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### **Proceedings of the Annual Meeting of the Cognitive Science Society**

#### **Title**

Metaphoric Gestures

#### **Permalink**

<https://escholarship.org/uc/item/91g238nt>

#### **Journal**

Proceedings of the Annual Meeting of the Cognitive Science Society, 4(0)

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#### **Publication Date**

1982

Peer reviewed

Metaphoric Gestures  
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An analysis of the internal structure of saying, for example, "that's ok" as based on pointing and saying "ok," suggests a form in which this (virtual) action could be expressed--namely, as a pointing gesture. Such a gesture would be regarded as a second manifestation of the internal action structure--the utterance of "that's ok" being the first (first in communicative importance). The same can be said of other utterances. The externalization of action structures in gestures offers a way of studying the internal organization of language actions that is separate from speech. The gesture and the speech can be compared in a relationship that is comparable in its ability to bring out details to triangulation.

Internal thoughts of actions--manipulations and movements of objects in the world--seem to play a metaphoric role in language actions. In producing speech a concept or meaning is shown through a (virtual) action--this imaginary manipulation or movement of objects. In the following example the concepts of pursuit and inaccessibility are presented in a complex gestural image of moving but non-closing objects. This image immediately presents a global and undivided picture of the conceptual content, while concurrently the content is segmented into words and arranged across time in the speech channel (the fact that the gesture image arises first shows that it is not a response to the words).

- (1) Speech: they um wanted to get where Anansi was
- Gesture: both hands held apart in the air, right hand flutters back and forth (where the underlining shows the temporal extent of the gesture).

The synthesis of thoughts on which this language action was based (as revealed in the gesture) was a (virtual) placement of two objects, one in motion, but without closure. This image shows directly the concepts of pursuit and inaccessibility. The utterance of "the wanted to get where Anansi was" is an expression of the same internal structure, as numerous detailed parallels of form between the speech and gesture channels show. For example, the participants (referred to by the pronoun and proper name) correspond to the two hands (that is, the gesture was two handed rather than one handed). The two hands were held apart at spatial extremes, and in the sentence appear at temporal extremes (rather than together as would have been possible in a frame such as "the sons [coreferent of "they"] and Anansi couldn't get together"); one participant is not in motion, and in the sentence is referred to in a stative locative construction ("where Anansi was"); the other participants are in

motion, and in the sentence are referred to by the subject of a verb of motion ("they wanted to get"); and the motion of these participants in the gesture was of small extent and ineffectual, and in the sentence are referred to by the subject of the verb "want." All of these parallels are explicable if the gesture and utterance were joint manifestations of the same internal structure--a synthesis based on the idea of placement and movement of objects. This idea is a metaphor for pursuit and inaccessibility. (It is well to remind ourselves that the relationship between the structure of language actions and that of language objects--these being two completely different perspectives--is anything but clear; therefore it is not particularly interesting to ask how thoughts based on actions such as placement of objects translate into deep structures or other linguistic object configurations.)

Gesture evidence reveals a very widespread use of metaphoric thinking in performing language actions in which thoughts related to actions are used to show meanings of a non-action kind.

Mathematics discussions are accompanied by a flow of gesture which show mathematical ideas in the form of actions. The mathematical meaning of a dual is that each concept is replaced by its converse; for example, the dual of upward is downward. The following examples (2-4), taken from non-consecutive places in a technical mathematics discussion, each contain a gesture in which a hand rotates through the air from one orientation to the opposite orientation; the gestures therefore show the concept of a dual in the action realm.

- (2) Speech: this gives complete duality
- Gesture: right hand palm rotates upward
- (3) Speech: when you dualize
- Gesture: right hand palm rotates downward
- (4) Speech: the powers of x kind of give a dual
- Gesture: right hand palm rotates front to back

Another mathematical concept is that of a limit, and in the following examples the hands move toward some boundary marked by the other hand or a sudden stop; thus these gestures also are images of a mathematical concept in the action realm.

- (5) Speech: it's an inverse limit
- Gesture: right hand flattens; left hand moves up to

right hand

- (6) Speech: the inverse limit  
of...(trails off)
- Gesture: right hand goes down,  
then up as to a  
boundary
- (7) Speech: which is a limit, a  
direct limit
- Gesture: right hand moves down,  
then up as to a  
boundary

Example (5) also included a second gesture that showed the concept of an inverse:

- (5') Speech: it's an inverse limit
- Gesture: right hand moves in a  
tight loop

The concept of finiteness is shown by enclosing or pinching down on a space by curling the fingers and hands; thus here too is a mathematical concept in the action realm.

- (8) Speech: through the finite  
pieces
- Gesture: fingers curl inward
- (9) Speech: to get the finite group  
scheme
- Gesture: fingers curl inward
- (10) Speech: some finite group  
functor
- Gesture: forms a two handed  
bounded shape with  
palms facing and  
fingers curled

A rule of gesture production is that new movements indicate changes of meaning; and so a gesture can indicate the emergence in discourse of a new element of meaning ("information focus"). Thus in (2), for example, the new element was the concept of duality, and the other examples can be interpreted in a parallel way.

Utterances are structured to make salient the same elements of meaning. This is another parallel that suggests a common source for gesture and speech. In (2), "that gives complete duality" was structured and pronounced to achieve the same effect as the gesture: reference to the concept of duality was held off until the final sentence position (the position of the rheme) where it was given main stress, and was introduced in full lexical form. On the other hand, the sentence topic was announced first with a pronoun, and was weakly stressed. The transitive sentence form also enhanced the information focus of duality. Internally the model for (2) seems to have been that something (the sentence topic) was pushing forward the example the gesture demonstrated of duality (hence the use of "gives").