Spatial Frames of References in Signed Languages

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WISSLR 2024

Outline

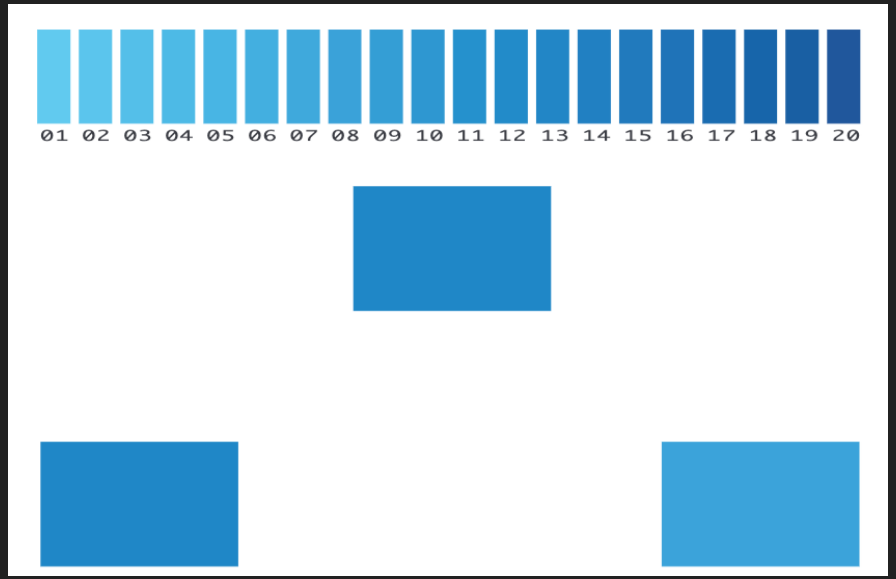
Background

- Spatial Frames of Reference in Spoken Language
- … in Signed Languages

Our contributions

- Methodology: coding paradigm for individual signs
- Implications

Colour Perception Varies Across Languages

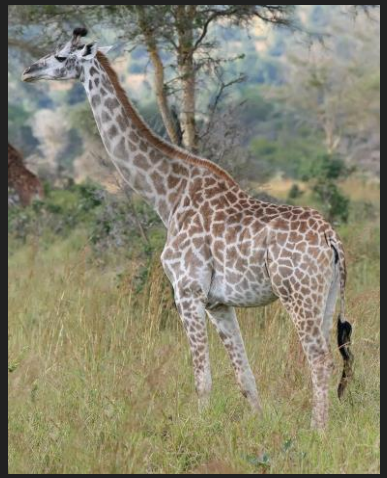


(Winawer et al., 2007; widened)

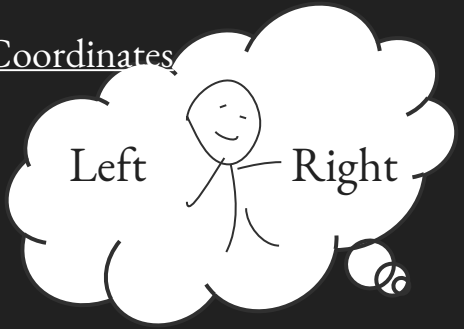
Spatial Terms Varies Across Languages

(Francis C. Franklin via Wikipedia, 2015. CC-BY-SA-3.0)

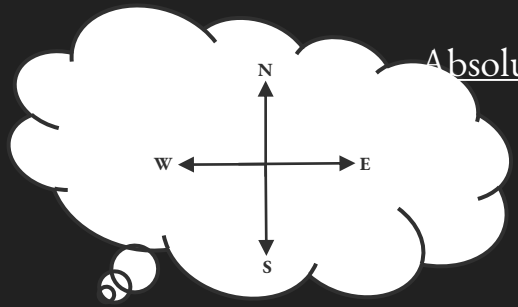
(Muhammad Mahdi Karim via Wikipedia, 2011. GFDL 1.2)



Egocentric Coordinates



Absolute Coordinates



(Levinson, 1992)

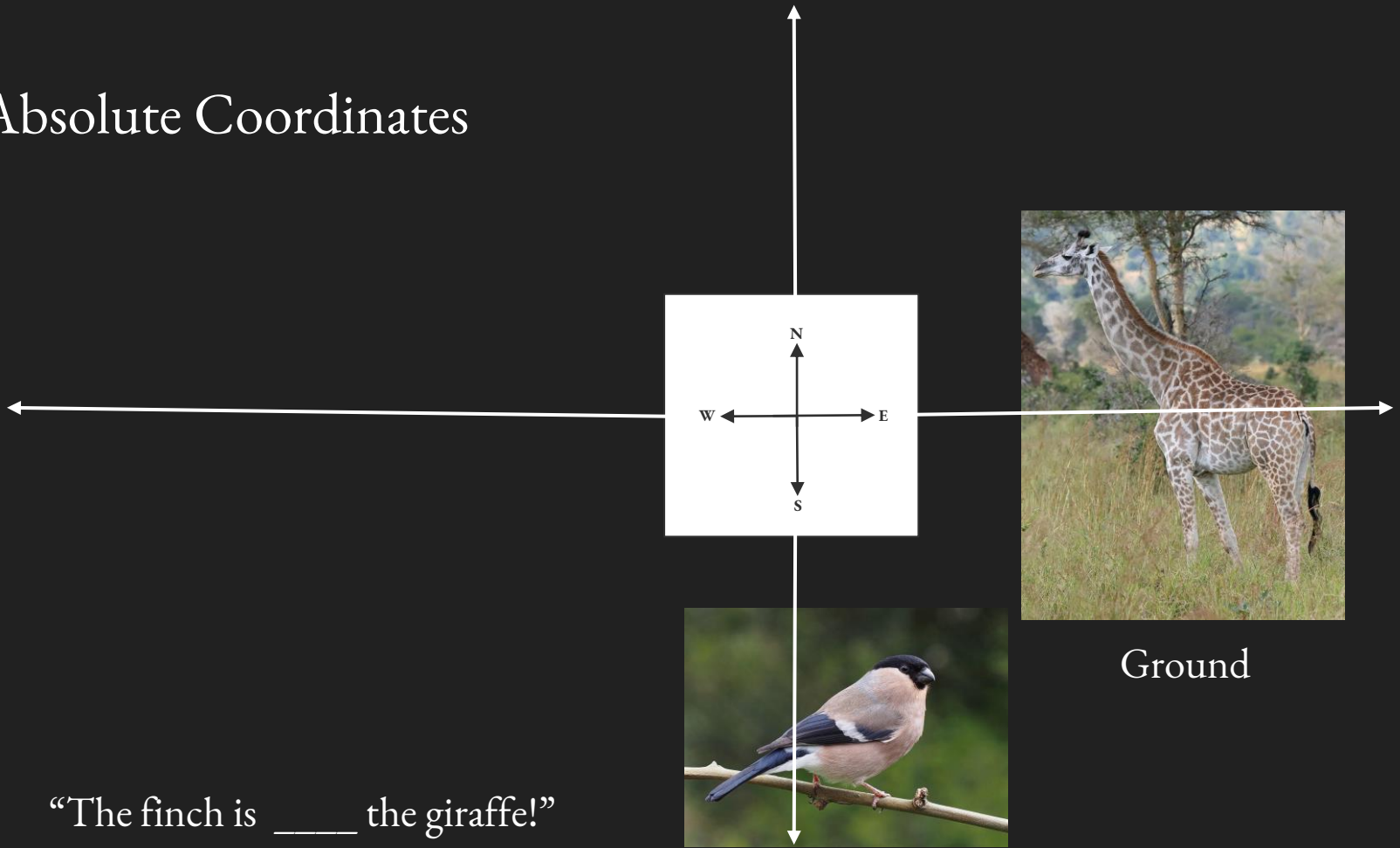
Absolute Coordinates

Figure

Ground

"The finch is ____ the giraffe!"

Absolute Coordinates



Ground

Figure

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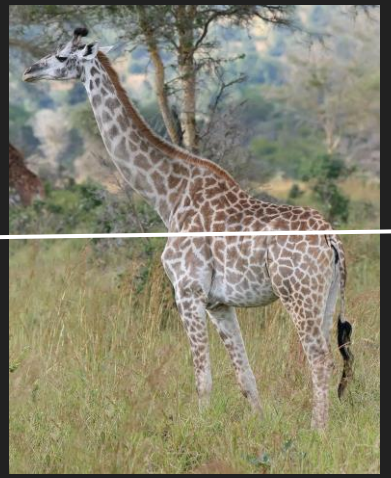
Absolute Coordinates

Figure



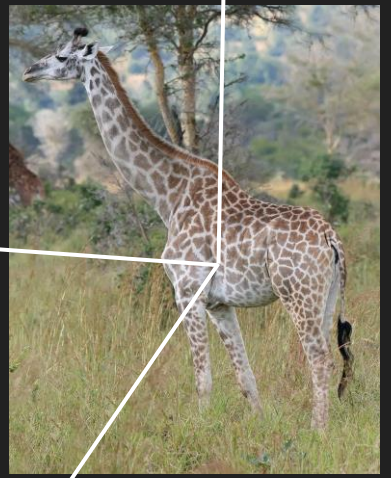
Ground

"The finch is ____ the giraffe!"

Intrinsic Coordinates

(Egocentric)

Figure

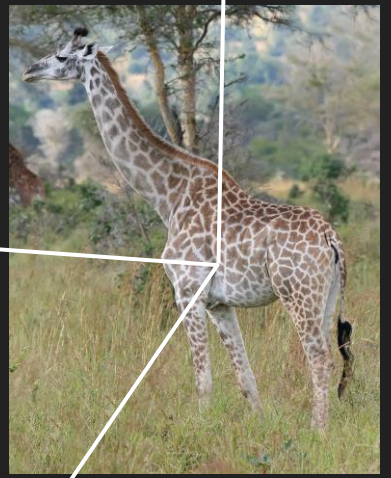


Perceiver

“The finch is ____ the giraffe!”

Intrinsic Coordinates

(Egocentric)



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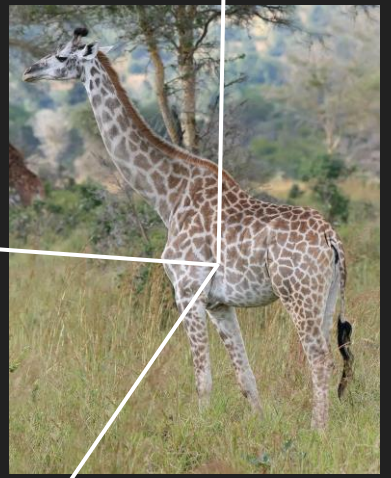
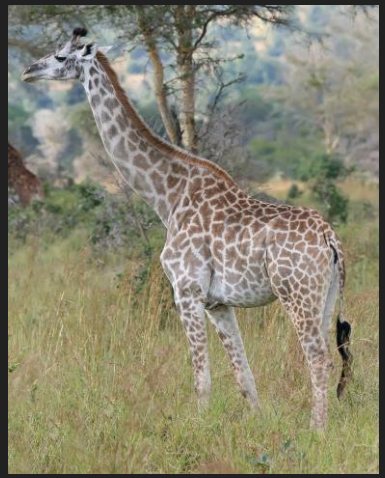


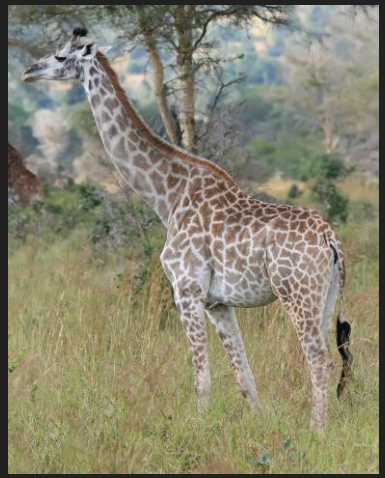
Perceiver

"The finch is ____ the giraffe!"

The finch is to the giraffe’s left



~~The finch is to the giraffe's left~~



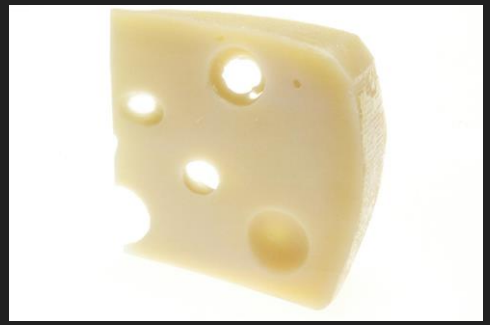
The finch is left of the giraffe?

Frames of Reference: Intrinsic

When an figure object's position is framed by a ground object (binary).

"The mouse is beside the cheese wedge."

(National Cancer Institute Author: Renee Comet via Wikimedia, 1994.)



Ground

Figure

(Sipa via Pixabay, 2015. CC0)

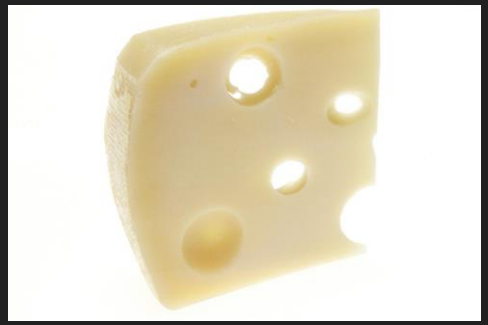
(Levinson, 2003)

Frames of Reference: Relative

When a figure object is framed by a ground object and a perceiver (ternary).

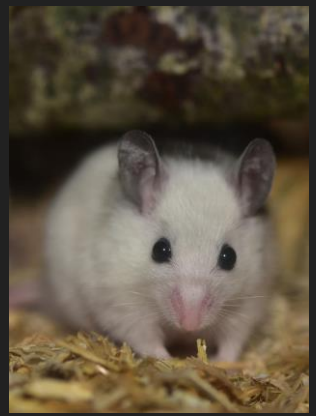
“The mouse is left of the cheese wedge”

Ground



Perceiver

Figure

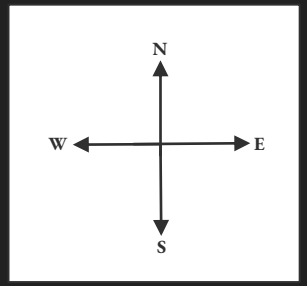


(Levinson, 2003)

Frames of Reference: Absolute

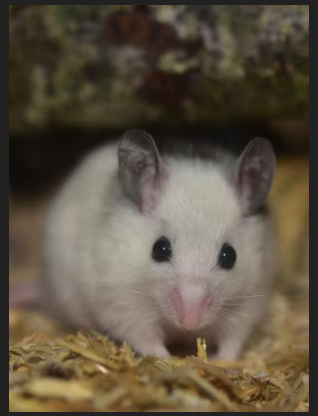
When a figure object is framed by a globally set axis.

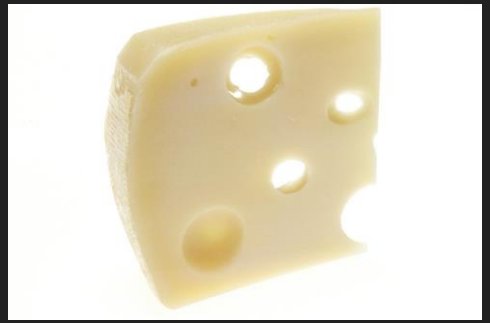
“The mouse is north of the cheese wedge”



Global Axis

Figure





Ground

(Levinson, 2003)

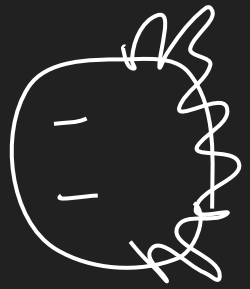
More FoR: Direct vs Object-Oriented (Intrinsic)

When we have a binary relationship, is the figure object's location framed by a perceiver or a ground object?

"The mouse is in front of you" vs. "The mouse is in front of the cheese"

Figure

Perceiver



(Danziger, 2010)

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Figure

Ground

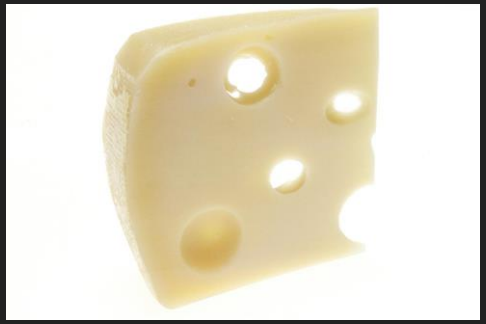
(Danziger, 2010)

More FoR: Unoriented

When the location of objects is not framed.

“The mouse is by the wedge of cheese”

Figure



Ground

(Palmer, 2003)

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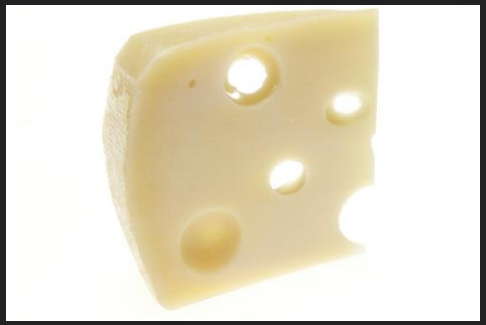
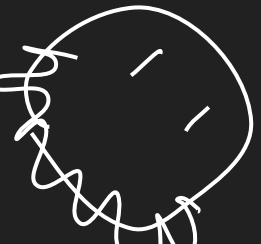


Ground

(Palmer, 2003)

Verbal Frames of Reference Vary with Sociotopography

Sociopography: cultural association with landscapes and other topographical features



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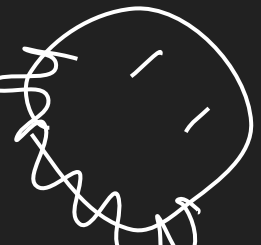

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Sociopography: cultural association with landscapes and other topographical features

E.g. Urban populations prefer Egocentric Spatial Representations

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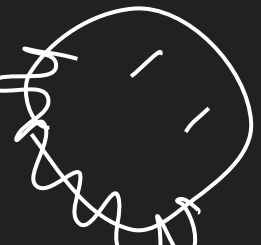

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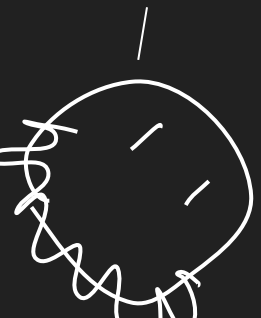
The store is left of the tracks



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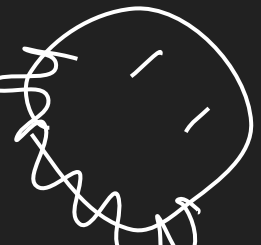

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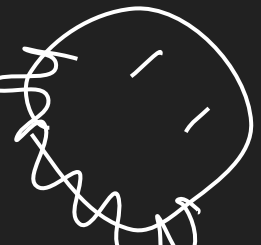

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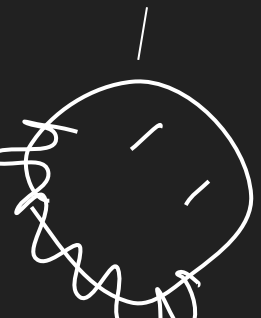

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Our contributions

- Coding paradigm for individual signs
- Implications

Signed Languages of the deaf and Space

(David Fulmer via Wikipedia 2008. CC-BY-SA)

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Signers make use signing space for grammar (Sandler and Lillo-Martin 2006) and meaning (Poizner 1987)

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Some signed languages make use of all three basic frame of reference (Emmorey 2002)

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Frames of References in Signed Languages

Space conveys meaning

(Tkachman, 2022)

Frames of References in Signed Languages

Space conveys meaning

“The tree is in front of me”

(Tkachman, 2022)

Frames of References in Signed Languages

Space conveys meaning

"The tree is in front of me"

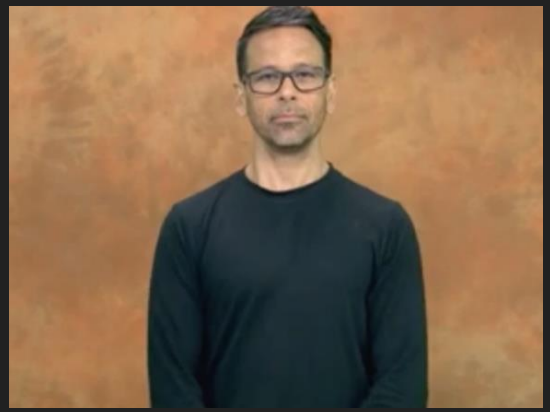
"The car is in front of the tree"

(Tkachman, 2022)

E.g. Estonian Signed Language - Meet

(spreadthesign.org)

E.g. Portuguese Signed Language - Ahead



(spreadthesign.org)

E.g. Croatian Signed Language - Ahead



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Pilot Coding:

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- Considered FoR such as
    - Direct, Object-Oriented, Relative, as well as Deictic, and Unoriented.

Deictic Example: British Signed Language - Far

(spreadthesign.org)

the figure is pointed to, not represented

Deictic Example: British Signed Language - Far

(spreadthesign.org)

Unoriented Example: Austrian Signed Language - Meet



(spreadthesign.org)

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    - Whether the sign was 2D/3D

2D/3D

2D/3D

(Super Mario Bros. - Wikipedia)

2D/3D

(Super Mario Bros. - Wikipedia)

or

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(Super Mario Bros. - Wikipedia)

or

(Leeroy Jenkins - Wikipedia)

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    - Whether the sign was 2D/3D
- Did not code lexical signs or composed signs.

Lexical Signs - American - Fly (verb)

(spreadthesign.org)

Composed Signs - Russian - Commute

(spreadthesign.org)

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- Did not code composed signs or lexical signs
- American, British, Croatian, Turkish, Japanese, and Chinese Signed Languages

Future Directions for this Ongoing Project

Currently coding the same spatial terms for all signed languages in the corpus as we continue to test our spatial representation paradigm to categorize signs across languages.

This project seeks insight on:

- Variation and consistency across modalities
- How languages represent space (patterns, difficulties, etc)

Predictions will be made based on sociolinguistic factors and cognitive factors.

Overview

-Spatial Representation in language varies topographically.

-Frames of References capture the location of objects in space.

-Signed Language can embed frames of references into standalone concept representations.

-We are coding for object-oriented, direct, relative, deictic, and unoriented FoR.

Thank you Oksana Tkachman for putting this project together, helping synthesize this body of research for these slides, and encouragingly answering all my questions related or unrelated to the project while all being in a different time zone.

Thank you Hassan Khan for parallelling-coding signs with me, giving great advice all the time as a friend and a fellow R.A, and for the “how to talk” pdf.

References

Winawer, Jonathan & Witthoft, Nathan & Frank, Michael & Wulund, Lisa & Wade, Alex & Boroditsky, Lera. (2007). The Russian Blues Reveal Effects of Language on Color Discrimination. Proceedings of the National Academy of Sciences of the United States of America. 104. 7780-5. 10.1073/pnas.0701644104.

Levinson, Stephen C., Sotaro Kita, Daniel B. M. Haun Haun & Björn H. Rasch. 2002. Returning the tables: Language affects spatial reasoning. Cognition 84. 155–188.

Levinson, Stephen C. 2003. Space in language and cognition: Explorations in cognitive diversity. Cambridge, U.K.: Cambridge University Press.

Danziger, Eve. 2010. Deixis, gesture, and cognition in spatial frame of reference typology. Studies in

Language. International Journal sponsored by the Foundation “Foundations of Language” 34(1). 167–185.

Palmer, Bill. 2003. Linguistic frame of reference reconsidered. Proceedings of the 2002 conference of the Australian linguistics society, 1–12. Sydney: Macquarie University.

Dasen, Pierre R. & Ramesh C. Mishra. 2010. Development of geocentric spatial language and cognition: An eco-cultural perspective. Cambridge University Press.