MEASURING INDEXICAL COMPETENCE: AN EXPERIMENTAL PARADIGM

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Introduction

One of the primary issues in experimental semiotics touches not merely on the type of experiential familiarity (in terms of sense data) an individual has been afforded in the course of development, but the kinds of mental signs which arise from such sense-based interactions. Familiarity with the environment is merely the groundwork for higher levels of intrapsychological semiotic tools. Spatial development consists in but one of the developmental genres within which semiosis can be measured. The particular semiosis vying to be measured is the ontogeny of the indexical sign. To adequately trace the semiosis of index, one must identify the kinds of qualitative changes taking place in the course of notable cognitive shifts, and attempt to determine how signs hasten and are an outcome of particular cognitive advances. The degree of universality and frequency of the index lends credibility to any general assertion (deduction or abduction) which issues from the related observation.

Gestures are universally the initial form of index. Eye-gaze, pointing, reaching and the like are employed during the prelinguistic period, until the distal demonstrative “that” is used. Use of the latter does not indicate far space/far objects, but a single entity of focus from the perspective of a single origo without determining spatial distance.¹ Later in development, after 2;7, both demonstratives appear, indexing objects whose location is contrastive. Prior to 2;7, when the distal demonstrative is used exclusively, index is restricted to its degenerate use (West in press). Afterward, genuine uses of index are employed concurrently with degenerate ones.

Piaget’s Framework

Piaget supplies a firm theoretical basis within which all individual claims cohere to form a system whose components do not contravene one another. Confidence, then, can be placed in Piaget’s theory, since it

¹ Origo is used in the Bühlerian sense of a point of orientation of a human, or of an object which has an inherent front, back, right, or left side.
has internal validity. What is incumbent upon experimental semioticians is to test his claims rigorously on relatively large and random samples of children. Piaget’s theory of the development of logical operations governs all of his assertions vis-à-vis how number, mass, and spatial concepts unfold. Hence, it is experimentally ripe to measure the semiosis of orientational (inherently spatial and indexical) signs, especially those deictic devices which track perspective-taking advances.

According to Piaget and Inhelder (1948: 67-79; 209-246), two types of spatial perspectives exist: the topological and the projective. While the former characterizes younger children’s spatial system (until approximately 8;0), the latter represents their system thereafter. Topical notions of space are defined by an adherence to a single origo as the point of orientation with respect to static object location; whereas, a system founded on projective principles validates dynamic, shifting origos and the possibility of object displacement:

It will be remembered that at the level where he tends to make every perspective a facsimile of his own momentary viewpoint, the child also shows himself unable to draw things according to the laws of perspective (‘visual realism’) but gives them an invariant shape, topological rather than euclidean (‘intellectual realism’). Thus it is not until he begins to be able to distinguish between other perspectives and his own that he becomes conscious of his own viewpoint as a particular one and is able to indicate it by means of relationships which are specifically projective (an explicit rendering of perspective) (Piaget and Inhelder 1948: 220).

Determining children’s mode of “seeing” with the mind’s eye (either topically or projectively) indicates the state of semiosis of indexical signs. Nonetheless, tracking this shift in spatial thinking requires a single instrument with sufficient sensitivity. Tracing the onset and use of demonstratives represents a sufficiently sensitive tool, given that alterations in their use reflect qualitative advances in perspective-taking – skills which directly illustrate indexical sign use (see Table 1.0). Entering the mind’s eye of the child to determine when “that” becomes a contrastive index is the initial indicator of some movement from a topological spatial system toward a more projective one. The next milestone is apprehension that alterations in the location of objects can affect what constitutes near and far space, and consequently what had originally been objects within near/far space may no longer be classified as such. At this juncture in development, children recognize at least two distinctive origos and two contrastive locations and objects within those locations from origo’s point of view, proximal and distal. That which still requires notice in the process of semiosis toward ascertaining the system of projective space is decreased dependence on the perceptual and the actual. Children must not rely merely on the appearance from
their mind’s eye, but must acknowledge, however unconsciously, that instantiations of their own observations (of themselves and of others) make up but an incomplete picture of: who can serve as origo, the diverse orientations of those origos within places (existent and nonexistent), and varying distances, trajectories and locations of objects within those places.

According to Piaget and Inhelder (1966: 94) it is at this juncture in development (when operations can be reversed) that children display the spatial logic of operations upon operations. The logic of operations upon operations entails the means to “decenter,” to consider several dimensions or attributes of an event concurrently in the mind’s eye and to determine which components must be drawn upon to successfully problem-solve. Children need to coordinate the object concept with issues of points of view or perspective legitimacy. Piaget and Inhelder illustrate the nature of the coordination of the object and origo systems by means of their “Three Mountain Task” in which three mountains of distinct colors are arranged three dimensionally—two in the foreground and one in the background or the reverse. The children being questioned are expected to perceive the array of the mountains either from their own perspective were they to alter their orientation to the mountains or from a doll’s perspective. The children must select a depiction which best represents the view of the mountains either as origo (the child or the doll) would see them. The doll’s or the child’s perspective is varied when it is displaced (volitionally or otherwise) to another orientation with respect to the mountains. Piaget and Inhelder describe the skills necessary to this perspective-taking task as follows: “When the child moves from position A to position B and, by means of his pieces of card, reproduces his present view together with his previous one, he is simply co-ordinating a perceptual notion (the view from B) with an imaginal one (the memory of the view from A)” (Piaget and Inhelder 1948: 217). This elevated form of coordination constitutes a late
acquisitional process during the close of the Concrete Operational Stage, being realized at approximately 8;0 – 9;0 (Piaget and Inhelder (1966: 106-107). The cognitive skill of operations upon operations provides children with the awareness that two or more factors contribute to whether to index an object as proximate or distant – the particular origo and its orientation, the location of the objects in question (relative to each other and to the given origo), and the likelihood of movement/displacement of the origo or of the object(s) (see Table 1.0). Foundational to perhaps all of these mental operations is a comparison between two or more locations or orientations, i.e., “this”-objects can become “that”-objects if one of three conditions is met: 1) self as origo changes orientation, 2) origo is other than self and changes orientation, or 3) the objects’ placement alters. Thus, operations upon operations requires holding two or more propositions concurrently in the mind’s eye, and may likewise entail integrating them.

The semiosis of index depends upon coordinating these mental operations; otherwise, index would be constrained to a static origo’s perspective of a single object in perceptual space.

Measures of the Semiosis of Index

The rather prolonged acquisition process of conversational and spatial deixtics (3;0 for the former, 4;9 for the latter) provides a forum for a micro analysis of indexical semiosis(West 2010; 2011a; 2011b; 2011c). While the acquisition process begins early on at the onset of first words, approximately 1;6 (Clark 2007: 166-167), coordinating invariant semantic meanings with pragmatic ones makes their acquisition quite protracted. Demonstratives, in particular, do not experience their full range of contrastive uses until 4;9 (Tanz 2009: 87, 125). “That” is the initial deictic appearing in the child’s repertoire (Clark 2007: 166-167); and for at least the initial year “that” is used to refer to any object of focus. At this juncture, “this” does not typically appear within children’s corpora (West 2011c: 94-95). During the initial year of use “that” has a non-contrastive meaning – its unmarked meaning surfaces. It is only upon production of “I” and “you” that “this” materializes. At this point in development both demonstratives are employed contrastively, “this” referring to objects within speaker’s proximate space and “that” indicating an object within speaker’s non-proximate space.

In the unmarked (non-contrastive) use of “that,” Secondness pervades—no reciprocal shifts are evidenced and fixing one’s notice to environmental features/stimuli is primary. Conversely, use of “that” contrastively – implying beyond “this” space, entails elements of Firstness and Thirdness. While “that” constrained to pure Secondness is rather static, in that spatial relationships from any origo’s perspective
are without spatially shifting confines, contrastive uses are more
dynamic, implying that spatial contrasts are pivotal within speaker’s
array of like objects. Even when the contrastive use of demonstratives
becomes operational, children still are governed by an egocentric per-
spective—the self as speaker representing the only viewpoint—the only
origo of spatial orientation. By 3;0 (when “you” is productively
employed) children can apprehend that two origos and spatial arrays
with respect to each origo operate. Afterward, when origos are coordi-
nated with dynamic orientations to objects these spatial deictics can
take on their potential indexical function – that of points of view defin-
ins objects’ situatedness (see Table 1.0). At this stage children can ascer-
tain that contrasting objects (defined by locatedness in near or far space)
can shift if speaker were not the child and/or if speaker (independent
of whether the child assumes such role) can displace him/herself, such
that speaker faces a different object of the array.

My own design when measuring children’s early use of demon-
stratives was to place two identical objects on a table surface—one on
each side of the table. The child and the adult either faced each other
from different sides of the table (having distinctive orientations to the
objects) or were seated on the same side (adjacent to each other), such
that they shared the same orientation to the objects. Eight trials were
provided (four in which perspectives were identical and four in which
they were distinctive). The child was instructed to “hide your eyes” for
purposes of taking part in a game. Then a candy was randomly hidden
under one of the objects (an overturned cup); and the child was allowed
to look at the cup arrangement, whereupon the adult mentioned: “the
candy is under ‘this’ or ‘that’ cup,” (without looking or pointing toward
either cup). The child was then expected to search for the candy (which
constituted a reward inherent to the task) by choosing the appropriate
cup. Overall accuracy was ascertained if seventy-five percent of
responses matched the standard adult response. Before 3;4 children did
not reliably choose the appropriate cup when the adult’s orientation
was the reverse of their own, although they consistently selected the
appropriate cup when the adult’s orientation was identical. This find-
ing demonstrates that a self governing perspective dominated all trials
of the task, and that other origos could not consistently serve as centers
of orientation. Furthermore, not until after 3;4 were children able to
begin coordinating the system of different centeredness with that of
movement in space either on the part of the origo or the contrastive
objects. Such coordination requires more advanced objectification skills
– to index with the mind of another.

Between 3;5 and 4;9 accuracy at all trials of the aforementioned task
materializes (Tanz 2009: 87, 125). Tanz’ (2009) design resembled my
own, only in lieu of cups and candy, she employed plates and pennies.
Even at 4;0 children’s responses were inconsistent (both for “this” and for “that”) when the adult’s orientation was distinct from their own; and not until 4;9 were responses of this type consistently accurate. In other words, the person centered system (speaker as _origo_) was not coordinated with the object system (categorization with respect to relative location) until rather late in development. What this design paradigm did not indicate is when in development are children freed from the perceptual to hold images of _origos_ and objects (together with their arrays) simultaneously in memory; and when it is that they can envision themselves in places and in orientations apart from the actual.

**Conclusion**

The semiosis of index is indispensable to measure spatial development—determining how demonstratives (as primary spatial situators) are employed, i.e., whether the use is non-contrastive, whether it is contrastive but ego-centered, contrastive and perceptual _origo_-centered, or whether demonstratives are understood in terms of constructed and dynamic mental images of _origos_ in the “there” and “then.” Initially, the degenerate form of index functions in Secondness by brute force to “direct the mental eyeballs of the interpreter to the object in question...” (CP 8.350). Then, index rises to the level of its genuine form when reciprocal, shifting _origos_ are legitimized and even more so when location of contrastive objects is classified into near and far space. This genuine use draws upon Firstness and Thirdness, such that _origo_ and speaker become integrated; and objects are categorized in proximal or distal space. Superimposed upon both the _origo_ and object systems is the shifting nature of each, contributing still further to a transcendence from the perceptual to the construction of views, places and orientations not hitherto experienced, taking index into imagined places with unfamiliar persons, who wander at will.

**References**

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