Multimodal Propositions? From Semiotic to Semantic Considerations in the Case of Gestural Deictics

Andy Lücking
Goethe University Frankfurt
luecking@em.uni-frankfurt.de

Multimodality
Utterances that comprise elements that are perceived by different sense modalities and are coded according to a non-linguistic code are **multimodal utterances** (cf. FRICKE 2012). An example for non-linguistically coded signs are indexicals like pointing gestures, which, according to PEIRCE, bear some nomological, causal or attentional relation to their objects (CP 1.372, 2.248, 2.285). How is this difference in interpretation of nonlinguistic elements treated in semantic theories?

Index vs. Referent
The entity (object, property, situation, ...) pointed at is called the index and does not need to coincide with the entity talked about, the referent (terminology from KÜHNLEIN 1999) – see example 2 below.

Spatial Extension of Pointings
The extension of a pointing gesture $G$ is specified in terms of the set of situations whose regions intersect with the pointing cone $r(G)$ (cf. KRANSTEDT ET AL. 2006):

$$M = \{ \text{region}(e) \cap r(G) \rightarrow \text{max} \}$$

sets out the $i$ situations that have the largest overlap with the pointing cone.

Example
1. “This egg” + $\arrowright$ is good in $s_1$, but not in $s_2$ or $s_3$.
2. “This hen” + $\arrowright$ is good in $s_1$, but not in $s_2$ or $s_3$.
3. “The left egg” is good in $s_3$.

Contribution of deictic gesture

Reconstructing the pointing cone
The region encircled by a gesture $G$ is determined by the set of vectors emanating in gesture space $V$ in the in the direction of the pointing hand/finger. The corresponding cone covers the following subspace $r(G) \in R \subset V; r(G) = \{ v \arrowrightarrow | \text{proj}_2 \text{proj}_2 v < |\text{proj}_2^2 v \wedge \text{proj}_2^2 v < |\text{proj}_2 \text{proj}_2 v \}$(where $\text{proj}_2$ is the orthogonal projection from vector $v$ onto line $\gamma$).

Semantic Integration: Figure-Ground Model

A model $M$ for gestural deictics is an octuplet of the form $(S, D, \leq, L, \models, R, V, V')$, where the ingredients are as follows:

- $S$ is a set of situations;
- $D$ is a domain of individuals;
- $\leq$ is a partial function over $S$.
- For all $s \in S$ there is exactly one $s' \in S$ such that $s \leq s'$, and for all $s'' \in S$, if $s \leq s''$, then $s = s''$;
- $L$ is set of locations $\{ (x \in \mathbb{R}^2) \}$ (time is treated according to a separate timeline, which is of no impact);
- $\models$ is a complete order over $L$, namely the order of spatial vicinity;
- $R$ is a set of regions, where any region $r$ is a $\leq$-connected subset of $\text{Pow}(L)$;
- $V'$ is a set of vector spaces;
- $V$ is a valuation function for interpreting constants. The ingredients are interrelated in the following way:
- a function $\text{cons} \subseteq D \times S$ assigns situations their constituents;
- a function $\text{region} \subseteq R \times S$ assigns every situation its spatial extension;
- a function $\text{place} \subseteq L \times D$ locates individuals. for all $d \in D$ and $x \in S$, place$(d) \in \text{region}(x) \rightarrow x \in \text{cons}(d)$;
- a function $\text{space} \subseteq D \times V \times V$ assigns a vector space $V \times V'$ to each individual $d \in D$. The origin of the vector space $d, O(V_d)$ is at place$(d)$ by default;
- a function $\text{speaker} \subseteq S \times D$ defines the speaker in a situation (a speaker is a constituent of $x$ with the property of speaking in $x$).

Comparison

Semiotics
affectionedhood
non-symbolic code
focusing attention

Semantics
form-based interpretation
perspectivity
token-reflexivity

Indexicality

Reference