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INTELLECTUAL REALISM AND VISUAL REALISM
IN THE SEMIOTIC ANALYSIS OF CHILDREN'S DRAWINGS

Master Thesis

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I have written the Master Thesis myself, independently. All of the other authors' texts, main viewpoints and all data from other resources have been referred to.

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INTRODUCTION

Children's drawings have been an important topic within psychology for over a hundred years, with various approaches to drawings as finished products and the drawing process having been developed over time. In recent years, semiotic terminology has become increasingly used in psychological studies of children's drawings. At the same time, some semioticians are turning to existing data and methods in psychological studies to explore how the understanding and use of signs or sign-object relations develop in children. More generally, mutual influence between the fields and interdisciplinary approaches are a continuation: Jean Piaget, the influential developmental psychologist, derived his terminology for signs from the Swiss linguist and semiotician, Ferdinand de Saussure (Krampen 1991: 18).

This thesis aims to explore a particular framework in psychological studies of children's drawings, a theory of progressive drawing stages that children develop through. Of the theorized stages, the progression from intellectual realism to visual realism has been extensively studied in experiments. The aim is to see how semiotics might offer some insight to unanswered questions, including: if evidence seems to suggest that there is a general progression from intellectual realism to visual realism, how do various manipulations of experimental conditions manage to influence it? In examining this question, a tension becomes apparent. Changes in children's drawings as they age could be attributed to hypothesized internal mechanisms. These changes could however also be investigated with a focus on the externally observable facts: the object that the child is asked to draw, the resulting drawing, and the drawing process that created the drawing.

Intellectual realism is, broadly, the idea that children draw what they know about something rather than how an object or scene might appear from a single viewpoint. Presented with a stimulus object in an experiment, a child may draw features of the object that they know are there, but which cannot be seen at the time of drawing. Within intellectual realism, this is framed as an appeal to a mental model or internal representation. By contrast, drawings are judged as visually realistic when they account for what is visible from the drawer's viewpoint, with particular focus on the omission of features that are important to the object, but cannot be seen. The studies focus on children between the ages of approximately four and eight years. Children of different ages indeed respond differently to the same task, but experimenters identify various conditions that yield a more or a less pronounced difference.

Strict stages of intellectual realism and visual realism and an abrupt transition from the former to the latter is no longer generally accepted, but literature on children's drawings still

uses the terms descriptively and does not deny a general trend. No model seems to be able to take account of the various factors that have been shown to skew experimental results in terms how much children of various ages seem to pay attention to their own viewpoint. If the data do not strongly support a progression from the hypothesized stages of intellectual realism to visual realism, but actually speaks against it, the question becomes whether this framework and its assumptions should not be reconsidered entirely. The data already collected may however still be useful.

The semiotic investigation into this problem builds on the recent work of Sara Lenninger (2012), a study of picture understanding situated at the intersection between semiotics and psychology. This thesis aims to uncover the potential application of some of Lenninger's concepts for picture production. Lenninger argues for two developmental tracks that must be integrated for proper picture understanding – understanding pictures as signs – to be in effect. Beyond noticing visual similarities between pictures and the world around them, children must also be able to share this meaning with others. The integration is accomplished when children understand that the picture affords not only the possibility of exploring visual meaning for themselves, but that it can also be a visual tool for communication with others.

The second key author to this thesis is Rudolf Arnheim (1954, 1969, 1974). His work provides valuable insight on the matter of mark-making, which of course is not central to picture understanding. Arnheim explains how children use the initially few marks and shapes available to them to stand for many objects, albeit very generally. As marks and shapes become more specific, so do their potential meanings. This theory of gradual differentiation from the general to the specific also underlies his views on perception and cognition and seems a necessary addition to Lenninger's work in order to comprehend early processes in development.

This thesis ultimately attempts to combine the work of Lenninger, Arnheim, and others in informing a semiotic model of sign–object (or picture–object) relations that can be applied to children's drawings. The application of the model to existing data investigates to what extent changes in children's drawings as they age can be attributed to changes in a developing understanding of picture–object relations.

Larger debates that are only touched on but which cannot be entered into in detail within the scope of this work include the depth and breadth of theories on perception and cognition and how similarity relations in iconic signs should be approached. The main aim of finding whether semiotics could offer an overarching model under which to gather the fragmented factors that seem to influence children's drawings in experimental conditions guides the work.

Overview

This thesis is organized into three main parts. Chapter 1 focuses on the study of children's drawings in psychology, especially theories dealing with how drawings change and seem to develop with children's increasing age. Chapter 2 looks at pictorial semiotics more broadly and then at recent work done in picture understanding at the intersection between psychology and semiotics. There are of course important differences between studying comprehension and production, but in both the psychological studies and the comprehension study the link between the picture and reality is emphasized. Ideas from Chapter 1 and Chapter 2 are synthesized into a potential theoretical approach for considering changes in children's drawings. Chapter 3 presents data from psychological studies of children's drawing and then reanalyzes it from the point of view of a semiotic approach that emphasizes changing understandings and uses of the picture–object relation.

Chapter 1

The literature review (Section 1.1) introduces the main sources from the fields of the psychology of children's drawings and semiotics. Although some semioticians have written on children's drawings, the amount of work is limited and, I contend, the theoretical utility is restricted. The mutual influence between psychology and semiotics as well as the overlap between their topics of interest has a long history, but truly well integrated studies seem few and far between. This thesis argues that much data is available for reanalysis, which could inform models in both psychology and semiotics. However, cooperation of this nature becomes increasingly challenging as individual lines of inquiry become exceedingly complex. It might be that some of this apparent complexity is due to lack of explanatory power in existing models, all the more reason to perhaps take a few steps back and try again. Limiting unnecessary terminology in an inter-disciplinary investigation poses a challenge, but I endeavour to introduce only a handful of main terms within the literature review. These terms are further explicated as they come up.

With the focus on the psychological study of children's drawings in the first chapter, having an understanding of how the field came to be and the various approaches that have been taken is of course indispensable. Section 1.2 introduces the figures of Georges-Henri Luquet and Jean Piaget, the impact of their work, and the connections between their work that have shaped the field over time. It also points to some general assumptions that underlay conceptions of visual perception, cognitive development, and children's drawings, the effects of which are still present in theorizing today. Furthermore, this section provides a description of the four broad theoretical approaches that have been taken to children's drawings. They are all related in their efforts to not only interpret a drawing as an attempted representation of

something, but to question whether the characteristics of the attempt reveal something of how a child thinks or feels. It is of course largely due to the influence of Piaget and others who focused on how children differ from adults that ‘childhood’ and ‘development’ are such important concepts at all. With adulthood placed as the final ‘stage’ to be reached, everything that goes before it is framed as steps in that direction, and it becomes easy to see these steps as deficient iterations of the final end product. The general description of the broad stages of children’s drawings introduced in Section 1.3 is thus provided with a number of qualifications. However, despite the potential problems of viewing development in terms of strict stages, there is little denying that children’s drawings do change as they grow older and that at least the drawings themselves can broadly be considered to move from the simple to the more complex. The drawings are of course not detached from their production process, and thus this section also briefly draws attention to the distinction between drawings as products and drawing as a process.

In more recent decades, two of the stages in children’s drawings received much attention and were the subject of experimental investigations. The crude summary of the difference between them is the opposition of drawing what you know versus drawing what you see. Intellectual realism is broadly characterized as drawing what you know, and visual realism is broadly characterized as drawing what you see. The paradigm that includes this opposition as well as intricacies of each concept are explored in Section 1.4.

Intellectual realism postulates a ‘mental model’ or ‘internal image’ that the child ‘copies’ onto the page. One problem with this idea is that children would appear to know much more than they put on the page. A child could, for example, already speak their native language quite well and articulately communicate many ideas, but that same child might still draw mostly scribbles¹. It appears that one requires a theory for talking about how the postulated internal model is translated into marks on a page. The work of the German–American perceptual psychologist and art theorist Rudolf Arnheim made a strong contribution to this end. Section 1.5 introduces his take on how children use different kinds of marks and shapes as they become available to them in the development of their graphic capacity. How exactly development of this capacity proceeds is hard to say, but it is well documented that children start out with a limited range of marks that cannot be well controlled. They then gradually become capable of producing more varied shapes and lines in addition to gaining ever more control over their movements and the medium. This development is most productively

¹ As an anecdotal example, I am thinking of a German boy of three-and-a-half, who was very articulate and even seemed capable of basic arithmetic, but who drew only scribbles and basic shapes.

viewed in tandem with the meanings attributed to lines and shapes, which is exactly what Arnheim provides.

Chapter 1 concludes with a summary of the points covered and the questions that have been raised (Section 1.6). The main question is whether intellectual realism and visual realism are at all accurate in describing children's drawings as they change with age. Based on my own argumentation and that of Arnheim, the preliminary answer is: "probably not". What is lacking, however, is better understanding of children's drawing development both in terms of their individual development *and* in terms of the socio-cultural context within which it takes place, and most likely *also* in terms of how these spheres interact.

Chapter 2

The introduction to the second chapter (Section 2.1) links the need identified at the end of the previous chapter with the contributions of Sara Lenninger's (2012) PhD thesis, 'When similarity qualifies as a sign: A study in picture understanding and semiotic development in young children'. She posits two developmental paths that must integrate in a balanced way for 'true' picture understanding to emerge. The first involves how we recognize things in pictures based on their similarity to the real objects or scenes, which by itself not yet constitutes true picture understanding. The second involves how we come to understand interaction and communication in social life, generally and not exclusively linked to pictures. By integrating the two, a child moves from seeing similarities verified by her individual experience to also incorporating the fact that these similarities are meaningful to others. Sharing meanings makes it possible for a picture not only to depict something, but also for that depiction to be used as a visual tool for communication.

Some of the theory that underlies Lenninger's work builds on Göran Sonesson's investigations in pictorial semiotics. It is important to at least cover the issue of a picture's similarity to its object, not least because this has been and still is a hefty issue in philosophy, art, perceptual psychology and the psychology of children's drawings, and semiotics. At the same time, this debate is not the core concern of this thesis. Hence, Section 2.2 covers Sonesson's theorizing in regard to the picture as a sign only insofar as it is necessary for better understanding the foundation of Lenninger's work.

Sonesson and Lenninger both have a conception of the sign in semiotics that posits pre-sign meaning that does not yet fulfil all the conditions of true sign meaning. This necessarily introduces a threshold of sorts. Based on previous experiments conducted by cognitive psychologist Judy DeLoache and her colleagues, Lenninger designs an experiment in which children can be shown to either understand the picture-object relation more generally, i.e. merely recognizing the object, or more specifically, i.e. recognizing the object and comprehending

that the relation refers to a here-and-now situation in the real world. Moving from the former to the latter level of understanding correlates with an increase in age. Lenninger's experiment is discussed in detail in Sub-section 2.3.1.

The dual processes of generalization, which Lenninger proposes work together to make a picture a visual tool for communication, are termed "iconization" and "conventionalization". What they encompass is covered in Sub-section 2.3.2. In integrating Lenninger and Arnheim's work on the way to a proposed model for analyzing data on children's drawings, some discussion of the notion of generalization is entered into in Section 2.4.

In the summary and conclusions (2.5) of the second chapter, the results of Lenninger's experiment, her development of iconization and conventionalization, and what was learned from Arnheim's work are taken together. I arrive at a potential model for approaching the re-analysis of existing data of children's drawings. It seems that children initially consider picture-object relations initially more broadly and generally. Narrower and more specific possibilities come about with their developing graphic skills, the similarity relations they notice themselves, and the similarity relations that are verified as valid in interaction with others.

Chapter 3

The data to be presented in this chapter are first contextualized (Section 3.1) within the broader spectrum of the kind of data that have been collected on children's drawings. There are naturally important differences between collecting drawings from anonymous children *en masse*, observing one's own child over the course of many years, and meeting individual children who take part in controlled experiments in the form of drawing tasks. The data explored in this thesis fall into the latter category. The experiments focus on intellectual realism and visual realism, sometimes concluding in general support of it and sometimes questioning it or suggesting alternatives. Children are generally presented with a model object and instructed to draw what they see, the question being at what age their drawings become more limited to their viewpoint as it is in the experimental setup. This focus on relating the drawing to the here-and-now object has some important parallels with Lenninger's experiment. For a semi-otic approach, drawing data related to a known object stimulus and known experimental conditions offer the opportunity of examining how picture-object relations appear to differ in pictures created by children of different ages.

Section 3.2 describes the data. The main experiment that set off a slew of others was N. H. Freeman and R. Janikoun's (1972) study in which children were asked to draw a model cup, the handle of which was turned out of sight. Younger children tended to include it; older children tended to omit it. Further information is limited to the third chapter to avoid repetitive data description. The reader who is interested in reading this thesis in the manner of a 'mur-

der mystery' of sorts is invited to read the full description of the study in Sub-section 3.2.1 after reading the literature review (1.1). The investigation of this thesis could be satirically summarized as the mystery of 'Who or what killed the cup handle?' Of course many researchers were actually asking the opposite: why was the handle there when it could not be seen on the model. Alterations of the experimental design that yielded variations in the results and multiple contributing or interfering factors are introduced in Sub-section 3.2.2. One study brings picture understanding and drawing together to some extent. It included both drawing stimulus objects and selecting a picture of them. Sub-section 3.2.3 concludes the data presentation by pointing out different trends. One study serves as an example of the ever narrower focus on the impact of experimental factors, with no comparison across age groups. By contrast, another study is fairly unconcerned with such factors and is still mostly interested in the extent to which children are influenced by their internal representations.

The various factors proffered as influencing whether drawings in drawing tasks of a model are more in the mode of intellectual realism or in the mode of visual realism are analyzed in Section 3.3. The theoretical approach sketched out at the end of Chapter 2 is developed into a semiotic model focusing on picture-object relations. Rather than explain children's drawings by an appeal to invisible internal models or representations, the focus on the picture-object relation stresses a codetermination of picture and object that changes with children's developing graphic skills, the similarities they perceive, and the similarities that have been established as important to certain communicative functions in their culture. Hence, as Section 3.4 concludes on the basis of the analysis, the processes of differentiation of graphic skills, iconization, and conventionalization are operative in how understandings and uses of the picture-object relation develop.

The Conclusion summarizes and concludes the thesis as a whole, mentions some limitations, and considers questions for the future.

1. PSYCHOLOGICAL AND SEMIOTIC RESEARCH INTO CHILDREN'S DRAWINGS

1.1. Literature review

The overview (above) already served to introduce some of the main sources that this thesis draws on. The literature review briefly elaborates on them, but it also aims to introduce more peripheral works that inform the reading of and contextualize the main sources. This also entails making short inroads into debates within psychology and semiotics that are related to pictures and drawings. Furthermore, although a few semiotic works on children's drawings exist, this review provides the rationale for their restricted contribution to the main body of work presented. Finally, some terminological issues are raised: some terms are mainly defined here, but others are detailed further in later sections.

A general overview of the psychological study of children's drawings is mainly informed by Maureen Cox's (2005) *The pictorial world of the child* and Glyn V. Thomas and Angèle M.J. Silk's (1990) *An introduction to the psychology of children's drawings*. Thomas and Silk provide a succinct overview of the various approaches that have been taken to children's drawings. They also provide a useful rough sketch of a general developmental path as it has been identified in children's drawings. This path derives from the history of attempts to classify children's drawings and the postulation of stages that emerged from it. Although ideas that contrasted drawing what one knows and drawing what one sees emerged before Georges-Henri Luquet's (2001[1927]) *Children's drawings (Le dessin enfantin)*, he is credited with creating the terms "intellectual realism" and "visual realism". These terms are central to the sections of Chapter 1 that follow, so for present purposes I only point out some problems that come up in their application. First, positing that a child draws from an internal model begs the questions of how such a model comes about and what its nature is. Second, it becomes clear that intellectual realism and visual realism are used in two ways: a) describing a general trend in children's drawing development, based on the amount of features and level of complexity of drawings created under any kind of circumstances, and evaluating to what extent the drawings approach some kind of 'standard' of visual realism; and b) describing whether a child draws a stimulus object that they are presented with by appealing to their hypothesized mental model or by focusing on the appearance of the object, i.e. basing the evaluation of drawings on how their features relate to or reflect the specific viewing circumstances.

Experiments conducted in the manner of (b), above, probably appeared senseless to Rudolf Arnheim (1954, 1969, 1974), a critic of, in his words, the “intellectualistic theory”. His work goes a long way in providing insight into the parallel differentiation of marks and meanings in development, revealing the logic of the processes rather than trying to explain apparent deficiencies in how children solve the problems of depicting something. Arnheim’s most notable follower specifically with regards to children’s drawings is the psychologist Claire Golomb (2003), author of *The child’s creation of a pictorial world*. She draws attention to the power of Arnheim’s work in describing the development of children’s drawing in a way that, in her view, can be considered to apply across cultures. The problem with describing children’s drawings in terms of specific examples, which may appear widespread across one culture, is that evidence of such examples may not be located in all or most cultures. A classic example of the amazing diversity with which a human figure can be depicted is G.W. Paget’s (1932) study ‘Some drawings of men and women made by children of certain non-European races’. Rather than fold in the face of cultural relativity, Golomb (2003) claims that Arnheim’s law of differentiation aids in the identification of a general “language” or “idiom” of child art.

Given that some theorists find Arnheim’s work highly influential and invaluable, it might be asked why it is largely ignored by others. As is noted in Chapter 3, some of the selected experiments seem to discover characteristics of children’s drawing process or drawing logic that had already been described by Arnheim some decades before. It might simply be that work not conducted as controlled experiments was not seen as relevant within that paradigm. It might also be that some theorists are not fond of the Gestalt school and related work, of which Arnheim is representative. In *Arnheim, Gestalt, and art: A psychological theory*, Ian Verstegen (2005) provides extensive background on the reasons for potential misgivings about Gestalt theory. Although the school had a decided influence on mainstream psychology and subsequent inquiries², Verstegen essentially argues for the merit of returning to some of the original ideas, qualifying and refining some of Arnheim’s thought with the benefit of a global view of all his works and that of other Gestaltists. So although specific details describing perceptual processes or brain functioning derived from Gestalt theorists’ investigations were rejected or proved as incorrect, Verstegen (ibid.: 40) argues for cases where the “meta-theory” should be maintained or the “spirit” of a theory was correct.

² Perhaps one of the most notable and oft-cited examples today is James Jerome Gibson. Although his theory is not in all respects a direct continuation of Gestalt psychology, he acknowledges his indebtedness to the tradition (Gibson 1986).

Verstegen (ibid.: 135) finds that although Arnheim may have been sympathetic towards ideas within more rigid developmental frameworks, such as that of Jean Piaget, Gestalt theory is not and need not be based on such ideas. Rather, it is a theory of psychological differentiation (ibid.). Verstegen (ibid.: 140) concludes that Arnheim and the Gestaltists avoid the nature–nurture dichotomy, or, at least, find an ideal middle road in “the lawful nature of learning”. Just like Golomb, Verstegen does not deny cultural difference; instead, he emphasizes that the same principles underlie how the various differences come about.

These issues are highlighted here because in reading Sara Lenninger’s (2012) PhD thesis, ‘When similarity qualifies as a sign: A study in picture understanding and semiotic development in young children’, questions of how perception and cognition operate are also unavoidable. These questions are addressed under Lenninger’s use of the term “generalization”, the use of which seems to be predominantly influenced by both Jean Piaget and Lev Vygotsky’s models of perception and cognition³. Both of Lenninger’s proposed processes of generalization, “iconization” and “conventionalization”, evolve with the build-up of experiences: “one generalizes from specific instances to broader principles” (ibid.: 181). In the case of iconization, the meaningfulness of specific perceptual instances are verified by their similarity or dissimilarity with the individual’s general experience (ibid.: 175). In the case of conventionalization, one takes into account both meaningfulness to oneself and others, using specific instances of interaction to generalize toward broader social and communicative principles.

These concepts are elaborated in Chapter 2, but their outlines are sketched here to make the reader aware of understandings of perception and cognition that necessarily underlie work in picture comprehension and production. A related underlying debate in Chapter 2 is iconicity. Paul Bouissac’s (1986) ‘Iconicity and pertinence’ is an enlightening and impassioned discussion of the problems of taking a theory of perception for granted in theorizing iconicity. Iconicity or iconic signs and questions of similarity or resemblance have many roots, but contemporary semiotics often refers to Charles Sanders Peirce. No single quotation could serve to make his ideas clear, but for the moment “likenesses” or icons can be considered as representations “whose relation to their objects is a mere community in some quality” (CP 1.558). Bouissac’s contribution serves to elaborate many of the issues that have been raised and to shed some light on the critique of iconicity. The critique of iconicity is also of great concern to Göran Sonesson’s (1989, 1994, 1995, 2010), who aims to prove that iconicity is not an empty notion, and that pictures cannot be understood as conventional signs. His work is

³ Of course, notions of generalization and abstraction in thought and perception have a long history (see for example Arnheim 1969).

referenced as background to Lenninger's investigation, which draws on it extensively. The same Festschrift for Thomas A. Sebeok, *Iconicity: Essays on the nature of culture* (Bouissac et al. 1986) that contains Bouissac's piece also provides Joseph Ransdell's (1986) 'On Peirce's conception of the iconic sign'. Sonesson and Lenninger reference Peircean semiotics and his notion of the iconic sign, but it is highly modified from the original logical form of Peirce's categories, and moulded so as to be combined with other theories into a framework apparently serviceable to pictorial semiotics. Ransdell thus provides a closer interpretation of Peirce that is kept in mind in the context of reading more divergent interpretations and applications.

Since I refer to pictures or drawings as signs and investigate the relation between such a sign and its object, a brief introduction of how this is viewed within a basic Peircean framework is required. The Peircean sign is triadic, consisting of a sign (also "representamen"), an object, and an interpretant in relation with each other. To address the problem of one of the components being labelled as "sign" and the relation as a whole also being a "sign", I specifically make reference to "sign relation" when the whole complex is intended. In contrast to questions of subjectivity and phenomenological concerns that enter into Sonesson and Lenninger's notions of the sign, Ransdell provides definitions of the theoretical conceptions that make up the sign relation that stress its objectivity. The interpretant is "the *objective content* of our understanding – i.e. of our interpretation – as such (as distinct from our understanding, or interpretation, considered as a 'subjective' or 'mental' occurrence or state)" (ibid.: 52–53, italics in original). The object is "*that about which* the sign has something to 'tell' us or reveal to us" (ibid.: 53, italics in original). The sign itself is "that which mediates – functions as a means and a medium – between that which it is capable of revealing something about" – the object – "and what it is capable of revealing about it" – the interpretant (ibid.). This account would seem to allow for a fairly simple sign relation in the case of figurative images: the picture is the sign, it represents something that is its object, and the objective content of what can be understood about that something with the help of the picture is the interpretant.

As an example of how concerns of a subjective or mental interpretation changes this, one could look at how Winfried Nöth (2009) envisions a Peircean picture-sign in 'Bildsemiotik' ('Pictorial semiotics'). Like Sonesson (2010), he invokes Peirce's division of the object into an immediate object and dynamic object, and he points to how the immediate object is closer to the sign relation, whereas the dynamic object is further, tending towards reality. The dynamic object is however not the 'real' thing; Nöth (2009: 242) states that we can only observe the effect (Wirkung) of the dynamic object, never the thing in itself, as it belongs to a reality to which we do not have complete empirical access. He invokes the object division in order to account for a "mental representation". A figurative picture thus first and foremost refers to an

immediate object that is a mental representation (ibid.). This mental representation was caused by the dynamic object and is required as previous knowledge for the sign to be able to refer to it (ibid.). The interpretant is also a mental representation. However, unlike the *pre-requisite* mental representation of the immediate object, the interpretant is a *resulting* mental representation: it is the effect of the seeing and interpretation process, the resulting impression on the mind and/or impact on the action of the viewer (ibid.). This use of “mental representation” can be kept in mind for similar notions in intellectual realism, succinctly explained by Alan Costall (2001) in the introduction to his translation of Luquet’s work.

Various complexities arise from a conception such as Nöth’s. Ransdell (1986: 53) states that “Peirce believed that, for theoretical purposes, it would be both possible and desirable to omit from the conception of the sign relation in its generic form any reference either to an interpreting agent or to an act of interpretation”. He does however add that this does not deny the potential pertinence of these issues for certain disciplines or applications, in which case additional conceptions of course need to be included (ibid.). The question of how to go about this remains open.

These issues are raised here because they are also fundamentally tied up with previously introduced questions of perception and cognition. The problems of including an interpreting agent or act of interpretation are compounded if one considers that cognition need not be conceived of as isolated from the social, as a title such as *Perspectives on socially shared cognition* (Resnick et al. 1991) might indicate. This is, again, not to say that these considerations should not or cannot be included, but simply to say that a single sign relation might become overcrowded by all of them. The appeal of Lenninger’s approach to the development of picture understanding is that it is fundamentally processual. Naturally, this makes sense in the context of studying development, but since she postulates dual processes, this means that even a single act of picture interpretation could be considered in terms of the state of both processes plus their interaction. Such an approach would seem to create some much needed room for considering sign relations and their interpretation. The challenge is to find balance within the space that has been opened up, and this is true of all the discussions that have been touched on here: taking into account perception and cognition, iconicity and convention, the individual and the social, without falling into a dualism debate. Various chapter authors as well as *Perspectives on socially shared cognition* (ibid.) as a whole thus offer valuable contextualization of Lenninger’s work and general debates touched on here. There is a strong parallel between these issues and the concern of those in social psychology in “the urge to define and use a unit that avoids reduction to either the individual mind or the social group” (Cole 1991: 413).

These concerns are also evident in existing works in semiotics that deal with children's drawings, notably in Gunter R. Kress's (1997) *Before writing: Rethinking the paths to literacy*. Although children's drawings are an important part of the book, as the title suggests, it is not narrowly focused on them; rather, it deals with many modes of representation and communication that children engage in before and during the process of learning to read and write. This is both a strength and a weakness for the purposes of this thesis. On the one hand, Kress introduces ideas that, broadly speaking, have some parallels with arguments to be made here. In many ways he illustrates that certain confined categories of an adult view of the world do not apply to children, for example in the case of a choice of modality:

Children act multimodally, both in the things they use, the objects they make; and in their engagement of their bodies: there is no separation of body and mind. The differing modes and materials which they employ offer differing potentials for the making of meaning; and therefore offer different affective, cognitive and conceptual possibilities. (ibid.: 92)

On the other hand, the good intuitions one finds are not supported by a robust theoretical framework. Kress finds a strong split between and subsequent uneven attention to either individual or social factors unsatisfactory, but his work does not go very far in addressing this. Instead, as the extract above also serves to illustrate, his emphasis on the child as a sign-maker driven by their "interest" and "motivation" skews his account quite thoroughly towards concerns of individual agency, despite his acute awareness of the social dimension. Thus, Kress offers food for thought that is useful in addition to other literature, but his contribution does not present a well-integrated approach on its own.

Another work within semiotics is Martin Krampen's (1991) *Children's drawings: Iconic coding of the environment*. This book identifies many themes also prevalent in the present work: it is positioned at the intersection between semiotics and psychology, with the aim of contributing to a paradigm of "developmental semiotics" (ibid.: 11–12); it deals explicitly with intellectual realism and visual realism; and it takes drawings as evidence of children's understanding. The understanding that Krampen wanted to measure was the extent to which children can distinguish between different types of buildings in their environment. A lack of distinction seems to indicate, to Krampen, a poorly designed environment. The merits of this supposed problem are not at issue here, so I only highlight some aspects of his methodology.

Krampen's main study involved children from two cultural groups between the ages of three and 12 years as well as handicapped children from the one cultural group. The children were asked to draw six different kinds of buildings. An elaborate scoring system established, amongst other things, how many drawings were recognizable, how well the drawings were differentiated from each other, and to what extent they approached a clear stereotype of the building type and/or included more visually realistic details. Krampen expected a develop-

ment from intellectual realism to visual realism and the rating of the drawings' features according to this framework does succeed. Since all drawings were free or spontaneous drawings, i.e. done in response to a verbal request and not upon presentation of an external stimulus, the assumption was that they are guided by internal models. Krampen's model of the sign process (ibid.: 5) shows how he could take evidence of these conceptions as evidence of environmental perceptions. He wanted to know how children understand their environment, so he studied drawings based on their hypothesized internal models to make some conclusions about their conceptions.

However, as the evaluation of the resulting drawings in terms of how much they approach some kind of visual realism and/or a clear stereotype of the building type indicates, the situation is far more complex. It would, for example, be hard to prove that children whose drawings approach a suitable stereotype have attained this because the buildings in their environment are adequately designed and not because they know a suitable way of making such a drawing from other pictures or inputs. The study thus uses as an evaluative mechanism something which very much complicates its central notion of "iconic coding of the environment". As is discussed later in this chapter, this is just one of the many reasons that taking children's drawings as a 'direct line' to their minds is dubious.

Additionally, Krampen's study depends on much statistical analysis, but the corpus of drawings collected in no way lends itself to this. The spread of participants is uneven across the age ranges and between groups. Sample sizes within some age-culture groups are too small, in contrast to much larger groups for other ages in the same cultural group or the same age in the other cultural group. In fairness, many of the studies introduced in Chapter 3 used sample sizes and analysis that serious statisticians would find unconvincing. I remain aware that certain suggestions based on these data can only be speculative for the time being, but I also hope that comparisons across studies offer support for the ideas that are put forward.

The work of both Kress and Krampen successfully introduces the importance of studying signs during development and it highlights how psychology and semiotics should inform one another in this respect. They also convincingly show the potential of examining children's drawings to this end. However, the challenges that they face and the limited utility that results from their efforts illustrate the large gap within semiotics regarding this interesting topic. There also remains a large gap within the study of children's drawings that could benefit from a semiotic framework.

As a brief illustration of this latter assertion, I offer three examples from recent literature. Aaro Toomela (2002) proposes that "drawing can be understood as a complex system of processes" in 'Drawing as a verbally mediated activity: A study of relationships between verbal,

motor, and visuospatial skills and drawing in children'. The title serves to indicate some of the proposed system's components. Toomela (ibid.: 246) finds that relationships between these components change developmentally. The more overarching ambitions of Toomela's approach can be contrasted with the specificity of Walker, Bremner, Merrick, Coates, Cooper, Lawley, Sageman, and Simm's (2006) 'Visual mental representations supporting object drawing: How naming a novel object with a novel count noun impacts on young children's object drawing'. Genealogically, this study ties in with the broad family of studies introduced in Chapter 3. Its eight authors, seven experiments, and 55 pages are an indication of the complexity with which single factors that appear to affect children's responses in a drawing task can be approached. In an opposite direction to both Toomela and Walker et al., Picard and Durand (2005) seem not to have moved much beyond the suggestions of Luquet and other early investigators. They ask 'Are young children's drawings canonically biased?', and ultimately propose that children's internal models may simply be more flexible than previously assumed.

Picard and Durand's study is included in Chapter 3, but the other two studies are only mentioned here. The three together serve as an illustration that studies of children's drawings appear to be in need of new, holistic approaches.

1.2. Theoretical approaches to children's drawings

Thomas and Silk (1990) outline four theoretical approaches to drawing as they have come about in roughly the last 130 years. First, developmental approaches emerged from about 1885, starting with the fairly general project of collecting spontaneous drawings made by children from different countries and then describing and cataloguing them. The idea that children have some kind of internal image from which they work to make a drawing is prevalent in the work of many early investigators. Since these terms come up often, it is worth noting that unless otherwise specified, I intend mental model, internal model, internal representation, etc. as the same phenomenon. Costall (2001: x) most poignantly points out what these notions are based on: "the idea that there exists a 'sensory core', a primary level of visual experience that is perspectival and depthless".

The early investigator Ricci (1887 in Cox 2005: 71), for example, suggested that children express their knowledge about objects and that they are not attempting to show actual appearances, and Kerschensteiner (1905 in Cox 2005: 71) claimed that features which children find to be central to their concept of the relevant class of objects are included in their drawings. Costall provides a succinct characterization of this viewpoint in the words of James Sully, Professor of Mind and Logic at University College London:

[...] the child's eye at a surprisingly early period loses its primal 'innocence,' grows 'sophisticated' in the sense that instead of seeing what is really presented[,] it sees, or pretends to see, what knowledge and logic tell it is there. In other words his sense-perceptions have for artistic purposes become corrupted by a too large admixture of intelligence. (Sully 1895: 396 in Costall 2001: x, Costall's emphases)

Costall (2001: xiii) finds that the modern literature's description of these early theories as 'stage theories' is misleading. Rather than develop into the ability to draw in perspective, this ability is "repressed or 'inhibited' by extraneous factors, most notably by the development of conceptual thought and its corrupting effect on the innocent, perspectival vision of the child" (ibid.). This point is well taken, but, as is often the case, it is neither the historical details nor the deeper theoretical underpinnings that are later recalled.

Drawings eventually came to be considered within the framework of strict developmental stages, most often associated with Jean Piaget. It may be that the influence of stage theories was so pervasive that it came to envelop investigations that had gone before. Indeed, as the next section explores further, readings of Georges-Henri Luquet, to whom the terms intellectual realism and visual realism are attributed, may also be more stage-like than he intended. The fact remains that developmental sequences in children's drawing development became regarded as evident (Thomas and Silk 1990).

Coupling the idea that children's drawings are based on their knowledge, and hence that a drawing is a sort of window onto a child's conception of something, and the idea that there are developmental stages in drawing lead to the development of drawing-based intelligence tests (ibid.). This kind of test is generally not regarded as a valid measure anymore and is rarely used. In a somewhat related vein, the second group of theoretical approaches that Thomas and Silk (ibid.) identify is clinical-projective approaches. In combination with psychoanalytic theory, the idea that a drawing can offer some access to what children think or feel lead to theories of how the emotional states projected into their drawings can be interpreted. Third, Thomas and Silk (ibid.) speak of artistic approaches in which educational concerns are also paramount. Added to previous approaches is the idea that children need to be encouraged to express themselves in art in order to promote cognitive development and personal growth. Clinical-projective approaches and artistic approaches are not of direct concern in this thesis, but it might be worth noting that Arnheim is generally associated with the educational and artistic branch.

What the foregoing theoretical approaches have in common, according to Thomas and Silk (ibid.: 31), is that they "largely consider only the surface structure of children's drawings', consequently neglecting the possible role of process. The process of constructing a drawing can lead to outcomes that are interpreted as, for example, what the child's conception of

something or their emotional state is like, when in fact they simply could not plan spatial arrangements sufficiently in advance and thus ‘squashed’ certain features of the object to fit in the available space on the page. Assuming a direct link between the mental image or emotional state and the resulting drawing without taking account of all the factors that can influence the ‘translation’ of the marks onto the page can thus result in misleading interpretations. Thomas and Silk (ibid.) see lack of consideration for performance factors as one of the reasons why Piaget underestimated children’s knowledge.

More recent experimental investigations of children’s drawings are far more cognizant of process in the making of a drawing. These studies ask specific questions and carefully design drawing tasks that could yield some answers. Children are commonly observed in the experimental situation and questioned about their drawings. The assumption that drawings can be interpreted as originating from, for example, perceptual experience and hypothesized representational structures of the mind still stands, but the importance of how such factors are translated through the drawing process into the drawing product is now also taken into account.

The studies to be described and reanalyzed later are good examples of this later development. Investigating intellectual realism and visual realism means that experimenters want to find out more about how cognition and perception operate in children’s drawings – and perhaps more generally. However, setting specific tasks and trying various experimental designs and conditions goes beyond thinking of strict developmental stages and static percepts or concepts, appreciating development, perception, cognition, and drawing as dynamic processes.

1.3. An outline of the general stages of children’s drawing development

Drawing may be studied differently from in the past, but the notions of intellectual realism and visual realism that emerged in the earlier years of developmental approaches have endured to this day. These two stages were part of four stages proposed by Luquet (2001[1927]) in his classification. However, as conceptions they had been around for some decades before Luquet named them (Costall 2001: xiii). Part of the importance of Luquet’s work was its subsequent influence on how Piaget developed his theories (Cox 2005; Thomas and Silk 1990). Retroactively, this influence appears to have become mutual. Cox (2005: 87) laments that Piaget’s stage theory, which involves discrete, progressively ordered, and invariant stages, probably changed interpretations of Luquet, imposing a similar rigid understanding on his work, even though his proposal was not as strict. Indeed, as Costall points out (2001: xvi), Luquet considered both intellectual realism and visual realism as legitimate and valid options. He did not regard visual realism as the ultimate competency to be attained, or ‘regained’, if

one recalls that some theorists thought knowledge represses or corrupts visual realism. With neither intellectual realism nor visual realism seen as the ultimate goal by Luquet, his theory can hardly be regarded as stage-like in itself. It may also be that combination of Piaget's stage-theory as well as the understanding of intellectual realism and visual realism as sequential that predated Luquet's work both determined how the concepts were taken up.

Trying to return to exactly what Luquet may or may not have intended would probably be a fruitless exercise for two reasons. First, because the theory was by no means perfect or resolved as it was (Costall 2001). And second, because despite being inspired by a twisted interpretation of an unresolved theory, the data yielded by experimental studies is interesting, puzzling, and worth considering. The perceived rigidity or strictness of Luquet's stages was probably part of the reason for the multiple studies that followed on Freeman and Janikoun's (1972) experiment. Since the differences between what Luquet's theory may have been intended as and where it ended up have now been raised, it is worth briefly considering how it is often characterized. This also serves as a preview of the perspective from which many studies described in the third chapter were conducted.

Researchers investigating the way children learn to represent information in drawings have hypothesized that there are at least two discrete stages in drawing development (Freeman & Janikoun, 1972; Luquet, 1927; Piaget & Inhelder, 1956). One stage, intellectual realism, covers the period from approximately 4 to 8 years of age. Children in this stage do not use immediate perceptual information when they draw but instead rely on a conceptual model of the subject matter to guide their work. Their drawings record properties and defining features of the subject matter rather than show the actual appearance of a model. A second stage, visual realism, begins at approximately 8 years of age. Children in this stage visually inspect a model and carefully records its actual appearance. The drawings produced by these children represent the model as it appears in their visual field. (Taylor and Bacharach 1982: 311–312)

Since stage theory is far from uncontentious, it probably seemed worthwhile to reexamine how two researchers had to conclude in favour of a progression from intellectual realism to visual realism. As will be discussed in Chapter 3, those studies showed that evidence which would indicate a progression is malleable through the design of the experiment. However, I would concur with Cox (2005: 87, 98) in concluding that even though there is no abrupt transition between the two and the two modes can be seen to coexist it does not mean that younger children are as expert as older children at producing drawings in either mode.

So indeed, the general problem with classifying a phenomenon into stages is that "it tends to obscure the continuities in development" (Thomas and Silk 1990: 40) and, as both Thomas and Silk (*ibid.*) and Arnheim (1954: 143) note, the relationship between a child's age and particular stages is not fixed. The authors of both sources also point out that new skills or strate-

gies do not replace those that went before – these can be returned to or combined with new possibilities. But none of these considerations unequivocally deny age-related change and I have not found an investigator of children’s drawings who does not regard the changes in children’s drawings as increasingly complex depictions that broadly relate to some kind of development in the child.

With all of the above qualifications to stages in drawing development in mind, I now present a brief account of Thomas and Silk’s (1990) description of a broad, approximate, and general model of how children’s drawings change as they grow older, with some notes from Cox (2005) or others where relevant. The basic idea is that children’s drawings become more detailed, better proportioned, and more realistic (Thomas and Silk 1990: 34). Of course the “more realistic” criterion requires unpacking, but this follows in Section 1.4. For now, some understanding of these stages should serve to guide the reader who might be only somewhat familiar with children’s drawings. It also introduces all four of Luquet’s stages before shifting the focus to intellectual realism and visual realism.

Eighteen months to two-and-a-half years

Thomas and Silk (*ibid.*) put the start of children’s mark-making on paper at about 18 months, but Cox (2005: 48) talks about early mark-making on paper or with other media from 12 months. Although children are not instructed on how to make marks at this age, they will already be learning *where* or *on what* it is appropriate to make marks (*ibid.*: 48–49). Many early scribbles do not seem to be motivated by representational intentions, but they do “demonstrate awareness of pattern and increasing eye-hand co-ordination” (Thomas and Silk 1990: 34–35). In contrast to some earlier ideas that children’s rhythmic arm movements around or across the page might be only for the enjoyment of the motor activity, some studies found that children quickly lose interest if their mark-making implement does not work (Gibson & Yonas in Cox 2005: 49–50), suggesting that the visual feedback of their activity interests them (Eng 1954 in Cox 2005: 50).

The first of Luquet’s stages, ‘fortuitous realism’, describes when children start to attribute meaning to their scribbles, usually after they have been completed (Thomas and Silk 1990: 37). Luquet postulated this stage as a stepping stone to making recognizable drawings: a child might make a drawing that they find to have a likeness with some object quite accidentally and then set out to achieve such a likeness intentionally (Cox 2005: 53–55). Cox (*ibid.*: 54) confirms that a child might first draw a scribble or shape, recognize a potential likeness, and then add some details to complete the drawing as a drawing of something. She is however sceptical of the necessity of this stage for a movement towards drawing in a more representational way; instead, she believes that children realize their marks could be put together to re-

semble an object, they just have to work out how to do this (ibid.: 55). Already in this age range one may thus observe somewhat diverse phenomena: scribbling for the sake of making marks on paper, scribbles that can be attributed a meaning if the child so chooses or someone asks, scribbles that can be consciously modified into a likeness, and perhaps the beginning of attempts at representations of objects.

The scribbles initially simply stand for the child's movement that caused them, but gradually the possibility that they could stand for something else starts to emerge. Children are also no doubt increasingly aware of this possibility: they probably encounter and become aware of more and more other pictures of various kinds, they might ask adults or other older individuals to draw something for them which they find recognizable, and of course they might be asked about their drawings – most likely, “What's that?”

Two-and-a-half years to five years

Children start to see their drawings as representations of something and may sometimes declare their intentions beforehand (Thomas and Silk 1990: 36). Intentions may however be altered depending on how the process goes or how the drawing turns out, what Thomas and Silk (ibid.) describe as an “element of opportunism”, like one finds with fortuitous realism. Luquet (2001[1927]: 27) offers an example: “In a drawing of a house, a detail originally meant to be a gutter with a drainage pipe became interpreted, through analogy of shape, as an umbrella instead”. In my experience, children may also interpret their drawings differently from one day to the next. Of course the drawing itself is probably not so detailed or specific that it speaks against an alternative interpretation; the only inconsistency is the fact that the child previously provided a different label. This problem becomes less apparent as earlier attempts that largely depended on the child ascribing a meaning to their drawing give way to drawings that are more spontaneously recognizable by others (Thomas and Silk 1990: 36). In what Luquet called ‘failed realism’ it could happen that children draw the parts of something without integrating them into a whole. Freeman (1980 in ibid.: 37) chose to term this “synthetic incapability” in the belief that the unintegrated parts do not signal a false relationship but the absence of relationship. Freeman's term is close to Piaget and Inhelder's (1967[1948] in Krampen 1991: 39) “synthetic incapacity”, but this term denotes a broader stage in their three-stage account of drawing development.

From about three-and-a-half years and beyond children bring the details that may have been somewhat disjointed before into a relationship (Thomas and Silk 1990: 37). Simple formulas or schemata emerge (Lowenfeld 1947 in ibid.), making it appear as if children draw according to a plan. Many researchers (Cox 2005: 80; Thomas and Silk 1990: 38) have noted that children may use a schema for representing something in their life even when the sche-

ma has no bearing on its actual appearance, e.g. a child draws their home with a pitched roof and a chimney, two windows, and a door when they actually live in an apartment building. The use of such schemata thus seem to have a partially arbitrary nature. But only partially, because, on the one hand, signifying places where people live with a drawing of a house is not entirely arbitrary and neither is the drawing itself a completely arbitrary representation of a house. On the other hand, using a very similar house drawing for all manner of buildings and living places no matter their actual appearance is somewhat arbitrary. Barrett and Light (1976 in Taylor and Bacharach 1982: 313) referred to this as “symbolic realism”: the child draws what they know about the general concept they want to portray. Since Luquet’s intellectual realism is up next, it can be noted here that Barret and Light’s proposal is a sort of subdivision of intellectual realism. In studies where children are presented with a model that they are asked to look at so as to make a drawing of it, Barret and Light theorize that the child could a) associate the model with its general concept or class and make a drawing using this knowledge, or b) use their knowledge of the model in front of them to make the drawing. In the case of drawing a cup with its handle turned out of sight, either ‘knowledge based’ approach could hypothetically yield a similar result.

Five years to eight years

Children draw increasingly “visually realistic” in terms of scaling and detail, but they also draw elements that cannot normally be seen or mix multiple viewpoints (Thomas and Silk 1990: 38). This corresponds to Luquet’s ‘intellectual realism’. A child might, for example, draw the food that a gorilla has eaten within the contour of his stomach (Arnheim 1974: 200). This approach is often termed a ‘transparency’ drawing. This term is also applied to the rather distinct case of occlusion: a side view of someone astride a horse might show both of the rider’s legs (Thomas and Silk 1990: 38). On the topic of occlusion it should be noted that younger children prefer depictions that show all the objects in a particular configuration regardless of what is visible from their viewpoint, both in terms of choosing from existing pictures (3 to 5-year-olds studied by Liben and Belknap 1981 in Light and Nix 1983: 481) and drawing their own (Light and Simmons 1983). As far as mixing viewpoints goes, a child might, for example, draw a fish pond as if one were viewing it from above and could see into the water where the fish are, the fish might be in a typical orientation viewed from the side, and the trees might radiate out around the border of the pond in a view that is generally not possible at all. What I just termed a ‘typical orientation’ is commonly referred to as the ‘canonical orientation’ of an object. Cox (2005: 73 after Gibson 1979 and Freeman 1980) defines it as “the object’s typical view and that which best displays its important structural features or invariant features”. Examples abound in children’s drawings but also in everyday life: one could

consider, for example, how different kinds of vehicles are depicted on road signs or other comparable informational documents like a driver's license. For the purposes of easy identification and comparison, it makes more sense to show the vehicles from the side.

As it is central to the thesis, more discussion of intellectual realism and visual realism follow in Section 1.4.

Eight years to adolescence

The progression towards Luquet's 'visual realism' involves attempts to portray depth in individual objects and further improvements in the relations between objects (Thomas and Silk 1990: 38). Children begin to draw from a particular viewpoint and work out proportions and relationships accordingly (ibid.). This stage is considered as approaching the visual realism of conventional Western standards (ibid.). Of course the way that most artists who are able to achieve highly realistic renderings of an object or scene achieve something of the 'standard' is usually through extended training and practice in observational drawing with models. For the purposes of a particular work an artist may also have a model present, use existing drawings, find photographic reference, or some combination of these. As is discussed in the next section, the possibility that there are also two somewhat different versions of visual realism – based on whether or not a model is actually present – becomes apparent.

Older children are also described as often turning to the resource of existing drawings, such as cartoons or comics, which they draw from (ibid.: 39). There are of course a variety of reasons for this to be an appealing activity, but I suspect it offers a form of basic drawing instruction, solutions to drawing problems that may be hard to invent purely from observation of the world and a lot of practice. Thomas and Silk also note (ibid.) a gradual increase in the conventionality of style, something which I posit may relate to imitating one's peer group and/or other resources like comics. It is also around this time when some children more vigorously pursue the activity of drawing, be it through self-directed practice or education in addition to what is offered in the regular curriculum, while other children partly or wholly give up the activity. This cessation is sometimes attributed to an apparent dissatisfaction with one's drawings (ibid.).

1.4. Intellectual realism and visual realism as notions and stages in the development of children's drawings

Attempting broad descriptions of stages in children's drawing development already pointed to the fact that intellectual realism and visual realism might not be very exact terms. This section goes into more detail regarding the issue of both of these conceptions appearing to have two versions. It also provides some more specifics on Luquet's notion of the mental model in

intellectual realism, which leads to the problem of how this internal information is translated onto the page. This question leads into Section 1.5 and Rudolf Arnheim's explanation of how mark-making and meaning-making develop in parallel.

What both broader and narrower conceptions of intellectual realism and visual realism have in common is the general idea that the former is more typical of younger children and the latter is more typical of older children. It would however seem as if talking about this development in general versus investigating it in an experiment where children are asked to draw from a model are somewhat different.

Thomas and Silk describe an increase in visual realism "in terms of scaling and detail" (ibid.: 38). 'Detail' is a somewhat precarious term involved in descriptions of progression towards visual realism. It can be taken in two ways. First, one could consider the increase in details. If I draw a hand, I could consider it part of the one simple line I have drawn for the arm. I could add lines for fingers. Later I could change this for an outlined hand that allows for the addition of lines that denote finger nails and knuckles. This hand could, however, still look quite flat. In that case I could make it more detailed in terms of texture and light effects. Assuming I have a line drawing with the basic well-proportioned outline of a hand's structure, I could proceed to include lines to show the texture of the skin. I could also use a line hatching technique or smudge my pencil to include shadows, showing both the lighting conditions and allowing for a more three-dimensional rendering of the hand.

Naturally, making something detailed does require including its details in the first place. The two are not entirely separate. The point is simply that one can include an immense amount of details without necessarily getting closer any standard of visual realism. The illustration below is by a professional adult illustrator who, like many illustrators, uses the 'child-like' conventions of intellectual realism. She mixes viewpoints to show as much as possible of the activity at the marketplace. She also adds many details: the textiles have patterns, the woodgrain of tables is visible, and we can identify a wide variety of hairstyles and accessories. Despite all these details, the viewer is not called to assume any kind of strong relation with visually realistic conventions such as linear perspective. However, paradoxically, this level of skill in a child's drawing might be favourably evaluated as a progression towards visual realism. The question becomes how a child's drawing process was considered to operate.



Figure 1.1 Xanele Puren: 'Marketplace' (2014, pen and digital illustration)

Luquet (2001[1927]: 47) postulates that the presence of a model would cue use of a child's internal model to make a drawing. Actually, he contends that the object being drawn must necessarily pass through the mind in "the form of a visual image" before it can be translated onto paper. So even in the presence of a model, the mind refracts the object in "a creative, though spontaneous, reconstruction arising from an extremely complex process of elaboration" (ibid.).

The question arises as to what extent this "creative refraction" involves the model itself and to what extent it involves some kind of stereotype. Cox (2005: 80) states that for Luquet, "the internal model tends to be *generic*, in the sense that it highlights the important features of a stereotypical member of its class". This relates to the aforementioned example of how a child might use some kind of schema of a house to draw someone's home, regardless of what kind of building they actually live in. It also reintroduces Barret and Light's (1976 in Taylor and Bacharach 1982) distinction between drawing from a more general internal model (their 'symbolic realism') or drawing from the present model but including more information than can be seen from one viewpoint (their 'intellectual realism').

Luquet (2001[1927]: 53) approaches this problem by considering what drawings depict on a scale between “individual subjects or motifs” and “generic motifs”. This would be the difference between, for example, ‘my daddy’ on the one hand and ‘a man’ on the other. An internal model for a generic motif can be built up from the influence of a variety of external circumstances (ibid.: 54): a child might include details gleaned from various different houses and pictures of houses in her drawings. How exactly this differs from a model for individual subjects or motifs is however not clarified. Instead, Luquet (ibid.: 53ff) continues by elaborating on how children distinguish between essential and incidental details and impose a hierarchy on them. Children thus select the details of something that they find important and include this in their drawings. As Cox (2005: 76) points out, however, saying that “something is important because it is included and it is included because it is important” is in danger of becoming circular reasoning. Furthermore, one is left with the fact that Luquet believed children attempt “to produce faithfully detailed representations of objects ‘in themselves’” (Costall 2001: xiv), the concept of ‘intellectual realism’ being defined as much by ‘intellectual’ as by ‘realism’ (ibid.: xxi), but this is somewhat in contrast to the contention that children are being selective of details, which means that they draw less than what they know.

Indeed it seems quite commonsensical that there is more to children’s understanding than what is in evidence in their drawings. Various experiments cited in Cox (2005) indicate this quite clearly: children who draw ‘tadpole’ figures, for example, can use picture body parts to build a human figure that has a torso, even if they do not draw it this way themselves. How children draw something thus seems to be decisively related to their graphic abilities. Luquet is not unaware of this. His concern for this problem seems to be considered under the term ‘graphic ambiguity’ (Luquet 2001[1927]). This would seem to refer to the possibility that shapes or lines drawn with a particular intention may end up resembling something else. His explanation of how the child’s intention, mental model, and graphic skills work together is, however, rather unclear.

This section has uncovered the problem of how specific or general the object to which a drawing refers is. Intellectual realism and visual realism can be viewed as general stages, development proceeding from the former to the later, and they can be viewed as equally valid options for depicting something, as Luquet would have it. Either way, testing for which ‘stage’ a child is in, or which ‘strategy’ or ‘mode’ a child chooses, is probably most sensibly conducted with a model present. But, provided that either drawing development or available strategies would seem to at least in part depend on a child’s mark-making ability, this needs to be investigated next.

1.5. Rudolf Arnheim's law of differentiation

One of the major appeals of Arnheim's work is how widely his understanding of children's drawings seems to be applicable and functional. This is not to say that he manages to take account of all the relevant dimensions, but as far as an insight into the underlying logic of seemingly puzzling aspects of how children represent things go, his contribution is unparalleled. In fact, some of the 'discoveries' made on the back of Freeman and Janikoun's (1972) initial draw-a-cup experiment could easily have been found in Arnheim's (1954) first edition of *Art and visual perception*.

It should be noted that Arnheim (1974: 164) is quite opposed to what he brands "the intellectualistic theory". Drawing from knowledge rather than seeing is a false dichotomy, because this 'knowledge' could only have been gained from visual experience in the first place. It thus is knowledge of a sort, but not "a knowledge that [can] be taken to be an alternative to seeing" (ibid.: 165). This "artificial distinction between perception and conception" (ibid.: 167) relates to the deeper assumption, so well articulated by Costall (2001), that 'pure' visual experience is somehow interfered with by knowledge. Arnheim (1974: 167) sheds light on another part of the problem, which is that perception was conceived of as dealing in particulars, thus relegating a drawing of some general conception of a person or dog to a domain that has a non-perceptual source, i.e. some kind of abstract thought. Instead, he finds that there is evidence that perception starts not from particulars that

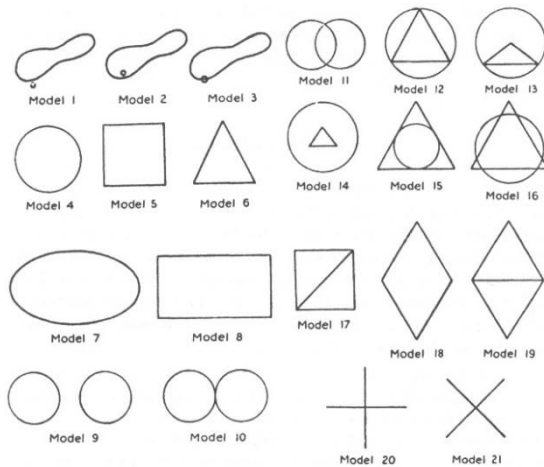


Figure 1.2 Geometric shapes used in a copying experiment by Piaget and Inhelder (1948 in Krampen 1991: 37)

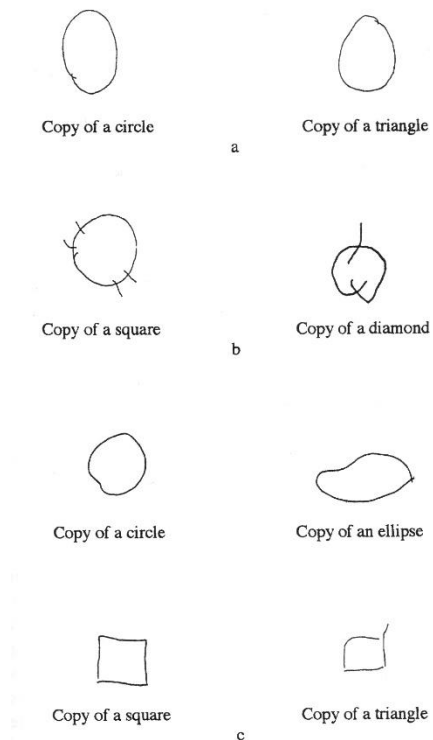


Figure 1.3 Results from a shape copying task: (a) at first, a round shape depicts closed forms in general; (b) later, shape modifiers differentiate the round shape; (c) finally, more shapes are drawn successfully, but now the angularity of the square also stands in for the triangle. (Cox 2005: 79)

are then “processed into abstractions by the intellect”; rather, it starts from generalities. In Piaget and Inhelder (in *ibid.*: 175), for example, one finds that early shapes are topological rather than geometrical: “they aim at such general, nonmetric properties as roundness, closedness, straightness, not at specific, ideal embodiments” (Arnheim 1974: 175).

Arnheim (*ibid.*: 206–207) is not under the illusion that a young child is only occupied with perceptual and intellectual growth and that “the mind is merely a kind of processing mechanism tackling the shapes of the outer world at a continuously complex level”. He is concerned that the “total human being” (*ibid.*: 207) be taken into account. That being said, he seems to be stressing the multi-facetedness of an individual rather than referring to a person as a social agent *per se*. So the part of his work highlighted here does have a strong perceptual-cognitive focus that is brought into a socio-communicative framework in the next chapter.

The focus and aim of Arnheim’s book is summarized by him as follows:

It discusses visual organization and invention as deriving from the cognitive functions of the mind: the sensory perception of the outer world, the elaboration of experience in visual and intellectual thinking, the conservation of experience and thought in memory. From this standpoint, pictorial work is a tool for the task of identifying, understanding, and defining things, for investigating relations, and creating order of increasing complexity. (*ibid.*: 206)

This also gives a broad idea of what his ‘law of differentiation’ is about. In its most elementary form, it is a principle that is congruent with other descriptions of development in biology and psychology. In biology, one finds the idea that unitary organization splits up into more specific functions, the indefinite becomes definite, confusion becomes ordered (Spencer 1862 after von Baer 1828 in *ibid.*: 179). Piaget (in Arnheim 1974: 179) also postulated that the self and the external world are originally undifferentiated, only becoming separate at a certain stage of mental development.

In the German art theorist Gustaf Britsch’s (1926 in Arnheim 1974: 171) work Arnheim finds an analogous description of the development of pictorial form. It “grows organically”, in a process of gradual differentiation, from the simplest to more complex patterns (*ibid.*). Again, if this development is acknowledged as a process in its own right, one avoids having to explain what has gone awry in perception that yields such odd forms which seem to have nothing to do with the perceived world. Arnheim (1974: 177) posits that a shape emerges first and then it establishes contact with similar shapes of objects perceived in the environment. Importantly, this “initial similarity rests on a broad, unspecific basis” (*ibid.*). In the Piaget and Inhelder example above one can see that the first closed shape that emerges is a round shape. This oval or round shape stands for any closed form in its general closedness and shapeness.

The movement from simplicity to complexity does however appear to have a counterforce that wants to retain simplicity. As has been noted (e.g. in Cox 2005), some children hang on to a particular schema for quite some time and trying to ‘push’ them beyond it has very limited success, as, for example, in trying to get tadpole drawers to draw a torso. Arnheim (1974: 181) does not exactly account for this phenomenon, but he builds it into his theory by appealing to the Gestalt principle of simplicity. Combining the principle of differentiation and the principle of simplicity yields the law of differentiation, which states the following:

- a) [...] any shape will remain as undifferentiated as the draftsman’s conception of his goal object permits
- b) [...] until a visual features becomes differentiated, the total range of its possibilities will be represented by the structurally simplest among them (ibid.)

This can be put together with the connection that Arnheim (ibid.) makes with E. H. Gombrich when he states that “the meaning of a particular visual feature depends on the alternatives considered by the draftsman”.

Now, if one considers that more and more shapes or visual features become available, bringing with them the possibility of more specific meanings, it stands to reason that reorganization of how visual features were used previously will be necessary from time to time. If a child wants to start adding more details to the head or body of a figure, this might become quite challenging if the two are still unified in the tadpole figure, so a reconfiguration seems necessary. In a broader sense, Arnheim (ibid.: 194) states that such development should probably be viewed as “an ongoing process in which subdivision and fusion alternate dialectically”.

Crucially, as long as a feature is not yet differentiated it should be read not as limited in meaning, but broader in meaning. Studies on tadpole drawers question why the children do not draw a torso and the intellectual realism answer would be “because it’s not important”. Indeed, Luquet (2001[1927]: 61) thinks this omission must be because children are ignorant of anatomy and the important functions of the vital organs. But if we take Arnheim’s theory into account, tadpole drawers strictly speaking *do* draw the torso, it is just that the torso and the head are not yet



Figure 1.4 A gorilla who has eaten his dinner (Arnheim 1974: 200)

differentiated. The round shape denotes the body-head configuration in general, together. This is also true of spatial relationships and is really where Arnheim reveals the logic. “As long as the two-dimensional view is not differentiated from the projective view, the flat pictorial plane serves to represent them both” (Arnheim 1974: 202). The stomach contents of a gorilla who has eaten his dinner is thus not visible because the gorilla is transparent, but because, within two-dimensional logic, the lines that delimit the gorilla’s shape are his outside border and he has no three-dimensional ‘surface’.

Now, consider the picture of a horse drawn by Heidi (Figure 1.5) at the age of four years and three months, Luquet’s (2001[1927]: 53) somewhat unexplored poles of “individual subjects or motifs” and “generic motifs”, and all that Arnheim elucidated regarding the logic of children’s drawings. If these factors are considered under a basic sign-object-interpretant relation, one could see the drawing as the sign, a horse as the object, and what we come to know about the horse through the drawing as the interpretant. The horse can however only be placed in the object position because we know that Heidi lived on a ranch and because she probably labelled the drawing verbally. What we actually come to know about this object through the drawing is that it has a head with a face, a body, and many legs. Assuming that we know a little about children’s drawings and are sympathetic to them, we could probably conclude that this is a non-human animate being, likely an animal. Besides the fact that a similar head and face might be used for a human or any other animate being, i.e. that this is undifferentiated in terms of the variety of heads and faces in the world, the legs of the horse are also a great example of non-differentiation. Heidi would appear to op-

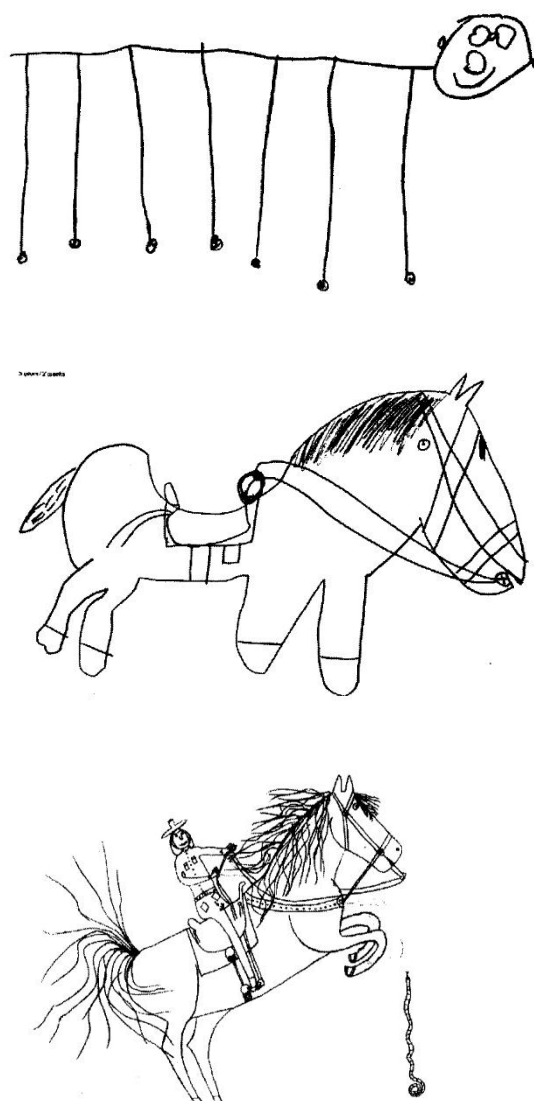


Figure 1.5 Heidi's horses from top to bottom: age four years and three months; between ages four and six; and age eight years and seven months (Fein 1984 in Golomb 2003: 86)

erate on a very general principle of one, two, and many, or – perhaps – as many legs as a human has and *more* legs than a human has.

Heidi's drawing thus may have been inspired by a horse, but the object within the sign-object-interpretant relation is in actual fact much more general. The next day she could have made exactly the same drawing and it might have been meant to represent a cow or a dog. The open nature of this relationship should also be kept in mind even when drawings have a narrower range of possible objects. Heidi's second horse drawing shows the correct number of legs of a horse, but she does not use occlusion to show which legs are on the viewer's 'side' and which legs are on the other side. But in Arnheim's sense, this is actually not one side view of a horse – it's both. The conception of space and spatial relationships as it is rendered in the picture is broader or more general than any single viewpoint.

Arnheim thus offers much assistance in interpreting children's drawings. Claire Golomb (2003) finds his work useful in justifying how she observes a general character of all child art despite obvious cultural differences. Universal claims are challenging, because there is no overt evidence to support it, besides perhaps in terms of scribbling (Matthews 1994 in Cox 2005: 228) and to some extent in the case of tadpole figures (Cox & Bayraktar 1989 in *ibid.*). Examples of all the various ways one might approach drawing a particular object or figure abound in cross-cultural studies such as G. W. Paget's (1932) classic collection in 'Some drawings of men and women made by children of certain non-European races'. In viewing such examples, one is indeed struck by the fact that despite their diversity, they do seem to be "reasonable solutions to the problem and are not merely arbitrary or random attempts" (Cox 2005: 230 after Golomb 1992). It may be that Arnheim's appeal to the Gestalt principle of simplicity is not necessary if one takes into account the social context in which the comprehension, production, and use of pictures and drawings is situated. The principle of differentiation explains development from simple to complex forms quite sufficiently, but which options within the various possibilities 'stick' may have nothing to do with a counterforce of simplicity as such, and more to do with the function of somewhat fixed forms within the context of socially shared meanings.

1.6. Summary and conclusions

Children's drawings change as they grow older and this change is generally regarded as a development. Describing this change and accounting for it has been dominated by the notions of intellectual realism and visual realism. These notions can be taken either as different options that a child might choose, both equally valid ways of making a representational drawing, or as sequential stages, where intellectual realism is usually an inferior stepping stone to the ultimate goal of visual realism. Both notions are somewhat problematic depending on the

context within which they might be evaluated. Specifically an experimental setup in which children are asked to draw a model object presents different conditions from drawing in general. A drawing done without a model necessarily draws on some kind of internal resource, regardless of whether the final product would be judged as closer to intellectual realism or visual realism.

The idea of a 'mental model' as an internal representation of sorts that can guide the making of a drawing is central to Luquet's (2001[1927]) account of intellectual realism, but how exactly the relevant contents of the model are translated into marks on a page is not entirely clear. If children can have a seemingly rich understanding of something in their minds and if they intend to produce a faithful likeness, why do some drawings seem sparse on details? Taking a drawing as very direct evidence of a child's mental and perceptual activity seems beset with problems.

Arnheim (1974) takes a much broader view. The simplicity of the forms that a young child uses does not directly reflect some internal image, but they are appropriate to the level of organization at which her mind operates (*ibid.*: 170). His law of differentiation makes it possible to postulate a kind of parallel development between the degree of specificity of forms and the degree of specificity of meaning. It would appear that younger children produce drawings that deal in generalities: the general and undifferentiated nature of the forms available to them show general and undifferentiated objects.

Two questions stand out at the end of Chapter 1. First, how does one account for the apparent use of schemata in the supposed stage of intellectual realism. Or, differently put, why do children seem to depend on certain fixed solutions for quite some time. Second, given that there is data that supports a shift towards visual realism in the general sense as well as a solution under experimental conditions, what factors influence or determine this process.

2. SEMIOTIC ANALYSIS OF THE PICTURE SIGN AND PICTURE UNDERSTANDING IN CHILDREN

2.1. Introduction

Sara Lenninger's (2012) PhD thesis, *When similarity qualifies as a sign: A study in picture understanding and semiotic development in young children*, presents a notable contribution to the study of children and pictures within a semiotic framework. Her development of the concepts of iconization and conventionalization aims to address how pictures relate to and figure in our experience of the wider physical world as well as how we make sense of the social world. She postulates that these "worlds of meaning construction" are separate for the youngest children, converging over time in the act of communication, the convergence becoming conventionalized as communication becomes more adult (ibid.: 176). These "worlds" seem to correspond to Lenninger's (ibid.: 177) conception of the dual nature of pictures – an iconic–communicative dual nature. A young child might find meaning in a picture by being able to identify what is depicted, but Lenninger (ibid.) sees true picture understanding as going beyond this iconic level to include comprehension of the picture's communicative role.

This is a slightly different take in comparison to other descriptions of the dual nature of pictures. For example, Gregory (1970: 32 in Cox 2005: 17) noted that pictures "are seen both as themselves and as some other thing, and Gibson (1979: 282 in Cox 2005: 17) stated that "a picture is both a surface in its own right and a display of information about something else". Beyond recognizing similarities between the picture and the object but not being confused about the fact that they are different things, Lenninger wants to emphasize that this similar-yet-separate relation is put to specific use in communication. The fact that a picture is both like and unlike its referent is only significant when we understand how this feature is put to use.

The opposition between visual meaning, as derived from ordinary perception of the world and as it carries over into picture perception, and sign meaning, as part of interpersonal communication, is developed in terms of the processes of iconization and conventionalization (Lenninger 2012). As Lenninger sees it, these processes must be balanced for pictures to function as picture signs. Before explicating these processes further, I focus on how they were derived. After investigating the background of the processes and the processes themselves, I consider their integration with Arnheim's contribution. Finally, informed by Lenninger and Arnheim, I put forward a semiotic model for analyzing children's drawings.

2.2. Sonesson and the picture sign

Lenninger (ibid.) follows Göran Sonesson (1989, 1994, 1995, 2010) in establishing the basis for some of her theory and concepts. It appears that her dual processes are partly inspired by conceptions of Sonesson's primary and secondary iconic signs. Sonesson's division is supposedly complementary to Charles Sanders Peirce's division of the iconic sign (Lenninger 2012: 87). According to Lenninger (ibid.: 106), Peirce's division of the iconic sign into image, diagram, and metaphor makes up Sonesson's primary iconic sign. She finds that none of these subdivisions satisfactorily describe how perceptual meaning comes to function in the sign use of pictures (ibid.: 91, 106) and thus concludes that the introduction of another level, the aforementioned secondary iconic sign, is justified⁴.

Retracing Lenninger's understanding and what Sonesson may have intended with this division has proved challenging. First of all, he appears to state the reverse of what Lenninger claimed when he defines "secondary iconicity" as "a relation between an expression and content of the kind described by Peirce", whereas a picture is taken as a "primary iconicity" (Sonesson 1995: 81). The apparent need for this supplement comes from the belief that iconicity cannot motivate a sign; rather, a sign that has already been recognized as such can be discovered to be iconic (ibid.: 79). Iconicity thus does not define the sign but characterizes iconic signs (ibid.); or, perhaps differently put, a certain likeness does not bring a sign into existence, a sign must first be identified as such and then it can be found to be characterized by likeness to something. Being less concerned with logic and more concerned with perceptual similarities, Sonesson (ibid.: 74) is "interested not in discovering 'what Peirce really said', but rather in making use of his concepts to the extent that they fit in with what has since then been established by semiotic reasoning and psychological findings". This means taking the idea of iconicity as some kind of similarity relation, but leaving most of its containing logical system behind.

Iconicity must then be tailored to fit Sonesson's sign conception, which is largely based on that of Edmund Husserl, placed within Ferdinand de Saussure's sign division, and supplemented with Piaget's "criterion of differentiation" that separates signifier and signified (Sonesson 2010: 160). The components of Saussure's dyadic model, signifier and signified, are renamed expression and content, after Hjelmslev and Greimas. Expression and content are differentiated by Piaget's criterion in that an interpreter separates them a) in time or space and b) by categories of meaning, i.e. an interpreter perceives that they are of different

⁴ "[...] I find Sonesson's distinction of primary and secondary iconic signs most useful. Of the two, it is, generally speaking, the primary iconic relation that is specified in Peirce's division, while secondary relations cover what is left over. The primary iconic ground is structured by meaning organization in ordinary perception and lifeworld experiences. Primary and secondary iconic relations work together to regulate similarities." (Lenninger 2012: 106)

natures (Lenninger 2012: 16). Within the Piagetian differentiation, Husserl's appresentation comes into play: the expression is directly accessible or perceived, although it is *not* the focus of the relation or "thematic", while the content is indirectly accessible or perceived but *is* taken as the focus of the relation (Sonesson 2010). This is the "double differentiation" of an expression from its content or the "double asymmetry" of the sign to which Sonesson (*ibid.*) subscribes. For him, this definition serves to separate sign meaning proper from other meaning (*ibid.*: 180), such as mere perceptual meaning. This is also a crucial underpinning for Lenninger's theory.

Sonesson (1989) both uses binary oppositions and finds them limiting, but a clear macro-level opposition in his definition of sign is the distinction between signs and nonsigns. Winfried Nöth (2009: 247) sees the dualistic tendency as contrary to Peirce's postulation of categories and processes that not only avoid dualisms, but also work in gradations – Stjernfelt (in Lenninger 2012: 51, 80) makes a similar observation. But, as has already been noted, it is probably safe to say that Sonesson does not intend to take the "systemic considerations" of Peirce's ideas, which Ransdell (1986: 51) believes are "an essential aspect of [their] substance", into his own theoretical considerations. Sonesson is rather more concerned with being able to discuss similarity in iconic signs without falling into the apparent traps of regression and symmetry. He refers to the "symmetry argument" made by Thomas A. Sebeok (1976: 128 in Sonesson 1995: 79), who indicates that iconicity cannot motivate a sign, because similarity is characterized as symmetrical and reflexive, whereas the sign is not. Sonesson (1995: 79) counters this by arguing that it is a false understanding of similarity. He believes the problem lies in conflating "the common-sense notion of similarity" with that of the equivalence relation in logic (*ibid.*). His conception of similarity, by contrast, is asymmetrical and nonreflexive: something can only be similar to something else – not identical – exactly because differences also pertain, and something with fewer properties tends to stand for something with more properties (1989, 1994, 1995, 2010).

Another theorist who picks up this thread introduced by Sebeok is Paul Bouissac (1986). He states the problem somewhat more clearly: symmetry "casts doubt on the unidirectionality of the likeness by asking, 'what resembles what?'" and regression raises the issue of how to define likeness so that everything does not dissolve "into a vast analogical networking according to which everything resembles everything else" (*ibid.*: 194). I return to his views on the matter towards the end of the chapter.

Although Sonesson finds that similarity and equivalence should not be equated, in the Peircean iconic sign it is exactly the logical equivalence relation that is at play, but it perhaps need not be as totalizing as feared. Peirce's categories can be applied to "isolate *dimensions* of

the significance in things” (Ransdell 1986: 57), meaning that a sign and its object may share a property or properties – i.e. have partial identity – without being indistinguishable as wholes (ibid.: 63). But assuming regression and symmetry are problems, they have indeed not been solved: saying that a picture has partial identity with an object does not make it clear which should stand in for the other or why *this* particular partial identity is somehow different from others.

Sonesson’s central project is to “salvage pictures from the critique of iconicity” (Sonesson 1995: 74), a critique put forward by Eco, Goodman, and others (Sonesson 1989, 1994, 1995, in 2010). On the one hand, pictures must be shown to be iconic, their meaning quite clearly perceivable through their obvious similarity to the world as opposed to conventionally determined; on the other hand, the proposed problems of symmetry and regression in iconicity must be avoided if pictures are to be true signs. So, to explain how “pictoriality is a peculiar modification of iconicity” (see also Sonesson 1989, 1994: 352) *and* the picture could really be a sign, Sonesson defines the ‘prototypical picture’ with a certain mutual dependency between potential similarity and the materials that signs might be made of. According to my understanding, a pictorial sign is thus apprehended as described below.

- a) A subject recognizes that something consists of “the kind of stuff of which signs are made” (Sonesson 1989: 229), i.e. materials like ink lines on paper that are not likely to carry some significance or importance in terms of their own object status, hence they potentially make up the expression of a picture sign (1995: 82, see also 2010: 153–155).
- b) Next, having identified the potential picture sign, the subject knows they can seek to establish a similarity relation between the expression (ink on paper) and a content (from everyday experience). Already there is little risk of confusing expression and content because of the asymmetrical nature of similarity: the subject could have some idea that something with fewer properties would stand for something with more (Sonesson 1995: 80). If a similarity relation is successfully established, there is “primary iconic ground” (Sonesson 2010), similarity not yet complemented by the sign function.
- c) Taken together, the hypothesis in (a) is confirmed with a positive result for the potentiality that is primary iconic ground in (b), and both working together would seem to confirm each other, resulting in an iconic sign.

Hence, it seems that to understand a picture (c) depends on knowing how a picture means (b) and finding something that it could mean (positive result in b), which depends on what a picture could be made of (a). Sonesson’s pictorial semiotics would thus appear depend on the ontology of the picture itself. So, in order to explain why some features of an object seem to characterize it more strongly than others, why some materials are immediately experienced

as signs, and why some objects are easily recognizable in pictures, one needs to understand the ‘Lifeworld’ (after Husserl) hierarchy of objects in each of these cases as well as how these hierarchies relate to each other (Sonesson 1989: 344). What these hierarchies and their relationships to each other would entail and how they would enhance pictorial semiotics is yet to be elucidated by Sonesson.

The abovementioned picture sign conception is summarized by Lenninger (2012: 17): she recognizes an “ontological tension” embraced by the sign – an uncertainty over its true nature. Differentiating a sign, figuring out the asymmetric relation between expression and content in which the former can stand for the latter but not vice versa, is key. In the ordinary use of pictures this is achieved through “a predisposition, deriving from the basic phenomenology of experience, to interpret the picture as an expression for [something] – and not [something] as an expression for its picture” (ibid.).

Some of this tension may very well originate from how Lenninger and Sonesson conceive of the sign in general and the picture sign in particular. Sonesson has been a keen defender of the picture sign against extreme cultural relativism, social convention, or arbitrariness. As Bouissac explains,

[...] the assertion that there is some evidence of cultural relativism regarding paradigmatic examples of similarity has led to the further uncautious assertion that similarity is a purely relative concept [...] (Bouissac 1986: 198)

Sonesson thus fought this assertion by theorizing that pictures are based on similarities with everyday perception. But mere similarity had to become sign meaning without appealing to arbitrary convention. To this end, similarity was shown to be asymmetrical in the first place (Sonesson 1995: 79–81), and it was argued that certain materials “are more apt to serve as expressions of a sign relation than others” (ibid.: 82). That some materials are “relatively less prominent” than others (ibid.) is a regularity that obtains “in every possible human Lifeworld” (ibid.). Thus without assigning individual meanings to pictorial expressions one by one like to words in a dictionary, in fact without any overt social agreement, mere similarities can become signs, albeit through a tense negotiation between potential similarities and the potential of certain materials to convey signs. The fact that no convention has to be known to take a picture as a sign and interpret its similarities is what makes it a primary iconic sign.

The primary iconic sign is opposed to the secondary iconic sign, in which conventions must be understood before similarities can be meaningfully interpreted. Peirce’s diagram “requires conventions to express similarity to anything extrinsic to itself”, but the picture puts similarity first, requiring “at least vague (real or fantasy) perceptual experiences extrinsic to the presentation to be pictures in the first place” (Lenninger 2012: 91). But Lenninger

somewhat shifts or supplements Sonesson's primary and secondary iconic sign distinction. She opposes visual meaning and sign meaning, or mere perceptual similarities and similarities understood in terms of their communicative role. Visual meaning forms the primary level; sign meaning forms the secondary level. Lenninger (ibid.: 106) may have reversed how Sonesson intended to organize primary and secondary iconic signs, but the necessity of the adaptation remains: the "integration of perceptual 'habits' in primary iconic signs like pictures [...] is never exposed by Peirce's division of iconic signs" (ibid.: 91). But where the recognition of similarity coupled with differentiating expression from content seems to be enough for Sonesson's pictorial sign, it is not yet sign-use proper for Lenninger. Rather, it is one of "two competing strategies for meaning construction" (ibid.: 182). The strategy of "meaning by vision" must be integrated with a strategy of "meaning by signs" (ibid.).

How the perceptual "meaning by vision" domain and the communicative or social "meaning by signs" domain come together in the picture sign is explained as follows:

[...] the picture offers two powerful and distinct domains for understanding meaning. On the one hand, it affords the opportunity to explore visual meaning: a largely 'private' affair. On the other, it is a visual tool for communication, dominated by social meaning through interpersonal relations. Initially, pictures occupy these two domains only separately, not jointly. The child is able to generalize relevant meanings in both domains but not yet link them. As she grows toward adulthood, they merge into one dual-natured semiotic resource that is the picture. (ibid.: 174, emphasis in original)

The generalization of relevant meanings within these two domains is termed "iconization" and "conventionalization". Before pulling together how Lenninger develops these terms and how their integration in the pictorial sign should be conceived of, I provide an overview of Lenninger's picture comprehension experiment that informed their evolution. A basic idea of the hypothesis, procedure, and results should be helpful in understanding some of the conclusions about how children comprehend and use semiotic resources. Although a picture comprehension study, it can be connected with the drawing data presented in Chapter 3.

2.3. Lenninger's dual processes in picture comprehension

2.3.1. Experiments in children's comprehension of semiotic resources

Lenninger's experiment builds on the work of Judy DeLoache and her colleagues in cognitive psychology. To study "the emergence of young children's understanding of iconic signs", they devised an object-retrieval game in which different iconic resources are to guide the child in finding a toy represented as being in a particular location through, for example, pictures or scale models (ibid.: 139). The basic hypothesis is that achieving success in retrieving the object from the real-life location based on what was perceived and understood in the picture or

scale model is evidence of “a crucial level of competence” in using these iconic resources (ibid.: 139–140). The reason for comparing performance with different kinds of resources is that salience is hypothesized as a potentially obscuring factor in the detection of sign use for a naïve sign user (DeLoache 2000; 2004 in ibid.: 142). A scale model is considered to have higher salience, which Lenninger (2012: 140) explains in terms of what impact the materiality of the sign (representamen) has on its ability to provide meaning about something else – the more concrete something is as a thing in itself, the more its ‘thing character’ might obscure its ‘sign character’. Lower salience, like in the case of a picture, pertains when sign character is more ‘obvious’ or ‘transparent’. This of course relates somewhat to Sonesson’s understanding of the picture sign as something made up of materials that have low salience in themselves (ibid.: 171). What this boils down to for DeLoache’s experiments is the hypothesis that increased salience would lead to a lowered tendency to engage an object in a sign relation, whereas decreased salience would lead to an increased tendency to engage an object in a sign relation (DeLoache 2000; 2004 in ibid.: 142). It is not necessary to enter into more details of DeLoache and her colleagues’ experiments, but the underlying conviction that some signs are more iconic than others should be noted, as this is commented on later.

Lenninger’s (2012: 154) particular interest in the DeLoache and colleagues studies and the version of the experiment that she creates is the possibility to test for understanding beyond the picture, specifically, “understanding of the relation between the picture and what it depicts”. For DeLoache, the use of iconic resources to guide action means that a child exhibits a basic level of “representational insight” (ibid.: 154–155). Representational competency is the focus of the third phase of Lynn Liben’s (1999 in Lenninger 2012) model of six successive competencies in the development of children’s external spatial representation. Lenninger (ibid.: 144) considers this model favourably in that it is both a general model of picture development and pinpoints “specific conditions for using pictorial meanings”.

Herein Lenninger finds another angle in support of her separation of nonsigns from signs. Specifically, the third phase with its representational insight competence “marks the entrance to understanding pictures as pictorial signs” – having been preceded by the first phase, the competence of identifying the depicted object, and the second phase, the competence of identifying the physical picture object as a separate category of things (ibid.: 146). What changes in phase three is that referential meaning is assigned from the picture to the referent object, and this is what Lenninger (ibid.) regards as a display of true pictorial competence and as use of the sign function – albeit still in a highly restricted way.

Lenninger’s (ibid.: 159) experiment is designed to use pictures in various ways that test different levels of understanding, including understanding that can function without suppos-

edly true sign relations. Lenninger (ibid.: 160–169) calls her version of the experiment a “no-orientation game” because the children were tested in the familiar environment of their own daycare centre. Differently from DeLoache and her colleagues, Lenninger thus did not need to indexically and verbally indicate relations between pictures and the target location before starting the real game. This provided her the opportunity to examine the roles of indexical and verbal cuing in the previous tests.

Warm-up phase

This phase has two parts: the matching-to-sample session and the recognition task.

The matching-to-sample session is repeated three times. It includes an object-to-picture condition (OP). A toy as well as three pictures are present. One of the pictures depicts the toy and the child is asked to identify this picture. Each trial ends with agreement that the correct sample was chosen, i.e. if the child does not get it right the first time their choice is questioned until they do, or if they do get it right their choice is confirmed.

The recognition task is repeated four times. It includes a picture-to-picture condition (PP). Each recognition task directly continues into the retrieval test (below), after which a new recognition task with a new toy and a new location starts. The experimenter presents the child with a picture of a particular toy on its own and a picture of the same toy in some context of the daycare centre. The child is asked to identify the toy depicted in the first picture in the context picture by pointing to it. The toys used were all unfamiliar to the children.

An object retrieval test follows on each recognition task. The test is also known as the sign condition (S). After the recognition task, the child is asked to go and retrieve the toy. Although the toy is new to the child, the locations are known, but the experiment was set up so that the locations were out of immediate sight. When necessary, prompting occurred in three phases: 1) the child returns to the original place where the pictures are and looks again; 2) the child is asked to identify the location in words and can take the picture along to try and find the toy; 3) the experimenter leads the child to the location and then asks her to retrieve the toy. If the experimenter noticed some spontaneous surprise or delight when the child found the toy in the location depicted in the picture, this was scored as successful fulfilment of a picture to object (PO) condition, but not of the test itself, i.e. the sign condition (S).

Results

Lenninger (ibid.: 162) takes the four conditions – OP, PP, PO, and S – as measures of different relational abilities in the use of pictures. Conditions were scored as successfully fulfilled or not based on a child’s first choice. She found her results, which showed rapid improvement after 30 months of age as well as between-trial improvement, to be congruent with previous

studies. Congruence with previous studies seems quite useful in supporting the validity of the results, since only 15 children took part in the experiment. Improvement between trials is not regarded as overly important, because despite this tendency the influence of age discrepancy on performance remains. By about three years of age children almost never fail at the test.

Conclusions

Younger children who could name the location in the picture or describe the things they usually do in that place but who still could not retrieve the toy are taken to not yet have developed the competency that older children have. The competency that allows for success in the object retrieval test is the ability to “relate the meaning of the picture to a meaning about reality, using the picture as a guide for finding the toy” (ibid.: 164). In the OP and PP conditions, the child need only detect similarity between two items that are both immediately present. In the sign condition, however, Lenninger (ibid.: 165) regards the similarity as more abstract, as it relates to something that is expected to be elsewhere.

Success in the object-retrieval test is thus taken as evidence of success towards using the picture as a sign proper. The sign function could be seen as operating within the conventions of the game, but a further developmental path remains ahead of the child in terms of generalizing this kind of sign use to more situations (ibid.: 184). The phase of representational insight in Liben’s model may thus correspond, for Lenninger, to sign-use proper within a limited context. In the later phases the basic competency may have been used and generalized enough to have developed to a point where it would qualify as sign use proper in all contexts.

2.3.2. Two processes of generalization: Iconization and conventionalization

Competencies that develop through the generalization of broader principles from instances of specific experience is what Lenninger gets at with her concepts of “iconization” and “conventionalization”. The above results and conclusions informed and can be viewed within the framework of these terms. Lenninger conceives of generalization as follows:

Generalization is about recognizing regularities, establishing categorizations, and assimilating new experiences into familiar categories or using them to re-evaluate those categories. Generalization connects concrete meaning experiences and responds to them, based on recognition of similarities and continuities or discontinuities. (ibid.: 175)

Drawing on Vygotsky, Lenninger (ibid.: 176) states that, for him, generalization is meaning. She takes signs as generalizations “that make it possible to communicate the world” (ibid.). For picture understanding, beyond generalizing visual meaning, Lenninger requires the ability to share visual meanings through communication. This is true picture understanding.

The separation of iconization and conventionalization perhaps can be productively viewed against the backdrop of Katherine Nelson’s (2007 in ibid.: 132) observation that “experience

is double-sided meaning”, in that it has both “an idiosyncratic, private, ‘inner’ component” and “an ‘outer’ component that can be shared with others” (ibid.).

Iconization, although not immune to the influence of others, is the ‘private’ side of the duality (Lenninger 2012). It is, according to Lenninger (ibid.), a process of generalization whereby the individual generalizes from perceptual meaning – from specific instances to broader principles (ibid.). The formation of perceptual similarity-based meanings in the environment is verified by subjective experience, so the process is primarily self-driven (ibid.). Meaning in pictures partially depends on this process, with some similarity to ordinary visual experience affording the viewer the opportunity to explore visual meaning in the picture (ibid.).

In the experiment described above, success in the OP and PP conditions would thus seem to depend largely on iconization. Success in the S condition, however, does not automatically follow. Finding similarities between the picture and ordinary visual experience thus precedes being able to use the picture as a sign that directs some kind of activity.

A parallel process that develops from intersubjectivity and communication needs to join iconization if the S condition is to be fulfilled. Both processes are independent trajectories, depending on their own ‘iconic ground’ of sorts. Iconization depends on perception, “meaning by vision” in the case of pictures. Conventionalization depends on a social, intersubjective, communicative ground for “meaning by signs” to develop. It does not necessarily involve sign meaning from the start: it is “essential for construing sign meanings, [but] not all meanings grounded on intersubjectivity are sign relations” (ibid.: 69). Lenninger (ibid.: 180) asserts that a communicative situation is recognized and felt to be important before an infant might have any idea of what it is about. Some communication can thus proceed without signs, but signs cannot come about without communication.

Lenninger (2012) defines conventionalization as a process of generalization that is dependent on iconization, i.e., that involves perceptually mediated meaning, but cannot be explained by perceptual meaning relations. It has its own origins in generalization as filtered by culture: it starts from instances of communication, generalizing from them, and is verified by meaningfulness to others, hence, it is intrinsically social (ibid.). Children come to grasp regularities in communicative acts or responses, with their attention being focused on the ‘correct’ similarities so that the process shapes the meaning of meaning itself (ibid.). The picture, beyond affording the opportunity to explore visual meaning, becomes a visual tool for communication – once more: meaning by vision is supplemented with meaning by signs (ibid.).

The object-retrieval test requires the child not only to recognize the location depicted in the picture but also to understand that this depiction is of a real situation and that she can

thus use this information to go and find the toy in the location, right now. Pictures can offer more than visual meaning when this meaning becomes conventionally shared. This sharing is possible through integrating what has already been learned from intersubjective experience. So, regularities in interpersonal turn-taking, for example, “provide a structure for incorporating ‘external’ objects, such as pictures, into communication” (ibid.: 174).

2.4. Lenninger and Arnheim on generalization

Dealing with theories of perception and the development of thought processes in depth is not within the scope of this thesis, but integrating the work of Lenninger and Arnheim requires at least some examination of foundational assumptions and principles that cannot help but deal with these issues to some extent. To better understand “generalization” as Lenninger uses it, some overt and covert connections to Piaget and Vygotsky are examined. As for Arnheim, I focus on *Visual thinking* (Arnheim 1969) to point out distinctions as well as potential similarities between his and Lenninger’s thought. This leads into a preliminary sketch of how integration of their ideas could inform semiotic analysis of development in children’s drawings.

Although Lenninger (2012) discusses a wide variety of theories relating to visual perception, none of them are overtly tied in with her description of iconization. Generally speaking, her approach is more “externalist” (see ibid.: 37–38 for discussion), i.e. the interaction between individual and environment is key in the formation of mechanisms for understanding. The alternative, internalism, would dictate that “perceptual meanings [are] mainly directed at or organized from internal processes” (ibid.: 37). Of course there are various extreme and in-between positions, depending on the relative weight and/or primacy of internal or external processes. Ultimately, however, Lenninger’s processes of generalization seem to be informed by Piaget, Vygotsky, interpreters of their work, and some more recent theorists in psychology.

From Piaget, there is the “schème”, “an instrument for generalizing and abstracting an individual’s meaning constructions” (after Piaget 1945: 79, 100; Piaget and Inhelder 1997: 366 in ibid.: 117). The scheme is closely related to “assimilation” and “accommodation”: in assimilation, an individual fits perceptions within existing schemes; in accommodation, schemes are modified in interaction with stimuli (Lenninger 2012: 117). Iconization seems to deal with the generalization of stimuli into schemes. Conventionalization seems to relate to concept formation and sharing concepts with signs.

The goal of constructing schemes is to arrive at *concepts*. In order to stabilize meanings into concepts, an individual’s experiences must be shared – communicated with others. Signs (Piaget, 1930) provide means to share meanings that transcend the idiosyncratic nature of the isolated individual. (ibid., emphasis in original)

Individual schemes versus shared, stabilized concepts relates to the division of iconization as private, verified by personal experience, and conventionalization as shared, verified by meaningfulness to others.

From Vygotsky, there is also categorization and generalization, “successively refined and coordinated with the concepts of others” (ibid.: 126). Based on a study of how subjects select differently shaped and coloured blocks based on the properties of the block that went before, Vygotsky proposed stages that lead up to stable criteria of selection found in adults’ performance (Wertsch 1985: 101). Young children use “organized heaps”, making fairly idiosyncratic though not entirely arbitrary selections (ibid.). After these fairly subjective ties between objects and criteria, “thinking in complexes” follows, a mode that helps to create generalizations “on the basis of more objective connections that actually exist among the objects” (Vygotsky 1934a: 121 in ibid.). Thinking in complexes is “tied to the concrete context in which the subject carries out the task” (Wertsch 1985: 101). Finally, there are “genuine concepts” (ibid.: 102), the most advanced form of which is “scientific concepts” (ibid.: 103). Here, some general relation with Lenninger appears. A scientific concept involves “simultaneously a relationship to an object and a relationship to another concept, that is, the initial elements of a system of concepts” (Vygotsky 1934a: 196 in ibid.). Hence, the basic connection between Vygotsky and Lenninger would seem to be development from personal, more idiosyncratic meaning to shared, more objective meaning as well as the notion that a scientific concept – or true pictorial sign – requires a dual relationship. A true pictorial sign relates to the object through the perception of similarities, but it must also relate to sharing signs with others in communication.

None of this is at odds with Arnheim’s views, except the question of where generalization begins. Lenninger claims that generalizations are made by comparing specific instances, but Arnheim argues that there has to be something according to which one generalizes in the first place. This problem recalls the externalist versus internalist stances mentioned earlier, or debates on empiricism versus nativism more generally. Arnheim (1969: 159) states that “an abstract concept, supposed to be the fruit of generalization, turns out to be its necessary prerequisite”, and this might be taken as internalist or nativist, but Verstegen (2005: 135) claims “Gestalt theorists never argued that nativism was correct”. Arnheim’s emphasis on the importance of sensory perception to thought (“visual thinking”) has parallels with Gibson, whose theory Lenninger (2012: 37) characterizes as externalist yet actually “both internal and external” with an emphasis on “the embodied nature of cognition”.

Abstraction, according to Arnheim, is thus embedded in perception.

There is no way of getting around the fact that an abstractive grasp of structural features is the very basis of perception and the beginning of all cognition. The grouping of instances, allegedly the necessary preparation for abstraction, must be preceded by abstraction, because from where else would the criteria for selection come? Before one can generalize one must single out characteristics that will serve to determine which things are to belong under one heading. This is to say: generalization presupposes abstraction. (Arnheim 1969: 161)

The important thing is that these abstractions need not be ‘advanced’. Bouissac (1986) is on a similar train of thought in his discussion of semiotic speculations and theories of perception. He argues that critiques of iconicity that took some evidence of cultural relativism and turned similarity into a purely relative concept based on social convention and arbitrariness were based on a number of fallacies (ibid.: 198–199), the ultimate fallacy being that perception is unorganized, providing the mind with an undefinable quantity of information in the form of indiscriminate sensations (ibid.: 199). He goes on to argue that semiotics must stay abreast of scientific advances and adapt its theories accordingly. As an example, he cites studies that found organization in perception at the cellular level, in “the selectivity of the responses of particular cells in the visual cortex” (ibid.: 201). Although Bouissac is quite aware that single studies and discoveries do not make a theory of perception, he finds that “[...] it is possible to conceive iconic signs not as free constructs made of features selected and abstracted from an indefinite stock of perceptual material, but, on the contrary, as genetically programmed selectors” (ibid.: 203). Thus, unsurprisingly, Bouissac is of the opinion that there is more supporting evidence for the notion that “a relatively immediate sensibility to some forms is at the core of the perceptual process”, as one finds in Gestalt theory and Gibson’s theory (ibid.: 205).

What Arnheim (1969: 166–167) emphasizes about the first perceptual and mental operations in a new situation or that of an infant is their *generality*. And what both Arnheim and Bouissac propose is that some of the most basic and general separation and selection of stimuli can be traced to biology. For example, certain cells in the visual cortex would seem to be selectively receptive to “orientations, [...] directions of movement, lengths of lines, colours, etc.” (Bouissac 1986: 202 after Hubel 1982). So, Arnheim (1969: 167) finds, there is no confusion or chaos; instead, there is fusion – in the sense of fairly undifferentiated sensation – and low-level order. Ultimately, he proposes dual processes: on the one hand, “percepts are generalities from the outset, and it is by the gradual differentiation of those early perceptual concepts that thinking proceeds toward refinement”; on the other hand, in active thinking, “wisdom progresses constantly by moving from the more particular to the more general” (ibid.: 186). Generalization thus requires particularities to work from, but these must first be identified as particularities. Particularities are differentiated from generalities, a process which at the most basic level is tied to perceptual organs and their processes.

Such a progression from generalities to specifics is actually quite evident in Lenninger's explication of the beginnings of conventionalization as a process. As already explicated, she notes that communication is felt before it is really engaged in: an infant recognizes the general significance of a communicative situation before identifying any of the specifics of what it is actually about (Lenninger 2012: 174, 180). She describes these initial generalities in terms of the role that iconicity plays in infant–parent attunement (ibid.: 174). I believe iconicity here is best taken as the general “firstness” of the phenomenon, the not yet actualized possibility of something (Collected Papers: 1.25), “predominant in feeling, as distinct from objective perception, will, and thought” (Collected Papers: 1.302). This notion can be considered in parallel with generality, the not yet differentiated – only the possibility of more specificity. The concluding section of this chapter picks up this thread in regards to the processes that could be used to describe drawing development.

2.5. Summary and conclusions

This chapter explored Lenninger's dual processes of generalization, iconization and conventionalization, and how they must be integrated for true pictorial comprehension to pertain. This involves sign-use proper, inspired by Sonesson's conception of sign. Lenninger and Sonesson divide meaning into nonsign meaning and sign meaning. Not unlike stage theories in psychology, this necessarily introduces a threshold, as well as pseudo- or proto-understanding. Sonesson attempts to make the pictorial sign as ‘naturally’ or ‘obviously’ comprehensible as a sign by appealing to its typical material characteristics – materials that have low significance, or prominence, or salience in their own right, a possibility in all human ‘Lifeworlds’, are more likely to serve as the expression of a sign (Sonesson 1989, 1994, 1995, 2010).

Indeed DeLoache and her colleagues' experiments are based on a similar notion. The salience of a three-dimensional model in itself might somehow block or obscure its potential sign character. This hypothesis seems to ignore that children are far more likely to be exposed to pictures as signs with specific real-life referents than to similar three-dimensional models. Toy cars or dolls may refer to cars or people in reality, but usually only generally. They are indeed much more objects in themselves: a doll has a name, and a personality and needs are imagined for it. Pictures could be seen as automatically more removed from being things in themselves, and many are, but there is no clear border: Kress provides examples of drawings that are cut out to ‘enter’ the object world. A paper doll, or a pop-up or lift-the-flap book, or many other such in-between creations exist. One kind of picture that does set picture and object experiences apart is, at least in today's world, the photograph. It is reasonable to expect that the children participating in these studies have seen many photographs of people, things,

and places they know. It is also highly likely that they do not commonly have three-dimensional scale models of the same specific referents.

The above can be taken with two cases often cited by Sonesson. First, the repeated citation (Sonesson 1989: 281, 1995: 82, e.g. 2010: 154) of a case where members of a tribe failed to recognize a picture because they were too preoccupied with the novel material of paper. Second, Sonesson (1989: 281, 2010: 154–155) contrasts the former case with that of Hochberg and Brooks (1962), who purposefully did not expose their child to pictures, but then when they did, found that he performed very well in recognizing objects in them. The argument would appear to be that the child, although unexposed to pictures, had learned something of the “hierarchy between things likely to be valued in themselves, and things most probably used to stand for other things” (Sonesson 1989: 281) that worked for picture perception, but lacking the same materials and hierarchy the tribe could not immediately perceive the pictures. Sonesson (1989, 2010) does however also argue for the likelihood of “*universals of prominence*”, for example how “two-dimensional objects are felt to be less prominent than three-dimensional ones and may thus more readily serve as expressions” (Sonesson 2010: 155).

What was presented earlier in the chapter and has been argued in this section comes together in a general questioning attitude towards the necessity for the subdivision of Peirce’s iconic sign into primary and secondary iconic signs as well as the opposition of nonsign meaning to sign meaning proper. Sonesson seems to argue that the pictorial sign is successfully apprehended through the combination of the picture’s similarity to experienced perception and the existence of this likeness on material that is relatively unimportant in itself. It is an ideal ‘amount’ or ‘level’ of iconicity for the sign function to ‘naturally’ emerge. In the primary iconic sign the expression is “self-evidently manifested as such” in that it is neither confused with its content, nor is it necessary that the relation to its content be pointed out somehow (Lenninger 2012 after Sonesson 2004b, 2008). In the secondary iconic sign, “the sign relation or similarity is not clear to the user if not pointed out by convention or an otherwise enhanced context”, which could be necessary when there is either too little or too much similarity for the sign relation to be apparent (*ibid.*).

For Bouissac (1986: 198), the notion of “degrees of iconicity” is one of the fallacies in critiques of iconicity also mentioned earlier. He finds that variability in how many details or features a sign exhibits, making it more or less iconic, is “the ground on which relativism can develop”, because “the successive choices that delete some informative elements [and] emphasize some others” are easily construed “as an effect of cultural relativism” (*ibid.*: 198–199). Sonesson also critiques the critiques of iconicity, but the notion of degrees of iconicity re-

mains; he avoids cultural relativism with an appeal to universals – the universals of prominence in materials. Given that our world is skewed to using some materials more than others, often purely out of efficiency and convenience, theorizing their inherent prominence is precarious at best. We are unlikely to raise children on 3D-printed scale models of specific familiar referents rather than pictures to evaluate how they fare on a DeLoache experiment.

Whereas Sonesson is at pains to fulfil both the conditions of his definition of sign and the non-culturally relativistic nature of the perception of prototypical pictures at a level that requires no conventions, Lenninger introduces conventionalization and its necessary integration with iconization as the requirement for true comprehension of a picture as a sign. Recall, from Lenninger's experiment, that if a child named the place in the picture but could not grasp that she could go and find the toy there, this was not fulfilment of the S (sign) condition. Even fulfilment of this condition is but the beginning:

By the end of the third year, picture meaning remains still strongly bound to the conventionalized meanings of communication games. Only later will the child explore the potential for distinguishing between different similarities and learn properly to separate expression from content. (Lenninger 2012: 185)

Learning to better separate expression from content is thus an ongoing process according to Lenninger, a process informed by social conventions and sign conventions (e.g. "Image, diagram, and metaphor relations remain to be learned and applied to picture understanding" (ibid.: 184)). For Sonesson, the fact that the picture is not mistaken for the thing itself or the fact that the surface does not go unrecognized as conveying significance beyond its own existence seems to fulfil the differentiation of expression and content.

What is far more appealing about the processual approach is that it implicitly acknowledges that a category such as 'picture' is not stable. It is not understood in the same way by people of all ages or backgrounds and it does not exist as an objectively definable category in the world. My argument, following Arnheim and Bouissac, is that general similarities can be said to obtain between things, but general does not mean unlimited. Bouissac (1986: 210) argues that iconicity should be anchored "in a socio-biologically relevant repertory of schematic percepts that would constitute an absolute constraint upon the combinatory power of perceptual features or properties". Radically simplified to the present context, the idea is that very general limitations can be put on what is similar to what, within the scope of human perception. Beyond that, we seek out established similarities, or share them and communicate about them, elaborating or simplifying them as we go along.

This accords with the primary nature of iconization and its later integration with conventionalization, but some clarification remains. Inasmuch as "fundamental aspects of picture

meaning are already available to the very young infant; but it takes years for the child to process picture meanings as signs” (2012: 182), young children are seen as exhibiting genuine but also simultaneously ambiguous understanding of pictures (ibid.). The ambiguity of meaning is traced to a tension or conflict between iconization and conventionalization since they are “competing strategies for meaning construction” (ibid.). For adults a balance between the two has been achieved, but

[...] for the very youngest children, who do not yet experience similarities or dissimilarities at all, visual features are still organized meaningfully. Those features become progressively better selected and more organized, and form the basis for similarity relations. (ibid.: 183)

Faces are offered as an example of a feature that is either learned very early or might be innate (ibid.). It is, however, very difficult to see how an infant could perceive no similarities or dissimilarities, but still perceive faces or stimuli that cause a sucking reflex.

Piaget cites a study by Rubinow and Frankl according to which any solid object approaching the face makes the infant respond with sucking although one month later only pointed objects produce this result. (Arnheim 1969: 165 after Piaget 1937: Ch. 1, § 6)

Surely the abovementioned approaching solid objects are similar in exactly the manner stated: they are approaching solid objects. And surely they are dissimilar from static objects or no objects. Similarities and dissimilarities would appear to be perceived, they are just of a very general kind. One month later they are somewhat more specific, but the differentiation that resulted in the specificity of “pointed objects” can and will be refined much further.

Thus, although years apart, the proposed ambiguous understanding of pictures and the assumption that infants could experience visual features as organized meaningfully, though not according to similarities or dissimilarities at all, have something in common. The apparent lack of differentiation in both cases could be replaced with the notion that differentiation proceeds from the general to the specific. Pictures may not be understood ambiguously so much as more broadly.

Lacking the abovementioned balance between iconization and conventionalization, children can supposedly make “realism errors” – “mistakes about picture-world relations” involving “confusion between appearances and reality” (Lenninger 2012: 178). Many studies have investigated children’s “understanding of correlations between realistic pictures and real-world events” (ibid.), a kind of correlation younger children supposedly struggle with even though they can identify known objects in pictures (ibid.). Although Lenninger (ibid.: 184) states that for a picture to be a sign it must be understood to have referent meaning, she also admits that “the nature of the picture’s relation to a referent meaning (and a variety of picture subjects) remains vague, and the sign function is strongly dependent on the context”.

These “realism errors” may be based not on confusion, but on a relatively less differentiated understanding of picture–object relations. If a child can verbally identify the depicted location in a photograph but does not succeed in going there and retrieving the toy, she is failing to grasp a *particular* possibility of the sign relating to a here-and-now state of affairs. Children who succeed at the object-retrieval test have achieved “basic insight into sign meanings” (ibid.: 146), but the conventionalization that has helped them to interpret the picture as meaningful is limited to the role of the picture in the game (ibid.: 184). Generalization would have it that this skill of relating the picture to an immediate real-world situation as developed within the specific context of the game should be generalized to other applicable situations. Differentiation would have it that there are parallel but different specifics that may emerge from the more general possibility, and that each of these may also be specified further later. Of course generalization is not excluded from the latter possibility, as discrete options may later be grouped again and generalized from.

Finally, returning to the parallel between iconicity and generality proposed at the end of the previous section, I put forward three tracks worth considering in describing children’s drawing development. Iconization and conventionalization are taken from Lenninger, with the qualification that although generalization may play its part, a movement from the general to the specific as in differentiation is preferred in comprehending earlier developments. The law of differentiation as in Arnheim’s description of how mark-making and its meanings develop is thus also present in how perceived similarities become more specific and how intersubjective relations become more specific – e.g. from the general feeling that a communicative situation is somehow significant to a plethora of social understandings, such as taking into consideration what others expect of us in a particular communicative situation. Key insights from Lenninger with regards to her processes and their integration are kept. Similarity relations are primary and verifiable by the individual’s own experience, but this process is influenced once it enters a communicative sphere where meaningfulness to others directs attention to the ‘correct’ similarities, shaping the meaning of meaning itself.

The component that drawing requires but which is not accounted for in picture comprehension is of course mark-making. Its beginnings in terms of generality or iconicity could be traced to scribbling. Indeed, in his take on Peircean semiotics and pictures, Nöth (2009: 244) explores the option of describing the prototypical iconic, indexical, and symbolic picture with examples, and he considers the prototypical iconic picture to be non-figurative, as in abstract painting. This points to a consideration of marks as such, as qualities or essences in themselves. It may however also be important to consider scribbling from an indexical point of view, as traces of the child’s bodily movements. The possibility of starting to associate scrib-

bles and shapes with objects is probably situated in children's own recognition of potential similarities, as in fortuitous realism, but also in how drawings relate to other, often representational pictures and how the child might be questioned – "What is it?" – even if she had not intended a representation. Hence mark-making needs to be considered in tandem with iconization and conventionalization. All three processes develop on their own but also influence one another as picture–object relations develop over time.

3. SEMIOTIC ANALYSIS OF CHILDREN'S DRAWINGS OF AN EVERYDAY OBJECT

3.1. Introduction

Children's drawings have been studied in a number of ways, as was noted in Chapter 1. The first studies used large numbers of drawings collected from children who were anonymous to the researcher except for data on age, gender, and country of origin (Costall 2001; Thomas and Silk 1990). Another strategy, which has persisted to the present day, is to study one's own children over time and, potentially, in great detail (e.g. Cox 2005; Kress 1997; Luquet 2001[1927]). The first option lacked any access to contextual insight, whereas the second option could be criticized for being biased in this regard (Costall 2001). A third possibility, that of setting up a model for children to draw, to observe the process, and to compare the resulting drawings, was already used by investigators like Clark (1897 in Cox 2005). This experimental laboratory⁵ method, including groups that are balanced across ages and sometimes between genders, is in evidence in much literature on children's drawings from the 1970s and '80s. One thread of these kinds of studies is explored in this chapter.

Some researchers who use the experimental method seem to be wary of anecdotal evidence. Findings that are in contrast to such evidence serve to remind them "of the importance of doing systematic work under controlled conditions with a suitable number of subjects" (Kosslyn et al. 1977: 209). Testability and falsifiability appear to be prioritized. As Krampen's (1991) investigation showed (Section 1.1), collecting children's drawings of particular topics provides data that can be compared over age groups, elements of the depictions being dividable into categories that can be scored. It is worth noting that scoring according to the researchers' categories usually is undertaken independently by two individuals, who then seek to resolve any differences in scoring at the end. Scores can then be used in support of a theory, in Krampen's case the general development from drawings that fit a more typical description of intellectual realism to drawings that reflect visual realism. However, since his hypothesis dealt with how children view and conceptualize buildings in their environment, his picture comprehension test for the falsifiability of the hypothesis is not directly related to intellectual and visual realism as such. If the hypothesis of a development from intellectual to

⁵ Often the experimental setting is a quiet space in a school, separate from regular activities.

visual realism is to be testable and falsifiable, presenting children with a model to draw from and giving them specific instructions seems a logical method to pursue⁶.

The first experiment covered in this chapter yielded results that seemed to prove an age-related progression from intellectual realism to visual realism. This was measured in terms of how sensitive children were to the orientation of the model as seen from their viewpoint versus – as it is hypothesized – how much this fact had to ‘submit’ to their internal model of the object. Freeman and Janikoun’s (1972) experiment is described in some detail so as to provide the reader with an idea of how experiments of this nature are conducted. Of course this study is by no means either the only or the absolute root, so at times other considerations also meet up with this line of inquiry.

A number of experiments followed Freeman and Janikoun’s investigation. Some require somewhat more description than others before I enter into reevaluation of the hypotheses and reanalysis of the data and conclusions (Section 3.3). These follow-ups introduced a list of factors that problematize the possibility of drawing a clear conclusion on the progression from intellectual realism to visual realism. However, despite various factors influencing how children respond in a drawing task, age-related change cannot be completely ruled out. What is lacking, is an explanatory framework that could attempt to account for the commonality of the factors that influence results, rather than dividing further research into more and more fragments that have to be reorganized and reconnected.

Sub-section 3.3.1 starts off the analysis by summarizing the data presented previously. Next, Sub-section 3.3.2 proposes a semiotic model focused on sign–object relations – termed picture–object relations for the present context. The aim is to take together factors that seem to ‘interfere’ with the operation of a mental model, questioning whether these factors and how children respond to them differently may be more than anomalies. Interpretation of the data is focused on known elements: the model stimulus, the resulting drawings, and, where available, data about the drawing process of the children. Comparing the data across age groups with picture–object relations in mind leads to the possibility that development in children’s drawings could be described in terms of how these relations are used by the children. How conception and use of picture–object relations change is informed by iconization, conventionalization, and the development of mark-making ability. Finally, reanalysis of data from a study dealing in both drawing and selection of pictures serves to underscore the arguments made in relation to drawings.

⁶ As an historical aside, the emphasis on these methods may also have a connection with the influence of the psychoanalytic tradition (briefly mentioned in Section 1.2). Inquiries into children’s emotional and mental life based on interpreting their drawings according to psychoanalytic principles probably seemed subjective and unfalsifiable to some, thus leading to a more ‘scientific’ approach being stressed.

3.2. Description of the data

3.2.1. Freeman and Janikoun's draw-a-cup study

'Intellectual realism in children's drawings of a familiar object with distinctive features' is the title of the Freeman and Janikoun's (1972) investigation that went on to launch many others. This description is fairly detailed, but, unfortunately, all the particulars of the experiments are not always clear. I try to make logical assumptions in these instances.

Freeman and Janikoun offer a basic overview of intellectual realism that fits squarely within the repression-of-pure-perception paradigm so eloquently described by Costall (2001). They argue, following Luquet, that "there is a general tendency for conceptual knowledge to be dominant over perceptual experience in children's drawings up to the age of 8 or 9" (Freeman and Janikoun 1972: 1116). They find that evidence in Piaget and Inhelder's 1969 publication *The psychology of the child* might suggest a somewhat earlier "transition" from intellectual realism to visual realism, at around seven or eight years of age (ibid.). As a classic demonstration that younger children appear to draw from an "internal model" rather than to "reproduce the visually available stimulus configuration", they cite Clark's (1897 in Freeman and Janikoun 1972) experiment of an apple with a hatpin stuck through it. An overview of how children's responses differed according to age in that case is provided in Figure 3.1.

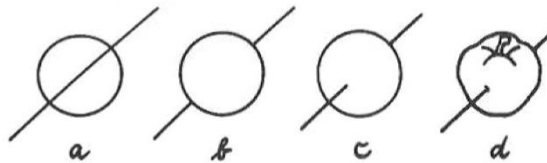


Figure 3.1: (d) the model as it can be drawn in accordance with rules of visual realism, including being view specific and showing three-dimensionality; (a) to (c) how children progress in making a representation of the model, from a 'transparency' in (a), to respecting the boundaries of the apple in (b), to moving towards three-dimensionality in (c) (Arnheim 1974: 202 after Clark 1897)

The reference to Clark is indicative of the continuity of a rather long historical thread in this line of inquiry. Freeman and Janikoun (ibid.: 1117) believe that the general idea of intellectual realism is clear, but that its exact mechanisms are not. In Clark's experiment, they question whether the unfamiliar context of drawing a rather odd object, as requested by an adult with unknown expectations, might have yielded peculiar responses (ibid.). A child who is unsure of their draughtsmanship, they suggest, might forego attempting visual realism, because the resulting drawing might not be good enough or convincing enough for the adult (ibid.). The "fairly dramatic" model of the apple with a hatpin stuck through it may also have forced peculiar ways of trying to depict it that deviate from regular approaches to drawing (ibid.). In a bid to remedy these possible shortcomings, they designed their experiment as a modification of Clark's experiment.

The model that children had to draw was a mug⁷. The use of a commonplace model has three advantages according to Freeman and Janikoun (ibid.): 1) it minimizes the “dramatic effect” that the model might have in inducing particular drawing styles; 2) children already have a “long-term mental image” to express; and, concomitantly, 3) children can be asked to produce a drawing of a mug before the task of drawing from the real model for the purpose of comparison. The researchers are thus able to rate the drawings made in response to the instruction to draw the model mug as either visual realism or “failures of visual realism” (ibid.), i.e., intellectual realism. Additionally, they have a drawing based on no external model for comparison. This drawing is presumably produced by expressing the mental image, so the extent to which it is similar or different from the external model condition could indicate how influential the mental image is.

The evaluation of the criteria stipulated above are possible because of the mug’s features. The handle is deemed a “defining feature”, a feature thought to be stereotypical of a cup and hence an important part of a child’s mental image of the object (ibid.). A “nondefining feature” was also added: the mug had a painted flower on the opposite side as the handle (ibid.). In presenting the children with the handle turned out of sight and the painted flower in sight, Freeman and Janikoun could score the results for errors of commission and omission (ibid.). The ‘correct’ response in accordance with the visual stimulus and visual realism is to include the flower but omit the handle. Including the handle constitutes an error of commission, whereas excluding the flower would constitute an error of omission (ibid.).

Sixty children took part in the experiment – 12 children from each of the year groups between ages five and nine (ibid.). During the procedure, the children were first asked by their teacher to make some drawings, and one of the requests was to draw a cup. These were spontaneous drawings, what Freeman and Janikoun term “imagined” (ibid.: 1119), although the topics were stipulated. After this the researcher⁸ tested the children individually. The researcher established rapport with the child, including favourably commenting on the drawings made previously. The child was then asked to copy some shapes that lay on the table with the instruction “I should like you to draw exactly what you can see from where you are sitting”. Next, the researcher handed the child a mug and asked her to examine it and name it. The mug was then placed four feet (1.2 metres) in front of the child with the handle turned

⁷ ‘Mug’ and ‘cup’ are used interchangeably in this experiment as well as many that followed. Freeman and Janikoun’s description of their model and their use of the words reflect what I would deem normal – albeit somewhat ambiguous – usage in English. A mug is a ceramic drinking vessel, usually used for hot drinks, which is generally larger than a cup that goes with a saucer. A mug could conceivably also be called a cup, but a cup-and-saucer type of cup would not be called a mug. The important characteristic that both share as functional objects in the Western world and which is important for the experiment is that they pretty much always have a handle.

⁸ Since the article provides no clear indication, I assume there was a single researcher in the interactions.

out of sight but the painted flower clearly visible. The same instruction used for the shapes was repeated: “I should like you to draw exactly what you can see from where you are sitting”. When the child was done, the researcher asked: “Is that how you want it to be?” “That’s how you think it should look?” (ibid.: 1118)

The results from drawing the shapes indicated that the children all had “an acceptable level” of draughtsmanship and that they could comply with the verbal instruction (ibid.: 1117). Almost all the children named the model as a ‘cup’, the few older children who did not use ‘cup’ presumably used ‘mug’. This confirmed for Freeman and Janikoun that the spontaneous drawings could be compared with the model drawings. They did not provide data for how many children drew a handle on these imagined cups, but said that there was a “tendency” to do so, and all their visual examples showed this (ibid.: 1119).

The model drawings showed inclusion of the flower or the handle unambiguously, so they could be scored for errors of omission or commission accordingly. Freeman and Janikoun (ibid.: 1117) found a striking change between the ages of seven and eight for the error of commission, i.e. including the out-of-sight handle. Between nine and 12 of the five-, six-, and seven-year-olds in their groups of 12 children included the handle; by contrast, only two eight-year-olds and zero nine-year-olds did the same. All children who included the handle did so by placing it in its stereotypical position, joined to the side of the cup. The flower was included by all the nine-year-olds, but only four 8-year-olds and progressively fewer of the younger children. Thus the majority of five- to eight-year-olds committed the error of omission, with all but one five-year-old excluding the flower.

















CLASS	SUBJECTS AGE	IMAGINED CUP	COPIED CUP	HANDLE	FLOWER	ADJUSTMENT TO SQUARE SHAPE
5	5;0			✓	✗	✓
	5;5			✓	✗	✗
6	6;0			✓	✗	✓
	6;2			✗	✗	✓
7	7;4			✓	✓	?
	7;5			✓	✗	✗
8	8;0			✗	✓	✓
	8;6			✗	✗	?

Figure 3.2: Samples of children's drawings of a cup. (Freeman & Janikoun 1972)

One metric that was difficult to judge and which did not yield clear results was whether or not children adjusted the shape of their cup from the first drawing to the drawing of the model. Freeman and Janikoun expected the stereotypical imagined cups to be round, whereas the model was a cylindrical shaped mug, i.e. when seen straight from the front, a fairly square shape. This metric was problematic because some children drew an angular cup to begin with and because the shapes were sometimes not determinate enough to be judged as *either* round *or* square. Also, with only one imagined cup, there was no proof that the shape of it would not vary over multiple drawings of an imagined cup (ibid.: 1118). Although most children verbally labelled the model as a “cup”, Freeman and Janikoun do not point out the potential ambiguities or overlaps between the words “cup” and “mug”.

Ultimately, Freeman and Janikoun (ibid.: 1119) conclude that “specific features may be used to diagnose drawings”. The likelihood that the handle forms part of the mental image was confirmed in as far as there was a “tendency” for it to be included in the spontaneous drawings (ibid.). They find that the results show a relationship between an increase in age and the decrease in the error of commission as well as the error of omission (graph in Appendix 1). The age range at which the change from intellectual realism to visual realism seems to occur accords with the range noted by Piaget and Inhelder (1969 in ibid.: 1120).

Freeman and Janikoun (1972: 1120) note that no children attempted to show the handle at the back of the cup by drawing it inside the lines of the cup, producing a “transparency”. They contrast this hypothetical solution, which would allow for inclusion of the handle to ‘satisfy’ the mental image but also show the position of the model’s handle, with the solution of attaching the handle to the side used by all handle-includers, which they take as a concern on the part of the child to produce a “recognizable copy” (ibid.). They do however also postulate that drawing the handle inside the lines of the cup may have the unwanted consequence of depicting the handle as actually *inside* the cup. Potential problems of including the flower are also considered in this vein: “The possibility remains that the omission of the flower was not solely an index of poor perception but may be partly due to this problem deterring the younger children” (ibid.: 1121).

Based on the children’s responses to questions at the end of the procedure, the authors hypothesize two main reasons for including the handle: a) because it is part of the child’s mental image, and b) because the child fears that her drawing might not be recognizable without the handle (ibid.: 1120). One child who omitted the handle, for example, admitted to doing this because he could not see it, but upon being questioned about whether the drawing looks like a cup in that case, he said, “Well, without the handle it looks like a pot. Shall I put it in to make it a cup?” (ibid.). A child who included the handle said she knew it was there, and another who did the same said that if the cup were turned it would be there (ibid.: 1121). Other reasons included concern about the drawing, not remembering that the handle was at the back, or simply “because it is there” or “because it is there even if you cannot see it” (ibid.).

One of Freeman and Janikoun’s (ibid.) main ‘take-away’ messages is that “there may be a whole range of psychological considerations acting to promote intellectual realism”. Many researchers subsequently set out to cast light on what these considerations might be.

3.2.2. Further investigations after Freeman and Janikoun

‘Drawing rules’ and naming the object may ‘interfere’ with the visual accuracy of young children’s drawings

In ‘Constraints on the visual accuracy of drawings produced by young children’, Marjorie Taylor and Verne R. Bacharach (1982) conducted two experiments that varied the conditions used by Freeman and Janikoun (1972). The results taken together were interpreted as indicating that “5-year-old children are more likely to produce visually accurate drawings than has previously been supposed” (Taylor and Bacharach 1982: 311), a rather emblematic conclusion of studies that reexamine supposed stage-like progressions – under the right conditions or with a better-informed research framework ever-younger children seem capable of

something previously attributed to an older group⁹. Another overall finding was that “drawing rules” and “drawing conventions” seem to interfere with the production of “accurate drawings” (ibid.).

Drawing rules or conventions are posited as part of the “inadequate development” of children’s “graphic representation systems” that may constrain their success when they try to produce a “visually accurate drawing” in a drawing task (ibid.: 313). This explanation is offered as a potentially more parsimonious alternative than the appeal to intellectual realism used by Freeman and Janikoun to explain their data (ibid.). In responding to a drawing task, younger children are thus simply “disadvantaged by their limited repertoire of potential responses” (ibid.): “children under 8 years of age have a restricted number of graphic vocabulary units and structural rules available to them compared with the graphic tools available to older children” (ibid. after Freeman and Hargreaves 1977; Goodnow 1978; Goodnow and Friedman 1972; Light and MacIntosh 1980).

Thus, the alternative hypothesis to children in Freeman and Janikoun’s study excluding the flower because it is a nondefining feature of the cup that is not included in the child’s mental image, is that inclusion of the flower would conflict with drawing rules used by five-year-old children (Taylor and Bacharach 1982: 314). A ‘containment’ drawing rule would entail that something drawn within the outlines that denote an object conveys the meaning of that something being *inside* the object, as opposed to *on* it, for example. To avoid a “misleading illustration” (ibid.) of where the flower is according to this rule, children may omit the flower altogether.

The other alternative hypothesis that Taylor and Bacharach offer relates to the inclusion or exclusion of the cup’s handle. Explained by Freeman and Janikoun with reference to the mental image, Taylor and Bacharach, after Barret and Light (1976 in Taylor and Bacharach 1982), draw attention to a possible division of the notion of intellectual realism. The question is whether children draw from a mental image based on “conceptual information about a class of objects to which the model belongs” (ibid.: 314), the model simply acting as a ‘trigger’ for this information, or whether children draw the model they are presented with but include hidden features “to avoid producing what to them would be a misleading illustration” (ibid.: 315). Thus, Barrett and Light’s distinction is between knowledge of the class of objects in general versus knowledge of the specific present model, although the basic idea of an appeal to knowledge rather than only what is visible from a particular viewpoint is the same. Taylor

⁹ Not entirely unlike Freeman and Janikoun’s bid to show the intellectual to visual realism transition as earlier, in accordance with Piaget and Inhelder, rather than a little later, as in Luquet.

and Bacharach's related yet somewhat different instinct seems to be that including the handle reflects the child's concern with the communicative value of the end-product.

To test the first hypothesis of whether the mental image or drawing rules are responsible for the omission of a supposed nondefining feature, Taylor and Bacharach designed three conditions for groups of five-year-olds or eight-year-olds¹⁰. Children were presented with a cup that had a flower transfer a) on its outside surface; b) its inside surface; or c) the flower transfer was simply presented separately, stuck on a piece of cardboard, and placed next to the cup. After being able to examine the objects in their assigned condition, the objects were placed on the table in front of the child and the instruction was to draw "what you can see here on the table" (ibid.: 316). Condition (c) served as a control for whether children of both age groups can adequately draw flowers and cups. This being confirmed, the results from that condition were not subjected to further analysis.

Drawings were divided into five categories: flower only, cup only, flower on cup, flower in cup, and flower beside cup. The visual examples in Figure 3.3 show drawings that were judged as "flower on cup" and "flower in cup", but Taylor and Bacharach do not state in response to which condition these drawings were made. Ultimately, drawings are taken as either "accurate" or "inaccurate" depictions of the flower-on-cup or flower-in-cup conditions. Although some solutions were taken as more optimal than others, "flower on cup" and "flower in cup" judgements were collapsed into the "accurate" category. Five-year-olds performed poorly in the flower-on-cup condition: most drawings were judged as either "flower only" or "cup only" drawings. By contrast, more than half of the drawings for the flower-in-cup condition were judged as "flower on cup" – the salient point being that a flower was drawn within the lines of the cup and hence the drawings were "accurate". Eight-year-olds performed significantly better than five-year-olds, with equal accuracy under either condition.

The fact that five-year-olds perform well in the flower-in-cup condition, which would seem to be more 'possible' within the parameters of the 'containment' drawing rule, casts significant doubt on Freeman and Janikoun's conclusion that a nondefining feature is likely to be ignored in deference to the mental image. Concomitantly, drawing rules seem to interfere with producing accurate depictions of a flower on a cup.

¹⁰ These ages reflect *mean* ages, not the actual age *range* of the group. In the case of the "five-year-olds", for example, the age range is actually from four years and five months to five years and seven months, with the mean age at five years and one month. For the sake of simplicity and brevity, and in accordance with the original work, I refer to mean ages in these descriptions.



Figure 3.3: Far left: 5-year-olds' drawings judged as flower on cup; centre: 8-year-olds' drawings judged as flower on cup; Right: 8-year-olds drawings judged as flower in cup. (Taylor and Bacharach 1982: 317–318)

The question of what might determine including an out-of-sight handle was addressed in the second experiment. The possibilities were: a) a mental image that includes the defining feature of a handle (Freeman and Janikoun 1972), also conceived of as a stereotyped cup stored in memory with “canonical information” (Freeman 1980 in Taylor and Bacharach 1982: 321); or b) “episodic information” (Barrett and Light 1976 in *ibid.*: 322) that was discovered about the present model, which is then available for use during the drawing task regardless of the model’s orientation. The potential reason for using the information from either of these postulated sources of knowledge was avoiding a “misleading illustration”.

Subjects tested had a similar profile to the previous experiment. There were four conditions: children were presented with a cup that had a) an intact handle in view; b) an intact handle out of view; c) a broken-off handle in view; or d) a broken-off handle out of view. In other respects the design was the same as in the first experiment, including that children could inspect the object before it was placed for drawing and the instruction to draw “what you see here on the table”.

Categories for the resulting drawings were: having a handle, having no handle, or having a broken handle. The latter two categories were collapsed for purposes of statistical analysis. Having a handle in the drawing was an accurate depiction for condition (a). Having no handle, which includes the possible indication of a broken-off handle, was an accurate depiction

for conditions (b), (c), and (d). In sum, five-year-olds performed better than would be expected based on Freeman and Janikoun's findings, and eight-year-olds performed more poorly than would be expected. For example, seven out of ten five-year-olds responded to the broken-handle-in-view, condition (c), by either not drawing a handle or drawing a broken handle. And, in the condition where the intact handle was not in view, five- and eight-year olds had very similar performance figures.

Taylor and Bacharach (1982: 326) conclude that five-year-old children clearly modified their drawings "to take into account the visual features of the model". In general, they find their results do not support a drawing stage hypothesis because the different age groups performed comparably on the task and most children made "visually realistic" drawings. This latter evaluation also means that support for Barrett and Light's hypothesis is present but weak: drawings deemed as visually realistic cannot be said to defer to either a general mental image or episodic knowledge of the present model. Children who did add handles that were broken off or out of view on the model provided a variety of reasons, thus, Taylor and Bacharach (ibid.: 327 after Freeman 1980) conclude that "several factors may be operating to determine the outcome of drawings produced by the children".

Besides the conclusions thus far presented, Taylor and Bacharach also question why they did not replicate Freeman and Janikoun's results. They point to differences in procedure. For example, children in their study did not draw a cup beforehand and were not asked to name the model. Subsequently, in the flower experiment, five-year-olds omitted either the flower or the cup from their drawings with equal frequency. Both the prior drawing and the naming of the model in Freeman and Janikoun thus could have caused a response bias. The children's attention being focused on *cups* may also be have been the reason behind the high rate of including out-of-sight handles. Taylor and Bacharach (1982: 328) find that evidence suggests interaction between task demands and children's "drawing systems", and so they call for more sophisticated experimental designs that take this into account.

Naming and prior visual inspection of the object as two factors that increase "hidden feature inclusion" in young children's drawings

J. Gavin Bremner and Susannah Moore (1984) set out to investigate exactly the possible 'bias inducing' factors mentioned above in their paper 'Prior visual inspection and object naming: Two factors that enhance hidden feature inclusion in young children's drawings'. They conducted two experiments. The conclusion based on their results frames drawings that are or are not view specific as a choice. Young children generally do not opt for a view-specific drawing because it is "less informative about the model" (ibid.: 376). When they do use this option it may be predominantly out of "conformity to adults' conventions" (ibid.).

Subjects in the first experiment were 30 children in each of the age groups five, six, and seven years. There were three conditions involving two objects: a regular mug and an unfamiliar object, a blue block with a conical spike. The order of presentation was balanced in each condition: the mug was drawn first by half of the children and the block was drawn first by the other half. The conditions were: a) the object was placed with its handle or spike feature in view; b) the child could look at and touch the object before it was placed with its feature out of view; and c) the feature was turned out of view and “particular care was taken to ensure that subjects did not glimpse the hidden feature before or during drawing” (ibid.: 372). Whether prior visual inspection causes any effect could be measured in the difference between hidden feature inclusion in (b) and (c), and the strength of the effect could be measured in the difference between (b) and (a). Unfortunately, the exact verbal instruction was omitted from the study description, but it is stated that neither object was named (ibid.). It would seem that children could not touch the object before drawing in condition (a).

The results from this study are most easily comprehensible in numerical form. Each condition had a group of ten children.

Table 3.1 shows how many children included the handle or spike in each condition at each age.

Age	Object	(a)	(b)	(c)
5	Mug	10	6	0
5	Block	10	4	0
6	Mug	10	6	2
6	Block	10	4	0
7	Mug	10	1	0
7	Block	10	1	0

Table 3.1: Amounts indicate the number of feature inclusions, in each case out of a possible maximum of 10. In (a) the object’s feature is visible; in (b) the object is first inspected, then it is placed with its feature out of sight; in (c) the object’s feature is out of sight from the start. The objects are never named. (Bremner and Moore 1984: 373)

Bremner and Moore find the results in condition (a) unsurprising, but do note that responses to the block clearly show that children can attend to details of an object never seen before. In condition (b), the key findings are that “hidden feature inclusions in drawings of mugs reduces significantly after the age of six years, and there is the hint of a lower tendency to include the hidden feature of the unfamiliar object” (ibid.: 373). The results for the block in condition (c) are to be expected since children could have no idea that there was a spike. As for the mug, only two out of 30 children included the handle, thus lending “very little support to the notion that children were guided by an internal model of a mug” (ibid.) and focusing attention on the importance of naming (ibid.: 374). The presence of an internal image and its ‘activation’ through naming is not ruled out however: “[...] object naming may increase the

incidence of hidden feature inclusion, maybe because it cues the child to draw from an internal image of a cup”.

This latter question drove the design of the second experiment. In this case, only six-year-olds were studied. The same mug was used as before, placed with its handle turned out of sight, and covered with a cloth until the child was seated to draw. There were two conditions. In (a), the child was told there is “something” under the cloth, the cloth was removed, and then the experimenter pointed and said “Can you draw it for me?”. After the drawing was completed the child was asked to name the object. In (b), the object was uncovered and then children were asked to name it. A correct response (“cup” or “mug”) was affirmed and an incorrect response was corrected (“Well, you’re not quite right. It’s a drinking mug.”), after which the child was asked the same as in (a), “Can you draw it for me?”

Children were asked to name the object after making their drawing in (a) so that Bremner and Moore could judge whether children omitted the handle because they did not know what they were drawing. They expected to find more handle inclusion in (b) than in (a), as was indeed the case. These results are also simple to comprehend in numerical form. Each condition was run with 14 children. The second instance of “includes handle” repeats the first but excludes the children who did not recognize the mug.

	Includes handle		Recognizes mug		Includes handle (ii)	
	Yes	No	Yes	No	Yes	No
(a)	1	13	12	2	1	11
(b)	12	2	11	3	10	1

Table 3.2: The mug was covered so that children could not see its handle turned out of view. It was uncovered once they were seated for drawing. In condition (a) children named the mug before drawing; in (b) the mug remained unnamed until after drawing. (Bremner and Moore 1984: 375)

The distinction between the two conditions is clear: significantly more handles were included in condition (b) (ibid.). Thus, despite the fact that most children *knew* that the object was a cup, “naming the object before drawing produces a dramatic increase in inclusion of the hidden feature” (ibid.: 375). So without prior visual inspection or naming “practically all the children drew a visually realistic picture” (ibid.).

Bremner and Moore suggest two somewhat related possible explanations. One is that a request to draw something that is explicitly named is akin to the same request even when there is no external model, i.e. drawing “from imagination” (ibid.). Another possibility is that a “child’s canonical representation (or plan for graphic representation) is tagged by the object name”, an emphasis on the name leading to “execution of the canonical representation” rather than a likeness of the present model (ibid.). A call for the importance of attending to instructions (ibid.) echoes Taylor and Bacharach (1982).

Finally, Bremner and Moore search for a potential answer as to why prior visual inspection leads to more hidden feature inclusion, as for six- and seven-year-olds in condition (b) of the first experiment, whereas knowing what the object is without prior inspection, as in condition (a) of the second experiment, does not. Both of these trials excluded naming, so the key difference is prior visual inspection. Rather than appeal to Barrett and Light's different kinds of intellectual realism, Bremner and Moore (1984: 376) emphasize that young children are not incapable of producing a view-specific drawing, bound by the inevitable use of either a general or a specific mental model of some kind. Rather, they choose not to produce such a drawing, "probably because it is less informative about the [external] model" (ibid.).

Appealing to J.J. Gibson's view of perception in *The ecological approach to visual perception* (1979 in ibid.: 375), they argue for perception that is continuous, rather than "individual 'snapshots' of the world that have to be integrated" (Bremner and Moore 1984: 375). It thus seems "more natural" that children take this "temporally continuous input" and attempt to represent it on paper (ibid.). In support of this they point to some results from condition (b) of the first experiment (prior inspection but feature hidden). Of the children who included the hidden feature, half of the five-year-olds and one six-year-old made "plan view" drawings (ibid.). Examples are not provided, but this probably refers to drawings that are also sometimes termed 'folding out' drawings – the one drawing by a five-year-old in Figure 3.3 that appears to show multiple sides of the cup serves to illustrate what is meant.

Limiting a drawing to "one frozen segment" is thus a choice, one that young children do not prefer because of the limited information it conveys (ibid.: 375–376). It would appear that it takes time for children to "restrict themselves to reproducing a snapshot of reality" as they learn to conform to "adults' conventions" (ibid.: 376).

Depicting one's own viewpoint versus depicting the spatial relationships between objects in the 'array hypothesis'

Another approach informed by Gibson, in this case by the 1950 work *The perception of the visual world* (in Light and Humphreys 1981; Light and MacIntosh 1980), is what I term the 'array hypothesis'. The experiments conducted by Paul H. Light (Light and Humphreys 1981; Light and MacIntosh 1980) and his colleagues do not involve cups, but the hypothesis they developed is important to further studies that follow. These studies are related to many others that focus on how children depict occlusion, i.e., when one object is in front of another and thus partially or wholly obscures the view of the object behind it.

In ‘Depth relationships in young children’s drawings’, Light and MacIntosh provide children with two different stimuli configurations that look very similar from a fixed viewpoint, but which have different spatial relationships within the configurations. Children drew a small toy house as placed inside a glass and another as placed behind a glass. Representative results can be seen in Figure 3.4.

All children drew the house-in-a-glass configuration as contained within the lines of the

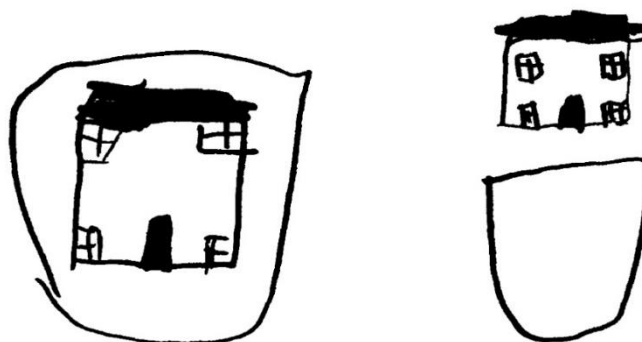


Figure 3.4: A drawing of the house inside a glass (left) and the house behind a glass (right). (Light and MacIntosh 1980: 83)

glass. Half drew the house-behind-a-glass configuration as separate entities, either in horizontal or vertical arrangement on the page. Unfortunately in this latter case there is no indication whether the other half of the children who used occlusion, drawing the house and glass as unified, truly did this in exactly the same way as their house-in-glass drawings. But, focusing on the children who drew a separate house and glass for the ‘behind’ configuration, one might be tempted to conclude that they simply wanted to avoid ambiguity between their two drawings, knowing that different spatial relationships obtain. However, Light and MacIntosh ran the experiment with some children who drew both configurations and some who were presented with only one configuration, and both versions achieved practically identical results – 100% “unified” drawings for the house in a glass versus a 50–50 split between “unified” and “separate” drawings for the house behind a glass.

The fact that all children can draw a house within the lines of the glass means that, despite the very similar appearance from their viewpoint, half of them opt to depict the different spatial arrangements of a house behind a glass in another way. Light and MacIntosh seek an alternative explanation to the ‘drawing what they know’ and ‘internal image’ of intellectual realism. They express these existing hypotheses as children’s concern about losing information about an object they know to be complete and their “production difficulties” in being able to manipulate “some kind of internal visual description” in such a way as to edit or delete parts of it that can thus be produced as an occlusion drawing on the page (ibid.: 80). Their

results show a concern with spatial relationships that is not covered by such explanations. Instead, they proffer two classes of spatial relationships that can be attended to in making a drawing, “those which are intrinsic to the array of objects and those which are purely relative to the viewpoint of an observer” (ibid.: 85). The distinction is connected to Gibson’s (1950 in ibid.) distinction of the “visual world” and the “observer’s visual field”.

A new dominance problem emerges: instead of the idea that children’s perception is dominated by their knowledge, one now finds that

The children in this phase seem to be oriented towards the constellation of objects as such and not to the perspective. They do not seem to differentiate between the visual world and the visual field but appear to be wholly dominated by the former. (Kielgast 1971: 181 in Light and MacIntosh 1980: 86)

Hence, children may interpret “instructions intended to refer to the visual field [...] as referring to the visual world” (Light and MacIntosh 1980: 86). This would mean that “one spatial relationship is as good as another” and objects placed behind one another could be drawn in any way within each other’s general vicinity (ibid.). Light and MacIntosh (ibid.) do however note that with an increase in age or emphasis on the spatial relationships, there already is some ‘order’ before occlusion is achieved in drawings: “we see a preponderance of vertical arrangements with the further object above the nearer” (ibid.). Also, there is the problem that “the supposed domination of visual field by the visual world” (ibid.) is not in evidence in picture comprehension. Hagen (1976 in ibid.) found that children’s comprehension of occlusion as a depth cue in pictures outstrips their drawing ability. Light and MacIntosh question the possible impact of the kinds of objects used: Hagen used simplified human figures that have a front and back, hence these figures also have a clear relationship with one another, but the symmetrical objects (blocks, cones) often used in drawing tasks do not have this feature.

Light and Humphreys (1981) follow up on these questions with ‘Internal spatial relationships in young children’s drawings’. In this study the array hypothesis becomes more crystallized. They used objects with a clear front and back: two painted rectangular blocks and two coloured pig figures. The long sides of the blocks were coloured: on one block, one half of the side red and the other half green; and green and black with the other block. The pigs were also coloured and placed in a configuration where the red pig “chases” the green pig. Children from the groups five, six, and seven years of age took part. Each child drew both configurations in four possible orientations. In the case of the pigs, for example, two “lateral” arrangements” (red on the left, green on the right; or rotated 180 degrees green on the left, red on the right), and then two “in depth” arrangements (the red pig’s backside occluding the green pig or the green pig’s face occluding the red pig).

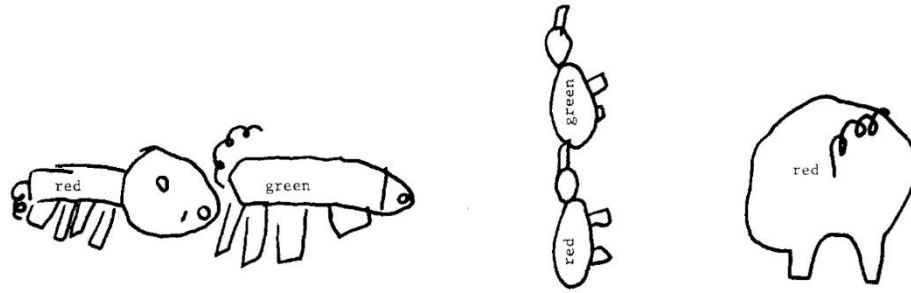


Figure 3.5: From left to right, a “horizontal”, “vertical”, and “occlusion” drawing, all drawn in response to an “in depth” arrangement of the pig figures. (Light and Humphreys 1981: 525)

The three age groups were termed “younger”, “middle”, and “older”. The “in depth” arrangements presenting a more complex problem and being of more interest for the study, these 388 drawings were categorized as “horizontal”, “vertical”, or “occlusion”. Figure 3.5 shows examples of the three categories, all drawn of the pigs in an “in depth” arrangement. With the amount of each kind of drawing taken as a percentage of all “in depth” drawings, the graph (Figure 3.6) succinctly summarizes the trends for each age group.

The horizontal drawings are taken as “highly informative as to the main feature of the objects and their relationship to one another in the array” but, simultaneously, as “completely uninformative about the position from which the child was viewing the array”. At the other extreme one finds an occlusion drawing that is highly informative of the child’s viewpoint,

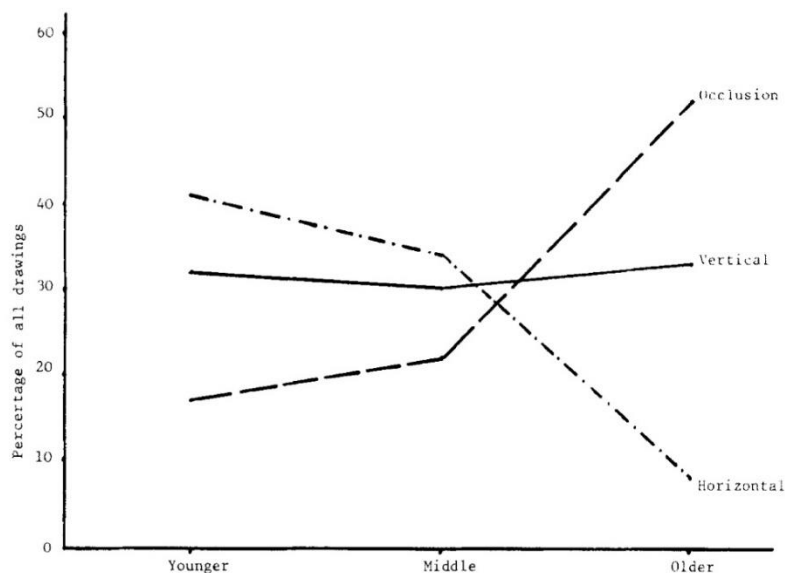


Figure 3.6: Age trends in the frequencies of the three main categories of “in depth” arrangements, with the amount of drawings expressed as a percentage of all drawings done in response to these arrangements. (Light and Humphreys 1981: 526)

but only someone who knows the array would have access to the ‘rest’ of the information. Light and Humphreys (ibid.: 529) conclude that there is a clear age-related shift from drawings that “concentrate on conveying array-specific information” toward drawings that “concentrate on conveying view-specific information”.

There was no identifiable age-related trend in the case of vertical drawings. The centre example in Figure 3.5 is representative of approximately three-quarters of these drawings, which showed the individual pigs in a side view; the other quarter showed them from the front or back. A strong bias in the vertical drawings shows the further object above the nearer one (Light and Humphreys 1981: 529). This could be regarded as a depth cue that contains “view-specific information” and perhaps functions as an “intermediary” between horizontal and occlusion drawings – some “array-specific information” is retained and some “view-specific information” is added (ibid.).

The instructions that Light and Humphreys (ibid.: 524) provided were somewhat vague or open: “I’m going to put these pigs/blocks in a special way and I want you to draw them for me”, then, after the objects were positioned, “Make me the best drawing that you can”. They thus conclude that a drawing the array and its internal relationships as clearly as possible is what younger children interpret as “best” (ibid.: 529).

Finally, they consider their results and the array hypothesis in the context of Piaget’s concept of ‘egocentrism’. Although the term would seem to suggest that the individual is concerned with mainly their own point of view, judging by *The Cambridge companion to Piaget* (Müller et al. 2009), it might depend on exactly which passage of Piaget is read. Light and Humphreys acknowledge the apparent “paradox”, but resolve it by describing egocentrism as “a lack of differentiation on the part of the child between his own point of view and those of other people” (Light and Humphreys 1981: 529 after Piaget 1962). This is shown in drawing by “a lack of concern with view-specific information”, with the absence of occlusion in drawings being one of many possible reflections of this unconcern (Light and Humphreys 1981: 529). Both Light and MacIntosh (1980) and Light and Humphreys (1981) put forward the argument that “the development of children’s drawings reflects a shift from an exclusive concern with the array itself toward consideration of the content of their visual field” (ibid.: 529).

A later picture selection study by Light and Nix (1983), “Own view” versus “good view” in a perspective-taking task’, closely mirrored the findings of the drawing studies. When children have one viewpoint of an array but are instructed to select a picture that matches a doll’s different viewpoint, they find two principles that appear to guide selection. First, the concern is to choose a picture that shows the array of objects well, and second, if there are several pictures that show the array well and your own view is among them, choose your own view

(ibid.: 482). Of course ‘viewpoint’ and ‘perspective’ are taken literally in these tasks, whereas the concept of egocentrism has much wider span into understanding other people’s thoughts and feelings more generally. Light and Nix (ibid.) conclude that “it remains an open question whether this orientation to the objective as opposed to the phenomenological is truly a general characteristic of children’s thought at this stage of development”.

Sensitivity to the context of the array may guide a choice of either ‘array-specific’ or ‘view-specific’ drawings by young children

Alyson M. Davis’ (1983) study, ‘Contextual sensitivity in young children’s drawings’, can be viewed as an example of how previous findings intermingle in one experimental design, so it is not described in great detail. Davis did not set out to study the effect of naming, but her experiments can be considered in terms of how the effect of naming and “the type of context present within the arrays” (ibid.: 478) interact.

Objects did not occlude each other in Davis’ experiments; she wanted to apply and test the array hypothesis in a different way. She investigated whether the context of a second object might influence how occluded features of a single object, a cup’s hidden handle as before, are depicted. The two conditions used in one experiment were the “single cup task” and the “paired cup task”. The single cup task is very much like the original Freeman and Janikoun (1972) study, except that no mention is made of children touching the cup. The experimenter simply placed the cup with the handle turned out of sight from the child’s viewpoint. In the paired cup task, one cup was placed with its handle clearly visible and the other was turned out of sight. The instructions included the label “cup”: “I want you to look very carefully at this/these cup/s – can you draw it/them just how it/they look from where you are sitting, don’t forget to keep looking at it/them so that you can try your best to copy exactly” (Davis 1983: 480).

The groups of four-, five-, and six-year-olds did both tasks and the presentation of tasks was balanced. The drawings were scored on whether the hidden handle was included in each task. Overall, there was a highly significant change in response between tasks: far fewer children included the hidden handle on the paired cup task. The order that the tasks were presented in was also significant: if the paired cup task was first, the fact that hidden handles were less likely to be included carried over into the single cup task. In the condition with the single cup task first and the paired cup task second, fifteen children included the hidden handle in the first, single cup task. With the tasks reversed, only two children included the hidden handle on their second task, the single cup task (table in Appendix 3).

Davis searches for an explanation for why nearly a third of the children who had the single cup task first and included the hidden handle went on to exclude it in the paired cup task.

Within the array hypothesis, she understands including the hidden handle in the single cup task as attention to array-specific information, whereas excluding it on the paired cup task reveals attention to view-specific information. The dominance of either for a child is thus an unsatisfactory explanation, because it does not explain why the different contexts would cause some children to shift. Also, the shift is not a random fluctuation, it takes place in the same direction – no children drew the hidden handle only in the paired cup task.

The hypothesis Davis (*ibid.*: 482, 485) puts forward is that the context of the array signals whether orientation is important. Some children did not “appreciate the deliberate non-canonical orientation” of the single cup, but this came to their attention when there were two cups in different orientations, yielding a “strong, visual contrast” (*ibid.*: 482). They then include only the visible handle “to preserve this contrast and thereby acknowledge their awareness of it” (*ibid.*). What was learned about the importance of context in one task can also be carried over into the next (*ibid.*: 482, 485). Based on further experiments in the study, Davis (*ibid.*: 485) also argues that both orientation differences and differences in the nature of the two objects can be noticed and indicated in drawings.

A follow-up study by Davis and Bentley (1984 in Cox 2005: 92–93) used a similar strategy, but with one cup at a time. A cup was placed with its handle in one of two orientations, in view or hidden from view, and for a second task another cup was presented on its own, this time in the other orientation. Based on the brief description in Cox (*ibid.*), results seem to be congruent with Davis (1983). What this points to is something that is often not clearly described in the drawing studies: how and when the cup is positioned might have an effect. That is, whether the cup is positioned by the researcher in a certain way while the child is watching, or whether it is positioned beforehand, and the child may just happen to glimpse the setup as they sit down to draw.

Thus, where Light and his colleagues attached concern with array-specific or view-specific relationships to a developmental trend, Davis (*ibid.*: 485) suggests it could be connected to whether or not the context within the array is important, and it could be that Davis and Bentley (1984 in Cox 2005: 92–93) identify another contextual factor in the positioning of the model. Possible developmental trends within Davis’ (1983: 485) data that she does not discuss are commented on later. Finally, Davis draws a parallel with work on language to emphasize the contextual–communicative nature of drawings. Just as a speaker in a given communication setting might “select words or enlarge sentences” (*ibid.*) to the extent required to “differentiate an object from the set of perceived *or* inferred alternatives” (Olson 1972: 139 in *ibid.*; emphasis in original), a drawing is communicative, conveying information “specific to a given situation” (Davis 1983: 485).

The significance of placement on the page and the order in which objects are drawn in young children's representation of depth

By highlighting systematic aspects of children's drawing *process*, Nigel Ingram and George Butterworth's (1989) 'The young child's representation of depth in drawing: Process and product' sheds new light on the problem of how children communicate information about objects and their spatial configuration in drawings. The researchers specifically paid attention to the order in which children drew the elements presented to them and found very specific age-related patterns.

The stimuli were two wooden blocks, a larger and a smaller one, in various spatial arrangements. These arrangements are pictured in Figure 3.7. A second experiment also included another combination, that of a small block placed inside a large block. The instruction used was "draw the objects on the table as you see them from where you are sitting" (*ibid.*: 359).

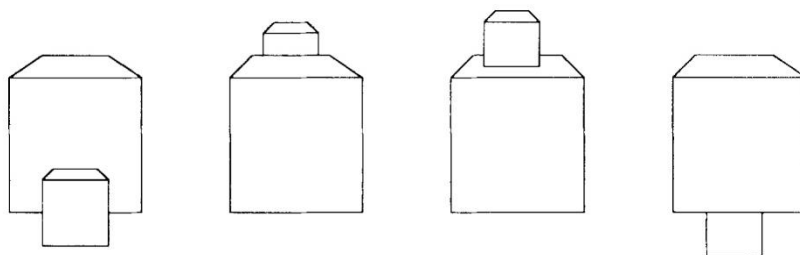


Figure 3.7: There were two "file" arrangements: a) small block in front, large block behind; and b) large block in front, small block behind; and two "pile" arrangements: c) small block on top, large block at the bottom; and d) large block on top, small block at the bottom. (Ingram and Butterworth 1989: 358)

Ingram and Butterworth studied children of three- to seven-years-old. They paid attention to the order in which the objects were drawn and asked the children to identify which block on their page referred to which block in the array. They found strong evidence for what Light and Humphreys (1981) had already noted: in the case of one model object presented behind another, a "file" arrangement in this study, objects drawn vertically on the page most often show the further object at the top, which can be considered "an elementary form of view-specificity" (Ingram and Butterworth 1989: 367). However, their investigation and its results went much further, leading them to propose that temporal order of production can convey meaning about spatial arrangements and viewpoints. This information is of course not evident when viewing only the final product of drawing.

Their key findings suggest, first, that "two temporal order rules may be available for the depiction of depth" (*ibid.*: 363). I would qualify this by saying that the first "rule" is not strictly speaking related to depth; rather, it is more concerned with the size of the objects themselves. In "file" arrangements, younger children of three or four years predominantly

drew the larger block first and the smaller block second. In most of these cases, as was mentioned above, it is vertical placement on the page that seems to follow a 'depth rule'. By six and seven years, children predominantly draw the block that is in front first. Hence, when the large block was in front as in (b), the 'rules' coincide and all the children but for a few three-year-olds drew the large block first.

Size is also the predominant factor for younger children in "pile" arrangements of stacked blocks, where the majority draw the large block first. A vertical arrangement consideration enters for older children, who predominantly draw the bottom block first, regardless of size. So, when the large block was at the bottom as in (c), all 5-, 6-, and 7-year-olds drew it first, as did more than three-quarters of 3- and 4-year-olds.

Another interesting metric was whether children drew the blocks separately, with clear space between them, or joined, be it with sides touching, or the units overlapping or contained within one another. One problem of interpretation from a reader's perspective here is that it is unclear whether the blocks were touching in the file arrangements¹¹. For present purposes I assume the blocks were always touching and, since there is no mention of the exclusion of the small block in drawings, that the small block was visible even behind the large one.

Between over 80% and 100% of 3- and 4-year-olds drew the blocks in all arrangements separately. The majority of older children did the same when the small block was in front (a), but only a quarter of seven-year-olds did so when the large block was in front (b). All seven-year-olds and almost all six-year-olds drew the blocks as somehow joined in the pile arrangements.

Temporal order of production becomes interesting when comparing responses in the second experiment to, again, the small block in front and the new condition of a small block inside a large block. Similar to Light and MacIntosh's (1980) house in a glass, the majority of children, and in fact all children between five and seven years, drew the small block in a large block as "enclosed", the lines of the large block surrounding the small block. This "enclosed" response was also recorded in 35% of the drawings of the small block in front. The difference is that when the large block actually contained the small one, 96% of these drawing processes started with the large block, but when the small block was in front and an enclosure drawing was made, all of these drawings started with the small block first. Thus drawings that look the

¹¹ The illustration that the researchers provide is misleading in that respect, since the small block in front would seem to be against the large block behind it (a), but the small block behind would have to be placed at some distance from the large block to be visible with the perspective used (b).

same in the end contain significant spatial information if the order in which the elements were drawn is taken into account.

According to Ingram and Butterworth (1989: 367), this means that all the drawings they collected could be regarded as some form of visual realism, casting doubt on Luquet's intellectual realism. The trick lay in casting the net wider to discover more of how children use the two-dimensional picture plane *while* they are drawing.

The drawing process may not have been spatiotemporally ambiguous to the children even though the eventual product is spatially ambiguous. It is interesting to note that distance in visual space is represented as lateness in time. The further the block is from the child in visual space, the higher it is up the vertical plane and the later it is drawn. (ibid.)

This study served to uncover much that was previously missed or seen as inadequacy or shortcomings in young children's drawings. By paying attention to the process rather than scoring the finished product for what was 'right' or 'wrong', Ingram and Butterworth (ibid.: 368) believe they show "young children are contextually responsive and able to represent spatial information from an object array".

Comparing young children's picture selections and drawings of the same objects

Besides studying children's drawings *or* their selection of pictures, various studies have investigated whether children choose pictures that reflect their way of drawing (e.g. Kosslyn et al. 1977; Moore 1986; Taguchi and Hirai 2003; Taylor and Bacharach 1981). One problem, which Vanessa Moore (1986) also points out, is that stimulus pictures prepared by researchers may not reflect how children would have drawn the stimulus objects. This is true of Stephen M. Kosslyn, Karen H. Heldmeyer, and Eileen P. Locklear's (1977) study, which was then further complicated by a struggle to match drawings and stimulus pictures within a precarious intellectual and visual realism framework. Another problem, one that is present in Moore's (1986) own study in my opinion, is that too many stimulus pictures are used. Consequently, differences between pictures are so subtle that they need to be pointed out, and the options can only be presented as pairs rather than one set, requiring complicated statistical analysis in the end. Ultimately, results of these kinds of studies lean in one of two directions. Either children's drawings are not taken as a good index of their "internal representations" (Kosslyn et al. 1977), or a correlation between how they draw and the pictures they prefer is found (Moore 1986). Of course, as may be evident, researchers are not always asking exactly the same question.

In ‘Planning and drawing of occluded objects by young children’, Masanori Taguchi and Seiya Hirai’s (2003) frame the pre-prepared pictures of two cups, of models placed one in front of the other, as “drawing plans” rather than asking children what they thought was the “best” depiction (Kosslyn et al. 1977; Moore 1986). Taguchi and Hirai (2003) question whether children have a plan that is derailed by their drawing skills or whether drawings basically come out as intended. Half of their participants had to choose a “plan” before drawing, and half had to choose it after drawing. The cups were arranged in “partial occlusion” or “total occlusion” (Figure 3.8). Children were asked, “If you draw the cups as you see them, how would you draw them? Please select one of these five picture cards which looks closest to what you want(ed) to draw” (ibid.: 911). The instruction for drawing was: “Please draw these



Figure 3.8: Arrows indicate the child’s point of view of the “partial occlusion” condition (left) and the “total occlusion” condition (right). (Taguchi and Hirai 2003: 911)

cups as you see them” (ibid.: 911–912). No mention is made of whether order of task presentation was somehow significant. By contrast, Kosslyn et al. (1977) offer interesting remarks on how some children who first saw the stimulus pictures asked to see them again when their turn to make a drawing came around. Some children seemed aware that a ‘better’ way of making the drawing existed, but they also knew that they were not able to draw in that way.

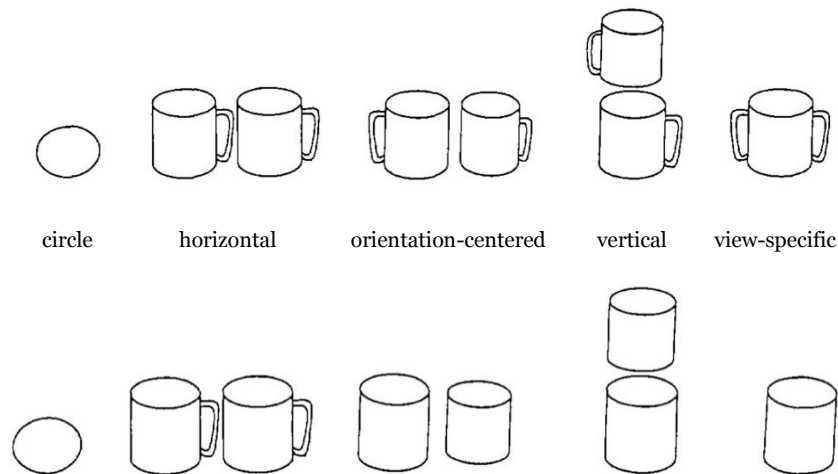


Figure 3.9: Picture cards and classification categories for the partial occlusion condition (top) and total occlusion condition (bottom). (Taguchi and Hirai 2003: 912)

However, compared to Kosslyn et al. (*ibid.*), the ‘tidy’ nature of Taguchi and Hirai’s (2003) study is appealing, because children’s drawings are categorized according to exactly the same possibilities as the picture stimuli offered. Unfortunately, the total occlusion condition has a potential ambiguity: the “circle” option and the “view-specific” option could conceivably look similar in some drawings (Figure 3.9). This might be why the raters’ classifications agreed by only 86%. This figure might seem high enough, but it is usually much higher in other studies. It means that for each group of almost 30 children of the ages four, five, and six years, the classification of three or four drawings had to be settled by discussion. Given that some categories are only allocated a few drawings in the results, such ambiguity could very much skew the overall impression.

Other details that are not mentioned include how children who made a “vertical” drawing in the “partial occlusion” condition oriented the handles of the cups and whether it always agreed with the picture for selection, and to what extent the researchers expected to see and saw size differences between the cups as in the pictures. Be that as it may, the final conclusions made by Taguchi and Hirai (*ibid.*: 913–914) are that their results are consistent with Light and his colleagues’ (Light and Humphreys 1981; Light and MacIntosh 1980) contention that children are concerned with representing the relations of the objects in the array and that “children select a picture card most similar to their own drawn products” (as also in Moore 1986). Hence, children are not limited by their drawing skills but act according to their intentions or “the representation of their planning” (Taguchi and Hirai 2003: 914).

3.2.3. Concluding remarks

Many more studies have been conducted, but more than enough material for further analysis has been presented. A few points regarding general trends throughout the works as well as studies that are excluded from detailed description are clarified here before moving on to Section 3.3.

A characteristic of a number of the studies, as part of a slow distancing from intellectual realism, is a decreasing interest in age-related, apparently developmental changes and an increasing interest in experimental design factors that influence outcomes, what broadly comes down to social and communicative concerns. Light and MacIntosh (1980) studied only one age group to begin with. More focused investigation of a particular factor in the second experiment of a study with a much narrower age group can be seen in both Davis (1983) and Bremner and Moore (1984). This trend is epitomized by Charlie Lewis, Claire Russell, and Damon Berridge's (1993) 'When is a mug not a mug? Effects of content, naming, and instructions on children's drawings'. These authors explore how naming ("glass" versus "mug" versus simply "this"), the contents of the vessel, like milk or a sponge (a factor already introduced by Davis 1984), and the explicitness of task instructions can influence outcomes. While the significant effect of each factor is duly noted, the children studied were all between five years and five years and eleven months old. Hence, there is no evidence that the impact of the various factors would not look different for another age group. Lewis et al. (1993: 291) suggest that "what children produce in studies of 'drawing' may well simply inform us about the development of an understanding of adults' communicative intent". While this is no doubt key, data that spans age groups seems hardly entirely reducible to this single consideration. Indeed, Sutton and Rose (1998 in Cox 2005: 91) found that explicitly instructing children to look at the model, compared to less explicit instructions, had a big effect on how much six-year-olds looked at the model and on their resulting drawings. By contrast, there was no comparable effect for four-year-olds, and eight-year-olds drew "visually realistic pictures irrespective of the detail in the instructions" (ibid. after Sutton and Rose 1998). Thus, rather than stress only one dimension, it seems necessary to achieve some balance between the developmental and the social or communicative.

The balancing of the developmental and social dimensions would probably be easier to achieve within a workable theoretical framework, but such a framework is lacking. Much of the research cited here has gone into questioning and dismantling the intellectual versus visual realism paradigm, and many interesting and important findings have resulted. Some shift in emphasis from products of drawing to the drawing process (e.g. Ingram and Butterworth 1989) has also been fruitful. However, without a model that pulls together the various incremental discoveries and advances, studies continue to be based on unproductive assumptions.

In the case of Delphine Picard and Karine Durand's (2005) 'Are young children's drawings canonically biased?', for example, one finds the following suggestion:

Most studies have assumed that erroneous drawings reflected a canonical bias in young children, but *no* study has collected children's canonical drawings to ensure that the bias is due to their canonical representations. [...] Introducing a free-drawing task prior to copying could provide information about the nature of the canonical representation in children's minds, and this could further be used to determine the nature of their copying errors. (ibid.: 51; my emphasis)

The astute reader may recall that the collection of "canonical drawings" with a "free-drawing task" was exactly how Freeman and Janikoun started their draw-a-cup experiment in 1972.

Furthermore, it is disconcerting to see how many good ideas have not caught on, perhaps – again – for the lack of unity, and how many less nuanced ideas have stuck around. Picard and Durand's (2005) chosen model is a saucepan, and part of their analysis hinges on the direction in which its handle points outward in the children's drawings – first in their free drawings and then in their drawings of model stimuli (Appendix 4). Many children draw a simple round shape with a handle pointing out in some direction. Recalling Arnheim's (1954, 1974) explanation of the two-dimensional logic applied to the picture plane, this round shape cannot be taken as a particular surface of the saucepan, and thus it follows that the handle is not pointing in a strictly identifiable direction – to the front, back, or side – in a free drawing. Of course, the direction may become significant in relation to a particular stimulus. Picard and Durand (2005: 60) found "a preference for mentally representing the handle at the top when it was known to be at the back and for mentally representing the handle at the bottom when it was known to be at the front". If the studies cited previously have shown anything, it is that these are potentially legitimate, sensible, and logical ways of drawing the stimulus. Taking a drawing as a "print out" of a mental model (Thomas and Silk 1990), however, leads to the incautious assumption (or conclusion!) that "knowledge can intrude in the depiction process and provoke drawing errors of a canonical type" (Picard and Durand 2005: 61). On the one hand, Picard and Durand (ibid.: 61–62) argue that the traditional view of intellectual and visual realism needs to be revised, because their results indicate varying flexibility of the mental model or "canonical representation" depending on the nature of the stimuli. On the other hand, it has not occurred to them that mental models which "mediate between the children's perception of an external model of [an] object and their drawings of that object" (ibid.: 61), as suggested by Luquet (2001[1927]), is a framework that has already been substantially altered – if not dismantled – since 1927.

The analysis that follows in Section 3.3 aims to find commonalities in the various factors introduced in experimental designs that yield results inconsistent with a strict stage progres-

sion from intellectual realism to visual realism. Focusing on the picture–object relation within a semiotic framework allows one to postulate that differences between how younger and older children draw may be traceable to changes in this relation. The mental model may have a role to play, but it cannot be the axis around which all theory pivots.

3.3. Analysis

3.3.1. Aspects of experimental designs that influence children’s drawings and their attempted explanations

Over time, the experimental approach has altered, diluted, or backgrounded intellectual realism in favour of various factors that influence how children respond to drawings tasks. In the preceding section (3.2), a number of factors that interfere with the notion that children draw what they know and not what they see were identified. Indeed, whether or not children produced a so-called ‘visually realistic’ drawing seemed to be almost wholly dependent on the context and demands of the task. However, studies honing in on factors often limited their investigations to narrower age ranges and did not conduct cross-group experiments. The factors are summarized below before a semiotic model for considering them more holistically is introduced.

Data collected from age groups some years apart or over an age group range consistently showed significant change with age, but a dominant mental model in younger children did not seem to explain everything. Sometimes the mental model notion had to be supplemented, sometimes countered. Freeman and Janikoun suggested a concern to make a recognizable drawing within limited graphic skills, i.e. communicative considerations in the drawing process. Taylor and Bacharach suggested “drawing rules” that avoid certain ambiguities in the drawing product may interfere with “visual accuracy” and found that naming and/or making a free drawing of a particular object before an observational task may introduce a response bias when two objects compete for depiction within a drawing rule. Bremner and Moore also investigated naming, where they found a dramatic effect in one age group. A possible explanation offered was that the mental model is “tagged” by the verbal label. They also found prior inspection of the object to have a hidden feature inclusion effect, but not for all ages tested. Light and his colleagues introduced a new influential distinction based on Gibson: drawings that show array-specific and view-specific information. Not intent on proposing a new version of intellectual realism, they emphasize the different communicative intent that young children seem to have. Davis found the distinction useful, but showed that what children seem to choose to communicate about an array is not only tied to an age-related development from producing array-specific to view-specific drawings; rather, children seemed sensitive to whether the array contained information that emphasized the importance of view specificity.

Ingram and Butterworth found that object-related and spatial information is systematically encoded in the drawing process, even if the product yields no evidence of it. Taguchi and Hirai confirmed previous suggestions that children draw like they do not because of certain limitations, but because they have and follow a “drawing plan”. Picard and Durand signified a strong return to much the same arguments put forward by Luquet, only with the qualification that mental models or internal “canonical representations” would appear to be more flexible than previously thought.

I suggested a potentially influential factor often not clearly described, namely whether or not the child witnesses the positioning of the object. Other factors sometimes mentioned and sometimes not mentioned but not tested in their own right include the use of erasers, the use of colour, the time available, and whether children do and/or are allowed to turn the page.

The question now is whether the researchers within their various frameworks and experimental designs have unearthed data that have commonalities and, if so, how these might be productively considered. One problem in reanalyzing data is the small number of participants in some conditions of experiments. All that follows is thus offered with the qualification that what may appear to be a trend or statistically significant could prove quite different if truly adequate sample sizes were tested. This general shortcoming notwithstanding, it makes sense to base and test new potential hypotheses on existing data before collecting more.

3.3.2. A semiotic model of picture–object relations

Chapter 2 concluded with a rough sketch of the model to be implemented here. It is likely neither complete nor perfect, but it aims to take into account all the available evidence from the studies described, broadly fitting the various factors identified within a model of how children treat picture–object relations. Some evidence from sources mentioned in Chapter 1 offer additional support for my arguments.

The model postulates that children start off with a fairly broad conception of what a picture is. This notion is supported by Thomas, Nye, Rowley, and Robinson’s (2001 in Cox 2005: 9–10) study, which found younger children much more open to labelling diverse things as pictures. Children were given a variety of objects, models, and pictures and asked to point to the ones that are “just pictures”.

Three- and 4-year-olds judged that real objects such as a packet of crisps or a candy-bar are not pictures. Nonetheless, what they did regard as pictures is quite wide – colour photographs of real objects, line drawings of recognisable objects as well as nonsense objects, drawings of an abstract irregular shape, a drawing of a circle bisected by a wavy line, complex abstract forms and repeated patterns. At age 6 to 8 years children made exactly the same judgements except that a few had doubts about the patterns and were not inclined to accept them as pictures. By age 9 to 10 years there was a distinct change in children’s judgements: with regard

to the drawings, nearly all of them regarded the realistic drawings of objects as pictures; however, rather few accepted the abstract pictures, the patterns or the drawings of nonsense objects. (Thomas et al. 2001 in *ibid.*)

In conjunction with the broad conception of what a picture is, is the broad conception of what and how aspects of the world can be depicted in it. Based on the data, I mainly refer to the aspects of an object or objects, but there are other related possibilities, such as events that unfold over time. Although pictures generally and drawings specifically made by a child are related, the nature of drawing, a process engaged in over a span of time, also sets what is to be discussed somewhat apart. I do however refer to drawings as “pictures” in what follows; drawings *per se* are emphasized where necessary.

Three processes act and interact between the object and the picture: following Lenninger, iconization and conventionalization, and, following Arnheim, the development of mark-making means and meanings, as in the law of differentiation. Mark-making involves motor skills and coordination as well as the materials and medium. Its development is partly tied to development in general, for example as fine-motor skills improve over time and more differentiated marks and shapes become possible. There is also an element of practice and familiarity with the medium: older children or adults unfamiliar with drawing may start out with scribbles and basic shapes before rapidly working through various ways of depicting something (Fortes 1940, 1981; Court 1982; Andersson and Andersson 1997 in Golomb 2003); an artist tests out a new pen, brush, ink, or paint in much the same way – indeed the scribble pad at the stationer’s is there for everyone to try out the ‘feel’ of a pen before buying it.

The original impetus to make representational drawings may come from both iconization and conventionalization. Conventionalization features in the connection of mark-making with the possibility of it being something else, as when a child is questioned about a drawing – “What is it?” – regardless of whether they intended it to be something. There is also part conventionalization and part iconization in the communicative role of other representational pictures and drawings and the perceptual similarities they are based on. Iconization as somewhat more ‘isolated’ can be seen in what Luquet termed ‘fortuitous realism’ (Section 1.3), when children apparently start to see representational potential in shapes they have created. Kress (1997: 31–32) offers such an example, when a four-year-old girl cut a shape from some folded paper, unfolded it, and uttered somewhat surprised “My Gawd, I made it like Australia!” Despite the somewhat accidental nature of this creation, Kress (*ibid.*: 32) emphasizes the child’s agency in creating something and reading meaning into it. No doubt iconization and conventionalization work closely together in this regard.

The possibility of representation being established, iconization serves to monitor similarities between marks and objects and/or marks and existing drawings of objects. A child may

try out various options, sometimes using a fixed schema for a while before it may require re-organization to accommodate more features or different kinds of details. However, drawings are of course also received by others and become comparable with other pictures, and children may watch others draw or draw with them. Of the many ways that something could be drawn, it is thus perhaps unsurprising that certain ways become privileged in a child's own drawings when they are already established, and hence easily understood or found pleasing, in the culture – be it among playmates, in picture books and comics, or countless other resources and interactions.

The picture–object semiotic model is different from the stage account of intellectual realism and visual realism in a number of ways. As Picard and Durand put it, drawing according to intellectual realism means that a “canonical representation” (or mental model, or similar) mediates between the object and the picture. A transition to visual realism entails being less ‘blocked’ by this mental model and utilizing information from perception itself. This was also articulated in Costall's (2001: xi) paraphrase of many theories regarding “how the innocent vision of the child comes to be repressed in their drawings”, i.e. how what should be ‘picture perfect’ perception that could flow onto the page is somehow corrupted by knowledge.

Here, in this semiotic approach, I want to emphasize that how a picture and object relate is different for children and adults. The approach is focused on the objects, drawings, and the drawing process itself. The intention is to keep inferences of how the picture and object elements and the drawing process differ at different ages close to the available evidence. My contention is that the visual realism ideal against which children's drawings are measured in experiments is one very specific kind of picture–object relation. In such a picture, only *visual* attributes of the object are relevant. More narrowly, only visual attributes as seen from a single fixed viewpoint are relevant. These attributes from a specific angle must be fixed and observable in the final product of the drawing. This convention is a specific picture–object relation, taken from perhaps countless possible relations, and fixed within what seems to function perceptually and within the relevant culture. Based purely on similarities that can be perceived between lines on the page and an object, many other possible relations exist. The young child has not yet differentiated the object to be depicted into only the specifics of its visual characteristics and has not yet limited the picture plane to a place for depicting single viewpoints.

Both the hypothesis that opposes intellectual realism to visual realism and the hypothesis that opposes array-specific drawings to view-specific drawings have the underlying idea that more becomes less. In intellectual realism, more information than is present in a single viewpoint is supposedly accessed via the mental model and put into the drawing. More knowledge

dominates less perception and the child theoretically develops toward visual realism by overcoming this dominance. An array-specific drawing is supposedly evidence that children are dominated by the visual world rather than the visual field. More perception dominates less perception.

The difference between being “oriented towards the constellation of objects as such and not to the perspective” and being oriented towards the perspective and not the objects as such (Kielgast 1971: 181 in Light and MacIntosh 1980: 86) perhaps should not be considered as starkly. Following Arnheim, the difference is between a more general view and a more specific view. As the object and the picture mutually constitute one another, within the changing possibilities available in mark-making, iconization, and conventionalization, more and more specific options for depicting specific subsets of information emerge. A view-specific drawing gives very specific information about the viewpoint, but says nothing about the objects that are not visible in that drawing. An aerial map gives very specific information about the objects in relation to each other and their top views, but says nothing about other sides of the object – only the sides and not the tops of the coloured blocks in Light and Humphreys were painted. From the adult point of view, children may appear to be mixing viewpoints, but that would entail them knowing the various possibilities, taking parts of each, and putting it back together. Rather, it seems that children are working with their own general idea of how the picture can show the traits and spatial arrangement of the objects, an idea that gradually develops into various separate and more specific ideas. The notion that children are oriented towards the constellation of objects as such has some value. Unarmed with a specific idea of how a particular picture convention can guide the selection of particular parts or views of an object, the children are still negotiating between the three-dimensional object and the two-dimensional picture to see what is possible, and it may be that a lack of picture convention limitations allows the object to dictate more about itself more ‘loudly’. It may also be that the earlier two-dimensional logic is more general or looser in some respects, allowing for what appears as mixed viewpoints from the point of view of more narrow conventions. Working from a somewhat established, albeit very general, picture convention, children try out various paths on the road to understanding and achieving other more specific conventions.

Picard and Durand argued that children’s mental models or “canonical representations” might be more flexible than previously thought. They claim that using different kinds of stimuli (Appendix 4), from an actual three-dimensional model of a saucepan, through pictures with more depth cues, to a plain two-dimensional line drawing, affects how much the mental model is used. Specifically, they suggest that pictures of their model saucepan in a noncanonical orientation “globally acted to undermine the probability that [their partici-

pants] rely on knowledge-based representations” (Picard and Durand 2005: 61). With the model of this thesis, I propose that their results are better interpreted in terms of picture–object relations and, as it happens, picture–picture-of-object relations.

In response to all three types of picture stimuli that showed the “back view” of the saucepan (no handle in sight), they received almost entirely view-specific drawings from the children aged four, five, and six years. The object (here, a picture of an object) does in fact not have a handle. The very few handle inclusions could be put down to effects hypothesized and tested before, notably having made a free drawing of a saucepan in the beginning and the fact that the object is named. A few of the younger children may thus ‘erroneously’ impose a communicative picture requirement on how they depict the object. I posit that drawing for recognition by others within one’s mark-making ability is probably a very early sort of picture convention. There are roots in iconization – noticing potential similarities between marks produced and objects – and in conventionalization –the awareness that one’s own drawings, like other pictures, can refer to something and the “What is it?” (What does it represent?) question. For the majority of the children who omitted the handle that is not in the picture stimulus, another convention is coming ‘on line’. For them, a picture–real-object relation and a picture–picture-of-an-object relation is different in that the picture of an object *as* an object model strongly dictates picture-related information and conventions that are easily translated into another picture.

The “front view” that shows the handle does prove more ‘challenging’. In response to the photographic picture stimuli with the handle partly ‘contained’ within the outer surface of the saucepan and partly sticking up above it, a fair amount of “canonical errors” and “noncanonical errors” resulted, more for younger and fewer for older children. For present purposes the errors can be regarded as of one kind: the handle sticks out in some direction, probably from an ‘outer edge’ line of the pot. So now that the picture of an object does have a handle, the details of a photographic image must be translated into lines. The arrested picture seems to assist many of the older children in creating their drawing, but not the younger children. The younger children are more aided by the line drawing stimulus of the front view. This stimulus is already exactly like the outcome desired of the children’s drawings: the perspective is fixed and it is drawn in lines. What all six-year-olds, almost all five-year-olds, and half of the four-year-olds would seem to understand is that the stimulus is exactly the kind of fixed-view drawing that the task demands, and it is already in lines, so the lines can just be copied. The object and the picture are essentially the same. Two things might have ‘hindered’ half of the four-year-olds. There is the aforementioned free drawing and/or naming bias, but this does not quite explain the difference in errors between back view and front view drawings for the

line drawing stimulus. Perhaps a contributing factor is that the handle shape that interrupts and is partly contained by the saucepan outline violates two-dimensional ‘drawing rules’. These ‘rules’ can be considered as an early picture convention of their own, a convention of what does and does not work in the two-dimensional logic Arnheim described. So some younger children, also knowing what the object is, are guided by their two-dimensional convention: the handle is better attached to the outside edge of a shape that signifies the entire volume of the pot. The picture of an object is indeed altered by knowledge when the drawing of it is created, but it is not knowledge in the form of an internal canonical representation that dictates how saucepan handles point out to the side. Indeed knowledge that it is a saucepan in the picture and not just lines on paper is important – if they were simply taken as lines then the lines could be copied (as would seem to be suggested by Cox 1992 in Taguchi and Hirai 2003). But working from the knowledge that the stimulus is a saucepan, and working without solid knowledge of single viewpoint conventions, the stimulus must be translated into a good line drawing, as is dictated by the prevailing two-dimensional logic on the picture side of the picture–object relation.

Taylor and Bacharach observed an absence of this conflict. Having named neither the cup nor the flower, younger children in the flower-on-cup condition drew either object with equal frequency in apparent deference to not violating the ‘containment rule’. Without command of a three-dimensional solution like the older children have (Figure 3.3), the picture dictated that the flower could not be drawn within the lines of a cup, because this means “inside”. Lacking any emphasis on either object, the picture could dictate that either one of the two objects simply be left out. A child who seems to find both objects important but is still without a three-dimensional solution might devise a ‘plan view’ solution like in Figure 3.3. Both objects demand to be depicted in the picture, but the picture only holds two-dimensional possibilities, so in the picture–object mutual constitution, the object folds out to reveal multiple surfaces in two dimensions, one of which can carry the flower.

A problem in many of the studies, which Taylor and Bacharach seem to pick up on in their own work to some extent, is that categories for judging drawings fail to take into account how children use the picture plane. Many flower-in-cup drawings drawn with the two-dimensional containment method are thus judged as flower-on-cup drawings by the raters, who of course only look at the final drawings without other information. Certain categories thus quite rightly had to be collapsed for statistical analysis to build in enough leniency for these kinds of drawings post hoc.

Another problem that comes up more often than not is that it is risky to draw conclusions based on the often tiny groups of participants within a particular condition. This caveat is al-

ways kept in mind, but one can at least examine whether the numbers, small as they are, plausibly fit a particular explanation. Interesting in Taylor and Bacharach's broken handle experiment is how inclusion of the not-in-view intact handle and the not-in-view broken handle are very similar for eight-year-olds, but not so for five-year-olds (Appendix 2). Three out of seven eight-year-olds include a handle or broken handle that is not in view. Barring a rating anomaly in what one has to assume was an ambiguous drawing, the rest of the eight-year-olds leave the not-in-view handle or broken handle out. With the five-year-olds, most children also do not draw the not-in-view handle, be it intact or broken, but when the broken handle is not in view two children who do draw a handle draw an *intact* handle. A few five-year-olds also draw the in-view broken handle as intact. Unfortunately some verbal responses as to why handles were included are pooled across conditions, so it is impossible to tell where which responses fit. Besides no verbal response, there were "conventional answers" such as "I just like to draw it that way" and "functional answers" such as "if there's no handle you can't carry it" (Taylor and Bacharach 1982: 326). Even though the object was not named, Taylor and Bacharach handed children the object before positioning it for drawing, and recognizing a cup may have a comparable effect to naming the object for some children. A "functional" concern may indicate that aspects important to the object, including non-visible aspects or even aspects of the object that have been altered from its normal form, determine what happens in the picture. In a manner of speaking, the picture is a better version of the object than the object itself, not unlike how younger children in Picard and Durand 'improved' the line drawing stimulus in their own versions according to their rules. A "conventional" concern is not all that different, albeit phrased differently in children's responses: a serviceable way to draw this kind of object exists, so discrepancies in the model might as well be ignored in favour of a good picture. This picture, at least to some children, need not be an *exact* here-and-now representation of the model for a picture-object relation to exist.

The fact that children may draw an intact handle where they know the handle is broken somewhat challenges Bremner and Moore's (1984: 376) suggestion that children may use information gained from continuous perception, choosing not to produce a view-specific drawing of a frozen moment "because it is less informative about the model". I contend that children tend to opt for what would seem to be the more 'informative' drawing because this is closer to a convention they already command. Expressing it as a choice would seem to suggest full knowledge of the viable possibilities and conscious selection of one for explicit reasons. I am not arguing that children flail about in ignorance; I am simply arguing that at certain times some possibilities are more established and familiar than others. Overall the evidence would seem to suggest that five- and six-year-olds are becoming aware of differentiated possibilities of the picture plane – possibilities that the picture can represent in different

and more specific ways. They are also able to respond to more specific conventions, but being on uncertain ground means they are highly impressionable when it comes to details of the task setup.

Bremner and Moore obtain results from a group of six-year-olds that shows a dramatic naming effect. The basis for this has already been introduced. In the picture–object relation, naming the object can be considered as the picture determining that the object needs to be recognizable to others as that thing that it was named as. Hence, what is included of the object complies with this requirement from the picture dimension – a socio-communicative requirement different from and probably developmentally prior to understanding the visual realism convention. Depending on the experiment, there might be competition between the conventions, especially for children aware of both possibilities but not equally familiar with them. Bremner and Moore probably managed to underscore the idea that view-specificity is important and hidden feature inclusion is undesirable both by not naming the object and by covering up the object.

As was mentioned in relation to the one visual example of a folding out drawing or a “plan view” (ibid.: 375) in Taylor and Bacharach (Figure 3.3), children might devise ways within their drawing means of answering to conflicting parts of the task. Children could inspect the cup or block with a spike in condition (b) of Bremner and Moore’s first experiment before the object was positioned with its feature out of sight. This “prior visual inspection” might also aptly be called visual *and* tactile inspection: children quite possibly gain information differently from simply watching someone else handle the object. In support of a view-specific drawing in this condition, there is the fact that the object is positioned with its feature out of sight and the object is not named. Nine out of ten seven-year-olds respond in kind. But in conflict with these factors is the prior inspection of the object. Half of five- and six-year-olds include the hidden feature. Potentially noteworthy among the inclusions is that just over a quarter of them are “plan views”, but this kind of drawing did not emerge in response to any other condition (ibid.) – none of which included prior inspection. So a few children seem to have experimented with what they experienced of the object, while acknowledging that it has many sides. In the picture–object relation there is some awareness that the side from which the object is viewed is important, but the object’s features as experienced also seem important. A plan-view drawing then answers to both a communicative drawing and a view-specific drawing convention while simultaneously answering to neither. In a sense, it is a convention in its own right, with its own uses.

Davis (1983) provided another competing situation of interest. Her task included naming the object, but it also included the context of the two cups being oriented differently. As she

noted, order of task presentation was significant: fewer children included the hidden handle of a single cup if they had drawn the paired cups before the single cup. Bremner and Moore (1984) showed that six-year-olds were far more likely to include the hidden handle on a single cup if the cup was named beforehand. In Davis, the contextual detail offered by the orientation of the two cups in relation to each other seems to mitigate the naming factor. Also, notably, the power of this contextual detail may be age related. Again, the number of participants is very small, but I nonetheless offer at least a potential interpretation. When first presented with the single cup task, most four-year-olds include the hidden handle on both tasks, most five-year-olds include it only on the single cup task, and most six-year-olds include it on neither task. Inclusion on both tasks can be taken as no response to the context – and perhaps the strong effect of naming. Inclusion on neither task, with the single cup first, can be taken as good understanding of the visual realism convention that the task asks for. Inclusion on the single cup task only shows the shift from naming and/or less consideration of the orientation to sensitivity to the context of the cups' orientation. The five-year-olds, in the single cup task first condition, appear most affected by the context of the second cup.

In the paired cup task first condition, five-year-olds and six-year-olds respond very much the same, and very comparably to how six-year-olds responded in the single-cup-task-first condition. Context challenged naming and/or contributed to attention being paid to the orientation from the start, also carrying over into the second task. A number of four-year-olds remain 'immune' to the context, but some also respond to it. Recalling that the two conditions are separate groups, it is interesting to note that comparable amounts of children who responded to the context in the first condition, i.e. drew the hidden handle only on the single cup task, are 'missing' from that option and 'added' to the children who drew the hidden handle on neither task in the second condition.

So, for some children naming has the effect of foregrounding a communicative picture requirement, while for others the positioning of the cup and the instructions that encourage observation and view-specificity signal that a visually realistic depiction is more apt. Older children appear to be more familiar with the latter possibility and are thus already likely to respond in kind. Despite factors encouraging a communicative drawing, some younger children realize that a visual realism convention is what is *actually* required. In the mutual constitution of the picture and the object, a clear cue in the objects' arrangement calls for view specificity and this is what the researcher is explicitly saying. Coupled with at least basic awareness of the convention she might be talking about and what the objects themselves seem to signal ultimately overshadows the fact that the objects were named. The significance of the order of task presentation means that paying attention to the array versus the view is

not a rigid division by age. The object itself can ‘call out’ to be represented in a particular way, especially so in a case like this with a clear contrast, but a developmental trend in noticing how this factor matches well with a particular picture convention is still observable.

What the objects themselves would seem to contribute for children of different ages is perhaps most clear in Ingram and Butterworth (1989). In contrast to many other studies of geometrical objects in occluded depth arrangements (e.g. Light and MacIntosh 1980; Light and Simmons 1983), Ingram and Butterworth collect very few horizontal drawings as responses. The key difference would appear to be that their two blocks are of different sizes, as opposed to pairs of balls or funnels of different colours but of equal size. Considering, for example, the small block in front of the large block, the fact that both are visible, even though the front one partly obscures the back one, is exactly a function of the size difference. Rather than depicting two objects that are unremarkable in their relation to one another in a horizontal drawing, even the youngest children are already encouraged to make vertical drawings. Arranging objects vertically on the page is a useful early depth convention. Since most children who use it draw the further block at the top, it also makes sense in terms of the drawer’s relation to the page and to the objects: the top of the page is further from the drawer’s body, just like the further object. Again, some aspects of the array-specific versus view-specific distinction have value if considered in tandem with picture–object relations. A view-specific drawing determines the appearance of the objects from a fixed viewpoint picture convention. Vertical arrangement of objects in depth suits two-dimensional means, but could also be considered as more determined by the objects – although probably not as specific as an aerial view, a vertical drawing is in some ways more ‘at one’ with the objects in their space.

Order of production is perhaps the most interesting part of Ingram and Butterworth’s findings. Already Light and Macintosh (1980) found that three-quarters of drawings of their horizontal or vertical drawings of a depth arrangement of funnels started with the nearer funnel¹². The fact that there is systematic use of the option to draw a particular object first, at least while someone is watching, indicates that the picture is not yet conceived of only in terms of the final product. Information can be encoded processually, meaning that the picture as it comes into being is in relation to its object throughout.

The dynamism of an object, action, or event can also be encoded in the drawing process and product. Here it might be that a story is told as the drawing unfolds, or that the drawing product is supported by necessary verbal explanation. Indeed these possibilities exist as more

¹² Light and Simmons (1983) observed a similar order effect in a control condition, but not when children knew that another child was going to use the drawing for a game in their absence. This is purely speculative, but even the significance of production order may be tied to the researcher watching the child while he or she draws.

narrowly differentiated conventions of all sorts. So a drawing product that is ambiguous in terms of how many events are depicted can go in many directions. Children’s television programmes may tell a story as someone draws it or the camera pans across static images. Picture books separate events over many pages, but keep them together in the bound format. Comics and cartoons split events over panels and pages and usually add information in text. These media also have conventional means for depicting action, movement, and sound.

In the tug of war between whether or not intellectual and visual realism forms a tenable framework, some studies seem wary of attributing more ‘advanced’ abilities to picture selection or preference than production. The argument in Taguchi and Hirai (Taguchi and Hirai 2003) and others is that children plan to draw the way that they do and/or prefer drawings similar to their own. A reanalysis of Taguchi and Hirai’s data (figures below and Appendix 5) shows that this is not true for all participating ages. I include only the partial occlusion planning and drawing tasks, because of the previously discussed problems of ambiguity in the total occlusion task.

Four-year-olds (Figure 3.10) overwhelmingly produced horizontal drawings, followed by far fewer circle drawings in second place. By contrast, their choices for a “drawing plan” are spread quite evenly across four of the five options. With six-year-olds (Figure 3.11), on the other hand, choices and drawings seem to match closely. View-specific drawings and picture selections lead the pack, with the vertical option in a much lower second place.

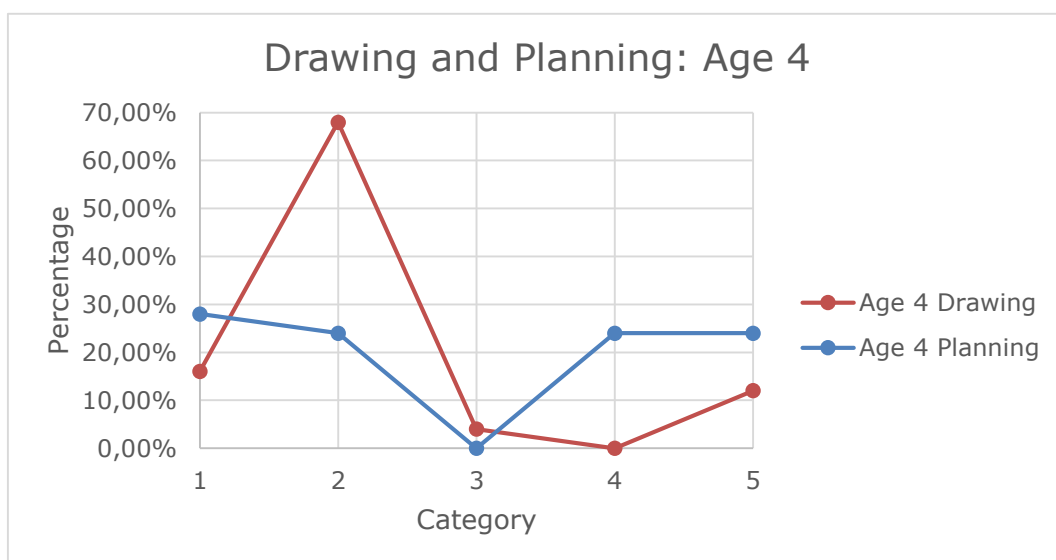


Figure 3.10: Data from Taguchi and Hirai (2003) are reanalyzed. The categories are cricle (1); horizontal (2); orientation-centered (3); vertical (4); and view-specific (5). Twenty-five four-year-olds took part. Their drawings (red) and picture choices (blue) are expressed as a percentage of the total.

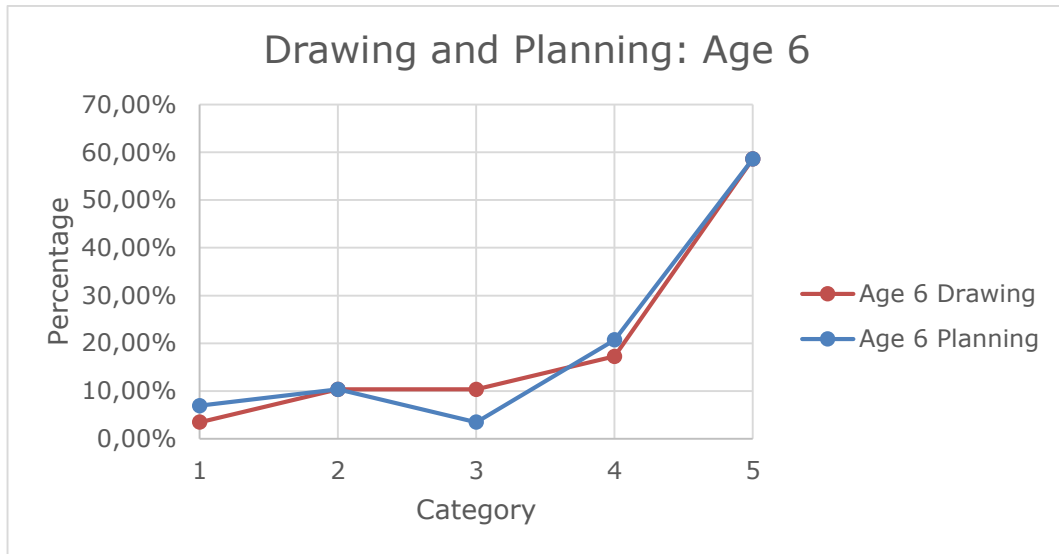


Figure 3.11: Data from Taguchi and Hirai (2003) are reanalyzed. The categories are cricle (1); horizontal (2); orientation-centered (3); vertical (4); and view-specific (5). Twenty-nine six-year-olds took part. Their drawings (red) and picture choices (blue) are expressed as a percentage of the total.

One could argue that the four-year-olds might not quite understand what is being asked of them in the planning task. But perhaps the exact details are unimportant; it is important that they are being asked to indicate a suitable picture–object relation, and it appears as if multiple options are roughly equally suitable. Perhaps this signals relatively more dependence on iconization, and less on conventionalization. All the picture options have legitimate similarities with the stimulus models. If there is as yet no strong adherence to a particular differentiated picture convention, then similarity serves just fine, but it serves quite broadly and undifferentiatedly. One object stimulus is potentially similar to many pictures.

The question then is why drawings are more specific. Actually, if the four-year-olds were as undifferentiated in their picture choice as their drawings, they should have made mostly “circle” drawings. The many horizontal drawings are however evidence of more differentiation in graphic skill. The very same skills could serve to make drawings that would fall within the other categories. Again, naming may have a part to play, but then naming should also have supported the choice of more clearly ‘communicative’ pictures. More mark-making skill does however not necessarily entail more differentiation in how to depict spatial arrangements. One horizontal drawing of two cups is potentially similar to many spatial arrangements of two cups.

As conventions that dictate the ‘right kinds’ of similarities are picked up, pictures chosen and drawings produced narrow down towards those categories, or ultimately the single view-specific category. An interesting anomaly is the “orientation-centered” option, which, although seven out of 82 partial occlusion drawings are categorized as such, is only selected by

one out of 82 children. Perhaps taking account of the spatial arrangement and the orientation are very much interrelated, hence a child either does not (horizontal) or one does (vertical, view-specific) take both into account as one package. The few drawings in the category might signal exploration of the depth-and-orientation terrain that could have included information in the order of production, if not in the final product. As a final product the orientation-centered drawing of the partial occlusion condition seems to have a particular dissatisfying dissimilarity with the stimulus and not to fit a particular picture convention well.

3.4. Summary and conclusions

Chapter 3 presented much experimental data collected in studies of children's drawings over approximately the last four decades. The notion of a mental model or canonical internal representation or similar as tied up in the concept of intellectual realism informed some studies, while others incrementally questioned its dominance and/or validity. Few studies completely depart from the idea of an internal model, but as more drawings created in response to known stimuli and conditions were analyzed and as a focus on the drawing process emerged, more became apparent in terms of how children approach the picture-object relation, and it seemed less necessary to appeal to 'pictures inside their heads' for explanations.

A semiotic model that analyzes how the picture-object relation manifests in different situations and within general development was tried out in some reanalysis of existing data. Earlier on, drawing according to a two-dimensional logic determines how the object is depicted within the codetermination of picture and object in the picture-object relation. Often no specific viewpoint is conveyed. Instead, the as yet limited graphic means are used to produce a basically recognizable drawing when the situation seems to call for it. This is probably related to how representational drawing emerges: in iconization, children start to notice similarities between their marks and objects; in conventionalization, the potential representing function of drawings is constantly reinforced by other pictures and by communication about pictures and drawings. The drawing need not only conform according to a communicative measure. Within a two-dimensional logic it can also be used to explore an object and its facets or characteristics. Just as what appears to be a single face of the object in the drawing may stand for its entirety, multiple faces can be employed to solve a single viewpoint problem within two-dimensional means.

Initially, the object and picture are more general and undifferentiated entities in a more general and undifferentiated relation. Without a differentiated notion of spatial relations, objects are depicted generally in the sense of "These are such objects" rather than "These are such objects that exist in relation to each other and in space in such-and-such a way". As children develop, they seem to become aware of narrower and more specific possibilities. Es-

pecially five- and six-year-olds seem sensitive to cues that ask for a view-specific drawing, even though they would not spontaneously opt for making a view-specific drawing. Varying of experimental design seems to affect this age group most dramatically. From about seven years onwards, much less variation in response to task demands is seen. Again, these children probably still often draw in ways that would be called 'intellectual realism', but the notion of a view-specific picture convention is clear to them and it does not waver in response to small shifts in task design. Confident in rendering certain three-dimensional forms, such as drawing a cup so that both its outer and inner surfaces are visible without distorting its structure, some drawing tasks do not pose much challenge. The object can be determined by picture requirements: some parts of the object may be partly or wholly hidden, but this object 'loss' is a viewpoint 'gain'. Developing drawing skills according to a visual realism convention means more and more ability to create a picture that appears to deal with here-and-now single viewpoint perceptual specifics.

Even though various pictures may be somehow similar to a model or models, children come to learn which kinds of similarities are more valued in which contexts. Over time, they may try out several possibilities, searching for similarities that both themselves and others understand and approve of.

CONCLUSION

The conclusion summarizes the chapters and presents overall concluding remarks. Finally, limitations of the study are discussed and possible future directions for further research are considered.

Chapter 1 introduced how development of children's drawings has been studied in psychology. The central figure of Georges-Henri Luquet and his influential notions of intellectual realism and visual realism were presented. Beyond the original intention of Luquet's work, the importance of how his framework became a stage theory of drawing was stressed. The mental models or internal representations that children are purported to base their drawings on were also found in sign models from pictorial semiotics. More broadly, issues of how perception and cognition are understood seemed to underlie in the study of children's drawings and debates about iconicity in semiotics.

One of the central problems of positing that children draw from a mental model is explaining how it ends up as lines on a page. Children's drawing ability as a physical skill would not seem to match, for example, their verbal skills. Rudolf Arnheim (Arnheim 1954, 1969, 1974), a critic of intellectual realism, explicated the development of drawing ability as a skill in its own right. As shapes and lines children are able to make become differentiated over time, they can stand in more specific relationships with the objects that they represent. A certain configuration may initially serve to depict a number of varied objects, e.g. people and animals, without much variation being possible. Later, the variation in marks allows for clearer relationships between the picture and its object.

Chapter 1 introduced some existing work in semiotics on children's drawings, but it was found lacking. Chapter 2 explored recent interdisciplinary work on children's understanding of pictures. Sara Lenninger (2012) drew on a wide range of literature from semiotics and psychology. The influence of Göran Sonesson's (1989, 1994, 1995, 2010) work needed to be retraced to some extent. The fact that Lenninger proposed a processual approach seemed useful in exploring development. The dual processes of generalization – iconization and conventionalization – offered themselves to extension in analysis of children's drawings. Lenninger managed to take account both of how children might notice and explore similarities on their own and of how particular kinds of similarities might be privileged through their use in communication.

Some inroads into conceiving of perceptual processes had to be made in the process of incorporating both Lenninger and Arnheim's work. Arnheim's emphasis on differentiation as

well as generalization seemed more amenable, as was argued from the point of view of how Lenninger developed parts of her theory as well as Bouissac's (1986) discussion of iconicity in relation to theories of perception. I proposed that iconization, conventionalization, and mark-making, all as developing processes, could be situated within the picture–object relation. As the processes develop and interact, children would conceive of the picture, the object, and their relation differently over time.

Chapter 3 introduced existing data from children's drawings under experimental conditions. Decades of research sometimes partly affirmed and sometimes partly questioned the tenets of intellectual realism and visual realism. Some alternatives were put forward, notably the notion that children choose to depict either array-specific or view-specific information in their drawings. The problem with intellectual realism and visual realism seemed to be that children are at the mercy of their developmental level, at the most extreme their perception is obscured by their mental model. However, many of the younger children proved sensitive to the appearance of the stimulus object or objects within certain experimental designs. The alternative suggestion that children exercise a choice between either array- or view-specific information took account of the fact that children are responsive to stimuli, but seemed to posit that they are aware and capable of all the possible ways of drawing something.

In the intellectual realism account, young children are deficient in responding to the stimulus in comparison to how older children or adults might do it. In the array- or view-specific account, children can respond however they want to, they just choose certain ways, perhaps out of concern with communicating more information rather than less. Although the latter account positions young children's drawings in terms of difference rather than lack, both accounts are working from adult understandings backwards to child understandings. Lenninger emphasizes again and again that even when children may appear to use words or pictures in the same way as adults do, they may still not conceive of these signs in quite the same way. The drawings of young children should thus be examined on their own terms. It may sound like a ridiculous truism, but children do not draw like deficient adults; children draw like children.

The reanalysis of the data from the point of view of the semiotic model and its emphasis on picture–object relations drew on Arnheim's differentiation of marks and differentiation in general as well as Lenninger's iconization and conventionalization. It suggested that children's representational drawings start with very general similarities – even if children command only a few shapes and lines these are used to represent numerous objects. For example, very similar configurations of lines and shapes may represent either a human or an animal, or either a flower or the sun. In picture selection tasks a similar generality can be seen, alt-

though it is inverted. Younger children seem to find more picture options a potentially valid match for the stimulus than older children. One kind of drawing can stand for a variety of objects, and one object can be depicted in a variety of ways.

The use of statistical analysis to see how spread out children's picture selection choices are is informative. In the case of the reanalysis of Taguchi and Hirai's (2003) data, it is however apparent that not *all* picture options are valid according to the children, including the four-year-olds. Certain kinds of similarities are already more acceptable than others, probably both from the point of view of the children's own judgments in iconization and from the point of view of what they have learned about picture conventions through conventionalization. The mismatch between how four-year-olds draw the cups and the pictures that they select is also interesting. A general lag of picture production behind understanding could be one explanation, but this does not appreciate the argument for generality in full. As far as mark-making skills go, the circle is the most general possibility for a drawing. The two cups lined up with their handles on the same side is also a very general possibility: according to the two-dimensional logic explicated by Arnheim, these cups are in no particular orientation or spatial relationship, hence they could be in many, but more accurately, the cups just *are*.

All the data taken together and reanalyzed suggest that what was called intellectual realism is actually evidence of a less narrow picture–object relation. The relation is open to more possibilities than a static drawing product would seem to allow for. Information about spatial relationships can be encoded within the drawing process itself, even though they cannot be read in the final product. Also, observations of various angles or various times can be encoded into static two-dimensional form. What was called 'visual realism' is one possibility of narrowing down the picture–object relation into specifics, like the specifics of the viewpoint that the object was seen from. The object is depicted frozen in space and time as viewed from a single fixed viewpoint. Specific picture conventions are useful to particular functions in visual communication. Children would appear not to be blinded by mental models; instead, they are in the process of learning how various possible similarities have been fixed and specified for particular uses by themselves and those around them.

In terms of limitations, this thesis lacks a thorough discussion of how interaction, feedback, and reiteration may be operative in communication with pictures. It is likely that some of the more or less fixed ways of depicting something within a group could be profitably explained along these lines. Thus, instead of an appeal to a law of simplicity for its own sake, the function of simplicity in visual communication should be considered. A number of compelling experiments by Simon Garrod and his colleagues (e.g. Fay et al. 2010; Garrod et al.

2007, 2010) have done just that, and these studies could reasonably inform an as yet vague notion such as conventionalization.

Simplicity or elaboration of drawings or other visual schemes should however not only be viewed in terms of their function in communication. They also have a function in thinking. Although the role of mental models has been questioned throughout this thesis, it is because their dominance over all other perceptual processes seemed unfounded, not because they are necessarily completely inoperative. Arnheim both critiques intellectual realism and often discusses mental models. The crucial point is that a drawing and mental model do not match each other. In the case of drawing or designing without a particular external stimulus, a mental model may tentatively guide marks as they appear on the page. But the mental model is necessarily somewhat general, whereas the drawing has to deal with specifics. Furthermore, the emerging drawing is not only guided by the mental model, but also by an ideal of what it should become. Both the mental model and an envisioned drawing end-product are involved in the process, and all of the process' constituent elements are adjusting as it unfolds. Both this process and the possibility to contemplate its result might be fruitfully considered in terms of its impact on perceptual and cognitive processes more generally.

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INTELLEKTUAALNE JA VISUAALNE REALISM LASTE JOONISTUSTE SEMIOOTILISES ANALÜÜSIS: KOKKUVÕTE

Käesolev magistritöö uurib laste joonistuste psühholoogilistes uurimustes kasutatud intellektuaalse ja visuaalse realismi mõisteid, ning püüab näidata, kuidas semiootika aitab vastata mõnedele seni vastamata küsimustele. Ehkki paljud uuringud tunduvad näitavat üldist arenguteed, mis viib intellektuaalsest realismist visuaalsesse realismi, tekib küsimus, mil viisil erinevad eksperimentaalsed tingimused uuringute tulemusi mõjutavad. Samal ajal kui teadlased on leidnud üha uusi asjaolusid, mis võivad laste joonistamisülesannete lahendamist mõjutada, on intellektuaalse realismi idee kui teatava juhtiva ja dominantse vaimse mudeli ehk sisemise representatsiooni idee osutunud üha vähem paikapidavaks. See tõstatab küsimuse, kas uuringute tulemusi mõjutavad asjaolud ise ongi need, mis kujundavad progressiooni intellektuaalsest visuaalsesse realismi, või tuleks neid vaadelda uuest vaatenurgast lähtudes.

1. peatükk tutvustab vastavaid psühholoogia- ja semiootikaalaseid allikaid. Põgusalt arutletakse selle üle, kuidas uurida pilti kui märki, ennekõike kui ikoonilist märki. Kitsam fookus on töödel, mis analüüsivad laste joonistusi. Varasem uurimus selles vallas on küll limiteeritud, kuid annab mõningase ülevaate teemast. Martin Krampen (1991) tegi oma semiootikaalased tööd intellektuaalse ja visuaalse realismi mõistete raamistikus, seadmata raamistiku enda paikapidavust kahtluse alla. Laste joonistuste psühholoogiliste uurimuste kontekstis kirjeldatakse mõisteraamistiku päritolu, eriti seda, kuidas omandas tähtsuse idee, et lapsed joonistavad pigem selle alusel, „mida nad teavad“, kui selle alusel, „mida nad näevad“. Idee pärineb ehk juba varasemate teadlaste töödest, peamiselt aga seostatakse seda Georges-Henri Luquet (2001[1927]) töödega. Võimalik, et Luquet ise ei pidanud tingimata tarvilikuks, et intellektuaalse ja visuaalse realismi erisust kirjeldataks kui üleminekut ühelt kindlapiiriliseltselt diskreetselt staadiumilt teisele, aga see, kuidas Jean Piaget mõningaid Luquet' ideid kohandas ning tema enda staadiumite-teooria mõju psühholoogias viisid vastava positsiooni väljakujunemiseni. Väide, et lapsed joonistavad mingi olemasoleva vaimse mudeli järgi, on mitmel põhjusel problemaatiline. Üks peamisi probleeme seisneb selles, kuidas seletada seesmise representatsiooni tõlkimist väliseks representatsiooniks paberilehele.

Ühtlasi tutvustatakse Rudolf Arnheimi töid (1954, 1969, 1974), mis heidavad valgust sellele, kuidas oskuste diferentseerudes suudavad lapsed joonistustele üha spetsiifilisemaid tähendusi anda. Arnheim oli intellektuaalse realismi idee suhtes kriitiliselt meelestatud ja keskendus pigem loogikale, mille alusel lapsed kolmemõõtmelise maailma kahedimensioonil-

isele paberilehele tõlgivad. Ehkki Arnheim tundis samuti huvi vaimsete mudelite ning mõtlemise visuaalsete aspektide vastu, põhineb tema lähenemine nähtaval maailmal ja vaadeldavatel joonistustel, mitte vaadeldamatuil seesmistel representatsioonidel.

2. peatükk vaatleb lähemalt seda, kuidas lapsed seostavad pilte ümbritseva maailmaga. Sara Lenningeri (2012) doktoritöö asetseb semiootika ja psühholoogia piirimaal ning uurib, millal lapsed hakkavad ära tundma pertseptuaalset sarnasussuhet, kuid ühtlasi aru saama sellest, et pilte saab kasutada visuaalse kommunikatsiooni vahendina. Lenningeri töö pealkiri „Millal kvalifitseerub sarnasus märgina: uurimus piltide mõistmisest ning väikelaste semiootilisest arengust“ peidab endas üht autori peamistest eeldustest. Nimelt et pildi ja maailma vahelise sarnasuse äratundmine pole päriselt märgikasutus tema enda märgimõiste seisukohalt, vaid pigem on tõelise pildimõistmise väljakujunemiseks vajalik integreerida pertseptuaalne mõistmine sotsiokommunikatiivse mõistmisega. Lenninger püüab näidata, et selline integratsioon leiab aset kaht iseseisvat teed pidi. Esimene tee kujutab endast üldistamisprotsessi, mida ta nimetab „ikoniseerumiseks“. Laps märkab pertseptuaalsete kogemuste vahelisi sarnasusi ja üldistab nende põhjal laiemad põhimõtted. Teine tee kujutab endast samuti üldistamisprotsessi, mida ta nimetab „konventsionaliseerumiseks“. Kommunikatiivsete kogemuste põhjal üldistab laps inimestevahelise interaktsiooni laiemad põhimõtted. Neid kaht protsessi kombineerides suudab laps ära tunda, mida pilt kujutab, kuid samuti kasutada pilti mingi konkreetse ülesandega toimetulemiseks. Lenningeri mängu-eksperiment näitab, kuidas pildi ja maailma seostamine viib lõpuks piltide täpsema tähenduse haaramiseni. Kui lapsed taipavad, et mängus viitavad pildid maailmas olevate asjade seisule siin-ja-praegu, tulevad nad mänguga edukalt toime. Mina seostan neid arengulisi protsesse, mis viivad üldiselt tähenduselt spetsiifilise tähenduse kasutamiseni, Arnheimi teoreetilise lähenemisega. Selle tulemuseks on laste joonistuste analüüsiks rakendatava semiootilise mudeli esialgne visand.

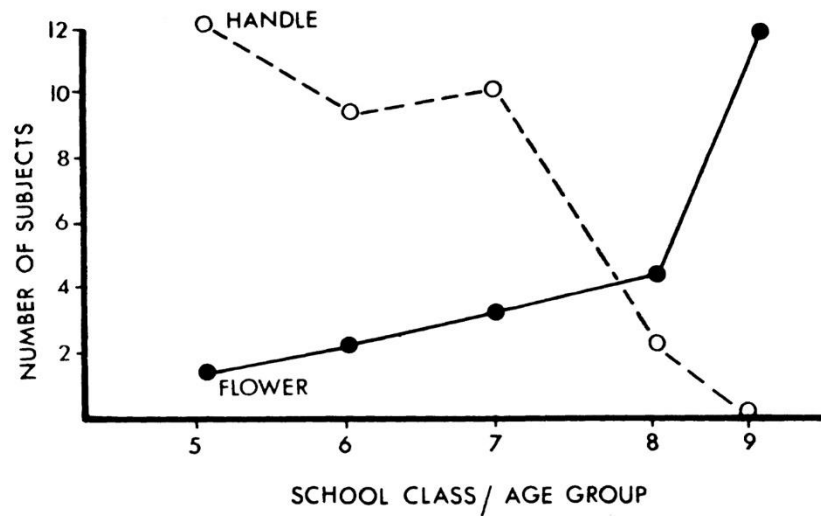
3. peatükk tutvustab andmeid, mis on kogutud laste joonistuste kohta tehtud psühholoogilistest uurimustest. Eksperimentide korraldusliku poole kirjeldused, nende tulemused, tulemuste interpreteerimine – need kõik viivad aruteluni selle üle, kuidas saab ikkagi rääkida intellektuaalse realismi progressioonist visuaalseks realismiks, aruteluni, mis on kestnud juba mitu kümnendit. Peatükis tutvustatakse erinevaid asjaolusid, mis näivad mõjutavat seda, kuidas lapsed joonistamisülesannetega toime tulevad. Tavapäraselt antakse nendes ülesannetes lastele stiimuliks mudel (näiteks joogikruus) ja palutakse neil joonistada seda, mida nad enda ees näevad. Eksperimente ja neid mõjutavaid tegureid reanalüüsitakse seejärel semiootilises raamistikus. Semiootiline raamistik keskendub pildi-objekti suhtele, sellele, kuidas täiskasvanud ja lapsed seda suhet erinevalt käsitlevad, ja kuidas selles suhtes

toimuvaid muutusi laste joonistustes vaadelda. Suhe muutub joonistamisoskuse arenemisega ning ikoniseerumise ja konventsionaliseerumise lõimumisel, mille tulemusel lapsed suunatakse kujutama sarnasussuhet kultuuris aktsepteeritud viisidel.

Laste representatsioonilised joonistused saavad alguse väga üldisest sarnasusest kujutatavasse objekti. Isegi kui lapsed valdavad vaid väheseid kujundeid ja jooni, kasutatakse neid mitmete erinevate objektide kujutamiseks. Väga sarnased joonte ja kujundite konfiguratsioonid võivad kujutada inimest või looma, aga ka lille või päikest. Samuti on pildivaliku ülesannetega: erinevalt vanematest lastest leiavad nooremad lapsed stiimulile piltide seast enam võimalikke vasteid. Kõiki andmeid kokku võttes ja uuesti läbi vaadates tundub, et see, mida varem kutsuti „intellektuaalseks realismiks“, kujutab endast tegelikult kitsamat pildiobjekti vahelist suhet. Seda suhet saaks vaadelda suurema hulga võimalike interpretatsioonide valguses kui staatiline joonistamise lõpptulemus lubab. Joonistamisprotsessis on võimalik kodeerida ruumilisi suhteid, isegi kui seda informatsiooni joonistamise lõpptulemuses näha pole. Samuti võib staatilisesse kahedimensioonilisse vormi kodeerida erinevaid vaatenurki või aegu. See, mida kutsuti „visuaalseks realismiks“, on üks võimalik viise pildiobjekti suhet kitsamalt käsitleda, näiteks selle vaatenurga seisukohast, millest objekti vaadeldi. Objekti kujutatakse ruumis ja ajas külmununa nii, nagu ta paistab mingist kindlast vaatenurgast nähtuna. Visuaalse kommunikatsiooni erinevate funktsioonide jaoks on spetsifilised pildilised konventsioonid kasulikud. Lapsi ei näi pimestavat vaimsed mudelid. Selle asemel leiame nad õppimisprotsessi teatavas hetkes, mil nad avastavad, kuidas erinevaid võimalikke sarnasussuhteid tabada ja täpsustada, et neid siis ise kasutada või teistega jagada.

APPENDIX 1

From: 'Intellectual realism in children's drawings of a familiar object with distinctive features'
(Freeman and Janikoun 1972)



Sixty children, 12 in each age group, participated in Freeman and Janikoun's study. The solid line indicates how many children included the flower on the cup – an in-view, nondefining feature – in their drawings. The dashed line indicates how many children included the cup's handle – an out-of-view, defining feature.

APPENDIX 2

From: 'Constraints on the visual accuracy of drawings produced by young children' (Taylor and Bacharach 1982)

Age	Handle	View	Handle present	Handle absent	Broken handle
5	present	in view	9	1	0
		not in view	3	7	0
	broken	in view	3	3	4
		not in view	2	8	0
8	present	in view	10	0	0
		not in view	3	6	1
	broken	in view	0	1	9
		not in view	0	7	3

Eighty children took part in the experiment, forty from each age group. The forty children were divided across four conditions of cup handles: an intact handle in view; an intact handle not in view; a broken handle in view; and a broken handle not in view. Drawings were categorized according to a complete handle's presence or absence, or an indication of a broken handle. The results in each condition for each age up to ten drawings.

APPENDIX 3






From: 'Contextual sensitivity in young children's drawings' (Davis 1983)

	Both tasks	Neither task	SCT only	PCT only
Order: SCT to PCT				
4 years	8	4	4	0
5 years	3	4	9	0
6 years	3	11	2	0
Total	14	19	15	0
Order: PCT to SCT				
4 years	6	9	1	0
5 years	1	15	0	0
6 years	2	13	1	0
Total	9	37	2	0

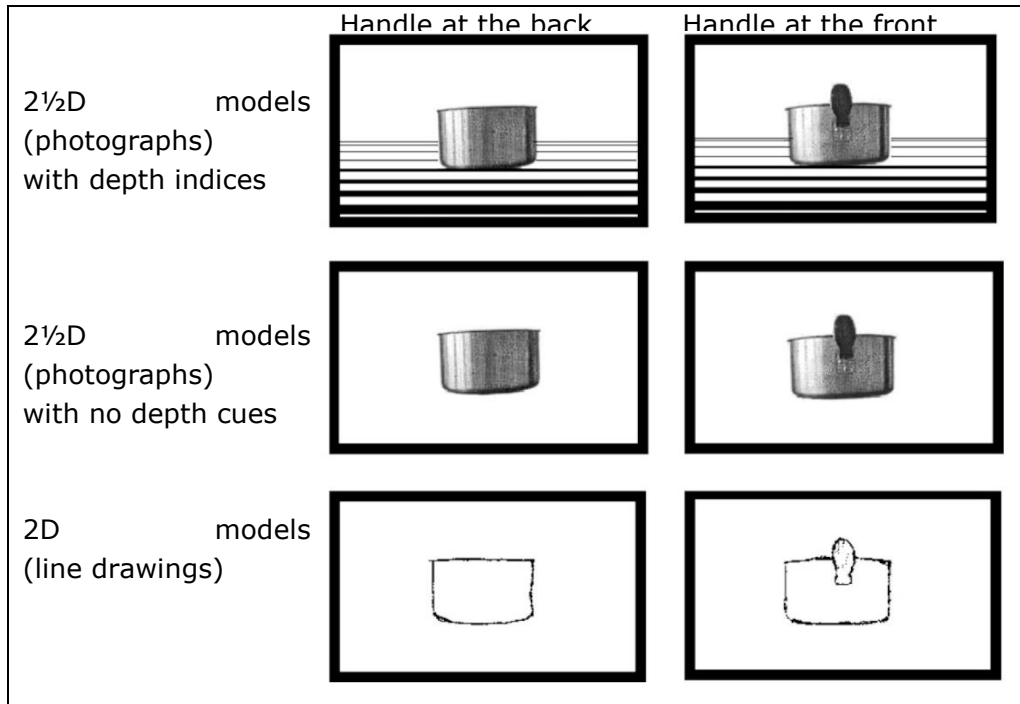
Thirty-two children in each age group took part in the experiment. Each group was split in half, one half took part in each condition. Order of task presentation was the difference between the two conditions: one half of the children had the single cup task (SCT) first and the paired cup task (PCT) second; the other half had the reverse. In SCT, a single cup was positioned with its handle out of sight from the child's viewpoint. In the PCT, two cups were positioned, one with its handle clearly visible, and the other with its handle not visible from the child's viewpoint. Drawings were scored according to whether the handle not visible from the child's viewpoint was included in the four possible categories: both tasks; neither task; SCT only; and PCT only. Hence, the numbers reflect hidden handle inclusions.

APPENDIX 4

From: 'Are young children's drawings canonically biased?' (Picard and Durand 2005)

Free drawing type					
	No handle	Handle at top	Handle at bottom	Handle at the left	Handle at the right
					
4 years	9	9	22	23	36
5 years	3	14	15	35	33
6 years	2	6	4	33	54

The study included 288 right-handed participants. Free drawings, i.e. as verbally requested without a stimulus model, were collected from all children at the beginning. Categorization proceeded according to the direction in which the handle of the saucepan points. The distribution across categories is expressed in terms of a percentage of the total drawings within the age group.



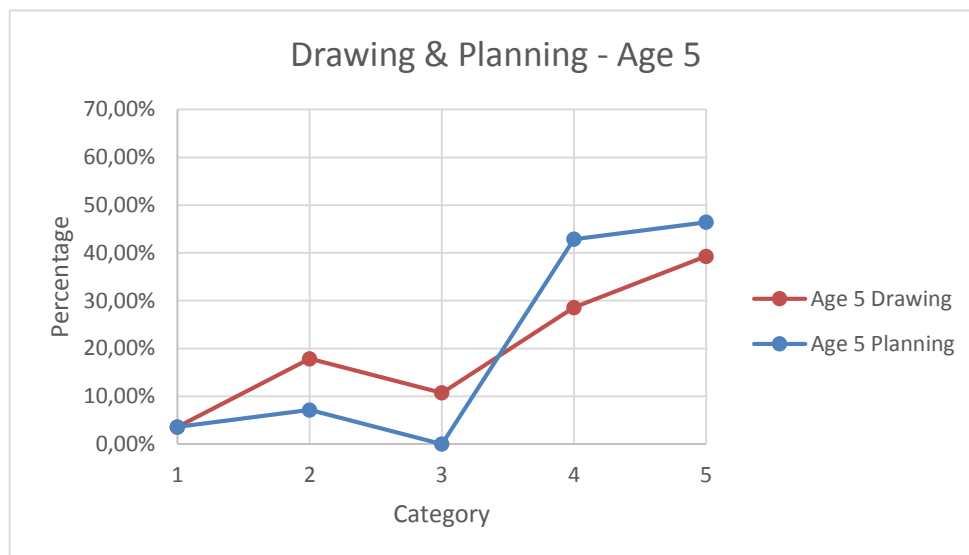
After each participant had completed a free drawing, they were presented with one of four stimuli. The stimuli were a three-dimensional model of an actual saucepan and the picture stimuli as depicted above. Each participant drew the front and back view of their stimulus, with presentation of the views counterbalanced.

APPENDIX 5

From: 'Planning and drawing of occluded objects by young children' (Taguchi and Hirai 2003)

Condition	Age	<i>n</i>	Circle	Horizon.	Orien.- centered	Vertical	View- specific
Planning task:							
Partial occlusion	4	25	7	6	0	6	6
	5	28	1	2	0	12	13
	6	29	2	3	1	6	17
Drawing task:							
Partial occlusion	4	25	4	17	1	0	3
	5	28	1	5	3	8	11
	6	29	1	3	3	5	17

Children were asked to select a picture (drawing plan) according to how they would draw the stimulus objects. They also had to draw the stimulus. Presentation of the tasks was counter-balanced. The drawing plans and drawings were categorized as: circle; horizontal; orientation-centered; vertical; or view-specific.



Data from Taguchi and Hirai (2003) are reanalyzed. The categories are circle (1); horizontal (2); orientation-centered (3); vertical (4); and view-specific (5). Twenty-eight five-year-olds took part. Their drawings (red) and picture choices (blue) are expressed as a percentage of the total.

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