

Tool and Sign in Vygotsky's Development *

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There is a tension within Vygotsky's writing and in its interpretation, hinging around the relation of sign and tool, sometimes taken up under the heading of word and deed (or action). This contradiction turns out to be a microcosm of the tension between language and labour in the wider field of Marxist theory, which in turn evokes the class antagonisms underlying the original work of Marx and Engels, antagonisms which have continued to be reflected in the development of theory and of social and political conflict up to the present time, as a result of changes in the labour process.

Vygotsky's final position was expressed clearly enough on the last page of *Thinking and Speech* (1934), where he speaks about word and deed:

The connection between thought and word is not a primal connection that is given once and forever. It arises in development and itself develops. "In the beginning was the word." Goethe answered this Biblical phrase through Faust: "In the beginning was the deed." Through this statement, Goethe wished to counteract the word's over-valuation. ... we can agree with Goethe that the word as such should not be overvalued and can concur in his transformation of the Biblical line to, "In the beginning was the *deed*." Nonetheless, if we consider the history of development, we can still read this line with a different emphasis: "In the *beginning* was the deed.

1934, p. 284-5

Although Vygotsky does not here explicitly touch on the question of tool and sign, this is, as will be seen, a clear and succinct statement of the relation, leaving to the reader the work of unfolding from that relation the richness and complexity of the history of intertwined development alluded to. However, there are other statements of Vygotsky, at other times and in other terms, and interpretations of his writing by other writers which oblige us to look more deeply into this problem.

I shall first review what Vygotsky himself said on the topic, which is variously framed in terms of tool vs. sign/symbol or action/deed vs. word, as well as technical tool vs. psychological tool.

Part 1: *Ape, Primitive Man* and Child*

The story begins with *Ape, Primitive Man, and Child: Essays in the History of Behaviour* (1930), a book which Vygotsky wrote in collaboration with Alexander Luria. Vygotsky

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wrote the first two chapters of the book, mainly drawing on the reports of contemporary zoologists, anthropologists and ethnologists. In Chapter 2, "Primitive Man and his Behaviour," Vygotsky clarified what he meant by "primitive man" as follows:

This term is commonly used, admittedly as a conventional label, to designate certain peoples of the uncivilised world, situated at the lower levels of cultural development. It is not entirely right to call these peoples primitive, as a greater or lesser degree of civilisation can unquestionably be observed in all of them. All of them have already emerged from the prehistoric phase of human existence. Some of them have very ancient traditions. Some of them have been influenced by remote and powerful cultures, while the cultural development of others has become degraded.

Primitive man, in the true sense of the term, does not exist anywhere at the present time, and the human type, as represented among these primeval peoples, can only be called 'relatively primitive'. Primitiveness in this sense is a lower level, and the starting point for the historical development of human behaviour. Material for the psychology of primitive man is provided by data concerning prehistoric man, the peoples situated at the lower levels of cultural development and the comparative psychology of peoples of different cultures.

1930, pp. 41-42, Italics in the original

By 'relatively primitive', Vygotsky meant people living in *non-literate societies*. Vygotsky's ideas were tested out by Luria in an expedition to Uzbekistan in 1930. There Luria studied the peasants who were undergoing a transition from feudal village life into the modern, collectivised Soviet economy. The background which frames *Ape, Primitive Man, and Child* is the conception that human behaviour is the product of three processes of development: (1) biological development, or phylogenesis, i.e., the biological evolution of the human genome, (2) cultural development, i.e., the history of the tools and signs used and produced by people, and (3) ontogenesis i.e., the development of the individual person over their life time (see Blunden, 2020).

In tracing the development from apes to "primitive man" to modern human beings, Vygotsky aimed to identify just one feature of behaviour which could be taken to be the essential component of development which "served as a link connecting a given stage in the development of behaviour with the very next stage of development," (p. xi), that is, that behaviour in the earlier type of being would generate a qualitative change and transition to a new type of being.

Vygotsky had drawn on the work of Wolfgang Köhler (1887-1967) to show that apes used tools in the normal course of their activity, in particular that they would use sticks as multi-purpose tools for digging, eating, fighting, poking, etc., and were on occasion capable of using other objects which they found to solve problems, chiefly gaining access to food. According to Köhler, the apes' problem solving was characterised by their perception of a problem situation as a Gestalt, so the discovery of a tool-mediated solution to a task depended on being able to fit the tool into the visual-spatial structure of the problem.

Although frequently taken as the archetypical characteristic of *Homo sapiens*, Vygotsky took tool production as that aspect of *animal behaviour* which brought about the transition from ape to human. Originating among apes, the production and use of tools reached a high level of development in "primitive man." This activity constitutes cultural development. Implicit in this conception is a protracted epoch of evolution during which cultural development operates *in tandem with* biological development in

the formation of the human biological type with the emergence of the hominids about 6 million years ago.

However, according to Vygotsky, it is *not* the production and use of tools which brings about the transition from “primitive” to *modern* human beings.

On the basis of evidence available at the time, Vygotsky correctly concluded that all human societies currently in existence were of the *same biological type*, biological differences being insignificant. Biologically, literate and non-literate human communities would be the same. Yet culturally, there would be profound differences. They would be at a different point in their cultural history. If literacy was posited to be the marker of modern, as compared to “primitive” man, then non-literate communities could be said to approximate the condition of human communities prior to the historical emergence of writing. Writing, after all, emerged independently in Mesopotamia c. 3200 BCE, in China c. 1200 BCE, in Phoenicia c. 1000 BCE and in Mesoamerica c. 700 BCE, and spread from there to other societies. There were in 1930 in the Soviet Union many communities that remained non-literate. In order to learn about what marks or enables the transition from “primitive” to ‘modern’ human beings, therefore, it made sense to search for the first, rudimentary use of writing in non-literate communities, and observe its impact on their behaviour.

History and evolution

According to Vygotsky, it is not that at a certain point biological evolution ended and cultural history began. Rather, there are *two distinct principles of development*, biological-evolutionary and cultural-historical. Up to a certain point, cultural change, that is, the development of tools and signs and their use, was *subordinate* to and constrained by biological change – in particular, the gradual change in the genotypical form of the hand and the organs of speech. But then, from some point in the past, “biological change of the human organism now became subordinate to and dependent upon the historical development of human society” (Vygotsky, 1930, p. 50). Far from holding that evolutionary change ceases when history begins, he actually suggests that “the hand and the brain, as natural organs, probably never developed so rapidly, and at such a gigantic pace, as during the period of historical development,” (*op. cit.*, p. 36) and in ‘The Socialist Alteration of Man’ (1930b), written about the same time, he says of Socialism: “this change in human behaviour, this change of the human personality, must inevitably lead to further evolution of man and to the alteration of the *biological type of man*” (p. 182). Nowhere does he suggest that capitalism has generated any development in the biological type of human being.

The epoch of “primitive man” intervening between the formation of the biological type of modern human beings and the creation of the first literate communities in China, the Middle East, North Africa and South America, is characterised by a highly developed *practical intelligence*, associated with the development of ‘technique’, i.e., tool production and use. According to Vygotsky, far from lacking logical thinking, “primitive man” *had to be logical* in their interactions with nature or they would not survive. There was no room for fools in their world. But Vygotsky differentiates between *practical intelligence* and *verbal intelligence*.

A contrary view has been repeated in different forms, however, across ‘ethnic psychology’ research: a subject from a non-literate society is presented with a formal logical problem to solve verbally. But the so-called ‘logical’ solution flatly contradicts what the subject knows very well from their practical intelligence and experience. The result is that the subject is unwilling or unable to solve the puzzle ‘correctly’, according to the dictates of formal logic applied to the hypothetical counter-factual scenario. It is

concluded that the subject is incapable of logical, syllogistic thinking. As we shall see, Luria fell into this fallacy in his research in Uzbekistan.

Periodisation of the intellect

Vygotsky periodised the development of the intellect of “primitive man” as follows: (1) practical intelligence, which enables human beings to well understand nature, but cannot be said to have anything like a ‘theory of nature’, (2) verbal intelligence, which is differentiated from practical intelligence but is still inadequate, and includes ‘magical thinking’ and (3) verbal intelligence, which is stabilised in a rational understanding of nature, distinct from practical intelligence. “More advanced technical development eventually separates the laws of nature from the laws of thinking, and magical action begins to fade away” (Vygotsky, 1930, p. 85) with the development of natural science.

Vygotsky says that the historical period of development is not marked by any significant development in the biological type of human being (there are changes, but these are relatively superficial and reversible). The point is that *a different principle of development is dominant* during this epoch. Development during the period prior to the emergence of literate societies is essentially grounded in the *tools* we use to mediate our action upon nature, and in the forms of social organisation corresponding to these tools. It is during this epoch that rudimentary signs first emerge from tools.

To be clear, at this time, Vygotsky used the term ‘sign’ or ‘symbol’ to mean an *artefact* which is used to regulate our behaviour by controlling our mind. *He did not count spoken words as signs*. In the study in question, Vygotsky was only concerned with ‘material culture’ in the sense in which the term is used by archaeologists, referring to enduring objects which, unlike the spoken word, are available for direct observation: jewellery, tattoos, marks on trees, message sticks, etc., and eventually writing.

Just as the turning point in biological evolution was the emergence of tool use, which is found in apes in rudimentary form, it is the emergence of *sign* use which brings about the *cultural-historical* transition to ‘civilised man’. So Vygotsky expected to find sign use amongst “primitive man,” but in rudimentary form. Once the use of signs to control our *own* behaviour (and subsequently that of others) emerges, a *new principle of development* becomes dominant and thus begins the transition from “primitive man” to modern literate societies. The crucial thing in the transition from “primitive man” to civilisation, according to Vygotsky, is the emergence of rudimentary forms of *writing*. This is the *cultural-historical* principle of development. It is no longer tool use, but sign use which is the dominant force in human development.

Vygotsky always carried out his psychological investigations in relation to *specific psychological functions*, so he never conceptualised cultural development as a single totalising, linear narrative. Instead, he allowed that each psychological function had its own path of development, including regression of some functions. This is important, because despite the totalising categories – ‘animal’, “primitive man,” ‘civilised man’ – which imply a single narrative, his approach actually relied on the intermingling of multiple narratives. One of the sections of his chapter on “primitive man” concerns the function of memory. In respect to memory, the problem is that without signs such as the written word, the *accumulation* of knowledge is limited to oral memory.

Everything that civilised humanity remembers and knows at present, all the accumulated experience in books, monuments and manuscripts – all this colossal expansion of the human memory, without which there could be no historical and cultural development, is due precisely to external human memorisation based on symbols.

'Symbols' in this sense encompasses everything that Vygotsky would call 'psychological tools' – maps, plans, books, movies, up to computers, all of which have developed out of and in close connection with the development of industry and technology in general. Although it was a novel idea in Vygotsky's day, it is uncontroversial today that such psychological tools have a profound effect on our thinking, not only as mediated through their impact on social relations, but *immediately*, in the hands of an individual user.

Again, to be clear: for Vygotsky at this point in his development, prior to the writing of *History* (1931), a spoken word is *not* a sign. The spoken word does not, like the written word, have the same irreversible 'ratchet' effect which fosters technological escalation. More importantly, however, the developmental path of the spoken word is different from that of the written word. Language arose in close connection with the first use of tools millions of years ago, whilst writing arose as an outgrowth of bureaucratic class societies a couple of thousand years ago.

Periodisation of tools

To track the transition from "primitive man" to 'civilised man', Vygotsky periodised the emergence of sign production out of tool production, into three phases in line with the above periodisation of the intellect of "primitive man."

(1) At first, the tools used to control nature also necessarily regulate and mediate human behaviour in the labour process. Tools control the mind mediately through their use in acting upon nature.

(2) Then rituals, music, symbols, incantations, icons and so on are used which function to regulate human behaviour, but the people using them are unclear as to whether the rituals, etc., are controlling nature or controlling their own actions in nature. Thus technique and magic (i.e., incipient verbal intelligence) develop side by side without fully penetrating one another.

(3) Verbal intelligence, that is, the ability to represent nature and human activity symbolically, matures sufficiently to be able to provide adequate theories of nature which are capable of effective regulation of technique. Psychological tools are adequately differentiated from technical tools, and with that, verbal intelligence fully differentiated from practical intelligence.

Vygotsky did not use the word 'tool' in the metaphorical sense in which people nowadays use 'tool' to refer indifferently to words, concepts, mental images and methods. *A tool is a useful material artefact.* The appropriate word to use for a metaphorical tool is 'means'. 'Psychological tools' emerge from technical tools as a *special type of tool*, a tool which, unlike the 'technical tool', is directed inwards, rather than outwards at nature. A 'sign' is a type of psychological tool, but so are "algebraic symbolism, works of art, writing, schemes, diagrams, maps, blueprints, etc." (Vygotsky, 1930a).

According to Vygotsky:

the basic components of the psychological development of primitive man are to be found in the development of technique and in the corresponding development of social structure.

Note the inclusion of 'social structure' here. Marx (1847) had said: "The hand-mill gives you society with the feudal lord; the steam-mill society with the industrial capitalist,"

and in his exposition of the development of human behaviour, Engels (1876) sees homo sapiens developing from the stone axe to the steam engine through a series of *social formations* corresponding to the development of technique. But Vygotsky's purpose was different. Vygotsky's concern went beyond the characterisation of entire social formations to the psychology of individuals. Engels' concern, on the other hand, was not psychology as such but social formations, which do in turn condition the psychology of a people.

The rudiments of the regulation of behaviour with psychological tools are to be found in "primitive man," even during an epoch in which, by and large, psychological tools did not figure. In turning to the development of civilised humanity, technical tools not only continue to develop and develop at a gigantic pace, but they develop in close connection with the development of psychological tools.

Using a term from a later time, once the transition from "primitive man" to modern societies is set in motion, the development of psychological tools could be said to be the 'leading activity'.

Tools and the mind: Technical tools and psychological tools

It is widely accepted nowadays that technology and its use plays a large part in the formation of the mind. Vygotsky was one of the first to recognise this. It is obvious that the use of psychological tools like mobile phones and personal computers have a big impact on the psychology of this generation. Also, the use of such tools as the motor car effects a change in mentality by how it expands the scope of a person's activity, and by the vast changes it has wrought in social structures which in turn bring about changes in mentality. But the motor car does not affect people's thinking *in the same way as the smart phone*. The smart phone operates on the mind; the car operates on nature.

Books, computers, search engines, WiFi, video cameras and other tools for thinking not only transform the production and use of tools (technique), and with technique, social structures – they do so by operating on the mind. This is what makes them psychological tools. Invariably, they are also either directly or indirectly vehicles for communication, so psychological tools are directly and intimately connected with the development of social structures as well as the mind as such.

Psychological tools and technical tools do not form a dichotomy or dualism. As a status symbol, the automobile is also a psychological tool, and a mobile phone can also control other devices such as the air conditioning. But the respective *objects* being acted upon – mental or material – are clearly distinguished in each specific practice.

According to Vygotsky at this point in the development of his thinking, the study of technical tool use as *the essential factor* in the formation of the psyche, is applicable *only* to the epoch of "primitive man." This is not the case for modern people, people already familiar with modern means of communication and part of a worldwide system of production and distribution. For our time, it is psychological tools which are the essential factors in the formation of the psyche.

Nonetheless, historically speaking, psychological tools arose *as a special kind of tool* for the regulation of behaviour in contradistinction to technical tools, for the regulation of nature, which first arose in the early evolution of homo sapiens. 'Signs' first arose as a type of tool, as an application of the technology of the time.

There are two aspects of *Ape, Primitive Man and Child* which do not directly bear on our topic, but which have to be dealt with so that the above reflections are properly contextualised. The first is Vygotsky's periodisation of word use in the transition from "primitive man" to literate societies; the second is the feature which Vygotsky would take as the essential feature of the ontogenetic development of behaviour and distinctive for

the third line of development mentioned in the title of the book: the development from child to adult.

Vygotsky's periodisation of word use in "primitive man"

Vygotsky later claimed that the development of the 'verbal intelligence' of non-literate peoples is manifested in the passage of word use through three stages:

[from] the first method of using words as *proper names* to a second method, whereby words serve as symbols for *sets* of things having some common attribute, and lastly to a third, involving the use of words as tools or means for the elaboration of *concepts*.

1930, p. 71

To use words only as proper nouns would imply that all individual objects, situations and actions in the life of "primitive man" each bore a unique name, thus a "proper noun" in the sense that proper nouns generally indicate a unique individual. However, this is not what he describes. What he meant is that, for example, 'young, male crow' may have a unique name, distinct from an older crow, or the female young of a different species of bird, etc.; however, each word designates a *relatively* concrete kind. This is just as 'MG' or 'Corvette' each denote a particular concept to us, but *not* an individual vehicle, such as 'the Batmobile' or 'Air Force One', nor a noun qualified by its features, as in 'expensive sports car'.

"Primitive man," said Vygotsky, "thinks not in concepts but in sets" (1930, p. 70). He explained the difference between the second and third stages, between a set and a concept, by taking a family name such as "Petrov" as an example of a word designating a set:

A set differs from a concept by virtue of the relationship between the individual object and the group name. By looking at an object I can say with full objectivity whether it is a tree or a dog, because 'tree' and 'dog' serve as the designations of *concepts* – in other words, generic groups to which, by virtue of substantive features various individual objects belong. I cannot, by looking at a man, tell whether or not he is a Petrov, because in order to do so it is simply necessary to know, as a matter of fact, whether he goes by such a name.*

1930, p. 70

But from the point of view of this writer (Blunden, 2012), and of the Vygotsky who later wrote *Thinking and Speech*, and of Hegel, this is not only *plain wrong*, it is *upside down*. The definition Vygotsky gives of a 'concept', as a collection of objects sharing a "substantial" – evidently meaning visible or at least observable – attribute, and a 'set' designating objects the connection between which requires knowledge of the inner connection between the objects, not given to immediate perception, are the wrong way around. It is the elements of a *concept* which are held together by inner, hidden relations. Vygotsky's second level of word use (picking out a common feature) is an associative complex and the third level what he would later call a pseudoconcept.

* Note that Vygotsky's example of a family name for a group of individuals differs from the way Wittgenstein used the idea of 'family likeness', in which all members of the family can be grouped at least pair-wise through a common observable feature, while there is no one feature which is common to all. In Vygotsky's later sense, Wittgenstein's 'family likeness' is a 'diverse set'. An interesting idea, but nothing to do with the issue here.

Lizards and pangolins are both four-legged, scaly little land animals, while dolphins and crocodiles are large water-bound predators, but dolphins and pangolins, with seemingly nothing in common, are mammals, while lizards and sharks are not. Emus and kangaroos are both two-legged Australian animals, but one is a bird the other a mammal. 'Family resemblance' whether in Wittgenstein's or Vygotsky's sense, is a feature of true concepts like 'mammal'. Dolphins and pangolins and kangaroos are mammals because of an evolutionary connection which is not immediately apparent, but depends on their 'family connection' in the *system* of concepts given by Darwin's scientific theory of phylogenesis. *True* concepts, uniting things according to a theory of the world, lying *behind* appearances, modern dialectical thinking shares ancient and indigenous societies and with genuine scientific thinking, but not with modern bureaucratic consciousness, which forms concepts according to tick boxes, survey forms and pigeonholes.

Luria took Vygotsky's erroneous distinction between a set and a concept with him on his expedition to Uzbekistan in 1930 (Luria, 1979). In one of his experiments to reveal the method of thinking of the Uzbek peasant, he showed a man, Rakmat, drawings of three wheels and a pair of pliers and asked Rakmat to say which did not belong because it was unlike the others. Rakmat refused to single out the pliers because "I know the pliers don't look like the wheels, but you'll need them if you have to tighten something in the wheels" (Luria, 1979, p. 70).

This verified that Rakmat could only solve the test of verbal intelligence by calling upon his practical intelligence (even though he knew full well that pliers did not look like wheels). Likewise, he would not separate log from the group (hammer, saw, log, and hatchet) because he would "need the tools for working on the log." Rakmat refused to approach the artificial group of objects from a taxonomic point of view. In the terminology of Chapter 5 of *Thinking and Speech*, he was given a test to reveal what kind of concept he would form in a test of the formation of artificial concepts. He was judged as forming a collection complex, which in 1928 Luria and Vygotsky ranked as a 'set' – a lower grade of complex than an associative complex or a pseudoconcept, while what they would later call a pseudoconcept, they were then ranking as a 'concept'.

Luria demonstrated that some subjects who had attended school had learnt to categorise objects taxonomically according to shared visible attributes. Others however "saw no need to compare and group all the objects and to assign them to specific categories" or "tended to deal with the task as a practical one of grouping objects according to their role in a particular situation rather than as a theoretical operation of categorising them according to a common attribute" (1979, p. 69). It appears that Rakmat responded to Luria's experiment much the way we would respond if a man in a white coat showed us three white kids and a black kid and asked us which was the odd one out. We would simply refuse to answer.

By the time of writing up Sakharov's 1928 experiments on concepts for *Thinking and Speech* Vygotsky put it this way:

The adult's thinking is often carried out at the level of complexes, and sometimes sinks to even more primitive levels. When applied in the domain of life experience, even the concepts of the adult and adolescent frequently fail to rise higher than the level of the pseudoconcept. They may possess all the features of the concept from the perspective of formal logic, but from the perspective of dialectical logic they are nothing more than general representations, nothing more than complexes. ...

... traditional psychology acted like a slave in following the description of the process of concept formation assumed by formal logic, ... representations ... can

be decomposed into their constituents, into their form, colour, and size. The constituents of these representations that remain are those that correspond to one another. A process of assimilation occurs for each of these constituents, the result of which is a general representation of each feature. Following a synthesis of these representations, we obtain one general representation or concept ...

1934, p. 160, 162

The *pseudoconcept* which Vygotsky is describing in 1931 (when this chapter was written) is exactly what Vygotsky was calling a *concept* in 1930!

Nonetheless, it seems that Luria may have correctly identified a problem with Rakmat's verbal intelligence in that Rakmat simply didn't get what Luria was asking him even though he very well knew everything about the objects in question. If Rakmat was going to live in a modern society dominated by bureaucratic thinking, he would have to learn to understand this inhuman way of thinking. It was the same in Dickens' *Hard Times*, when Cissy, who had an intimate practical knowledge of horses, was demanded by Mr. Gradgrind to give the definition of a horse, proving to her great embarrassment that she does not know that the answer is "four legs, forty teeth, etc., etc."

The importance of this mistake is that Vygotsky appears to have established that "primitive," that is, non-literate peoples *do not have true concepts* while 'civilised' peoples do. This mistake had, of course, political implications at the time. But this claim is based on what Vygotsky himself came to see as a *grave misunderstanding*. In fact, what was shown is that many *schools*, like Mr. Gradgrind's, especially elementary schools, teach only pseudoconcepts, and in populations where practical intelligence outstrips verbal intelligence, such instruction could, in the relevant contexts, supplant true concepts with pseudoconcepts. This might be a benefit for people in their dealings with the bureaucracy, but is a step backwards in their cultural development, insofar as it relates to their own lives.

Contra the Vygotsky of 1930, 'non-literate' peoples, *must have* had true concepts, otherwise they could never have survived as a people, not only because they could not otherwise regulate their relation to nature, but even more so because they could not have maintained and regulated their social structures. Nonetheless, the most uneducated and despised (subaltern) sections of a people *could be excluded* from access to the professions by being educated into pseudoconcepts at school, surviving only thanks to the knowledge indigenous to their own ethnic community.

The people of Uzbekistan did not think in pseudoconcepts. Archaeological findings tell us that the earliest human communities used religious rituals and seemed to believe in a life after death, which implies that they did *not* organise their understanding of the world on a sensory-taxonomic basis, but had *concepts, true concepts*. Such concepts must have rested on some conception, though certainly not a scientific one, of the place of people in the cosmos. Such concepts allowed them to organise their activity so as to successfully reproduce their communities and care for their land for millennia, whether that was rain forest, desert or tundra.

Further, the forced substitution of taxonomic categories for true concepts is a *degradation* of conceptual thought, flowing from inhuman, *bureaucratic*, administrative methods of social organisation. Doubtless, these bureaucratic means, adapted to the impersonal management of large numbers of people and things, is also associated with the use of writing in preference to speech. Both written speech and bureaucracy are inventions of civilisation, but they are not both conditions which foster true concepts. There is little romance in the discovery that the first writings were not poems, stories or

epitaphs but accounts of property. Bureaucracy, in fact, militates *against* true concepts, while literacy on the whole supports and promotes true concepts.

Thus, we have to conclude that Vygotsky's periodisation of word use in terms of sets and concepts was mistaken.

Modern positivist philosophers create sophisticated concepts. But when it is concepts which are the object of study, they invariably grasp concepts as what Vygotsky called pseudoconcepts. This expresses a general law: that when we are required to do an operation which we can do effortlessly without conscious awareness, under conscious control, our performance falls to a lower level.

Lines of development differentiate and interact

Each critical point in the development of behaviour was considered by Vygotsky from the standpoint of the new function or relation it brings to the process of development. That is, each critical point provides a starting point for the higher process of development.

We will consider as such turning points in the behaviour of the apes the use of implements, or tools; in the behaviour of primitive man, work and the use of psychological symbols; and in the behaviour of the child, the splitting of its line of development into psycho-physiological and psycho-cultural development.

1930, p. xii

Tool use fostered the development of the hand and speech in our immediate evolutionary predecessors, and their further development characterised the whole epoch up to the formation of literate civilisations, and continues its involvement in development, but now interconnected with the development of psychological tools, whose rudimentary forms appeared in the period of "primitive man." But in the formation of the human species, tool use occurred in conjunction with the spoken word. Tool use stimulates speech and speech participates in the development of technique. Language and technique develop hand in hand.

According to Vygotsky, it is the *separating out* of verbal intelligence from practical intelligence which marked the cultural transition from "primitive man" to civilisation. Vygotsky believed that it is only with the adoption of writing that this separation becomes possible. This explains Vygotsky's idiosyncratic interest in the exotic and antique mnemotechnical artefacts, as precursors to writing.

What child development brings to the question is the separation of the *cultural* development of the personality from its *physiological*, inherited basis – unlimited cultural formation of the personality. That inherited basis includes the capacity to pay attention to signs from other people and find meaning in them, and an interest and facility in handling artefacts. Each of these lines of development *interacts with* the other in ontogenesis, allowing each line of development to far surpass the limits which would be possible along one line alone.

This last paragraph alludes to material which constitutes the field of cultural psychology but this is not the place to elaborate any of it. What is of interest here is only problems with the concept of tool and tool use and its relation to the concepts of sign and sign-mediated action. How can the material on tool use reported in *Ape, Primitive Man and Child* be taken forward? Where did this report leave Vygotsky's research project in 1930?

In this context it is noteworthy that speech, which appears together with labour at the very beginning of human phylogenesis (see Chapter 12, this volume), played no part in Vygotsky's schema in *Ape, Primitive Man and Child*, other than to manifest the stages of

word use which marked the distinction between practical and verbal intelligence during the epoch of “primitive man,” and in this case, Vygotsky had the relation back to front, mixing up true concepts and pseudoconcepts!

Instrumental Psychology: history or method?

The kind of scientific activity which Vygotsky is advocating in *Ape, Primitive Man and Child* is an ethno-psychology or social history based on a history of artefacts. Is there any reason to think that this is a fruitful approach to the building of a general psychology, which was Vygotsky’s explicit aim? Very little, I think.

I believe this is the activity to which Vygotsky was referring when he agreed with A.N. Leontyev, in a letter of 29 July 1929, that ‘instrumental psychology’ was an unprofitable pursuit. I take this to be something quite distinct from “The Instrumental Method in Psychology,” which remains among his most important contributions to Psychology, and on which I will touch shortly.

That the cultural and historical development of human society and psychology is tied up with the production and use of both tools and signs, is an insight by no means unique to Vygotsky. What is unique to Vygotsky is the *experimental technique* – “the instrumental method in psychology” or “functional method of dual stimulation” – which made it possible to take the philosophical insights of Marxism, cultural analysis and classical German philosophy *into the psychological laboratory* as an effective method for the practical investigation of the human mind. (See Blunden, 2012, chapter 12)

So when Vygotsky (2007) writes to his younger colleague, A.N. Leontyev on 29 July 1929:

Dear Aleksei Nikolaevich, thank you for the letter. I wholeheartedly share your sentiments. There is some benefit to a situation in which I[nstrumental] P[sychology] winds up in the category of unprofitable pursuits. In particular, I cannot say strongly enough how highly I value (in ethical terms as well) the thought that the idea must be as pure and rigorous as possible. This is our principal task – to fight against muddled ideas and ‘making ourselves comfortable’.

It is this historical/archaeological study of instruments which seemed to be ‘unprofitable’. In other letters collected in the same journal Vygotsky makes references to the instrumental method in psychology: “everyone should work in his field according to the instrumental method. I am investing all the rest of my life and all my energy in this” and “Most important, I want to convene a ‘conference’ in spring or summer of people working with the instrumental method.” In his later work, especially in *Thinking and Speech* (1934) he realised his commitment to this experimental-genetic method which in 1930 had been dubbed the “instrumental method” (see 1930a) as an approach to cultural-psychological research. This was possible however only because he had completely revised his conception of the place of *speech*.

There are two reasons to believe that Vygotsky wanted to abandon a ‘history of tools’ and *not* the ‘instrumental method’: (1) Much later, Leontyev used the word ‘instruments’ exclusively to refer to tools for working on nature and not psychological tools while in fact including the ‘instrumental method in psychology’ in his theory, and crediting Vygotsky’s ‘early work’ for the idea; (2) Vygotsky did not in fact abandon the ‘instrumental method’.

This proposition throws up four possible sharp objections which cannot be dealt with summarily. (1) isn’t it the production of tools which distinguishes mankind from the animals? (2) didn’t Engels himself suggest that the history of development of the means of

production was the essential narrative of human psychology? and (3) isn't it a basic premise of Marxism that it is the labour process (i.e., tool use and tool production) which is the determining factor in social life? And (4) is not every tool also a sign for the means of its use, through which human beings understand the natural world in the process of changing it with tools?

These are four serious objections which will be dealt with in due course. But first I want to briefly consider some of Vygotsky's post-1930 works as to what he had to say about the relation of tool and sign. Up to this point we have only considered one pre-1930 work of Vygotsky which has a number of serious defects.

Part 2: Tool and sign in Vygotsky after 1930

The instrumental method in psychology

It was at a talk given in 1930 entitled 'The Instrumental Method in Psychology', that Vygotsky introduced the term 'psychological tools or instruments' by analogy with 'technical tools', characterising symbolic devices such as books and maps as a type of tool – "artificial devices for mastering one's own mental processes" as opposed to devices for controlling nature – 'labour tools'. All "instrumental acts" can "without remainder" be reduced to natural (i.e. unmediated) ones, just like a machine each part of which obeys the laws of physics, but combine to serve human purposes. Vygotsky introduced with this talk the triangular diagram of 'instrumental processes' which can represent actions mediated by psychological tools or actions mediated by technical tools.

Vygotsky goes on to explain how with the instrumental method:

We can also look at the behaviour of man from the viewpoint of his use of his natural mental processes and the methods of this use and try to comprehend how man utilises the natural processes of his brain tissue and masters the processes that take place in it.

Vygotsky, 1930a, p. 86

So far then, the 'instrumental method' *in fact* concerns only the use of tools to act on nature, provided we accept the proposition that the human body in general and the brain in particular are natural, material things which can be shaped for human purposes, just like other artefacts. Admittedly, the inclusion of one's own brain as a part of nature on which a person acts when they use a tool, seems somewhat idiosyncratic, but it makes for the continuity of tools, from technical tools to a special type of tool called a 'psychological tool'. This is not just a metaphor.

He goes on to describe how a mental task is solved by introducing the use of a psychological tool. "Any behavioural act then becomes an intellectual operation." The 'instrumental act' (the act that involves mediation through the use of some instrument) is described as "an elementary unit of behaviour"* for the purposes of research. He again stresses the continuity with technical tools, from which the psychological tool is differentiated because it is used to act on the *mind* ("the natural processes that take place in the brain"), not external material processes.

Then: "By its very essence the instrumental method is a historical-genetic method" (p. 88), and he points to three areas where this method can be used: (a) social-history and ethnic psychology, (b) investigating the higher mental functions in the laboratory, and (c) child and educational psychology. "The instrumental method studies the child not only as

* This is the first time that Vygotsky uses the idea of a unit, here a unit of artefact-mediated behaviour.

a developing, but also as an educable being" (*op. cit.*, p. 85). The instrumental method provides a method for both research into the development of an individual and for education, by the introduction of a psychological tool into the activity of a child who is engaged in some task with which they are experiencing difficulty.

This is an *epoch-making discovery*, unique to Vygotsky and arguably his most important legacy. By showing how internal mental processes could be studied objectively, in the laboratory, Vygotsky unified the 19th century currents of 'brass instrument' psychology and 'cultural' psychology into a single science, able to produce useful results applicable to the full range of human behaviour. It also created the unit of analysis which would be later elaborated in *Thinking and Speech* (1934), introducing a key Hegelian insight into the methodology of modern science.

But Vygotsky also included under the heading of 'the instrumental method' an approach to social history and ethnic psychology which I believe he judged to be 'unprofitable'. Vygotsky was now using the term 'instrumental method', for a method which proved to be immensely 'profitable', also referred to as 'the functional method of dual stimulation'.

It is in 'Tool and Sign in the Development of the Child', evidently written in 1930, that Vygotsky first used the reference to Goethe to explain the relation of tool and sign in a short section entitled 'Word and Action'. Vygotsky here uses the word 'action' to mean only 'tool-mediated action', in contrast to 'word' which would *henceforth* be characterised as the archetypal 'sign-mediated action'.

To certain psychologists the ancient biblical 'In the beginning was the Word' retains all its fascination. New investigations, however, do not leave any doubt as to the fact that the word does not stand at the beginning of the development of the child's mind. ...

Practical intellect is genetically more ancient than verbal; action precedes the word, even intelligent action precedes the intelligent word. Now, however, while repeating this thought, very true in itself, there is a tendency to overestimate action at the word's expense.

... we have tried to show how the *word*, becoming intellectualised and developing on the basis of *action*, lifts this action to a supreme level, subjects the child to its power, stamps it with the seal of will. But since we wanted to express all this in one short formula, in one sentence, we might put it thus: if *at the beginning* of development there stands the act, independent of the word, then at the end of it there stands *the word which becomes the act*, the word which makes man's action free.

1930c, p. 166-70

In the course of this section he says: "To consider speech as a more particular case of action means to depend upon an incorrect definition of the concept of *action*." (*op. cit.*, p. 66) I interpret this to mean that *speech is not a type of tool-mediated action, arising from labour activity as if it were a type of tool*, something which *could* be said of writing. Speech has to be considered as a qualitatively distinct function *alongside labour*. He specifically negates any idea of the spoken word arising from, as an extension of, tool use in the sense he had held with respect to the written word.

History of Development of Higher Mental Functions

In 1931, Vygotsky wrote a manuscript which has been published in Volume 4 of *LSV CW* under the title *History of the Development of the Higher Mental Functions*, and Chapter 2 on 'Research Method' has a short treatment of tool and sign. He says:

... the basis for the analogy between the sign and the tool is the mediating function of the one and the other. From the psychological aspect, they may, for this reason, be classified in the same category. ... from the logical aspect, both may be considered as coordinative concepts included in a more general concept – mediating activity.

1931b, p. 62

He then refers to Hegel's use (cited by Marx in *Capital*) of the concept of mediation as "the most characteristic property of the mind," and cites the chapter in Marx's *Capital* where Marx is discussing the instruments of production and refers to Hegel's concept of the "cunning of reason" to the effect that in using material objects and material processes acting according to their own natural law, they yet serve human purposes. Vygotsky then quotes Marx again in connection with the tools of labour:

[Man] makes use of mechanical, physical, chemical properties of things in order to change them into tools to act on other things according to his purpose.

Marx, 1867, p. 189-190

Vygotsky then justifies the idea of signs mediating actions, just as tools mediate actions. He also notes that the mediating role is not restricted to tools and signs "since the activity of the mind is not exhausted by the use of tools and signs." (Presumably he is referring to thinking which is 'beyond words'.) He reiterates the functional distinction: the tool is directed at changing nature, while the sign is directed at changing a mind, and points to their interconnection in both phylogenesis and ontogenesis.

the first use of a sign signifies going beyond the limits of the organic system of activity which exists for each mental function. The use of auxiliary devices, the transition to mediated activity radically reconstructs the whole mental operation just as the use of a tool modifies the natural activity of the organs, and it broadens immeasurably the system of activity of mental functions. We designate both taken together by the term *higher mental function*, or higher behaviour.

loc. cit.

So both technical tools and psychological tools are implicated in the construction of the 'higher mental functions', but the contribution to this change is *different* in the case of tools on the one hand, and signs on the other.

Vygotsky has by now developed an *antipathy* to the metaphorical use of the word 'tool' to indicate a sign:

The indeterminate, vague meaning that is usually connected with figurative use of the word *tool* actually does not lighten the task of the researcher interested in the real and not the picturesque aspect that exists between behaviour and its auxiliary devices. Moreover, such designations obscure the road for research. Not a single researcher has yet deciphered the real meaning of such metaphors.

loc. cit.

The discussion continues in Chapter 4, where Vygotsky describes how sign-mediation is used as an *experimental technique* to investigate the development of various psychological functions in children – “the instrumental method in psychology,” a.k.a. the “functional method of dual stimulation.” He makes the point that “a tool directed outward and a sign directed inward fulfil technically different mental functions” (Vygotsky, 1931c, p. 89), and makes it clear that it is *signs*, not *technical tools*, which are to be used in this research. Vygotsky defends, against criticism from various sides, the idea of the construction of an ‘intellectual reaction’ through the incorporation of signs into behaviour. It is clear that Vygotsky has identified the use of psychological tools, including signs and words, in ontogenesis as an extraordinarily fruitful area of experimental research.

Once taken for granted, *spoken words* were now recognised as the primary *signs*.

In order to trace how the natural formation of the sign, which is not at all an intellectual discovery, develops in the child, we must deal with how speech in general is formed.

1931d, p. 126

This is a departure. Previously, ‘signs’ had referred to outgrowths of labour tools, archetypically, the written word, and Vygotsky had taken no account of the spoken word as a sign mediating speech action. But now, in 1931, for the first time he talks about spoken words *as signs mediating actions* as a means of mastering one’s own behaviour.

Now, with labour and speech (action and word), developing in intimate connection with one another, even merging, they each develop at each step beyond what either line of development could have achieved separately.

Thinking and Speech

Produced in Vygotsky’s last days, *Thinking and Speech* (1934) is Vygotsky’s masterpiece. Here the key mediating element is for the first time, the *spoken word*.

The genetic relation between thinking and speech as two interconnected lines of development is expressed succinctly in the chapter on ‘The Genetic Roots and Thinking and Speech’:

1. In their ontogenetic development, thought and speech have different roots.
2. In the speech development of the child, we can with certainty establish a pre-intellectual stage, and in his thought development, a pre-linguistic stage.
3. Up to a certain point in time, the two follow different lines, independently of each other.
4. At a certain point these lines meet, whereupon thought becomes verbal and speech rational.

1934, p. 112

This general schema applies equally well to language and labour, or word and deed, and other instances of interconnected processes of development. Each has independent roots and an independent line of development, but at a certain point they intersect and transform one another.

Thinking and Speech opens declaring its aim to be the analysis of thinking and speech, in which the *word is taken to be a sign*. The essential process is not the written word, but the *spoken word*, a unity of sound and meaning – the spoken word that has

been there, together with and intimately connected to labour, from the very beginning of humankind.

In chapter 5, reporting Sakharov's experiments on concept-formation, Vygotsky no longer refers to complexes as concepts, but simply as stages in the process of concept formation. Chapter 6 deals with true concepts (i.e., what are *truly* concepts). But further, Vygotsky now includes in the chapter on concept formation the 'potential concept'. This is a pre-intellectual form of activity which children share in common with many animals. A potential concept registers the practical significance of a situation, as a signal for some action which has become a *habitual* response to a given perceptual Gestalt. In this way, Vygotsky gives recognition to the co-existence of 'practical intelligence' along with the development of verbal intelligence, which is the subject matter of *Thinking and Speech*, and the role of tools in ontogenesis.

None of this detracts, however, from the significance in social history of the invention of writing and other psychological tools, nor of the impact of literacy in ontogenesis. It does emphasise, however, the importance of restricting our use of the word 'tool' to *material artefacts being used to act upon material*, and to not mix up the specific meaning of the word 'tool' as Vygotsky used it, with the metaphorical use of the word 'tool' as the means, and applicable to concepts, methods, theories, techniques of activity, etc.

Part 3. Marx, Engels, Vygotsky and the Marxist tradition

I shall now deal with some issues which arise from the Marxist tradition of which Vygotsky is a part.

Marx and Engels on 'Just So stories'

The idea that the production and use of tools was not just an essential characteristic of the human species, but was the essential process which, through Darwinian natural selection, *created* the human species, originated with Engels' article *The Part Played by Labour in the Transition from Ape to Man* (1876). This claim was Engels's original idea, published only 17 years after the publication of Darwin's *The Origin of Species* (though prefigured by Benjamin Franklin and Samuel Johnson in the 18th century).

It is hardly possible that a leading ideologist of the communist movement of the 19th century, based on the *industrial working class*, was unaware of the ideological implications of the claim that industrial labour created the human species – not the Christian God, or competition and survival of the fittest, but industrial labour.

As Engels had written in 1875:

The whole Darwinian theory of the struggle for existence is simply the transference from society to animate nature of Hobbes' theory of the war of every man against every man and the bourgeois economic theory of competition, along with the Malthusian theory of population. This feat having been accomplished – (... I dispute its unqualified justification, especially where the Malthusian theory is concerned) – the same theories are next transferred back again from organic nature to history and their validity as eternal laws of human society declared to have been proved.

Engels, 1875, pp. 107-8

The ideological bourgeois interpretation of natural selection has since been challenged, with the anarchist Pyotr Kropotkin, for example, emphasising the role of *cooperation* in natural selection. These kind of 'Just So Stories' (Kipling, 1902) were not

the invention of the 19th century. Marx wrote in 1867, alluding to a comment by Benjamin Franklin published in 1780:

The use and fabrication of instruments of labour, although existing in the germ among certain species of animals, is specifically characteristic of the human labour process, and [Benjamin] Franklin therefore defines man as a tool-making animal. ... It is not the articles made, but how they are made, and by what instruments, that enables us to distinguish different economic epochs.

Marx, 1867, p. 189

Later, he noted wryly:

Aristotle's definition is that man is by nature a *town-citizen*. This is quite as characteristic of ancient classical society as Franklin's definition of man, as a *tool making* animal, is characteristic of Yankeedom.

Marx, 1867, p. 331

So Marx well understood how social classes and movements legitimise themselves by elevating their particular mode of existence and social position to be the essentially human one. The Marxist Evelyn Reed, for example, continued the defence of the origins of the human species in tool making in the 1960s against claims for the brain, speech and aggression being the essence of humanity responsible for the origin of our species. In 1970, she participated in the furious debate amongst feminists to establish that early human society was *matriarchal*, and that the patriarchy was instituted as part of the transition to feudalism, in which the women were robbed of their inheritance.

So let us be clear. Origins stories are always interesting, but they are also invariably *ideological*, discovering in ancient history and nature conceptions which in reality have their origin in the problems of today. I believe that this was how come Vygotsky and Luria found themselves pursuing an avenue they eventually realised was 'unprofitable' – "Instrumental Psychology" – in pursuit of their aim, Cultural Psychology. In the end, Vygotsky discovered what was before his eyes in the first place: *speech*, which originated at the same time as labour and in close connection with it. It was the production and use of tools in labour, *in combination with speech* which created mankind.

Labour and language

The 'linguistic turn', beginning in the 1960s, could not but impinge on the ideological differences over the essential features of Cultural Psychology. In his day, Marx had said:

One of the most difficult tasks confronting philosophers is to descend from the world of thought to the actual world. *Language* is the immediate actuality of thought. Just as philosophers have given thought an independent existence, so they were bound to make language into an independent realm.

1845a, p. 446

The problem of the priority of language versus labour has long been the arena for a struggle for supremacy between the professional, upper layers of the working class and the industrial working class. The linguistic turn came at a time when the industrial working class itself was losing its hegemonic position in progressive politics, at the same time as the most advanced sections of the working class were increasingly becoming a class of 'symbolic analysts' more likely to be wielding a keyboard than a hammer. So one should not be too quick to judge the ideological content of the tension in Cultural

Psychology between Activity Theorists and Semioticians or Discourse Analysts. *Science needs to follow its own logic.* It is inevitable that social tensions arising from the development of the productive forces will intrude into science and determine its directions. But the scientist must try to remain above that, and follow the logic of their subject matter, not partisan imperatives, and thereby *anticipate* social movements, rather than be driven blindly along by them.

The same is true of choosing whether to use the term 'labour' or 'activity'. Insofar as these terms are correctly used in Cultural Psychology, they are co-extensive. The labour process is the determining factor in *historical* development, that is true. Nonetheless, 'activity' means purposive activity, activity aimed at changing the world – both the world of nature and the social world, and is inclusive of all activity in the labour process. All that the word 'labour' brings to cultural psychology is *connotations* which emphasise (wrongly) industrial labour in contrast to other kinds of activity, such as personal services, child rearing, political activity, supervision of labour, child's play, writing poetry and scientific treatises. Ideological prejudices do no favour to science or to the social movements they serve.

Vygotsky began his social history and ethnic psychology project on the assumption, shared by most of the Marxists of his time, that it was the development of the *means of production*, i.e., tools, which was the decisive factor in history. But this is not the case. According to Marx, the first steps in the accumulation of capital are (1) primitive accumulation, which means outright robbery, driving the peasantry off their land thereby creating a class of labourers who do not own their own means of production (*Capital*, v. 1, part viii); (2) the subsumption of the existing labour process under capital as wage labour; (1861-3, pp. 424ff.) (3) the transformation of the labour process into capitalist production and the concomitant revolutionising of the forces of production (Marx, 1864, p. 424ff) – 'forces of production' being a category which includes the skills, organisation and energies of the workers. So in fact, it is not the means of production themselves but the social relations in which these means are utilised which are decisive. Were this not the case, capitalism would have emerged centuries earlier in China, not in 18th century Europe.

Vygotsky got there in the end, with the inclusion of the spoken word as a sign, and his formulation of the relation between word and deed as independent lines of development each with their own roots, while mutually interpenetrating and transforming one another – but in the *beginning* was the deed. This captures the relation free of the distorting lens of ideology. The relation is *not fixed once for all*, but changes in the course of development.

* * *

Vygotsky underwent at least two major reversals at the time of writing *History* (1931): he reversed his idea of set *vs.* concept, and abandoned his pursuit of the history of tools, putting the spoken word rather than the tool in centre stage. What brought about this reversal? It seems to this author that Hegel lies behind it. A study of references to Hegel in Vygotsky's *Collected Works* (Blunden, 2009) suggests that it was only from the time of writing *History* in 1931 that Vygotsky had more than a superficial familiarity with Hegel. But it seems unlikely that even by this time, he had read more than a paragraph or two of Hegel. Vygotsky did collaborate in a project with some supporters of the Hegelian-Marxist Abram Deborin in 1930, so this may be where the Hegelian influence came from. This is a problem for further research.

A.N. Leontyev on labour and tools

The mediation of actions by tools was taken up by Vygotsky's younger colleague, A.N. Leontyev, as part of activity theory and it continues to play a role in activity theory, including that of Yrjö Engeström. So Vygotsky's work on tool-mediation did not go to waste. Before outlining the use to which tool-mediation has been put by Activity Theorists, I should mention a rather unpleasant manifestation of the ideological use of the word/deed relation by Leontyev in the toxic political atmosphere which prevailed in the decades of the Soviet Union after Vygotsky's death.

In 2005, the *Journal of Russian and East European Psychology* published a formerly unpublished and undated article by Leontyev entitled 'Study of the environment in the pedological works of L.S. Vygotsky'. This work was a rather scurrilous attack on Vygotsky, labelling him as an idealist (see Blunden, 2014a). The charge of idealism is based on Vygotsky's 'linguistic turn' in 1930:

What, indeed, is communication as the term is used by Vygotsky? We are aware of two usages of the term: first, its usage to signify the general fact of people's interrelations, which encompasses their 'material dealings', and second, its usage in the ordinary, more narrow sense, in the sense of 'spiritual' relationships, that is, in the sense of communication using language. Obviously, for Vygotsky, it has only the second, narrower meaning. So, the process of verbal communication is defining for the child's psychological development; and consequently, the child appears in Vygotsky's work as *social*, and first and foremost as a *socialised* being. But, behind the superficial similarities of these two words lies a gulf separating their sense – the same gulf that separates materialism and idealism.

2005, p. 19

This is an empty criticism because language *is* a material interaction and it is ultimately *material* relations which are communicated and psychologically appropriated by means of words. Conversely, the central weakness of Leontyev's own theory is that he overlooks that it is the *concept* a person forms of their situation that frames their psychological response to it, and that concept is generally formed only through the mediation of words. But Leontyev "sets aside [Vygotsky's] complicated idea of the different course of development of the 'spontaneous' and 'scientific' concepts" (p. 18), made possible by his analysis of word meaning.

Tools and operations in activity theory

Origins play a very significant role in Leontyev's approach to psychology. He spent the major part of his scientific life tracing the emergence of life from its simplest manifestations through the lower animals to primates to human adults, and his highly structured theory reflects its genetic derivation.

In Leontyev's view, the most primitive forms of activity are *operations*. These are movements which may originate as a simple reflex response to a situation, whether conditioned or innate, and cannot be said to have any aim distinct from the operation itself, as the organism has no conscious awareness of the operation. More complex activities necessitate the concatenation of multiple such operations to achieve a goal (or 'object'). Thus these operations now share a goal which differs from the immediate goal of each. The operation adapts to its conditions rather than being controlled by the organism and its motive, and can be executed without conscious awareness.

The aggregate of these operations is an *action*, which the organism consciously controls towards its object. More complex objects may be achieved by an aggregate of

actions, *an activity*, with the aim of each action being distinct from the object or motive of the aggregate. Thus *activities* constituted by a series of actions, each controlled by its own subordinate goal, can be carried out either by successive actions by the same organism, or actions distributed between different members of a community, via a division of labour. Only humans and the higher animals are able to carry out activities.

Conversely, when an action is carried out *habitually*, so that it can be executed and adapted to conditions without conscious awareness, each such action reverts to the status of an operation, until something upsets the operation, and it springs back into conscious awareness. It is then subjected to conscious control as an action. What can be done habitually, controlled by conditions, can be done by an algorithm or by a machine.

Tools can be incorporated in the labour process if a routine operation carried out by a person is *objectified* and given material form in an artefact. In the earliest phase of cultural development, the natural means of production were common property, like the language.

The need for awareness of operations already arose in the transition to the fashioning of differentiated tools, and especially of composite ones. The earliest tools, as archaeological finds have shown, could still have been the result of simple 'adaptation' of natural objects to the conditions of labour activity (for example, the 'natural retouching' of universal stone implements in the course of using them).

1981, p. 14

Leontyev argued that in apprehending a tool, and knowing how to use it, a person forms a concept of the human labour operation objectified in the tool. The invention and fashioning of tools is the process whereby human communities form concepts of nature, in the form of all the operations by which human beings interacted with and changed nature, and the material means used to do so.

A tool is an objectified operation. Every action, once it has become habitual, is ripe for objectification as a tool.

The consciousness of early humans was composed of 'potential concepts' (to use Vygotsky's term) based on tools, objects which exist outside of consciousness and can be sensuously apprehended like other objects and processes. Language developed in the labour process and as each operation was mastered, so far as possible the operation was objectified in a tool, and named in the language. In this way, the practical intellect of human beings was constructed from the tools we use to interact with the world around us. Practical intelligence, at first, led the development of verbal intelligence.

Leontyev credited Vygotsky's early work, i.e., that reflected in *Ape, Primitive Man and Child*, for the ideas behind this theory:

The idea of analysing activity as a method of scientific human psychology was proposed, as I have already said, in the early works of L.S. Vygotsky. The concept of tooling ('instrumental') operations, the concept of purposes, and later the concept of motive ('motivational sphere of consciousness') were introduced.

1978, p. 98

This approach also underlay Davydov's (1990) idea in which a tool which objectifies an operation forms the 'germ cell' from which a more concrete concept can develop. Yjrö Engeström (1999; 2015) has further developed this idea. For James Wertsch (1985), on the other hand, "It is Vygotsky's later interpretation of signs and their mediational capacities

that will be the primary focus.” These writers *all* acknowledge that their work is based on Vygotsky’s concept of the *artefact-mediated action*.

Postscript: Engels and Vygotsky

It is clear from Vygotsky’s writing that he was an avid reader of Engels’ popularisations of dialectics. *The Part Played by Labour in the Transition from Ape to Man* (1876) and its more developed version as the Introduction to *Dialectics of Nature*, must have had an influence on him. A couple of observations on this essay are in order.

Engels was the first to say that it was labour which brought about the transition from not-yet-human apes to human beings. “Labour begins with the making of tools.” Freeing the hands by the adoption of an erect gait led to the making of tools, that is, labour, and this led to the expansion of the brain, language and sundry other changes, and eventually to the emergence of human beings as a species. So

... the development of labour necessarily helped to bring the members of society closer together by increasing cases of mutual support and joint activity, and by making clear the advantage of this joint activity to each individual. In short, men in the making arrived at the point where *they had something to say* to each other ... and the organs of the mouth gradually learned to pronounce one articulate sound after another..

1876, p. 455

and summing up

First labour, after it and then with it speech – these were the two most essential stimuli under the influence of which the brain of the ape gradually changed into that of man.

loc. cit.

Vygotsky seems to have paid attention to that. In the introduction to *Dialectics of Nature*, published in Russia in 1925, Engels says:

With humans we enter *history*.

1875a, p. 330

That is, once the human species has arisen, thanks to the biological transformation of the ape effected by labour, a new principle of development takes the lead. Engels then presents a short history of human activity from the stone axe to the socialist revolution:

the more that human beings become removed from animals in the narrower sense of the word, the more they make their own history consciously.

op. cit.

Engels placed the history of the human race in the context of the eventual extinction of life on Earth and the death of the solar system itself, but he makes no particular distinction between the cultural-historical, psychological and biological development of human beings or the principles governing these processes of development. He also told this story as if it were a single undifferentiated line of development encompassing all of human history in a single ‘grand narrative’. Engels’ concern was with the possibilities for the transformation of social relations, not psychology. So in terms of constructing the foundations of cultural psychology, Engels left all the work still to be done.

Nonetheless, it is remarkable that Engels' speculations, made only 16 years after the publication of Darwin's *Origin of Species*, are now, 140 years later, widely accepted, namely, that tool making and language developed side by side in the predecessor species before the emergence of homo sapiens, and it was at this earliest point in evolutionary development that the brain underwent its most rapid expansion. The eons over which homo sapiens then evolved were marked by cultural evolution and relatively modest anatomical change, and brain size has actually *decreased* during the last 15,000 years – perhaps because we have been able to rely more on our 'extended mind'.

Tool and sign have each had independent roots in the development of Marxism and Cultural Psychology. These two lines of development continue to interact and transform one another in the work of Cultural Psychologists and Activity Theorists, an interaction which can surpass what either line of development could achieve separately. As Hegel (1802) said: "The word is the tool of Reason."

Conclusion

We have traced the development of Vygotsky's thinking from his early *Ape, Primitive Man and Child* up to his mature work embodied in *Thinking and Speech*. Vygotsky changed his mind 180 degrees on more than one major issue in the course of this development. The conclusions he arrived at are too subtle and complex to summarise in a few lines, so I will not attempt to do so.

The prejudices with which he approached his study of prehistoric human society were largely those of his time. Much of what he later considered to be mistakes remain conventional wisdom elsewhere, but even in this early work omitted from his *Collected Works* there are outstanding insights which remain generally unknown to analytical science.

I think one of the key insights that he developed in the course of his scientific career was how any concrete feature of human beings originates through more than one line of development when those separate lines of development intersect and become intertwined with one another. It is never just this feature or that feature, but the mutual imbrication of two unfolding lines of development.

This is in contrast to the tendency to counterpose one feature of human beings to another as the essential feature, the abstract, either-or mentality which always fails to grasp the concrete. The way in which Leontyev wilfully misunderstood Vygotsky, denouncing him as an idealist, rejecting his ideas about concepts as 'complicated' and conflating the subject matter of psychology with orthodox 'historical materialism' may have been made under Stalinist compulsion, but it is something which has been seen throughout the history of Marxism. Doubtless these struggles between opposing lines of development have been necessary and not without fruit. We see in the history just outlined how Vygotsky himself passed through these struggles. The issue however is how to understand the human being *concretely*, and Vygotsky has shown us how.

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