

# The Anthropological Aspect in the Comprehension of Machinery

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**Abstract.** The authors of the work substantiate the necessity for specifying the role of tool concepts in the world landscape, seeking for various methods of their identification. From the standpoint mentioned, special attention is drawn to metaphors and figurative comparisons, including the names of various tools. We prove that body parts and functions, underlying the metaphoric names of tools and their components, remain important for comprehending the present-day machinery and its further technical development. The paper contains an extensive theoretical study of hypotheses and philosophical doctrines, explaining the origin of work tools and the principles of their operation through their similarity to human organs. The theoretical conclusions of our research are complemented and illustrated by numerous examples, borrowed from literary works of Russian and Soviet poets and writers.

## 1. Introduction

The article is dedicated to the analysis of the language expression of mental concepts of similarity between humans and technical devices. In this paper, we study image reinterpretation, revealing the anthropocentric nature of mechanisms in historical dynamics. The material of the study included the nouns of the Russian language, denoting various tools, from the most primitive ones, invented in ancient times, to sophisticated units of our days. We have analyzed multiple examples of their use in the works of Russian writers, materials of journalistic nature, folklore sources, as well as in the National Corpus of the Russian language.

## 2. Methodology

In the process of study, we have employed the following methods: 1) the method of contextual analysis; 2) the method of corpus linguistics; 3) the method of introspection.

## 3. Discussion

From ancient times, a man tried to transform the surrounding reality, purposely developing and improving a variety of functionally different mechanisms and devices. The question of what motives guided the person in its creation, has been discussed by various scientists. The comprehension of machinery began from anthropocentric interpretation.

One of the popular hypotheses of the origin of primitive machinery is the principle of organ projection, marking the emergence of the philosophy of machinery, allegedly introduced by E.Kapp. Its essence consists in the following. Proceeding from the fact, that, at the dawn of civilization, people structured the space on the basis of their inherent physical properties and actions, E.Kapp suggested

that work tools were also created by a man, largely taking his own nature as a basis, by imitating his own organs. This idea is based on direct observation.

For example, in all possible positions of human upper limbs, we recognize the prototypes of tools, necessary for survival. Namely, a handle of a makeshift hammer was an extension of a hand, while a primeval hammer itself replaced a fist. Spades, rakes and ploughs had their own prototypes, namely, hand wrists, palms and fingers with horny coverings of ends, i.e. nails, so convenient for earth works. At the time, the ability of teeth to tightly grip resulted in the idea of inventing tongs, while their crumbling ability underlied the invention of a saw. The lower limbs of humans (legs, etc.) also played their role in modeling work tools (Kapp, 1925: 95-104).

This proposition is substantiated by numerous examples in the nomination of the simplest devices. Let us note, how words, naming the parts of a human body, are able to be mentally transferred to work tools, owing to their similarity in appearance. For example, pliers have «lips» or «cheeks», rakes have «teeth», while a hammer has a «head». The part of an axe, supporting its handle at the front is a «beard» or a «tongue». Among the technical terms, it is easy to find such nominations as «neck», «hair», «tooth», «throat», «ear», «head», «shoulder», «fist», etc.

Let us give examples, borrowed from literary works, in which human characteristics are attributed to work tools. For instance, the parts of some tools are called «teeth» (in Russian, *zuby, zubtsy, zubchiki*), whose shape and function have been conceived and modeled, for example: 1) *Шла борона прямехонько, да вдруг махнула в сторону – На камень зуб попал!* (*The harrow went straight, but suddenly skewed; the tooth bumped against a stone*) (N.A.Nekrasov, *Who is happy in Russia?*); 2) *Мужик стоял уже в пяти шагах, сжимая в руках короткие четырехзубые вилы* (*The man was already five steps away, clutching a short four-pronged pitchfork in his hands*) (S.Babayan, *Captain Nezhentsev*); 3) *Два ряда острых зубов блеснули, как зубья пилы* (*Two rows of sharp teeth sparkled like saw teeth*) (M.Tyrin. «It will hurt a little»).

We have noticed the similarity between the outlines of work tool parts and a nose: *Захарыч воткнул носом топор в бревно, которое тесал* (*Zakharych stuck the axe nose into the log he hewed*) (S.Loginov, *The Joseph's Workshop*).

The analogies with hands are drawn. *Эка, брат, руки-то у тебя - грабли!* (*Your hands are much like rakes, buddy*) (E.I.Zamyatin. Rus). *Мужики покренче берут вилы трехрогие с длинными рученками и подают солому наверх* (*Stronger men take three-pronged pitchfork and lift the straw upwards*) (A generalized essay. Timofey and Four Sons).

A foot contour is compared to a spade handle by external parameters. *В центре двора была воткнута одноногая лопата, давно забытая и никому не нужная* (*In the centre of the yard, a one-footed spade was stuck, long-forgotten and unwanted*) (V.Povalyayev, *The Bullfight on Friday Evening*).

Despite the presence of numerous examples, there is still no consensus on the philosophical doctrines of E.Kapp. Many of his ideas are either developed and advanced by such scholars as R. Boyle, I. Newton, E. Jur, or refuted, for example, by P.K. Engelmayer.

From the viewpoint of the latter one, the idea of organ modeling as a basis of creating mechanisms is applicable to certain prehistoric work tools only, which can be viewed as a projection of our limbs. «With reference to an arrow, the principle of E.Kapp is called into question, while a cart wheel does not even have a prototype in an animal organism, hence, the principle of organ modeling is not at all applicable to a machine» (P. Engelmayer, 1912: 120).

In this paper, we decided to examine whether the principle of anthropocentric interpretation is applicable to explain the creation of higher-level machines, and whether this theory can exist in the modern world.

It is generally known that, with the progress of society, work tools, devices and mechanisms have been growing more sophisticated. Mankind advanced to a more civilized society, the range of handy tools was expanded, and newer intricate devices appeared, whose association with human movements and appearance is not so obvious. However, in this case also, some parallels can be drawn.

The cases of a man, associating the simplest device with himself, the «attribution» of his own functions and anatomical structure to it, can also be found with reference to sophisticated devices. For example, as P.A.Florensky notes, even more advanced devices and mechanisms have purposes, similar to those of organs, are designed to solve a specific task in response to a specific need, and their similarity is due to their function. It is not superficial, therefore, there is always morphological similarity between them.

The article presents the following examples. The projection of a palm is an iron, eyes have resemblance to a magnifier, homeothermy is compared to a thermostat and bones are a prototype of reinforced concrete structures. A telescope, a piano and an organ are imperfect projections of an eye, an ear and a throat, respectively. The human nervous system is modeled by telegraphic cables and electrical networks.

In response to the objection that not all tools are organ projections (e.g. a wheel, a propeller, a dynamo), the philosopher replies: «Not all our organs or their structure are known to us either, some of them do not manifest themselves or are rudimentary, that does not prevent their projection, even in case it is not conceived. That is why, it is absolutely possible that, among the mechanisms, we can find those tools, whose organic prototypes have not been found yet» (Florensky, 1999:152 - 161).

A more modern counterpart of «organ projection» is the concept of «human external extensions» by McLuhan. The important theme of his book is the idea that all technologies are extensions of our bodies and feelings, aiming to increase energy and boost speed. The main feature of all work tools and machines, saving of gesture, is a direct manifestation of any physical pressure, making us to protrude or extend ourselves. A man can reflect this aspiration both by ploughs and by locomotives.

Unlike simple work tools, enhancing the gesture, a machine is an «explicitation» of internal processes. Electricity is taken as an example, which, like a brain, is a means of making contact with all facets of being at once. A microphone and a telephone are also viewed as a product of numerous attempts to reproduce the physiology by human means, modeled in the image and likeness of the human mouth and ear structure, improving and sophisticating the ear and voice. An ear can also be correlated with a radio, deciphering radiomagnetic waves and reciphering them into sound, while voice is compared to a radio transmitter, able to convert sound into electromagnetic waves. In the course of everyday use of technology (i.e. its body, extended by all possible means), a man is constantly modified by it and, in turn, finds ever new ways of its further improvement (G.M.McLuhan, 2003: 56).

In later works, we come across the opinions that a human eye could probably serve as a prototype of optical devices, for example, it is similar to a camera in its design. The stethoscope was created to enhance the function of an ear, while a pump works on the principle of cardiac activity.

A car is also seen as a living organism, for example: *Автомобиль – как лакмусовая бумажка, проявляющая истинное содержание – душевный мир ее хозяина, черты его характера и подлинный темперамент. У машины – лицо и тело ее хозяина (A car is like a litmus test showing the true content, the inner world of its owner, the traits of his character and genuine temperament. A car is a face and a body of its owner)* (V.Bagrov. Next). *Понимаешь, Глаша, этот автомобиль – личность, джентльмен, он красив, интеллигентен, престижен, наконец экономичен и романтичен одновременно (You know, Glasha, this car is a personality, a gentleman, it is handsome, intelligent, prestigious, and, finally, economical and romantic at the same time)* (A. Danilova. Lonely nights together). It became classical to compare a heart to an engine. *Первым делом автослесарь слушает, как работает мотор - сердце автомобиля (At first, the car mechanic listens to how the motor, the heart of the car, works)* (G.Shalaeva. The big book of jobs). *Броня моя – кожа, изъедена ржой. И двигатель-сердце, как будто чужой (My skin is my rust-eaten armour, a motor, my heart, is somewhat alien)* (A.Levitsky. Technodarkness). A car is vested with its own life through reference to its breathing ability: *Мерно, медленно отдавались из глубины вздохи машины (The machine sighs echoed from the depths in a regular, slow way)* (I.Bunin. A Scream). Almost its every system can find its counterpart in the human body. A car body copies a «corpus», while wheels are «feet». We can see the similarity between the car's exterior design and the human mouth, where

headlights are «eyes», taking account of their position and pair-type nature, and a bumper is a «mouth». *Вот уже сто лет, как в нашем городе ездят машины, но у них почему-то очень грустные фары-глаза (For the past one hundred years, cars have been going in our city, however, their eye-type headlights are somehow really sad)* (R.Blavo. Parables, bringing health and happiness).

Let us give opinions on the fact that even the most modern computer technologies are, in their essence, «human-dimensional». There is an assumption that a professional invented a computer, based on the model of self-consciousness; that is, long-term and short-term memory were prototypes of soft and hard disks, respectively, and the images, arising in our mind, were the basis of monitor images. *Компьютер, безусловно, обладает встроенным интеллектом. Человек и компьютер как бы составляли одно целое, один огромный мозг с интеллектом Франсуа и возможностями машины (A computer surely possesses the in-built intelligence. A man and a computer somewhat formed a whole, one giant brain with Francois's intelligence and capabilities of a machine)* (G.Maksimovich. A phrase from a diary).

Let us present other examples from literary works, in which various devices and mechanisms resemble a man. For example, the engine of an aircraft is compared to a head. *Над одной шестой в небо ввинчивал с грохотом нимбы свои двухголовый святой (Over one-sixth, the two-headed saint screwed its halos into the sky with a roar)* (J. Brodsky. Night Flight). A microphone resembles a throat: *Он бальзамом мне горечь вливает в микрофонную глотку мою (He is pouring, like balm, bitter gall in my microphone throat)* (V.Vysotsky. The Song of a Microphone).

The question also arises of the opposite effect of technology on humans. According to E.Kapp, a man conceives himself on the basis of devices, invented by him, applying the created environment to himself as a measure. A «mechanism», created by the organic sample, serves to explain and understand the «organism», to which it owes its origin (Kapp, 1925: 95-104). The «thingness» of human body parts allows for the operation of two-way transition, i.e. the body representation in the «corporeal» code and the representation of things in the «quasi-corporal» code (Toporov, 1995:14).

Here are some examples of analogies between the outlines of people and work tools. *А у этой Любки бабка была длинная и худая, как вилы, белая (This Lyubka had a grandmother, tall, thin and white, like a pitchfork)* (M.Gigolashvili. A Ferris wheel). *Купец Рябинин плоскотелый, как лопата (The merchant Ryabinin had a flat, shovel-like body)* (V.Y.Shishkov. Ugryum River). Human actions are also comparable to tool work, for example: *Как тяжкий плуг, проходишь ты (You are passing like a heavy plough)* (M.M. Prishvin. Diaries). *Ну, чего встал как врытая соха? (Why did you stand up, like a dug-in plow?)* (M.S.Sholokhov. Virgin Soil Upturned). *Вот она: стоит распольней, словно вилы, которыми сено на стог подают! (Here is she; standing spreading-wide, like a pitchfork, serving hay into the stack)* (M.E. Saltykov-Schedrin. The Old Times of Poschekhonye. Nikanor's Being).

Certain body parts bear resemblance to primitive devices. An arm becomes the object of comparison. *Он запустил руки, как вилы, в сани и выбросил на снег кучу грязнейших лохмотьев (He dipped his pitchfork-like hands into a sleigh and threw a pile of filthy rags into the snow)* (V.Y.Shishkov, the Lake of Peipsi). *Замерзаем. Руки как грабли (Getting frozen. The arms are like rake)* (M.M. Prishvin. Diaries). *Рука на ощупь оказалась крепкая, шершавая и твердая, как лопата (By touch, the arm appeared to be strong, rough and firm, like a spade)* (A. Gelasimov. The Steppe Gods). *Руки у нее были сильные, что клещи - из них никогда ничего не\_выскальзывало (Her hands were strong like tongs, nothing could slip out of them)* (G.A.Galakhova. A Small Light Boat – A Cabbage Leaf).

The parts of arms are also reconceived. *Громадная костяная кисть, на тонкой высохшей кости, поистине напоминала грабли (A huge bony wrist upon a thin dried bone really resembled a rake)* (G.I. Uspensky. The Unbroken Ties). *Он залез на кобуру широкой, как лопата, ладонью (He reached the holster with his arm, wide, like a spade)* (S.Babayan. Gentlemen Officers). The actions of tools and people become the object of comparison. *Ядреные заскорузлые пальцы взяли, стиснули сзади его локти, стиснули, как плоскогубцы (The large hardened fingers took and squeezed his*

*elbows from behind, like pliers*) (M. Sholokhov. *Virgin Soil Uplifted*). *Его пальцы, как железные клещи* (*His fingers are like iron tongs*) (A. Mariengoff. *My age, friends and girlfriends*).

Feet are seen as similar to tools. *Желание иметь маленькую ногу, изогнутую, как серп, сделалось своего рода манией* (*The desire to have a small leg, curved like a sickle, became a kind of mania*) (V.D.Cherevkov. *Along the Chinese Coast*). *Ноги, привыкшие бить по лошадиным бокам, какие-то выгнутые, похожие на железные клещи* (*The feet, used to beat on the horse's sides, are somewhat curved, similar to iron tongs*) (V.V.Vereschagin. *The year of 1812*). *Ее колени, словно клещи, обхватывают голову Виолет и резко тянут ее вниз* (*Her knees, like tongs, clasp the Violen's head and sharply pull it downwards*) (B. Verber. *The Mirror of Cassandra*).

A face is associated with tools either. *Курносое лицо его плоско, точно лопата* (*His snub-nosed face is flat, like a shovel*) (M. Gorky, *In the World*). *Желтое продолговатое лицо Шауро было точно как эта лопата* (*The yellow oblong face of Shauro was exactly like this shovel*) (G.Y.Baklanov. *The life, gifted twice*). *У него было очень обыкновенное лицо, каких много, не выражающее ничего, как лопата* (*He had a very ordinary face, of which there are many, not expressing anything, like a shovel*) (I.A. Goncharov. *The Pallas Frigate*). *Один высокий, худой, и морда худая и костлявая, узкая, как топор* (*One is tall and slim, with a face, thin and narrow, like an axe*) (Y.Verov. *Never response to strangers*).

By means of the «weapon» metaphor, facial features can be demonstrated, e.g. *Я вспоминаю серп ее бровей* (*I remember the sickle-type curve of her eyebrows*) (V.Y.Yan. *Chingiz-Khan*). *Борода моя – лопата* (*My beard is of a shovel type*) (A.Belyi. *The Village*). *В переулке около кафе-мороженого гортанные кавказцы с усами будто ножницы и плоскозубцы торговали дивными розами* (*In the lane, near the ice-cream parlour, guttural Caucasians with moustaches, like scissors and pliers, sold marvelous roses*) (O.Slavnikova. *A Dragonfly, Enlarged to the Dog's Size*). *Нос с подбородком, словно щипцы, которыми щелкают орехи* (*The nose with a chin resembling the tongs for nut cracking*) (N.V.Gogol. *Night on the Eve of Ivan Kupala*). Teeth also become the object of comparison, e.g. *Зубы были стиснуты, как клещи* (*The teeth were clenched like ticks*) (I.A.Bunin. *The Spring Evening*).

A man associates himself with even more complex devices. Many centuries ago, the idea of a man, being a machine, became popular. R. Descartes was one of the first to express the idea of human mechanics. He used the clock metaphor to describe the human body, where the heart is the main spring of the machine, and the soul is the light fixture.

In the recent past, Soviet people were understood as «cogs» in the state machine. When controlling this mechanism, the party apparatus had to firmly hold the helm, correctly use political levers and drive belts, timely press the pedals and press the drive springs. In certain cases, to maintain the operability of the examined «mechanism» (that is, the Soviet people, the builders of communism and the fighters against world imperialism), one has to «tighten the screws», replace rusty and outdated parts, repair «engines», «gearboxes» or other quickly wearing machine parts. A man could also be understood as an autonomous mechanism that was given «steel wing-like arms» and «a fiery motor instead of a heart». This mechanism needed refueling and recharging. However, it might fail or even burn out (Chudinov, 2001: 162-170).

Nowadays, it is becoming a common thing to compare people and cars. *В представлении большинства наш организм – словно автомобиль, способный проехать 100 тысяч миль без ремонта* (*In the view of most people, our body is like a car capable of driving 100 thousand miles without repair*) (D. Buttner. *The Rules of Longevity*). Here is how the car's work is compared to the one of the human circulatory system. *Механик может сказать, что машина в прекрасном состоянии и не нуждается ни в каком ремонте. Но в бензобак может попасть небольшое количество грязи. Через двадцать четыре часа эта грязь достигнет трубки, которая ведет к мотору. Грязь может заткнуть ее, и бензин не будет проходить по трубе. Мотор заглохнет. Именно это иногда и происходит во время сердечных приступов.* (*A mechanic can say that the machine is in excellent condition and does not need any repair. But a small amount of dirt can get into the petrol tank. Twenty-four hours later, this dirt will reach the tube leading to the motor. Dirt*

*can plug it, and petrol will not pass through the pipe. The motor will stall. This is what sometimes happens during heart attacks).* (F. Kernet. Stress and our heart).

It has long been a tradition to compare the operation of the brain with the one of a computer: *Голова работала, как компьютер. Кровь бежала по жилам, как электричество по проводам* (*The head worked, like a computer. Blood ran through veins, like electricity did through wires*) (A.Ivanov. The Cynoccephali). *Мистер Хеллман был глубоко законопослушный гражданин своего отечества, как компьютер, начиненный всевозможными инструкциями, правилами и сводами законов* (*Mr. Hellman was a deeply law-abiding citizen of his fatherland, like a computer stuffed with all kinds of instructions, rules and codes of laws*) (M. Valeeva. Kusaki, the Red-Haired Demon). *Миша был внутренне пуст, как компьютер, лишенный программы* (*Misha was internally empty, like a computer devoid of a program*) (E.Radov. The Snake Sucker). *Мысли были холодные, безэмоциональные, как будто компьютер внутри файлы гонял* (*The thoughts were cold, unemotional, as if the computer was scrolling files inside*) (A. Mazin. The Barbarians). *Она посмотрела на него как-то странно, будто он был компьютером с зависшей программой, перезагрузка не помогла* (*She looked at him in a strange way, as if he was a computer with a still program; the reboot did not help*) (T. Ustinova. Always say: «Always»).

The following analogies are also known: *У меня глаз как рентген, сразу просвечиваю все платья насквозь* (*My eye is like an X-ray, scanning all dresses through at once*) (M.Chulaki. The Primus Stove). *Все равно глаз – как машинная фара, она не любила украшений* (*All the same, an eye is like a headlight, she did not like jewelry*) (I.Muravieva. Philemon and Bavkida). *У нее глаз как бинокль* (*Her eyes are like binoculars*) (A.Zaytsev. The Secrets of Evolution). *Молодая крепко, словно утюгом, погладила его по голове очень горячей ладонью* (*A young lady firmly, somewhat iron-like, stroked his head with a very hot palm*) (I.Muravieva. The Evening in the Cherry Orchard). *Очень трудно не впасть при этом ни в какую настроенность, а остаться холодным и точным, как фотоаппарат* (*It is very difficult not to lapse into any kind of mood, remaining cold-blooded and correct, like a camera*) (M. Zemskaya. The Meridian Point).

#### 4. Results

In the contemporary world, the equipment is certainly created on the basis of the advancement level of engineering science and technical knowledge. The shape of most modern inventions and the figure of the human body have very little in common; in the similar way, the correlation of a person with things through gestures is becoming less obvious. Technical inventions have become more refined and perfect than their organic counterparts. It takes more time to master and understand the logic and principles of its operation.

There is no doubt that sophisticated devices are getting farther away from the human world in terms of size and scope of their properties. For instance, the average user of a personal computer hardly sees the analogy between the brain and a high-tech device, whose operation is invisible and not understandable to him. When an object reaches a certain level of complexity, a man finds it difficult to conceive all the proposed functions of units, especially in their relevant device, hence, he hardly associates himself with them. Modern devices often exceed the demands and cognitive level of their users. Let us, for example, take household appliances, such as a TV, a fridge, or a phone. You can successfully use the TV every day, not having the slightest idea about its structure and the principle of operation. There is no visible correlation between the actions of people, performed with modern devices, and the results of these actions (Bystritsky, 1990: 210-238).

The human needs are growing, going beyond their simple movements. The equipment no longer embraces the previously known gestures and human skills; the intervention of a man is minimized; buttons, handles and actions with things as such no longer require manual effort. Many habitual gestures turn out to be unnecessary, and things have become more sophisticated than human actions, related to them. Technical devices are becoming more differentiated, while our gestures are getting less diverse. Now, the human body imparts the signs of its presence to things, while, otherwise, they function independently (Baudrillard 2001: 50-61).

Nevertheless, all the cited examples can be considered as indirect confirmation of the echo of organ projection in the modern world. When creating more advanced devices, a person somehow continues to analyze what he is like, and generates new things in his own image, perhaps without thinking about it.

## 5. Conclusion

We can say that, in complex devices, the imitation to the external body shape of a man, as well as to his manual and pedal work, begins to recede. Whereas in early times the work tools, their application and structure bore a clear imprint of the human image and likeness, such a close link is not obvious at the level of a sophisticated technical product. However, despite the fact, that even more sophisticated machines lose their external resemblance to human organs, the body functions remain important for technical development. Instead of gestures and the body image of a man, his needs, abilities, the result of cognition and mental development find reflection in automatic inventions.

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