

The Unit of Analysis and Germ Cell in Hegel, Marx and Vygotsky

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"Psychology is in need of its own *Das Kapital*," wrote Vygotsky in 1928, observing that "the whole of *Das Kapital* is written according to this method," the method in which Marx identifies the 'cell' of bourgeois society – an exchange of commodities – and then unfolds the entire process of bourgeois society from an analysis of the contradictions within this single cell. Vygotsky was the first to grasp *Das Kapital* in this way, and his application of the method of 'analysis by units' is his most important legacy.

What Vygotsky did was to produce *one* study which would function as an exemplar for research in psychology. That one study addressed the age-old problem of the relation between thinking and speech. By solving this *one problem* in an exemplary fashion, he created a paradigm for research in all domains of psychology, and as a matter of fact, in *all* the sciences. Vygotsky in fact left us as many as *five* different exemplars of analysis by units.

But first let us reflect on the historical origins of this idea.

Part I: From Goethe to Marx

Origins of the concept of "cell" as a method of analysis

The idea of the 'cell' originated with Johann Gottfried Herder (1744-1803), often recognised as the founder of anthropology. In his effort to understand the differences between peoples, Herder introduced the idea of a *Schwerpunkt* ('strong point'). This idea is probably better known nowadays in its formulation by Marx: "There is in every social formation a particular branch of production which determines the position and importance of all the others ... as though light of a particular hue were cast upon everything, tingeing all other colours and modifying their specific features" (1858, p. 106-7). Herder's friend, Johann Wolfgang von Goethe (1749-1832), sought to use the idea in his study of botany during his Italian journey in 1787, to understand the continuity and differences between the plants found in different parts of the country.

Goethe came to the idea of an *Urphänomen* – not a law or principle, but a simple, archetypal phenomenon in which all the essential features of a whole complex process are manifested. In Goethe's own words:

The *Urphänomen* is not to be regarded as a basic theorem leading to a variety of consequences, but rather as a basic manifestation enveloping the specifications of form for the beholder.

1795, p.106

Empirical observation must first teach us what parts are common to all animals, and how these parts differ. *The idea must govern the whole*, it must abstract the general picture in a genetic way. Once such an *Urphänomen* is established, even if only provisionally, we may test it quite adequately by applying the customary methods of comparison.

1827, p. 118

This meant that in order to understand a complex process as an integral whole or *Gestalt*, we have to identify and understand just its simplest immediately given part – a radical departure from the 'Newtonian' approach to science based on postulating intangible forces and hidden laws.

It is widely agreed that the idea which Goethe was working towards was the *cell* of an organism, but it wasn't until microscopes became powerful enough to reveal the microstructure of organisms that Schleiden and Schwann were able to formulate the cell theory of biology in 1839. The cell is the

unit of analysis of biology, and alongside the organism and Darwin's idea of evolution by natural selection, constitutes the foundation of biology.

Hegel's formulation of the idea

The philosopher, Hegel, took up Goethe's idea and gave it a firm logical foundation in his *Science of Logic*, in which the place of the cell was now taken by the *Concept* – the simplest unit of a 'formation of consciousness'. The *Logic* describes the formation and development of concepts in three Books. Book One, the Logic of Being, describes the process in which the basic regularities are abstracted from the flow of immediate perception in the form of a mass of measures. Book Two, the Logic of Essence (or Reflection), describes the emergence of theories trying to make sense of this data, with each theory being contested by opposing theories and both then being overtaken by others, digging successively deeper, and building up a theoretical picture of the phenomenon, until ... Book Three, the Logic of the Concept, begins when, in a kind of Aha! moment, an abstract concept emerges which captures the phenomenon as a whole at its simplest and most abstract level. Beginning from this abstract concept – the 'cell', the phenomenon is then reconstructed as a *Gestalt* – an entire 'organism' – by unfolding the contradictions inherent in this cell as it interacts with other cells.

Note that each of these three phases has the form of a movement from abstract (in the sense of simple and isolated) to concrete, *and* from concrete (concrete in the sense of immediate and real) to abstract. Being: from perceptions to measures, Essence: from measures to a concept; Concept: from a simple concept (cell) up to a rich and concrete concept of the whole.

In the *last* section of the *Science of Logic* on The Idea in which Hegel outlined the method of Analytic and Synthetic Cognition, he specified how the division of the subject matter of the sciences is to be carried out according to the inner nature of the subject matter itself, rather than by some arbitrary, subjective scheme imposed from without.

Here is the key passage from the *Science of Logic*.

The progress, proper to the Concept (*Begriff*), from universal to particular, is the basis and the possibility of a *synthetic science*, of a *system* and of *systematic cognition*. The first requisite for this is, as we have shown, that the beginning be made with the subject matter in the form of a *universal* (*Allgemeinen*).

In the sphere of actuality, whether of nature or spirit, it is the **concrete individuality** (*die konkrete Einzelheit*) that is given to **subjective, natural cognition** as the **prius** (*das Erste*); but in cognition that is a **comprehension**, at least to the extent that it has the form of the Notion for basis, the **prius** must be on the contrary **something simple** (*das Einfache*), **something abstracted from the concrete**, because in this form alone has the subject-matter the form of the **self-related universal** or of an **immediate based on the Concept**.

Hegel 1816, p. 801, S 779. The italics are Hegel's, the bold mine

"Prius" is a translation of the German "*der Ersten*," the first. The prius is the concept from which each science is to begin – the 'cell'. Hegel is saying that the *synthetic* phase of a science must begin with this "*something simple*." **This prescription applies to** "actuality, whether of nature or spirit" – i.e., the natural and social sciences.

Hegel describes this "something simple" (*das Einfache*) as "the concrete individuality that is given to subjective, *natural cognition*." *Einzel* means 'single', so *Einzelheit* means a 'singularity'. "Natural cognition" refers to the common sense or normative perception of a process within a given social formation, prior to critical analysis or synthetic cognition.

For Hegel, 'concrete' means the intersection or unity of two distinct concepts. For example, he says (1831, §§87-88) that, whereas Being and Nothing are *abstractions*, Becoming is the first concrete concept because it is the organic unity of Being and Nothing. As an organic unity of opposites, there is an internal contradiction which is what drives development and unfolds the content of the 'concrete individuality'. The beginning is made in the Logic of Being from the One, the self-related

individual determinate being (1831, §§97ff.). This clarification of the initial abstraction is always necessary to make the beginning with the ‘first’.

The *Erste* is the product of analytical cognition. At nodal points in the development of a science a corresponding ‘simple something’ is abstracted from concrete experience, and subjected to *synthetic cognition*, that is, the dialectical unfolding or reconstruction of a whole process, the whole ‘circle’ of the particular science. These nodal points mark out the alternation between analytical cognition and synthetic cognition.

This ‘something simple’ must be “*abstracted* from the concrete” by analysis. So, the beginning of a science requires the abstraction of such a concrete individuality from the whole concrete field of experience which can be made the starting point for a synthetic reconstruction of the concrete in theoretical form. This act of abstraction requires an insight into the whole process:

analytic cognition ... starts from a *presupposed*, and therefore individual (*einzeln*), *concrete* subject matter; this may be an object already *complete in itself* for ordinary thought, or it may be a *problem*, that is to say, given only in its circumstances and conditions, but not yet disengaged from them and presented on its own account in simple self-subsistence.

Hegel, 1816, p. 787, S. 753

Hegel said that “the first requisite for this is, as we have shown, that the beginning be made with the subject matter in the form of a *universal*.” That is, the concrete *individuality* which is the product of analysis is simultaneously *the universal*, that is to say, it is an *archetype* or ‘germ cell’ of the entire organism which is to be synthesised in theory. ‘Concrete individuality’, for Hegel, means that the cell is internally contradictory (like the exchange-value and use value of a commodity), the coincidence of two antithetical concepts which can be exhibited by analysis. It is by the unfolding of this internal, implicit contradiction, that synthetic cognition unfolds the whole circle of phenomena which make up the science in question. This process of identifying a germ cell is represented in the first volume of the Logic: Being and Essence.

Note that the “something simple” is an *individuality* and this is the difference between, for example, ‘morality’ and moral *actions*, or between ‘art’ and a *work* of art. An individuality is discrete and bounded, and not continuous or intangible; a particle rather than matter, a something rather than stuff, an action rather than activity.

According to Hegel, an exposition of the science following the path of synthetic cognition begins from this concrete individuality which is deemed to be an abstract (i.e., simple, and abstracted from its concrete circumstances) instance of the Universal – the phenomenon which is the subject matter of the whole science, and proceeds from there to the various particular forms of the universal. This phase of the science is demonstrated in the *Logic*: the *concept* of a concrete individuality is taken up and clarified. It is then subjected to immanent critique, successively surpassing its limits, exploring the particular forms implicit in it, until arriving at a contradiction which can be resolved in actuality only by the emergence of some new concrete individuality, and with that a new branch of science.

It should be noted that Hegel does not claim that the natural and human sciences can be elaborated by logic alone, without reference to observation and experiment:

Their [the sciences’] commencement, though rational at bottom, yields to the influence of fortuitousness, when they have to bring their universal truth into contact with actual facts and the single phenomena of experience. In this region of chance and change, the adequate notion of science must yield its place to reasons or grounds of explanation.

Hegel, 1831, §16. S. 70

Marx went further than Hegel on this point. Marx insisted that the *synthetic* phase of the science – the development from the cell to an organism – *also* necessarily relies on observation of the development of the subject matter itself and the theorist’s intervention in the subject matter, rather than merely logical critique by a philosopher. Marx explicitly states this in the *Grundrisse*:

the movement of the categories ... is a product of a thinking head, which appropriates the world ... The real subject retains its autonomous existence outside the head just as before.
1858, p. 102

This is evidenced in the almost complete absence of speculation about the future in *Capital*. Further, as Lenin observed, Marx made no reference in the *Communist Manifesto* (1848) to what the working class would do if it took state power, but waited until 1871 when he was able to witness the Paris Commune to amend the *Manifesto* with a Preface on this question.

In the *Logic*, the simple concepts which mark the beginning of each book are, respectively: the One, The Thing and Abstract Concept. These concepts are in a sense also ‘simple somethings’, and the development of each offers a model of synthetic science to be applied in the natural and human sciences.

The One

The idea of the unit is first developed in the very first section of the Logic. Hegel’s philosophy begins from the abstract concept of Being. Hegel shows that this concept is empty and therefore Nothing. By the fact that Being progressed to Nothing, Hegel has derived Becoming, the “first concrete concept” (as the unity of Being and Nothing). But Becoming implies that *something* is becoming, thus deriving Determinate Being (*Dasein*). Understood in itself as distinct from some other, the *Dasein* must be One (*das Eins*), and implicit in One is that there are Many. The One is what unites the Many (continuity) but at the same time marks its discreteness (discontinuity). Hegel then unfolds the entire logic of quantitative science from this unit, the One.

The remainder of the *Encyclopaedia* demonstrates the use of ‘simple somethings’ which have the form of the self-related universal, including, for example:

- The first book of the Logic is ‘Being’, but Hegel determines the One as the concept from which the Logic is to be unfolded. He insists that the One is the presupposition for the Many, rather than just being ‘one amongst many’ as it is for representational thinking.
- The first book of the *Philosophy of Nature* ostensibly begins with ‘Space’, but much more determinate concepts are his immediate beginning: the Point, the Line, and the Surface (which encloses a space).
- The second book of the *Philosophy of Nature*, nominally begins with ‘Mechanics’, but actually begins from the Particle. ‘Organic Physics’, nominally about ‘Life’, actually begins from an Organism.
- The three books of the *Philosophy of Subjective Spirit* are ‘Soul’ (a nervous system), beginning with Feelings, ‘Consciousness’ beginning with Sensations, and the Finite Mind.
- In the *Philosophy of Objective Spirit*, ‘Abstract Right’, goes through: Possession (Taking Possession, Use and Alienation); ‘Contract’ (Gift, Exchange and Pledge) and ‘Wrong’ (a Non-malicious Wrong, a Fraud and a Crime).
- ‘Morality’ goes through: Purpose, Goal, Means, Intention, Welfare, the Good, among others, and
- ‘Ethical Life’ goes through: Family, Market, Public Authorities, Corporations, and State.
- In the *Philosophy of Absolute Spirit*, Art is ostensibly about the ‘shape of beauty’ but begins from the Work of Art; Revealed Religion begins from the ‘Concrete Individuality’ (*konkrete Einzelheit*); and Philosophy from the Syllogism.

The above include 37 examples of ‘cells’ used by Hegel in some of the various sciences he outlined. There are many more. Each topic that is taken up in the *Encyclopaedia* has the same form: after an initial clarification of the subject matter which usually presents itself as an abstraction, Hegel determined a ‘simple concrete something’ which is the unit or germ cell representing what is universal in the science. He then ‘unfolds’ this germ cell in a synthetic reconstruction of the whole science or phenomenon.

Marx's appropriation of Hegel

Marx acknowledged his debt to Goethe and Hegel in the first Preface to *Capital*, where he says:

The value-form, whose fully developed shape is the money-form, is very elementary and simple. Nevertheless, the human mind has for more than 2,000 years sought in vain to get to the bottom of it, whilst on the other hand, to the successful analysis of much more composite and complex forms, there has been at least an approximation. Why? Because the body, as an organic whole, is more easy of study than are the cells of that body. In the analysis of economic forms, moreover, neither microscopes nor chemical reagents are of use. The force of abstraction must replace both. But in bourgeois society, the commodity form of the product of labour – or value-form of the commodity – is the economic cell-form.

1867, p. 8

Marx further indicated his debt to Hegel's *Logic* in the famous passage of the *Grundrisse*, 'The Method of Political Economy', in which he described the history of political economy in terms of two phases: firstly, an analytical phase in which the economic data is analysed and represented in a succession of theories until arriving at the abstractions, such as 'value', from which point then, the whole phenomenon can be reconstructed synthetically.

Along the first path the full conception was evaporated to yield an abstract determination; along the second, the abstract determinations lead towards a reproduction of the concrete by way of thought.

1858, p. 100

The first phase corresponds to the decades Marx spent in the *immanent critique* of the theories of political economy leading to the discovery of the 'cell'. The second phase is the *dialectical reconstruction* of political economy in *Capital*, beginning from analysis of exchange of commodities in Chapter I.

In his 'Notes on Adolph Wagner' (1881, p. 544) Marx says:

I did not start out from the 'concept of value' ... What I start out from is the simplest social form in which the product of labour is presented in contemporary society, and this is 'the commodity'.

The commodity is a *form* of value, but 'value' is an intangible, neither 'a geometrical, a chemical, or any other natural property' (Marx, 1867, p. 47) – but a suprasensible (i.e., social) quality of commodities, and as such is unsuited for the role of cell. Value is a *social relation* which can therefore only be grasped conceptually. Nonetheless, commodity exchange is a form of value which, thanks to everyday experience, *can be grasped viscerally*. This means that the critique of the concept of commodity works upon relations which can be grasped viscerally by reader and writer alike. By beginning with the (concept of) commodity Marx mobilises the readers' visceral understanding of commodities, and as he leads us through each successive relation, so long as that relation exists in social practice, then not only is the writer's intuition validated by the *existence* of that relation, but it also allows the reader to securely grasp the logical exposition.

Marx's decision to begin not with 'value' but with the 'commodity' illustrates Marx's debt to Goethe as well as Hegel. Further, he insisted on tracing the emergence of every relation in economic life, rather than in claiming to derive them from pure logic, thus recovering the *empirical*/moment in Goethe's original idea, before it was taken up as a *logical* category by Hegel.

The unit of capital

Only the chapters I to III of *Capital* deal with simple commodity production, which Marx represented symbolically as C—M—C. That is, selling a commodity (C) you have for the money (M) to buy the commodity (C) which you need. In chapter IV, Marx derives the first, abstract concept of

capital which is to be the real subject matter of the book: M—C—M' – buying in order to sell at a profit. This action is the basic unit of capital, and is reified as the capitalist firm. While capital is an aggregate of commodities, it is a qualitatively distinct unit of analysis. Capital accumulation gives a new direction to the development of economic life, and the remaining chapters of *Capital* represent the phase of dialectical reconstruction of the concept, equivalent to Volume Two of Hegel's Logic, the 'Concept Logic'. There never has been any such thing as a society based solely on 'simple commodity production'; the historically-first instances of commodity exchange were regulated by means other than capital. 'Simple commodity production' is an analytical abstraction, not an historical precedent.

Bourgeois economists had begun their analysis with the fact of money, confronting the mystery of how money can have value. Value is utterly intangible, and nothing about the sensuous nature of money makes it possible to understand how money can have value. The entire problem is mysterious. But even a child can understand the simple act of swapping one useful product for another (C—C), without recourse to any prior theory or abstraction. We can grasp it viscerally. This gives the writer and the reader a firm grasp of the basic process and it is easy then to explain how all the complex phenomena of money credit, capital, etc., grow out of this simple germ cell.

The development of science

Marx had been able to appropriate Hegel's method, but neither the naturalist-poet Goethe, nor the philosopher Hegel nor the communist Marx could have a significant impact on the course of natural scientific activity during the nineteenth century. How could this achievement of Classical German Philosophy be transformed into methods for the resolution of the problems in the various branches of science?

Science proceeded piecemeal, and not according to the grand plan of Hegel's *Encyclopaedia of the Philosophical Sciences*. The natural sciences were in general able to make progress by problem-solving in the separate disciplines, with occasional unexpected breakthroughs, without any overall conception guiding their work. It took almost a century from Hegel's death in 1831, through the efforts of German natural science, French social theory and American Pragmatism, before a practical, laboratory method for understanding how individual human beings appropriated the cultural practices of their time was finally accomplished by Lev Vygotsky. Vygotsky's breakthrough was thanks to his appropriation of the idea of 'unit' from Hegel and Marx, and the cultural conditions created in the wake of the Russian Revolution.

Hegel on mediation and immediacy

Before looking at how Vygotsky appropriated and used the idea of 'cell', I must recall a key concept with which Hegel framed his entire philosophy. He writes in the preface to the *Science of Logic* (1816):

[T]here is nothing, nothing in heaven, or in nature or in mind or anywhere else which does not equally contain both immediacy and mediation, so that these two determinations reveal themselves to be unseparated and inseparable.

Hegel, p. 68

In the introduction to his *Encyclopaedia*, Hegel characterises the history of European philosophy in terms of a struggle between the various philosophies of *immediate* knowledge: Descartes' Rationalism, the Empiricism of the natural sciences, and Jacobi's reliance on Faith, versus Kant's philosophy which held that all knowledge is *mediated* – things in themselves cannot be objects of experience, and knowledge of them is impossible.

Hegel's entire philosophy was built on what is known to followers of Vygotsky as 'double stimulation':

The relationship of *immediacy* and *mediation within consciousness* will have to be discussed explicitly and in detail below. At this point, it suffices to point out that, although

both moments *appear* to be distinct, *neither of them* may be absent and they form an *inseparable* combination.

Hegel, 1831, §12n

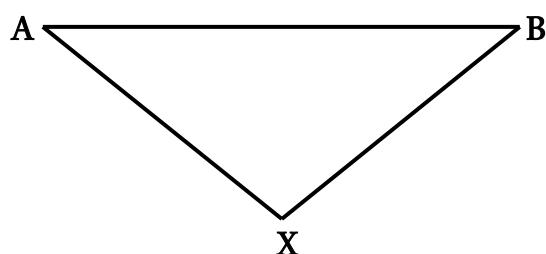
Part II: Vygotsky and Activity Theory

Vygotsky on the method of double stimulation

Until Vygotsky's breakthrough, psychology had been split between those like Helmholtz who approached psychology with 'brass instruments' as if it were a branch of the natural sciences, and those like Dilthey who studied cultural phenomena as if psychology was a branch of the 'human sciences' (see Blunden, 2013, pp. 197-221). Recognising that the mind was formed by the joint actions of physiology and culture, Wundt had even proposed that there be two separate psychologies: one carried out in the laboratory with the aid of introspection, the other through the study of literature and art. In the twentieth century, psychology was split between Behaviourists who denied the existence of consciousness and saw psychology in terms of reflexes, and 'empirical psychologists' who studied the mind by means of introspection. The 'brass instrument' methods hitherto employed in psychology laboratories were capable of investigating only the most elementary and primitive reflexes which humans have in common with other animals, while introspection was incapable of providing *objective* access to consciousness. Contra Behaviourism, human behaviour cannot be understood without reference to consciousness; but consciousness (like history or geology) cannot be observed *directly*. However, consciousness mediates between physiology and behaviour, both these are objectively observable (see Vygotsky, 1924).

Vygotsky solved these problems with the experimental method of double stimulation.

The method of double stimulation was first formulated by Vygotsky in conjunction with Alexander Luria in 1928 (see Luria, 1928 & Vygotsky, 1928). An experimental subject, typically a child, would be presented with a problem, such as memorising a series of words. As they were trying to solve the problem, the researcher would present them with an artefact, such as a picture-card, to use as a means in solving the problem. In this simple scenario, we have the germ cell of cultural development and activity. In the diagram below:



A represents a person who confronts an object or problem, *B*, and *X* is a sign, an artefact introduced into the scenario by a collaborator, as a means of solving the problem. This simple germ cell captures the essential relation of people to their culture: a problem set by social situation is solved by using an artefact (a sign in Vygotsky's experiments) drawn from the cultural environment. In the process of appropriating the use of the given artefact, the subject's psychology is enhanced by the creation of a new reflex, associating *B* with *X*. Vygotsky has set up here an extremely simple scenario, which can be sensuously experienced and therefore grasped viscerally, without the need of a pre-existing over-arching theory. But in this simple set-up we have both the immediate situation of an individual confronting a problem, and the entire cultural history of the subject's environment represented in the artefact-solution. This is a unit of analysis in which both the individual psyche and an entire cultural history are present.

The meaning of the term ‘dual stimulation’ is illustrated in the diagram. A is subject to two stimuli at the same time, both the object itself, $A \rightarrow B$,^{*} and the auxiliary stimulus, $A \rightarrow X$, which is associated with the object, $X \rightarrow B$. Thus the subject A responds to the object B in two ways at once, the immediate perception of the object $A \rightarrow B$, and the sign $A \rightarrow X$. Each of these reactions is a perfectly natural reflex. It is the mediated reaction $A \rightarrow X \rightarrow B$, which is *socially constructed* and which gives *meaning* to the object, B , a meaning acquired from the culture, thanks to the collaboration with the other person, in this case, the researcher. X may be an image on a card which reminds the subject of the word to be remembered, for example, or it may be a written word giving the name of the object. This idea, in which all our relations to the environment are taken to be *mediated*, is directly linked to Hegel’s *dictum* (1816, §92) cited above. It is by using cultural signs and tools, to solve problems thrown up in life in collaboration with others, that people learn and become cultured citizens of their community – introducing mediating signs and other artefacts to control their interaction with their immediate environment.

Using this experimental set-up, Vygotsky was able to observe, for example, whether and how children of different ages were able to use memory-cards to improve their performance in memorising tasks, and by this means demonstrated, for example, the qualitative difference between how small children, older children and adults remember. By appropriating elements of their culture in the course of their development, people completely restructure their consciousness.

This first unit of analysis, the *sign-mediated action*, is the first germ-cell developed for psychological research by Vygotsky.

Word meaning

In 1931, Vygotsky came to the conclusion that not just any sign, but *the spoken word*, was the *archetypal* cultural artefact through which people appropriated the culture of their community. After all, every physiologically able child spontaneously learns to speak while many never master literacy, and speech had emerged contemporaneously with labour (the use of tool-artefacts) in the very evolution of the human species. Signs, such as the written word, were a later invention, with writing corresponding to transition to bureaucratic class society. It was with this conviction that Vygotsky composed his last and definitive work, *Thinking and Speech* (1934).

In the first chapter of *Thinking and Speech* Vygotsky presents his only extended exposition of analysis by units, and in this instance his chosen unit was *word meaning* – a unity of speech and thinking, that is, of sound and meaning. A word is a unity of sound and meaning because a sound without a meaning is not a word and nor is a meaning without a physical sign a word – a word has to be both. Word meaning is equally a unity of generalisation and social interaction, of thinking and communication. A word is a *unit* because it is the simplest, discrete instance of such a unity.

Vygotsky was not writing as a linguist. It is a matter of indifference here whether the ‘word’ is a single word or actually a phrase, for example. By ‘word’ is meant a spoken sign for a concept. Linguistics and the related disciplines of discourse analysis, etymology, pragmatics, etc., all give further important insights for psychology, sociology, etc., and have different units of analysis. But Vygotsky’s aim in this work is a general psychology, not linguistics.

The unit, word meaning, has to be understood as a *sign-mediated action*. Vygotsky insisted that word meaning is not a *subset* of the larger category of artefact-mediated actions, which would have the effect of subsuming communicative action, including speech, under labour activity. Rather, the relation between tool use and sign use is genetic. The archetype of a ‘sign’, according to Vygotsky is a mnemonic symbol, such as a knot in a handkerchief or a notch in a message stick, and these signs, he claimed, developed into the written word several thousand years ago. Sign-mediated actions, such as the use of written words, arose during the past few millennia as an extension of tool-mediated actions. *Speech* however arose in close connection with the development of labour in the very process of human evolution. The use of symbolic artefacts, such as writing, therefore has to be understood as something phylogenetically and ontogenetically distinct from speech which co-

* The concept of ‘stimulus’ implies that the arrow should be in the other direction $A \leftarrow X$, but I follow Hegel, Marx and Vygotsky in taking the *attention* to a stimulus to be an active, not a passive action by the subject.

evolved as part of the labour process which, according to Engels (1876), drove the evolution of the human species.

In his discussion of tool use, Vygotsky distinguished between ‘technical tools’ and ‘psychological tools’. Tools in the normal sense, technical tools, are used to operate upon matter, whereas psychological tools are used to work on the mind, and these include “language, different forms of numeration and counting, mnemotechnic techniques, algebraic symbolism, works of art, writing, schemes, diagrams, maps, blueprints, all sorts of conventional signs, etc.” (Vygotsky, 1930, p. 85). Note that a ‘psychological tool’ is a material artefact, just like a technical tool; it is not a ‘psychological entity’ like a mental image or idea. Using a (technical) tool has profound psychological effects because tool use widens the scope of a person’s activity and expands their horizon of experience, but it does not ‘work on the mind’ in the direct sense as does a psychological tool. Psychological tools developed alongside of and as an extension of the development of technical tools.

It is important to emphasise that to speak, that is to say to act with a word, is an *action*; to *mean* something, that is, word-meaning, is an action. ‘Word meaning’ does not refer to an entry in the dictionary, it is the action in which an intention is carried out by means of a meaningful word.

Just as Marx first analysed the commodity as early as 1843, but took until 1859 to realise that the commodity had to be taken as a *unit of analysis*, Vygotsky pointed to the importance of analysing speech in his first published work (1924) but took a further decade to settle on the spoken word, the simplest act of ‘psychological exchange’, as the *unit of analysis* for his final work.

Using this unit of analysis, Vygotsky analysed the development of the *intellect*, that is, of verbal thinking. The unit of ‘practical intellect’ is a tool use, and has a distinct path of development, side by side with (verbal) intellect, whose unit is a word meaning. The word is also a ‘germ cell’ in the sense that it is the cell which can grow into an entire theory and practice, just like a cell can grow into an organism. Different units would give different insights, and human science demands the use of different units, each shedding light of a particular hue on to the human condition.

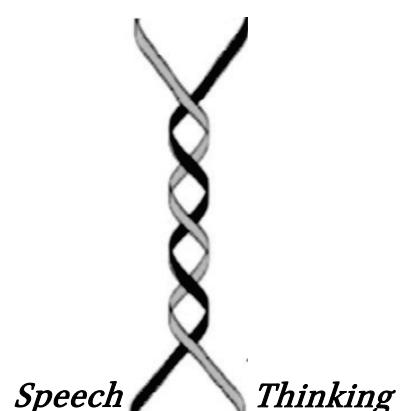
Concepts as units of the intellect

Although word meaning is the basic unit of the intellect, a larger, ‘molar’ unit is required to understand the structure and development of the intellect. This molar unit is the *concept*, which is an aggregate of many word meanings. The centre of Vygotsky’s analysis in *Thinking and Speech* is the formation of concepts, which only reach a fully developed form in late adolescence. Vygotsky’s task was to trace the development of the intellect from infancy to adulthood, by observing the development of speech. It is the intellect which is the real subject matter of *Thinking and Speech*, just as capital, not commodities, is the real subject matter of Marx’s *Capital*.

Vygotsky summarised his study of the emergence of speech in young children as follows:

1. As we found in our analysis of the phylogenetic development of thinking and speech, we find that these two processes have different roots in ontogenesis.
2. Just as we can identify a ‘pre-speech’ stage in the development of the child’s thinking, we can identify a ‘pre-intellectual stage’ in the development of his speech.
3. Up to a certain point, speech and thinking develop along different lines and independently of one another.
4. At a certain point, the two lines cross: thinking becomes verbal and speech intellectual.

1934, p. 112



Vygotsky traced the changes in word meaning from the first emergence of speech in the form of *unconscious expressive* speech, to communicative speech (calling upon adults for assistance), to *egocentric* speech in which the child gives itself audible instructions or commentary, with the child taking the place of the adult in commanding their own behaviour, to egocentric speech which

becomes more and more curtailed and predicative passing over into *inner speech*, and later, as he notes in the final chapter of *Thinking and Speech*, thinking which goes *beyond* speech with the most developed forms of thinking which are no longer tied to putting one word after another. The changing form of word-meaning allowed Vygotsky to trace the emergence and construction of the verbal intellect and thereby understand its essential nature.

The development of thinking and speech takes the form of a double-helix.

This model of co-development is used throughout by Vygotsky in understanding the complex development of all the higher forms of activity acquired by human beings.

By use of a germ cell which is open to observation, and tracing its internalisation as it is gradually transformed into something private and inaccessible to observation, Vygotsky created an objective scientific basis for Cultural Psychology. This was an astounding achievement.

The formation of concepts

In his study of the early formation of concepts in the fifth chapter of *Thinking and Speech*, Vygotsky describes experiments using the method of dual stimulation with children set sorting tasks. Children were invited to sort a variety of different sized, shaped and coloured blocks into groups that were 'the same'. The problem could be solved by looking at nonsense words written on the base of the blocks. The children were only gradually introduced to these clues so that the researchers could observe the children's actions in forming better and better groups, aided by reference to the signs. Vygotsky was able to describe a number of discrete types of concepts, according to the different ways children sorted the blocks.

Vygotsky identified each of these concepts as a *form of action*, rather than as a logical structure, as Hegel might have categorised them, and nor did Vygotsky reify them as mental functions or capacities; they were just forms of action. Thus, by using sign mediated actions as his unit, Vygotsky was able to study the emergence of concepts, the units of the verbal intellect. These concepts, constructed in the laboratory on the basis of features of the objects being sorted, were not yet truly concepts, but exhibited the type of concepts which arise among children, who have not yet left the family home and entered the world of adult concerns and concepts assembled and worked out on the historical and cultural plane of human life.

True concepts, acquired through instruction in some real-world institution and actual concepts developed through participation in both everyday and professional life, are yet different forms of activity. These Vygotsky investigated in the sixth chapter with experiments involving speech. Typically, young people would be asked to complete a narrative sentence with "because ..." or "although ...," observing their efforts to verbalise causal relations with which they were well-accustomed, but now with conscious awareness. The insight behind these experiments is that a child, or even a domesticated animal, can learn to respond rationally to a situation, demonstrating an implicit understanding of the relevant causal connections between events. However, the ability to isolate this relation in a form of thought, and with conscious awareness use the thought form (concept) as a unit in verbal reasoning – intellect – is something characteristically human. True concepts are transmitted through the generations by cultural institutions, professions and so on, and are invariably carried by words which are part of a real language. So, a concept is the conscious awareness of a form of activity organised around a word or other meaningful artefact.

By characterising concepts in this way, as formations of artefact-mediated activity, Vygotsky laid the basis for an interdisciplinary science. Social formations are made up of a variety of forms of activity, each of which is apprehended as a concept, and these concepts together constitute the culture of the given community. Vygotsky has given us a down-to-earth laboratory method for studying how people acquire these concepts.

Marx did not take value as some intangible quality, but rather began with a specific type of social action – exchange. Likewise, Vygotsky did not take 'concept' to be some intangible mental entity, but rather a specific type of social action. And this is true of all Vygotsky's units of analysis – they are specific, observable forms of activity.

Note that in the above we have seen *two* units: word meaning and concept. The 'larger', or molar unit, concept, arises on the basis of the 'smaller' or molecular unit, word meaning. Words only

exhibit their full meaning as part of a system of meanings constituted by the concept they evoke, and conversely, concepts exist only in and through the large number of word meanings and other artefact-mediated actions associated with them. Nonetheless, Vygotsky showed that children learn to use words long before they master conceptual thinking, at which point their speech activity is transformed.

This process whereby a molar unit of activity arises on the basis of the action of a molecular unit, is a common feature of the analysis of processes by units. It is found in Marx's critique of political economy with commodity and then capital, and in activity theory where the molecular unit is an artefact-mediated action and the molar unit is an activity. The method of analysis by units allows the researcher to trace step by step how the more developed unit emerges out of the action of the fundamental units which can be grasped viscerally.

Germ cell and unit of analysis

The concept which Marx referred to with the term 'cell-form' is referred to in Cultural-Historical Activity Theory (CHAT) by two different terms: *unit of analysis*, and *germ cell*. These are two different expressions for the same concept but indicate two different aspects of that concept.

'Germ cell' indicates the germ from which more complex forms develop, just as the cell grows into an organ. For example, actual exchange of commodities is rarely seen in modern capitalist society, where everything is bought and sold, not literally traded. But Marx showed how, historically, once a community starts producing for exchange, perhaps on its borders or with passing merchants, it is more or less inevitably drawn into the world market, and with that comes the need for a universal measure of value. Thus, a universal commodity, emerges – gold, paper money, credit and so forth all 'unfold' themselves from the original simple practice of exchange. This first unit, C-C, through the mediation of money, opens up into C—M—C, in which a person sells in order to buy. From this mediating element there arises a whole class of people who buy in order to sell at a profit: M—C—M', and thus arises *capital*, a new unit of value, a new social relation which arises on the basis of the 'logic' of that simple relation, *exchange*. With the emergence of capital – firms buying in order to sell at a profit – economic life is reorganised, with production of commodities now subsumed under capital (rather than under pre-existing feudal relations) and reoriented towards the accumulation of capital rather than simply the cooperative provision of human needs. The 'germ-cell' of capital, M—C—M', exhibits this course of development in embryo.

Likewise, in psychology, the simple word meaning, when developed through discourse, gives rise to more developed forms of thinking and speech, namely concepts (which is not to imply that a society of speech without concepts ever existed). 'Germ cell' emphasises this aspect of *development*, the relation between the simple undeveloped relation, on the one hand, and on the other hand, the mature, concrete relation.

Vygotsky appropriated the term 'unit of analysis' from social science, in which it meant the 'resolution of the analytical microscope', so to speak, the smallest entity which is taken account of in a given theory. In mainstream social science, the unit of analysis is usually taken to be individuals, sometimes groups, classes or even nations. The difference with how Vygotsky used the term is that he recognised that the unit of analysis is already implicitly a *concept of the whole*. That is, he merged this analytical concept with Goethe's idea of the *Urphänomen* as a representation of a Gestalt.

I will illustrate how the idea of a unit of analysis figured in Marx's work. The young Marx was outraged by the treatment of the poor, censorship and other social issues, but realised that he knew nothing of the root causes of these phenomena. Thus, he turned to a study of political economy. Twenty five years later, when he wrote *Das Kapital*, 'bourgeois society' was now conceived of as an integral whole, a market place – just millions and millions of commodity exchanges, and nothing else. Other phenomena, such as censorship, political corruption, cruelty, now came to be seen as *inessential* and contingent. By taking commodity exchange as the unit, the whole, the *Gestalt*, was now re-defined and was not coextensive with his original conception of the whole. This is the other aspect to the concept of 'cell' – it means taking the whole process to be nothing other than millions and millions of this one simple relation, a relation which can be grasped viscerally, without the need for abstract theories and forces and so on. The 'unit of analysis' expresses the results of analysis in

terms of a relation between the whole and the part. The whole is *nothing but* millions and millions of the same unit of analysis. It is possible to see the water cycle – rain, rivers, ocean, evaporation, clouds and back down again as rain – as one whole process, a *Gestalt*, because all these are nothing but billions and billions of the same unit: H₂O molecules.

Identifying the unit of a complex process is an Aha! moment, seeing that the process is nothing but such and such a simple action or relation. This becomes the *starting point* for a truly scientific understanding of the process, an understanding which allows us to grasp the phenomenon not just as a process with this or that features, but as a whole, as a *Gestalt*.

Thus the germ-cell and the unit of analysis are one and the same thing, but in one case the developmental aspect is emphasised and in the other case the analytical aspect is emphasised.

Five applications of the method of analysis by units

'Unit of analysis' is a relative term: analysis of *what?* A unit of analysis is always used for the analysis of some specific problem or phenomenon. Some writers only ever analyse one phenomenon and devote their lives to that issue. For example among philosophers, Kant takes the judgment as the unit of experience, Frege takes the smallest expression to which pragmatic force can be attached, and Wittgenstein the smallest expression whose utterance makes a move in a language game, Bakhtin uses the utterance (speaking turn) as the unit for discourse analysis, and Robert Brandom takes the proposition as his unit of analysis.

Vygotsky's work covered *five different domains* of psychological research. He used the unit of *sign-mediated actions* to analyse a range of distinct psychological functions, such as will, attention, memory and so on. And he used *word meaning* to study verbal intelligence and concept formation. In addition to these, Vygotsky found a unit of analysis for three other areas of research.

Perezhivanie

Perezhivanie is an untranslatable Russian word meaning 'an experience' together with the 'catharsis' entailed in surviving and processing that experience. One and the same event does not have the same significance for every person, so *perezhivaniya* are 'lived experiences' which depend not only on characteristics of the event itself, but also on characteristics of the individual. Vygotsky wrote that alongside heredity, it was *perezhivaniya* which formed the personality. Understanding the personality (*lichnost*) as a process rather than a product, he claimed that *perezhivaniya* were units of the personality. *Perezhivaniya* stand out from the general background of experience, have a beginning a middle and an end and throughout the course of the experience, have a unity and a certain intense emotional colour. *Perezhivaniya* have a definite psychological form. Reflect on your own life, remember those seminal experiences, the daring moves you got away with, the public humiliations you suffered, the reprimands, injustices or accolades you received – your personality is the aggregate of all these *perezhivaniya* and analysis of them would give a therapist or prospective partner insight into your personality. It is these *perezhivaniya* which makes up the story you tell yourself of your own life, your identity.

Vygotsky dealt only briefly with *perezhivaniya* in a lecture called 'The Problem of the Environment' (1934a) in which he defines a *perezhivanie* as a "unity of environmental and personal features." This expression has been the source of some confusion. A personal feature might be a child's stage of intellectual development, and an environmental feature might be the school-entry age; neither of these features by themselves shape the personality of a child, but *taken together* – whether at school age the child is *ready* to attend school – is self-evidently a factor in the forming of the child's personality. Further, *perezhivanie* is often translated as 'lived experience', which in contemporary social science is taken to be entirely subjective, whereas *perezhivaniya* have objective as well as subjective sides. *Perezhivanie* does not mean 'experience' (as in an applicant's 'work experience') – for which the Russian word is *opit*. *Perezhivaniya* are discrete episodes which stand out from the background of experience and include the active contribution of the subject and its aesthetic character.

Defect-compensation

Vygotsky devoted much of his efforts to work with children affected with a variety of disabilities. In those days, the Soviet government grouped all kinds of disabilities together under the heading of Defectology. But Vygotsky did not see the defect as being on the side of the subject. Rather, the defect lay in the relation between the subject and the cultural environment, including the failure of the community to provide for the full participation of the subject in social life.

For every defect, there is a compensation. That compensation is a combination of measures on the part of the community to facilitate the participation of the subject, and the psychological adjustment made on the part of the subject to overcome the barrier to their participation. Vygotsky took the unit of analysis for defectology as the unity of the defect and the compensation – the ‘defect-compensation’. Vygotsky’s writing on defectology are in Volume 2 of his Collected Works. To a great extent, Vygotsky appropriated Alfred Adler’s work on the ‘inferiority complex’.

Social situation of development

In his work on child development, Vygotsky developed the concept of ‘social situation of development’. Vygotsky insisted that the social situation is not just a series of factors – age of mother, salary and occupation of father, number of siblings, etc. – it is a *specific situation* or predicament. Each of these situations has a definite name in a given culture, such as ‘infant’ or ‘elementary school child’, etc. Each of these situations entails certain expectations placed on the child and their specific needs are met in a corresponding appropriate way. The child is more or less obliged to fit into this role. In the process of normal development however, at a certain point, the child develops needs and desires which cannot be met within the current social situation, and a crisis breaks out in the family group, both the child and its carers. The child may become difficult and rebellious, and if the family and carers respond, the child and the whole situation will undergo a transformation and a new social situation will be established, with the child occupying a new social position. Child development is constituted by this specific series of situations, with both family and child going through a series of culturally specific transformations in which the child eventually develops into an independent adult. The social situation of development is a unity of the child and its carers in a specific caring relationship.

In each of the areas of psychological research into which Vygotsky went, his aim was to establish a unit of analysis. He was not always successful, and for example, his study of the emotions failed to arrive at a unit of analysis before his death in 1934 (see Holodynski, 2013). But he did discover five units: artefact-mediated actions, meaningful words, *perezhivaniya*, defect-compensations, and social situations of development.

Activities

The Activity Theorists, who continued Vygotsky’s work, particularly contributed to the notion of ‘germ cell’ as an agent of social and psychological change.

A.N. Leontyev also famously defined a hierarchy of three units of analysis: (1) The *operation*, a form of action which can be done without conscious awareness, adapting itself to conditions, (2) The *artefact mediated action*, and (3) The *activities* (or projects or forms of practice). Note that here ‘activities’ means the discrete aggregates of actions all having a common motive, and each having a distinct goal differing from the shared motive, and possibly executed by different individuals. This is distinct from the notion of ‘activity’, meaning the generalised substance of human life. Activities as units of analysis is a rendering in social rather than psychological terms of Vygotsky’s unit of *concepts*. Indeed, it is important to remember that the motive of the activity is always a concept even though the object of the activity is an objective part of the larger social formation. Hegel used the same idea in his *Philosophy of Right*.

The importance of Vygotsky for social theory

Hegel, Marx and Vygotsky each made an important development on the methodology originated by Goethe. Hegel replaced the *Urphänomen* with the abstract concept which could be a subject of

reasoning, rather than merely intuition. Marx insisted that the real subject was social practice rather than thought, and critique could only reconstruct what was given in social practice. Consequently, rather than an abstract concept such as 'value', the germ-cell would be a practical action such as commodity exchange. In his critique of psychology, Vygotsky showed that this germ cell had to be a discrete, finite, observable interaction. Whereas Marx left us only two instantiations of this method, Vygotsky applied the method to the solution of five different problems, and provided five different instances of a 'germ-cell', thus making the idea explicit and the method reproducible.

Vygotsky was a psychologist, in particular, a cultural psychologist, not a social theorist. He approached the cultural formation of the psyche, as mentioned above, by means of a study of the collaborative use of artefacts originating in the wider culture, in some social situation, also a product of the wider culture. But he did not investigate the processes of formation of the social environment itself. These problems were taken up by the Activity Theorists who followed on from Vygotsky's work. Although the Activity Theorists made important developments, they were not all able to consistently maintain Vygotsky's method of analysis by units.

Nonetheless, through the method of analysis by units, and in particular through the unit, artefact mediated action, Vygotsky has given social theorists an approach which can fully integrate the psychological, social and historical sciences. Rather than psychology on one side, and social theory on the other, Vygotsky has given us the opportunity for a genuinely interdisciplinary human science. Concepts are equally the unit of a culture and the unit of the intellect, and Vygotsky's research on concepts in *Thinking and Speech* shows us how we can understand concepts, not as invisible thought forms, but as forms of activity. Vygotsky's approach is a powerful alternative to the 'ideology critique' which is the usual fare in Marxist social theory and suggests an approach which can generate new insights into the complex social problems of today.

The special value of analysis by units for social theory is that units/germs can be viable vehicles for social action for those of us who wish to change entire social formations.

A note on reification and units of analysis

Marx's Capital

Marx says (1881) "What I start out from is the simplest social form in the which the product of labour is presented in contemporary society, and this is 'the commodity', and in the opening lines of *Capital* (1867) he says: "The wealth of those societies in which the capitalist mode of production prevails, presents itself as 'an immense accumulation of commodities.'" So, he clearly says that he believes that values take the form of *things* in bourgeois society and this is his starting point.

And yet we have good reason to believe that Marx wanted a 'philosophy of praxis'. In *Theses on Feuerbach* (1845), he says in a dozen different ways: "All social life is essentially practical. All mysteries which lead theory to mysticism find their rational solution in human practice and in the comprehension of this practice." So why in *Capital* does he insist on the ultimate reality being *things* rather than practices? Why does he start from the commodity rather than the practice of commodity exchange?

I see three reasons.

First, how can a social theorist observe and measure human activity en masse other than by observing the things which are the products and means of their activity?

Second, it is a feature of bourgeois society that wealth is conceived of as 'an immense accumulation of commodities', and indeed this is essential to the practice of *accumulating* wealth. Even if you grant that a service can be a commodity and therefore a form of value, the buyer can only possess the product once the service has been enjoyed, not the service as such. When a builder builds a house for you, you look to owning the house, not the builder's action of building the house, whether your object is that of a homemaker or a real estate speculator.

So, the *reification* of value into material products at some point is essential to the practice of accumulating value. In the further development of capitalism wealth comes to be rendered in the form of writing in ledgers (including electronic ledgers), but the meaning of these symbolic forms of

value lies in their standing for things, and failing that, the symbolic wealth evaporates, just as possession is not property unless legally legitimised.

The third reason is that Marx put forward his theory in *opposition* to the idea of exchange of commodities being cast as an exchange of *services*. Such a conception of commerce renders the activity of the wage worker as a service to the employer, while the provision of means of production is cast as a service on the part of the employer. This has the effect of conflating the industrial worker with the domestic servant, and the exploitation of wage labour with purchase of personal services for immediate consumption. Such a conception mystifies the source of surplus value which, according to Marx, lies in the appropriation of unpaid labour arising from the difference between the socially necessary cost of production of labour power and the value of the product of labour. In Marx's conception, the capitalist *directs and uses* the 'labour power' of the worker to add value to products and thereby acquires a product worth more than the sum of the value of its components. Marx saw services, on the other hand, as objects of personal consumption. However he does allow that "a schoolmaster who is engaged as a wage labourer in ... a knowledge-mongering institution, is a productive worker" (1867, ch.2) and *does* produce surplus value. Thus Marx's insistence that a service provision cannot be productive of surplus value is not held consistently. It is just that he takes the production of tangible commodities as the archetypal form, the *germ cell*, of wage labour.

In the 150 years since *Capital* was published, it has become clear that services can be bought and sold on the market for the purpose of accumulation of surplus value in any branch of industry. Indeed, industries that are exclusively reliant on the production of stuff are in general less successful in appropriating surplus value than the service industries. It remains the case that wealth cannot be accumulated but only consumed in the form of services. Generally speaking, wealth is accumulated in symbolic commodities, not piles of stuff, so there is little point in insisting on the priority of production of stuff as opposed to services. Though, of course, the stuff has to be there to buy and use or the size of your bank account is useless.

On close examination, Marx's units of analysis of bourgeois society are the practices of (1) selling labour in order to buy the means of life ($C \rightarrow M \rightarrow C'$) and (2) buying in order to sell at a profit ($M \rightarrow C \rightarrow M'$) – both *forms of practice*. However, the actions in question are *artefact-mediated* actions, that is, essentially, the practices in question necessarily entail actions *with artefacts*. In the case of pure services, the artefacts in question are human bodies and human energy and means which are not the property of the worker.

So, my thesis is this. The reification of actions in the form of commodities which can be accumulated as wealth is a feature of any society based on the accumulation of wealth, and the use and production of things is an essential moment in the perception of labour activity. However, even though Marx does not say so, the units of analysis he uses in *Capital* are forms of *practice*, ($C \rightarrow M \rightarrow C'$) and ($M \rightarrow C \rightarrow M'$).

See my *Goethe, Hegel and Marx* (2016) for more on this.

Vygotsky's Thinking and Speech

It is generally agreed that Vygotsky used artefact-mediated actions as a unit of analysis across a range of studies. This claim is reiterated in significant works by A.N. Leontyev, Mike Cole and Yrjö Engeström, and is taken to be the foundation of activity theory. In the first chapter of *Thinking and Speech*, Vygotsky elaborated the idea of 'unit of analysis', but only in connection with 'word meaning', and explicitly had speech and not writing in mind. In *The Instrumental Method in Psychology* (1930) he distinguished between 'technical tools' (used for acting on nature) and 'psychological tools' (used for acting on the Mind).

So, Vygotsky identified three different kinds of artefact-mediated action:

- the spoken word (by 'word' is meant a sign for a concept),
- the psychological tool (sign, written word, map, diagram, ...) and
- the technical tool (the hand-tool is the archetypal technical tool).

Three types of artefact-mediated action, corresponding to the three types of artefact, have developed in the biological and cultural evolution of the human species:

- speech evolved in close connection with labour (i.e., tool use) in the early evolution of the species, and probably evolved out of manual sign use,
- (technical) tools developed in the course of evolution of the species and continue to develop culturally, but Vygotsky believed that tool use *led* speech development in human evolution,
- signs (i.e., psychological tools) developed as an outgrowth of the development of technical tools, although expanding the communicative function formerly belonging to spoken words and gestures. (See Chapter 12, this volume).

Formally speaking, speech is a sub-category of the use of psychological tools, the word a type of sign, but the two are markedly distinct *genetically*, in the evolution of the human species and in the development of the human individual. All children spontaneously master the form of speech which they find in their environment, but children have to be deliberately instructed in reading and writing. Although all human communities use tools of one kind or another, many communities have been illiterate. Writing is an invention of bureaucratic, class societies, although less developed forms of sign use (marking of land, cave painting, jewellery, ...) are ancient.

Tool use and sign use are closely interlinked in the development of human culture. In Vygotsky's aphorism: "in the beginning was the *tool*, but ... in the *beginning* was the tool." This developmental, genetic distinction between tool, word and sign is of primary significance for Vygotsky, rather than their all being categorised as artefact-mediated activity.

Words and tools play distinct, albeit interconnected, roles in human development. Vygotsky resisted the subsumption of words as a subset of artefacts, implicitly subordinate to tools, resisting the theoretical subordination of communicative action to the labour process. In this he was taking a stand against the Soviet orthodoxy in Marxist theory (see Blunden, 2014a). In the analysis of social history, technical tool development (the development of the means of production) leads the development of communicative action (the superstructure, cultural activity), but this is *relative*, not absolute, and certainly not the case in psychology. Tool use certainly leads the development of practical intelligence but not the intellect properly so called. Access to technical tools may widen the field of a person's activity and promote the development of social structures, and thereby promote learning, but it is only thanks to the use of signs, mainly words, that that wider field of experience may be productive of intellectual development. You may need a car to get to school, but you will only learn if you listen to what is said at school. My point is this: word meaning, psychological tool use and technical tool use are three *distinct* lines of artefact-mediated action.

As a unit of analysis, 'word meaning' is not itself an artefact, such as an entry in the dictionary, far less an entry in some neural look-up table. 'Word meaning' is an *action* in which the mediating artefact is a spoken word. 'Meaning' is the gerund of the transitive verb 'to mean', as in doing what you meant to do with a word. By 'word' is meant the sign for a concept, be it a phrase or a single word. No other interpretation of the term is tenable.

In Chapter 5 of *Thinking and Speech*, when Vygotsky discusses the experiments in which children constructed groups of blocks by referring to the signs written on the underside of the blocks, they were engaged in performing a concept, reified in the group of blocks gathered together by the sign-mediated actions of the child. Each action is a sign-mediated action, of the same kind as using a spoken word. All the actions taken together are an activity, a concept characterised by the criteria implicit in the mode of grouping blocks and *reified* in the blocks so grouped.

Now, 'meaning' *also* means that reified artefact, the relevant entry in a dictionary. But not only dictionaries – the entire mass of cultural artefacts in a language community constitute a reification of the meaning of the users of words (and signs) and constitutes a kind of 'living dictionary'. Words 'carry' a meaning given to the word by the entire cultural history of the community. It is well-known that misunderstandings can arise when someone hears a word and ascribes a meaning to the speech act which can *differ* from the meaning of the speaker. So, it is not the actual meaning (intent) of the action which *has effect* but the meaning implicit in the word (as spoken in its context, with the given accent, emphasis, etc.). Ultimately, it is the culturally determined meaning of the word, its use-value, so to speak, which is materially active in the action, whatever the speaker's intention. The listener in turn realises the meaning of the word in their own interpretation.

Vygotsky points out that word meaning is the unity of sound and meaning, of speech and thinking, of affective and intellectual processes, of generalisation and social interaction, of thinking and communication. And we must add also, a unity of the speaker's intention and the hearer's reception. A unit of analysis is a *concrete concept*, and as such, a concentration of diverse determinations, the contradictions between which unfold in the manifold phenomena under consideration.

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