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Imitation and Variation: reflections on toddlers’ strategies for learning

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ABSTRACT  The process of learning for young children is primarily a question of learning in the present and being able to utilize that which is learned in totally new settings or situations in the future. In this article we will illustrate how learning is a question of developing an understanding of, or creating ways of experiencing, aspects or phenomena of the surrounding world. Imitation is an important ingress into learning for young children. Additionally, variation provides insight into the cognitive world of very young children. Both imitation and variation are interwoven in the strategies for learning used by children. Two observations and analyses are presented. In the first observation a toddler attempts to master a skill and in the second observation a group of children are playing on a slide.

Keywords: toddlers; imitation; variation; day care

OUR PERSPECTIVE ON LEARNING

Our perspective on learning will be described in four sections. The first section is comprised of two parts: a general perspective including examples of how humans understand and how this approach to learning develops. The second section deals with imitation and the third with variation (where our empirical data will be presented). In the fourth, and last, section imitation and variation as interwoven aspects of young children’s strategies for learning will be discussed.

Learning as a Change in Experience

The theoretical perspective which our argument is based on is that ‘knowledge is an internal relation between the human being and her world’ (Pramling, 1994; Marton & Booth, 1997). The ontology this statement is based on says that the subject and the object are not distinguishable, but are related in the process of learning. When a child incorporates the world surrounding him or herself, that surrounding world becomes a part of the child. On the one hand, the child’s understanding of that
world becomes integrated with the child as a person; knowledge is in this way deeply personal. On the other hand, the non-dualistic perspective means that there are not two worlds, one real and one objective, distinguished in the subject’s world of mental cognizance. There is only one world of existence that humans experience in many different ways. This world is simultaneously subjective and objective. When a child is making knowledge his/her own, that is to say integrating knowledge into his or her own way of understanding something, the child goes beyond him/herself and becomes implicated in something subordinated; in other words, collective knowledge. Although knowledge always exists in relation to human beings, it subordinates the individual. Experience includes a relationship between the object and the subject, incorporating both (Marton, 1992). Experience as such is used as a concept for how something appears to a child, how he/she sees, discerns or understands the phenomenon in focus. On the one hand, children cannot experience or create an understanding of something that they have no experience of. In other words, children cannot give shape to experiences that have no relationship or reference to the surrounding world. On the other hand, children change when their awareness is changed. That is to say, a new experience contributes to a child’s manner of experiencing or relating him/herself to a phenomenon in a qualitatively new way. As a consequence, knowledge and learning becomes a question of quality: creating meaning in one’s experience by relating oneself to seeing, discerning and making sense of or experiencing something different than before.

Young children’s intentions can be derived from their observable actions. Lindahl (1996) has shown that one-year-old toddlers learn via their own intentional actions. Many times children show an understanding of something before they can verbalize the notion/thought; this can be compared to Piaget’s point of sensory–motor intelligence. It can also be derived that children are aware of their own learning in that they show an awareness of the differences between knowing and not knowing. Being aware of learning sometimes precedes the ability to perform the action. In many observations young children focus their interest on the will to learn something specific. Additionally, when adults turn a child’s interest towards something else, the child can sometimes still keep his/her focus on the intention of his/her own interest. The child’s experience is indicated by his/her verbal and motor actions.

Below is an example of this perspective of learning, supported by the work of other researchers such as Heath (1983), with an outline of the periodic observations of a young child named Vilgot.

**Step I** (14 months). Vilgot finds a book among his toys. He opens the book. He turns its pages and begins to use oral speech.

He illustrates for the adult observer that he connects speaking with the turning of pages. That’s what books are all about to him. He experiences the activity of reading a book as an act of turning pages and talking.

**Step II** (22 months). An adult asks Vilgot if they should read a book. Excited, Vilgot shouts ‘Yes!’ and runs to the bookshelf. He selects a voluminous novel. The adult sits down with him on the floor, turns pages
and tells a story which has nothing to do with the actual book. Vilgot listens, looks at the pages now and then, but is quite satisfied with listening to the story.

For Vilgot, the concrete object of a book is now connected with the action of telling a story. At this point in his life this is what a book means to him.

**Step III** (26 months). Vilgot wants to read a book with the adult. This time he picks out one of his own books *Alfie Atkins* and hands it to the adult. The adult cannot read the book, as her glasses are not nearby, so she starts telling him the story from memory. Very soon Vilgot says, ‘No, Grandma read what it says, properly’.

Vilgot has now realized that there is an exact wording to a book, which must be read each time. His world of experience has expanded his view to be aware of the text as such, without knowing the word text.

**Step IV** (30 months). Vilgot selects an old children’s book. He brings it to the adult and she asks ‘Do you want me to read this book for you?’ Vilgot turns the pages back and forth for a while and then turns around towards the bookshelf again. He says, ‘No, there is too much text in this book’.

Vilgot has realized that the black patterns in the book are called text and that it will be boring to listen to a book with too much text. No one has, of course, taught Vilgot about the notion of text, but in the interceding process of reading a book someone must have used the word text, which he now uses himself.

**Step V** (34 months). Vilgot is playing with small alphabet blocks. He asks the adult to ‘write’ all the names of the family members and those of different animals. Although he cannot physically ‘write’ his own name he points to different letters and tells the adult each time a letter from his own name is selected. ‘That’s in Vilgot!’ he exclaims.

His awareness is now focused on the letters in written words.

In the aforementioned observations Vilgot’s actions (both verbal and physical) express step-by-step differences in quality. That is to say, the different ways in which he relates himself to books and reading; the various ways he experiences one aspect of the world around him over a certain period of time. These steps are Vilgot’s coordinated actions (in regards to book reading) and statements made during that interaction. These actions are based upon that which presents itself to Vilgot in certain situations: what he experiences as important and meaningful in the moment, at every step in the process.

Views on learning theories have changed from one of universal maturity stages with the child as novice to relating children’s learning and development to a context; viewing the child as a resilient and competent being (Stern, 1985, 1991; Valsiner, 1987). Additionally, Bråten (1998) claims that the physical participation and reciprocity in children’s and adults’ feelings and expressions are acceptable as a main aspect of research regarding how infant learning is viewed today.
Athey (1990, p. 69) shows how children work simultaneously on many different levels when grasping ideas. By this she means that children work on ideas via motor actions (using their whole body), symbolic functioning (in play and drawings), functioning dependency relationships (what the use of something is, how something functions, etc.) and finally in thoughts (what the child knows and can talk about). Children focus their intention on what interests them or on what they are struggling to master. Learning becomes a question of the relationship between a child and the people and objects around the said child in a dialogue which creates meaning (Vygotsky, 1978).

**Variation, Discernment and Simultaneity**

So what does it take to learn in accordance with the approach outlined above? Bowden & Marton (1998, p. 24) express learning as a question of preparing students for what is unknown (the future) by using what is known (present knowledge):

The kind of learning we are interested in is learning which implies that the learner develops capabilities for seeing or experiencing situations or phenomena in certain ways. For every kind of situation and phenomena it is possible to identify a limited number of distinctively different ways in which the situation or that phenomenon can be experienced. The differences between different ways of seeing a particular phenomenon (or a particular class of situation) can be understood in terms of critical aspects that defined the phenomenon (or situation) as experienced. For each phenomenon there is a limited number of critical aspects that can be discerned and focused on simultaneously. So differences in how the phenomenon is experienced reflect differences in what critical aspects are discerned and focused on simultaneously.

A child always discerns something in every situation, and this discernment springs from the experience of variation. In other words, a child cannot discern things that do not vary. It has been said that it is impossible to take a bath in the same river twice (Herakleitos), since a mass of water is always moving. This idea is also applicable to children. A child is never in the same learning situation twice, since time goes by and new experiences arise. This phenomenon is related to the classical question of transfer pondered upon in learning psychology. However, Bowden & Marton (1998) state that the notion of transference is redundant, since all that an individual learns must be usable to him/her in other situations. One can never recreate a situation in which a child learns something for the first time. Transference is involved in every moment of learning, which turns the question of transference into a question of learning. This begs the question: what is it the child has learned to make it possible for him/her to handle a new situation?

Marton (1999) claims that it is certain features of experience in various, specific situations that the child has learned. These are features that vary and which the child has simultaneously in his/her mind. Bowden & Marton (1998) mean that in order to handle a certain situation in a certain way you must experience the said situation
in a certain way. This also applies to motor skills, which originate from certain ways of experiencing an activity or the situation in which it is embedded.

To learn to swim properly means that the tacit meaning of breathing changes. … To learn to ride a bicycle implies a discovery of the relationship between speed and the necessary correction with the handle bar and body positioning in order to maintain balance (Bowden & Marton, 1998, p. 29).

Within a child’s learning there is a variation of structure and meaning that exists in symbiosis and reaffirms the other. Vilgot has created a meaning of meaning as an entirety. However, he sees experience as coming about by age, differentiating such parts as text and letters, which hold meaning for a person. In order to be able to read one must also experience structure and break the reading code (develop the skill to read). This will happen when all critical aspects of the experience of reading are simultaneously part of one’s awareness. Bowden & Marton (1998) use another example: a child who learns to hit an object with a ball by throwing different objects from different distances and directions.

In this way we learn to discern the relevant aspect of situations that are critical in relation to our objective of hitting something: aspects such as distance, weight, position and possibly even wind strength. When throwing we try to capture all those different aspects simultaneous. If we fail to capture all critical aspects we will probably not succeed. So the experience of trying to hit a target with a ball can be characterized in terms of which aspects of the situation are discerned and are simultaneously in the focus of awareness, and how they are related to each other, i.e. in terms of the structure we are imposing on this kind of situation (Bowden & Marton, 1998, p. 33).

This means that the child can make sense of a new situation in terms of critical features, which as such are dimensions of variations constituted by the new situation and a previous one, which the current situation resembles in some critical respect. Certain aspects appear more relevant to a child than other aspects, depending on the child’s structure of awareness shaped by earlier experience (Gurwitsch, 1964). Since a child is simultaneously aware of both the new and the old, or rather that the new is given its meaning through the old, it is by experiencing variation in certain respects that a person can equip him/herself for the future. This meaning is constituted through the discernment of different aspects of a situation and, as discerned, is born out of awareness of the dimensions of variation; variation, discernment and simultaneous experience become key factors in children’s learning.

IMITATION

When thinking about young children’s learning, imitation usually appears as an obvious factor. In many psychological studies imitation as an aspect of learning for young children is thoroughly documented (see for example Piaget, 1952). Meltzoff (1985) says that the paradigm of imitation is a good starting point for studying
young children’s mental and social competence. Imitation can help one understand the acquisition of perceptual and cognitive skills, as imitation implies that children by necessity can perceive the acts of the model, transfer the perception to a plan of action and conduct a motor activity themselves which is similar to the action of the model. Social skills are also important, as imitation entails that an individual him/herself experiences that he/she can recreate the skills shown by others.

Imitation is an innate capacity that serves both learning and communication (Butterworth, 1999). A toddler with limited language competency makes use of immediate imitation to share references with peers; this helps to bridge the gap between non-verbal and verbal communication. Butterworth means that toddlers spontaneously generate a mimetic culture around the artifacts provided for them, in order to serve the purpose of communication.

Heimann (1988) has examined infants’ imitation of tongue protrusion, mouth opening and lip protrusion as well as imitation of vocal sounds, temperament assessment and observations of mother–child interaction. Those behaviours most frequent in baseline (mouth opening and tongue protrusion) activity were much more likely to show selective imitation after modelling than the relatively infrequent behaviour of lip protrusion. Imitation during the early phase of life also relates to measurement of the children’s behaviour during mother–infant interaction.

Hanna & Meltzoff’s (1993) studies reveal that the most important ways in which infants learn, before language development, consist of looking and imitation. Infants can, as many researchers have shown, immediately copy an action as well as wait many hours and copy the action in a different environment. This is an important discovery regarding the principle of long-lasting learning, i.e. the ability to memorize and generalize multiple concepts or tasks.

Infants can create simulations from observations alone without simultaneous action. These simulations are retainable and the infants can use them as a basis for actions even after substantial delay. The development of imitation from birth to 2 years of age illuminates how infants come to treat others as sentient beings, just like the self. Imitation is not just a behaviour, but a means for learning about who we are (Meltzoff & Moore, 1999).

Hanna & Meltzoff (1993) claim that infants prefer to imitate what other small children do rather than what adults do. In an experiment conducted by the Hanna and Meltzoff team, one small male child was taught to play with some toys in a variety of different ways. The researcher intentionally varied both the time and place for the child’s play. The child therefore became an ‘expert’ in playing with the toys. Other infants of the same age mimicked the ‘expert’s’ actions when playing with him and the pre-selected toys. The experiment shows that other infants could imitate the ‘expert’s’ activities, both immediately and at least 2 days later in a different environment.

According to Hay et al. (1991), younger children’s imitation is not just the copying of movements of other people, but a reflection of the whole meaning of actions witnessed. Early formation of children’s thinking is based on the child’s competency in recognizing and acting on their own abilities and the wishes of others. Imitation has meaning because it reflects the understanding of the intention of
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somebody else. It is a mental activity that helps to formulate the conceptions of the world around us. Hay et al. (1991) claim that imitation is selective in some sense and not an automatic, reflexive action. Children make choices by recognizing actions selectively. Children’s imitation also serves a social function by creating interactions and relations with other individuals. If children use imitation to create interaction, they then use it as a creative tool, i.e. to activate the interaction of a partner. Research has demonstrated that imitation is mostly used as a ‘show off’ function to confirm one’s own wishes or respond to others during the second year of life.

Imitation is an important source of children’s understanding, especially of their understanding of the relationship between the self and other people (Bremner, 1992). Bremner is inclined to assume that if an infant imitates the action of an adult, that infant understands the relationship between his/her action and the adult’s action, no mean achievement in cognitive terms, let alone in terms of its implications for social awareness.

According to Uzgiris (1999), most empirical studies of imitation approach the phenomenon at the level of action, where the effects of imitation are then examined. These studies show large individual differences among infants at similar developmental levels. Uzgiris indicates that at least some of these differences are due to variation in the goals of the participants or in the meaning attached to imitation. Imitation is fundamentally interpersonal and it can be expected that the cultural valuation of imitation influence reliance on imitative acts in infancy. Imitation viewed as an activity seems to have two major functions, the cognitive and the communicative. Here the cultural meaning of imitation is clearly central in determining if it becomes a recognized and encouraged activity or is submerged in other culturally valued pursuits.

Imitation then, and this is our essential conclusion, fits into the general framework of the sensory–motor adaptation, which characterizes the construction of intelligence at this age. As we have constantly seen, intelligent adaptation is the equilibrium between assimilation and accommodation. Without assimilation, accommodation would fail to produce co-ordination or comprehension, while without accommodation, mere assimilation would distort the object to suit the subject. Sensory–motor intelligence is therefore always both accommodation of the old schema to the new object, and assimilation of the new object to the old schema (Piaget, 1962, p. 84).

Piaget sees imitation as one of two complementary functions that are essential for human intelligence. In his theory, Piaget describes a situation where he puts his face close to the face of a little girl. He wants the girl to imitate the closing and opening of his eyes. He repeats the task occasionally, over a period of a couple of months. When the child is 11 months old she is imitating Piaget as usual when suddenly she makes a mistake (attributable to Piaget). At that point the girl looks at Piaget, smiles, continues looking at his eyes and then slowly opens and closes her mouth. She continues this movement eight times as he tries to get her to imitate his eyes opening and closing.

Piaget’s quote can be seen in the light of children’s mastering of different
aspects of the world around them in terms of an increase in the space of variation (Koffka, 1928). If we consider the observation above to be about the child’s struggle to master her body and the act of opening and closing various parts, then there are not many other areas where this action can be performed, besides the eyes and the mouth (of course one can never be entirely sure in the interpretation of a chart observation). This means that from the child’s perspective there is a similarity between mouth and eyes in that both areas could perform the same action. According to Piaget’s interpretation, the girl has made a mistake.

When Koffka (1928) talks about imitation, he mentions perception and movement as important factors. For example, when a child hears a spoken sound he/she hears it as something that is to be imitated. The child speaks in order to imitate the sound, hearing his/her own voice as a more or less acceptable replica of what he/she has heard. When the spoken sound results in a good copy of its model, the organizing will stop and the imitation attains a state of equilibrium. This connection between perception and movement is of the same class as that which enables us to perceive the nature of others’ mental processes. This connection entails both relatedness and similarity, but of a different sort. Learning by imitating can occur in two ways: the individual learns to perform an already familiar act in a new situation, being understood only after the movement is made, or the imitation itself introduces and arises from a new configuration.

Imitation, identification and elaboration are three important concepts (Holgersen, 1998). Holgersen means that imitation is not a result of the child’s reflection but of a desire to do what other people do or seem to do. The imitating child could be more or less directed towards the social meaning of imitating a model. The child’s interpretation or creation of a meaning content characterizes identification. The child expresses his/her power via living the part and identifying another person’s expression of intent. Identification is based on the assumption that the child develops his/her own theory of mind. This means being able to make his/her own representations of other people’s intentions, but also to be able to make the intention one’s own.

Elaboration means that a child works out a personal expression by creating something new in an actual context (innovation) or expressing something known from other contexts (transformation). The child is able to transform his/her earlier expressions, based upon representations of what other people do in the same or similar situations. Elaboration is expressed in continuous form: from smaller variations to improvisations, to making a performance of his/her own. The child could be oriented towards its own performance or cooperation, but the most important factor is the expression per se. In elaboration, there is an element of searching for something unknown, in contrast to identification, where the focus is on the well known.

According to Koffka (1928), observations of children show that they do not imitate to any extent until they have begun to understand other people’s actions. For example, continual repetition of speech only begins after an interest in and a comprehension of speech has already taken place. Koffka (1928) claims that most of the things we learn are acquired not through our own discovery, but through the
comprehension of models. Imitation is a key factor in social interaction and communication, but also in the child’s way of creating meaning for him/herself and the world around him/herself.

VARIATION

Learning and thinking are always situated in a cultural setting and always dependent upon the utilization of cultural resources. Even individual variation in the nature and use of the mind can be attributed to the varied opportunities that different cultural settings provide, though these are not the only sources of variation in mental functioning (Bruner, 1996).

It is first of all necessary for learning that a child is able to distinguish one object from another, one situation from another, one phenomenon from another, etc., i.e. to experience differences as differences. In order to acquire the ability to discern between and among objects, the situations or phenomena, etc. must vary. To create understanding, a child must not only be able to discern, but also be simultaneously aware of the variation, that is to say, that which is varying. Through experiencing variation within a certain area, the child will be better able to generalize and transfer concepts to a new task or situation. Becoming aware of and experiencing variation is not only a question of generalization, but also of making sense of a situation, task, notion, etc. or developing a particular skill. Marton & Booth (1997) state that if children learn variation, the unknown is included as a possibility (by going beyond the earlier experienced variation).

Stern (1991), for example, stresses that all small variations in a mother’s behaviour when she interacts with a child strengthens the child’s development of variation. Due to the fact that the child must correct his/her own behaviour, he/she obtains increased self-awareness.

Valsiner (1989, 1997) claims that children produce variation early in life, for example, in accordance with adults’ permission to follow or break rules and norms, in accordance with different customs, treatment and ways of relating oneself to different situations and contexts. Children rapidly learn where the limits are in a specific environment, such as their home, at Grandmother’s place, at friends’, in preschool, etc. Children are also aware of different people’s various ways of relating to them. Valsiner’s point is that it is through variation in children’s experience that children develop. When observing adults’ communication with children, one can notice both different people’s varying approaches to similar situations with a child and an individual’s varying approaches to similar situations with a child. There is, in other words, variation in different people’s ways of approaching the child and variation in the actions of one and the same person in dealing with that child. The conclusion one can draw from Valsiner’s studies is that children relate themselves to the world around them and produce variation. It can also be concluded that adults’ natural ways of relating to children are characterized by variation. Experiences of variation expand and challenge the child’s understanding and (taken for granted) perspective of the surrounding world.
Another way to explain the dimension of variation is found in Hundeide’s work (1986, p. 312):

When it comes to deviation from a category or dimension, we are concerned with the breadth of experience or the monotony–variation dimension. In a world that is completely homogeneous in certain aspects—like a fish in water—there cannot possibly be any awareness of those aspects because such awareness presupposes a comparison with alternatives. As is the case with the fish’s standard of normative expectancy, which we could call a recurrent alternative, there is no deviation, no comparison, and therefore no awareness.

The analytical conclusion is that key principles in learning are variation, discernment and simultaneity in how children experience different aspects of the world around them. By being involved in diverse experiences, a child’s ability to discern is aided and, via this process, his/her capability to be aware of earlier experiences simultaneously with new experiences is heightened, thus enhancing a child’s understanding of its world. In other words, variation is a prerequisite both for discernment and simultaneity and for a child’s ability to make sense of its experiences. This conclusion should be compared with the many studies of generalization, where variation is a prerequisite (see for example Amibile & Rovee-Collier, 1991; Bauer & Dow, 1994).

Both Athey (1990) and Nutbrown (1994) have studied children’s learning in the preschool environment by observing children’s spontaneous actions, which they describe in categories of patterns. Their research shows how children focus on particular activities in a large variety of ways during certain periods. Children’s interest is periodically directed towards specific patterns, such as round objects, ‘dynamic circular’-like balls, rounded-yet-flat objects, etc. Another topic of interest to the children was vertical patterns (up and down) or straight ‘dynamic vertical’ lines, like similarities of length, height dimensions and symmetry. Still another topic is ‘containing–enveloping’, that is to say when children pick out and put objects into something. Through interest and experiments with these types of problems, children lay the base for mathematical and scientific understanding.

Children’s interest in mastering these patterns and other ‘schemes’ is due to children’s awareness of and thoughts about different phenomena. When the child’s intention is focussed on specific ‘schemes’, they look for a variety of objects or situations where they can practice the phenomenon they want to master. Lindahl (1996), in her thesis, also shows many examples of how one-year-olds spontaneously vary their exploration when trying to solve problems of various kinds. Valsiner (1989) talks implicitly about variation or diversity in experiences as a main factor in learning. He means that variation is the basic element in all development, which in his perspective also includes learning.

Tyler (1978) is of the opinion that one of the most important functions of play may be to produce individual repertoires during childhood years. Play is rooted in the biology of the species, dependent on both heredity and environment. Due to the fact that flexibility is advantageous to our species, germ plasm has come to contain a predisposition to seeking novel stimulation and emitting new responses, to explora-
ing, investigating and manipulating. The result of this predisposition is variability. Each person varies in the way he/she reacts to a given situation at different times; different persons vary in the way they react to the same situation. It is clear that the development of individual repertoires of qualifications would facilitate such variability and thus would be highly adaptive for the species as a whole. Qualifications represent a completely different way of structuring our perceptions of others. The more qualifications other people have the better for each of us and it is essential for the function of complex society that individuals develop different repertoires of qualifications.

Possibility processing structures come into existence if we observe a small child in an unfamiliar room containing many objects, materials and toys. At first the child wanders around, picking up one thing or another, letting the object drop, idly piling blocks together, making a few marks on a paper with a crayon. Even these random, haphazard actions show some structure based on previous experience with similar objects and materials. Before long, the child’s behaviour changes. The child settles down in a corner to build a block tower, sits in front of a piano and pounds the keys or opens cupboard doors looking for food. The next time the child is brought to the same room, patterned activity is likely to appear immediately. Varied possibilities have taken on a structure for that child.

Variation is a precondition for being aware of one aspect in contrast to another, which constitutes the meaning of intentionality. Variation then becomes the key to making sense of experiences and not only for generalizing an understanding. A point of departure for analysing the following observations is that variation, discernment and simultaneity are related to a child’s intention to learn or master the world around him/her. Additionally, variation is as important as imitation in making sense of children’s experiences, since both aspects are necessary.

**Observation I: Variation as a Child’s Approach to Learning**

Example one is a video observation showing a child working on mastering the phenomenon of spinning.

Wataru (14 months) has just started in the day care centre. His mother is still with him on the third day of a four day adjustment period. In the morning, the teachers and the children are occupied by playing with different small traditional toys. Wataru approaches one of the teachers with a circular plastic ring in his hand. The teacher takes the ring and shows with her fingers how to make the ring spin on the floor. Wataru is given the ring back and tries *to model the teacher’s action*, but the ring only falls on the floor. Wataru gets up from the floor and *puts the ring on a table*, where he tries to move it in the same way as he did on the floor moments earlier. The ring spins a little. After that, he falls back on his bottom with the ring in his hands. He remains on the floor, looking intently at the communication between the teacher and another boy.

In the sequence above Wataru tries to imitate his teacher. He may have seen her
spinning the ring on an earlier occasion; this could be the reason why he hands the ring over to her. He himself tries to spin the ring in different places (on the floor and on the table). The impression is given that this particular phenomenon, spinning, appears in Wataru’s awareness as an interesting and meaningful way to experience the world around him. In this manner, Wataru’s actions spring from his experiences.

After a while he crawls away, leaving the ring on the floor. When he comes back he has found another ring with a much larger diameter. He crawls with the ring in front of him to show the teacher. Wataru holds the ring in the air to show the teacher. She looks at the ring and makes some comments. After that, she just puts the ring on the floor and shows him another toy. Wataru turns his head away from the toy, looking at something else. The teacher now takes the big ring and makes it spin twice. Wataru now takes the small ring and tries to make that ring spin again. When he tries a second time he succeeds in making it spin. Wataru yells with delight and lifts the ring to show the teacher. The teacher takes the ring and makes it spin inside the big ring. Wataru moves and once again shows the small ring to the teacher.

It is possible to see how Wataru’s intention is focused on rings and getting them to spin. He discerns that the form of the bigger ring is a variation of the smaller one, that they are indeed objects with similar features. The other toys the teachers show him are of no interest. When he returns to the small ring and succeeds in spinning it, he shows his happiness by yelling, wanting confirmation from the teacher.

A little while later they are sitting near the small table. Wataru finds a round white tray. He holds the tray in the air and tries to catch the teacher’s attention. The teacher takes the tray and puts it on the floor without looking at it. Wataru takes the tray again, now looking at it very carefully. The teacher once again puts the tray away, this time on the table. Again, Wataru takes the tray and holds it in his hand. He is now trying to make the tray spin upon the table. When he succeeds in this, the teacher claps her hands, confirming his success. He hands over the tray to the teacher, who thanks him. She hands the tray over to him again, saying ‘please’.

Wataru now discerns an object with a similar shape to the ring (the tray), which he would like the teacher to spin. When the teacher doesn’t understand, since she probably isn’t aware of what his intentions are, Wataru himself tries and succeeds. Once again, he tries to get the teacher to spin the tray, but she merely gives it back to him. In the teacher’s opinion, trays are not for spinning. When Wataru tries yet again and succeeds, the teacher becomes aware of his attempts and gives him confirmation.

A little girl, Mayu, takes the tray and runs away. When Wataru notices this, he starts chasing her. She is a fast runner and when Wataru turns around to catch her, he falls on his bottom. He is a toddler and not yet a fast walker, so Mayu wins the game. She is well aware of his desire to have the tray and therefore teases Wataru a little by waving the tray in front of him.
Wataru’s intention is to get the tray back, most likely to try to get it to spin again, but his motor skills are not developed to the extent where he can fulfil his intentions.

A few days later Wataru starts playing with the small rings again, together with another teacher. He takes one ring from a shelf, puts it on the floor and with his special finger grip he makes it spin. He has now got a rather good momentum going. The teacher is also spinning another ring. Wataru crawls away and finds two rings of the same size. He puts one in each hand and starts spinning both of them at the same time. Wataru holds both rings in the air to gain confirmation from the teacher. The teacher takes one of them and makes it spin. Wataru has the other ring and offers it to a visitor, who seems to think he is playing ‘give and take’. Wataru starts to cry.

Wataru is developing his skill by variation, using one small ring in each hand, i.e. spinning two small rings at the same time. Again, he wants confirmation from the teacher. As Wataru does not know the visitor and the visitor does not understand his intentions, he starts to cry.

A little while later Wataru is sitting in front of a mirror together with another teacher. He has a ring in his hand and the teacher has a tray. Wataru starts spinning the ring on the floor with great skill. He tries to get the tray and, when he gets it, disposes of an object that was placed on it. Wataru is now spinning the tray very fast. However, when the tray falls on the floor, a little girl comes and climbs on it. Wataru just watches her hold one of the rings in the air. The girl leaves the tray and Wataru puts the ring on the tray and spins it, skillfully and fast. Then he takes the tray and makes it spin quickly as well. While the tray is spinning, Wataru claps his hands, seemingly happy with his performance. He finds a small, thicker wooden ring (which he releases from something else) and gets that one to spin on the table.

It can be seen how Wataru practices to get these objects to spin. He also recognizes that one part of another toy has similar features, which is why he extricates it and uses it for spinning.

**Summarized Interpretation.** The learning process for Wataru starts with imitation. However, since Wataru seems to find spinning an interesting phenomenon, his intention of working on and mastering this skill takes over. He is looking for a variety of objects and discerns objects that have a similar shape to the ring. In other words, he is not choosing objects by chance but intentionally looking for objects with certain critical features (round, flat). When he discovers the tray, he can picture in his mind the ring he played with earlier. The adult, however, is not always aware of the fact that Wataru’s attention to the round shape is caused by Wataru’s desire to see the object spin. Wataru shows that he was able to discern the round shape from other shapes and that he also understands that round objects can exist in different sizes. Additionally, Wataru shows that he can transfer the action of spinning from
one object to another in various places at various times. This indicates that he has already created a general idea in his mind, as he otherwise wouldn’t know what characteristics to look for in objects. However, in order to become skilled in spinning he tries a variety of objects. It could be said that if he learned to get one particular ring to spin, he had learned just that. It is, however, possible from the observation to conclude that Wataru learns the phenomenon of spinning. *Wataru develops the idea of spinning and the conditions of shape and manual activity required by sampling various objects.* The same act, spinning, is attempted with different objects that fulfilled certain criteria. When Wataru takes action with these objects, the idea of spinning is constituted. Through the space of variation, the child’s ability to spin objects develops. The child’s interest in spinning (the beginning of the constitution of spinning) starts by imitating the teacher’s actions, but later on the diversity of objects becomes an expression of variation.

**Observation II: Variations Among Toddlers Sliding Down a Slide**

Example two is a group situation where seven children (aged 15–30 months) both imitate and vary their behaviour while trying to master a piece of gross motor equipment, a slide. This entails that *the object in this observation is constant and that the children introduce variety in their actions on the slide.*

Two children, Jim and Linda, are sitting at the top of a slide. Linda starts to slide down the slide, but seems to regret her action and turns to go down the ladder instead. Jim then follows her actions, sitting down right behind her. When Linda starts to go down, Jim follows. When the slide is empty, a third child, Ron, dares to get on the slide. He climbs the stairs and upon reaching the top stands there for a little while looking around, before sitting down. He holds on tightly to the sides of the slide and then slides down.

Jim and Linda are used to sliding on the slide. However, while sitting on the top of the slide, Linda suddenly got a *new idea.* She will not slide down the slide in the ordinary way, but instead try out a *new variation* and go down the staircase. Jim follows, directly *imitating* her actions. Ron is still a little unsure of sliding and wants to experiment with the slide without other children’s involvement.

Jonny is lying under the slide. He turns his face upwards, looking around. Ben comes over to the slide and climbs on to the slide via the staircase. Ann at the top of the slide and Tony on the floor glance at each other when Ann goes over the edge. Tony then climbs up to the top and sits down there. During this time, four other children start to compete for a turn on the slide. A teacher tells Tony, who is sitting at the top, to slide down, but he stands up instead. She tells him again to slide down and takes his hand to assist him down the slide. He then sits down and slides along on his bottom.

After a short break, Ron starts to slide down the slide again in an *ordinary fashion.* Another boy, Sven, starts climbing up the ladder. Once at the top,
he at first stands upright, then sits down and slides down the slide. Ron climbs the stairs again. When he tries to slide down, Jonny is climbing up the slide from the front and Ron reacts by quickly standing up. When Jonny eventually turns around and lies down on the slide, Ron once again tries to sit down, succeeds in this and slides down. Jonny moves, but before he is completely out of the way he touches Ron’s head in a friendly manner.

Jonny is creating yet another variation on sliding down the slide by climbing up from the front and going down the slide by lying on his back. Ron seems to be watching him with admiration. Jonny understands that Ron is not able to imitate this advanced way of sliding yet and therefore comforts Ron by touching Ron’s head. Jonny seems to be aware of Ron’s limitations.

These children show variety in how they climb onto and slide down a slide. The children show awareness in being able to discern other variations of climbing and being the first to get to the top of the slide. The teachers seem to be disturbed by the children’s lack of orderliness and therefore one of them regulates the children’s behaviour.

Jonny climbs over Linda to reach the top of the slide. The teacher helps Jonny by holding his hand, which enables him to slide down on his belly, head first. Next, Linda slides down on her bottom, but folds her upper body over, holding her feet with her hands. The next child in line, Tony, turns his body around and lies down on his belly, feet first, and then proceeds to slide down.

Jonny, Linda and Tony show the observer three different ways of going down the slide; sliding on their belly head first, sliding on their bottom, folding the upper body over while at the same time holding their feet with their hands and, lastly, sliding on their belly feet first. None of the children imitate another, but merely slide in their own way, displaying a variety of methods for doing so.

After a little while there is a constant stream of children sliding down on their bellies, one after the other. Suddenly, Linda discovers a new way to go down the slide by standing upright and (with bare feet) running down the slide.

In this sequence the children initially imitate, but very soon Linda discovers a different way, a new variation, namely to go down the slide standing upright.

Anne now wants to get on to the slide before Peggy, a small girl who is climbing the stairs. The teacher stops Anne, but she circumvents the teacher by climbing directly to the top of the slide without using the ladder. The teacher does not like this approach and therefore lifts Anne away.

Anne, who attempted to find new, alternative ways (i.e. new variations) to get on to the slide is regulated and stopped by the teacher. This is due to that fact that the teacher abides by taking turns; a person may not cut in front of someone else.

Peggy continues to climb up the ladder and soon she comes to the top of the slide herself, without any assistance from the teacher. She then sits on
her bottom and slides down. Peggy succeeds in gaining access to and sliding down the slide all by herself.

Peggy is the youngest of all the children using the slide and demonstrates the typical way of sliding down the slide. She seems to be simply learning how to master the slide, and in this she succeeds.

Anne, who was stopped by the teacher, climbs up once again via the ladder and slides down on her bottom, the typical way.

Anne only imitates Peggy (the younger girl) by sliding down in the same, typical fashion.

Jonny climbs up the ladder. At first it seems as if he wants to go down the slide head first (belly down), but he changes his mind and flips his body around and over, so that he is facing feet first. Then he slides down, holding his arms up in the air. He slides down the slide once again in the same manner.

At first Jonny seems to be thinking of sliding head first, but as that is not challenging enough for him he invents a new way of sliding, feet first while holding his arms up. Jonny slides once more in this manner to manifest a new method of sliding, imitating himself.

Tony is now developing a new technique, lying on his back, head first, looking up at the sky.

Tony now tries to make sliding even more difficult, i.e. more advanced, than the boy before him. Tony ups the ante by sliding down head first on his back, yet another variation on the theme of sliding. It is apparent that he seems to find this way of sliding a little scary.

Jonny, who started sliding feet first while lying on his back, tries this method again. Another child imitates this way of sliding. Tony, who slid head first while lying on his back, tries his method again.

Tony decides to start sliding on his bottom again, feet first, but this time he dares to slide without holding onto the sides of the slide. Jonny, who slides feet first while lying on his back, continues to do so. Two other boys are waiting for their turn. Tony, who then slides face up while lying on his back, repeats this process. Another boy is waiting at the top of the slide, but he slides down on his bottom.

Jonny, who slid feet first while lying down, now tries to develop his sliding techniques further by turning and lying on his back, head first. As this seems to be too scary, he changes his mind and flips his body around and over, sliding down feet first on his back. This style of sliding engages many children, and in this manner the children gradually expand their sliding repertoire.

The children slide down once again, everyone demonstrating his/her new method
of sliding. The children seem to need to repeat their new techniques in order to be able to establish their unique sliding style. Each time, however, a small variation takes place, i.e. one child slides down without holding on to the slide. Jonny tries to expand his sliding style in a more advanced way, but dares not do it. This leads to him turning back to a less adventurous manner of sliding. Other, less daring, children are stimulated by their sliding methods and continue sliding, with small variations each time.

Summarized Interpretation. The children sometimes imitate one another (a common practice), but many times these children are trying to develop new ways of sliding which differ from the other children’s methods of sliding. In total, we can observe seven different ways of sliding (down the ladder, down the slide, on one’s bottom, on one’s back, on one’s belly, while standing up, while holding one’s feet). However, there is also variation in the fact that the children sometimes slide head first or feet first and in the different ways they get to the top of the slide. The children intentionally seek variety in their sliding styles. When a child discerns that a new way of sliding exists (for example sliding on his/her back feet first or laying down head first), that child spontaneously starts repeating his/her actions in an effort to master this new found skill. In this observation, numerous ways of sliding down, getting on to or climbing on a slide are presented. During this period of time the children discover many new ways to slide, without the teachers being aware of the fact. Neither are the teachers aware of the children’s learning processes used for discovering variation in conjunction with sliding. In watching each other the children either imitate or up the ante to experiment with new ways of sliding. The end result is that children as a group alter an action in individual ways. Children communicate physically with their bodies and in that manner the idea of sliding constitutes a phenomenon in that the children discern methods of sliding from each other simultaneously. As the children become aware of the phenomenon of sliding, variation grows and is practiced, resulting in a mastery of the cognitive idea. The phenomenon of sliding is formed by the collective space of variation, although in this observation one also notices individual variation.

IMITATION AND VARIATION

The experience of variation has an important role in the learning process, even though imitation is used as the starting point: the stimulating or even the simultaneous factor. This article has analysed two different situations: the first exploring the events of a single child attempting to master the skill of getting objects to spin and a second where a group of children work on mastering sliding techniques. In these observations one can interpret what is going on in the children’s minds as cognitive ideas of discernment (both objects and strategies). In the first observation, a single child becomes interested in the phenomenon of spinning. The child seems to create a concept of the critical features needed for an object to spin, which is proven in the observation of the fact that the child never attempts to spin unsuitable objects. The child never experiments with other objects such as chains, blocks, etc., all of which are in his surroundings. He keeps the act of spinning constant, or at most imitates
or repeats it, varying the objects spun. Through this, the child becomes able to spin (a general phenomenon). In the second observation, a group of children focus their attention on the same phenomenon, sliding, which in this case becomes the imitating or repeating part. However, in this second observation, the children use their bodies to create variation.

In the process of constituting meaning, a factor must be repeated or imitated for another factor to be varied. That this is the case can be claimed both logically and empirically. The constant factor (imitated or repeated) in the first observation is the act of spinning, while in the second observation it is the action of sliding. A child’s focus of intention (what he/she wants to learn) is constant during a certain period of time, but the objects and methods for reaching their goal change. Additionally, how a child’s intention is focussed on solving the problem at hand and how the child him/herself introduces variation become key factors. As Valsiner (1989, 1997) stresses, the children in the aforementioned empirical examples produce variation both for objects (Wataru’s spinable objects) and actions (the slides in numerous variations).

Lewin (1935; quoted in de Rivera, 1976) has also addressed the issue of variation. He distinguished two types of variation: the change in the external action structure and the change in the meaning of the actions. The most typical phenomenon of what Lewin calls the satiation process is the creation of variation. This process has been observed in both observations, where the children continually alter their tasks. These children challenge themselves by creating variety, i.e. discovering new objects or varying their physical actions.

Wataru, mentioned in the first observation, is only 14 months old. As he works on mastering the task of getting an object to spin, a great deal of hand coordination is necessary. Very few children in his age group can master an activity requiring such coordination. However, Wataru has had many opportunities in which to refine his fine motor skills at his day care center. He therefore has become quite skilled in this area. Whenever Wataru’s teacher demonstrates a skill, he rises to the challenge. In the process of imitating Wataru became skilled and in that manner learned about himself and his capabilities (see also Meltzoff & Moore, 1999). In the second observation it becomes obvious how a familiar setting and interaction between the children set the scene, providing the children with opportunities to test their limits and capabilities.

Hanna & Meltzoff (1993) describe how infants prefer to imitate children of their own age rather than imitating adults. Imitation for children is a natural part of childhood and a way to communicate with peers. Imitation is utilized in being social with others, to develop social competence and for developing one’s own self (Koffka, 1928; Hay et al., 1991; Stern, 1991; Bremner, 1992; Hanna & Meltzoff, 1993; Meltzoff & Moore, 1999). In these observations imitation of both peers and adults has been seen. However, in the observations analysed in this article, the children themselves have introduced variation. It should be noted that individual studies have been undertaken where variation was systematically introduced into children’s learning in preschool (see for example Pramling, 1990, 1994, 1996; Lindahl, 1995). These studies each show great success in developing children’s
awareness of various aspects of the world around them. Holgersen (1998) states that imitation is not a result of reflection, but instead the child’s desire to mimic what other people do. The observation of children sliding down the slide illustrates this theory. With reference to Holgersen, the children furthermore identify expressions of meaning in other persons’ actions and at the same time elaborate their own personal expression. That is to say, the children create something new in the actual context while developing their own way of sliding.

It is the purpose of this article to shed new light on the extent to which children are aware of the world around them and to demonstrate how children as young as 14 months old spontaneously utilize variation as a strategy for learning. Learning, in other words, cannot be described from an isolated developmental perspective where imitation precedes variation or as something that precedes generalization (see for example Koffka, 1928). Instead, learning is two simultaneous parallel processes.

Additionally, the analysis of the observations shows that quite an advanced process is taking place cognitively, allowing children to discern and perceive variation simultaneously in both circular and vertical patterns. Wataru, the young boy in the first observation, works on what Athey (1990) calls ‘dynamic circular’ experiences of schemas, whereas the group of children in the second observation all work on experiencing ‘dynamic vertical’ schemes. Finally, the children’s variation is not due to mistakes, as Piaget (1962) might have believed. Children imitate others in order to try and make sense of those people’s actions; in doing so, this leads to assimilation with peers, which is the main goal (Hundeide, in press). At the same time, as the children imitate that which interests them, they vary their actions, as the children find variation interesting in and of itself. The view of Bowden & Marton (1998) concerning how an individual develops capabilities is expressed in the two empirical examples. The critical aspects concerning Wataru’s objects of interest have similar form yet varying size, weight and volume and the need for a distinct spin velocity. This entails his focussing his awareness on all of these aspects at the same time, i.e. simultaneously, in order to succeed. A corresponding situation occurs when the children vary their body positions while sliding. The critical aspects in this situation concern experiences of height, depth, climbing, body position, other children’s manner of sliding, etc. The children must focus their awareness on all of these critical aspects in order to develop their sliding abilities. Therefore, it can be deduced that imitation and variation go hand in hand.

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