The Impact of 3D Technology on Communication

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Abstract: *The present article focuses on the impact of 3D technology on the evolution of communication. Communication is a process which has been going on since the genesis of humankind and which will not only continue indefinitely, but will also be in constant development, depending on the factors that influence the development of the communication situation. Technology, on the other hand, came much later. It can be argued that it has only evolved significantly in the last decade to encompass the emergence and development of the many technologies and devices that we currently find in the homes of most of us.*

Keywords: *telecommunications, 3D technology, communication, holography*

1. Introduction

This paper is primarily addressed to students of the Faculty of Communication Sciences and of the Faculty of Electronics, Telecommunications and Information Technologies. It contains theoretical aspects from both communication sciences and telecommunications. My intention was to create a basic guide for

students in both fields, who want to innovate in one field using knowledge from the other field.

Students at the Faculty of Communication Sciences can use the basic information in the field of telecommunications to better understand how communication is currently carried out and how it is affected by the evolution of technology, and to be able to forecast the evolution of communication.

Students at the Faculty of Electronics, Telecommunications and Information Technologies will find the information in this paper useful for the development of future communication devices and technologies; a good understanding of the development of the communication situation will facilitate the development of new communication technologies.

At the same time, yet to a lesser extent, this paper could also serve students of the Faculty of Education Sciences or those of the Department for Teacher Training. These fields have relatively many meeting points with the field of communication. That is why this study also sometimes includes information from the field of education, as well as proposals to improve the communication situation in a pedagogical context.

2. Results

Communication theory

Technology has developed in the last decade at an extraordinary speed, which could only attract a development of the fields closely related to it, communication and public relations being amongst them. Letters have turned into phone calls, overseas visits have become video conferences, hours of waiting at the counter have turned into bots that we can access through our phones or on digital platforms.

Until recently, the development of communication as a result of the development of technology came as a side effect, not an intentional one. The purpose of this paper is to create a bridge between communication

sciences and technological sciences, which would facilitate the simultaneous and systematic development of the two fields.
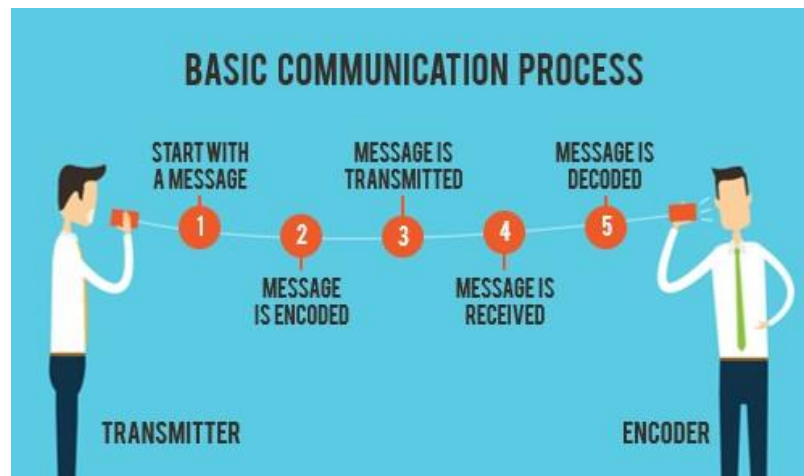

Fig. 1. The basic communication process

Communication is the transfer and counter-transfer of information, based on the transmission, reception and understanding of information. As Rus (2002) also states, a sender, one or more receivers, a transfer and a message medium are needed to carry out the communication process. Communication is a complex concept and can be classified according to various criteria.

Depending on the number of participants, it can be interpersonal or intrapersonal. Interpersonal communication involves two or more entities, is influenced by various factors, and produces several effects among participants. Intrapersonal communication is communication with oneself and contributes to one's inner balance and self-development.

In terms of the environment in which it takes place, Rus (2015-2016) enumerates political or electoral communication, corporate communication, public communication, educational communication, etc. For example, political or electoral communication involves information for electoral purposes, while public communication

involves information by state institutions, such as the mayor's office, ministries, autonomous regions, etc. Educational communication involves information for educational purposes and takes place in both formal educational institutions, such as schools, high schools, universities, and non-formal education institutions.

The distinction between verbal and non-verbal communication is, however, the most relevant to the subject of this paper. Verbal communication includes all communication situations in which the transmitted message is carried out through the spoken or written word. Some examples of verbal communication are: dialogue, monologue, letters, instant messaging, articles in newspapers, magazines, publications, etc. Non-verbal communication, also called analogical communication, is achieved through various social indicators, such as: facial expression, body language, tone of voice, eye contact, posture, gestures, physical appearance, gaze, kinesthetics, touch, etc.

According to the theory developed by Albert Mehrabian following a case study conducted at the University of California in Los Angeles (1967), face-to-face communication is effective due to the three "V" elements – verbal, vocal, visual. The verbal element comprises the words, the content of the message; the vocal element means the tonality of the voice, the intonation; the visual element includes body language, physical appearance, gestures. Surprisingly, the ratio of these elements in terms of importance is not balanced at all: 7% for the verbal element, 38% for the vocal element, and 55% for the visual element. Therefore, it is extremely important that the visual element should supports the message one wants to convey, so that the message is processed correctly by the receiver.

Inconsistency between two or more elements of communication will lead to uncertainty or lack of confidence on the part of the receiver. Of course, this inconsistency in communication can be used intentionally - for example, when one wants to convey a passive-aggressive message. This passive-aggressiveness is caused by the inconsistency between the verbal component and the vocal or visual

component. It is important to be aware of the communication elements and their importance, precisely so as not to accidentally cause communication situations that may turn out to be unfavourable.

When it comes to the digital space, the theories related to non-verbal communication are not only valid, but also carry more weight. From pragmatics and advertising to media design, the focus in these fields is very much on the visual component: the colours, shapes and images used are chosen carefully because they weigh much more than the verbal component.

People tend to think that, in the digital space, non-verbal communication has less impact than in face-to-face communication, because social cues such as body language, facial expressions, tonality, intonation are not (always) present. However, the digital space has some specific characteristics, which are considered non-verbal social indices. Features such as social media reactions, GIFs, emoticons and other paralinguistic elements are a form of non-verbal communication characteristic of the digital space. For example, if one cannot hear someone else's tone in the digital space, they can identify other elements that reflect the tone of voice: Caps Lock is often used when people want to convey a message which, in face-to-face communication, would be uttered in a raised voice.

Even if, for instance, we do not see one's appearance in a social media post, this does not mean that the non-verbal elements on which we can form a first impression are absent. In the digital space, we would use the person's spelling or the wording of the message to form an image of them. Also, the soundtrack, the colours, the symbols, the images used along with the transmitted message are elements that influence our perception and experience. These elements are found in all categories of media products: social media posts, documentaries, news, TV shows, series, movies, etc. Often, news stories have a dramatic soundtrack to heighten the effect they have on viewers.

Moreover, the colour used (an element related to non-verbal communication) has a great impact on the processing of the transmitted

message. For example, shades of green are ideal for nutrition companies, fruit and vegetable distributors or vegan food producers, as green suggests health, freshness, nature and harmony. Shades of red are perfect to inspire determination, power, action, passion, energy, but also love or anger - hence the expression "to see red". Shades of pink are almost always present in the branding of women's products, as pink - a muted shade of red - inspires elegance, gentleness, femininity and grace.

Fig. 2. Colour meanings

According to Olesen, these colours not only inspire certain feelings, but also have the power to influence our mood and judgement. For example, a certain colour can spoil our mood if we associate it with an unfortunate event or happen to be overexposed to that colour; or conversely, we may be more likely to find a certain person more attractive if they wear a colour that suits them or that we like. Olesen states that, if we become aware of the meaning of colours and the associations that the human brain makes, we can significantly improve the control we have over the reactions and the accuracy of the message conveyed.

Colours are also used by experts from various fields, such as business or law, to turn the communication situation and its outcome to their advantage. An excellent case in point would be a common practice in the field of law, where clients are advised by lawyers to wear white clothing and to look as neat, flawless and clean as possible, so as to inspire innocence and purity. This practice has been well known for over 30 years, as explained by Heiman in an LA Times article (1993).

Telecommunications theory

The evolution of technology has always been accompanied by the evolution of human relations, and hence, of communication as well. Considering the technological progress made over the past 30 years, we will continue to witness a significant change in the way people communicate. If previous generations had to resort to letters or to go to the post office for a phone call, today's generations can do everything almost instantly: they can send text messages, call anyone, anywhere, make video calls, etc. If, 30 years ago, a communication situation unfolded over the course of a few days, now it unfolds instantly, regardless of the distance between the participants.

Verbal communication in the digital world has currently reached its peak. As a result, the focus should shift to the development of non-verbal communication methods in the coming years. As already emphasised, nowadays the focus is on the visual component of both communication and technology. In terms of communication, 55% of the transmitted message is assimilated visually. A similar observation can be made about technology, by looking at the bandwidth for audio transmission, on the one hand, and that for video transmission, on the other: audio transmission in calls uses somewhere around 100 Kbps, while a video call takes somewhere between 500 Kbps and 1.5 Mbps, usually for lower video quality. Therefore, the bandwidth in audio/video transmission points to the impact it has on the assimilation of the message. Regardless of the transmission medium, the audio

component will always have the least bandwidth, while the visual one will take up most space.

3D technology is relatively limited at the moment, especially for the general public. However, it will continue to develop, and with this development will come new devices and new ways of using it. Although 3D technology is currently mostly used for entertainment, there are many other areas that will revolutionize communication and education once they become more developed and accessible. For example, some circuses have abandoned animal exploitation and opted for hologram shows to help reduce animal cruelty.

Such technologies are also used in museums to enhance visitor experience and stimulate the senses. Another area where such technology is used is virtual reality therapy. Phobias such as fear of heights, fear of public speaking, fear of animals can be combated by virtual reality therapy. Patients are brought face to face with their fears in a controlled environment so that they can overcome them, and this is only possible with technology that has evolved enough to simulate reality in a credible way. The table below provides the three main device categories that use 3D technology and a short comparative analysis:

Table 1. Device categories

3D television (without glasses)	3D television (with glasses)	VR/AR headset
• works on the principle of autostereoscopy; • stereoscopy is achieved by rapidly alternating two images from slightly different angles; the alternation of the two images is fast enough to be perceived by the brain, but not perceptible to the viewers; • does not require additional accessories.	• works on the principle of stereoscopy; • stereoscopy is performed by viewing two superimposed images, one red and the other blue or green, with the help of glasses with lenses of different colours, so that each eye sees a different image, these being superimposed and perceived in relief at the level the brain.	• works on the principle of stereoscopy; • stereoscopy is performed as follows: in front of each eye, there are two small screens as lenses; on each individual screen, an image taken or generated from different angles is broadcast, so that, at the level of the brain, it is perceived three-dimensionally.

Unfortunately, at the present time, 3D technology is neither financially nor affordably accessible. Ideally, many institutions and businesses would use the available technology to combat various issues such as animal cruelty, waste of resources, pollution, etc. But unfortunately, the costs are currently too high for widespread adoption. Education is another area where 3D technology adoption and mass implementation would be beneficial.

The adoption of such technology in education would significantly improve the field. Not only would it facilitate learning in fields such as anatomy, physics, biology, architecture and mechanics, but it would also accommodate students with educational needs different from the majority. In his book *Multiple Intelligences – New Horizons* (2006), the American psychologist Howard Gardner developed the theory of

multiple intelligences. He describes in detail eight types of intelligence, namely: visual-spatial, musical, kinaesthetic, interpersonal, intrapersonal, naturalistic, verbal-linguistic, and logical-mathematical. Gardner found that the students responded differently to stimuli; although the students were exposed to the same stimuli, different hemispheres of the brain were activated in each student, depending on the category of stimuli applied (visual, auditory, tactile, etc.).

Gardner (2006, 21-22) explains that students will respond differently to stimuli, depending on their brain structure: "Linguistic intelligence also passes our language tests. For example, a specific area of the brain, called Broca's Area, is responsible for making grammatical sentences. A person with this affected area may understand words and sentences well, but will have trouble putting words together in anything other than the simplest sentences. At the same time, other thought processes may not be affected at all."

Currently, the pedagogical structure of formal education is mainly based on the verbal-linguistic and logical-mathematical learning style. In some places, the other learning styles are also used, but in much smaller proportions - even too small, for students who have a different main learning style than the one used predominantly. This structure is best reflected in the Romanian theoretical high schools, which are organised into two main tracks: the humanities track (the verbal-linguistic learning style) and the exact sciences track (the logical-mathematical learning style). Indeed, there are also vocational, technical and technological tracks, but in a much smaller proportion and, unfortunately, with much more limited opportunities.

However, there are creative and affordable options that can be implemented in the meantime, just like my craftwork shown below, which was inspired by online sources (https://www.youtube.com/shorts/pdDIW3g0Ubs): with just four clear plastic trapezoids and some hot glue, I built a pyramid frustum that projects a hologram-like image, if placed over a tablet screen.
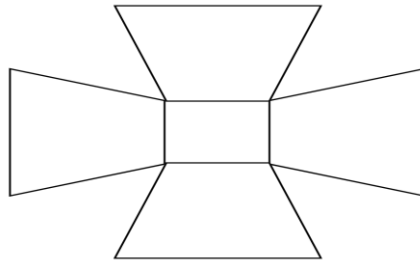
Fig. 3. Cutout sketch for the pyramid frustum

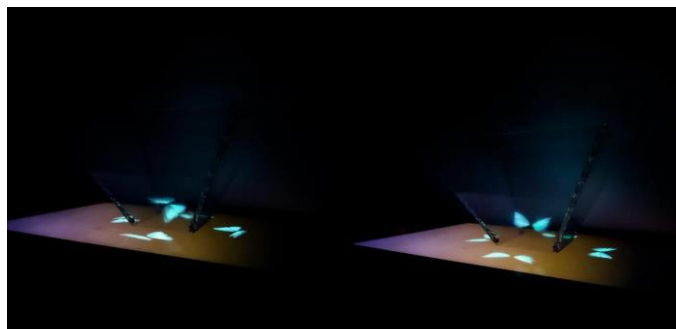Fig. 4. Built prototype of the pyramid frustum

Fig. 5. Prototype demonstration

To create a solid, transparent material, two blank A4 sheets were laminated. From these, four identical trapezoids were measured and cut to construct a pyramid frustum. A hot glue gun was used to join the edges, forming the frustum structure. The dimensions can be adjusted according to the device used to project the hologram, with a larger size chosen in this instance to accommodate projection from a tablet or laptop.

The next step involved selecting a video formatted for hologram projection. Such videos can be sourced online or custom-made, though creating one requires additional digital skills. Research on "hologram video" on YouTube revealed that the video should have a transparent background and be arranged in an X shape, with four frames.

To complete the setup, the device must be placed horizontally on a flat surface, making phones, tablets, or laptops with 360° foldable screens particularly suitable. The pyramid frustum is then placed at the center of the screen, allowing the holographic image to project within it.

3. Conclusions

The main purpose of this article was to create a bridge between communication sciences and telecommunications to better understand the way in which the evolution of technology influences the changes that occur in other fields, such as communication.

As already detailed earlier in the paper, human communication has been strongly impacted by the evolution of technology and by the accessibility of multiple technologies. This influence has been more or less conscious and intentional, but I believe that collaboration between experts in the two fields, so as to steer this evolution in the right direction, cannot be anything but favourable for both specialists and the general public.

I believe it is crucial to merge technology and communication. The progress up to this date is incredible, but the potential to improve communication and revolutionize it is massive. Implementing more

technology into everyday communication could facilitate the assimilation of the message and improve the communication situation.

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