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The Fate of Stages Past: Reflections on the Heterogeneity of Thinking from the Perspective of Cultural-historical Psychology[1]

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This paper touches upon the problem of the fate of the "old knowledge" on two genetic levels, the ontogenetic and the cultural-historical, as well as the relationships between the two. The heterogeneity of human consciousness has been acknowledged by many authors (S. Freud, L. Lévy-Brühl, L. Vygotsky, A. Luria and others) but the heterogeneity was mainly discussed in terms of collective consciousness, and has penetrated developmental psychology to a much lesser extent. We argue that one important aspect of the acquisition of knowledge is that the new knowledge does not totally replace old knowledge: the latter, being ousted from the dominating position under the steady pressure of enculturation is, nevertheless, preserved in a latent form and is able, under certain circumstances, to recover its influence in an individual's mind and to regain control over the individual's actions. Three lines of research are reviewed in which such a recovery of the «old knowledge» presumably took place.

Das Schicksal vergangener Stufen: Erwägungen zur Heterogenität des Denkens aus der Sicht der kultur-historischen Psychologie. Der Beitrag behandelt das Schicksal «älteren Wissens» auf der ontogenetischen wie auf der kultur-historischen Ebene sowie die Beziehung zwischen diesen Ebenen. Die Heterogenität des menschlichen Bewußtseins ist von vielen Autoren anerkannt worden (S. Freud, L. Lévy-Brühl, L. Vygotsky, A. Luria und andere), aber diese Heterogenität wurde bevorzugt im Hinblick auf das kollektive Bewußtsein diskutiert und hat die Entwicklungspsychologie sehr viel weniger beeinflußt. Wir argumentieren, es sei ein bedeutsames Merkmal des Wissenserwerbs, daß neues Wissen altes Wissen nicht völlig ersetzt. Vielmehr werde das alte Wissen zwar unter dem anhaltenden Druck der Enkulturation aus seiner dominierenden Rolle verdrängt, es bleibe aber nichtsdestoweniger in latenter Form erhalten und mache sich unter geeigneten Umständen geltend, indem es die mentalen Prozesse der Person beeinflusse und ihr Handeln mitbestimme. Drei Forschungsfelder werden überblicksweise dargestellt, in denen solches Weiterwirken "älteren Wissens" wohl nachzuweisen ist.

Perhaps the most well known discussion of the heterogeneity of human consciousness is that presented in Freud's monograph, *Civilisation and its Discontents* (1930). Regarding what he called the "Problem of preservation", Freud rejected the idea that old knowledge is obliterated, preferring instead the hypothesis that in mental life nothing which has once been formed can perish, that everything is somehow preserved. Freud likened the layering of knowledge in the mind to the layers of history in Rome where traces of the most remote epochs are mixed with the remnants of the metropolis of recent centuries and decades. He goes on to examine the applicability of this "archaeological" metaphor to human mental life. After probing various problems with the metaphor, he concludes with the comment that "We can

only hold fast to the fact that it is rather the rule than the exception for the past to be preserved in mental life" (Freud, 1930, p. 19).

The acknowledgment of the heterogeneity of mind can be also found in Vygotsky's writings, although Vygotsky seems to have been of two minds regarding the fate of old knowledge. Writing at approximately the same time as Freud, Vygotsky used a geological metaphor, which he attributed to Ernst Kretschmer, a German psychiatrist. Vygotsky applied this "law of stratification" in the history of development both to understanding the ontogenesis and regression of behaviour resulting from brain insults and to the ontogeny of concepts. With respect to research focusing on the brain bases of mind he wrote that "Research has established the presence of genetically differentiated layers in human behaviour. In this sense the geology of human behaviour is undoubtedly a reflection of "geological" descent and brain

development (1930/1971, p. 155). With respect to his well known studies of concept formation he wrote that "Forms of behaviour that have emerged very recently in human history dwell alongst the most ancient. The same can be said of the development of children's thinking" (1934/1987, p. 160). Vygotsky also cited Heinz Werner, who quite explicitly draw the parallel between ontogeny and cultural history. Declaring that human beings may vary in the genetic level of their thinking from one moment to the next, Werner suggested that "In this demonstrable fact that there is a plurality of mental levels lies the solution of the mystery of how the European mind can understand primitive types of mentality" (1926/1948, p. 39).

The author best known for his claims about the qualitatively distinct nature of thought process in pre-literate societies, is Levy-Bruhl, whose work provided the most visible source of evidence for claims about cultural differences in thinking. Levy-Bruhl argued that although the characteristics of "collective representations" reflect a qualitatively different way of thinking than that of the modern European "Considered as an individual, the primitive, in so far as he thinks and acts independently of these collective representations, where possible, will usually feel, argue and act as we should expect him to do. The inferences he draws will be just those which would seem reasonable to us in like circumstances" (1966, p. 63).

We cannot hope to provide a thorough treatment of the complex issue of the extent and nature of the reorganization of mental content and processing brought about developmental change at both the cultural-historical and ontogenetic levels. Our more modest goal is to present findings that seem to demand recognition that developmental reorganizations do not totally obliterate prior forms. In other words, we are going to put under question psychological perspectives based on the idea of steady progress in mental development of the child and the logic of "cultural optimism" that ascends to the great rationalistic theories of the 18th and 19th centuries.

We are of course not the first to question this optimistic "linear perspective". Many years ago Margaret Mead (1932), in her fieldwork in Manus, reported observations that must seem to

be at least anomalous from the "linear" point of view. In their conversations and everyday practices, children in Manus demonstrated notions of causality that resembled physical more than magical causality. For example, if a canoe floated away from a child s/he attributed the mishap to the tide and the fact that s/he forgotten to tie it up. However, as they grew older the children became more likely to give animistic explanations, for example that a water spirit had moved the canoe, in line with the animistic and magical "world outlook" of adults. To round this picture out, recent work by Harris and his colleagues has documented the fact that fear of ghosts and monsters is present among European children and also summarized historical evidence that general belief in magic among adults receded relatively recently beginning in the 17th century in Europe (Dias & Harris, 1988; Harris, Brown, Whittal & Harmer, 1991). To this we should add that such beliefs exist even among educated classes in the industrialized world today (Zusne & Jones, 1982).

More recently Tulviste (1991) and Wertsch (1992) have discussed the problem of heterogeneity both across and within cultures. Tulviste argues that types of thinking correspond to different forms of activity, rather than to different cultures. It is a mistake, he contends, to make blanket comparisons across cultures as if the kinds of activities they sustain are all of a single type. Wertsch emphasizes the way in which different institutional settings afford the use of different modes of discourse, each of which privileges a particular mode of reasoning.

Our own approach to the problem of heterogeneity of thinking is similar in many ways to that of Tulviste and Wertsch. However, we are particularly concerned with the heterogeneity of thought whithin individuals presumed to be at a particular "stage" of development (taken either historically or ontogenetically). We also are less concerned with those different modes of thought which independently accumulate in the mind in the course of development than with those complex patterns of different modes of thinking that arise as interdependent aspects of thought and action as a whole.

Two of the three lines of work we will summarize here are focused on children and adults in

modern industrialized soc US). The third, which d genetic and cross-cultur cludes both industrialized ized societies. After pres work, we will step back to consider to be their imp standing of the fate of the and behaviour when new scene.

Case 1: Object permanen perspective

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modern industrialized societies (Russia and the US). The third, which draws on both onto-genetic and cross-cultura comparisons, includes both industrialized and pre-industrialized societies. After presenting these lines of work, we will step back to summarize what we consider to be their implications for understanding of the fate of the old ways of thinking and behaviour when new ways come upon the scene.

Case 1: Object permanence in a life span perspective

In one of his most brilliant studies, Piaget (1937) argues that the development of causality and object permanence goes through a series of stages in early ontogeny. In Stages 1 and 2 children's minds lack both notions of permanent object and physical causality; they seem to be entirely ruled by magic and nonpermanence, not because of some sort of "cultural influence" (which many would consider minimal at this age) but simply because of the mind's primitive assimilative nature. This "primitive mind" of the infant is gradually socialized through his or her numerous activities with objects and communication with people. Shortly before reaching two years of age, according to Piaget, children acquire the concepts of physical causality and object permanence on the level of sensorimotor actions; some time later these concepts appear on the level of verbal judgements.

Piaget mentioned, but did not investigate the object concept as it moves from the sensorimotor domain to domains where the objects are not accessible to direct manipulation, such as stars and the wind. Although Piaget suggested that development of a stable object concept may not be complete until the age of 10-11 years, researchers have generally assumed that once attained according to the criteria of Piagetian experimental treatments, it remains unchanged. Instead of studying conservation of objects in older children, Piaget and subsequent researchers have studied conservation of various object qualities such as conservation of quantity or mass.

Subbotsky (1985, 1991) has carried out a number of studies attempting to determine the

later fate of the object concept and notions of causality. His basic strategy has been to investigate conditions under which children of 4, 5, and 6-years-old might abandon the notions of object permanence and non-magical causality. One simple technique is to begin by asking children if it is possible to change physical reality by direct action of thought. All 5-6 year-olds and 75% of 4 year-olds denied that this could happen.

In one such study the child was then told a story in which a little girl receives a magic box as a gift. If she said magic words, the box would turn drawings of objects into the objects depicted. A few days later the child was brought back and given some pictures depicting a ring, a brooch, a spider, and so on. The child was then left in the room with the box and the pictures while the experimenter was "busy elsewhere".

During the experimenter's absence about 90% of the children at all ages attempted to transform the pictures into objects (except for "scarey" objects such as a spider). Many of the children tried repeatedly to transform their pictures, repeating the magic words and engaging in other "magic-appropriate" actions like rubbing their hands over the box.

Lest it be thought that such childish beliefs quickly disappear, Subbotsky conducted experiments based on the same logic with adults (using, however, transformations of a postage stamp as the potentially magical event). In this case adults initially used the rule of object permanence to explain changes in the postage stamp. However, when, following their spontaneous explanations, Subbotsky asked them to judge the probability that he had learned to change objects at a distance by means of sheer will power, his subjects judged such an achievement to be possible and several expressed something like a need to encounter phenomena that transcend the boundaries of everyday life (Subbotsky, 1991).

As Paul Harris (1991) points out in his commentary on this research, "The implication of this analysis is that collective beliefs concerning magic find fertile ground with the child's mind" (p. 140). More than that, the ground is not totally barren with respect to such beliefs even in the adult's mind. These experimental facts show that fundamental physical laws and their in-

terpretation in social and cultural context are not absolutely independent phenomena. Such phenomena can not be satifsfactorily explained from the «linear» perspective; rather they correspond to the view that magical and nonpermanence beliefs are as «culturally conditioned» as the opposite beliefs in physical causality and permanent object (see Mead, 1932; Tulviste, 1991). They are not absent even in the adult mind, nor are they produced and reproduced solely in "primitive" cultures, but in European cultures as well.

Case 2: Syllogistic reasoning in ontogeny and cultural history

In a famous series of studies carried out in Central Asia in the early 1930's, A. R. Luria asked traditional peasants and people who had begun to engage in collectivized, mechanized, bureaucratized agriculture to solve a variety of verbal syllogistic reasoning problems. One of the frequently cited problems was the following: "In the far north, where there is snow, all bears are white. Novaya Zemlya is in the far north and there is always snow there. What color are the bears there?". The people who had entered into the new forms of activity and ways of life promoted by the state answered problems of this sort in a manner that appears straightforward to us; the bears are white. Traditional peansants, however, did not answer in his way. Instead they provided some variation of the following response: "I don't know what colour the bears are, I have never seen them."

Despite repeated probing by Luria, his informants refused to speculate about matters they had not themselves witnessed. They responded easily and correctly when the content of the syllogism concerned matters common in their experience, but did so not in terms of the logical figure of the syllogism, but in terms of what "everybody knew to be true". Luria's basic results have been replicated in many parts of the world (see Tulviste, 1991, for a summary).

Luria interpreted these results as evidence that the thought processes of the traditional peasants depended upon concrete, "graphical-functional" thinking, whereas those who had entered into modern economic life responded in an "abstract, theoretical" manner. Scribner

(1977) and Tulviste (1991) speak of these same results in terms of distinction between "empirical" an "theoretical" modes of problem interpretation: the more modern, more educated subjects appear to treat the problem as purely hypothetical and respond accordingly while the more traditional, less educated subjects interpret the problems in terms of their empirical truth value.

In line with the theme of this paper the question we pose regarding this phenomenon is whether the "theoretical" mode of responding replaces the "empirical" mode, or whether the two exist simultaneously, revealing themselves according to the particular circumstances in which the reasoning is evoked. Two lines of work argue rather persuasively that the two modes of interpreting syllogisms exist simultaneously not only among adults from traditional and modern cultures, but among young children in modern cultures as well (and most probably in traditional cultures as well, although data on this point are lacking).

For example, Scribner and Cole (1981) presented logical syllogisms of two kinds to literate and non-literate members of the Vai tribe of north-central Liberia. When using problems of the type studied by Luria they replicated his findings. Vai adults who had attended school were significantly more likely than Vai non-literate people to provide theoretical responses to syllogisms. Moreover, the amount of theoretical responding decreased the longer it had been since the subject last attended school, a finding also obtained by Tulviste (1991). However, when subjects were presented sets of problems half of which had a clearly fantastic content (like, for instance, "All stones on the moon are blue. The man who went to the moon saw a stone. Was the stone he saw blue?"), the level of theoretical responding was increased. Moreover, when the syllogisms were presented following an extended discussion of the properties of language and concepts, the level of theoretical responding was higher than in cases where the syllogisms were presented before discussions of language. Such results are clearly inconsistent with the idea that one mode of thinking has replaced another, suggesting instead that the two modes exist side by side, being evoked by different circumstances for different people.

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Case 3: The arousal of ol new contexts

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A second line of evidence for the co-existence of different modes of reasoning about syllogisms comes from studies carried out entirely in industrialized countries among college educated people and young children. Even college-educated people have now been shown to reason differently about problems presented as syllogisms with varying content (D'Andrade, 1990). Most strikingly, 4–5 year old children have been shwon to reason theoretically about problems where the logically correct solutions runs counter to their experience if the problem is presented in a play context (Dias & Harris, 1988; Hawkins et al., 1984).

These results suggest quite clearly that while activities such as formal schooling, (where the logical relations among problem elements are often emphasized as a part of teaching scientific methods of reasoning at the cost of their empirical truth) increase the likelihood that mundane problems will be solved on a purely logical basis, this ability is relatively fragile and coexists with an apparently tenacious tendency to privilege empirical knowledge over hypothetical.

Case 3: The arousal of old leading activities in new contexts

Although each of the previous examples provides evidence that forms of thinking acquired at an earlier time (historically or ontogenetically) remain a part of the cognitive repertoire, to be called upon when circumstances make them appear plausible tools of action, it is difficult to escape the conclusion, or perhaps only the nagging feeling, that the "old" way of thinking is also considered more primitive in the pejorative sense of the word. There is no doubt, for example, that Piaget, Werner, Vygotsky, and other psychologists who have commented on this problem believed that earlier was in fact "lesser" in one of several senses of the word: there is little choice in the matter when the conditions that evoke the "old way" of thinking are associated with brain injury, schizophrenia, or life in the jungle.

Our final example pushes the inquiry one step further to ask whether or not there might be circumstances in which "earlier/older" psy-

chological formations are manifestly instrumental to people's well being and might even be deliberately harnessed as a means of promoting development among people living in modern, industrialized societies.

Instead of a purely cognitive achievement such as object permanence, causal and syllogistic reasoning seem to be, the focus of this example is on what Leontiev (1981) refers to as "leading activities", i.e. activities that "are of greatest significance for the individual's subsequent development" at this particular period of life whereas other activities are less important. Some years ago Griffin and Cole (1984) illustrated the utility of the notion of leading activity to characterize variations in children's behaviour as they move from one activity to the next in a specially constructed educational setting. In the course of this work they noted that it became useful at certain times to think of activities in which one or more "type" was simultaneously "leading" for children at a given age. Although they did not remark upon it at the time, they were in fact touching upon the topic of concern here, since at least one of the "co-leading" activities was, according to Leontiev's formulation, an "old" (an hence non-leading) activity.

Of course, the "leading activity" is a notion that refers to a long term scale that is measured in years. On a short term scale in real life situations all sorts of activities are normally present side by side and which of them is said to be "leading" at the moment, is to a large extent, a matter of convention. For instance, you can hardly meet a 5 year old child involved in a play activity without being engaged at the same time in some sort of learning activity or "peer interaction" activity, etc. The "peer interaction" activity of young teenagers often involves play and learning activities. In other words, it is not an isolated action of one selected "leading activity", but rather the joint action of various activities what we observe in real life settings, the psychological development being also the result of this joint action.

In his present work, Cole and his colleagues are extending the research begun with Griffin, using a specially organized activity system in which the activities discussed by Leontiev, El'konin, and others (affiliation, play, study,

107

The Wizard is also an essential tool in re-ordering power relations between adults and children in the 5th Dimension. This rearrangement comes about in part because when conflicts arise in the 5th Dimension, adults need not confront children directly because it is the ever absent Wizard, not the human participants, who has the power to adjudicate disputes. In such cases, adults as well as children must write to the Wizard to decide how matters should proceed. It is also important that by subordinating themselves to the Wizard the adults can collude with the children in the pretension of the Wizard's existence and thereby play with the child. Finally, since computer technology is not especially reliable and programs or computers often fail to work, adults can offload responsibility onto the Wizard at strategic moments, a possibility that has endeared the Wizard to all adults who have worked in the 5th Dimension.

An important feature of the 5th Dimension is that it is staffed primarily by undergraduate students who participate in the activity as part of a course requirement in the departments of psychology or communication. These undergraduates have generally not worked with computers before and often know less about the specific game activities than do the children. Their assignment is to participate with the children in the role of "older siblings". The normative "rule of thumb" that guides their participation is that they should provide as little help to the children as possible, but as much as necessary so that the children have a good time. After every session of the 5th Dimension they write detailed field notes about their activities with the children, the Wizard, the software, and the life of the 5th Dimension.

The purpose of bringing this somewhat unusual activity system into the present discussion is that data collected in the 5th Dimension bear directly on the issue of what happens to prior leading activities when they are superseded by later ones. Is the "leading" nature of leading activity context-independent in the sense that belief in object permanence or forms of reasoning were once thought to be? Or can it be shown that in some contexts currently non-leading forms of activity (for instance, play activity or affiliation) will become dominant? And if the latter is the case, does the reappearance of an earlier form of activity represent a "regression" or "primitivisation"? Or might such occasions provide a resource for personal development?

An example of how a deliberately created context that reorders the relationships between "leading activities" can be used to illuminate the issue of "old forms' preservation" we present a filed note written by a 20 year old undergraduate student immediately following her participation in a session of the 5th Dimension. At appropriate functions in the text we insert interpretive comments indicating what activity is "leading" at that moment.

Fieldnotes by Jill Strickstein
Site: Library
Date: 2-14-90
Child: Jamie (8 yrs old) and Lisa (6 yrs old)
Activity: Mystery House

Right away I was anxious to get started since I knew that Jamie had been looking forward to working with me again after last Thuersday. But this day was special . . . it started out different and ended up being one of the greatest experiences of my life. Never before have I exerted so much energy in the fifth dimension . . . Leaving the library I was wiped out but really felt like I made a difference in two beautiful children's lives. Actually I went home to sleep for hours. WOW was it worth the extra energy!

And the reason for this sudden burst of energy came from the fact that Jamie requested me as her partner. I don't know why this meant so much to me but I guess it was because I wasn't quite sure the kids were liking me. *[Appearance of affiliation as central motive].* First thing Jamie tells me that Lisa her sister was going to play with us "A LITTLE" since she really was not in the mood to play full out. Jamie acted very motherly and quite protective of Lisa. She made sure that I understood that Lisa would not be a big part of our team. This was a great opportunity to give Lisa, only 6, freedom to do or not to do. As we get started with Mystery House, Lisa sits back and observes, but the minute I explained to them the purpose of the game, the objectives and strategies, she piped up her ears and got into it. After the first five minutes of so, Lisa was full-fledged into the game and we couldn't have progressed through the different rooms of the house without her help. *[Play becomes the leading activity for children.]*

All three of us were stunned when we realized that the reason we couldn't go and look in the refrigerator is that the computer would not eat our command to "Look Refrigerator" – UNTIL we wrote "GO TO REFRIGERATOR". This made all three of us stop and think, HMMMM, why can't we look there? AHAAAA! We must GOOOOOO there first, then we can look. *[Adult enters into play with children.]*

Here are some of the goals we had, when we started the game . . . We should try to get through as many rooms of

the first floor of the house and collect as many objects on our way as possible, while at the same time, staying away from the "masked killer" who was somewhere roaming the house. But we were also looking for the killer at the same time, so this in turn affected our decisions about what to gather as we ventured through the house. For example, when a knife was lying in the kitchen sink, we grabbed it! For protection of course.

The children really rely on the pictures on the screen. I say this because two times, the picture affected our next step. For example, Lisa saw the stove in the kitchen as one that was "never looking" and thus, didn't need to be lit by matches. Rather she informed me that it was "not an old fashioned stove and that her mom doesn't have the kind that needs matches any more". So, when I suggested that we light the stove for some light, the first reaction Jamie had was that it was a bad idea because the house could catch on fire if we lit the stove and then left the kitchen to search other rooms. Lisa also thought my idea wasn't a good one because of the fact that the stove looked like an electric range (as opposed to gas). *[Logical reasoning and inference by six year old in context to play.]*

So we went with Lisa's idea and kept our eyes open for a candle. When that candle finally turned up, you woldn't believe how exited they got!!! It was as if they accomplished so much. *[Children are now deeply involved in play.]*

The game doesn't count matches, and we couldn't actually gone through the whole day lighting matches time that the lights shut off, but they both realized that there was a more efficient way of doing things, and they could save a lot of time with a permanent time source. Plus, I think Lisa was getting really scared. She said, "Jill, I hope that lights don't go out again, I hate the dark. And what if the killer sneaks up behind us when the lights go off?" *[Border between fantasy play and real life becomes obscure.]*

I could really go on and on about the amazing interaction that took place between all tree of us. But i want to illuminate one more incident that took place which really stood out in my head. We are outside in the back porch of the "Mystery House" and we adventurously risk going through the gate. It was as if we were actually tiptoeing through this scary place always in the lookout for the killer. Lisa was so scared but having fun at the same time. Anyways we find ourselves in the graveyard and instead of there being a dead body lying there, as we had found in most of the other rooms, there was alive person digging graves!!!

Lisa and Jamie were terrified. We stood at the gate (although there is no figure on the computer which represents the player – we imagined ourselves standing at the entrance to the graveyard) and decided what to do about this strange person who was mysteriously alive and digging graves.

But as we are thinking about what to do with the gravedigger – should we kill him with the knife we got or should we sneak away without him seeing us and go get the dagger and come back later and kill him??? – I ask them why they think he is the killer and not just an innocent bystander.

Jamie: Well, why is he alive if he's not the killer?
Lisa: Plus why won't he talk to us?

Jamie: He looks pretty suspicious to me.
Me: You can't always tell things that easily. He may be innocent.
Lisa: Well why is he digging six graves then? He obviously knows that six people will die and he's preparing to bury them.
Jamie: That has to be him. UNLESSSS, the killer asked him to dig the graves as a favour!!!
Lisa: That would mean that Joe (gravedigger) knows who the killer is!
Jamie: Maybe Joe's friends with the killer.
Lisa: We should kill him.
Jamie: Yeah either way he's bad.
[Logical reasoning in the midst of the fantasy.]
So they both took to me for final approval and I made sure they understood that they were rising getting killed since all they had to kill him was a butterknife. So we decided to get another weapon and come back.

Here's the moral of the story: We developed goals as we went, and each new peace of information lead to new ideas and strategies. There aren't too many limits to this game, and it is complex enough to keep a child busy for a week straight. But what was really educational to all three of us was realizing that the computer needs to be almost taken by the hand and lead through the motions. That is, the computer needs specific (super specific) instructions in order to do what you want it to . . . Lisa and Jamie both agreed that the computer is "stupid" and this made them feel superior to this grandiose, complex, technologically advanced, somewhat frightening machine. This leading experience for the girls was really valuable. They recognized the potential to master the machine . . . But at the same time, realized that in order to do this, they needed to be very careful with their word choice for the commands, and in choosing the right moves. They learned the difference between a computer and a human being. And what's REALLY amazing is that they informed me about this newly acquired information. We discussed how a real person doesn't need to stop and think about every little detail of everyday actions before doing them. The computer does. It needs detailed directions. For instance the fact that you couldn't look somewhere for an object before commanding the computer to "GO THERE" proves the point. Or that we couldn't open a door until we said "GO DOOR" taught them that there are steps that everybody in real life goes through but doesn't have to think about it first in such structured terms. *[Both the children and the adult are induced to reflect on the nature of computer programs; in addition the adult gains insight into basic process of goal formation, an educational goal of the professor teaching the class.]*

Concluding Remarks

In the era when it was popular to use stratification or "geological" metaphors to describe the developmental relations between older and new psychological functions it was also popular to think of human history as the story of progress and to see the appearance of industrialized Eu-

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ropean societies as the triumph of reason and civilization over irrationality and nature. At present there is much deeper scepticism both about the possibility and the desirability of triumphing over nature or attaining complete rationality as the everyday norm of human thinking.

Parallel to the increased scepticism about the extent to which "newer, bigger, more rationalized, more technologized" means "better" is a growing belief that "older, smaller, less rational, less technologized" have their virtues too, not least of which is that they were present first. In place of the belief that a lower, more primitive, more "natural-biologial" form of mind is replaced by a higher, more developed, cultural form of mind it now appears essential that both nature and culture deal with a human mind of the same complexity, but they deal with it differently. The role of culture vis a vis phylogeny appears more to be the restructuring and enrichment of already existing systemic elements than a substitution of "primitive concepts" by "advanced ones".

As some authors argue, "skeletal" protostructures of many adult concepts can be found under highly structured and simplified conditions in early infancy (Carey and Gelman, 1991). In Leslie's (1986) phrase, these skeletal protoconcepts help to get development off the ground. For example, one can see how a "causality module" would help children to form their initial discriminations between causal and noncausal events while the "cultural context" would later draw upon this initial structure to elaborate a mature notion of causality. One possible way to put this is that at a certain point in development children are not only able to perceive causal events, but to understand that they perceive them, that is they become aware of them. This becomes possible with the children's acquisition of language. Through the intertwining of the "natural" and the "cultural" streams of history (to use Vygotsky's terminology) the "causality module" is transformed into the "causality concept" giving rise thereby to children's theories of causality. The awareness is not, of course, the only result of speech acquisition. As Vygotsky stressed, the appearance of language enables children eventually to come into possession of

their own mental functions, bringing the isolated functions of pre-speech thinking into a certain degree of systemic unity.

It is at this point that cultural variability begins to exert its differentiating effect on mental development, amplifying some of the child's "protoconcepts" and inhibiting others. It is the historically particular cultural configuration into which children are born that determines whether their theories of causality will be dominated by science or mythology and therefore whether children are seen as little scientists or little magicians.

We hope that we have also made a case for the co-existence of scientific-logical and magical-emotion-fused forms not only in society but inside one and the same individual mind. That a tribal person living in the African veld may employ the two thought genres in different circumstances than an industrial chemist in a laboratory should come as no surprise, given what else we know about such modes of life. But that both genres are available to both as a real life practice appears highly probable, as Levy-Bruhl long ago pointed out.

In Figure 2 (that we take from Subbotsky's recent book, 1992) we have sought to contrast the two views, one in which mode of thought A replaces mode of thought B in something like a homogeneous stage shift. To this "either or" vision we have added the kind of heterogeneity which seems minimally necessary to encompass the phenomena that we have been discussing.

No one visual representation can capture the full diversity and complexity which we know to characterize human behaviour in its daily production in culturally organized events. In particular, we would not insist that the relationships between "new" and "old" structures are perfectly reflected by the "layer" metaphor or by metaphors similar to it (such as the "geological" or "onion" metaphors). What we argue for merely is that the "old" structures conserve their significance inside the developing mind, they conserve their structure and identity, although the "cocktail" of the "new" and "old" in the course of mental development undergoes drastic changes. Parts of this vastly complex system of relations are available for analysis, and we hope we have shown one path to this forms of analysis.
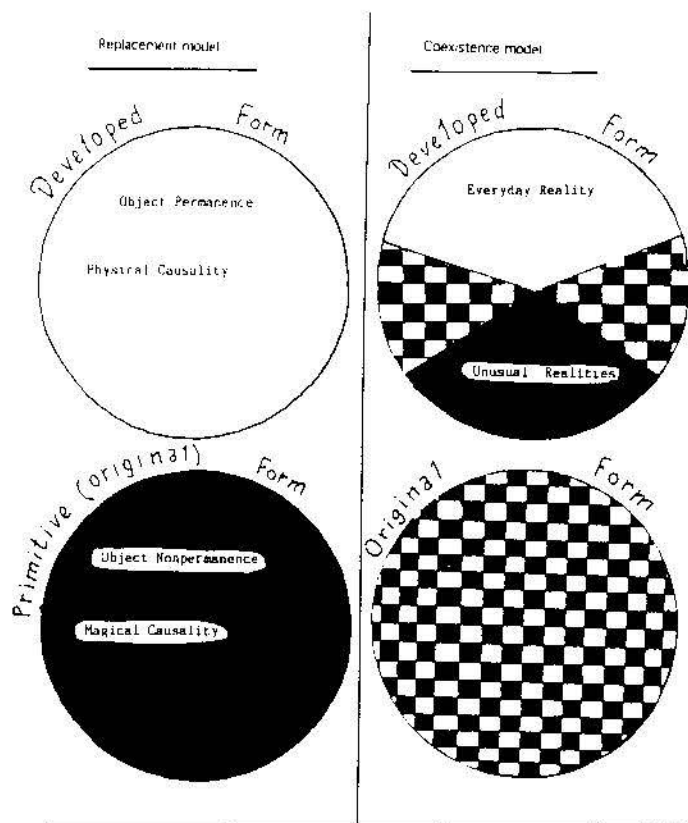
Figure 2: Linear and Nonlinear Perspectives in Understanding of the Development of Mind

In addition, we also hope that we have brought attention to the possibility that self-conscious use of the different modes of activity is a worthwhile possibility to consider. As some of Subbotsky's adults remarked, they would like to be able to believe in magic. As the behaviour of both Subbotsky's and Cole's subjects indicates, when circumstances afford it, they will revert to it when possible. And as the widespread existence of institutions supporting the experience of fantasy and magical thinking, or those supporting the use of alcohol and psychotropic drugs attest, such forms of thinking manifest no signs of disappearing before the onslaught of rational modern life.

This is not bad news. It is the same systems properly that allows a scientist to solve formulas during the day and attend a theatrical performance at night. To overgeneralize virtues of the scientific-rational mode of thinking is to fall prey to the predicament of a hero in Milan Kundera's "Book of Laughter and Forgetting" whose lover acccuses him of making love like an intellectual. The heterogeneity of human consciousness is inescapable; the problem is to come to understand this fact and learn make use of it for our own survival.

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