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GESTURE LANGUAGE: HISTORY, DEVELOPMENT STAGES AND CURRENT STATE

The article highlights the history of gesture language, communication problems of hearing and speech impaired people in the world practice and their solutions. It provides information about technological means which enable communication with gestures. Technological tools allowing gesture communication are commented upon.

Keywords: gesture language, non-verbal communication, hearing impaired people, gesture communication.

Introduction

Information Society is a new stage in the development of civilization. In this society, information and knowledge are transformed into a major strategic resource. The main objective of the Information Society is to meet information needs of all people regardless of age, language, religion, race, space and time, to create a social communication environment among them, and to convey their knowledge and ideas to the community. Information society creates phenomenal opportunities for the solution of global socio-economic and spiritual problems of human beings that have been inherited for thousands of years [1].

The "National Strategy for the Development of Information Society in the Republic of Azerbaijan for 2014-2020" approved by the Decree of the President of the Republic of Azerbaijan dated April 2, 2014 specifies the elimination of existing diversity in the use of information and communication technologies (ICTs) between different groups of population, urban and rural settlements, and different fields of economy. To enhance the capacity of society to benefit from ICT, first of all, knowledge of the population on relevant technologies should be increased, their awareness about the available opportunities should be raised, and favorable conditions should be provided for public information centers ensuring information access and for obtaining computers with discounts. Another goal and objective of the National Strategy aims at improving the quality of services provided to the population in the field of education, health, and social protection. The key principles of the strategy include delivering the knowledge and information about these technologies to the public to involve population into information society building and to ensure the participation of each member of the community in this process [2].

It is impossible for a person to live out of a society in which he/she is accustomed to social life. Natural or virtual communication is a regular requirement of everyone to reach any purpose, get information, and connect to social environment. However, meeting abovementioned needs of hearing and speech impaired people and their socialization and integration into society have been historically a serious problem. In the information society, many opportunities are available for solving the relevant problems of those physically disabled people.

The article highlights the development of gesture language, its opportunities, conditions and technological prospects for hearing-impaired people to integrate, socialize, be educated and meet other social needs, and the problems in this area.

The essence and characteristics of gesture language

Obviously, language is the most important means of communicating among people. Communication through language is a verbal communication. However, speech impaired people cannot communicate through language. Therefore, people of this category have to convert through non-verbal and gesture communication [3].

Communication through gesture language is realized with facial expressions, hand movements, and body language. In other words, gesture language is an independent language made up of gestures. Gesture is an intuitively selected unit of gesture speech (communication). In general, gesture is an expression of eye, face mimics, and movements of head, hand and body. [4]. Gesture is an exchange of information among individuals, and a transmission of their emotional signals through natural means. Psychologists argue that a person speaking through verbal language conveys about 60% of information by gestures, and 40% - by words [5].

Gestures are the means of communication of all living beings (humans, animals). People who speak the same or different language often use gestures to convey ideas clearly. Gestures have historically been the only way of communication for hearing impaired people.

Since the 50s of the twentieth century, the number of studies on communication through gesture language has increased. In the 1950s and 1960s, many scientific works, research and articles focused on gesture communication. For example, "Introduction to Kinesics" and "Kinesics and Context" by R. Birdwhistell, "Nonverbal Communication: Notes on the Visual Perception of Human Relations" by Jurgen Ruesch and Weldon Kees, "Nonverbal language" by E.Hall, "Body Language" by Julius Fast, "Telling lies" by Paul Ekman, "Communication via Touch" Frank and so forth [6].

Theorists focus on gesture language in their research on speech culture. A. F. Koni writes about speech culture: "The gesture revives the expression, defines and strengthens the idea. But one should be careful about it. The gesture should coincide with the meaning of statement. For example, regular hand movement in the same direction distracts attention of listener from the meaning of phrase" [7].

All people around the world learn or study verbal language depending on the geographical area in which they live. The use of gestures figuratively accompanying the words in the course of communication clarifies the idea. Gestures vary in different countries due to their national characteristics. For example, as a sign of approval, the Azerbaijanis nod a head up and down, while the Bulgarians - to right and left [7]. Despite the fact that we speak the same or very similar language, upward movement of head in Turkish means denial.

Generally, from the birth, a human being receives initial information in a figurative form, and therefore has more experience and skills in communicating with gestures. Hence, the origin of gesture language goes to the ancient times. Known as the most famous rhetorician Greek and Roman Marcus Fabius Quintilianus, who lived in the first millennium of BC, wrote 12 books on the formation of a culture of rhetoric reflecting all subtleties of this art. In book from this series "Advice to rhetoricians", Quintilianus shows that body, hand movements and mimics are a valuable resource for a clear, fluent and completed expression [8].

Gesture language is closely related to anthropology, linguistics, philosophy, psychology and science about animals. In general, communication via gestures is possible not only between humans, but also between humans and animals, or between animals themself. In his book "The Expression of Emotion in Man and the Animals" published in 1872, Charles Darwin commented that human and animal have the same universal emotion based on primitive biological act. For example, expression of the same emotion by demonstrating teeth and claws of an attacking wild animal flinging his hand and gnashing his teeth while expressing anger. R. L. Birdwhistell in his book "Mimics, Gesture, Motion, Position and Meaning", published in the mid-twentieth century, refused Darwin's ideas and stating that sometimes human smiles to hide his/her sadness. M.Mead, G. Bateson, E.Hall, and C.Osqud supported this idea of R. L. Birdwhistell in their research. However, P.Ekman and U. Friessen confirmed that the basic emotions such as joy, sorrow, anger, laughter, grief, humiliation, sorrow, mourning, regret, etc. are universal [9].

Hearing-impaired people regularly use gestures as the sole means of communication. Gesture language has an indispensable role in connecting people to the social environment. Gesture language develops independently of sound. Although gesture is used by all people, gesture

language is not based on verbal communication. It does not depend on people living in the same region. However, there can be two or more gesture languages in a single-language country, and only one gesture language in a country with several spoken languages. For example, several countries are compared below [10]:

- Countries speaking different verbal languages however using similar gestures: USA and France or South African countries;
- Countries speaking the same verbal languages however using different gestures: UK and US, or Germany and Austria.

As mentioned above, not only all hearing-impaired people, all living beings are referred to the carriers of gesture language. Gesture has an indispensable role in fulfilling the tasks of numerous professions. Special Operation Forces or a vehicle patrol officers use special gestures to convey information remotely during an operation. By focusing on gesture, one can better understand intention, purpose, and position of speaker. Gesture is not just a means for a communicator expressing idea. Focusing on gestures and mimic, reaction of listener can also be predicted. In other words, gestures play a major role in mutual understanding [7].

The role of gestures in the development of culture is expressed in dance, ballet, pantomime theater etc., as the words are generated from letters, phrases and sentences from words, a dancer builds different combinations and generates the composition of dance. The audience is able to understand dancer's monologue or dialogue by following these combinations.

International experience in gesture language

Historically, each country has formed its own alphabet and gesture language. In the mid-16th century, Spanish priest Pedro Pons de Leon taught children with hearing problems to read, write and count in Latin and Greek [11].

In France, gestures language was first taught to two hearing and speaking-impaired girls by Ch.M.de l'Épée. Advances in the training of deaf pupils encouraged de l'Epe to open a school (institute) in 1770 in his own house in Paris, which was the world's first special educational institution for the deaf. In 1789 de l'Epe Institute was recognized as a national institution. Subsequently, the method of de l'Epe was introduced into the practice of teaching the deaf in different countries [12].

Samuel Heinicke practiced the training of deaf children in Germany, which gained him a great popularity not only in his native city (Leipzig), but also beyond it. Education of deaf children provoked suspicions of clergy accusing Heinicke to "violate the rights of God". Despite this, he continued to teach deaf children. Heinicke opened the first institute for the deaf in Leipzig in April 14, 1778. It was the first paid institute with only 15 teachers [12].

In the XVIII century, Ch.M.de l'Épée's successor L. Kleck was invited to the United States to establish a school for hearing impaired children. The school began functioning in Connecticut in 1817 and was based on the French teaching methodology. In 1973, the first university for hearing impaired people was opened in Washington. Success of German and French trainers in this area has led to the development of gesture language in other countries [13].

In 1806, a private school for the education and upbringing of hearing impaired children was set up in Pavlovsk, Russia. Along with local teachers, educators from Paris were invited to arrange more effective training in this school. Each of them contributed to the development of Russian *surdopedagogics*. School teachers developed new teaching and methodical aids creating more perfect teaching system [4].

Surdopedagogical schools existed in the Soviet Union too. After graduating from high school, pupils got education in various professions, and exceptionally talented students were educated at the Faculty of Fine Arts for hearing and speech impaired people of Herzen State Pedagogical University in St. Petersburg.

The first World Federation of the Deaf (WFD) was established in 1951 and the idea of standardizing gesture language was initiated. The main purpose of the standardized gesture language was to create conditions for people with hearing impairments to attend congresses, conferences and symposia along with other professionals. Thus, the Commission initiated by WFD attracted the representatives from many countries and prepared a simplified gesture dictionary during its functioning for a quarter of century in 1973. The federation registered 70 million hearing impaired people and more than 300 gestures. It was represented by 132 organizations. In 1975, at the VII World Congress dedicated to the Problems of the Deaf held in Washington, the official gesture language, along with English and French, was also adopted as a working language of the congress [13]. Years later, the gesture language gained the official status in New Zealand in 2006 and in Iceland in 2011.

The development of a standardized gesture language made it easier for people with hearing impairments to travel to other countries and attend congresses and events. There were favorable conditions for the participation of physically impaired youth in sports competitions. Physically impaired athletes have now an opportunity to participate in national and international sports competitions, Paralympics and Surdolimpic Games, including at the Special Olympics World Games.

Since 1958, last Sunday of September has been celebrated as the World Deaf Day to draw attention of society, primarily the world politicians to the problems of hearing impaired people.

Gesture language in Azerbaijan

Azerbaijani Deaf Public Union was founded in 1929. The first school for speech- and hearing-impaired people in Azerbaijan was founded in 1962. Currently, there is a kindergarten and two schools for the people of the relevant category under the Ministry of Education of the Republic of Azerbaijan. The admission of pupil to these schools is regulated by the Republic Medical and Pedagogical Commission. Education here is divided into two divisions: for pupils with partial and total hearing impairments. The Latin alphabet is taught to the students with gestures. The total duration of education is 10 years for the first division, and 11 years for the second. The students of both divisions are given a 9-year education certificate. In addition to teaching the students to count, write and read, they are individually thought an "Individual Study on Adaptation and Recognition" and "Mimicry and Dactiology" [14, 15].

The student's favorite room at these schools is a computer cabinet equipped with computers and electronic boards. Acquiring new technological knowledge facilitates the socialization problems of hearing impaired students.

Schools for people with disabilities are also available in other settlements of Azerbaijan such as Ganja, Sumgayit, Mingachevir and Lankaran [16].

The project "Computer Courses for Hearing Impaired People" was implemented in 2014 with the financial support of the Youth Foundation under the President of the Republic of Azerbaijan and with the support of Azerbaijani Deaf Public Union and Azerbaijan Union of Journalists [17].

Nar Mobile launched a new project called "School for speech and hearing impaired people". The courses were attended by speech and hearing impaired youth aged 15-28. The workshops were conducted in four directions: florist-designer, hairdresser, computer technology and decorative handicrafts. There are currently several hearing-impaired employees in the company [18].

Application of information technology to gesture language

In modern times, information technologies have become an integral part of human life. Now, the Internet is a common place for people to get and share information, and communicate with each other from different parts of the world. Nowadays, global network is rapidly developing, and regardless of race, sex, health or age, the problem of unbarred access to its resources is among the most important

tasks of each country targeted at building information society.

In particular, processing, storage and transfer of any type of electronic information in the modern era engender the problem of socialization of hearing-impaired people. With the use of information technology, technical methods and programs the systems can be developed to ease the lives of people with hearing impairments, to benefit from global information and communication environment, to communicate, integrate into the society, develop education, and, most importantly, to increase their will to live and create.

To facilitate communication through gesture, a number of technological tools are developed and implemented successfully in practice. For example, SignLanguageGlove translating the gestures into text are designed. Five flex sensors were attached to the glove corresponding to the five fingers to detect the orientation of the hand. The output values of the sensors are displayed on a screen. Now, Hadeel Ayoub, a student from the University of London, Goldsmith, is working on syncing this glove with smartphones supporting Wi-Fi [19].

Thomas Pryor and Navid Azodi from the University of Washington, USA, developed gloves that help people with speech impairments to communicate. The device reads hand gestures and signs and sends information to the computer through "Bluetooth". With the use of special algorithms, data is analyzed and processed and translated into sounds [20].

The biggest disadvantage of devices translating gesture into voice or text is the limited database. Gesture is processed in accordance with a comparable database to be processed into text or sound. For example, a computer based on software that recognizes gesture language is developed by Chinese researchers. This computer only translates Chinese and American signs into text. In 2012, Chinese researchers introduced *Microsoft Research* technology that recognizes Kinect signs translating them into text and speech. At present, Chinese Academy of Sciences and Beijing University are working together for the project improvements. This system can recognize the most commonly used 370 gestures of China and America. The system translates the word into gesture or vice versa and visualizes them on virtual screen [21].

Japanese scientists developed a bracelet model to facilitate communication between dumb and deaf opponents. The smallest sensors attached at finger tips sense hand gestures and sound them through mini-loudspeaker built-in the user bracelet. It also translates speech into gesture and displays it on the small screen of the bracelet. *Language Ring* was designed to eliminate communication barriers and to understand the language of the deaf. The device consists of bracelets and rings. With the help of special software, the device recognizes hand gestures or signs and translates them into audio signal. The device has a user-driven memory drive. The developers of this devise are Chinese designers [22].

The *UNI* tablet produced by *MotionSavvy* in New York enables the communication by interpreting *ASL* gestures into text. The device *CES* produced by the Italian *IK Multimedia* translates music into gestures [23].

Conclusion

Emergence of gesture language, its development stages, and methods of use have taken place in different periods in various countries and based on several approaches. Fundamental studies have been conducted and different standards and teaching concepts have been developed for gesture language at different times and countries. As a result of this, nowadays, global unification problems of the development, standardization and practical application of gesture language are topical throughout the world.

Opportunities provided by ICT create exceptional prospects for effective solution of this problem. Due to the potential of ICT and the use of technical methods and applications numerous systems can be designed to ease the lives of people with hearing deficiencies, to assist them to integrate into other countries, to communicate, socialize and develop, and, most importantly, to be encouraged to live and create. Solution of these issues and development of optimized software will

effectively eliminate the problems of hearing impaired people. This problem can be solved by training professionals and specialists who do not need the verbal language in activity, thereby their spiritual development, material security, and, most importantly, the stimulus of life can be changed.

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