and a noun is expressed through *upapada-vibhakti*, *sambandha-vibhakti*, etc. There are seven *vibhaktis* which express the above mentioned relations viz. *prathamā*, *dvitīyā*, *trītiyā*, *caturthī*, *pañcamī*, *ṣaṣṭhī* and *saptamī* (first, second, third, fourth, fifth, sixth and seventh case suffix respectively). Pāṇinian sūtras A. 2.3.1 - 2.3.73 focuses on the discussion of *vibhaktis*.

For analysing relations in BhG, we followed the guidelines for annotation scheme for *kāraka* level tagging<sup>1</sup>.

There is a list of around 35 tags which are broadly classified under two headings and their sub-headings which are:

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<sup>1</sup> <https://sanskrit.uohyd.ac.in/scl/Corpus/TaggingGuidelines/kaaraka-tagging-guidelines>

1. Intra-sentential
  - (a) Kāraka relations.
  - (b) Kāraṅketara relations.
2. Inter-sentential
  - (a) Relations marked by sentence-connecting words.
  - (b) Relations marked by relative pronouns.

We mention in the next section only those tags which are applicable for BhG sentences. These sentential analyses are represented in the form of a graph prepared with the aid of a utility called ‘graphviz’. The relations herein are marked through a directed label arrow. The appropriate tag for a relation is marked with an arrow from one point to another point. This would be explained further in the discussion on various relations below.

## 9.1 Statistical Analysis

As mentioned earlier we manually analysed each and every śloka of BhG and marked the relations between words. Wherever necessary the missing verbs were borrowed from the previous ślokas. The *kāraka ākāṅkṣā* for frequently occurring *dhātus* is given in appendix - D. We give below the frequency distribution of various relations based on above mentioned classification.

### 1. Kāraka relations

The relation between a verb and a noun is known as *Kāraka* relation. Table 9.1 shows the distribution of these relations.

Relation	Freq.	Relation	Freq.
Kartā	1253	Karaṇam	132
Karma	938	Apādānam	76
Adhikaraṇam	359	Sampradānam	15

Table 9.1: Kāraka Relations

It is noted that maximum frequency is of *kartā kāraka* followed by *karma* while *apādānam* and *sampradānam kārakas* have low frequencies.

## 2. Kāraḱetara relations

Table 9.2 gives the distribution of *Kāraḱetara* relations.

Relation	Freq.	Relation	Freq.
Viśeṣaṇam	1271	Hetuḥ	100
Kartṛsamānādhikaraṇam	392	Prayoḱanam	67
Ṣaṣṭhīsambandhaḥ	359	Nirdhāraṇam	67
Sambodhyaḥ	241	Vīpsā	29
Kriyāviśeṣaṇam	198	Upapadasambandhaḥ	21
Karmasamānādhikaraṇam	117	Vibhaktam	12

Table 9.2: Kāraḱetara Relations

Here it is noted that *viśeṣaṇam* has the highest frequency followed by *Kartṛsamānādhikaraṇam*. It is to be noted that though *Kartṛsamānādhikaraṇam* and *Karmasamānādhikaraṇam* are not included in grammar texts, it is a topic of discussion in the *śābdabodha* analysis and hence we have included these terms in our work.

### (a) Kṛdanta-Kriyā Relations

Table 9.3 gives the distribution of *Kṛdanta-Kriyā* relations.

Relation	Freq.
Pūrvakālaḥ	195
Samānakālaḥ	54
Bhāvalakṣaṇasaptamī_pūrvakālaḥ	12

Table 9.3: Kṛdanta-Kriyā Relations

Based on the above statistics we present in the next section the *Pāṇinian* rules for each of these relations, *vṛttis*, English translation<sup>2</sup> followed by an example from BhG with illustrated graph.

## 9.2 Teaching Module

Now we present below an example of each *kāraḱa* from BhG. We also introduce the graphical rendering of the relations, which we would be using as a tool in pedagogy.

<sup>2</sup> English translation is taken from Rama Nath Sharma (Sharma, 2000, 2002)

## 9.2.1 Kāraka Relations

- Kartā

(Including Kartṛsamānādhikaraṇam)

Sūtra 1: स्वतन्त्रः कर्ता (A. 1.4.54)

Vṛtti: क्रियायां स्वातन्त्र्येण विवक्षितोऽर्थः कर्ता स्यात्।

Eng. Tr. : A *kāraka* which is independent of others (*svatantra*) is termed *karṭṛ* ‘agent’.

For instance, the sentence ‘*śaḥ śabdaḥ tumulaḥ abhavat*’ (BhG 1.13) (That **combined\_noise** was tumultuous.) is represented in Figure 9.1.

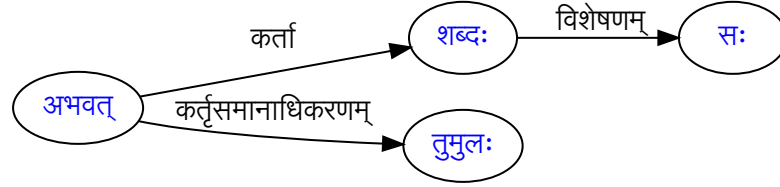


Figure 9.1: Kartā

Here the word *śabdaḥ* is the main doer / agent of the action and is in *prathamā vibhakti*<sup>3</sup> and is given the tag *kartā*. The word *tumulaḥ* which act as *vidheya* is given the tag *kartṛsamānādhikaraṇam*. Maximum instances are found in BhG.

Sūtra 2: कर्तृकरणयोः तृतीया (A. 2.3.18)

Vṛtti: अनभिहिते कर्तरि करणे च तृतीया स्यात्।

Eng. Tr. : A *tr̥tīyā* occurs to express *karṭṛ* and *karaṇa* when they are not expressed otherwise.

For instance, the sentence ‘*mayā guṇakarmavibhāgaśaḥ cāturvarṇyam sṛṣṭam*’ (BhG 4.13) (The four\_divisions\_of\_human\_society in\_terms\_of\_division\_according\_to\_quality\_and\_work are created by\_me.) is represented in Figure 9.2.

Here *mayā* is in *tr̥tīyā vibhakti* due to above sūtra and is also given the tag *kartā*.

There are 63 instances in BhG.

<sup>3</sup> प्रातिपदिकार्थलिङ्गपरिमाणवचनमात्रे प्रथमा — A. 2.3.46

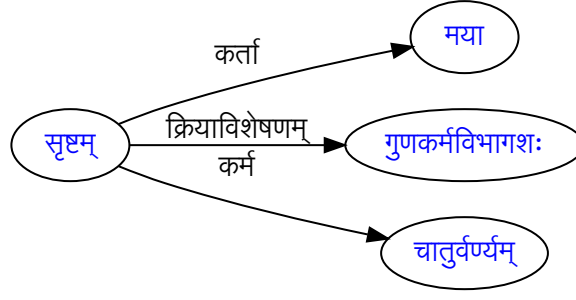


Figure 9.2: Kartā1

- Karma

(Including *Karmasamānādhikaraṇam*)

Sūtra: कर्तुः ईप्सिततमं कर्म (A. 1.4.49)

Vṛtti: कर्तुः क्रियया आप्तुमिष्टतमं कारकं कर्मसज्जं स्यात्।

Eng. Tr. : A *kāraka* which the agent most wishes to reach through his actions is termed *karman*.

For instance, the sentence ‘*pāṇḍavaḥ jagat devadevasya śarīre ekastham apaśyat*’ (BhG 11.13) (Arjuna beheld the universe concentrated at one place in the person of Supreme Deity.) is represented in Figure 9.3.

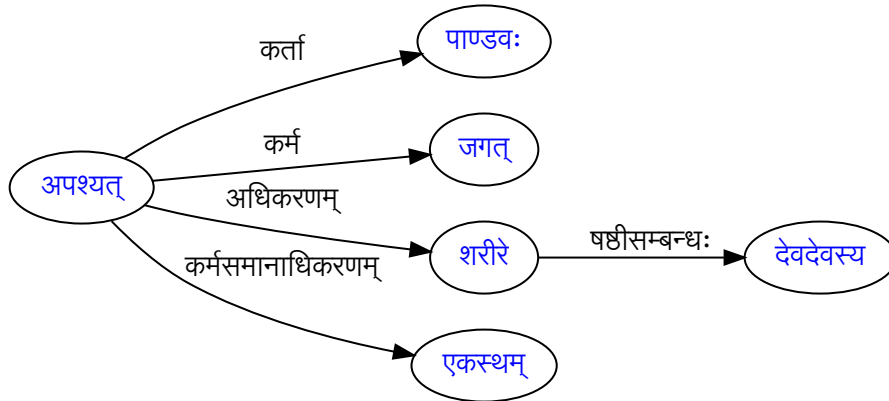


Figure 9.3: Karma and Adhikaraṇam

Here the word *jagat* is in *dvitīyā vibhakti*<sup>4</sup> and is given the tag *karma* while the word *ekastham* which act as *vidheya* is given the tag *karmasamānādhikaraṇam*. There are 938 instances of *karma* and 117 instances of *karmasamānādhikaraṇam* in BhG.

<sup>4</sup> कर्मणि द्वितीया – A. 2.3.2

- **Adhikaraṇam**

Sūtra: आधारः अधिकरणम् (A. 1.4.45)

Vṛtti: कर्तृकर्मद्वारा तन्निष्ठक्रियाया आधारः कारकमधिकरणसञ्ज्ञः स्यात्।।

Eng. Tr. : A *kāraka* which serves as locus of action is termed *adhikaraṇa*.

In Figure 9.3 the word *śarīre* is in *saptamī vibhakti*<sup>5</sup> and is given the tag *adhikaraṇam*. There are 359 instances in BhG.

- **Karaṇam**

Sūtra: साधकतमं करणम् (A. 1.4.42)

Vṛtti: क्रियासिद्धौ प्रकृष्टोपकारकं कारकं करणसञ्ज्ञं स्यात्।

Eng. Tr. : A *kāraka* which serves as a means, more than anything else, is termed *karaṇa*.

For instance, the sentence ‘(manaḥ) *abhyāseṇa* ca *vairāgyeṇa* gr̥hyate’ (BhG 6.35) (Mind can\_be\_controlled by\_practice and also by\_detachment.) is represented in Figure 9.4.

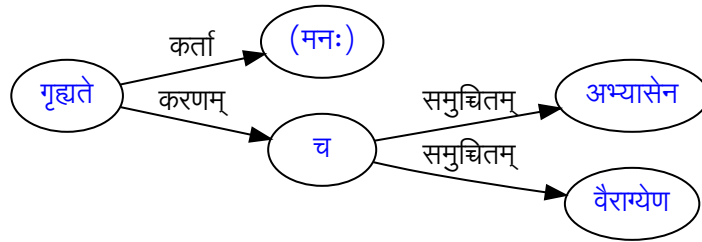


Figure 9.4: Karaṇam

Here both the words *abhyāseṇa* and *vairāgyeṇa* are in *tṛtīyā vibhakti* due to A. 2.3.18 mentioned above. They are joined by connective *ca* and is given the tag *karaṇam*. There are 132 instances in BhG.

- **Apādānam**

Sūtra: ध्रुवमपाये अपादानम् (A. 1.4.24)

Vṛtti: अपायो विश्लेषः, तस्मिन् साध्ये ध्रुवमवधिभूतं कारकमपादनं स्यात्।

Eng. Tr. : A *kāraka* which serves as a fixed point of reference when movement away is denoted is termed *apādāna* ‘ablative’.

For instance, the sentence ‘*annasambhavaḥ parjanyaṭ (bhavati)*’ (BhG 3.14)

<sup>5</sup> सप्तमी अधिकरणे च — A. 2.3.36

(Food\_grains\_are\_made\_possible from\_rains.) is represented in Figure 9.5.

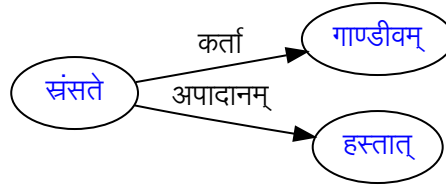


Figure 9.5: Apādānam

Here the word *parjanya* is in *pañcamī vibhakti*<sup>6</sup> and is given the tag *apādānam*. There are 76 instances in BhG.

- Sampradānam

Sūtra: कर्मणा यम् अभिप्रैति स सम्प्रदानम् (A. 1.4.32)

Vṛtti: दानस्य कर्मणा यमभिप्रैति स सम्प्रदानसञ्ज्ञः स्यात्।

Eng. Tr. : A *kāraka* which serves as someone whom the agent intends as goal of the object of his action is termed *sampradāna*.

For instance, the sentence ‘(aham) *te divyam cakṣuḥ dadāmi*’ (BhG 11.8) (I bestow to\_you the divine eye.) is represented in Figure 9.6.

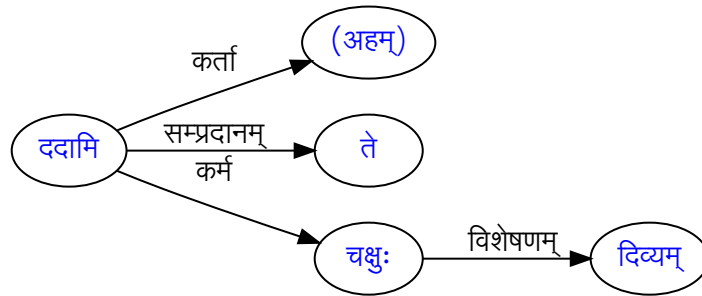


Figure 9.6: Sampradānam

Here the word *te* is in *caturthī vibhakti*<sup>7</sup> and is given the tag *sampradānam*. There are only 15 instances in BhG.

<sup>6</sup> अपादाने पञ्चमी – A. 2.3.28

<sup>7</sup> चतुर्थी सम्प्रदाने – A. 2.3.13

## 9.2.2 Kāraṅketara Relations

- Viśeṣaṇam

That which qualifies the *viśeṣya* is known as *viśeṣaṇam*.

For example, the sentence ‘*maunī aniketaḥ sthīramatiḥ bhaktimān* (BhG 12.19) *naraḥ me priyaḥ (asti)*’ (He who is given to contemplation, having no sense of ownership in respect of residence, having fixed determination and is engaged in devotion, that person is dear to me.) is represented in Figure 9.7.

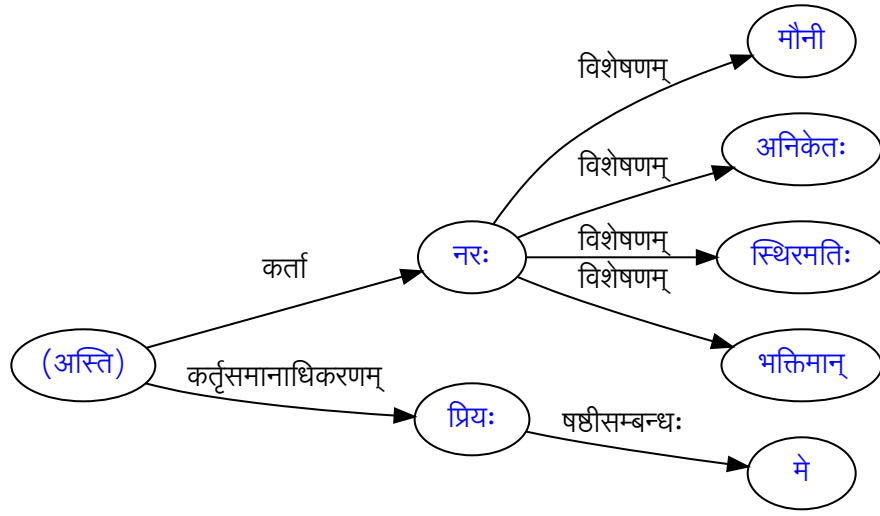


Figure 9.7: Viśeṣaṇam

Here the words *maunī*, *aniketaḥ*, *sthīramatiḥ* and *bhaktimān* are qualifiers of *naraḥ* and are marked by the tag *viśeṣaṇam*. Maximum instances i.e. 1271 instances are found in BhG.

- Ṣaṣṭhīsambandhaḥ

Sūtra: षष्ठी शेषे (A. 2.3.50)

Vṛtti: कारकप्रातिपदिकार्थव्यतिरिक्तः स्वस्वामिभावादिसम्बन्धः शेषः, तत्र षष्ठी स्यात्।

Eng. Tr. : A *ṣaṣṭhī* occurs after a nominal stem when the remainder (*śeṣa*) is to be expressed. In other words where there is general relationship such as owned-owner relation, father-son relation, etc. between a noun with another noun is termed as *ṣaṣṭhīsambandhaḥ*.

For instance, the sentence ‘*janārdana ātmanaḥ yogam kathaya*’ (BhG 10.18) (O Janārdana describe **your** yogic powers) is represented in Figure 9.8.

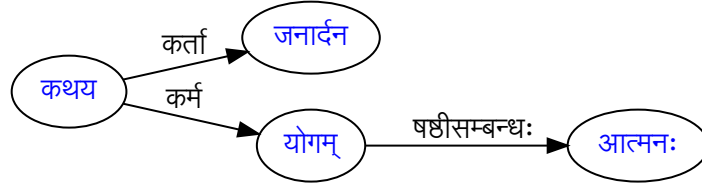


Figure 9.8: Śaṣṭhīsambandhaḥ

Here the word *ātmanaḥ* which is in *ṣaṣṭhī vibhakti* is related to *yogam* and is given the tag *ṣaṣṭhīsambandhaḥ*. There are 359 instances in BhG.

- **Sambodhyaḥ**

Sūtra: सम्बोधने च (A. 2.3.47)

Vṛtti: इह प्रथमा स्यात्।

Eng. Tr. : A *prathamā* also occurs after a stem when *sambodhana* ‘address’ is to be expressed. *Sambodhanam* means addressing someone to attract attention. There are two marked relations viz., *Sambodhyaḥ* which is the relation of a word in *sambuddhi* with the verb and *Sambodhanasūcakam* which is an interjective particle such as *dhik*, *he*, *aho*, etc. is in relation with *Sambodhyaḥ*.

For example, the sentence ‘*He Kṛṣṇa tvam pūjyaḥ asi*’ (*O Kṛṣṇa*, you are venerable) is represented by the Figure 9.9.

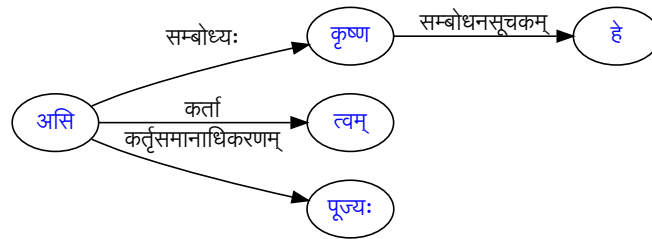


Figure 9.9: Sambodhyaḥ

It is seen that *Kṛṣṇa* is marked by the tag *sambodhyaḥ* and the interjection *He* which is related to *sambodhyaḥ* ‘*Kṛṣṇa*’ is marked by the tag *sambodhanasūcakam*. There are 241 instances of *sambodhyaḥ* and just three instances of *sambodhanasūcakam* in BhG.

- **Kriyāviśeṣaṇam**

*Kriyāviśeṣaṇam* qualifies either an action or the result of an activity. This tag is either primitive or derived from noun, pronoun or numeral. For instance, in the sentence ‘*Kirīṭi Kṛṣṇam sagadgadam āha*’ (BhG 11.35) (Kirīṭi (Arjuna) spoke **falteringly** to Kṛṣṇa) is represented by the Figure 9.10.

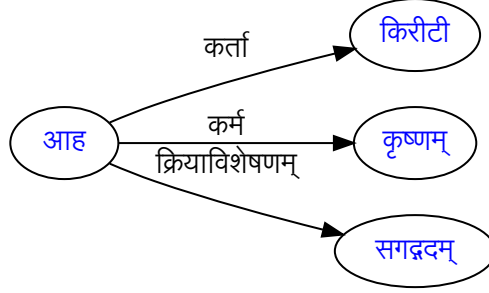


Figure 9.10: Kriyāviśeṣaṇam

Here the word *sagadgadam* is marked by the tag *kriyāviśeṣaṇam*. There are 198 instances in BhG.

- **Hetuḥ**

Sūtra 1: हेतौ (A. 2.3.23)

Vṛtti: हेत्वर्थे तृतीया स्यात्।

Eng. tr.: A *trītiyā* occurs after a stem which denotes *hetu* ‘cause’. Thus *Hetu* is the cause / reason affecting either a thing, a quality or an action and is marked by third or optionally by fifth case suffix.

There is an option to this sūtra.

Sūtra 2: विभाषा गुणे अस्त्रियाम् (A. 2.3.25)

Vṛtti: गुणे हेतावस्त्रीलिङ्गे पञ्चमी वा स्यात्।

Eng. tr.: A *pañcamī* optionally occurs after a non-feminine stem which denotes *hetu* as well as *guṇa* ‘quality’.

For instance, the sentence ‘*mayā uktam pramādāt praṇayena vā*’ (BhG 11.41) (Spoken by me **out of foolishness or love**) is represented in the Figure 9.11.

Here we have two words *pramādāt* which is in fifth case suffix from sūtra 2 and *praṇayena* which is in third case suffix from sūtra 1. Both are marked as *Hetu*. There are 53 instances of words in fifth case suffix while 28 instances for words in third case suffix. Remaining 19 instances are those marked in avyayas.

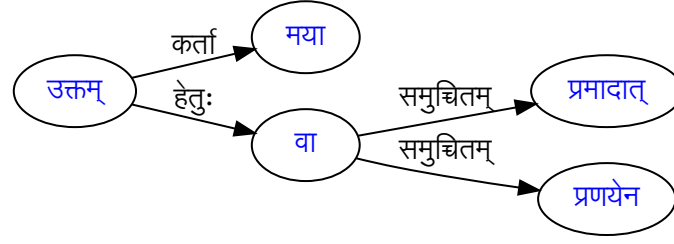


Figure 9.11: Hetuḥ

- Prayojanam

*Prayojanam* is the purpose for accomplishment of an action. This is indicated either by a *tumun* or fourth case suffix or by the term *artha*.

The sentence ‘*Aham dharmasaṁsthāpanārthāya sambhavāmi*’ (BhG 4.8) (I emerge for re-establishment of dharma) is represented by the Figure 9.12.

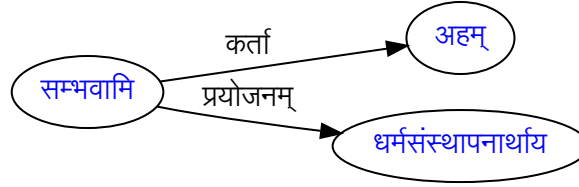


Figure 9.12: Prayojanam

Here the word *dharmasaṁsthāpanārthāya* is given the tag *prayojanam*. There are 31 instances of words in fourth case suffix, 21 instances of words in *tumun* and 15 instances of words indicated by term *artha*.

- Nirdhāraṇam

Sūtra: यतः च निर्धारणम् (A. 2.3.41)

Vṛtti: जातिगुणक्रियासञ्ज्ञाभिः समुदायादेकदेशस्य पृथक्करणं निर्धारणं यतस्ततः षष्ठीसप्तम्यौ स्तः।

Eng. Tr. : A *ṣaṣṭhī* or *saptamī* also occurs after a stem which denotes many, from amongst which one is singled out. It is indicated either in sixth (example 1) or seventh (example 2) case suffix.

**Example 1:**

The sentence ‘*aham sthāvarāṇām himālayaḥ asmi*’ (BhG 10.25) (I am the Himalayan mountain amongst immovable things) is represented in the Figure 9.13.

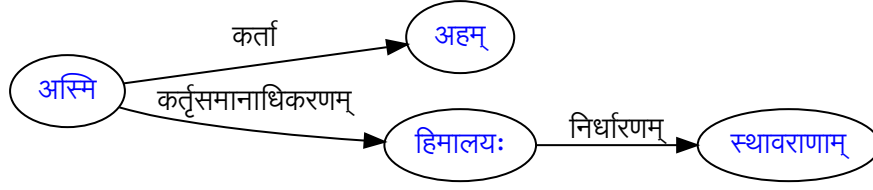


Figure 9.13: Nirdhāraṇam1

Here the word *sthāvarāṇām* which is in sixth case suffix denotes a range from which *himālayaḥ* is singled out and is given the tag *nirdhāraṇam*. There are 62 instances in BhG.

#### Example 2:

The sentence ‘*yogaḥ karmasu kauśalam asti*’ (BhG 2.50) (yoga is **skill** in action) is represented in the Figure 9.14.

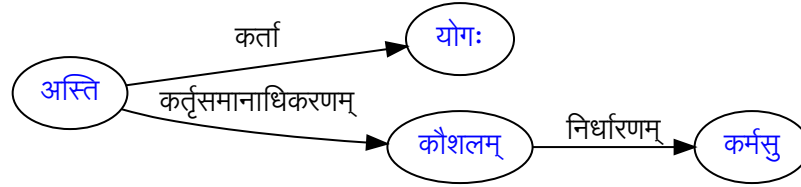


Figure 9.14: Nirdhāraṇam2

Here the word *karmasu* which is in seventh case suffix is marked with the tag *nirdhāraṇam*. There are only five instances in BhG.

#### • Vīpsā

*Vīpsā* is the repetition of a word for emphasis. The relation of first word with its repeated second word is marked by *Vīpsā*.

#### Example 1:

The sentence ‘*yadā yadā dharmasya glāniḥ bhavati*’ (BhG 4.7) (**Whenever** there is discrepancy of dharma) is represented in Figure 9.15.

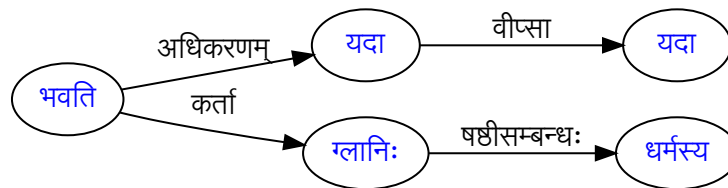


Figure 9.15: Vīpsā1

Here the repetition of word *yadā* is given the tag *vīpsā*.

### Example 2:

The sentence ‘*naraḥ sve sve karmaṇi saṁsiddhim labhate*’ (BhG 18.45) (A man achieves perfection in **his own** work) is represented in Figure 9.16.

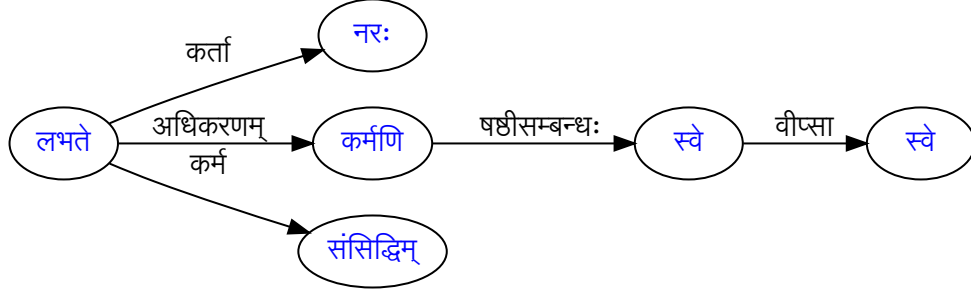


Figure 9.16: Vipsā2

Here the word *sve* is repeated and is marked as *Vīpsā*.

### • Upapadasambandhaḥ

That relation which is marked in connection with certain words, or with certain types of words is known as *upapadasambandhaḥ*.

For instance, the sentence ‘*mayā sadṛśaḥ anyaḥ kaḥ asti*’ (BhG 16.15) (Who else is equal to me?) is represented in the Figure 9.17.

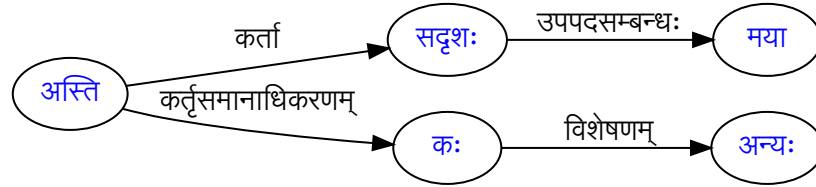


Figure 9.17: Upapadasambandhaḥ

Here the relation between *mayā* and *sadṛśaḥ* is marked by tag *upapadasambandhaḥ*. There are 21 instances in BhG.

### • Vibhaktam

Sūtra: पञ्चमी विभक्ते (A. 2.3.42)

Vṛtti: विभागो विभक्तम्। निर्धार्यमाणस्य यत्र भेद एव तत्र पञ्चमी स्यात्।

Eng. Tr. : A *pañcamī* occurs after a stem which denotes something from which something different is distinguished. It is termed as *vibhaktam* and is in fifth case suffix. It is noted that this tag is not included in the guidelines.

For example, the sentence ‘*manasaḥ buddhiḥ parā ucyate*’ (BhG 3.42) (The intellect is considered superior than the mind) is represented in the Figure 9.18.

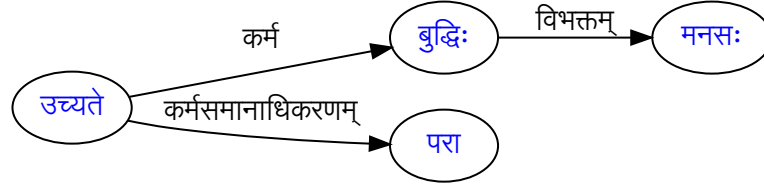


Figure 9.18: Vibhaktam

Here the word *manasaḥ* which is in fifth case suffix is compared with *buddhiḥ* and is given the tag *vibhaktam*. There are 12 instances in BhG.

*Sambandhaḥ* is a blanket term used to cover various *kāraka* or *kāraṇetara* relations such as *na*, *eva*, *api*, *iti*, *etc.*, and are marked by the tag *sambandhaḥ*. For instance, the sentence ‘*āyam tattvataḥ na eva calati*’ (BhG 6.21) (He (Yogi) **does\_not** move from\_truth on\_any\_account) is represented in Figure 9.19.

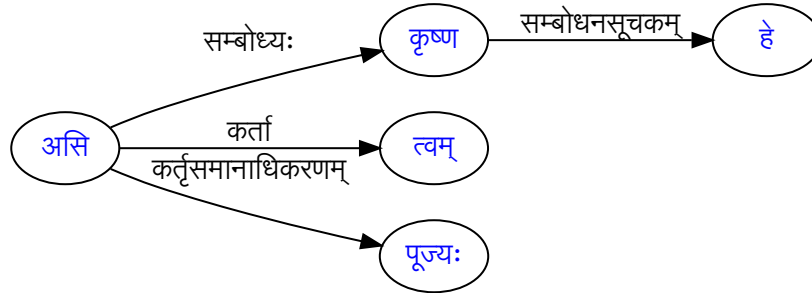


Figure 9.19: Sambandhaḥ

Here the words *na* and *eva* both are marked as *sambandhaḥ*. There are 755 instances in BhG.

### Kṛdanta-Kriyā-Relation

- Pūrvakālaḥ

Sūtra समानकर्तृकयोः पूर्वकाले (A. 3.4.21)

Vṛtti: समानकर्तृकयोर्धात्वर्थयोः पूर्वकाले विद्यमानाद्धातोः क्त्वा स्यात्।

Eng. tr.: Affix *Ktvā* occurs after a verbal root which denotes a prior action relative to some subsequent action provided both actions share the same agent.

For example, the sentence ‘*pitāmahaḥ tasya harṣam sañjanayan uccaiḥ siṃhanādam vinadya śaṅkham dadhmau*’ (BhG 1.12) (The grandfather (Bhīṣma) **while** **cheering** him (Duryodhana) up, **roared** loudly like a lion and blew his conch.) is represented by the Figure 9.20.

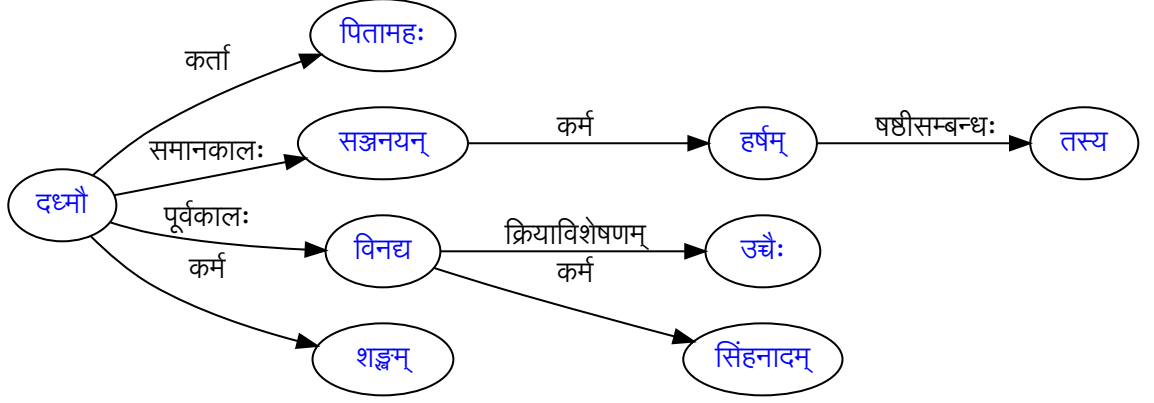


Figure 9.20: Pūrvakālah and Samānakālah

Here the word *vinadya* shows precedence to the verb *dadhmau* and is marked by the tag *pūrvakālah*. There are 195 instances in BhG.

- **Samānakālah**

When two actions are simultaneous and the action denoted by suffix शतृ / शानच् is related to an action denoted by another verb, is known as *samānakālah*. In Figure 9.20, the word *sañjanayan* denotes simultaneity with the verb *dadhmau* and is marked by the tag *samānakālah*. There are 54 instances in BhG.

- Bhāvalakṣaṇasaptamī\_pūrvakālaḥ

Sūtra: यस्य च भावेन भावलक्षणम् (A. 2.3.37)

Vṛtti: यस्य क्रियया क्रियान्तरं लक्ष्यते ततः सप्तमी स्यात्।

Eng. Tr. : A *saptamī* occurs after a stem whose implied action characterizes another action.

For instance, the sentence ‘*yaḥ vinaśyatsu sarveṣu bhūteṣu parameśvaram avinaśyantam paśyati*’ (BhG 13.27) (He sees the Supreme being as imperishable and present in all **perishable** living entities.) is represented in the Figure 9.21.

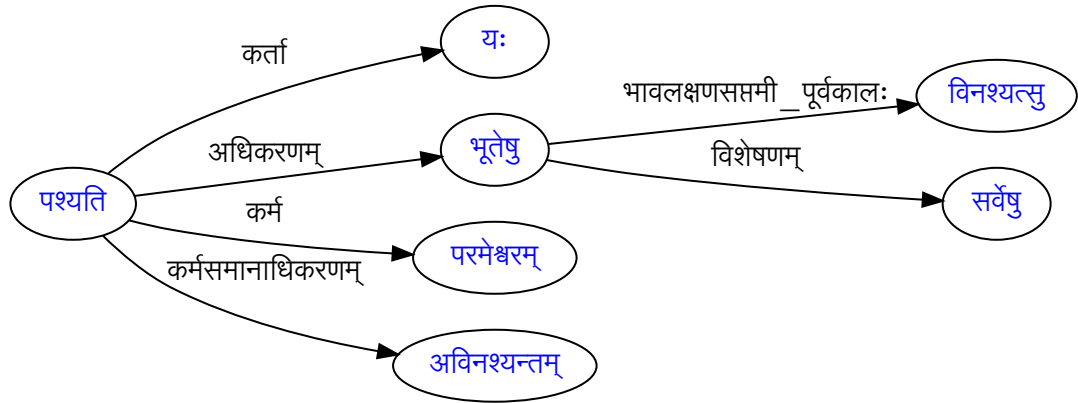


Figure 9.21: Bhāvalakṣaṇasaptamī\_pūrvakālaḥ

Here the word *vinaśyatsu* is in seventh case suffix and is marked by the tag *bhāvalakṣaṇasaptamī\_pūrvakālaḥ*. There are 12 instances in BhG.

In the next subsection we give those relations which are connectors between two sentences.

### 9.2.3 Inter-sentential Relations

#### 1. Pair of Connectors

The relations between two individual sentences are marked by pair of connectors such as *yadi-tarhi*, *yataḥ-tataḥ*, *yadvat-tadvat*, etc. For example, the sentence ‘*etat asthiram cañcalam manaḥ yataḥ niścarati tataḥ niyamya ātmani eva vaśam nayet*’ (BhG 6.26) (This unsteady and flickering mind runs after **whichever** (worldly objects) has to be regulated **from\_thereof** and fix (the mind) on God) is represented in Figure 9.22.

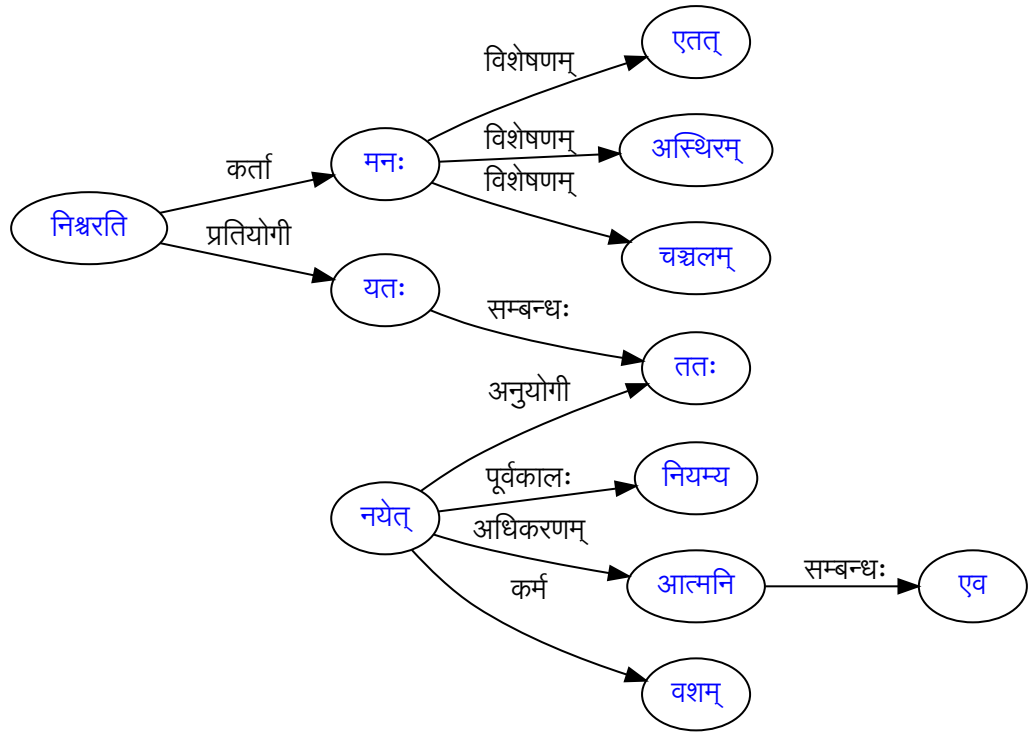


Figure 9.22: Connectors

Here the pair of connectors *yataḥ-tataḥ* are connected with each other and are tagged as *sambandhaḥ*. *Yataḥ* is marked in relation to the verb *niścāṛati* with tag *pratīyogī* and *tataḥ* is marked in relation to the verb *nāyēt* with tag *anuyogī*. There are few instances of these pairs of connectors in BhG.

## 2. Co-relative Pronouns

The co-relative pronouns such as *yaḥ-saḥ*, *yat-tat*, *yathā-tathā*, etc. not only mark the relation between two sentences but also indicates the relation among themselves having the same *vibhakti*. For example, the sentence ‘*Bhārata yaḥ asammūḍhaḥ mām evam puruṣottamam jānāti saḥ sarvavit sarvabhāvena mām bhajati*’ (BhG 15.19) (O Bharata!, the wise man **who** thus realizes me as the Supreme Person, knowing thus, **he** constantly worships me with his whole being.) is represented in Figure 9.23.

Here the pronoun *yaḥ* refers to the pronoun *saḥ* and is marked with the tag *sambandhaḥ*. *Yaḥ* is marked in relation to the verb *jānāti* with tag *pratīyogī* and *saḥ* is marked in relation to the verb *bhajati* with tag *anuyogī*. Maximum instances of *yaḥ-saḥ* (52 instances) followed by *yat-tat* (45 instances) are found in BhG.

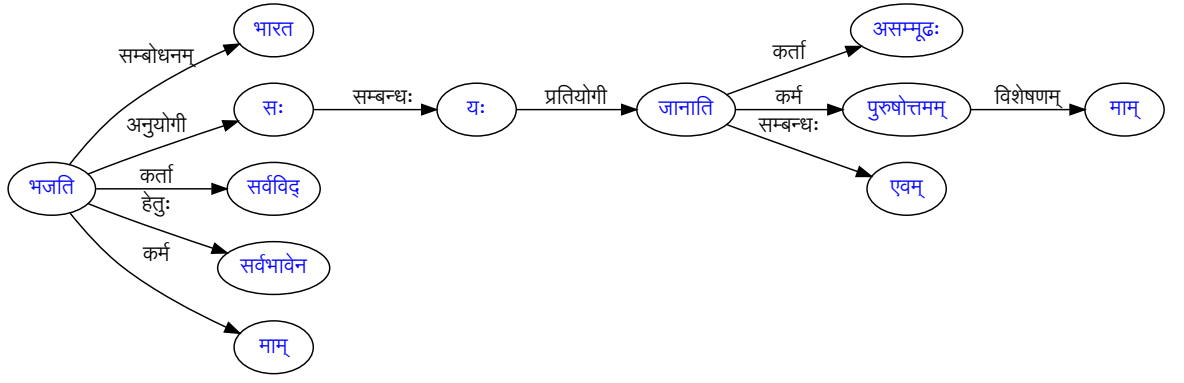


Figure 9.23: Co-relative Pronouns

### 9.3 Summary

In this chapter we gave the distribution of various relations. Based on these statistics we have given the relevant *Pāṇinian sūtras* along with illustrated graphical example from BhG. This is the last portion of Phase Three. In the next and final chapter of our work we conclude with concluding remarks and scope for future research.

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## CHAPTER 10

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### FUTURE IMPLEMENTATION

#### 10.1 Conclusion

There are a certain class of people who are interested in studying and understanding ancient Sanskrit scripture. But they want to learn only that particular section of grammar in a compact form which is conducive to easy understanding of the scripture in a specific time period. This work is an attempt towards the potential use of digital tools and how they can be combined into novel digital environment like e-teaching capsule for a specific text. Our work is specifically oriented toward e-teaching and learning BhG. We have provided an interactive interface of BhG alongwith the suitable teaching module for the benefit of learners. The various computational tools can be productively used to supplement teaching as follows:

- It is essential to teach grammar, vocabulary and prosody side by side with literature. Key grammatical information forms the structural focus of the text. The statistical analysis through interface can help a teacher to decide which aspect of Sanskrit Grammar is more relevant for the study of a text. This in turn helps in achieving maximum student attention on the structure of the language.

- Teacher learn what to emphasise with the whole class and what needs less explanation which in turn would help build up an active learning environment. It may also contribute in planning and preparing courses.
- We observe that with the help of available computational platforms, a teacher can follow the method of *Khaṇḍānvaya* method to make student comprehend any unseen Sanskrit text.
- Computational tools help encourage and support independent learning. Learners can build skills step-by-step in a specific time constraint. This helps keep them motivated and consistent while trying to improve.

In the next section we discuss the potential scope for future research.

## 10.2 Future Research

1. We have touched upon only those grammatical sūtras necessary for learning BhG at the elementary stage (preliminary level), later on after gaining sufficient knowledge and confidence therefrom we can gradually include sūtras for rare instances in BhG at an advanced stage. Further, as regards the forms of words, pada formation prakriyās as well as derivational processes are not included in this work. These could be added in future.
2. The different forms seen in BhG do not belong to different Part of Speech categories but typically fall within the same ‘Part Of Speech’ (POS) category. For example, a neuter noun in singular has the same form in nominative as well as accusative case. There are many such instances of regular clashes of forms in different case-number combination. This statistics as a side product, provides an important insight, especially for building a POS tagger. In Machine Translation as well as other NLP applications, POS tagger plays an important role. It helps in removing / reducing the ambiguity in the morphological analyses. The above observations that the regular clashes in Sanskrit morphology are within a noun category and not across the categories, hints that POS tagger based purely on the category information for disambiguation is of very little use in Sanskrit.

On the other hand a hierarchical tagger with information of various associated features makes sense.

3. BhG being coherent and complete in itself, such a word level and sentence level analysis of BhG can be used for higher level computational analysis such as discourse analysis, topic identification, anaphora resolution, word sense disambiguation and so on.
4. We have not explicitly marked *taddhitas* mainly due to its semantic complexity and unavailability of an automatic tool. This data would be helpful in disambiguating the semantic nuances of *kṛdantas*, *taddhitas*, *avyayas* and *polysemous words* in BhG.
5. BhG being part of the *Mahābhārata*, later on if necessary, it can be used as an initial training data for boot-strapping for automatic annotation of complete critical edition of *Mahābhārata* (with around hundred thousand verses).
6. At later stage we can mark the variations in the different interpretations as well as differences in linguistic analysis provided in the the original commentaries by various ācārayas. This would help us gain valuable insight towards the underlying philosophical doctrines.
7. BhG can be taken as a guideline for preparing similar Sanskrit texts which would further help build '*Sanskrit Digital Repository*'. Learner could easily develop similar domain specific interface or even create virtual courses by adopting similar methodology.

# Appendices

Given below are the lists of '*Pāṇinian Sūtras*' for Sandhi, Samāsa and Sentential analysis and Dhātu-wise Kāraka expectancy. These lists are specifically for studying BhG.

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## A - LIST OF PĀNINIAN SŪTRAS FOR SANDHI

A. 1.4.109 – परः सन्निकर्षः संहिता

वृत्तिः – वर्णानामतिशयितः सन्निधिः संहितासंज्ञः स्यात्।

### Ac-Sandhi

1. 6.1.101 – अकः सवर्णे दीर्घः

वृत्तिः – अकः सवर्णे अचि परे दीर्घ एकादेशः स्यात्।

2. 6.1.77 – इको यणचि

वृत्तिः – इकः स्थाने यण् स्यात् अचि संहितायां विषये।

3. 6.1.88 – वृद्धिरेचि

वृत्तिः – आद् एचि परे वृद्धिः एकादेशः स्यात्।

4. 6.1.89 – एत्येधत्थूठसु

वृत्तिः – अवर्णात् एजाद्योरेत्येधत्योः ऊठि च परे वृद्धिरेकादेशः स्यात्।

5. 6.1.87 – आद् गुणः

वृत्तिः – अवर्णात् अचि परे पूर्वपरयोः एको गुणादेशः स्यात्। संहितायाम्।

6. 6.1.109 – एङः पदान्तादति

वृत्तिः – पदान्तात् एङः अति परे पूर्वरूपम् एकादेशः स्यात्।

7. 6.1.78 – एचोऽयवायावः

वृत्तिः – एचः क्रमात् अय् अव् आय् आव् एते स्युरचि।

8. 8.3.19 – लोपः शाकल्यस्य  
वृत्तिः – अवर्णपूर्वयोः पदान्तयोर्यवयोः वा लोपः अशि परे।
9. 1.1.11 – ईदूदेद् द्विवचनं प्रगृह्यम्  
वृत्तिः – ईदूदेद् अन्तं द्विवचनं प्रगृह्यसंज्ञं स्यात्।
10. 6.1.125 – प्लुतप्रगृह्या अचि नित्यम्  
वृत्तिः – प्लुताः प्रगृह्याश्च वक्ष्यन्ते। ते अचि परे नित्यं प्रकृत्या स्युः।
11. 1.4.57 – चादयोऽसत्त्वे  
वृत्तिः – अद्रव्यार्थाश्चादयो निपातसंज्ञाः स्युः।
12. 1.1.14 – निपात एकाजनाङ्  
वृत्तिः – एकः अच् निपात आङ्वर्जः प्रगृह्यसंज्ञः स्यात्।
13. 1.1.15 – ओत्  
वृत्तिः – ओत् अन्तो निपातः प्रगृह्यः स्यात्।

#### Hal-Sandhi

1. 8.2.39 – झलां जशोऽन्ते  
वृत्तिः – पदान्ते झलां जशः स्युः।
2. 8.4.55 – खरि च  
वृत्तिः – खरि परे झलां चरः स्युः।
3. 8.3.34 – विसर्जनीयस्य सः  
वृत्तिः – खरि विसर्जनीयस्य सः स्यात्।
4. 8.4.40 – स्तोः श्चुना श्चुः  
वृत्तिः – सकारतवर्गयोः शकारचवर्गाभ्यां योगे शकारचवर्गौ स्तः।
5. 8.4.45 – यरोऽनुनासिकेऽनुनासिको वा  
वृत्तिः – यरः पदान्तस्य अनुनासिके परे अनुनासिको वा स्यात्।
6. 8.4.63 – शश्छोऽटि  
वृत्तिः – पदान्तात् झयः परस्य शस्य छो वा स्यादटि।
7. 8.3.32 – डम्पो ह्रस्वादचि डम्पु नित्यम्  
वृत्तिः – ह्रस्वात् परो यो डम् तदन्तं यत् पदं तस्मात् परस्य अचो नित्यं डम्पुडागमः स्यात्।

8. 8.4.60 – तोर्लि  
वृत्तिः – तवर्गस्य लकारे परे परसवर्णः स्यात्। नकारस्य अनुनासिको लकारः।
9. 8.4.62 – झयो होऽन्यतरस्याम्  
वृत्तिः – झयः परस्य हस्य पूर्वसवर्णो वा स्यात्।
10. 8.3.23 – मोऽनुस्वारः  
वृत्तिः – मान्तस्य पदस्य अनुस्वारः स्यात् हलि।
11. 8.4.59 – वा पदान्तस्य  
वृत्तिः – पदान्तस्य अनुस्वारस्य ययि परे परसवर्णो वा स्यात्।

### Visarga-Sandhi

1. 8.3.37 – कुप्वोः  
वृत्तिः – कवर्गे पवर्गे च परे विसर्जनीयस्य क्रमात् जिह्वामूलीयोपध्मानीयौ स्तः।
2. 8.3.36 – वा शरि  
वृत्तिः – शरि परे विसर्जनीयस्य विसर्जनीय एव वा स्यात्।
3. 6.1.132 – एतत्तदोः सुलोपोऽकोरनज्जमासे हलि  
वृत्तिः – अककारयोरेतत्तदोर्यः सुः तस्य लोपः स्यात् हलि न तु नज्जमासे।
4. 8.2.66 – ससजुषो रुः  
वृत्तिः – पदान्तस्य सस्य सजुष् शब्दस्य च रुः स्यात्।
5. 6.1.114 – हशि च  
वृत्तिः – अप्लुतादतः परस्य रोः उः स्यात् हशि।
6. 6.1.87 – आद् गुणः  
वृत्तिः – अवर्णादचि परे पूर्वपरयोरेको गुणादेशः स्यात्संहितायाम्।
7. 6.1.113 – अतो रोरप्लुतादप्लुते  
वृत्तिः – अप्लुतादतः परस्य रोः उः स्यात् अप्लुते अति।
8. 8.3.17 – भोभगोअघो अपूर्वस्य योऽशि  
वृत्तिः – एतत्पूर्वकस्य रोर्वादेशः स्यादशि परे।
9. 8.3.22 – हलि सर्वेषाम्  
वृत्तिः – भोभगोअघोअपूर्वस्य लध्वलघूच्चारणस्य यकारस्य लोपः स्याद्बलि सर्वेषां मतेन।

10. 8.3.7 – नश्छव्यप्रशान्

वृत्तिः – अम्परे छवि नकारान्तस्य पदस्य रुः स्यात्।

11. 8.3.4 – अनुनासिकात् परोऽनुस्वारः

वृत्तिः – अनुनासिकं विहाय रोः पूर्वस्मात्परोऽनुस्वारागमः स्यात्।

12. 8.3.15 – खरवसानयोर्विसर्जनीयः

वृत्तिः – खरि अवसाने च परे रेफस्य विसर्जनीयः स्यात्पदान्ते।

13. 6.1.134 – सोऽचि लोपे चेत्पादपूरणम्

वृत्तिः – सस् इत्येतस्य सोर्लोपः स्यादचि पादश्चेत् लोपे सत्येव पूर्येत।

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## B - LIST OF PĀṆINIAN SŪTRAS FOR SAMĀSA

2.1.22 – समर्थः पदविधिः

वृत्तिः – पदसम्बन्धो यो विधिः स समर्थाश्रितो बोध्यः।

### Tatpuruṣa

1. 2.1.22 – तत्पुरुषः

वृत्तिः – अधिकारोऽयं प्राग्बहुव्रीहेः।

2. 2.4.26 – परवल्लिङ्गं द्वन्द्वतत्पुरुषयोः

वृत्तिः – एतयोः परपदस्येव लिङ्गं स्यात्।

3. 2.2.8 – षष्ठी

वृत्तिः – राज्ञः पुरुषो राजपुरुषः।

4. 2.2.9 – याजकादिभिश्च

वृत्तिः – एभिः षष्ठ्यन्तं समस्यते।

5. 2.2.10 – न निर्धारणे

वृत्तिः – निर्धारणे या षष्ठी सा न समस्यते।

6. 2.1.30 – तृतीया तत्कृतार्थेन गुणवचनेन

वृत्तिः – 'तत्कृत' इति लुप्ततृतीयाकम्। तृतीयान्तं तृतीयान्तार्थकृतगुणवचनेन अर्थशब्देन च सह प्राग्वत्।

7. 2.1.31 – पूर्वसदृशसमोनार्थकलहनिपुणमिश्रश्लक्ष्णैः  
वृत्तिः – तृतीयान्तमेतैः प्राग्वत्।
8. 2.1.32 – कर्तृकरणे कृता बहुलम् ।  
वृत्तिः – कर्तरि करणे च तृतीया कृदन्तेन बहुलं प्राग्वत्।
9. 2.1.33 – कृत्यैरधिकार्थवचने  
वृत्तिः – स्तुतिनिन्दाफलकम् अर्थवादवचनम् अधिकार्थवचनम्। तत्र कर्तरि करणे च तृतीया कृत्यैः सह प्राग्वत्।
10. 2.1.34 – अत्रेन व्यञ्जनम्  
वृत्तिः – संस्कारकद्रव्यवाचकं तृतीयान्तम् अत्रेन प्राग्वत्।
11. 2.1.35 – भक्ष्येण मिश्रीकरणम्  
वृत्तिः – मिश्रणक्रियाद्वारा सामर्थ्यम्।
12. 2.1.40 – सप्तमी शौण्डैः  
वृत्तिः – सप्तम्यन्तं शौण्डादिभिः प्राग्वद्वा।
13. 2.1.41 – सिद्धशुष्कपक्वबन्धैश्च  
वृत्तिः – एतैः सप्तम्यन्तं प्राग्वत्।
14. 2.1.42 – ध्वाङ्गेण क्षेपे  
वृत्तिः – ध्वङ्गवाचिना सह सप्तम्यन्तं समस्यते निन्दायाम्।
15. 2.1.43 – कृत्यैः ऋणे  
वृत्तिः – सप्तम्यन्तं कृत्यप्रत्ययान्तैः सह प्राग्वदावश्यके।
16. 2.1.44 – संज्ञायाम्  
वृत्तिः – सप्तम्यन्तं सुपा प्राग्वत् संज्ञायाम्।
17. 2.1.45 – तेनाहोरात्रावयवाः  
वृत्तिः – अहो रात्रेश्च अवयवाः सप्तम्यन्ता क्तान्तेन सह प्राग्वत्।
18. 2.1.46 – तत्र  
वृत्तिः – 'तत्र' इत्येतत् सप्तम्यन्तं क्तान्तेन सह प्राग्वत्।
19. 2.1.47 – क्षेपे  
वृत्तिः – सप्तम्यन्तं क्तान्तेन प्राग्वन्निन्दायाम्।

20. 2.1.48 – पात्रेसमितादयश्च  
वृत्तिः – एते निपात्यन्ते क्षेपे।
21. 2.1.24 – द्वितीया श्रितातीतपतितगतात्यस्तप्राप्तापन्नैः  
वृत्तिः – द्वितीयान्तं श्रितादिप्रकृतिकैः सुबन्तैः सह वा समस्यते स तत्पुरुषः।
22. 2.1.28 – कालाः  
वृत्तिः – 'क्तेन' इत्येव। अनत्यन्तसंयोगार्थं वचनम्।
23. 2.1.29 – अत्यन्तसंयोगे च  
वृत्तिः – 'कालाः' इत्येव। अक्तान्तार्थं वचनम्।
24. 2.1.36 – चतुर्थी तदर्थार्थबलिहितसुखरक्षितैः  
वृत्तिः – चतुर्थ्यन्तार्थाय यत् तद्वाचिना अर्थादिभिश्च चतुर्थ्यन्तं वा प्राग्वत्। तदर्थेन प्रकृतिविकृतिभावे एव गृह्यते।
25. 2.1.37 – पञ्चमी भयेन
26. 2.1.38 – अपेतापोढमुक्तपतितापत्रस्तैरल्पशः  
वृत्तिः – एतैः सह अल्पं पञ्चम्यन्तं समस्यते स तत्पुरुषः सुखापेतः।
27. 2.1.39 – स्तोकान्तिकदूरार्थकृच्छ्राणि क्तेन
28. 2.2.6 – नञ्  
वृत्तिः – नञ् सुपा सह समस्यते।
29. 2.2.18 – कुगतिप्रादयः  
वृत्तिः – एते समर्थेन नित्यं समस्यन्ते।
30. 2.2.19 – उपपदमतिङ्  
वृत्तिः – उपपदं सुबन्तं समर्थेन नित्यं समस्यते, अतिङन्तश्चायं समासः।
31. 3.1.92 – तत्रोपपदं सप्तमीस्थम्  
वृत्तिः – सप्तम्यन्ते पदे 'कर्मणि' इत्यादौ वाच्यत्वेन स्थितं कुम्भादि।

#### Karmadhāraya

1. 1.2.42 – तत्पुरुषः समानाधिकरणः कर्मधारयः
2. 2.1.57 – विशेषणं विशेष्येण बहुलम्  
वृत्तिः – भेदकं समानाधिकरणेन भेदेन बहुलं प्राग्वत्।

3. 2.1.60 – तेन नञ्विशिष्टेनानञ्  
वृत्तिः – नञ्विशिष्टेन क्तान्तेन अनञ् क्तान्तं समस्यते।
4. 2.1.69 – वर्णो वर्णेन  
वृत्तिः – समानाधिकरणेन सह प्राग्वत्।
5. 2.1.56 – उपमितं व्याघ्रादिभिः सामान्याप्रयोगे  
वृत्तिः – उपमेयं व्याघ्रादिभिः सह प्राग्वत्, साधारणधर्मस्य अप्रयोगे इति। विशेष्यस्य पूर्वनिपातार्थं सूत्रम्।
6. 2.1.62 – वृन्दारकनागकुञ्जरैः पूज्यमानम्  
वृत्तिः – गोवृन्दारकः। व्याघ्रादेराकृतिगणत्वादेव सिद्धे सामान्यप्रयोगार्थं वचनम्।
7. 2.1.55 – उपमानानि सामान्यवचनैः  
वृत्तिः – पूर्वनिपातनियमार्थं सूत्रम्।

#### Dvigu

1. 2.1.23 – द्विगुश्च  
वृत्तिः – द्विगुरपि तत्पुरुषसंज्ञः स्यात्।
2. 2.4.17 – स नपुंसकम्
3. 2.4.1 – द्विगुरेकवचनम्  
वृत्तिः – द्विग्वर्थः समाहारः एकवत् स्यात्।
4. 2.1.51 – तद्धितार्थोत्तरपदसमाहारे च  
वृत्तिः – तद्धितार्थे विषये उत्तरपदे च परतः समाहारे च वाच्ये दिक्संख्ये प्राग्वद्वा।
5. 2.1.52 – संख्यापूर्वो द्विगुः  
वृत्तिः – 'तद्धितार्थोत्तरपदसमाहारे च।' इत्यत्रोक्तः संख्यापूर्वो द्विगुः स्यात्।

#### Bahuvrīhi

1. 2.2.24 – अनेकमन्यपदार्थे  
वृत्तिः – अनेकं प्रथमान्तमन्यपदार्थं वर्तमानं वा समस्यते, स बहुव्रीहिः। अप्रथमाविभक्त्यर्थे बहुव्रीहिरिति, समानाधिकरणानामिति च, फलितम्।
2. 2.2.25 – सङ्ख्ययाऽव्ययासन्नादूराधिकसङ्ख्याः सङ्ख्येये  
वृत्तिः – संख्येयार्थया संख्यया अव्ययादयः समस्यन्ते स बहुव्रीहिः।

3. 2.2.26 – दिङ्नामान्यन्तराले

वृत्तिः – दिशो नामानि अन्तराले वाच्ये प्राग्वत्।

4. 2.2.27 – तत्र तेनेदमिति सरूपे

वृत्तिः – सप्तम्यन्ते ग्रहणविषये सरूपे पदे, तृतीयान्ते च प्रहरण-विषये, इदं युद्धं प्रवृत्तमित्यर्थे समस्येते कर्मव्यतिहारे द्योत्ये, स बहुव्रीहिः।

5. 2.2.28 – तेन सहेति तुल्ययोगे

वृत्तिः – तुल्ययोगे वर्तमानं 'सह' इत्येतत् तृतीयान्तेन प्राग्वत्।

### Dvandva

2.2.29 – चार्थे द्वन्द्वः

वृत्तिः – अनेकं सुबन्तं चार्थे वर्तमानं वा समस्यते, स द्वन्द्वः। समुच्चयान्वाचयेतरेतरयोगसमाहाराश्चार्थाः। परस्परनिरपेक्षस्य अनेकस्य एकस्मिन्नन्वयः समुच्चयः। अन्यतरस्य आनुषङ्गिकत्वे अन्वाचयः मिलितामामन्वये इतरेतरयोगः। समूहः समाहारः।

### Avyayībhāva

1. 2.1.6 – अव्ययं विभक्तिसमीपसमृद्धिवृद्ध्यर्थाभावात्ययासंप्रतिशब्दप्रादुर्भावपश्चाद्यप्यानुपूर्व्ययौगपद्य-सादृश्यसंपत्तिसाकल्यान्तवचनेषु

वृत्तिः – 'अव्ययम्' इति योगो विभज्यते। अव्ययं समर्थेन सह समस्यते। सोऽव्ययीभावः।

2. 2.1.14 – लक्षणेनाभिप्रती आभिमुख्ये

वृत्तिः – आभिमुख्यद्योतकौ अभिप्रती चिह्नवाचिना सह प्राग्वत्।

3. 6.3.81 – अव्ययीभावे चाकाले

वृत्तिः – सहस्य सः स्यात् अव्ययीभावे न तु काले।

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## C - LIST OF PĀṆINIAN SŪTRAS FOR SENTENTIAL ANALYSIS

### Kāraka

1. 1.4.54 – स्वतन्त्रः कर्ता  
वृत्तिः – क्रियायां स्वातन्त्र्येण विवक्षितोऽर्थः कर्ता स्यात्।
2. 2.3.46 – प्रातिपदिकार्थलिङ्गपरिमाणवचनमात्रे प्रथमा  
वृत्तिः – नियतोपस्थितिकः प्रातिपदिकार्थः। मात्रशब्दस्य प्रत्येकं योगः। प्रातिपदिकार्थमात्रे लिङ्गमात्रा-  
द्याधिक्ये संख्यामात्रे च प्रथमा स्यात्।
3. 2.3.18 – कर्तृकरणयोः तृतीया  
वृत्तिः – अनभिहिते कर्तरि करणे च तृतीया स्यात्।
4. 1.4.49 – कर्तुः ईप्सिततमं कर्म  
वृत्तिः – कर्तुः क्रियया आप्तुमिष्टतमं कारकं कर्मसञ्ज्ञं स्यात्।
5. 2.3.2 – कर्मणि द्वितीया  
वृत्तिः – अनुक्ते कर्मणि द्वितीया स्यात्।
6. 1.4.45 – आधारः अधिकरणम्  
वृत्तिः – कर्तृकर्मद्वारा तन्निष्ठक्रियाया आधारः कारकमधिकरणसञ्ज्ञः स्यात्।
7. 2.3.36 – सप्तमी अधिकरणे च  
वृत्तिः – अधिकरणे सप्तमी स्यात्, चकाराद् दूरान्तिकार्थेभ्यः।

8. 1.4.42 – साधकतमं करणम्  
वृत्तिः – क्रियासिद्धौ प्रकृष्टोपकारकं कारकं करणसञ्ज्ञं स्यात्।
9. 1.4.24 – ध्रुवम् अपाये अपादानम्  
वृत्तिः – अपायो विश्लेषः, तस्मिन् साध्ये ध्रुवमवधिभूतं कारकमपादनं स्यात्।
10. 2.3.28 – अपादाने पञ्चमी
11. 1.4.32 – कर्मणा यम् अभिप्रैति स सम्प्रदानम्  
वृत्तिः – दानस्य कर्मणा यमभिप्रैति स सम्प्रदानसञ्ज्ञः स्यात्।
12. 2.3.13 – चतुर्थी सम्प्रदाने  
वृत्तिः – अनभिहित इत्येव।

### Kāraketara

1. 2.3.50 – षष्ठी शेषे  
वृत्तिः – कारकप्रातिपदिकार्थव्यतिरिक्तः स्वस्वामिभावादिसम्बन्धः शेषः, तत्र षष्ठी स्यात्।
2. 2.3.47 – सम्बोधने च  
वृत्तिः – इह प्रथमा स्यात्।
3. 3.4.21 – समानकर्तृकयोः पूर्वकाले  
वृत्तिः – समानकर्तृकयोर्धात्वर्थयोः पूर्वकाले विद्यमानाद्वातोः क्त्वा स्यात्।
4. 2.3.23 – हेतौ  
वृत्तिः – हेत्वर्थे तृतीया स्यात्।
5. 2.3.25 – विभाषा गुणे अस्त्रियाम्  
वृत्तिः – गुणे हेतावस्त्रीलिङ्गे पञ्चमी वा स्यात्।
6. 2.3.41 – यतः च निर्धारणम्  
वृत्तिः – जातिगुणक्रियासञ्ज्ञाभिः समुदायादेकदेशस्य पृथक्करणं निर्धारणं यतस्ततः षष्ठीसप्तम्यौ स्तः।
7. 2.3.37 – यस्य च भावेन भावलक्षणम्  
वृत्तिः – यस्य क्रियया क्रियान्तरं लक्ष्यते ततः सप्तमी स्यात्।
8. 2.3.42 – पञ्चमी विभक्ते  
वृत्तिः – विभागो विभक्तम्। निर्धार्यमाणस्य यत्र भेद एव तत्र पञ्चमी स्यात्।

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## D - *DHĀTU*-WISE (INCLUDING THE UPASARGAS) KĀRAKA EXPECTANCY

We have listed only the high frequency *dhātus* here. Given below are the tags for following tables:

Kāraḥa	Tags
Kartā	K1
Karma	K2
Karaṇam	K3
Sampradānam	Sam.
Apādānam	Apā.
Adhikaraṇam	Adhi.

Table 1: Kāraḥa Tags

Bhvādi Gaṇa							
No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
1.	Bhū	✓				✓	✓
	Bhū_ṇic	✓	✓	✓			
	Sam_bhū	✓		✓		✓	✓
	Pra_bhū	✓				✓	✓
	Abhi_bhū	✓	✓				

*continued on the next page*

No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
2.	<b>Dṛś</b>	✓	✓	✓			✓
	Dṛś_ṇic	✓	✓			✓	✓
	Anu_dṛś	✓	✓				✓
	Pra_dṛś	✓	✓				
	Sam_dṛś	✓	✓				✓
3.	<b>Sthā</b>	✓	✓	✓			✓
	Sthā_ṇic	✓	✓				✓
	Ava_sthā	✓					✓
	Āñ_sthā	✓	✓	✓			
	Ud_sthā	✓					
	Adhi_sthā		✓				
	Anu_sthā	✓	✓				
	Pra_sthā	✓					✓
	Prati_sthā		✓				✓
	Vi_sthā						✓
	Pari_ava_sthā	✓					
	Sam_upa_sthā		✓			✓	✓
4.	<b>Vṛt</b>	✓	✓				✓
	Ni_vṛt	✓				✓	✓
	Pra_vṛt	✓	✓			✓	
	Anu_vṛt	✓	✓				✓
	Ati_vṛt	✓	✓				
	Āñ_vṛt			✓			
	Sam_vṛt						✓
	Vi_ni_vṛt	✓					
	Vi_pari_vṛt	✓					
5.	<b>Gam</b>	✓	✓	✓		✓	✓
	Adhi_gam	✓	✓	✓			✓
	Āñ_gam	✓	✓				
	Vi_gam	✓		✓			

*continued on the next page*

No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
	Sam_adhi_gam	✓	✓				
	Sam_āñ_gam	✓					✓
	Ava_gam	✓					
	Ni_gam		✓				
	Upa_sam_gam		✓				
6.	Śru	✓	✓	✓		✓	✓
7.	Tyaj		✓	✓			✓
	Pari_tyaj		✓				
8.	Hṛ	✓	✓	✓			✓
	Sam_hṛ	✓	✓				
	Ut_hṛ		✓	✓			
	Ut_āñ_hṛ	✓	✓				
	Vi_āñ_hṛ		✓				
9.	Śri		✓				
	Āñ_śri		✓				
	Upa_śri		✓				
	Sam_śri		✓				
	Upa_āñ_śri		✓				
	Vi_apa_āñ_śri		✓				
	Sam_upa_āñ_śri		✓				
10.	Labh	✓	✓			✓	✓
	Upa_labh	✓					✓
11.	Bhaj	✓	✓	✓			
	Vi_bhaj						✓
	Pra_vi_bhaj	✓		✓			
12.	Smṛ	✓	✓	✓			✓
	Anu_smṛ		✓				✓
	Sam_smṛ		✓				
13.	Arh	✓	✓				✓
14.	Car	✓	✓	✓			

*continued on the next page*

No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
	Āñ_car	✓	✓				
	Ni_car	✓					
	Sam_āñ_car	✓	✓				
15.	Yaj	✓	✓	✓			✓
16.	īkṣ	✓	✓	✓			✓
	Ava_īkṣ	✓	✓				
	Nir_īkṣ	✓	✓				✓
	Vi_īkṣ	✓	✓				
	Sam_īkṣ		✓				
	Sam_pra_īkṣ		✓				

Table 2: Ākāṅkṣā for Bhvādi Dhātu distribution

Adādi Gaṇa							
No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
1.	As	✓	✓	✓		✓	✓
	Vi_ut_as		✓				
2.	Vac	✓	✓		✓		✓
	Pra_vac	✓	✓		✓		✓
3.	Vid	✓	✓	✓		✓	✓
4.	Yā	✓	✓	✓		✓	✓
	Upa_yā	✓	✓	✓			
	Pra_yā						✓
	Sam_yā	✓	✓				✓
5.	Han	✓	✓				✓
	Han_ñic	✓	✓				
	Abhi_han		✓				✓
	Upa_han	✓	✓				
	Ni_han	✓	✓				✓
	Pra_han	✓	✓				

*continued on the next page*

No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
6.	I	✓	✓				✓
	Ati_i		✓				
	Upa_i	✓	✓	✓			
	Vi_ati_i		✓				
	Sam_ati_i		✓				
7.	Brū	✓	✓		✓		✓
	Pra_brū	✓	✓		✓		
8.	Ās	✓					✓
	ās	✓	✓	✓			
	ās	✓	✓				

Table 3: Ākāṅkṣā for Adādi Dhātu distribution

Juhotyādi Gaṇa							
No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
1.	Dhā	✓	✓				✓
	Abhi_dhā	✓	✓		✓		✓
	Āñ_dhā	✓	✓				✓
	Vi_dhā	✓	✓	✓			✓
	Abhi_sam_dhā		✓				
	Pra_ni_dhā		✓				
	Sam_āñ_dhā		✓				✓
2.	Dā	✓	✓		✓		✓
	Āñ_dā	✓	✓				
	Pra_dā		✓				

Table 4: Ākāṅkṣā for Juhotyādi Dhātu distribution

Divādi Gaṇa							
No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
1.	Jan	✓					✓
	Jan_ṇic	✓	✓				
	Abhi_jan	✓				✓	✓
	Upa_jan	✓					✓
	Sam_jan	✓	✓			✓	
2.	Man	✓	✓			✓	
3.	Naś	✓	✓	✓			✓
	Naś_ṇic	✓	✓	✓			
	Pra_naś	✓				✓	
	Vi_naś	✓					
4.	Āñ_pad	✓	✓				✓
	Upa_pad	✓	✓				✓
	Prati_pad	✓	✓				
	Pra_pad	✓	✓				
	Sam_pad	✓	✓				
5.	Vid	✓					✓

Table 5: Ākāṅkṣā for Divādi Dhātu distribution

Tanādi Gaṇa							
No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
1.	Kṛ	✓	✓	✓			✓
	Kṛ_ṇic	✓	✓				
	Namas_kṛ		✓				

Table 6: Ākāṅkṣā for Tanādi Dhātu distribution

Svādi Gaṇa							
No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
1.	Āp	✓	✓	✓			
	Ava_āp	✓	✓				
	Pra_āp	✓	✓				✓
	Vi_āp		✓				
	Sam_āp	✓	✓				
	Pari_sam_āp	✓					✓
	Dus_pra_āp	✓	✓				
2.	Āñ_vṛ	✓	✓	✓			
3.	Śak	✓	✓	✓			✓

Table 7: Ākāṅkṣā for Svādi Dhātu distribution

Tudādi Gaṇa							
No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
1.	Viś	✓	✓				✓
	Āñ_viś		✓	✓			✓
	Upa_viś	✓					✓
	Pra_viś	✓	✓				
	Ni_viś_ṇic	✓	✓				✓
2.	Muc	✓	✓	✓		✓	
	Muc_ṇic	✓	✓			✓	
	Pra_muc	✓		✓		✓	
	Vi_muc	✓	✓	✓			
3.	Iṣ	✓	✓				
	Anu_iṣ	✓	✓				✓

Table 8: Ākāṅkṣā for Tudādi Dhātu distribution

Rudhādi Gaṇa							
No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
1.	Yuj	✓	✓	✓			✓
	Pra_yuj	✓	✓				✓
	Ni_yuj	✓	✓				✓

Table 9: Ākāṅkṣā for Rudhādi Dhātu distribution

Kryādi Gaṇa							
No.	Dhātu	K1	K2	K3	Sam.	Apā.	Adhi.
1.	Jñā	✓	✓	✓			✓
	Vi_jñā	✓	✓				
	Ava_jñā	✓	✓				
	Abhi_jñā	✓	✓	✓			
	Pra_jñā		✓	✓			
	Prati_jñā	✓	✓				
2.	Bandh	✓		✓			
	Ni_bandh	✓	✓	✓			✓

Table 10: Ākāṅkṣā for Kryādi Dhātu distribution

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