# Balinese Frame of Reference

**I Nyoman Aryawibawa**
Universitas Udayana
Email: inyoman.aryawibawa@gmail.com

**Abstract**

Wassmann and Dasen (1998) did a study on the acquisition of Balinese frames of reference. They pointed out that, in addition to the dominant use of absolute system, the use of relative system was also observed. This article aims at verifying Wassmann and Dasen' study. Employing monolingual Balinese speakers and using linguistic and non-linguistic tasks, Aryawibawa (2010, 2012, 2015) showed that Balinese subjects used an absolute system dominantly in responding the two tasks, e.g. *The man is north/south/east/west of the car.* Unlike Wassmann and Dasen's results, no relative system was used by the subjects in solving the tasks. Instead of the relative system, an intrinsic system was also observed in this study, even though it was unfrequent. The article concludes that the absolute system was dominantly employed by Balinese speakers in describing spatial relations in Balinese. The use of the system seems to affect their cognitive functions.

**Key words**: relative frame of reference, absolute frame of reference, intrinsic frame of reference.

**Abstrak**

Wassmann dan Dasen (1998) melakukan penelitian tentang acuan spasial (*frame of reference*) dalam Bahasa Bali. Mereka menunjukkan penggunaan sistem acuan spasial absolut dalam Bahasa Bali yang sangat dominan, disamping penggunaan sistem acuan spasial relatif, meskipun tidak sering digunakan. Tujuan penelitian ini untuk memverifikasi hasil penelitian Wassmann dan Dasen tersebut. Dengan melibatkan subjek yang hanya bisa berbahasa Bali dan menggunakan tugas-tugas yang bersifat linguis dan bukan-linguis, Aryawibawa (2010, 2012, 2015) menunjukkan kalau subyek yang terlibat dalam penelitiannya menggunakan sitem acuan spasial absolut secara dominan dalam menggambarkan sistem spasial, misalnya *Anak ento mejujuk*

*dajan/delod/dangin/dauh mobile* "Orang itu berdiri di sebelah utara/selatan/timur/barat mobil itu". Berbeda dengan Wassmann dan Dasen, sistem relatif tidak digunakan oleh subyek dalam penelitian ini. Sebagai pengganti sistem relatif, sistem spasial intrinsik juga ditemukan dalam penelitian in, meskipun pemakaianya jarang. Artikel ini menyimpulkan bahwa sistem absolut digunakan secara dominan oleh masyarakat Bali dalam menjelaskan hubungan spasial. Penggunaan sistem tersebut tampaknya mempengaruhi fungsi kognitif penuturnya.

**Kata-kata kunci**: sistem acuan spasial relatif, sistem acuan spasial absolut, sistem acuan spasial intrinsik.

## Introduction

Languages mark their frames of reference distinctly (Herskovitz 1986; Levinson, 2003; Brenzinger 2008; Boroditsky 2011). Levinson (2003: 52) uses the rotation of objects to explain the logical structures, i.e., the properties, of intrinsic, relative, and absolute frames of reference. More concretely, the intrinsic facets of the reference objects provide an anchoring coordinate system to describe the spatial relation between a located object relative to a reference object. Thus, when the viewer and the whole array are turned 180°, the description of spatial relation using the intrinsic system, for example between a ball and a chair, remains the same, i.e., *The ball is in front (side) of the chair.* But, when the reference object, i.e., the ground object (the chair), is turned 180° the spatial description changes, i.e., *The ball is in the back of the chair*. For the relative frame of reference, the rotation of the viewer and the whole array affects the spatial description, i.e., *The ball is to the right/left of the chair*, while the rotation of the reference object does not. Regarding the absolute frame of reference, the rotation of the viewer and the reference object does not affect the spatial description, i.e., *The ball is north of the chair*. However, the spatial description between objects changes when the whole array is turned 180°, i.e., *The ball is south of the chair*.

To summarise, in describing spatial relations between objects, spatial nominals, e.g., north, south, east, west, etc., are usually used for the absolute frames of reference, while the complex prepositions, e.g., in front of, in the back of, etc., are used for the intrinsic frames of reference, and the complex prepositions, e.g., to the right, to the left, are used in the relative frames of reference.

Interestingly, languages differ in using the principles of applying each of these frames of reference. More specifically, within the intrinsic system determining the inherent features of reference objects can be decided on a functional basis, e.g., English, or a shape-based system, e.g. Tzeltal (Levinson 2003). The principles of using the relative system depend on whether speakers of a language use a translation principle, e.g., Hausa, a reflection principle, e.g., English, or a 180° rotation principle, e.g. Na Tar, one dialect of Tamil (Levinson 2003). Regarding the absolute system, determining spatial orientations can be based on landmarks, e.g., Austronesian languages, an abstract system, e.g., Tzeltal, or an intermediate system between the landmark and abstract systems, e.g., the riverine system in Alaska (Levinson 2003).

More importantly to note, a language that uses a certain frame of reference, e.g. an absolute system or a relative system, could also be related to how the language organises time progression as reported by Boroditsky (2011). In her article (2011: 64), she pointed out that speakers of Kuuk Thaayorre, a language spoken in Pormpuraaw an aboriginal community on the western edge of Cape York in Northern Australia, uses fixed cardinal terms in their spatial orientation. So, spatial descriptions like "the cup is southeast of the plate", "the boy standing to the south of Mary is my brother" (Boroditsky 2011: 64) are common in the language. Quite interestingly, as Boroditsky (2011) further pointed out, when a speaker of the Kuuk Thaayorre, language was presented set of shuffled photos describing, for example, physical development of a crocodile, and asked the speaker to organise the photos, the speaker arranged them from east to west irrespective of any cardinal direction the speaker was facing.

The fact is different from English speakers, as Boroditsky (2011: 64) also informed, that given the same task, they will arrange the photos from left to right, and is also different from Hebrew language speakers, presented the same task, they will arrange the photos from right to left.

In addition to the spatial nominals and complex prepositions, there are also languages that employ place-names to specify the absolute frames of reference as Brenzinger (2008b: 4-5) describes.

> In conveying spatial information on locations in the bush, for example, on hunting/collecting sites, Khwe refer to landmarks – mainly the water pans, which all have individual names. The mental map of an experienced Khwe hunter or collector includes names and positions of between one hundred and two hundred pans; he will memorize the location of many fossil drainage lines and is familiar with the major elephant tracks. Most of all, he will remember thousands of prominent trees. Khwe place-names, as a rule, are primarily names for water pans óró-ca and dug wells //gáàna – the main water sources in West Caprivi. One could expect a total of far more than 600 Khwe place-names for the core area of Khwe-land, which stretches from West Caprivi north into Angola and south into Ngamiland of Botswana. A Khwe elder once stated emphatically that in Khwe-land 'There is no place named, where there is no water'. It is the water sources that are named, and this is done mainly by referring to environmental features, such as plants, animals and physically features.

This paper is mainly aimed at identifying Balinese systems in explaining spatial relation between objects to respond to a previous investigation by Wassmann and Dasen (1998). In their previous study, they pointed out that to some extent Balinese people use a relative system in their using frames of reference. In this paper, I will point out if Wassmann and Dasen's finding is confirmed or not.

**Balinese Frames of Reference**

Local languages in Indonesia use various systems of frames of reference in describing their spatial orientations. It

becomes interesting because the languages belong to the same language family, that is Austronesian. Rongga language, an isolating language spoken by Tanarata village in Flores, for example, uses an absolute system dominantly. In addition to the absolute system, an intrinsic system is also observed in the language (Aryawibawa, 2010). In contrast, Indonesian language, a language used as a national language by people coming from different ethnicities in Indonesia applies a relative system as a frame of reference. The use of an intrinsic system is also observed in the language. For more comprehensive findings and discussions of Rongga and Indonesian frame of reference systems, please refer to Aryawibawa (2010, 2012).

This section presents studies on frames of reference applied in Balinese. One classical study on the topic was conducted by Wassmann and Dasen (1998). In the following sub-sections, I summarise their study followed by my investigation on the topic. As stated at the outset of this article, current paper is mainly aimed at responding Wassmann and Dasen's findings.

**Wassmann and Dasen's study**

Wassmann and Dasen (1998) investigated the acquisition of frames of reference in Balinese, which shows that the relative frame of reference can still be observed in Balinese, although not dominantly. They provided two different tasks in their study (1998: 702- 704) as summarised in the following paragraphs.

In the first task used by Wassmann and Dasen (1998: 702-704), i.e., Animals in-a-Row, a series of three animals to which the subjects are familiar with, e.g., duck, goat, frog, tortoise, was provided to their subjects on the first table for five successive trials following a demonstrated task. The objects, i.e., animals, were directed alternately to the right, i.e., *kaja*, and to the left, i.e., *kelod*. The subjects were told to remember the arrangement. They were asked to reproduce the previous arrangement on the second table after a 30-second delay.

In their second experiment, i.e., Steve's Mazes, a drawing of landscape that consists of a house, rice-fields and trees was

presented to the subjects on the first table. A path was indicated on it with a winding course stopping a short distance from the house. The researcher instructed the subjects that they had to find the way to the house without having to cross the woods or the rice-fields. The researcher indicated the solution by tracing the remaining path on the drawing with a finger. The researcher told the subjects to memorise the remaining path. On the second table, three cards were placed, showing different path segments, one representing the relative solution, another showing the absolute solution, one representing an irrelevant solution. The task consisted of five of these drawings in addition to a demonstration trial (Wassmann and Dasen 1998: 702- 704).

The evaluation criteria for the results and subjects' background were also explained in their study. The criteria for evaluating the results are as follows. If the subjects, out of five trials, give four or five answers of a single type, they are classified as A or R (A=absolute; R= relative); if they give three answers of one type, they are classified respectively as A- or R-. Regarding the subjects, the experiment involved twenty-eight subjects, i.e., eight children aged 7 to 9 (up to 2 years of schooling), eight children aged 11 to 15 (2 to 5 years of schooling) and twelve adults between 20 and 60 years of age (up to 6 years of schooling)), with a virtually equal distribution between sexes (Wassmann and Dasen (1998: 702- 704).

Wassmann and Dasen (1998) pointed out that in their first experiment, the subjects used the absolute solution, while in the second experiment only one quarter of the subjects provided the systematic response of absolute frame of reference, and most of them mix absolute and relative. Another quarter produced systematic response of relative frames of reference.

**Aryawibawa's study**

As a native speaker of Balinese, I found Wassmann and Dasen's findings very interesting especially on their observation on the use of relative system in Balinese, although not dominantly. Balinese has terms for right and left which are

*tengawan* and *tengebot* respectively, but they are used to refer to body parts such as *lima tengawan* "right hand" and *lima tengebot* "left hand". To the best of knowledge, they are hardly used to describe spatial orientations such as to the right/left. However, it needs to be further tested systematically. To confirm the use of the relative system in Balinese, I investigated the frames of reference in Balinese as I summarise in the following subsection mainly based on Aryawibawa (2010).

**Methods**

The methodological issues summarised here are taken from Aryawibawa (2010, 2012, 2015). To be able to point out the true frame of reference system used in Balinese, selection of language consultants should be given a priority. The language consultants should be Balinese speakers who only speak Balinese to avoid the interference of the use of *to the right/left orientations* from Indonesian. Although recruiting Balinese monolingual language consultants could be challenging (because most Balinese speakers speak Indonesian or at least understand Indonesian), such language consultants could be recruited. Thus, the study involved three monolingual speakers of Balinese language, and, following Levinson (2003), both linguistic tasks, e.g. object rotation and asking direction, and non-linguistic tasks, e.g. reordering featured and un-featured objects, were used.

Balinese Linguistic data for frames of reference were elicited using the rotation of objects illustrated by Levinson (2003: 52). For example, a ball was put at a chair's front. I then asked my language consultants to describe the location of the ball in relation to the chair in Balinese language. The chair is then turned 180°. I again asked them to specify the current spatial relation between the two objects in the language. Different objects were also employed in this task. For example, a bottle was put in front of a TV. The language consultants were asked to describe the position of the bottle relative to the TV. The same procedure like the previous one that was the bottle was put at

the back of the TV, and then the language consultants were told to describe the current spatial position between the two objects.

The non-linguistic tasks I used was similar to the one used by Levinson (2003). The procedure I employed was as follows. I and my language consultant sat at the same table, i.e., the table was in the north-south axis. We were facing each other. I then arranged three different featured objects, e.g., *a toy truck, a toy house, and a ball*, on the table based on their intrinsic features, i.e., the truck is in front of the house, the ball is in front of the truck. I told my language consultant to look at the position of the objects and remember it well. After that, I took the three objects and switched the seat with him. There is an interval of three-quarters of a minute delay between the stimulus presentation and the rotation (following Levinson). I had a conversation during the delay. The purpose of such an interval is to minimise specific short-term memory effects that could trigger the participants to use relative orientation since a visual image automatically encodes an egocentric viewpoint (Wassmann and Dasen 1998: 702). But a visual image is normally replaced by new visual information and has a natural decay period of below 30 seconds (Baddeley 1990: 31 in Wassmann and Dasen 1998: 702). I then asked him to rearrange the same objects exactly in the way he saw them earlier.

The same procedure was also applied for unfeatured objects such as keys, a rubber, and a book. The three objects were placed on the table in the north-south axis. As in the previous experiment employing featured objects, the language consultant was asked to watch the arrangement of the three objects carefully. The objects were then taken by the experimenter, and after switching the seat, the objects were given to the language consultant to be rearranged exactly as he watched previously. A minute delay was also applied in this experiment.

**Findings and Discussions**

The results of linguistic tasks employing rotation of objects showed that such cardinal terms as north, south, east, west,

are entirely used in describing spatial relations between, for example, the bottle and the chair as can be seen in the sentence *Botole dajan kursie* "The bottle is north of the chair". When the bottle was moved south of the chair the cardinal term *delod* "south" was again used as in *Botole delod kursie* "The bottle is south of the chair".

For the second linguistic tasks, i.e. asking direction techniques such as "where is the location of a place?", the terms north, south, east, west were dominantly used by the language consultants as well. For example, when a language consultant was asked the house of somebody, a response like the sentence *Uling umah Mangaye ngelodan. Nyen tepuk umah Adik, delod umah yee* "Go south Mangaye's house. You will see Adik's house. His house is south of Adik's house". For more comprehensive results of the linguistics tasks, please also see Aryawibawa (2010, 2012, 2015).

Regarding the non-linguistic tasks (the tasks including featured objects) as reported by Aryawibawa (2010, 2012, 2015), all Balinese subjects' reorderings of objects were based on the fixed bearings (using such cardinal terms as north, south, east, west, etc.). Interestingly, the positions of the objects were exactly the same as the ordering I provided initially which was based on the objects' intrinsic features. This indicates that the results might be affected by the presence of those features, not the fixed bearings, i.e., the absolute frame of reference, per se. To verify this, I provided objects with no intrinsic features to all my language consultants. The results showed that it seemed the features of objects did not affect the ordering of objects. All my Balinese language consultants ordered the objects consistently using the absolute solution.

What do the findings inform us? It is evident that the use of frames of reference in Balinese seem to root deeply at the cognitive faculty of speakers of the language. Put another way, the application of linguistic frames of reference in the language is not only reflecting language on superficial level. Rather, the use of the system seems to affect Balinese speakers' cognitive

faculty as well especially in using spatial systems. The evidence further informs us that a language, e.g. Balinese, reflects not only linguistic aspects, but also cultural values of people speaking it. Specifically, while, for example, English emphasises the importance of ego in describing spatial relations, Balinese highlights that of local landmarks, e.g. mountains, for their religious values.

The significant spatial orientation in Balinese is rooted in the Balinese Hinduism belief, where mountains, which are associated with *kaja* "north" or *kangin* "east", are considered as sacred places. Hinduism believes that Gods live there. This belief underlies many cultural practices in Bali in relation to what are considered to be proper positions (Arka 2005b: 7). For example, when someone is sleeping, his or her head must be towards north or east side of the room or bed. Another example is when someone is building a family temple, it must be located at the northeast of the compound. Besides, the temple site is more elevated than other buildings in that compound. Unlike mountains, the sea is considered as a "lower place", hence a non-sacred place. Seas are associated with *kelod* "south".

The extreme importance of spatial relations in Balinese are also reported by Wassmann and Dasen (1998). The importance of spatial orientation seems to relate not only to physical landmarks, e.g., mountain, sea, but also to cultural, religious, and social space (Wassmann and Dasen 1998). In Balinese, the orientation *kaja* (translated into *utara* "north" in Indonesian and English) is associated with the direction towards the central mountain in Bali, i.e. Gunung Agung. *Kaja* is derived from *ke* "towards" and *aja* "hill" or "mountain" (Wassmann and Dasen 1998: 692). Gunung Agung is believed by Balinese people to be a place where Hindu Gods live. In contrast to *kaja*, which is considered as a sacred place, the direction towards the sea *kelod* is believed less sacred. *Kelod* is derived from *ke* "towards" and *laut* "sea" (Wassmann and Dasen,1998: 692). Please note that not the sea itself is considered as an unsacred place, but the direction (Arka 2005b). In Balinese cultural and religious practices, the sea

water is believed to be pure. The term *kelod* is translated into *selatan* "south" in Indonesian and English.

However, as Aryawibawa (2010) reported, the *kaja* and *kelod* directions in Balinese are not fixed as also indicated by Arka (2005b). If we look at the Balinese map in Figure 1 taken from Arka (2005b) below, for Balinese people who live in the southern part of the island *kaja* (indicated by 1) is towards the mountains located in a row in the middle part of the island that splits the island into two (shown by the double lines in the figure), while *kelod* (indicated by 3) is towards the sea in the southern part of the island. In this sense *kaja* and *kelod* are used in exactly the same as *utara* and *selatan*, and *north* and *south* in Indonesian and English respectively. These directions are fixed when those people move outside their territory, or even outside Bali. But, for people who live in the northern part of the island, *kaja* is towards the south now because the location of the mountain is in the south part of their territory.

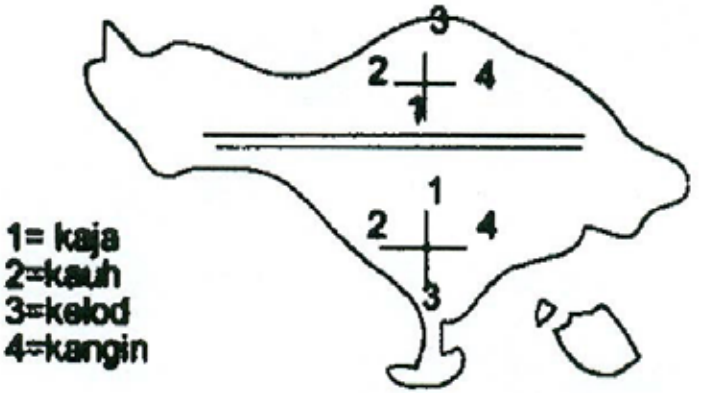


Figure 1. The orientation of *kaja* "north" and *kelod* "south" relative to mountains (Arka 2005b).

Unlike *kaja* and *kelod*, *kangin* (indicated by 4) orientation (translated it here as "east"), which is associated to the place where the sun rises and is also considered sacred, and *kauh* (indicated by 2) orientation (translated it as "west"), which is associated to the place where the sun sets down are fixed for people living in the southern and northern parts of Bali island.

Aryawibawa (2010) also pointed out that in the eastern part of Bali, i.e., eastern tip of the island, the spatial system is local, i.e., the reference of *kaja* and *kelod* changes from place to place as indicated as well by Wassmann and Dasen (1998) as illustrated in Figure 2 below taken from Wassmann and Dasen (1998). In the village of Seraya, for example, as the map in Figure 2 shows, *kaja* (indicated by 1) "north" in this village is towards the mountain Seraya, which is in the northern part of the village, and *kelod* (indicated by 3) "south" is towards the sea, which is in the southern part of the village. *Kangin* (indicated by 4) "east" refers to the direction where the sun rises, and *kauh* (indicated by 2) "west" is referred to the direction where the sun goes down. In other words, for Seraya villagers the directions *kaja, kelod, kangin, kauh* "north, south, east, west" are the same as people living in the southern part of the central Bali Island. But if we look now at the Batukaseni and Banyuning villages, *kaja* (indicated by 1) is still towards the mountain and *kelod* (indicated by 3) is still towards the sea. But, the position of the mountain used as a reference for *kaja* in these two villages is different from that used in Seraya village, i.e., the mountain in Batukaseni and Banyuning villages is now towards the West, not towards the North as in Seraya village. Furthermore, the location of the sea also shifts from the South in Seraya village to the East in Batukaseni and Banyuning villages. Note also that *kangin* "east" designating the direction where the sun rises in Seraya village now designates the North in Batukaseni and Banyuning villages. Thus, in this sense the *kaja, kelod, kangin, kauh* directions are highly local in the villages in the easternmost part of Bali Island.

But, what landmark is used for spatial orientation when Balinese people are outside Bali, e.g., they are in Lawrence, Kansas, where there is no mountain? In this case, they use an absolute system, i.e., they still use the cardinal directions, e.g., north, east, etc. The cardinal directions themselves are now determined using an east-west axis, which is based on the directions where the sun rises (east) and where the sun goes down (west). The other directions, i.e., north and south, are

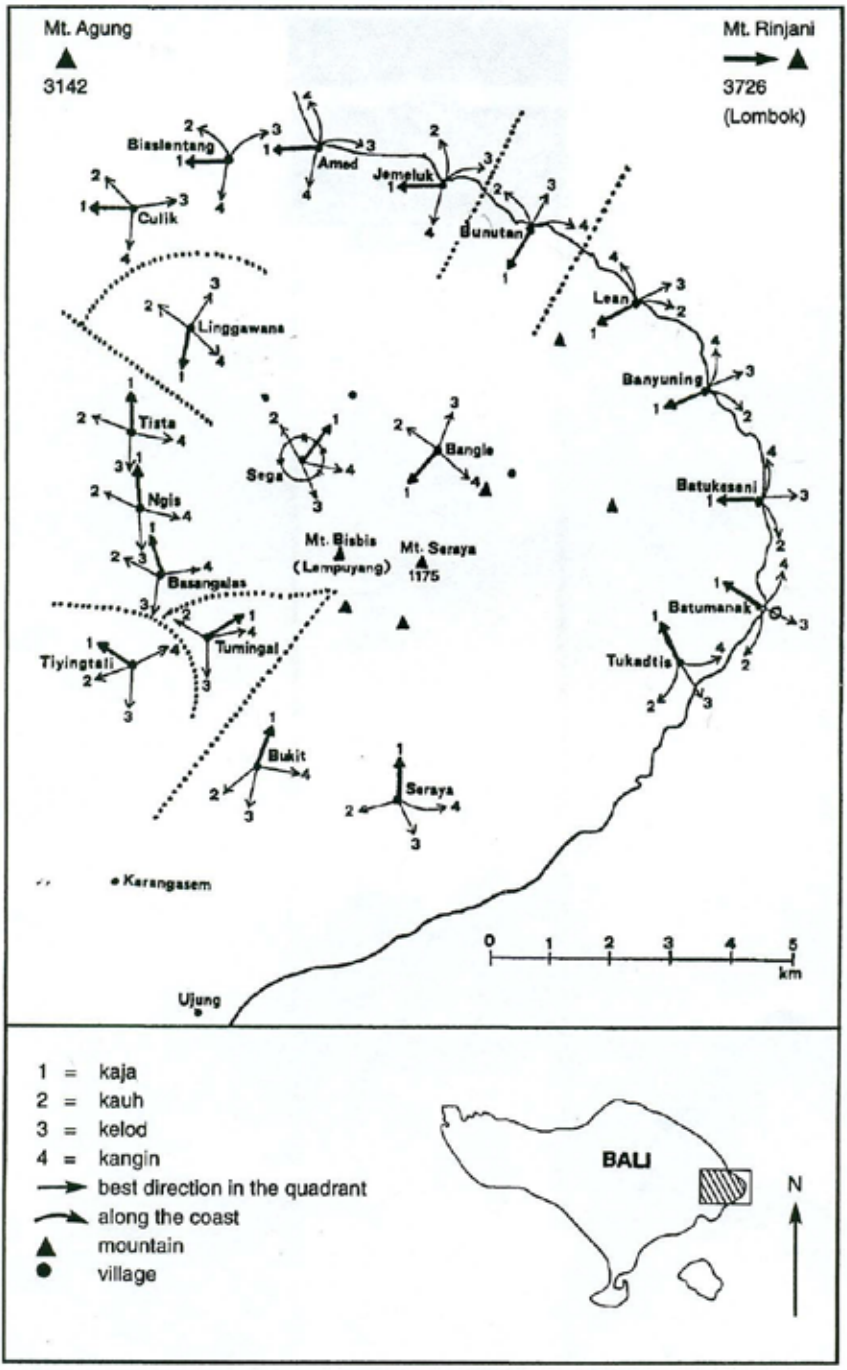


Figure 2. The topographical adaptations of Balinese spatial orientation system around the North-East Peninsula (Wassmann and Dasen 1998).

decided by using clockwise rotation beginning from the east (Aryawibawa, 2010).

In addition to the main cardinal terms, i.e., *kaja* "north", *kangin* "east", *kelod* "south", and *kauh* "west", there are also inter-cardinal terms such as *kaja kangin* "northeast", *kelod kangin* "southeast", *kelod kauh* "southwest", and *kaja kauh* "northwest". These inter-cardinal terms correspond to particular colours and Gods in Balinese Hindu as Figure 3 (Wassmann and Dasen 1998) shows.

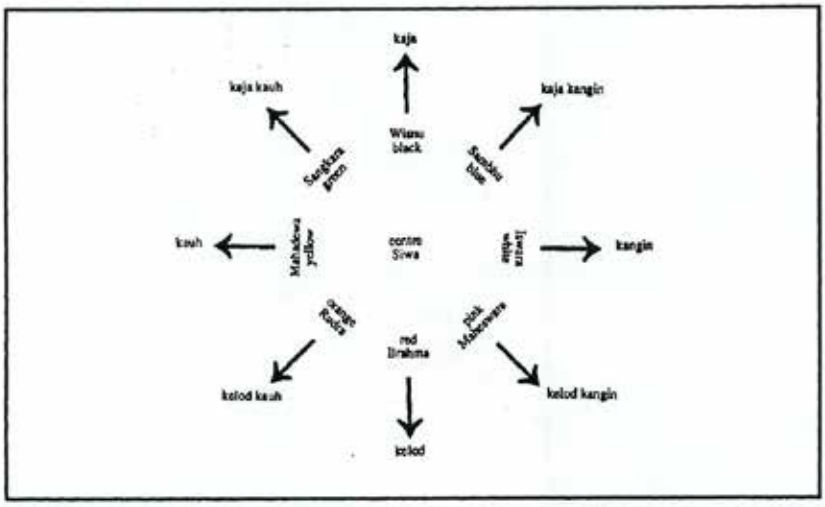


Figure 3. The Balinese Spatial Orientation System (Wassmann and Dasen 1998)

Figure 3 illustrates Balinese religious life. Balinese Hinduism believes in one God, the almighty God. The almighty God, in their belief, has powers associated with different Gods with different locations. For example, as Figure 3 shows, the God *Sambhu* is located at the northeast, the God *Maheswara* is at the southeast, at the centre is the location for the God *Siwa*, etc. To worship each God, a temple was erected by people living at the local society. Many aspects of Balinese life follow this scheme as Wassmann and Dasen (1998: 693) describes:

> Villages are built prototypically along *kaja kelod* line, with the main temple (Pura Bale Agung) and the temple of the purified village ancestors (Pura Puseh) on the mountain side and the cemetery on the sea side. Each temple is aligned in the same

> ways, as well as the various shrines within the temples along both axes. The houses of a family compound are similarly oriented, with the family temple in the most sacred corner, situated *kaja kangin*. The head of the family lives on the *kangin* side of the compound, and everyone sleeps with his or her head oriented towards *kaja* or *kangin*. The layout of various parts of the house and of the furniture follows similar rules: the kitchen will be built *kelod* and the animals and the rubbish can be found in the least sacred corner, *kelod kauh.*

What we can learn from all the evidence is that the linguistic systems, i.e. frames of reference, of Balinese does only refer to surface structural forms, but more importantly reflect cultural values of people speaking the language. Since it reflects speakers' cultural knowledge, it certainly affects their cognitive function or the way they think. Thus, the findings of these experiments lend further support to Boroditsky (2011) and Levinson' claim, i.e., that language affects spatial reasoning.

**Conclusions and Suggestions**

The findings show, unlike Wassmann and Dasen's study, that Balinese speakers employ the absolute frame of reference dominantly and exclusively, i.e., no relative system was observed. This can be seen from the results of both linguistic and non-linguistic tasks. The non-linguistic tasks are employed to confirm that the use of the absolute system is not influenced by the intrinsic features of the objects. In this fashion, it is expected that we can have more reliable results in using the frames of reference in Balinese.

Quite interestingly, the distinct uses of frames of reference in Balinese are not only a matter of using the systems in different ways, but in fact affecting the cognitive functioning, i.e., recall memory, of the Balinese speakers as can be drawn from the results of the non-linguistic tasks.

If the findings in this study are truly the case, a follow-up study is imperative to be conducted. A study involving children will be interesting to see how they acquire and apply the absolute system in their early age. The acquisition aspect is

important to further confirm the current findings. Such a follow up study is being prepared.

In addition to the linguistic and non-linguistic tasks employed in this study, it is highly suggested that experiments using the tasks used by Wassmann and Dasen (1998) need further testing.

## References

Arka, I. W. 2004b. *Spatial Expressions in Rongga.* Paper presented at Departmental Seminar, RSPAS, ANU, November 2004.

Arka, I. W.2005b. *Spatial Expressions in Balinese and Rongga*. Paper read at Congress of the Indonesian Linguistic Society at Padang, Indonesia, 18-21 July 2005.

Aryawibawa, I. N. 2010. 'Spatial Reference in Rongga, Balinese, and Indonesian'. Ph.D. Thesis. The University of Kansas.

Aryawibawa, I.N. 2012. "Non-topological Relations in Rongga, Balinese, Indonesian: Some Evidence from Linguistic and Non-linguitic Tasks". *Linguistik Indonesia* Tahun ke 30, Nomor 1. Masyarakat Linguistik Indonesia, Universitas Katolik Indonesia Atma Jaya.

Aryawibawa, I. N. 2015. "Linguistic and Cultural Knowledge in Teaching English" in the *Proceeding of the 6213 TEFLIN Conference,* 14-16 September, 2015 at University of Udayana.

Boroditsky, L. 2011. "How Language Shapes Thought: The Languages we speak affect our perceptions of the world". *Scientific American*, 63-65.

Brenzinger, M. 2008. *Conceptual Strategies of Orientation among Khwe: From Sunrise/Sunset Bisects to a Left/Right Opposition*.

Herskovitz, A. 1986. *Language and Spatial Cognition*. Cambridge: Cambridge University Press.

Herskovitz, A. 1982. *Space and the Prepositions in English: Regularities and Irregularities in a Complex Domain*. Ann Arbor Michigan: University Microfilms University.

Levinson, S. C. 2003. *Space in Language and Cognition*. Cambridge: Cambridge University Press.

Wassmann, J. and Dasen, P. 1998. "Balinese Spatial Orientation: Some empirical Evidence of Moderate Linguistic Relativity". In *Journal of the Royal Anthropological Institute* (inc. MAN) 4: 689-711.