APPLICATION OF SAUSSUREAN THEORY ON SIGNED SIGN CLASSES AND LEXICALISATION PROCESSES

Grounding and Linguistic Structure: Findings from Greek Sign Language corpus analysis

Efthimiou, Eleni, professor of linguistics, ISLP Athena

Sapountzaki, Galini, lecturer of linguistics, Department of Special Education, University of Thessaly, Volos, Greece

Andreou, Georgia, professor of linguistics, Department of Special Education, University of Thessaly, Volos, Greece

Abstract:

This presentation examines how sign languages conform to the prerequisites of linguistic signs according to the Saussurean theory. The hypothesis is, in partial contrast to what happens with spoken languages, that the visual-motor channel of sign language articulation and comprehension affects their structures as to the arbitrary relation between concepts, objects and relations. We will examine the interconnection of linguistic representations with real world phenomena (be them tangible objects, concepts or processes) applying findings from cross-linguistics studies, on the one hand, and from the area of cognition and psychology, on the other hand. The cognitive areas of grounded cognition and embodiment, in specific, are critical for the development of our arguments.

Introduction

From the standpoint of Language studies, the most prominent assumption has been that Language is the means to represent concrete objects and real world relations through abstract means, such as the lexicon, or grammatical mechanisms. Thus, linguistic processing in the brain is quite similar to computer parsing (Pinker, 1994; Jackendoff, 1987). The concept of the Saussurean Sign and the classical semiotic triangle stress on the arbitrariness of language and consolidate assumptions that have been shaped after centuries of dualistic thinking in Philosophy (see, for example, Platonic or Cartesian ideas on dualism). Grounded cognition theory, on the other hand, deals with the interconnection between bodily states or real world states, with cognitive states of mental imagery. Most studies assume that the resulting cognitive structures and bodily states *do not* re-create full experiences, but rather, are random and asystematic. (Barsalou, 1999; 2003; Lakoff and Johnson, 1980). Grounded cognition also functions backwards, with these established cognitive representations to cause in turn new bodily states (*Dual Code Theory*, Paivio, 1986). Our claim is that cognition and embodiment can in principle result in linguistic structures. Real world relations are linguistically expressed through metaphors and force dynamics drawn from representations of bodily states and experiences; in addition to that, recent findings suggest that certain real world assets do feed our linguistic system, these being a) knowledge about body and about situations in order to shape metaphors for abstract concepts and b) knowledge about paths, spatial relations, processes and forces that have gained ground in theoretical thinking about linguistics (Lakoff, 1987; Langacker, 1987; 1991; Talmy 1983; 1988).

1. Relation between real world objects, mental ideas and Language Studies

These interconnections are anything but new to the human understanding of cognitive processes. Philosophers as early as Epicurus have argued that mental states depend on aspects of the body and on assumptions about the world built into the body and the brain, sawing the first seeds of grounded cognition. Later on however, especially during the recent centuries such ideas received a lot of criticism and dismissal as not scientific enough. Several centuries later, Kant stated that a succession of mental states depends causally on a corresponding succession of bodily processes. Such arguments finally proved right in the light of experimental evidence supplied by recent studies
of behavior and neural mechanisms, bridging the gap between body and mind, solid and abstract (Pezzulo et al, 2013), so that a strict type of physicobiological reductionism is not really applicable: Interconnection between biology and different cognitive domains is all around us, as well as in linguistic structures, especially so in the case of signed languages; in short, the Saussurean Sign does not need to be as arbitrary as initially thought (Givon, 2001; Lakoff, 1987). With this paper, we present evidence that, at least to what holds true for Greek Sign Language, common mimetic schemas found in cognition and psychology are used as *conventional systems*, not random instances, in order to bridge the gap between embodiment and language. In the following parts both abovementioned trends of thinking (linguistic or philosophical dualism, as well as existing grounding and embodiment theories) will be challenged on the grounds of linguistic corpus evidence.

2. Non – effects of the motor - visual modality of sign languages

Sign languages are human language systems, coming along with all this means: their grammars are much alike those of auditory – spoken modality languages; their conventional vocabularies, duality of patterning; slips of the tongue revealing internal morpho-phonological structures; productivity of the language and syntactic structure follow similar trends to those of auditory – spoken languages. Processes of acquisition of a sign language are similar to these of a spoken language, in support to their conventional nature of sign language grammatical systems -even transparent and iconic signs are acquired by children just as non-iconic ones, much in a way that abstract lexical units of a linguistic system are acquired in a spoken language (Orlansky and Bonvillian, 1984; Meir (2002) cited by Woll, 2008). Word–recalling tests also reveal that iconicity is a non-effect in language structure:

when recalling signs, adults also recalled iconic/transparent and non-iconic ones in the same way and in similar proportions (Klima and Bellugi, 1979).

3. Effects of the motor / visual modality of sign languages

Linguistic expression and comprehension or retrieval of mental images in sign language takes place through established visual simulation processes. As is known in ground cognition theory real world objects, actions, relations or introspection are stored in human memory through selective or random patterns based on their features (visual, motor, auditory or other), and can then be mentally re-enacted. With repetition over time, re-enactment of the same simulation is reported to further ‘distort’ the initial simulator and become more compact. On the other hand, mental re-enactment has proven to facilitate memory and shorten reaction time in message comprehension in Cognitive Studies. These findings hold at least partially true for the relation between standard linguistic forms and representation of object as these are expressed in sign language structure, some of which comply with the categorization of Barsalou (2008; 2004). Further to that, if we extend a fundamental process of ‘inaccuracy’ of grounded cognition to the study of sign languages, i.e. mechanisms based on random feature detection and resulting in distorted real world images we will see that selection, and not random feature detection, is accurately grammaticalised in sign linguistic systems. Ground cognition tendencies, in this view, follow the Principle of economy and activate specific feature detectors for means of easily storing, remembering and retrieving information through linguistic rules in sign languages. Establishing lexemes and expanding syntactic structures in all possible environments also follow the same Principle.

4. Perspective–taking and sign language syntax

Mental re-enactment in real world situations rarely occurs in vacuum. Findings from spoken language users suggest that we simulate internal states similarly to how we simulate external states, so, processing an abstract concept becomes much easier once we ground the concept as a situated, contextualized action. On the other hand, while very few of real world objects and relations are related to sound images, most of them are related to visual images. Sign Languages, being in principle economical systems have developed linguistic mechanisms for re-enactment of simulations from different perspectives for the description of the categories proposed by Barsalou (2008), i.e. objects, actions introspections and relations. Probably more than that, sign languages possess mechanisms for combinations of communicating whole events from different perspectives, usually two or three in Greek Sign Language. Some of these mechanisms are classifiers, lexicalization and deconstruction of lexical signs, transfers that deploy role shifts and lastly, simultaneous signing, either of the two hands, or of the torso and the hands in a multi-layered manner. A simple example from GSL is given below:

According to grounding cognition a typical multimodal representation in the brain processing of (spoken language) comprehension involves a) the appearance of an object, b) an action or state and c) an introspection of an experience. Taking a quite iconic and tangible example of a GSL verb, such as *sitting on a chair*, we can see how these three parameters have been incorporated in the linguistic system for the multimodal representation of the event:

a) how the chair or the seating area looks can be traceable through the use of entity classifiers; b) the action of sitting is given by the respective manual sign with a downwards movement for an action, or minimal movement for a state; however, if any other quality is of important, such as number of seated persons, absolute or relative positions, orientation and movement are expressed through complex syntactic structures of simultaneously use of optional entity classifiers for seating area (articulated with the non-dominant hand) as well as entity classifiers for animate subjects in relation to seating area, to each other and to signer's perspective; c) introspections, such as comfort or uneasiness, and judgements as to the number of animates seated, speed or duration of state are morphologically expressed through close-up enactment by signer's torso, incorporating the respective adverbials through measurable and conventional, language specific movements of the mouth, cheeks, eyes and eyebrows. Thus, we propose hereby that full symmetry with re-enactment is found in abundancy in GSL structures and words, not only in respect to linguistic comprehension but also to linguistic *productions* in all three above parameters.

In the analysis of the sitting example above, classifiers play a crucial role in GSL embodiment and situatedness. Focus on classifier driving forces, subcategorization and on internal differences within the category is relatively scarce to date. A short breakdown of the different types and roles adopted by GSL classifiers is given in the section below.

5. Greek Sign Language Classifiers, embodiment and situatedness:

In spoken languages comprehension tests for embodiment, storing and understanding a text in pictures is a proven mechanism; simply reading words about actions, is found to activate the reader's motor system. In the stage of elicitation of our GSL corpus we found out that not only storing and understanding, but *producing* a text in pictures is what happens through use of classifiers: when the signing stimuli was a written text, albeit describing spatial relations and movement, informants did not produce as elaborate classifiers but their descriptions were a lot more linear and less iconic. On the contrary, when the elicitation was an immediate result of linguistic representation of pictures with actions, informants came up with full use of GSL classifiers. Classifiers are a strong example of simulators in sign languages. Typologically, they stand as whole predicates, providing information on shape features, position and movement of an object in real space, with the aid of lexical information of standard abstract lexemes. As is fundamental of simulators to 'implement concepts that underlie knowledge' (Barsalou 2008) in sign language structure, one can indeed find out the borders between the Saussurean sign and the signifier, and the hereby suggested ‘grey area’ between the two, that classifiers cover in sign languages. In this manner, a real world moving object such as a vehicle, realized through a relevant classifier, is perceived as two dimensional in most sign languages of the European family, or as three dimensional in some Asian sign languages. Shape and Size (SASS) classifiers used extensively for contextualization of abstract concepts in GSL, syntactically incorporating use of physical space on or in front of the body, while some of them, SASS classifiers in particular, are extensively exploited as sources for abstract lexemes. In our set of findings, out of a total of 15,444 lemmata 1324 were glossed as not-(yet?) lexicalized classifiers. In terms of categorization, following the well-troden path of classifier studies, three main semantic subgroups were found: In a total of 2000 lemmata excluding the category of classifiers, Handling classifiers were N=201; Entity classifiers were N=477 and Bodypart classifiers were N=14.

6. Conclusions

Once we decide to research higher in semantic primes and ontological categories (Sowa, 2000), we come to a much more precise working explanation of GSL function for classifiers. We now strongly argue that the ontology of classifiers in GSL is a crucial tool for determining their internal structure rules of primes and situatedness. Different modifiers applied upon each other produce adjectival predicatives of quality and quantity primes on measurable subcategories of what has long been cumulatively termed as *classifiers*, merely due to their iconicity. Moreover, as shown above, “frozen” or lexicalised forms form a significant number of our GSL classifier corpus lemmata. These lemmata, although they have been registered in the core classifier group, even when isolated from their context and with no prior reference of a specific noun can be recognized as lexical. A full list of the roots for such lexicalized classifiers in the corpus is being accumulated at this point.

Deploiting semantic primes for breaking down the classifier category into more, one comes up with the following semantic prime subcategories:

- Handling
- Predicative
- Body part
- Lexicalized
- One dimensional / two dimensional / three dimensional
- Plus tracing / static
- Plus human or animate
- Plus solid
- Open-ended vs close categories
    - and so on

Following these primes during our corpus analysis, our findings were surprisingly clear and straightforward, making the connection between ontologies, embodiment and classifiers measurable. In this way, it became clear that Entity (e.g. human or vehicle) classifiers are usually *predicative*; Static Shape and Size (SASS) classifiers can be *objects* or be assigned an *adjectival meaning*; however, the subcategory of Non-static SASS classifiers, that have cumulatively been thought as just next to Static SASSes, usually have a *clitic pronominal* function in the manual level, and a *predicative* function in the path of movement; de – lexicalized or deconstructed classifiers serve as *points of pronominal reference.*

Acknowledgements: The present research is based on the corpus developed for Dicta-Sign; Dicta-Sign has been a three year EU-funded research project. During the Dicta-Sign project a large sign language corpus was created in four sign languages: German, British, French and Greek (DGS, BSL, LSF and GSL respectively). Data collection took place in all four countries involved in the project. Regarding to GSL language, 16 signers were videotaped in pairs, interacting with each other. All subjects are aged between twenty and fifty, are Deaf and fluent users of GSL. The outcome of the GSL annotation gave 2000 lemmas. The data were annotated using iLex, an annotation environment linked to a database (Hanke 2008).

References.

1. Barsalou, L. W. (1999). Perceptual symbol systems. Behavioral and Brain Sciences, 22, 577–660.
2. Barsalou, L. W., Santos, A., Simmons, W. K., & Wilson, C. D. (2008). Language and simulation in conceptual processing. In M. De Vega, A. M. Glenberg, & A. C. A. Graesser (Eds.), Symbols, embodiment, and meaning (pp. 245–283). Oxford, England: Oxford University Press.
3. Barsalou, L.W. (2003). Abstraction in perceptual symbol systems. *Philosophical Transactions of the Royal Society of London: Biological Sciences, 358*, 1177-1187.
4. Emmorey, K., Damasio, H., McCullough, S., Grabowski, T., Ponto, L., Hitchwa, R. & Bellugi, U. (2002). Neural Systems Underlying Spatial Language in American Sign Language. Neuroimage 17: 812-24.
5. Epicurus (341-270BC). (1987). Sensation, imagination, and memory. In A. A. Long & D. N. Sedley (Eds.), The Hellenistic philosophers, Vol. 1 (pp. 72–101). New York: Cambridge.
6. Frishberg, N. (1979). Arbitrariness and iconicity: historical change in American Sign Language.
7. Givón & Talmy, (2001). *Syntax: An Introduction*, vol. I. Amsterdam; Philadelphia: John Benjamins. (new edition of Syntax: A functional-typological introduction, 1984).
8. Hickok, G., Pickell, H., Klima, E. & Bellugi, U. (2009). Neural Dissociation in the Production of Lexical versus Classifier Signs in ASL: Distinct Patterns of Hemispheric Asymmetry. Neuropsychologia. Jan 2009; 47(2): 382–387.
9. Jackendoff, R. S. (1987). Consciousness and Computational Mind. MIT Press, Cambridge: Massachusets.
10. Kaplan, J., Bronwell, H., Jacobs, J., & Gardner, H. (1990). The effects of right hemisphere damage on the pragmatic interpretation of conversational remarks. Brain and Language 38: 315 – 333.
11. Klima, E.S. and Bellugi, U. (1979). *The signs of language*. Cambridge MA: Harvard University Press.

12. Lakoff, G. (1987) Prototype Theory and Cognitive Models. In Neisser, Ulrich (ed.) The Intellectual and Ecological Bases of Concepts. Cambridge University Press. 1987.
13. Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago: University of Chicago Press.
14. Langacker, R. W. (1987). *Foundations of cognitive grammar*: Vol. 1. Theoretical prerequisites. Stanford, CA: Stanford University Press.
15. Meier, R., Cormier, K., Quinto-Pozos, D. (eds) (2005). Modality and Structure in Signed and Spoken Languages. 43: 414 – 447. Cambridge University Press.
16. Orlansky, M. D., & Bonvillian, J. D. (1984). The role of iconicity in early sign language acquisition. Journal of Speech and Hearing Disorders, 49, 287_292.
17. Paivio, A. (1971). *Imagery and verbal processes*. New York: Holt, Rinehart & Winston.
18. Paivio, A. (1986). *Mental representations: a dual coding approach*. Oxford. England: Oxford University Press.
19. Pezzulo, G., Candidi, M., Dindo, H., and Barca, L. (2013). Action simulation in the human brain: Twelve questions. *New Ideas in Psychology*. 31(3): 270–290.
20. Pinker, S. (1994). *The Language Instinct.* London: Penguin Books.
21. Poizner H, Feinberg T, Dowd D and O'Grady L (1992). *Dissociation between linguistic and non-linguistic gestural systems: a case for compositionality*. Brain and Language.
22. Sallandre, M. – A., (2007). Simultaneity in French Sign Language discourse. In: Simulteneity in Signed Languages: Form and Function, M. Vermeerbergen, L., Leeson & O. Crasborn (eds.) 103-125. Amsterdam: John Benjamins.
23. Tai, J. (2004). Modality Effects: Iconicity in Taiwan Sign Language. National Chung Cheng University.
24. Talmy, L. (1983). How language structures space. In H. Pick & L. Acredelo (Eds.), *Spatial orientation: Theory, research, and application* (pp. 225–282). New York: Plenum Press.
25. Talmy, L. (1988). 'Force Dynamics in language and cognition'. In: *Cognitive Science*, 12, 1, 49–100.
26. Thomas H. & Storz, J. (2008). iLex – A database tool integrating sign language corpus linguistics and sign language lexicography. L-Rec 2008 - 3rd Workshop on the Representation and Processing of Sign Languages: Construction and Exploitation of Sign Language Corpora.
27. Woll, B. (2008). How the brain processes languages in different modalities. Barcelona: Institut d'Estudis Catalans, 2008, p.143-172.