

THE TRANSFORMATION OF THE VERTICAL AXIS TO HORIZONTAL:  
A CASE STUDY FROM SINHALA\*

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1. INTRODUCTION. This paper presents and analyzes a case in which the Sinhala language<sup>1</sup> applies spatial postpositions for the vertical axis to denote horizontal relationships. Among the three axes proposed by Fillmore (1982:36-7) to be common in the linguistic treatment of spatial notions--- i.e. up/down, front/back, and left/right--- the vertical axis has usually been associated to the pull of gravity. Sinhala, however, demonstrates a case where the forms denoting the vertical axis can be used to describe spatial relationships that are in fact horizontal.

The remainder of the paper will start with an account of an experiment for spatial conception, the result of which reveals the transformed usage of the verticality terms in Sinhala (§2). The following section (§3) discusses the mental (or cognitive) manipulation of the vertical axis, which is assumed to have given rise to the phenomenon in question. The analysis is based upon a framework involving image-schema operations proposed by Ekberg (1997) (§3.1). In §3.2, I present cases in which the vertical and frontal axes are interchangeable, followed by cases in which they are not. To account for the interchangeability and restrictions, it is proposed that only by switching from the route perspective to survey perspective can the speaker activate the image-schema manipulation (Vertical → Horizontal), and the blockage of the reference point's view by one of the focal participants to the other can inhibit the perspective switching, and in turn block the transformation from the vertical to horizontal (frontal). Section 4 summarizes and concludes the paper.

2. VERTICAL TO HORIZONTAL IN SINHALA. The fact that Sinhala can use verticality terms to code horizontal meaning was discovered in the results of a mini-project designed to figure out whether a language applies egocentric/relative or absolute coding in describing spatial relationships.<sup>2</sup> In the project presented in this paper, two tables are set up in an L-shaped arrangement. On one of the tables five objects (i.e. a book, a tissue box, a cup, a bottle, and a walkman) are arranged in an array as shown in Fig. 1.

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<sup>1</sup> Sinhala is an Indo-Aryan language mainly spoken in Sri Lanka. My consultant is Oshan Fernando. Aged 30 in 2005, Oshan is a native speaker of Sinhala.

<sup>2</sup> The project was adapted by Susanna Cumming based on the project introduced in Levinson (1996). The primary difference between the current project and Levinson's is that in the former the array is rotated 90°, while in the latter the rotation is 180°.

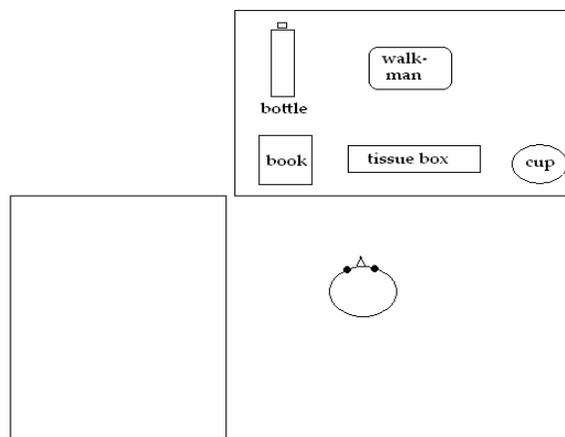


FIGURE 1. Object arrangement for the elicitation of spatial description in the mini project.

The consultant was required to describe the array so that someone else could arrange the objects in the same way according to his instruction. The consultant was actually encouraged to speak as colloquially and naturally as possible. Then the speaker was asked to move the objects to the other table and arrange them in the same way as they were arranged on the first table. The description was recorded, transcribed and glossed with the help of the consultant.

An especially appealing finding from the results of the project, which turned out to be the main theme of the present study, is the way in which Sinhala profiles two of the spatial relationships as shown in Figure 1, namely the relation between the bottle and the book, and the relative location of the walkman to the tissue box. Languages like English, Persian and Chinese tend to represent these relations with a horizontal (or ‘frontal’) axis (For example, ‘The bottle is behind the book’ and ‘The tissue box is in front of the walkman’). The Sinhala consultant, however, chose to code them using vertical postpositions meaning ‘above’ (*uḍiṇ*) and ‘below’ (*yaṭiṇ*), as shown in 1-2.<sup>3</sup>

<sup>3</sup> Abbreviations in these examples include: ABL ‘ablative’, DAT ‘dative’, DEF ‘definite’, FOC ‘focus’, GEN ‘genitive’, INAN ‘inanimate’, IND ‘indefinite’, LOC ‘locative’, NPST ‘non-past’, PL ‘plural’.

- (1) *potə=ɬə*<sup>4</sup>                      *uɖij*<sup>5</sup>    *bootəlayak*    *tiye-nəwa*  
 book.DEF=DAT.DEF    **above**    bottle.IND    be.INAN-NPST  
 ‘There is a bottle above the book.’
- (2) *bootəlee=ɬə*                      *dakunu*                      *pettə=e*                      *saha*    *tišupettiyə=ɬə*  
 bottle.DEF=DAT.DEF    right                      side=LOC.DEF.INAN    and    tissueBOX.DEF=DAT.DEF  
**uɖij**                      *vookmānekak*    *tiye-nəwa*  
**above**                      walkman.IND    be.INAN-NPST  
 ‘On the right side of the bottle, and above the tissue box is a walkman.’

Three axes have been proposed by Fillmore (1982:36-7) as common in the treatment of spatial notions in natural language semantics: up/down, front/back, and left/right. Among these, front/back tends to be anthropocentric, and the up/down axis refers to relations existing independently of communication act participants since it actually takes the direction of the pull of gravity as its reference. A prototypical above relation is thus one with the figure object being at the same horizontal coordinate and higher than the reference object (Hayward and Tarr 1995:78-9).

<sup>4</sup> While the object NP of simplex postpositions (i.e., postpositions that cannot be further analyzed into a relational noun and a case marker) tend to take no case marking; the object NP of composite postpositions can take not only genitive case, but also dative or even ablative case. For instance, composite postpositions based on *eliyā* ‘outside’ very often have their object to be in ablative case:

- (1) *gedərə=iŋ*                      *eliyā=e*                      *lamai*                      *selləŋkərə-nəwa*  
 house.DEF=ABL.DEF.INAN    outside=LOC                      child.PL                      play-NPST  
 ‘The children are playing out of the house.’

The distinction made in describing the figure below suggests that different case marking on the postposition object conveys additional information between the Figure and the Ground. In this case, the key semantic determinants in the selection between dative and genitive cases are support and contact. That is to say, in describing the location of the handprint relative to the window, the Ground (‘window’) must take genitive case, as a whole major surface of the handprint is in contact with and occupies a part of the most salient dimension of the window. Dative case, on the other hand, highlights rather a trajector between the Figure and the Ground, thus does not serve as an apt choice here.



- (2) *attə*    *tiyenn-e*                      *janeele/\*janeele=ɬə*                      *dakunu*    *pətte*  
 hand    be.INAN-FOC    **window.GEN.DEF/window.DEF.DAT**    right    side.LOC  
 ‘The hand is on the right section/side of the window.’

English can also make such a distinction with ‘The hand is **on** the window’s right side’ and ‘The flower is **to** the window’s right side’. What makes the case in Sinhala especially interesting is that such a semantic load does not fall on postpositions, but on the case marker taken by the postposition NP.

<sup>5</sup> An observation made by the consultant testifies to the affinity between *uɖij* ‘above’ and *uɖə* ‘on; on top of’. While analyzing the compositionality of *uɖij*, he contends that it is certainly a combination of *uɖə* + *=iŋ* (‘on’ + ABL). The form coding the opposite orientation to *uɖij* ‘above’, *yaɖij* ‘below’, is also formed via the same process from *yaɬə* ‘below; underneath’. The main distinction between the two groups (i.e., *uɖij*-*yaɖij* versus *uɖə*-*yaɬə*) lies on the factor ‘attachment’.

With the arrangement of the objects shown in Figure 1, however, it is obvious that in these sentences the notion involving ‘the direction of the pull of gravity’ is totally absent. In fact, it looks like that the speaker adopts vertical terms to profile horizontal relations, taking objects further away to be higher, and those that are closer to be lower.

Such a usage of the vertical axis, however, does not mean Sinhala is devoid of the notions and forms for the frontal axis. The following example shows that the language does have frontal postpositions:

- (3) idiripiṭə ‘in front of’  
 liikoṭəyak **idiripiṭə** perəliccə mutṭiyak tiye-nəwa  
 stump.IND **in.front.of** overturned pot.IND be.INAN-NPST  
 ‘There is an overturned pot in front of a tree stump.’

Like most Western languages, Sinhala uses what Hill (1975) calls an ‘ego-opposed’ strategy in coding the frontal relationship. In this strategy, the reference point (here the speaker) and the Ground (the stump) are facing each other, so the Figure (the pot), situated between the two, is in front of the stump. In other words, the example in 3 can be interpreted as:

- (4) The pot is near the tree stump, on the side of the sump closest to me.

**3. MENTAL MANIPULATION OF THE VERTICAL AND HORIZONTAL AXES.** In this section, an account for the phenomenon in question will be proposed based on the analysis of image-schema manipulation by Ekberg (1997). A range of evidence provided in the previous literature on space and language has attested to the semantic nature of spatial relations. It has been observed that our daily perceptual interaction in the world can derive basic and simple cognitive patterns (i.e. image-schema), and spatial markers (in particular prepositions) denote the location of the Figure with respect to the Ground usually along one and rarely more than two spatial axes (Hayward and Tarr 1995:79). Image schemas, according to Johnson (1987), are schematic and retain only visual and force-dynamic properties rather than having propositional structure. They are ‘constantly operating in our perception, bodily movement through space, and physical manipulation of objects’ (Johnson 1987). Therefore, image-schema rotation is correlative to physical-object manipulation.

**3.1. IMAGE-SCHEMATIC OPERATION: FROM VERTICAL TO HORIZONTAL.** Based on the cognitive and linguistic nature of spatial conception and description, Ekberg (1997) presents four common principles for image-schema operations. The one that can be used to account for the situation in Sinhala is Principle A:

**Principle A: Vertical Axis → Horizontal Axis**

e.g. ‘He walked up and down the corridor.’ (Ekberg 1997:71)

When Principle A is applied in a deictically unspecified system, the ground level serves as the unmarked conceptual reference point. That is, in the schema, the reference point coincides with the lower end of a vertical axis that goes upward, and the reference point is away from the upper end no matter whether the vertical axis is upright or tipped, as diagrammed in Figure 2.

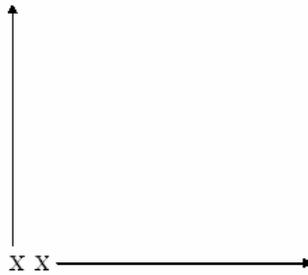
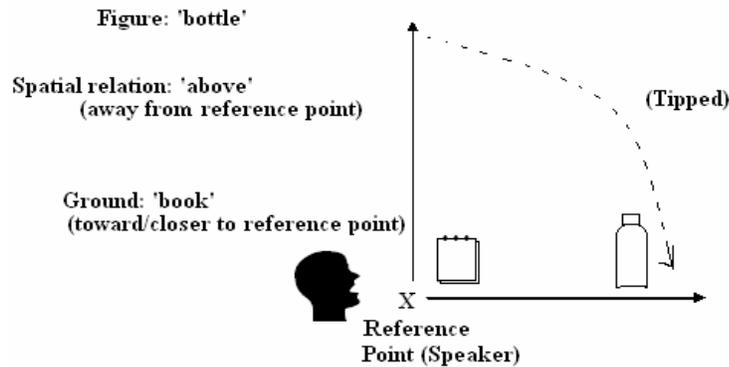


FIGURE 2. The deictically unspecified version of the (transformed) vertical axis  
(Adopted from Ekberg 1997:71) x= reference point

Such an account accords perfectly with what is observed in Sinhala as shown in 1-2. For these cases, the vertical axis ('above'/'below') can be assumed to have been 'tipped'. The reference point (the speaker) is situated at the lower pole of the axis, with the object 'above' being 'away from', and the object 'below' being 'toward' the reference point, which indeed makes a scenario that corresponds to the 'ego-opposed' frontal schema demonstrated in 3-4. A diagram illustrating the image-schema operation for 1 is provided below:

(5)



**3.2. VERTICAL AND FRONTAL AXES: INTERCHANGEABILITY AND RESTRICTIONS.** Further investigation with the consultant on the spatial description for Figure 1 reveals that the frontal axis is also applicable to specify the spatial relation between the book and the bottle, as well as the location of the tissue box relative to the walkman. Compare the following example with 2.

- (6) bootālee=ṭə      dakunu      pettā=e      saha    tiṣupettiyā=ṭə  
 bottle.DEF=DAT:DEF    right      side=LOC.DEF.INAN    and    tissuebox.DEF=DAT.DEF  
**pitipasse**      wookmānekak    tiye-nāwa  
**behind**      walkman.IND    be.INAN-NPST  
 'On the right side of the bottle, and behind the tissue box is a walkman.'

Here the same spatial relation can be coded appropriately using either the vertical or frontal axis. This means in specific cases the two axes are interchangeable. But what are the primary principles that governs this interchangeability? Is there any limitation? These are the issues to be investigated in the remainder of this section.

There are, as one can image, situations where the vertical axis is the only apt choice. The spatial arrangement of a hat and two books in Figure 3 shows a prototypical situation for the vertical axis, in which the objects are at approximately the same horizontal coordinate, but show a significant difference on the gravitational (i.e., vertical) axis:

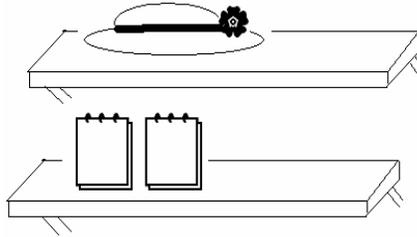


FIGURE 3.

As shown in the examples below, the spatial relation of the hat and books is characterized by the verticality postpositions *uđiŋ* ‘above’ and *yađiŋ* ‘below’, which cannot be replaced by *idiripiṭə* ‘in front of’ and *piṭipasse* ‘in back of’.

- (7) *toppiyə=ṭə yađiŋ pot tiyə-nəwa*  
 hat.DEF=DAT **below** book.PL be.INAN-NPST  
 ‘There are books below the hat.’
- (8) *pot wələṭə uđiŋ toppiy-ak tiyə-nəwa*  
 book.PL DAT.PL **above** hat-IND be.INAN-NPST  
 ‘There is a hat above the book.’

By the same token, there are also situations where the frontal axis is the only apt choice. In the situation illustrated in Figure 4, the consultant is standing at the entrance of the department library, and is describing the spatial arrangement of a table and some bookshelves near the table.

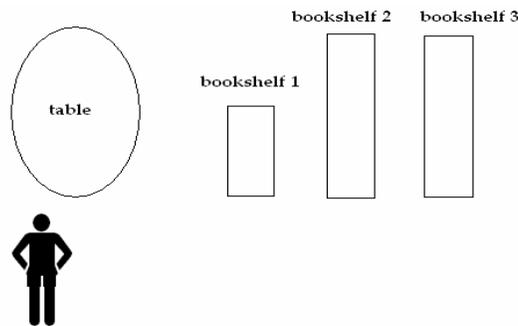


FIGURE 4.

The consultant starts with using left-right axis to locate the table and the first bookshelf:

- (9) *meese=ṭə dakunu pətte pođi pot raakəyak tiyə-nəwa*  
 table=DAT.DEF right side-LOC small bookshelf=IND be.INAN-NPST  
 ‘To the right side of the table, there is a small bookshelf’

But afterwards, the consultant takes the books as the Ground, and switches to the frontal axis to locate bookshelves 2 and 3. What should be noted here is that bookshelves 2 and 3 are taller than the consultant, and for this case the frontal postpositions are not interchangeable with the vertical postpositions.

- (10) *ee potraake=tə pitipasse tawə loku potraakek ui eekə*  
 that bookshelf=DAT **behind** other big bookshelf-IND and that  
*pitipasse tawat loku potraakek-ut tiye-nāwa*  
**behind** another-also big bookshelf.IND-also be.INAN-NPST  
 ‘Behind the bookshelf, there is another big bookshelf also. And behind that, there is also another big bookshelf.’

It seems that the uses of the frontal axis and its interchangeability with the vertical axis are determined and restricted by two primary factors. One is the semantic nature of the frontal axis, and the other is the perspective the speaker adopts in spatial description.

Langacker (1999), in the following quote illuminates the most crucial property that distinguishes the frontal axis from other horizontal axes such as left/right:

Consider the semantic opposition between in front of and in back of... [The diagram for each] profiles the relation involving two focal participants wherein one participant stands in the line of sight... between a viewer and the other participant... In front of takes the far participant as a landmark for purpose of locating the near participant, whereas in back of reverses those roles. (Langacker 1999:8)

Thus, for both 6 and 10, it is reasonable to say that the frontal axis is applied because both focal participants (the Figure and the Ground) and the speaker can be considered to be standing on the same line, with the ‘front’ one to stand in the line of sight between the speaker and the ‘back’ one. In fact, the spatial relation and objects described in 10 even highlights one of the frontal axis’s properties that involves ‘the line of sight’, as bookshelf 2 are taller and bigger in size than the consultant, thus visually blocks the bookshelf (bookshelf 3) behind it from the speaker.

Perspective, on the other hand, has to do with the position from which things are viewed (Langacker 1983:123). In spatial descriptions, perspectives speakers can take are primarily categorized into two kinds. Here I would like to follow Taylor and Tversky (1996) in naming them respectively ROUTE PERSPECTIVE, in which landmarks are described with respect to a viewer moving through or situated right within the depicted space; and SURVEY PERSPECTIVE, wherein landmarks are described with respect to each other as if viewed from above. It is easy to see why the image-schema operation (Vertical → Horizontal) is only applicable when the speaker adopts survey perspective. For one thing, being in this perspective, the speaker can profile arrangement using the canonical vertical view of a map, taking objects near the reference point (the speaker) as being below, and objects further away as being above.

Nonetheless, if the size and height of a focal participant create a visual blockage between the reference point (the speaker) and the other focal participant, the survey view cannot be activated since the speaker cannot have an overall view of the object arrangement. That is to say, once a focal participant blocks the view of the reference point to the other focal

participant, the switching from route perspective to survey perspective is inhibited, and in turn the transformation from vertical to horizontal is also blocked.

An attestation to this hypothesis involving perspective, schematic transformation and the semantic nature of the frontal axis came about in the results of another mini-project. In the beginning of the project, the consultant was asked to describe the spatial setting of the buildings shown in a fraction of a campus map. Again, here we have a situation in which the vertical and frontal axes are interchangeable, as survey perspective is a very natural choice, and schematic manipulation (Vertical → Horizontal) is thus possible.

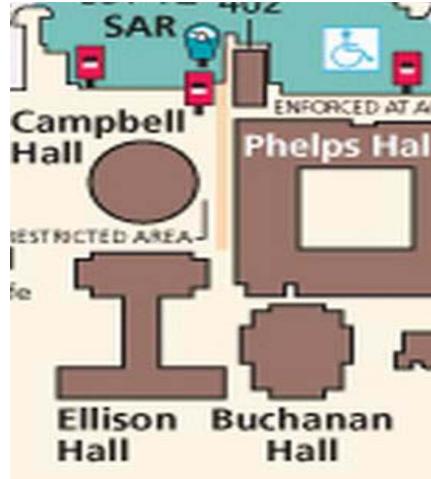


FIGURE 5.

- (11) *kembelhol wələtə yaɪɪn/idiripiti elisənhol tiye-nəwa*  
 Campbell.Hall DAT.PL **below/in.front.of** Ellison.Hall be.INAN-NPST  
 ‘Below Campbell Hall is Ellison Hall.’
- (12) *bjukənəhol wələtə uɔɪɪn/piɪpasse we-nnə felpshol tiye-nəwa*  
 Buchanan.Hall DAT.PL **above/in.back.of** be-INF Phelps.Hall be.INAN-NPST  
 ‘Towards the top of Buchanan Hall is Phelps Hall.’

Then, the consultant was asked to imagine that he is standing right in front of Ellison Hall, and is asked to tell where Campbell Hall is with respect to Ellison Hall. Not surprisingly, the frontal axis is the only apt choice, for Ellison Hall can block the speaker’s view to Campbell Hall. The speaker cannot have an overall view of the environment where he is situated, thus can only stick to route perspective to locate the Figure (Campbell Hall).

- (13) *kembəlhol tiyenn-e elisonhol wələtə piɪpasse*  
 Campbell.Hall be.INAN-FOC Ellison.Hall DAT.PL **behind**  
 ‘Campbell Hall is behind Ellison Hall.’

**4. CONCLUSION.** This paper accounts and analyzes a case in which Sinhala can use verticality terms to code horizontal (i.e. frontal) relation in spatial descriptions. The analysis is, on the one hand, based on the image-schema operation (Principle A: Vertical → Horizontal) proposed by Ekberg (1997). In light of such an operation, one can explain why ‘in back of’ can correspond to ‘above’, and ‘in front of’ can correspond to ‘below’, given that the reference point should be

at the ground level of a vertical axis directed upward, and being in the back is further away from the reference point than being in the front.

In explaining why human beings would prefer a vertical expression over a non-vertical one when the spatial relation in point is non-vertical, Ekberg (1999), based on evidence on language acquisition and human cognition, proposed that it is because the vertical axis is more natural, more salient, and thus easier to perceive. The facts observed in Sinhala, however, do not seem to go with this explanation. Rather, it could be the speaker's switching from route perspective to survey perspective that triggers him to adopt the canonical vertical view of a map, and in turn makes the schematic operation (Vertical Horizontal) possible. In other words, it seems in Sinhala the uses of and interchangeability between the vertical and frontal axes are determined by the semantic nature of the frontal relation, the perspective taken in depiction, as well as the applicability of the image-schema operation with respect to the adopted perspective.

#### REFERENCES

- BROWN, PENELOPE, and STEPHEN C. LEVINSON. 2000. Frames of spatial reference and their acquisition in Tenejapan Tzeltal. *Culture, thought, and development*, ed. by L. Nucci, G. Saxe, and E. Turiel, 167-97. Mahwah, NJ: Erlbaum.
- CIENKI, ALAN. 1995. Properties of image schemas as a category/Properties of categories of image schemas. *Lexical and syntactical constructions and the construction of meaning: Proceeding of the bi-annual ICLA meeting in Albuquerque, July 1995*, ed. by Marjolijn Verspoor, Kee Dong Lee and Eve Sweetser, 69-88. Amsterdam and Philadelphia: Benjamins.
- EKBERG, LENA. 1997. The mental manipulation of the vertical axis: how to go from "up" to "out", or from "above" to "behind". *Lexical and syntactical constructions and the construction of meaning: Proceeding of the bi-annual ICLA meeting in Albuquerque, July 1995*, ed. by Marjolijn Verspoor, Kee Dong Lee and Eve Sweetser, 69-88. Amsterdam, Philadelphia: Benjamins.
- FILLMORE, CHARLES J. 1982. Towards a descriptive framework for spatial deixis. *Speech, place and action*, ed. by Robert J. Jarvella and Wolfgang Klein, 31-59. New York: John Wiley & Sons Ltd.
- HAYWARD, WILLIAM G, and MICHAEL J. TARR. 1995. Spatial language and spatial representation. *Cognition* 55.1.39-84.
- HILL, CLIFFORD A. 1975. Variation in the use of 'front' and 'back' by bilingual speakers. *Proceedings of the first annual meeting of the Berkeley Linguistic Society*, ed. by C. Cogen, H. Thompson and J. Wright. Berkeley: University of California.
- JOHNSON, MARK. 1987. *The Body in the Mind: The Bodily Basis of meaning, Imagination, and Reason*. Chicago and London: The University of Chicago Press.
- LAKOFF, GEORGE, and MARK JOHNSON. 1980. *Metaphors we live by*. Chicago and London: The University of Chicago press.
- LANGACKER, RONALD W. 1987. *Foundations of cognitive Grammar. Vol. 1. Theoretical prerequisites*. Stanford, CA: Stanford University Press.
- LANGACKER, RONALD W. 1991. *Concept, image, and symbol. The cognitive basis of grammar*. Berlin: Mouton de Gruyter.
- LANGACKER, RONALD W. 1999. *Grammar and conceptualization*. Berlin: Mouton de Gruyter.
- LEVINSON, STEPHEN C. 1991. Relativity in spatial conception and description. *Rethinking linguistic relativity*, ed. by John J. Gumperz and Stephen C. Levinson, 177-202. Cambridge: Cambridge University Press.

- TAYLOR, HOLLY A., SUSAN J. NAYLOR, and NICHOLAS A. CHECHILE. 1999. Goal-specific influences on the representation of spatial perspective. *Memory and cognition* 27.2.309-19.
- TAYLOR, HOLLY A., and BARBARA TVERSKY. 1996. Perspective in spatial descriptions. *Journal of memory and language* 35.371-91.
- THORNDYKE, PERRY W., and BARBARA HAYES-ROTH. 1982. Differences in spatial knowledge acquired from maps and navigation. *Cognitive psychology* 14.560-89.

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