

Pictorality in Early Picture Comprehension

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Abstract

The picture space and the young child learning about pictures Picture understanding is a complex competence (in the individual and in culture) that involves knowing, thus having expectations on things. It takes time for the child to learn about the picture sign and also to adults pictorial experiences continue to have effect on the conception of pictorial signs. Picture comprehension applies to perceptual, conceptual and social capabilities and during several years of development, in becoming sign minded, the child will learn to understand pictures. A significant aspect of understanding pictures is of course to differentiate the expression from content; that is one of the basic conditions to learn about sign functions. The notion of pictorality (Sonesson 1989) puts up specific conditions for the iconic relation between expression and content in the picture sign and this should be observed in studies of the development of picture sign in the child. Pictorial iconicity actualizes the question on realism or familiarity of real life in pictures and in my talk at AISS-AIS 2009 I will discuss some implication of this connected to the child's comprehension of pictures, and to my concern, specifically the photographic picture. Mere recognition of depicted objects are not necessarily indications of picture understanding but the picture as «a guide for action» indicates early pictorial understanding according to DeLoache (1994, 1995). In her retrieval tests the implication is that the child has to understand the iconic relation between the picture and the room depicted to find the hidden target. The tests convincingly show that this can not be done by the child before it is about two and a half years old. But the role of iconicity in the sign relation is not clear. If the picture is exchanged to an iconic scale model the child will not pass the test until it is three years old, but on the other hand if there is no sign relation (to the child) between the two spaces (the scale model and the room) the child finds the hidden toy already at the age of two and a half (DeLoache 1997). Actually to the child, in the second condition, there is only one space which had been changed by «the shrinking machine».

Months before the first anniversary the child's perceptual mechanisms allow it to pick-up, in Gibson's sense, invariant features of objects from their pictures. But this is not equivalent to say that they understand pictures. Learning about pictures is a composite process, and for the young child this process will take years. Pictorial meaning entails sign function in the child and involves a complex of perceptual and cognitive readiness in encountering the world socially, psychologically and physically, i.e. bodily. Recurrently it has been pointed out that crucial for picture comprehension is to understand that the picture-thing is an object in itself and simultaneously functions as a sign-vehicle about something else. This has been referred to as «the dual nature» or «the paradox» of pictures, or «dual apprehension» and also «dual representation» in pictures (Gibson 1966, 1979; Gregory 1990, Sigel 1978; DeLoache & Burns 1994).

However all signs are at least dual and this causes difficulties in learning about any sign relation. The paradox of pictures also falls back on the specific condition for similarity, and deviation, in relation to the referent in pictorial signs. The picture-surface showing a dog is not the dog it shows but it (sufficiently) looks like a dog (or the visual experience of something looking-like-a-dog) and it often «means» a dog. And sometimes it even specifies a specific dog at a specific place, and perhaps at a specific occasion or situation.

Pictures are iconic signs but are not *any* iconic sign, and iconicity (the principal that makes a relation by similarity possible) is not enough to explain pictorial meaning. In relation to other signs, the picture sign is characterized by its way of taking advantage of visual experiences in ordinary perception. The specific way to which all pictures relies to meaning is by Sonesson called *pictorality* (1989). Pictorality concerns the specific conditions for similarity in pictorial displays and how this condition in sign function recoils to its use of relations also by indexicality and conventions^[1].

In culture, pictures have been used to sustain communication and visual realism has by far always been the priority. But, keeping on to the definition of the picture sign as based on the report between a discernable surface and a recognition of a visual experience in ordinary perception then the picture per definition involves, at some degree, apprehension of something already visually known.

Like all signs the picture sign is linked to the subject to whom it means something, and to be communicative it has to be interpersonal. Hence the sign is always a sign to someone and to be used in communication it has to be shared with others, or at least rely on the expectation on being shared with others. For the child to learn about pictures the child has to differentiate and evaluate the relations constituting the sign. In a sign relation the one is an expression for the other and not the reverse without there is a change in signification. It is not sufficient to identify a difference between the picture of the dog and the dog. The picture is not a bad example of dogs, it is showing something of the dog but far from everything about the dog.

[1] Also tactile or haptic pictures (Kennedy 1993) can be discussed in terms of being surfaces rendering meaning in accordance to tactile experiences of the ordinary world.

DIFFERENTIATING THE PICTURE THING

The paradox of pictures, or the difficulties to understand the paradox of pictures, can be illustrated by the observations of manual exploration of pictures in infancy. In such observations Pierrosakos and DeLoache (2003) show that at the age of nine months children have a tendency to act towards depicted objects as if the pictures were the objects themselves (See also Murphy 1978). The children are observed while persistently scratching on, grip at or «tasting» the depicted objects. According to Pierrosakos and DeLoache the child concentrates on the areas of the depicted objects, not on the areas of the highest contrasts. The persistent scratching, gripping and also of «tasting» on pictures is rapidly reduced for the 15-month-old and has almost disappeared among the 19-months old^[2]. Also notable in the studies (2003) referred to above is that the manual explorations are significantly more frequent and persistent in interaction with colour photographs than in interaction with black and white photographs, and the less with drawings. These comparative observations seems to indicate that the degree of (or perhaps the wider range of) iconicity supporting visual realism has an effect on manual behaviour on pictures among the *youngest* children but that this correlation between realism and manual exploration seems to be reduced by the age of 1,5 years old^[3]. The child has learned something about the picture.

Is this manual exploration of pictures by young children indicating that the child does not differentiate between the three dimensional object and its picture? I would answer yes and no. In the observation test by Pierrosakos and DeLoache (2003), only the picture condition was available for the child. If both the object and its picture are available the child will reach for the object (Liben 1999, cf. Yonas & Granrud 1985). Thus when both conditions are present the child (5-months old) has a preference for the object. It seems reasonable to assume that the 3-dimensional object affords more tangibility. The same tendency in preference has been shown true also for gaze; the child preferably looks at the object than at its picture if both are presented to the child (DeLoache 1994, Beilin & Pearlman 1991). But, and this strengthens the indication of differentiations in the child, in habituation tests also 5-months old children respond to the difference between picture and object. When habituated to a picture the child looks longer at the object and vice versa.^[4] It may be that for the child, in this situation, the object and its picture are two examples of the same category but one of them seems to be more interesting (Lenninger 2004).

[2] Beilin (1999) refers to Pierrousakos, S., & Maybry, Y. (1995) *When do infants grasp the nature of pictures?* Poster presented at the March 1995 meeting of the Society for Research in Child Development, Saint Louis, MO.

[3] Also among older children realism affect picture interaction, this can be the case if for example the picture display presents a highly alluring object such as an ice cream (Beilin 1991). This can also, I believe, be true for adults.

[4] In a semiotic context I find it relevant to point out that the method of habituation test *per se* presuppose and confirm early tendency for expectations in the child. Cf. Claes von Hoffsten (2004) on infant learning of contingencies between two events as easily picked-up and just as easily lost.

THE PICTURE BEING ABOUT SOMETHING

By the age of 15 months manual exploration of pictures, as described above, has radically diminished in children, and is almost gone at the age of 18 months. Around the second year children change their behaviour with pictures. At this age naming and pointing dominates children's actions with pictures in the prototypical parent-child picture-book interaction (Murphy 1978, Ganea et al 2008). According to Murphy the pointing act is a continuation of the gripping and scratching observed in the younger children and also she interprets pointing as a precursor to literacy. Pointing is then understood as an early tendency towards a differentiation of pictorial meaning from what is presented (Bus & IJzendoorn 1997).

Preissler and Carey (2004) argues that for the child, from the age of about 18 months old, the «naming» of a picture belongs to the referent object not the picture-thing. Remembering that one criteria for meaning by signs was the asymmetric relation between expression and content for the sign user, hence this could be an early indication of such an asymmetric relation between the picture and its object. Influenced by Baldwin and colleagues tests (1996)^[5] on referential mapping and word symbols in children at the age of 18 months, Preissler and Carey have designed a study to show early referential mapping by pictures in children. The experimenter anchored a new object *by means of its picture* with an unknown word to the child. For example told the child that «this is a whisk» or a «tug» when showing them a picture of a former unknown object. After this training phase the child was presented to *both* the picture of the «whisk» and the object shown on the picture. Now the child was asked, «can you give me the «whisk»? Virtually no child chose *only* the picture (2,5%), 40,5 % chose *only* the object and 57% chose *both* picture and object. Control tests show that when presented to a mis-matching object and the «correct» picture the child chooses the picture, thus a general prominence of objects does not explain the result. The authors' interpretation is that children already at 18 months old understand that pictures are «representations of real-world objects» (p.208). The test is interesting and I do agree that the test indicates a *relation* between the object and its picture anchored by a word label (i.e. the label was extended to the object) to the child but perhaps the authors draw too hasty their conclusion on *pictorial «representation»*. In a narrow sense the test convincingly shows that the picture-whisk was not the best example of the «whisk» to the child.

Comparative tests on picture understanding in children up to 2,5 years old show that with no word-game-anchors the matching between the picture and its object becomes more fragile to the child (Callaghan 2000; Harris, Kavanaugh & Downson 1997). Also Robinson, Nye & Thomas (1994a; 1994b) has shown that the relation between the picture and the real world referent is unclear to children until at least 3-4 years old.

To sum up it seems reasonable to argue that the young infant 5-9 months old recognizes known object on pictures without former cultural learning on pictures and that the degree of

[5] According to Baldwin (1993) word mapping by mere association is not explaining the early word learning process in the child. Baldwin stresses the social dimension in the development of speech and argues for early emergence of intentionality in children. Infants appreciate the «aboutness» of social actions and actively consult cues that speakers provide. Cf. Baldwin & Markman 1989.

visual realism matters. But this is not to say they understand pictures. Their actions towards pictures indicate a conflict between what is presented to them and their expectations of the objects. At 18 month the child behaves differently in interaction with pictures. At this age they increase pointing at pictures and involve pictures in naming games when interacting with adults. But still for the three and also four years old child the relation between the picture and the «reality» it depicts is insecure (Zaitchik 1990, Robinson, Nye & Thomas 1994). When prompted with the conventions and social interactions of a naming game the child's responds related to pictorial meaning present more stability than without the naming game context.

ICONICITY IN SIGN RELATION AND SELF

In a series of retrieval tests DeLoache & Burns (1994) have shown that firstly at the age of 2,5 years the child can use the picture as a guide to find a hidden target. In tests the child is involved in a hiding game where the child should find a hidden toy with means of a picture showing where a hidden toy is to be found. If the child finds the target this is argued to be an indication of «symbol use» (i.e. sign use) (See also Lenninger 2007).

In an alternative setup, using scale models to inform the child where to find the hidden target, the child does not pass the test until it is about 3 years old (36 months), half a year later than passing the picture condition (pass at 30 months old). Hence the scale model, sharing the 3-dimensionality with the room, is harder for the child to use as «guide» for solving the same type of problem. Both the picture and the scale model relate to their referents by iconicity but according to DeLoache it is harder for the child to appreciate the «symbolic function» in the scale model since the scale model is more attractive in itself to the child (the salience hypothesis). Thus it is harder to attend to the dual nature of the scale model than the dual nature of the picture. When informed only verbally the child finds the target already at the age of 2 years (24 months).

DeLoache have rearranged the design of the scale model condition in two major directions to make it easier for the children. One direction is by changing the medium, the other by changing the child's belief in the relation between the model and the room. In a variant of changing-medium-condition a transparent plastic window was put in front of the scale model and restricted manual interaction with the medium. The hypothesis was that by making it less salient, restricting tangibility, the dual nature of the scale model would be more apparent to the child (DeLoache 2000). By the barrier of a transparent pane the medium became more picture-like but the sign relation between the model and the room was principally the same. The other change in the scale model test was by a change in relation. In this direction of change the belief was changed in the child and it has been presented in two conditions: The «nonsymbolic task» (DeLoache, Miller & Rosengren 1997) and corresponding spaces (DeLoache 1989) (In a strictly sense both could be addressed «nonsymbolic tasks» but only the latter corresponding spaces). To the child, in the «nonsymbolic task» there existed *only one space*, which could be changed in size by the «shrinking machine». In this condition the child was shown the hiding place in the miniature scale model and then told that the shrinking machine can make the «little room» bigger (and smaller), they just had to turn the machine on and leave the «little room».

When returning to the now fully sized room the child (30 months) could find the hidden target. The second condition for altering belief is «corresponding spaces». In this condition the child encounter two separate spaces but in which none stands for the other (no proper sign relation). The child is informed and showed that the two spaces are similar but of different size. The process of the test is the same as in the original scale model test but the story to the child is different. In condition the child is informed that there is *another bigger* toy at the similar pace in the *other bigger* room. In this setup, it turned out that the children passed the test at the average age of 33 months.

It turned out that both directions (changing medium and changing relation) helped the children but the most significant change in performance was found when changing the relation. Most significance was shown in the shrinking machine alternative, in this condition the child does not have to relate two different spaces because there is only one room to the child, which has been enlarged.

What then does the comparison with the scale model tests show us? What is the role of iconicity? Several different setups of the same test paradigm indicate that iconicity does matter but it is not apparent how. The child's learning about mediums, or semiotic resources, does not seem to remain stable through development and the influence of iconicity is not unambiguous in either prompting or obstructing the sign relation in iconic signs. The variables in the scale model conditions indicate that a change in the beliefs of the relation (to the child) have more impact on the performance than the change in medium (age 30-36 months). It must be noted here that in the case of the picture condition (finding a hidden target by means of a picture) there was no significant difference in performance with photographic pictures, realistic drawings or with more «close-up» perspectives focusing on the hiding places in the pictures. At the age of 26 months old the children failed but passed after 30 months old irrespectively (DeLoache & Burns 1994). As the child learns more about the medium (learning about something as a sign-vehicle) the influence of iconicity seems to interfere less obstructive. The naming game situation shows us that language anchors may help the child to extend new words to new objects also when mediated by pictures. But when the medium is not differentiated, as is the case with the scale model in retrieval test iconicity can distract the child. This is also the case with manual manipulation in children inter acting with pictures at the age of 9 months.

REFERENCES

- Baldwin, Dare A. (1991): «Infants' contribution to the achievement of joint reference», *Child Development*, 62, No(5): 875-890.
- (1993): «Early referential understanding: infants' ability to recognize referential acts for what they are», *Developmental psychology*, 29(5): 832-843.
- Baldwin, Dare A. & Markman, Ellen M. (1989): «Establishing word-object relations; a first set up», *Child development*, 60:381-398.

- Beilin, Harry (1999): «Understanding the photographic image», *Journal of Applied Developmental Psychology* 29(1): 1-30
- Beilin, Harry & Pearlman Elise G. (1991): «Children's iconic realism: object versus property realism», in Hayne W. Reese (Ed.) *Advances in Child Development and Behaviour*, 23:73-111.
- Bus, Adriana G. & van Ijzendoorn, Marinus H. (1997): «Affective dimension of mother-infant picturebook reading», *Journal of School Psychology*, 35(1): 47-60.
- Callaghan, Tara C. (2000): «Factors affecting children's graphic symbol use in the third year language, similarity, and iconicity», *Cognitive Development* 15:185-214.
- DeLoache, Judy S. (1989): «The development of representation in young children» in Hayne W. Reese (Ed.) *Advances in Child Development and Behaviour*, 22:1-39.
- (2000): «Dual representation and young children's use of scale models», *Child Development*, 71(2): 329-338
- DeLoache, Judy S. & Burns, Nancy N. (1994): «Early understanding of the representational function of pictures», *Cognition*, 52: 83-110.
- DeLoache, Judy S., Miller, Kevin F. & Rosengren, Karl S. (1997): «The credible shrinking room: Very young children's performance with symbolic and nonsymbolic relations», *Psychological Science*, 8(4):308-313.
- Ganea, Patricia A., Pickard, Megan Bloom & DeLoache, Judy S. (2008): «Transfer between picture books and the real world by very young children», *Journal of cognition and development*, 9:46-66.
- Gibson, James J. (1983[1966]): *The senses considered as perceptual systems*. Westport, Connecticut: Greenwood press
- (1979): *The ecological approach to visual perception*. Boston, Mass.: Houghton Mifflin
- Gregory, Richard (1990): «How do we interpret images?», in *Images and understanding, thoughts about images ideas about understanding*, Horace Barlow, Colin Blackmore & Miranda Weston-Smith (Eds), Cambridge University Press.
- Harris, Paul L., Kavanaugh, Robert D. & Downson, Laura (1997): «The depiction of imaginary transformations: Early comprehension of a symbolic function», *Cognitive Development*, 12(1):1-19.
- Kennedy, J. (1993): *Drawing and the blind*. New Haven: Yale University Press.
- Lenninger, Sara (2004) Paper at the 8th congress of the IASS/AIS, Lyon.
- (2007): «In search of differentiations in the development of a picture sign», in *Communication: understanding/misunderstanding (2)*, proceedings of the 9th congress of the IASS/AIS, Eero Tarasti (Ed.) Helsinki: Acta Semiotica Fennica.
- Liben, Lynn S. (1999) «Developing an understanding of external spatial representations» in I. E. Siegel (Ed.), *Development of Mental Representation*, Mahwah, NJ:Erlbaum.
- Murphy, Catherine M. (1978): «Pointing in the context of a shared activity», *Child Development*, 49(2):371-380.
- Pierroutsakos, Sophia L. & DeLoache, Judy S. (2003): «Infants' manual exploration of pictorial objects varying in realism», *Infancy*, 4:141-156.
- Preissler, Melissa Allen & Carey, Susan (2004): «Do both pictures and words function as symbols for 18- and 24-month-old children?», *Journal of Cognition and Development*, 5(2):185-212.
- Sonesson, Göran (1989): *Pictorial concepts: inquiries into the semiotic heritage and its relevance to the interpretation of the visual world*. Lund: Lund Univ. Press

- Sigel, Irving E. (1978): «The development of pictorial comprehension» in Bikkar S. Randhawa & William E. Coffman (Eds.): *Visual learning, thinking, and communication*. New York: Academic Press
- Robinson, Elizabeth J., Nye, R., & Thomas, G. V. (1994a): «Children's conceptions of the relationship between pictures and their referents», *Cognitive Development*, 9(2): 165-191.
- (1994b): «How children view pictures: Children's responses to pictures as things in themselves and as representations of something else», *Cognitive Development*, 9: 141-164.
- Rosander, Kerstin & von Hofsten, Claes (2004): «Infants' emerging ability to represent occluded object motion», *Cognition*, 91:1-22.
- Yonas, Albert & Granrud, Carl E. (1985): «The development of sensitivity to kinetic, binocular and pictorial depth information in human infants». In: D. I. Ingle, M. Jeannerod and D. N. Lee (Eds) *Brain mechanisms and spatial vision*. Dordrecht, Boston: Nijhoff.
- Zaitchik, Deborah (1990): «When representations conflict with reality: The preschooler's problem with false beliefs and «false» photographs», *Cognition*, 35: 41-68.