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THE PRIMACY OF INDEX IN NAMING PARADIGMS. Part I

This analysis highlights semiotic naming differences between pronouns, nouns, and verbs. It capitalizes on the pivotal role of Peirce's Object in assigning names, and the special character of pronouns to hasten notice of Objects. It showcases Peirce's indexical sign as an individuating instrument, by arguing that nouns do not name the Object uniquely. The indexical sign alone forces attention on unique entities. Their capacity to invoke notice of shifting places via pronouns/verbs is paramount.

   The findings indicate a particular developmental course: a noticed "something," classified object, individuated sequence of actions. The naming begins with the most pure Indexes (pronouns), then nouns (which draw upon similar features); afterwards, the verbs emerge to name dynamic event profiles. This illustrates the indispensability of index in the naming process. Advances in deictic individuation establish and reinforce joint attentional ventures: co-signers are compelled not merely to attend to the same Object, but to recognize distinctive participant roles in event structures.

   KEY WORDS: index, naming, pronouns, deictics, Peirce.

Introduction: Indexical Inferencing in the Naming Process

Current psycholinguistic and philosophical models have yet to recognize the essential place of semiotically informed approaches to drive developmental advances in the selection and application of names for things. A semiotic approach implies that the process of fitting name to the referent is more than a product of observing perceptual and/or functional similarities of the entity to be named, or determining semantic and pragmatic features particular to each name; rather, a semiotic account brings to light the fact that the referents incite distinct kinds of representations. Accordingly, representations (with their meaning correlates) determine the names assigned to the objects and events. A semiotic model recognizes the critical influence of representations (names (nouns) as one kind of representation) to verify the influence of referents in the interactive world, even before (or without, as Landau, Gleitman, and Spelke [1981] report) direct interaction with them.

   Representations which operate at early stages in ontogeny surface as a consequence of the coordination of different schemes at increasingly higher levels: perceptual, socio-ecological, and logico-mathematical. Children notice objects/events in predetermined ways consequent to universal spatial representations (Mandler 2010: 33, 2012: 427), consonant with elemental geometric parameters (Coventry, Garrod 2004: 46);

soon thereafter, they likewise confer upon referents more latent extra-geometric relational features (affordances). Nonetheless, it is the advent of naming which codifies many of these affordances: in the name (tantamount to Peirce's symbolic sign) resides many features intrinsic to the referent but not directly observable. Fitting the name to the referent (objects, events, places) then results from increasingly higher forms of constructive inferencing, resultant from the scheme coordination, first on the perceptual plane, on the inter-psychological level, and finally intra-psychologically. A semiotic approach accounts for the power of names to synthesize affordances unique to particular objects and event types via Peirce's Interpretant (the meaning/effects accorded to the sign-object relation). Hence, naming is constructed upon a system of dynamic spatiotemporal parameters which names, referents, and meanings together embody. Essentially, the perceptual attributes accorded with the name necessarily include more than the objects (referents); they entail inferences specific to the functional relationships among interacting participants and objects in an array (Interpretant).

This system requires implicit but deliberate (often unconscious) construction of testable inferences. In the naming process, the inferences are relied upon, when a name is applied, to an object based on the best exemplar criteria, when a name is deemed to be a more fitting substitute, or when a vague or novel name is selected to characterize the kind of object, place, or event. Inferences which underlie naming can develop into more plausible hypotheses if their premises can be subjected to the later probes. The probe is the production/assignment of the name to distinctive referents, since it is the name which makes the categorical pronouncement. In this way, the truth value of names can intrinsically contain predicates, "bird" signifying the many properties accorded to birdness, going beyond the referent itself.

This model posits that representations are constructed according to a cyclical process of interaction and reaction (using indexical facilitators) at increasingly higher levels of system coordination and reasoning within discrete spatial fields. These indexical representations are founded upon more static sensorimotor schemes; afterwards, the indexical representations become enriched by more dynamic affordance-based knowledge (Gibson 1979: 178–182). Index's early appearance in ontogeny, before 0;4 with coordinated vision and reach (Piaget, Inhelder 1966/1969: 9), and its role in driving increases in apprehension of affordances intrinsic to spatial primitives, grounds it in Lakoff and Johnson's source, path, and goal schema, in Gibson's ecological theory of perception, and in Mandler's model of spatial primitives. Rather than being foundational to linguistic forms alone or to sensori-perceptual competencies alone, a semiotic model obviates the need for a process driven theory of naming, initially governed by coordinating spatial inferencing at a sensorimotor level (geometric and extra-geometric). Using container, movement, fit, force, support, and the like, serves as the foundation to construct categories, and the names themselves can coordinate social and logical operations at a micro level. Accordingly, the process capitalizes on the maturation of attentionally based mechanisms of the Index (drawing on the perceptual, social, and logical planes), which coordinate not merely spatial schemas on the perceptual level, but linguistic spatial parameters, expressed as representational categories in

lived experience. Ultimately, with index's enhancement of spatial universals, the nature of objects' affordances is highlighted providing qualitative information for the naming enterprise.

Furthermore, the foundational role of indexical representations in the naming process supports the inclusion of other than common nouns in naming enterprises, certifying the place of other lexical categories (pronouns, proper names, verbs, locatives) to qualify as names for things. The claim that naming is influenced by underlying indexical processes underscores the foundational place of spatial primitives in fitting names to widely conceived substances and events, since index distinguishes and relates object functions. As such, the early indexical schemes serve as the conduit for affordance determinations, since the propensity to remember objects is grounded in where they materialize, in the expectations of schemes to interact with them, as well as in the conditions (e.g., movement trajectories) which they do or do not afford. Index is the common facilitating element which embodies all of the underlying spatial competencies of assigning features and functions to referents, realized in: containment, path, motion, support, force against other objects, attachment to surfaces (Mandler 2010: 33, 2012: 427), and origo (West 2012: 286–287, 2013a).

Finally, the fact that the Index maximizes attention to objects and their spatial relations provides the key to semiotic advances from pre-naming to naming: persons, places, events, and things. Index (as the unifying internal and social attentional focus-fixing device) represents the vehicle for shifting from sensorimotor spatial schemas to linguistic representations. As such, Index serves as the coalescing factor because of

its means to eventually encode location as a proposition; thus, it is endowed with the means to transport physical locationality and relative positionality into conceptual expressions of space, as in demarcations/shifts in demonstrative use. As such, early attentional tools in the form of index operate to structure both spatial arrays and the experiences (assigning names to things/events) which individuate and relativize spatial arrays.

The existence of spatial primitives does not presume a purely nativistic account; spatial knowledge is not assumed to be *a priori*. Rather, this model posits that particular spatial competencies present at birth guide sensorimotor, social, and linguistic representations which are indexical in nature. Spatial primitives simply consist in propensities to follow an indexical path, to interpret parameters and boundaries, and to perceive spatial relationships (Coventry, Garrod 2004: 46, Bryant 1997: 239–264).

The Ontogenetic Path

At 0; 2.5, the motion into and out of containers, e.g., rooms, is first documented (Baillargeon 2004: 391–424), demonstrated by direction of eye gaze and by length of continued gaze to moving persons. The second spatial primitive surfaces at the same age are again measured via looking time of the blocked path (Spelke *et al.* 1992: 101–107). Nonetheless, not expecting an object to reappear when its path and motion are precluded must eventually require an inference of density, and elasticity of the involved objects (Gibson 1979: 178–182). This, in turn, bears upon how the issue of force affects an object's reappearance in this scenario (Mandler 2010: 36–37). Afterwards, the spatial-relational primitives of the container, blocked movement, force,

and the like inform reference to space in language. As such, forming objective inferences, judgments, and hypotheses about whether particular objects are stoppable or breakable by another object, is a lengthy process, likely to continue into adulthood. However, what these spatial primitives have in common is the Index, since each requires directionality within, towards, and against other objects. These spatial primitives are enhanced by the Index even early on, since at 0;4 the principle of cause to move (self-start) becomes operational (Leslie 1984: 31–32). Between 0;5 and 0;9, some sensitivity to the goal emerges, as demonstrated by recognition of the existence of ends of the paths (Woodward 1998: 1–34), but only when the paths are direct (Csibra *et al.* 1999: 237–267). Hence, spatial primitives are operational early in development; and Index unquestionably governs these primitives, and may even facilitate how and when they unfold. To this end, Index, given its attentional character, highlights potential applications of source, path, and goal primitives increasing their visibility and resourcefulness in impending activity. Likewise, Regier and Carlson (2001) give attention a primary place in their Attention Vector Sum (AVS) model, without addressing the representational nature of attention, namely the Index.

In the case of containment, in particular, Index is a significant factor in establishing landmarks necessary for orientation within and without a container figure. The container may well consist in practical orientation within a room or smaller contained space such as a playpen or a sandbox. Boundary interpretation within the container requires a point of orientation within the container, or one outside its confines. That which is within the container permits formulation of

distance from the walls; and according to Coventry and Garrod (2004), objects therein experience substantial "location control." This claim is likewise supported by Hespos and Piccin's (2009) findings that tight and loose fitting objects are noticed differently by five-month-olds inside than outside of containers. Conversely, spatial relations outside of the container materialize via the establishment of viewer (Origo) location and orientation, i.e., Hespos and Piccin's (2009) findings demonstrate that once outside a container tight and loose fit is less relevant, since their subjects did not habituate sooner to the tight than to the loosely fitting non-container objects relations. Interpreted in light of perspective-taking theory, these findings indicate that the point of orientation (container as a landmark or persons outside the container as Origo) determines what is spatially relevant, and that which is relevant is noticed.

Other schemas which incorporate either inside or outside vantage points consist of path, movement and precluders to movement along the path. Path schemas (which incorporate motion) implicitly entail a source, which equates to the viewpoint of the particular viewer; and the location of the viewer(s), together with the direction in which the viewer(s) is facing, constitute attentional Indexes requiring the establishment of Origo in the spatial array. These spatial primitives are indispensable to subsequent individuation and analogy based schemas necessary for the discovery of names for things. In their uniqueness, "things" give rise to reference to any possible individuated substance, state of things, or events. As such, this definition would include all lexical categories: nouns (common and proper), pronouns, verbs, prepositions, etc. It follows, then, that all of the afore-

mentioned lexical categories, despite their uniqueness in the name-referent relations, operate on the common principle of spatial primitives, although these primitives (given their relations) more obviously underlie verbs and other locatives than nominals. In view of their common basis (cf. West 2013b for a discussion of locative nucleus within object files with respect to nouns), both nouns and verbs are driven by competencies substantially reliant on inferences arrived via attentional Indexes, although it is certainly the case that nouns have been given the greater focus in the naming enterprise.

The distinct lexical categories (pronouns, common and proper nouns, verbs, and locatives) all unquestionably individuate: charge self or others with a selected focus. Nonetheless, specific types of names individuate differently. While pronouns differentiate uniquely, proper nouns and common nouns do so with a comparison to similar objects in mind (although the differentiation in the former use is often implicit). Despite the relativizing function of verbs; nonetheless, they individuate the direction of the argument structure. All of the lexical categories embody the Index by virtue of their particular individuating function; and most require (at least implicitly) the establishment of Origo to draw attention to and locate the focused object(s) or event(s).

Pronouns as Names

Pronouns individuate in a very particular way. They do so as terms with little or no semantic content. Demonstratives are a quintessential illustration of an individual term whose use determines the focus on different occasions of use. When "that" is produced early on in the development, it possesses little, if any, semantic content. "That" merely serves to determine the ref-

erent in each context. In fact, the referents of "that" have little in common with other "thats": all that is common to their referents is compulsive attention to the settled-upon entity. Neither perceptual features, nor functional attributes qualify entities to "that" status. "That" entities range from: present objects, to coughs, to absent or imagined entities or conditions, e.g., smurfs, angels, possible events and places. More specifically, a "that" on one occasion of use might refer to the trunk of an elephant, while on another occasion of use (even within the same discourse) "that" might well refer to a vehicle present in the context, to an absent something, or even to a more abstract entity such as a constructed idea. In short, in their initial use, the pronouns merely indicate the uniqueness of the referent, not to the similarities like objects. Index is alive and well in these uses of demonstrative pronouns; it is indispensable as an accompanying gesture in the naming process. Without indexes (eye gaze, pointing, and the like), initial uses of pronouns are often rather vague or ambiguous. In fact, "that" individuates as an individual and embodies the most global category of referents possible, focused objects or events. Whether this form of individuation rises to the level of names, the things remains unsettled.

Objects of pronouns possess just such power, according to Peirce: a brute force to ground their signs when the signs are primarily indexical. These Objects particularly stand out; they are not the types but tokens injecting their uniqueness apart from all else. As such, their signs are most often individuals, unless they impel association with particularized perceptual or functional features of other potential Objects: "…tokens always become unique through individuation... If two tokens were

identical they would be one. In the natural world no two material objects of any kind are identical" (Salthe 1993: 141). Objects of pronouns are regularly the pieces of space, places differentiated from other places, but without spatial comparisons and clear Origo differentiations. Objects of "that" or "there" are equivocal to a place or an entity within a place out there somewhere (including but not limited to near space), not tethered to reciprocal sources as points of reference. As demonstratives and proper names are legisigns, and as such they are without easily defined means to index the Object, their Objects must invoke another visual Index to indicate them, or must have within themselves a salience of such proportion that the sign becomes rather incidental. In this capacity, the Object of these legisigns is a brute force Second, firing another concomitant physical sign or intensifying its properties to the mind of the observers. These Objects essentially trigger the use of individuals over singulars (by virtue of their uniqueness) and reduce the effect of the Interpretant to a catchall slot for potential meaning. So, if the Interpretant is present at all, it is characterized as an empty slot, awaiting the possibility of being filled with analogic features in the inferencing process. Here, the Interpretant exists as a potentiality or possibility.

In the discourse, speech partners are influenced by tangible Objects that they see all-at-once or to memories which emerge spontaneously in that place; this attentional enterprise requires signs which can individuate immediately and in as precise a manner as possible, namely, Indexes. These indexical signs (whose delivery is concurrent with indexical legisigns) have a distinctively attentional and visual character, e.g., eye gaze or pointing or some other directional gesture. The Object needs more than an indexical legisign to complete the referential act, namely, a second visual Index. Consequently, in these cases, the pronoun, despite its individual character alone, is insufficient to refer. In this way, the Objects of individuals largely require the use of more than one indexical sign concurrently to achieve success at singling out the Object from a host of potential referents.

Signs consequent to notice of these compulsively determined Objects impel the use of a second sensorimotor Index (directional gaze or finger extension toward the Object in question). Accordingly, objects of pronouns, as individuals, need a greater degree of disambiguation than does the Objects of proper names or other nouns, consequent to their relative lack of associated meaning. When demonstratives are employed as individuals, access to Interpretants appears to be immaterial (hence, Interpretants are mere unfilled potentials) during early referential acts. For example, a little need arises for access to prior representations in the process of enhancing interpretation of the compulsive notice of Objects; and Interpretants serve little or no fundamental purpose here. In 1901, Peirce indicates that: "an Index …would at once lose the character which makes it a sign if its Object were removed, but would not lose such character if there were no Interpretant," (CP2.304). In a word, Objects of individuals (such as Index) do not initially give rise to covert representations in the referential act: it is spatial co-occurrence with their sign which secures the sign, Object connection.

What constitutes likely Objects of "that" in their unmarked use (when near versus far space is undifferentiated) is the imposition of uniqueness which they bring to bear in the referential process. The uniqueness can

take the form of the presence or absence of physical properties, curious functions or behaviors, or distinctive mental constructs. These Objects can be existents, or may materialize as constructions of volition in the imagination. Whatever is salient: tangible inanimate objects, moving inanimates, stationary inanimates, animates which possess skills of propulsion, individually invented smurfs, and the like, can constitute "that" Object. The critical feature for "that-ness" is the appeal to the participants' attention at the time of the discourse. As such, the Object of "that" can be anything, from an existent within the spatio-temporal milieu to a less obvious entity such as a sneeze, a virus, a hole, or a shadow. The diversity of potential Objects (whose properties are quite dissimilar) coupled with the sudden, compulsive imposition of these Objects upon the consciousness of two parties (given the necessity of joint attentional schemes to elicit notice) account for the dispensability of Interpretants in particular semiotic acts.

Nouns as Names

For the last century, the philosophers and linguists have characterized naming as names for things, namely, particular objects or substances. Early naming practices have been characterized as a caregiver announcing the label for the object, e.g., "this is a cup," while using an Index (eye gaze, pointing) to orient to the object in question. This practice obviates the use of nouns to tangible objects in the here and now. "This is a cup," or "this is mommy" are quite reasonable. It is hardly likely that a caregiver would use verbs, pronouns, or prepositions in the same manner: "this is a 'bring'," "this is a 'he'," or "this is an 'at'." In spite of the fact that the verb "bring" is potentially more

indictable than are the others, more stative verbs (e.g., like); it still lends itself less to this caregiver naming paradigm, in the light of its less static and less parameter-based structure. Consequently, virtually no investigating effort has been expended toward these categories in the naming process. Although greater observable parameters exist in defining the physical boundaries of individual use of pronouns, their encoded meaning is initially elusive, given their shifting character of use, e.g., "she" identifying different females depending on the conversational focus. One simply cannot observe a "she" or a "bring" in such concrete way as in the case with common nouns in which fast mapping of nonsense terms of an object is assumed, or is thought to hasten the attachment of the noun to the referent. Nonetheless, concentration on nouns as the best or the only illustration of names in the acquisition process is misplaced, given that it ignores elementary spatial relations. Further, it is explored the way this narrow focus inadequately addresses how spatial primitives inform naming.

In general, the explanations for how children apply nouns to objects take one of three paths: the "whole object constraint" the "mutual exclusivity constraint," and the "taxonomic constraint." The "whole object constraint" as proposed by Carey (1978), Mervis (1987), and Markman (1991) assumes that children universally fit noun to the entire object, i.e., the noun presumably does not refer to features/qualities of an object, but to the object in its totality. The "mutual exclusivity" account (proposed by Markman and Wachtel 1988) restricts the "whole object" constraint to a "one noun for one object" paradigm (the same noun cannot refer to more than a single object, nor can more than one object apply to more

than one noun); the question of overlapping meaning to different nouns is not explicitly addressed. Each noun retains status as a whole object, regardless of the individual object with which it is associated. The "taxonomic" account (Markman, Hutchinson 1984) assumes that each exemplar of an object corresponds with a different noun, allowing some overlap of nouns and their meanings to members of the same hierarchy within the exemplar category. In spite of their collective popularity, none of these accounts constrain the use of nouns sufficiently to account for children's overextensions, using a term to refer to an object which conventionally is not associated with such term, but which is assumed to fit the category given some perceptual or functional similarities is incongruent with using only one name for one object. More particularly, overextensions provide disconfirming evidence for the mutual exclusivity account, since overextensions themselves constitute the application of the same term to more than one object. All that is operating here is the child's need to individuate, which underlies reference to a single object.

Some evidence in favor of the "whole object" constraint emerges from the findings that count nouns appear earlier in ontogeny than do mass nouns: at 1;1 compared to 2;0 and beyond (Waxman 1999: B35–B50; Soja *et al.* 1992: 101–107; Gordon 1985: 209–242). Count nouns are first produced at 1;1 (Waxman 1999: B35–B50), but the conceptual categories which coordinate with such nouns appear to be understood at 1;0 (Xu 2002: 223–250). These links between noun naming and underlying category learning are especially obvious in the acquisition of count nouns, as opposed to mass nouns (Waxman, Markow 1995: 257–302; Wilcox,

Baillargeon 1998: 97–155). This happens because the mass nouns are less individuated ("I want some juice," [mass] "I want a cookie," [count], they are later acquisitions (Lust 2006: 236–237). Although the whole object constraint fails to address relational constructs, particularly spatial ones which are well in place by the point in development when naming materializes, its onset patterns offer support for the early existence of spatial primitives. The productive use of count before mass nouns evidences the primary role of individuation over classification, and the enterprise of applying a lexeme to a noticed entity. The issue is that count nouns typically individuate, while mass nouns intimate a similarity of relations across objects with similar perceptual features, e.g., "a juice [box]" vs. "juice" or "some juice [not explicitly limited by container]." Whereas quantity is limited by the container for count nouns, such is not the case for the mass nouns. This increased need for individuation via earlier use of count nouns supports the early and sustained influence of the Index in the naming process, in that individuation (differentiating one entity from another, rather than one class of entities from others) accounts for a more basic attentional thrust in the name to object process (Bates 1976: 61).

The argument in favor of Index, with its individuating properties, as the foundation for naming (rather than the whole object constraint) is founded upon two rationales: 1) it demonstrates a continuous process of pre-linguistic to linguistic representational systems; and 2) it foregrounds the elemental role of attention (both unidirectional and bidirectional) in the process of acquiring names for things. The latter illustrates the critical nature of attentional phenomena in establishing continuity between pre-

linguistic and linguistic representational thought: what children select as their focus heavily influences what they choose to name. The earliest index (beginning at 0;1) demonstrating unidirectional person/object selection is eye gaze (Scaife, Bruner 1975: 265; Meltzoff, Moore 1977: 75-76; West 2013b). Thus, at 0;4 the arm/hand coordinated with eye gaze (Piaget, Inhelder 1966/1969: 9) constitutes a further development of index (West 2013b); and at 0;8 and 0;9 giving and receiving exchanges, together with pointing (Bates 1976: 61; Carpenter *et al.* 1998: 681; Volterra *et al.* 2005: 9) represent still more developed indexes (West 2011: 92). Afterwards, at 1;4, attention becomes joint, employing joint visual indexes and movement trajectories, namely, eye gaze, pointing, ball-throwing, and the like (Tomasello 1999; Baldwin, Saylor 2005: 123–143; Saylor 2004: 608). The point when attention becomes joint via visual indexes marks the period when the count followed by mass nouns is produced. Since interlocutors are an integral part of these joint attentional interactions, and since naming flows from a need to individuate with and for the interlocutor, attentional index likewise constitutes the major tool in the naming process. Thus, individuation (based on discrete lived experience) is a more fitting explanation for earlier ontogeny of count nouns than is the "whole object" constraint. The "whole object" constraint is merely one illustration of children's propensity for individuation, it represents only one example of index's influence and ignores the attentional phenomenon.

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