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Concept of ‘Time’, Semantic Relationships and Cultural Frames

Abstract
This paper deals with the impact of culture, especially ancient traditions and indigenous cultures, on conceptualization and semantic relationships. Gives examples of representation of the common „universal” concept of „Time,” viewed through select cultural perspectives. Provisions for representing „Time” in knowledge organization tools (KOTs) are examined. Some of the ideas and examples presented arose from our work for developing multi-lingual, multi-culture databases, the related KOTs, user-interfaces, and retrieval processes.

Introduction

Objective
The objective of this paper is to briefly discuss the impact of culture on the formation of concepts about „Time”, interrelationship among concepts and their representation in knowledge organization tools (KOTs) especially dealing with multilingual multi-cultural knowledge resources.

Working Definitions

Concept: A mental representation that stands collectively for all meaningful statements that can be made about an entity.

Culture: Depending on the context „Culture” may signify: (1) a particular society at a particular time and place, e.g. Mayan culture, Vedic culture, Dravidian culture; or (2) the knowledge and values shared by a society e.g. modern Bengali society; or (3) the tastes, styles in art and manners favoured by a community or social group, e.g. Elizabethan poetry, French Renaissance art, and (4) the attitudes and behaviour characteristic of a particular social group or organization, e.g. Jain monks, Ku Klux Clan, South-Pacific Islanders.

Frame: A structure or framework (conceptual or concrete) supporting or containing something.

Background

Concepts, their names (terms), their semantic inter-relationships and organization in meaningful ways are basic to knowledge formation and development of KOTs such as, subject classification schemes, information retrieval thesauri, taxonomies, ontologies, etc. Concepts and their formation are impacted by cultural frames or perspectives. Increasing interactions among peoples of different cultures result in changes in cultural perspectives. KOTs need to accommodate such different cultural perspectives of concepts and relationships among them to enable effective search and retrieval in multilingual domains.

languages of non-Latin origin, such as Sanskrit, Farsi and Tamil. The ideas and examples relating to “Time” presented in this paper are based on our work on developing multilingual, multi-faith, multi-culture databases, the related KOTS, user-interfaces, and retrieval processes.

**Concept of Time**

The concept of Time is universal although its definition, occurrence, applications (role played) and methods of timekeeping (e.g. calendar) differ across communities and cultures. KOTS such as classification schemes and thesauri may have a separate (common) schedule for Time concepts. In application (e.g. in KOTS) the need to disambiguate the particular cultural way of timekeeping (e.g. in calendars) arises, e.g., 1745 (Hijara), 4345 (Shalivahana). “Time” may be studied by scholars in different domains; or on the basis of time concept and timekeeping of particular groups, e.g. Sami Time discussed below. Most of the daily, weekly, monthly, annual activities of peoples all over the world are in some manner or the other synchronized with Time. Time is “static”; yet the rotation of the earth and other cosmic phenomena make us feel that Time flows, changes. And there are biological internal clocks to whose functioning – normal and abnormal - the human body is attuned and responds to.

**Time in Indic Cultures**

The notions of Space and Time are extensively dealt with in Indian philosophy and cultures. Indic culture is largely inspired by its ancient philosophy and Vedic culture, even though over the past centuries external invading forces, colonizers, and settlers e.g. Persians, Mughals, Europeans - have had their impact. The different religions and the related practices of Jainism, Buddhism, Hinduism, Judaism, Islam, Christianity, etc., too have impacted. Ancient Hindu units of measures (e.g. timekeeping) are still in use especially in the Hindu and Jain ways of life. Dravidian civilization is the other major Indic culture.

Time (kAla) as conceived and represented in Hindu scriptures ranges from the smallest unit to astronomical units. The Indian perspective of Time is that it is circular or cyclic. The use of the term kAlachakra in Hindu and Buddhist philosophies is also indicative of this perspective of Time. The term chakra (wheel shape) is an important polyvalent sign, organizing metaphor and iconographic device among Indic religions, e.g. Dharmachakra and Sudarshana Chakra. Hindu sages describe the cyclic time as an endless procession of creation, preservation and dissolution. Indian mythology has numerous elements regarding the cyclic nature of time, e.g. the repetitive „Yugas”, the repetitive cycle of the sixty samvatsaras (years), etc. The Hindu cosmology calculates the duration of the Earth as one mahAyuga (about 432 million years) at the end of which the Earth dissolves into the cosmic ocean and remains in that state for an equivalent duration before another cycle of the process of creation begins. The aeons (Yugas) are divided into four periods, namely, kritayuga, trEtayuga, dwAparayuga and kaliyuga. While most cultures base their cosmologies on familiar units such as a few hundred (centuries) or thousand years (millennium), the Hindu concept of time embraces billions and trillions of years. The Puranas describe time units from the infinitesimal truti, lasting 1/1,000,000,000 of a second to a mahamanvantara of 311 trillion years. There are also several different calendars in use in India, although broadly these are either the solar calendars or the lunar calendars. With a recorded history of over 5000 years, Indian cultures, religions and philosophies have thrown up an extremely rich collection of time-related concepts. The reasons are obvious;
the nature, location and vastness of the country with diversified geography, climate, sea, rivers and mountains, fauna and flora and the exposure to several European and other cultures have, over centuries, served as a fertile platform for nourishing highly philosophic as well as mundane ways of thinking and styles of living; the Online Tamil Lexicon includes over 800 time-related concepts. This is probably true of other linguistic groups also. Narada Samhita (an ancient Hindu text) lists nine methods / types of measuring time and in all the nine systems a year is made up of 12 months, each month having 30 days. Thus, a year is made-up of 360 days. The year is further split into: Ayanas (dakshinAyana and uttarAyana), Ritus (seasons; six seasons are recognized as against four in western calendars), months, pakshas (fortnights), days, muhurthas, ghatis, kshanas, kalas, kashthas, and nimishas. The concept of Time also manifests in a variety of ways in Indian cultures.

Other Indic Measures of Time: The smallest unit of time is a kaashta which is 18 times the length of time to blink an eyelid. Ten kaashtas make a kshanam; 12 kshanams make up a muhoortam, and 60 muhoortams make up a day; 30 days constitute a month and 2 months make up a rito; and 12 months constitute a human year.

In the realm of departed souls - the pitrus - a human month equals the length of a day. The brighter half of a lunar month is the pitru's day and the darker half constitute their night. In the realm of the Gods or Devas, a human year is equivalent to a single day. The brighter half of the year or uttarayana makes up the day time of the Devas and dakshinayana or the darker half constitutes the night time.

A yuga (epoch) of 1200 Deva years (1200 x 360 = 432000 human years) constitute the kaliyuga or the present epoch; the preceding dwAparayuga was twice the length of the kali yuga i.e. 2400 Deva years; the 3600 Deva years preceding the dwAparayuga made up the trEtAyuga; and 4800 Deva years preceding the trEtayuga made up the krita yuga. A cycle of 4 yugas is called catur yugas. A cycle of catur yugas lasts for 12,000 Deva years or 12,000 x 360 i.e. 4,320,000 human years.

In Indian mythology, these time measurements may be correlated with the process of creation thus:

Brahma is referred to as the creator. A thousand catur yugas make up the day time of a single day of Brahma's life. Another thousand make up the night time of a single day of Brahma. Thus, a single day in Brahma's life spans 2000 x 4,320,000 = 8,640,000,000 human years; 360 such days, each lasting 8.6 billion years constitute a year in Brahma's life, which lasts for a 100 Brahma years. At the end of one Brahma's life, another cycle starts. A Brahma's life is also known as a Para. Each half para is a parardham. It is said that we are currently living in the 2nd half of the life of the present Brahma! In the performance of Vedic rituals, the time-frame in which the ritual is being performed is specified both in macro and in micro terms, the term 'dviteeya paraardhe' (the second half of Brahma's term) is stated. The reference point here is the moment when Brahma began the creation of the Universe. Krishnaswami writes, 'When we say 'dviteeya paraardhe', which Brahma are we referring to? How many Brahmas have preceded the current one? This specification is non-existent in Vedic mantras. Since the whole process is cyclical, with one Brahma commencing when another completes, and with this process repeating forever, there may not be any significance in stating the position of Brahma. If time is postulated as being linear and unidirectional there will have to be an absolute starting point for time. This cyclical nature of time as believed in Indian mythology refers to time as that without a beginning or 'anaadi'.'

Another measure of time is kalpa. A kalpa or an epoch is made up of 14 manvantaras and each manvantara spans 71 catusyugas. The fourteen manvantaras are respectively swayambhava, savosisha, audhama, thaanasa, raivatha, sakshusa, vaivasvata, savarni, daaksha savarni, bhramha savarni, dharma savarni, rudra savarni, rochya and bowdhyya. The present kaliyuga is the 28th in the present Vaivasvata manvantara. Each Brahma's term lasts for 7 kalpas. The current period in time is said to belong to the sweta varaha kalpa, which is in the second half of the life of Brahma. The puranas are named after kalpas, thus matsya kalpa, koorna kalpa, lakshmi kalpa, sweta varaha kalpa, shiva kalpa, bhramha kalpa, vishnu kalpa, etc.

Sankalpam: Vedic mantras pin point the time of performance of a ritual - by narrowing down from dviteeya paraardhe (in the 2nd half of the term of Brahma), Sweta varaha kalpe (in the kalpa sweta varaha), Vaivasvata manvantare (in the 7th manvantaram), Kaliyuge (in the Kali epoch) - through the finer details such as the name of the current year, month, etc.
More frames of kAlam (time, duration):

kaNam = Shortest duration of time as measured by a snap with the fingers.
ilaku = One of 10 varieties of kAlam (time, duration) which consists of 16384 kaNam.
akapatam = One of ten varieties of kAlam (time, duration) which consists of 65536 kaNam, etc.
patem = nAzhikai = Indian hour of 24 minutes

New Year: Given the cultural and ethnic diversity of India, New Year's Day is celebrated at different times of the year by different communities; over fifteen variations. Generally the Lunar calendar has been the base of calculations from ancient times. Most of these New Year celebrations are based on the months in the Lunar Hindu Calendar. The New Year celebration may relate to a deity, advent of a season, a certain practice, a cosmological event, etc. Here are a few examples:

- Rongali Bihu (= Bohag Bihu) is celebrated in mid-April. 15 April, (Maanuh Bihu), marks the first day of Hindu Solar calendar. Advent of Spring and seeding time.
- Ugadi in Andhra Pradesh and Karnataka. The first day of the Hindu month Chaitra; advent of spring. (Brahma, the creator, began creation on this day according to Hindu mythology)
- Gudi Padwa is in Maharashtra,. the first day of the month Chaitra. Brahma is worshipped and the gudi, Brahma's flag (also called Brahmadvaji), is hoisted in every house as a symbolic representation of Rama's victory over Ravana.
- Puthandu or Varsha pirappu, in Tamil Nadu., on the first day of the Tamil month Chithirai, 14 April. Women draw patterns called kolams. A lamp called a kutvnilaku is placed on the center of the kolam, to eradicate darkness. A ritual called kanni takes place. Kannu means 'auspicious sight'. People watch jewellery, fruits, vegetables, flowers, nuts, rice etc., as it is a belief among Tamil people that it brings prosperity. People wear new clothes and special dishes are prepared for the occasion. A car festival is held at Tiruvadamarudur, near Kumbakonam.
- Vishu in Kerala; the first day of the Malayalam month of Medam. Offerings to the divine called Vishukanni arranged on the eve of the festival and consist of rice, linen, cucumber, betel leaves, holy texts, coins and yellow flowers called konna (Cassia fistula). A bell metal lamp - nilavilakku - is placed alongside. People read the Ramayana and visit temples; people wear new clothes, burst crackers, prepare special dishes and the elders of the house give money to children, servants and tenants - Vishukaineetam.

Other New Year days in India include; Cheiraoba (Manipuris); Navreh (Kashmiris); Maha vishuva Sankranti (Odissa); Bestu Varas (Gujaratis); Cheti Chand (Sindhis); Chaititi and Basoa/Bishu (Himachal Pradesh); Pohela Boishakh (West Bengal and Bangladesh); Vaisakhi (Sikhs): Chaitra Pratipada (Biharis). Thus,

New Year

- RT ugaadi (Andhras, Karmadigas, March)
- RT gudi padwa (Maharashtrians, March)
- RT pottaandu (Tamilians, Chitra, Mid-April)
- RT bestu varas (Gujaratis)
- RT vishu (Malayalis, Kerala, Medam month)

Similarly for other communities

Each of the days may be associated with a deity or divinity, special offerings, oblations, and other functions and celebrations – giving rise to a network of related concepts.

Similarly, there are differences in the beginning and end of government, business and administrative years, in school / academic year. Venkateswara Rao (2012) writes about the concept of a „spiritual year”.

Time Representation in Space / Architecture

Hindu philosophy, religion and culture which had their origin in India later spread to several countries of Asia in particular. Many elements and aspects of the Indian cosmology, for instance, have been absorbed into the Indonesian Balinese dances and the architecture of Cambodia’s Angkor Wat temples, as in Indian classical dances and temple architecture. The expression of Time in Angkor Wat temple architecture is explained thus: “There were temporary wooden structures built for invoking the Spirit even in the pre-Vedic period,
several centuries before the C.E. … The circular fire altar is made up of three hundred and sixty bricks to symbolize a revolution, a concrete representation of cosmic time. The imagery of the cosmic body or Purusha represented by the pole at the centre of the consecrated space-time altar called Mahaavedi corresponds to the human body with all its limbs, senses and apertures. This body in time establishes a relationship with space above and around, thus giving form to abstract speculative thought (Kak, Subbash (2000), quoted in Srinivasan (2002).) We may compare this „unity of ideas across genres“ of performing arts, with S.R. Ranganathan’s concept of „semenal mnemonics“ and its applications.

Further, in the “Angkor Wat the entire sanctuary including its outer moat is based on Hindu cosmology of aeons or yugas. As mentioned above the duration of the earth is calculated as a Mahayuga lasting 432 million years, which is a single day of Brahma, the Creator. At the end of it, the earth dissolves into the cosmic ocean for an equal period of time, regarded as the night of Brahma. The process of creation, preservation and destruction repeats thus endlessly in a cosmic cycle.”

**Sami Concept of Time**

A widely studied indigenous culture of Europe is the Sami culture. The concept of Time of these people of the Lapland is based on their strong relationship with nature and the behaviour of the reindeer. It is experiential knowledge “accumulated through repeated experiences of particular situations and arising from the idea of man following the flow of nature without altering it, and that one cannot rush nature.” Their wooden calendar reflects these cultural view points. The seasons are harmonized with the life-cycle - the annual behavioral pattern - of the reindeer marked into eight seasons. In recent years interactions with people from outside Lapland (e.g. trade, tourism, etc) has lead to creating equivalent notations for the Gregorian calendar months in the Sami calendar.

Similar variations in the „calendar“ of North American Indians are known. All such cultural variations (frames) relating to the concept of time and timekeeping need to be accommodated in the KOTS. (Neelameghan and Narayana, 2012).

The Sami calendar is also divided into months that more or less match those of the Gregorian calendar, but they are far less rigid about the time period that they define.

<table>
<thead>
<tr>
<th>Western</th>
<th>Sami</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>ODDŋgamánnu</td>
<td>New Year Month</td>
</tr>
<tr>
<td>February</td>
<td>Guovvamánnu</td>
<td>[Unknown]</td>
</tr>
<tr>
<td>March</td>
<td>Njukčamánnu</td>
<td>Swan Month</td>
</tr>
<tr>
<td>April</td>
<td>Cuoŋománnu</td>
<td>Snow Crust Month</td>
</tr>
<tr>
<td>May</td>
<td>Miessemánnu</td>
<td>Reindeer Calf Month</td>
</tr>
<tr>
<td>June</td>
<td>Geassemánnu</td>
<td>Summer Month</td>
</tr>
<tr>
<td>July</td>
<td>Suıııdneııamánnu</td>
<td>Hay Month</td>
</tr>
<tr>
<td>August</td>
<td>Borgemánnu</td>
<td>Molt Month</td>
</tr>
<tr>
<td>September</td>
<td>Čakčamánnu</td>
<td>Fall Month</td>
</tr>
<tr>
<td>October</td>
<td>Golgıgotmánnu</td>
<td>Rut Month</td>
</tr>
<tr>
<td>November</td>
<td>Skäbbamánnu</td>
<td>Dark-Period Month</td>
</tr>
<tr>
<td>December</td>
<td>Juovlamánnu</td>
<td>Yule Month</td>
</tr>
</tbody>
</table>

As mentioned the Sami concept of Time is based on natural phenomena. The meaning of Sami name Guovvamánnu for February has been lost in time. However, the names of other months show the close connection between Sami culture and Nature. Also, the influence of reindeer herding is evident and the calendar is also based on other yearly occurrences within the reindeer cycle. For example, the Sami name for April, Cuonjománnu, is derived from the Sami word for the hard crust that is beneficial during the migration from the winter grounds to the calving grounds.
Cuománnu (April)
SN Term derived from the Sami word for the hard crust, beneficial during the migration of the reindeer from the winter grounds to the calving grounds
RT Hard crust
RT Migration of reindeer
RT Calving ground

The influence of Christianity is evident in the Sami name for December. Yule is a pre-Christian word.

The Weeks: The Sami concept of time also includes various names for the different weeks in a year. A few have survived and some of them relate to events of the Christian calendar. The use of calendars designating weeks probably became necessary after introduction of Christianity and weekly church services. The impact of Western society led Sami calendar to place importance on the religious cycle as well as nature’s cycle, a step towards the assimilation of the Sami culture. Still, dependence on reindeer husbandry demanded accurate knowledge of the seasons and life-cycles of the reindeer. As tax collectors, traders and missionaries moved into Sami territory, these weekly calendars became a necessity as interaction with the outsiders needed a more fixed timetable.

The Sami Wooden Calendar: The wooden calendar is also divided into weeks and serves as a portable device for telling time. Fabricated from wood or reindeer antler, this calendar was used to keep track of both natural phenomena and religious occurrences. Written in the runic alphabet, the wooden calendar was a useful tool in helping preserve the balance between nature and religion. These calendars date back to the mid-1800’s and are another indication of the impact of Christianity upon the Sami. In the drawings of the Sami wooden calendar, there is a great deal of detail and attention given to the intricacies of this way of telling time.

The following list of Sami names of the weeks and the wooden calendar are indicators of this change in the Sami culture. In Table 2 below the Sami name (first column) has an Associative Relationship (RT) with the corresponding name of a Saint or Christian event, or Season or Animal etc. (second column).

<table>
<thead>
<tr>
<th>Sami Name</th>
<th>Meaning (Week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar’debei-vâk’ko</td>
<td>St. Bartholomew (Aug. 24th)</td>
</tr>
<tr>
<td>Birgit-vâk’ko</td>
<td>St. Birgit’s</td>
</tr>
<tr>
<td>Dal’ve-vâk’ko</td>
<td>Winter</td>
</tr>
<tr>
<td>Gil’de-Marija-vâk’ko</td>
<td>Virgin Mary</td>
</tr>
<tr>
<td>Hallemes-vâk’ko</td>
<td>All-Saints</td>
</tr>
<tr>
<td>Mattumes-vâk’ko</td>
<td>St. Matthew’s</td>
</tr>
<tr>
<td>Miccmar-vâk’ko</td>
<td>Mid-Summer</td>
</tr>
<tr>
<td>Mikkalmes-vâk’ko</td>
<td>St. Michael’s</td>
</tr>
<tr>
<td>Oar’re-vâk’ko</td>
<td>Squirrel</td>
</tr>
<tr>
<td>Simmun-vâk’ko</td>
<td>St. Simon’s</td>
</tr>
<tr>
<td>Sobner-vâk’ko</td>
<td>Before Leaf-fall</td>
</tr>
<tr>
<td>Gássa-vâk’ko</td>
<td>Goose</td>
</tr>
<tr>
<td>Urva-vâk’ko</td>
<td>Trees Leafing</td>
</tr>
</tbody>
</table>

Symbols: Crosses denote days of religious significance while fish and leaf sprigs denote various events in nature. By keeping track of time in this way, the Sami can easily refer back to earlier times of the year in order to predict when the fishing season would be most bountiful or whether or not spring would arrive early or not. This sensitivity towards the ways of the natural world was and is mandatory for the reindeer herders, fisherman and farmers alike. Here again each symbol (and name of symbol and picture) can be related to corresponding events in nature.
Concluding Remarks
Hajime Nakamura (1993), writes that “the concept of Time in Indian thought is quite different from that of the West. “In Indian thought, time, like other phenomena, is conceived statically rather than dynamically…. although it is recognized that the things of this world are always moving and changing. But the substance of things is seen as basically unchanging, it’s underlying reality unaffected by the ceaseless flux. The Indian does not concede that we never step into the same river twice; he directs our attention not to the flow of water but to the river itself, the unchanging universal. Indian thought places a high value on universality, and the connection between this, and the static conception of phenomena, is not accidental. "The one remains, the many change and flee. … this static conception of time permeates Indian thought... it is present in the very forms of language itself, conditioning all philosophical thinking. Nakamura provides examples from Sanskrit language."

From the brief descriptions in the examples given above, we may note:
• Lateral relationships of Time to concepts in different domains – Anthropology, Cultural studies, Sociology, Architecture, Temples, Philosophy, Cosmology, Mythology etc.
• In KOTs, such as classification schemes a common Time schedule is given (e.g. DDC, LC, CC). Wherever Time concept occurs its code / term may be picked up from this schedule and attached in constructing the subject class code.
• Classification schemes enumerate Time element in the schedules for a broader domain. For example in Colon Classification Time is enumerated in the schedules for Physics (in the Personality facet) along with other Fundamentals–Space, Energy, Matter, etc; in Cosmic hypothesis, Mysticism; Time in Indian Classical music or Time based theory of music where Time occurs as an attribute (property) of music; Time reckoning in Mathematics; Mental chronometry in Psychology; Time table in Education
• Time may occur as a qualifier (Speciator), e.g. World War II-1939-1945; Work-Time; Birth-Date
• Time qualified (speciated) by another concept, e.g. Time-Auspicious; Time-Wasted
• There are documents that comprehensively treat Time, e.g. Time and the sciences …. / Josefina Mena Abraham and Frank Greenaway, eds. Paris Unesco; 1979; Natural philosophy of time / G.J.Whitrow; 1980; Time in history: views of time from pre-historic to the present day; 1989; The geography of time: the temporal midadventures of a social psychologist, or how every culture keeps time just a bit differently / Robert Levine; 1997. CC provides for such comprehensive treatment in Generalia Entity Study.

Issues to be considered in designing multilingual KOT:
1. Identifying equivalent / near-equivalent concepts/terms in all the languages of the KOT. If such multi-lingual (online) dictionaries are available or prepared, the system may be enabled to pick up all the equivalents (and near-equivalents) from the dictionary for matching with the search term(s). In some cases exact equivalent term (phrase) may not be available in a particular languages, but lengthy definition or scope note may be available. If the terms are coded, say, the class code in a classification scheme, then it can be assigned (used as a tag) in the exact terms, near-equivalent terms or definitions in all the languages. Such a code used in the search expression can pick up the terms, definitions, etc., irrespective of the language of the text. In earlier papers it was shown that in a multi-lingual thesaurus, using a multilingual dictionary (English-Tamil-Kannada), with the search term can be in any one of these languages, the system will pick up equivalent term(s) in the other languages, search and retrieve matching records in all the three languages (Neelameghan and Lalitha, 2011). A similar facility is available in the cc Kannada-English version. In a pilot project, generating a thesaurus of the concepts/terms in the Personality facet for the subject „Education“ in the cc Kannada-English version, with facility for searching by the class code (class number) of the search term retrieves all records matching with the code, irrespective of the language of the record / text. (Sharada and Lalitha, 2012, under publication). The code may be from DDC or any other appropriate classification or coding scheme.
2. As pointed out above, the lateral (RT) links to a concept may be different in different cultural frames.
3. Disambiguation of homonyms and homographs.
4. Hyper-linking of terms in a KOT e.g. Classification scheme, thesaurus, to other KOTS, data collections, images, etc., must be provided to enable comprehensive search and knowledge discovery.

References