Technology and Language Технологии в инфосфере.
2020. 1(1). 40-44
https://doi.org/10.48417/technolang.2020.01.09

Cybernetics for the Blind: The Reading Machine «Luch» (The Ray)

Anna Kotomina (✉)
Polytechnic Museum, Novaia Ploshad, 3/4, 101000, Moscow, Russia
akotomina@yandex.ru

Abstract
This essay for the inaugural issue of *Technology and Language* looks at a particular technical device that was to give access to the written word. In the late 1960s Rostislav Muratov proposed the model of a reading machine named "Luch" (Ray). "Luch" was designed for blind people to provide comprehensive access to books, newspapers, and magazines. Muratov understood blindness as "the loss of information" and assumed that his invention would appeal to a desire to participate on one's own terms in the circulation of knowledge and information. Then as now, however, people were content to have texts preselected for them.

Keywords: Reading Machine; Typhlotechnics; Cybernetics; Human-Machine Interaction

Аннотация
В этом эссе для первого выпуска журнала *"Технологии в инфосфере" ("Technology and Language")* рассматривается конкретное техническое устройство, которое должно было обеспечить понимание письменных текстов людьми с ослабленным зрением. В конце 60-х годов прошлого века Ростислав Муратов предложил модель читающей машины "Луч". "Луч" был разработан для слепых, чтобы обеспечить полноценный доступ к книгам, газетам и журналам. Муратов понимал слепоту как "потерю информации" и полагал, что его изобретение обращается к желанию самостоятельно выбирать информацию для чтения. Между тем тогда как и сейчас люди были довольны тем доступом к информации, который уже имели (при нём тексты подбирали для них, а не они сами делали это).

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In the late 1960s Rostislav Muratov proposed the model of a reading machine named “Luch” (Ray) to the Academy of the Pedagogical Sciences. The machine was able to “transform the graphemes of the typographic fonts of the printed book text to phonetic and tactile signals” (Muratov, 1968, p. 13). The device consisted of “photosensitive resistors”, “miniature amplifier” and “audible alarms”. The engineers who constructed “Luch” were looking forward to using this device with all the current achievements of the “acoustics, optics and radio-electric engineering” of the mid-XX century. “Luch” was projected and designed for the comprehensive reading of books, newspapers and magazines published for a mass audience of blind people. The loss of sight should not block human ability to use the language, to communicate and to study. Adolf Krogius was one of the founders of the Russian-Soviet Academic School of Typhlopsychology. In the beginning of the XXth century he performed many thousands of experiments on blind and sighted people and proved that ”the blind operate in real life with the notions and the concepts equivalent to those used by the sighted” (Muratov, 1968, p .4). The evolution of the mass-education systems and the progress of technologies for the production of printed texts in the XXth century increased the amount and quality of notions and concepts necessary in “real life”. At that time, current events and advanced scientific knowledge were mainly coded and represented to the public in printed form. To keep up with the sighted, blind people needed widest possible access to new texts.

Since 1829, blind people could read the books made for them with the relief-point font invented by the French teacher for blind Louis Braille. Since the 1960s blind readers could get “Talking books” recorded on magnetic tape. When Rostislav Muratov and his colleagues started to design “Luch” both technologies of coding texts for blind people were already well-known. Muratov stressed that Talking books and Braille books were remediated and selected for blind readers mainly by sighted people (Muratov, 1960). His motivation in developing the reading machine was to make blind readers more independent from the selection made by the sighted creators of special libraries. He manifested the new reading machine as an agent “to open for blind readers unlimited access to all existing books, newspapers, magazines” which would make them independent in their self-development.

To get that unlimited freedom of choice in reading, blind pupils were challenged to overcome the complexity of fluent understanding of the tactile signals and the sounds produced by “Luch” while scanning the visual texts. The potential blind readers were obliged to learn a special artificial language to communicate with the machine. It was not an easy task and some weeks of hard training were necessary to reach this goal. Muratov and his collaborators worked out the system of exercises to educate readers to handle the machine for the schools for the blind. Muratov had been the founder and head of the Typhlotechnical Laboratory which was established in 1956 at the Scientific Research Institute of Defectology (Inclusion) of the Academy of the Pedagogical Sciences in Sverdlovsk (Ekaterinburg). In addition to “Luch” the Laboratory invented and constructed the photoelectric indicators “Photophone” and “Photoskope” for the scanning

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of surrounding objects, the sound locator "TPP" warning a blind person of an obstacle, and dozens of other devices. Most of the devices constructed by the Laboratory existed only in the forms of drafts and prototypes, as they were not approved for mass production. The lack of flexibility of the Soviet planned economy was not the main reason of the difficulties in getting the new devices to the mass audience of the blind.

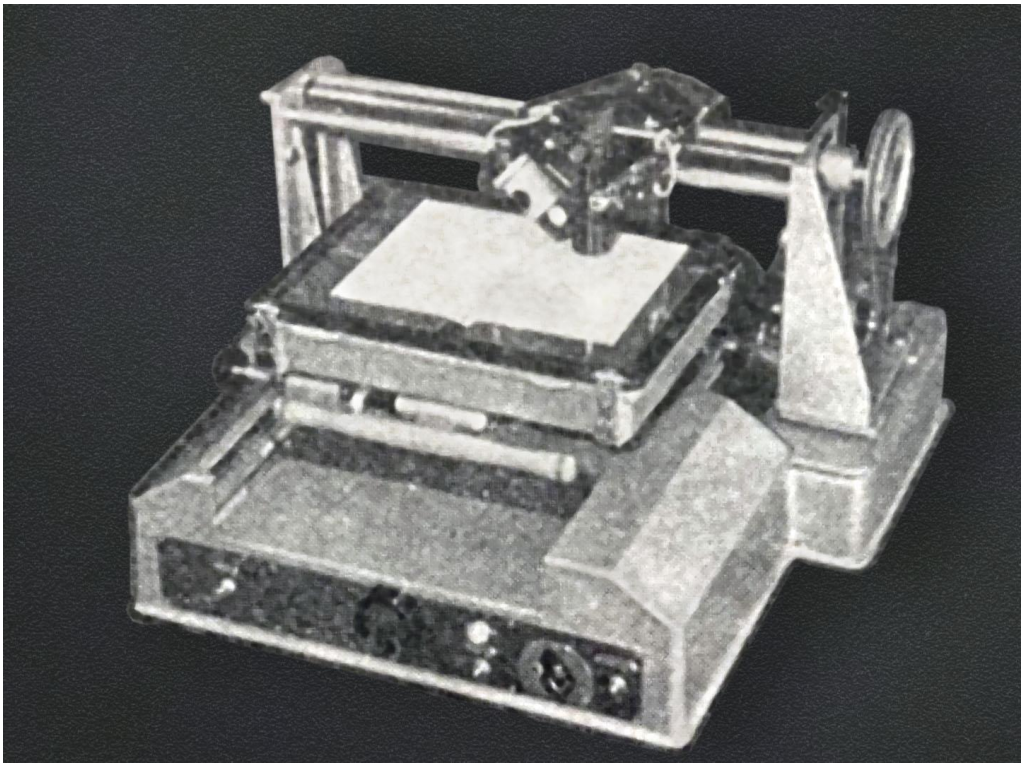

Figure 1. "Luch" (Muratov, 1968, p. 164)

In the theoretical parts of his written works, Muratov considers the blind human as "the damaged link in the chain of information exchange in the society" (Muratov, 1968, p. 15). He understood blindness as "the loss of the information", "the obstacle." This gap in the circulation of information could and should be compensated by the usage of electro-mechanical devices. Typhlotechnical devices must provide the humans with the "exactness of the varied important parts of the complicated signal" to prevent "information loss." In his works technical devices and human bodies are described on the same plane as one system of information exchange. He insisted to name his chosen approach to blindness "cybernetical." "Cybernetic approach" to the psycho-physiological problem of the dysfunction of the sight on the theoretical level radically destroyed the border separating the human and the machine. This border seems to be imaginary but yet it is rather important for how we understand ourselves. In fact, the border between the human body and the machine is not easily shifted or crossed: The blind people were not very enthusiastic to use the devices that were invented in the Laboratory. Muratov (1968) noted with some disappointment that "many of the blind people do not recognize their own need in the availability of access to additional information about the world because

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of their habit to use a limited amount of information every day" (p. 96). The existence of the possibility of wider access to knowledge and information does not always motivate people to realize this possibility. Muratov (1968) then suggested that the further development of the Typhlotecnick will speed up "the invention of a rather complicated cybernetic device … equal in its functional possibilities to the human brain" (p. 97). From our time perspective we can see that he had in mind the invention of the PC, not yet realized during the times when the Laboratory in Sverdlovsk was active.

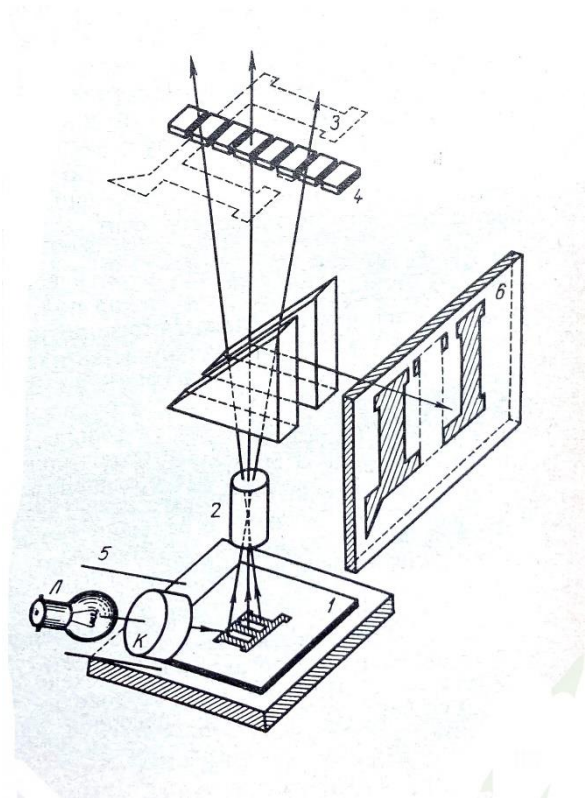

Figure 2. Diagram of the path of light rays in the microprojector of the reading device in the "Luch" (Muratov, 1968, p. 165)

Sixty years have passed since the invention of the reading machine "Luch," and many technical problems that were insurmountable for the Soviet engineers have now been solved. Today, scanners are transforming the typographic fonts to the digital data. Without the participation of the user this data can be represented in any form suitable for comfortable perception. The huge amount of printed texts is now transformed to digital data. However, the problem of how to organize access is still crucial and much discussed by users. Blind as well as sighted readers of digitalised books are now dependent on automated selection by the bots. The lack of motivation by users to widen their cognitive horizons is as striking now as it was in the 1960s. In comparison with the theoretical thinkers of the mid-XXth century, our advantage comes with the knowledge that technical progress provides no guarantee of solving basic human problems.

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