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# **India's Contribution to Linguistics**

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इदमन्धं तमः कृत्स्नं जायेत भुवनत्रयं ।  
यदि शब्दाह्वयं ज्योतिरासंसारं न दीप्यते ॥

महाकवि दण्डी

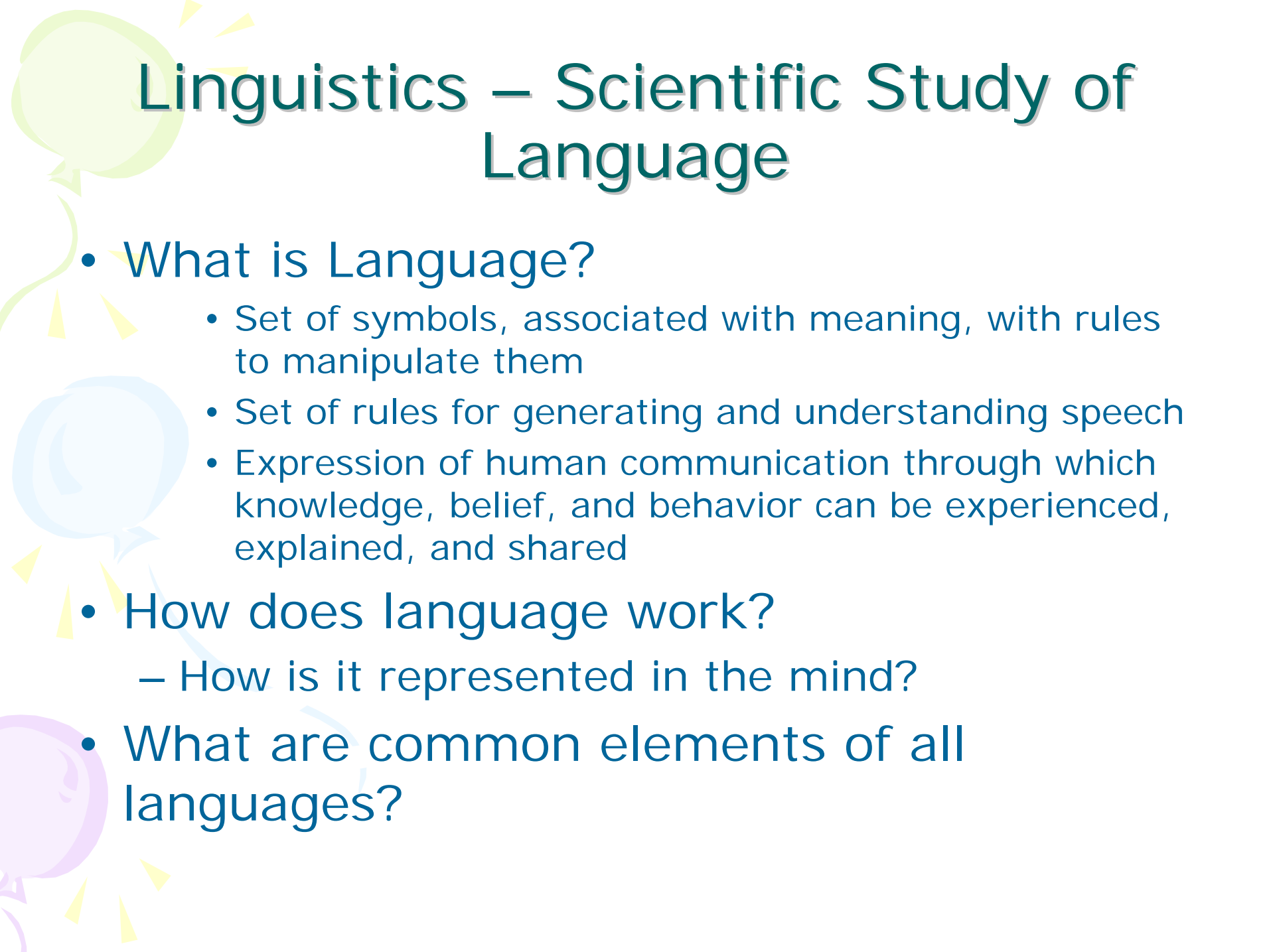
The three worlds would be completely enveloped in blinding darkness if not illumined to its complete extent by the light called *word*.

- Dandin, 7<sup>th</sup> Century CE



# Agenda

- What is Linguistics?
- Linguistic thought in India
  - Emphasis on Sanskrit and the Vedic tradition
- Contributions of Indian Linguists
  - Learn Sanskrit!
- Relevance to modern times

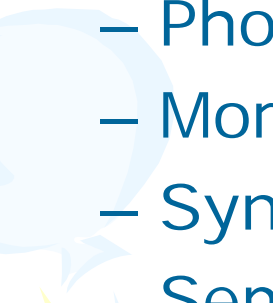



# Linguistics – Scientific Study of Language

- What is Language?
  - Set of symbols, associated with meaning, with rules to manipulate them
  - Set of rules for generating and understanding speech
  - Expression of human communication through which knowledge, belief, and behavior can be experienced, explained, and shared
- How does language work?
  - How is it represented in the mind?
- What are common elements of all languages?



# Areas of Linguistics

- Theoretical
    - Phonetics: Sounds of a language
    - Phonology: Sound patterns
    - Morphology: Word formation and structure
    - Syntax: Sentence structure
    - Semantics: Study of meaning
  - Applied
    - Understanding and teaching other languages, translation, speech therapy
- 
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# Linguistics in the West

- Sir William Jones (18<sup>th</sup> century)
  - Noted striking similarities between Sanskrit, Greek, Latin, and Celtic
  - Comparative Linguistics
- Modern Linguists
  - Ferdinand de Saussure (1857 – 1913)
    - Language Structure
  - Noam Chomsky (1928 - )
    - Generative Grammars





# Linguistics in India

- Very ancient tradition
  - Great emphasis on correct speech
  - *mleccha avyakte śabde*
- Literature
  - Vedas
  - Prātiśākhya
  - Nirukta (Yāska) ~ 800 BCE
  - Aṣṭādhyāyī (Pānini) ~ 600 BCE
  - Mahābhāṣya (Patañjali) ~ 150 BCE
  - Vākyapadīya (Bhartṛhari) ~ 500 CE

# References in the ṚgVeda

- X.71 – Jñānaṁ

उ॒त त्वः॑ प॒श्यन् न द॑दर्श॒ वाच॑मु॒त त्वः॑ शृ॒णवन् न शृ॑णोत्येनाम् ।  
उ॒तो त्व॑स्मै त॒न्वं॑ वि स॒स्त्रे जा॒येव॑ पत्य॒ उ॒शती॑ सु॒वासाः ४

- X.125 – Vāgambhrṇī

यं का॒मये॑ तंत॒मुग्रं॑ कृ॒णोमि॑ तं ब्र॒ह्माणं॑ तमृ॒षिं तं सु॑मे॒धाम्

- I.164 – Asya Vāmasya

च॒त्वारि॑ वाक् परि॒मिता॑ प॒दानि॑ तानि॒ विदु॑र्ब्रा॒ह्मणा॑ ये म॒नीषि॑णः ।  
गु॒हा त्री॑णि॒ निहि॑ता॒ नेङ्ग॑यन्ति॒ तुरी॑यं वा॒चो म॑नु॒ष्या व॑दन्ति ४५





# Observations on Language

- Language can be defined by a set of ***rules***
- Rules must explain
  - Existing usage
  - Future usage
- Rules must be precise
  - Rule application defined by ***metarules***
- Separate conceptual (abstract) representation from expression



# Language Structure

- Sound and pronunciation (Śikṣā)
- Varṇa– basic unit of sound
  - Precise definition of attributes
  - Sanskrit has **no** sound that is indistinct
- Rules of saṁdhi
- Pada (word)
- Vakya (sentence)
  - Bhartr̥hari considers the sentence as the basic unit of communication
  - Sentence-meaning is primary, and the word-meaning the result of rather artificial analysis



# Important Concepts

- Kāraka – कारक
- Samāsa – समास
- Taddhita – तद्धित
- Kridanta - कृदन्त

# Kāraḱa - कारक

- Abstract model of semantic relationships
- Fundamental idea expressed by action (kriyā)
- Relationship to action
  - Kartā - agent
  - Karma – direct object
  - Karaṇa – instrument
  - Saṁpradāna – indirect object
  - Apādana – that from which departure takes place
  - Adhikaraṇa – location, substratum
- Vibhakti – Expression of relationship
  - Indicated by case endings (prathamā, dvitīyā, etc.)
  - All other relationships - ṣaṣṭhī



# Samāsa - समास

- Compound words
- Types
  - Avyayībhāva, Tatpuruṣa (Dvigu, Karmadhāraya), Dvandva, Bahuvrihi
- Elaborate rules on formation
  - Order of words
  - Distinguishing using accent
  - Samāsa vighraha
- Modern Examples
  - Database, Internet, Workspace, White-collar



# Taddhita - तद्धित

- Noun Derivatives – adding pratyaya
- Used to indicate
  - Descendant (Tasyāpatyam)
    - Dāsharathi, Vaishwamitra
  - Having that quality (Tasya bhāvastvatalau)
    - Hindutva, Samatā
  - Someone's teaching (Tena proktam)
    - Pāṇiṇīyam
- Examples in English
  - Suffixes such as –ness, -ity, -tion, -dom



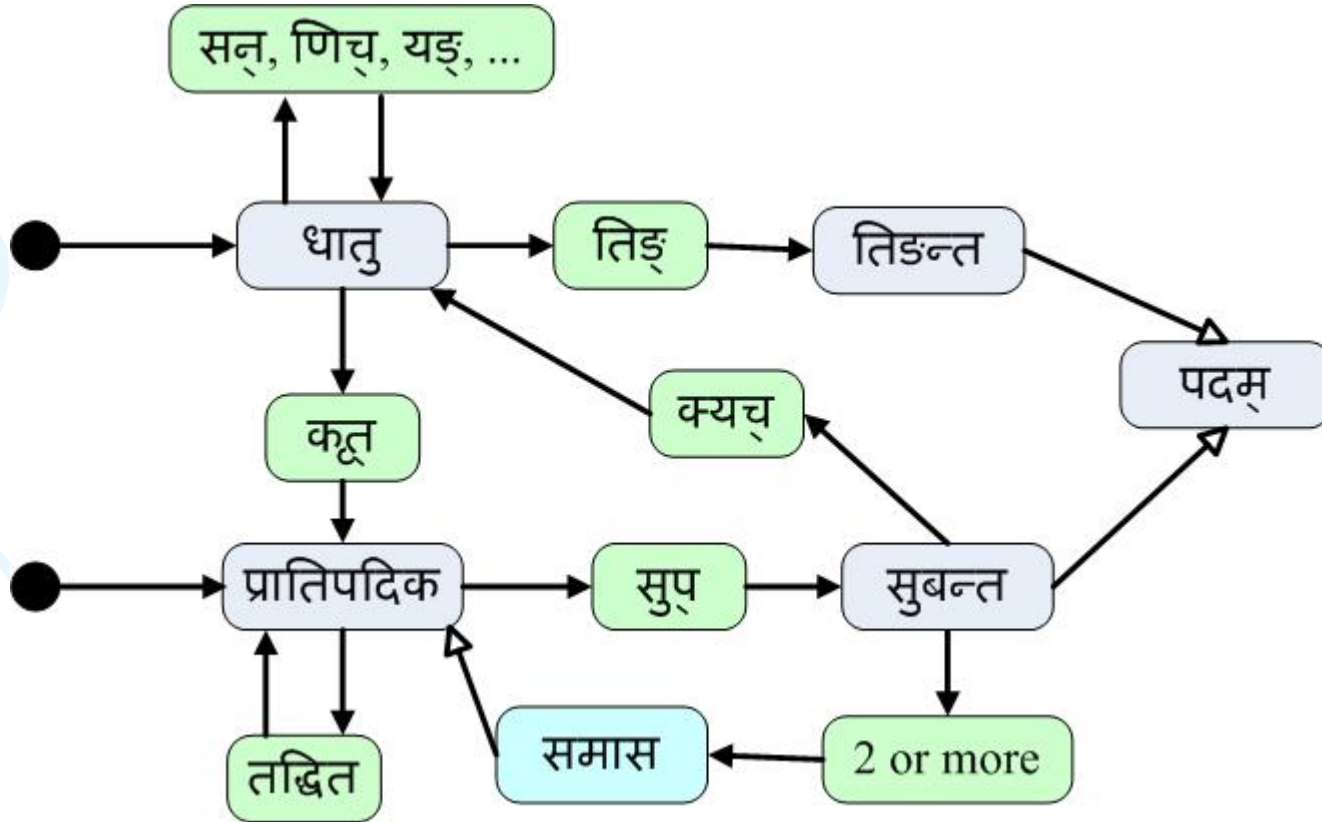
# Kridanta - कृदन्त

- Verb Derivatives
- English
  - Accept – acceptance
  - Go – going
  - Pay – payment
- Uṇadi Sutras
  - Vāyu

## **Ancient tradition**

Pānini, Vararuchi, Patañjali

# Conceptual Model





# Bhartrihari (6<sup>th</sup> Century CE)

- Linguistic Philosopher
- Possibly identical to the author of the śatakatraya (nīti, śṛṅgāra, vairāgya)
- Major Concepts
  - Vyākaraṇa is a Darśana
  - Language is the only key to knowledge
  - Identifies śabdātattva (speech principle) with Brahman
  - Sphota theory: What the speaker utters and the listener listens is vākya sphota (complete meaningful sentences)

# Vākyapadiya Organization

- Brahma kāṇḍa
  - Nature of śabda which is proclaimed to be identical with Brahman as well as the principal means to attain it
- Vākya kāṇḍa
  - Different attitudes towards the sentence vākya. The sentence is the real meaning-bearer, whereas the meanings of the single words are artificially inferred from it
- Pada (Prakīrṇa) kāṇḍa
  - Issues dealt with by the other philosophical traditions, including the problems connected with padārthas such as jāti, dravya, and kāla

# Importance of Vyākaraṇa

अनादिनिधनं ब्रह्म शब्दतत्त्वं यदक्षरम्।

विवर्ततेऽर्थभावेन प्रक्रिया जगतो यतः ॥ १ ॥

The affairs of the word are carried out by the eternal and indestructible being, manifesting itself through meaning and expression.

अर्थप्रवृत्तितत्त्वानां शब्दा एव निबन्धनम् ।

तत्त्वावबोधः शब्दानां नास्ति व्याकरणादृते ॥ १३ ॥

Words alone are the means to express something that is desired. Understanding of the essence of words is not possible without recourse to linguistics (Vyākaraṇa) .

# Stages of Speech

- Vaikhari – Elaborated, Expressed
- Madhyama - Mediating
- Pashyanti – Seeing, witnessing
- Para – Transcendental (term not used in VP)

वैखर्या मध्यमायाश्च पश्यन्त्याश्चैतद्द्भुतम् ।

अनेकतीर्थभेदायास्त्रय्या वाचः परं पदम् ॥

This is the amazing, supreme abode of speech, manifesting as vaikhari, madhyama, and pashyanti, and divided in multifarious ways.

The background features several large, overlapping, semi-transparent swirls in shades of purple, green, and blue. Scattered throughout are numerous small, yellow, triangular shapes that resemble confetti or starbursts. The overall aesthetic is bright and modern.

# **Modern Applications**

# Examples from Web 2.0

- *Sneak in an extra vowel, drop in a consonant - welcome to the lexicon of web 2.0*
- varṇa āgama: bhīma -> bhīṣma
- varṇa viparyaya: hiṃsa -> siṃha
- varṇa vikāra: r->l, taruṇa taluna
- varṇa nāśa (lopa): klish + a -> kesha
- Example: blog
  - (world wide) web + log



# Computational Linguistics

- Natural Language Processing
- Goals
  - Communicate with computers using natural language
  - Software should listen and speak
- First International Sanskrit Computational Linguistics Symposium, Paris, October 29-31, 2007
- JNU Research Center
  - <http://sanskrit.jnu.ac.in/index.jsp>
  - Tools and technologies for translating between Sanskrit and Indian Languages



# Summary

- India has had a long tradition in Linguistics
- The Sanskrit language incorporates many sophisticated linguistic concepts
- Studying Sanskrit can greatly benefit understanding of language
- Computational Linguistics can use concepts from Sanskrit



The background features several large, stylized, overlapping swirls in shades of purple, green, and light blue. Scattered throughout are numerous small, yellow, starburst or triangle-shaped elements, some pointing towards the center and others towards the edges, creating a festive and celebratory atmosphere.

# **Thank You**

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