

REVIEW ARTICLE

## “Scientific Psychology”- Some Epistemological Considerations

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### Abstract

Psychology has adopted a positivist framework established by Auguste Comte in which positive was identified with the scientific, and scientific with the discovery of natural laws. That humans are the creators of higher psychological functions and that the development of human beings is dialectic and therefore cannot be simulated by simple cause-effect understanding, should be underlined in an alternative epistemology for human beings. The approach taken in this article is that the elementary, ‘natural’ mechanisms would impede the development of psychological features because natural mechanisms are antithetical to cultural-psychological mechanisms and features. The only way that biological processes can participate with cultural processes is for them to bequeath their determining properties over behavior to culture, and for biological processes to recede into the background as a general potentiating substratum of human psychology, consciousness and behavior.

**Keywords:** *Biology, Culture, Higher psychological functions, Psychological epistemology.*

### Introduction

Contemporary psychological epistemology is inherited from the natural sciences. These sciences and their methods have become ideals for the social sciences, including psychology. It hardly existed a psychological science before the 20<sup>th</sup> century. The results from the natural sciences became evident in the 19<sup>th</sup> and especially in the 20<sup>th</sup> century and the methods and techniques for understanding the law of nature, including human nature, obtained a prestige in scientific psychology. Psychological research also inherited from the natural sciences the importance of quantification of variables. The expulsion of reflexivity on the side of subject matter has resulted in ‘the quantitative imperative’, an obligation commented on by Michell [1]: “There are different sources of fragmentation in psychology, but the quantitative imperative is certainly one of the strongest’.

Quantification is more than just a translation of qualities into quantitative data. It implies according to Porter [2] a moral and political philosophy required by modern societies closely related to one of the founding fathers’ of sociology and social psychology, Auguste Comte and his ‘positive science’. According to Comte, all sciences and scientific knowledge of nature, society and human beings had to pass through three stages; (i) the theological, (ii) the metaphysical, and (iii) the scientific or positive. Psychology could be

scientific only by treating social and psychological phenomena as objective “thing”. The new conception of science is deeply embodied in the cultural setting of the time of enlightenment and its demarcation from theology and metaphysic. In Comte’s [3] historical reconstruction, “the positive state” has completed the development of human mind and human history by overcoming the previous theological and metaphysical ones. Positive philosophy regarded all phenomena as subjected to invariable natural laws and the task in all sciences was to discover these natural laws. Also human psychology has to be studied by the same methods as used in natural science since there are general laws existing in all sciences, and the aim for the researchers is to reveal them by “positivistic” methods. Comte became a main contributor to the idea that the methods in the natural sciences had to be utilized by the psychologists if they wanted to be scientific.

Quantification has to be applied as a general strategy in building superior scientific cultures of objectivity, in contrast to the dominance of what has been called insecure and unpredictable subjective criteria. It was assumed that quantification as a way of knowing endorses objectivity [4]. The human sciences like psychology therefore adapted the empirical strait jacket borrowed from the old natural sciences, and the modern drill in mathematical statistics.

That linear mathematics and statistics also become tools for the social sciences and psychology in their struggle to become scientific and be accepted as evident. This eager to become scientific on the premises of the natural sciences and to adopt the paradigm of the sciences with so much theoretical and practical success is now dominating social sciences and psychology. Today the so-called “evidence based methods”, resting on a simple cause-effect dichotomy and with the randomized controlled experiment as the gold standard, maintain a particular epistemology in the social and human sciences and contribute to the “machine paradigm” (see below). Paradoxically, psychology has adopted for the most part of its history the framework which deprived it of specificity of its phenomena (subjectivity, intentionality, meaningfulness) [4]. Introspective psychology was ascribed to the unscientific past and with this change in the subject-matter - from consciousness to behavior - there was no place left at the level of subject-matter that could be a source of reflexivity.

## The Machine Paradigm and the Computer Metaphor

Social and cultural influences are essential to understand what is fundamental about the psychological ‘nature’ of human beings. However, this comprehension was not always thought to be the case. From the perspective of many scientists during the 20<sup>th</sup> century, the contributions of culture and the social world to psychological functions were neglected since social and cultural factors were thought to be of minimal interest with respect to the basic development, structure, or processes of the brain and mind following invariable natural laws [5]. Psychological functions and brain functions were comprehended as something developing from within and established in the genetic outfit and inborn brain, independent of cultural, environmental impact.

The dominant metaphor of the brain was the stand-alone desktop computer whose functioning relies on the set of information-processing operations implemented exclusively inside the machine. The sources of mind and behaviour were assumed to be located in the recesses of the individual brain.

Descartes’s idea of the brain as a complex machine culminated in our current idea of the brain as a computer and in localizationism. Mainstream psychology has relied heavily on these ideas [6]. Humankind as a machine became not only a metaphor, but a model. The analogy between a computer and the human brain became

even more accepted with cognitive psychology in the 1980s and it was strengthened by neurobiology/neuropsychology and brain research in the 1990s (the ‘decade of the brain’). According to this popular metaphor, information processing in a human mind is analogous to the information processing that takes place in a computer.

Gaining knowledge about complex living organisms by treating them and their context in this way give however distorted knowledge about real human beings and the paradigm has therefore been under attack in recent decades. The comprehension of the humans as a machine and the brain as a computer excludes the possibility for human beings to take an effective part in its own development, and it therefore cast out of psychology any self-determination approach. A machine is unable to develop in a dialectic manner, i.e. change its qualities, structure and functions as a result of impact from surroundings it has created. The distinction between living, human and inert entities is important and it might require a radically different epistemological framework to study humans than it does to explain a machine.

Kohler [7] comments on three mismatches between the “machine paradigm” and Homo sapiens. The machine model does not take into consideration the most important features of the living human: (1) the role of experience and memory, (2) its agency and (3) the plasticity (of the brain). The machine paradigm therefore does not offer a relevant frame for understanding human psychological functions. An alternative epistemological framework for understanding the psychology of Homo sapiens has to be established. Since an important purpose is to overcome the fragmentation and to study the ‘wholeness’ of humans in their development, a “systemic approach” focusing on inter-functionality between biology, psychology and culture and a dialectic or inter-functional development has been presented as an alternative.

Today we know that the brain is more like a computer’s software since it due to its plasticity is changing as a result of being used. Our genes and inborn qualities and instincts enable an adaptive and developing human brain, a cerebral structure that receives cultural impact and develop and increases its capacity by changing both structure and function. That human beings are able to change themselves is an important aspect making up the difference between inert and alive human entities. There are also other important differences between a machine (computer) and

human beings: Humans are creative and they have an active, purposeful perception.

## Creativity

Kohler [7] underlines that humans are generating their cultural context and able to change and create new environments with purposeful thinking and action. No machine can ever reach this ability and be creative in the human way. Humans are also the architects of higher psychological functions by forming a culture and environment that develop the mind and brain in turn. This inter- or bi-directional relationship between individuals and environment cannot be simulated by simple cause-effect processes. Vygotsky's [8] presentation of creativity and imagination is important to understand human beings. He explains how creativity works together with repetition and introduces creativity as a necessity for human survival. The dialectic or bi-directional understanding of human development and the focus on the repetitive and the creative, how humans relate to the cultural context, is crucial for understanding of human beings.

## Perception = Sense impression + Cognition

A human being is constantly creating (new) meaning to sense impressions. Perception, giving meaning to sense impressions, is a fundamental capacity of humans we do not find in a machine or in other animals to the same degree. The human brain cannot give any (cognitive or emotional) meaning to sensations, for instance the visual impressions, without input from the mind.

The same sense impression, for instance when watching another person's activity, releases different understanding, consideration and cognizing in different situations, from time to time, and from person to person. The 'fundamental attribution error', a tendency to explain others' behaviour as arising from dispositions (personality) while neglecting situational causality, is for instance more pronounced for Americans than for members of other cultures. South and East Asians give more weight to situational factors in explaining the causes of people's actions [9].

People evaluating the same sense impression in psychophysical studies do not see or hear the same. They very naturally interpreting the same sense stimulus, for instance a color or a sound, in different manners and give it different meaning, depending on cultural distinctiveness and their subjective, personal experience stored in their mind and memory. This fact was actually looked

upon as a problem by some (machine) psychologists at the turn of the 20th century, and introspection, or subjective experience, was declared non-scientific. But introspection has to be at the core of every psychological methodology. It tells what people actually feels, thinks and do, the main subjects of human psychology.

## Evolutionary and Cultural Approach

Two perspectives dominate current thinking about human similarities and differences: an evolutionary perspective, emphasizing how biology and human kinship makes us similar, and a cultural perspective that emphasises how cultural impacts make us diverse.

Evolutionary psychology has by somebody been looked upon as a modern variant of the deterministic machine paradigm since living species' behaviour, human beings included, is steered by the "selfish gene" only "interested" to reproduce itself. Intentional or conscious behaviour is looked upon as an illusion. According to evolutionary psychology we are ruled by the genes motive to reproduction. Our psychological makeup, our anxieties, worries and happiness is inherited and determined by the genetic selection process in the past. This understanding of human beings is however wrong. There is no genetic determinism that can account for all changes in living beings, and the changes in individuals represent a space of freedom before the surviving comes into play to keep some of the creative changes and eliminate others. Also in the nature (and of course in the culture) there are indetermination governing and deciding the development processes. First comes the variation in human individuals, either deliberately or accidental, and then the selection. It is possible to think and behave consciously in a way that has a greater possibility to survive and to spread the genes to the next generation and this mechanism has consequences for the content of evolutionary psychology.

Human beings develop from a biological organism into cultural individuals. They are permanently changing. Qualities are transformed, reshaped and new patterns or configurations are created all the time, both in the mind and in the brain. Separate elements which intervene create new elements, functions and phenomena and they again influence each other. Old functions or elements, for instance biological instincts, are still part of a human being, but the elements have changed to another form, with another meaning and signification in the mind as well as in the brain. The machine paradigm and the computer metaphor cannot explain this kind of development



and do not offer a relevant frame for understanding how and why humans develops in this way. To clarify how biology, culture and mind interact in a dialectical, developmental and inter-functional manner is a significant task for an understanding of human developmental psychology.

An epistemology based on human beings as machines and their brain's as computers has to be rejected. There is however, a distinction between the "machine paradigm" and the "natural scientific paradigm". Psychology should be inspired by recent natural sciences, both their theories and methods. Theory of relativity and "chaos" theory are both different from the Newtonian deterministic mechanics, and especially chaos theory underlines a particular kind of indetermination [10].

### The Western Way

The machine/computer paradigm and the non-dialectical way of thinking is a typical Western way of reason. It is based on Western philosophy and epistemology emphasizing a simple, deterministic world, focusing on salient objects instead of dialectical relationships. In this Western epistemology there is also a prohibition against contradictions [11, 12]. There is no place for quantitative development creating qualitative changes and a new inter-functionality when combining components. Contemporary human sciences have inherited the Western focus on analyzing single elements or variables. They are knitted together in an additive or interactional way by multivariate statistics and linear mathematics, and this represents a mechanistic way of constituting a human being, not a dialectical or 'organic' way. The East Asians on the other hand believe in interdependence, constant change and contradictions. In the East Asian epistemology the part cannot be understood without understanding the whole. Confucians believed, far more than the intellectual descendants of Aristotle, in inseparable connectivity and also malleability of human nature depending on the context. The world was too complex and interactive for independent categories and strict rules to be helpful for understanding objects and controlling them, according to East Asian philosophers and scholars.

Another research tradition characterizing mainstream psychology in the West has been dealing with individuals without reaching them: psychology of inter-individual differences [13]. Psychology has according to Jaan Valsiner invested the most rigor in measurement of

differences between individuals and instead of deepening insight into concrete individuals. This tradition has favored looking at as many as possible individuals and focusing on common traits or factors underlying the differences. In this way psychology substituted concrete individuals for mass of individuals and it could still pretend dealing with individuals but this time dealing with de-individualized subjects [4].

### The Neurological Fallacy

The brain is the most significant tool in carrying out our psychological tasks. We can say that the brain is a central mediator in all psychological functions [14]. However, the psychological functions cannot be reduced to the brain, even if the brain is necessary for them being performed. The brain does not attend, think, feel, remember or act. Only human beings do these things, and although they could not do them without their brains, this does not mean that the brains are doing them. The fallacy of reducing psychological phenomena to brain processes arises from a misguided metaphysics, deeply entrenched in Western thought, which is the tendency to suppose that 'what anything is' is identical (in the very strongest sense) with 'what it is made of' [15]. If the mind exists, so it goes according to this misguided metaphysics, it must be made of physical matter (the brain), for anything in the universe is material, and mental predicates must thus be ascribable to the brain, if anything. Understanding that the mind is not a thing but skills and dispositions should according to Brinkmann [16] enable us to overcome this metaphysics.

### On Psychological Systems and Inter-Functional Connections

Cultural-historical psychology represents a dialectical and inter-functional understanding of human development. It focuses on how humans' higher psychological functions are created and how they relate to lower functions (biology) and the cultural context. These interrelations are crucial for an understanding of human development. Analysis of developmental processes allows us to understand the interaction between biological predispositions and environmental information with respect to the initiation of culturally informed developmental pathways. The biological heritage and the cultural present are components of the same developmental processes. Culture does not simply regulate natural processes; it also develops and makes available psychological tools that transform lower elementary processes and creates all higher psychological functions [17].

A pervasive aspect of human life is the use of psychological/cultural tools to improve specific psychological functions, for instance the memory function. If we cannot use the brain to remember particular details (e.g. birthdays), we may use a mediating notebook instead. We use different sorts of cultural or psychological tools and cognitive technologies, glasses, pencils, calculators, computers and books to carry out numerous tasks more efficient. This allows us to “supersize our minds” [18]. Such psychological tools mediate the mind’s functions in the Vygotskian perspective [19].

Cultural-historical psychology also dealt with the concept of inter-functional connections, and how development can be understood as modifications and changes of relationships between functions. It is the “inter-functional structure” that matter, in making new functions and not changes in functions themselves:

“What is changed and modified are rather the relationships, the links between the functions. New constellations emerge which were unknown in the preceding stage. That is why intra-functional change is often not essential in the transition from one stage to another. It is inter-functional changes, the changes of inter-functional connections and the inter-functional structure that matter. We will call the development of such new flexible relationships between functions a psychological system, giving it all the content that is usually attached to this, unfortunately, too broad concept” [20].

To understand the nature of human beings and their development means to clarify the relationship or inter-functionality between contributing factors and ingredients. The mystery of man is not revealed by studying each ingredient separately, but by focusing on the relationships between the building blocks, and how these elements are changed and becoming something else and typical human when combined. There are in particular three relationships which are important for the psychology of man: the inter-functionality between nature and nurture, i.e. between biology and genetics on the one hand and culture and environment on the other. How these two components are related and function when they are combined is crucial for an understanding of human and human development. The other relationship is the one between the brain and the mind, how human consciousness and psychological functions are related to the structure and function of the biological brain. The

third relationship defining human beings is how culture interacts to both mind and brain, the

mind-brain-culture inter-functionality.

The inborn abilities and the capabilities acquired by being a cultural being make humans different from both (other) animals and machines. The ability to think using a language is crucial in this regard. Neither animals nor machines have this capacity. Human’s have developed phylogenetic to acquire particular biological characteristics like the voice-tube and a big brain. These biological capacities are crucial in the ontogenetic development for every individual in a cultural context. Human’s psychology can only be understood by revealing the development of their higher psychological functions, both phylogenetic and ontogenetic, and how they are created by biology and culture.

### Inter – Functionality

The concept of inter-functional connections and how development can be understood as modifications and changes of relationships between functions are essential when explaining human psychology. In each stage of development there are a unique and changing set of relations. New constellations emerge which were unknown in the preceding stage. That is why intra-functional change is often not essential in the transition from one stage to another. It is the changes of inter-functional connections and the inter-functional structure that matter. The principle of inter-functionality and the system structure of higher psychological functions is a principle for modern neuropsychology when describing development and plasticity of the brain and how brain and mind interact [21].

Mind does not consist of special processes which supplementarily exist on top of and alongside the brain processes, but as the subjective expression of the same processes, as a special side, a special qualitative characteristic of the brain functions. The brain is on the other hand a special side of the psyche and its capacity is a function of the mind. The psychological functions and processes can only acquire its meaning and sense when integrated with the psychophysiological processes in the brain, and vice versa. The insolubility of the mental problem for the older psychology resided to a large extent in the fact that because of its idealistic approach the mental was torn from the integral process of which it forms a part. The understanding of inter-functionality arrive therefore at the recognition of unique psychophysiological unitary processes representing the higher forms of human

psychology and behavior, in contradistinction to physiological processes and lower psychological functions .

The approach to psychology has to be fundamentally inter-functional and systemic. That means an epistemology that simultaneous search for (i) elements of a structure, (ii) relationships and emerging wholes, (iii) and their development. Since humans have acquired language and are characterised by the language function this approach has to focus on a unified understanding of the human culturally shaped mind as a semiotically mediated functional system. Different levels of explanation must be dealt with in explicit complementary relationships and the unified understanding at each level of explanation has to be related to the systemic properties of a whole. No analytic study can make sense unless conducted with an understanding of the place each element has in the totality. The inter-functional, dialectic and systemic approach seeks understanding of the mind from biological, psychological and socio-cultural perspectives simultaneously. The idea of “functional systems” is an important point in this regard. The important aspects of psychological functioning are not domain specific but shows wide generality realized in conscious awareness of the cognitive processes and ability to voluntarily modulate them. The ideas about functional systems have been subsequently elaborated also in the neuropsychological domain.

Two more specific relationships are of particular interest when dealing with human development. These are (1) the inter-functionality of language and mind; and (2) the inter-functionality of language and the brain, i.e. how the higher psychological functions based on language ability

are affecting and stored in the brain and how the brain affect the language function. To describe and explain these inter-functionalities and interactions, how they affect mind and brain and are depending on cultural impact, has to be the epistemological focus for psychology.

A human being is biologically prepared but fully completed only through cultural participation. The environment enters the brain through the senses and the ‘pure’ sense impression in all animals, including human beings. Humans are, however, affected by a “second system”, the culture and cultural tools like language, signs and symbols which influence the mind and the brain and create the higher psychological functions characterizing human beings. Semiotically culture has to be transformed into language, signs or symbols before it can enter the brain and mind and create an individual.

The inter-functionality of mind and culture has been revealed by cultural-historical psychology for 100 years and recently the inter-functionality of culture and brain in human beings has become an essential and a frontier for cultural neuroscience. During the last decades there has been referred to empirical evidence for this approach and also presented theoretical ideas and insights to illuminate the inter-functionality between mind, brain and culture. This material illustrates how to tackle the long-standing question regarding the extent to which a person’s mind and brain function is determined by genetic background (nature) or/and by experience (nurture). The specific interpretation of the empirical evidence of relationship between mind, brain and culture is colored by a more general view on the nature of the human species and especially the importance of the genetic outfit and culture respectively.

## References

1. Michell J (2003) The Quantitative imperative: positivism, naive realism and the place of qualitative methods in psychology. *Theory & Psychology* 13(1):5-31.
2. Porter T (1995) *Trust in Numbers: the Pursuit of Objectivity in Science and Public Life*. Princeton, NJ: Princeton University Press
3. Comte A (1853/2009) *The Positive Philosophy of Auguste Comte*; 2 volumes; Chapman, 1853 (reissued by Cambridge University Press, 2009).
4. Jovanovic G (2010) Historizing epistemology in psychology. *Integr Psych Behav*. 44:310-328.
5. Zhou H, Cacioppo J (2010) Culture and the brain: Opportunities and obstacles. *Asian Journal of Social Psychology*, 13(2):59-71.
6. Block, N (1995) The mind as the software of the brain. In *Thinking*, Vol. 3, 2nd Edn, EE Smith & DN Osherson, (Eds.), Cambridge, MA: MIT Press, 377–425.
7. Kohler A (2010) To think human out of the machine paradigm: *Homo ex machina*. *Integrative Psychology and Behavioral Science*, 44:39-57.
8. Vygotsky LS, Luria A (1930/1993) *Studies on the history of behavior. Ape, primitive, and child*. Hillsdale, NJ: Erlbaum.
9. Nisbett RE, Masuda T (2003) Culture and point of view. *Proceedings of the national academy of sciences*, 100(19):11163-11170.
10. Kolstad A (2010) Time for paradigmatic substitution in psychology. what are the

- alternatives? *Integrative Psychology and Behavioral Science*, 44:58-64.
11. Kolstad A (2012a) From the machine paradigm to brain plasticity and how culture overrules biology in humans. *Psychology*, 3(9):691-697.
  12. Kolstad A (2012b) Inter-Functionality Between Mind, Biology and Culture: Some Epistemological Issues Concerning Human Psychological Development. In M. L. Seidl-de-Moura (Ed.) *Human Development - Different Perspectives*, Ch. 2, pp. 19-41, InTech, ISBN 978-953-51-0610-4.
  13. Valsiner J (2009) Integrating psychology within the globalizing world: A requiem to the post-modernist experiment with *Wissenschaft*. *Integr Psych Behavior*, 43:1-21.
  14. Kitayama S, Uskul AK (2011) Culture, mind and the brain: Current evidence and future directions. *Annual Review of Psychology*, 62:419-449 DOI: 10.1146/annurev-psych-120709-145357.
  15. Coulter J, Sharrock W (2007) Brain, Mind, Human behavior in *Contemporary Cognitive Science: Critical assessments of the philosophy of psychology*. Lewiston: Edwin Mellen.
  16. Brinkmann S (2011) Towards an expansive hybrid psychology: Integrating theories of the mediated mind. *Integr. Psych. Behav.* 45:1-20.
  17. Ratner C (1994) The unconscious: A perspective from sociohistorical psychology. *J. Mind and Behavior*, 15:323-342.
  18. Clark A (2008) *Supersizing the mind: Embodiment, Action, and Cognitive Extension*. Oxford: Oxford UP.
  19. Wertsch JV (2007) Mediation. In H. Daniels M Cole, & JV Wertsch (Eds.), (pp. 178-192). Cambridge: Cambridge University Press.
  20. Vygotsky LS (1982) *Vosprijatie i ego razvitije v detskom vozraste*. In Vygotsky, L.S. *Collected works*. In 6(2):363-81. Moscow: Pedagogica
  21. Akhutina TV, LS Vygotsky, AR Luria (2003): *Foundations of neuropsychology*. *J. Russian and East European Psychology*, 41(3/4):159-190.