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Internet Based Social Networks – New Informal Spaces for Gender Social Relations and Life-long Learning

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Abstract

The report presents the relationships between Bulgarian men and women as active users of social media. The study looks for dependencies and differences between male and female relationships in the digital and real world. The accent is on the way Bulgarian women represent themselves in the online environment, what is their image and what roles they play. The author also discovers the online communication and life-long learning strategies of women, as well as the reasons about the differences between the real and digital profile of a woman. The research is about Facebook and LinkedIn as part of the social medias that become a huge part of the everyday life and change it. The report analyzes opportunities for building online knowledge systems in Bulgarian corporations, taking into account the specificities of how to share information across genders.

Keywords: Internet social networks, digital world, gender differences, gender equality, digital life-long learning

1. Introduction

It is difficult to describe digitization in one sentence, as it is far more comprehensive than the Internet and smartphones. But a brief definition would sound like this: digitization is the ability to do all that is already familiar to mankind, but virtually, unlimited, and everywhere. Thanks to digital technologies, we have a wide choice of inexhaustible resources in real time, wherever we are. Mobile devices entertain us, inform us, guide us, learn, offer us bargains. But, in addition to benefits, do the modern information and communication technologies have a negative effect on people?

This article reflects the author's attempt to answer questions such as: Is there a difference in the relationship between Bulgarian man and Bulgarian woman in the digital world compared to the real one? Are there any changes in the way and in the quality of communication between sexes? Whether Internet social networks bring people together or divide people in Bulgaria? What are the attitudes, behaviors and roles of men and women to learn through social media and electronic technologies?

Object of study – men and women in Bulgaria who have profiles in social media.

The subject of research is the role of social networks as a non-formal learning environment and their impact on the ways of communication between Bulgaria men and Bulgarian women.

2. Design, methodology and approach of research

Empirical research was conducted through focus groups and a specially developed survey card among a sample of 30 women and 30 men. The respondents are undergraduate students in business administration in New Bulgarian University, Bulgaria. They are all working in companies with different subject of activity, ownership and form of organization. They were chosen at randomly, with the main criterion being gender and availability of at least one social media profile, such as Facebook, Instagram, LinkedIn, YouTube, etc.

Aristotle's communication model and John Stacy Adams' theory of equality were used as a framework for structuring the survey and the research process. In addition, the legislative framework and other national factors influencing the process of digitization and gender relations has analysed in the text.

The study focuses on two aspects:

- (1) The development of legal and theoretical frameworks for gender equality, including opportunities for life-long learning.
- (2) The technological capabilities of "smart devices" for communication and how they are used by different genders.

3. Research background

3.1 *Legislative and theoretical framework for gender equality and life-long learning opportunities in the digital world*

Due to the patriarchal structure of social hierarchy, for thousands of years women have been perceived as a passive and secondary sex, whose primary role is to raise children and take care of the home. Like wildlife for predominantly male individuals, people have built up their societies and social structure based on these primary forms of behavior.

This sexual subordination, throughout history, is grounded in any intellectualized primitive views that affirm the "naturalness" of female subordination, bringing arguments from religious texts (Bibles) to pseudo-Darwinian philosophies about the "natural role" and purpose of women. The innate conservatism in the human psyche and the unconscious fear of men from further competition, as well as the passive feminine nature, have contributed to the continuation of this unfair deprivation and limitation of women until today, outside of the law, into the stereotypes of mass culture.

The development of gender equality and equal opportunities for life-long learning has made great progress. Women have been able to do much in this area, given the limitations they have faced. Science has contributed to the fact that, after a number of studies, the female brain is 8% smaller in size than the male, but women use their brains more effectively than men (Costandi, 2013). This is due to the fact that women use less energy and fewer brain cells but have more connections between them. The suppression of female capacity over the years does not mean that men are smarter. It means that, in equal conditions of both sexes, in most cases women would show the same, and often higher, results than men.

Women are sensitive to the relationships they maintain with men. In the modern world, women want men to treat them in dignity. According to Adams (1965) theory of equality

and justice, maintaining a balance between what people give and what they receive is one of the important conditions to have motivation to communicate. Adams defines the concept of justice as the sense in which perception and comparison of the contribution and outcome of the individual is equal to the contribution and outcome of others. Equality is the equal position of the people in society, brotherhood, freedom. Being a woman on an equal footing means being treated fairly in comparison with a group of other persons or with respect to another person. Equality and honesty are not only ethical categories but emotions and feelings, and there is always a process of comparison. However, women do not expect to be treated in the same way with everyone else, because they are not the same among themselves.

From the past, the direction of legislation has headed towards anti-discriminatory norms for equality (in terms of gender, race, religion, as well as economic, legal and social opportunities; equality by nature; liberal and democratic equality, etc.). Gender equality is a fundamental right, a common value of the European Union, and a necessary condition for achieving the Union's objectives of growth, employment and social cohesion.

Bulgaria is a country with traditions in promoting gender equality. The history of Bulgaria in the second half of the 20th century determines the distinctive features of women's participation in the labor market, reflecting the specifics of Bulgarian culture. Legislation is updated in relation to maternity and social roles (such as childcare and adult care) to allow maximum participation of women in working age in the labor market. In the 1970s, national concerns about the negative population growth increased, and measures were taken to promote the reproductive role of women by changing the support system. The equality of responsibilities and rights related to state social security is stated in the *Code of mandatory social security* (1999), now the *Social security code* – Article 3 establishes the fundamental principle of equality between people.

Bulgaria's membership in the EU has taken efforts a step up, so as to build national legislation in this area and gender equality policy. The state policy to encourage women's participation in the country's economy is implemented within the framework of the common policy on equal opportunities for women and men, in line with the government's program *Government, development and justice*, which set out the commitments of the Republic of Bulgaria in the field of equality between women and men in the period 2013-2017. The aim was to provide conditions for equality between women and men in all spheres of public life, prevention and protection against discrimination.

The National action plan for promoting gender equality, prevention of discrimination against sex, was adopted in 2014. This prevention has been implemented in the labor market regarding the occupation of positions, regardless of their level, equal access to education and professional qualification. The fight against violence towards women in all its forms, including domestic violence, is also one of the important priorities of Bulgarian institutions. As gender affects all sectors of society, the challenge lies with all executive bodies and public administration structures. This problem can't be left to a specialized unit, with all institutions involved. To this end, it was decided that gender equality policy be applied in the development and implementation of all government policies and strategies.

4. The technological capabilities of “smart devices” for communication

The widespread use of the Internet over the last decades, access to computers and the deployment of communication processes in the digital space have changed the human concepts of how we interact with each other. The physical world, known before personal computers entered the daily routine, was gradually transferred to the global Internet network. Is the virtual world equivalent of the real?

Three are the main trends in the way our “smart devices” support communication between the sexes:

- (1) Apps that help you learn more about the world.
- (2) Health care applications that make the world a safer place. They track the health and safety indicators. In this way, they help in healing, driving or sports.
- (3) Social networks that are used to find new friends, new cultural events, new activities, new goods, and so on.

5. Internet social networks – a new informal environment for men and women:
Communication and non-formal learning

From a sociology point of view, a social network is a social structure of individuals linked to network-specific relationships such as friendship, ideas, views, traditions, financial attitude, hyperlinks, and so on. From an information technology perspective, the social network is a platform or website that focuses on building or reflecting social relationships between people.

Social networks are classified according to:

- the *information*: to share contacts, preferences (news, music, videos, pictures, etc.), copy content (articles, music, etc.) and to share personal information;
- the *reference*: un-follow and follow – not giving and weighting the site to which they are targeting.

Web 2.0 is a technology that allows individuals to interact with others and build networks based on mutual, personal or professional interest. Social media provide new tools for sharing, storing and publishing content, discussing and expressing opinions and influence. For example: blogs (Blogger) and microblogs (such as Twitter); Video sharing (YouTube), presentations (SlideShare), instant messaging (for example, Skype). Social networks allow collaborative creation of a collective product without space and time constraint: Wikis (Wikipedia); Shared workspaces (GoogleDocs). Social networks offer new ways to work with others by connecting, socializing in communities, networking social services (Facebook, LinkedIn). Social media tools are used to supplement the content, such as describing, adding or filtering information, tagging content, and displaying a link between content: Pinterest, News Aggregators (Digg). Social networking tools are designed to mix and compare content – a combination of pre-existing web services that allow a user on a single platform to use another application in a specific window, without having to exit the original site (Bonson & Flores, 2011).

Six features add value and enhance the quality of social interaction between men and women as well as learning in social networks:

- (1) *Authenticity*: an opportunity to share real voices with real people.
- (2) *Transparency*: communities and other data can be made visible to the public.
- (3) *Proximity*: the ability of members of the public to communicate and engage in online conversations.
- (4) *Participation*: an opportunity for everyone to take part in a corporate conversation on the blog of the company, independent forums, personal blogs, etc.
- (5) *Connectivity*: the ability to connect and share thousands of places.
- (6) *Accountability*: the ability to monitor users.

6. Attitudes, behavior and roles of men and women towards learning through social media and electronic technologies

Life-long learning aims to increase people's adaptability to economic and social change, to promote equality and participation in all forms of professional and personal development. The concept of life-long learning is embedded in the European development policy – "any life-long learning activity aimed at improving knowledge, skills and competences within personal, civic, social perspectives (including suitability for employment)". In Bulgaria, the educational strategy is geared to all areas of learning and is addressed to pre-primary education and training, general school education, vocational education and training, higher education, continuing adult education, validation of non-formal learning outcomes and self-study. The main goal of the approved strategy is to create the conditions for every citizen to develop his/her personal and professional knowledge, skills and abilities to improve his/her own well-being and the competitiveness of the national economy.

Statistics show that women in Europe are more educated but less paid than men and have less time off. Women are still often forced to choose between children and careers. In spite of high education, women's chances of finding a job in the specialty are smaller, their opportunities to grow in the profession and careers, their decision-making in politics and the economy are also smaller. The legislative framework formally guarantees gender equality and non-discrimination, but in practice there are a number of imbalances, discriminatory practices in recruiting and paying female labor. The continuous upgrading of skills and the accumulation of new knowledge and skills is a prerequisite for the successful realization of women in the labor market. Social media is a tool that women use to learn, share and discuss professional issues at a time appropriate to them to enhance their competence. Regarding the relationship between women's individual characteristics and attitudes to using social networks and enterprise intranet technologies, research indicates a direct relationship with the age: different generations use Internet technology to varying degrees (60% of Baby Boomers, 39% of Generation X, 35% of Generation Y). With increasing age, the desire to use this tool for sharing knowledge at work increases: 25% of Y generation, 41% of generation X, 55% of Baby Boomers' generation. Regarding the position in the organizational structure, only 26% of the white collar and almost half (47%) of managers (middle and top management) use internal social networks (Gaál, Szabó & Obermayer-Kovács, 2014). The higher the position, the greater the need to use such a tool that makes it easier to establish cooperation with employees working in other departments or in other countries in an international organization. Young people choose open systems and they use such applications that have free access anytime and anywhere. Regarding the relationship between individual characteristics and the use of external social networks, the survey found that using social networks (such as Facebook, LinkedIn) is higher when the employee's position is higher in the hierarchy. 68% of top management, 59% of middle managers, and nearly half (49%) of white collars use this tool to share knowledge at work. It is important to distinguish between Facebook and LinkedIn. Facebook is believed to have fewer top management members, and most of them are in lower positions, but more top managers and experts are involved in LinkedIn, as brains are known to gather information from this site. This result can be explained by the fact that the lower the position, the external social network is usually not for professional use but for keeping friendships.

What are the attitudes, learning and behaviors in the communication of men and women in the social media in Bulgaria?

7. Empirical research

This current conducted empirical study does not claim to be fully comprehensive. It is limited within a relatively small group of subjects with relatively homogeneous age limits. But its

results make it possible to draw conclusions about a little research topic in Bulgaria and provoke discussions with other researchers in this field.

Despite all efforts to achieve gender equality, there are still people who do not accept, that women can be equal to men. They share Greek philosopher Aristotle's opinion, that male representatives are better in nature, and this can't be eliminated by any attempts to culturally or educationally equalize. Both the philosopher (called "the father of science") and our contemporaries assume that women are not only naturally weaker physically but also weaker in their soul.

Despite Aristotle's negative attitude towards women, the principles and model of effective communication described in his treatise *Rhetoric* (Aristotle, 2013), even after more than 2300 years, are still relevant and useful. Moreover, this current study shows that this model works effectively, both in eye-to-eye communication and in the Internet social networking, and the different elements of the model are applied in a specific way by different genders in the real and digital environment.

The ingredients of effective communication, according to Aristotle, are the following: *ethos* (communicator's credibility), *pathos* (the emotional effect of the communicator or message), and *logos* (logic of the message).

Through these three components and their characteristics, respondents assess the specificities of gender communication in the Internet media.

The results show the following communication features in terms of these ingredients:

(1) *Ethos* – in both men and women, face-to-face communication gives a clear idea of reliability, experience, qualification, reputation, credibility; technical expertise, knowledge, skills; wisdom, strength, maturity, self-consciousness. Women's Facebook profiles speak of a relatively high degree of credibility, unlike men's, where the reliability of information in their profiles is in doubt. The style of expression of men towards women in the web space is changing, in relation to the way they speak when meeting in person. When communicating and expressing themselves in Facebook, 75% of surveyed women show modesty, empathy, sensitivity, audience concern. On the other hand, 70% of men show enthusiasm and passion in Internet communication only if there is a motivation for a reward. 60% of men and 50% of women use the Internet social network to find friends of interest. The survey shows that 85% of women apply a style and approach that is appropriate for the situation, while 90% of men and only 15% of women do not take the audience into account. Men engage in discussions only if they know the subject well, while women express their opinion despite not being a specialist and speaking from personal experience, sharing stories. In LinkedIn, given that it is professionally oriented, the situation is different. Both genders express opinions on topics only if they are competent and citing reliable sources and facts. In the real and digital world, women talk and write with more enthusiasm, energy and passion than men. Here the difference is in the subject. Men in an informal environment speak with enthusiasm and passion for sports, politics, hunting, fishing and women, while women share their daily experiences.

(2) *Pathos* is associated with emotions. Words such as "sympathy", "empathy" and "apathy" originate from the word "pathos". In social networks men show sympathy or apathy, while women show empathy. Women write with more pathos than men. They most often talk about people and their actions, while men like to think about abstract concepts, not about particular persons and their behavior. Women like to attract the attention of men, to attract more audiences. Men like to be liked, to look nice, be interesting, fascinating, creating desire and attention; as well as impact through unauthentic photos and publications, which makes communication unreliable. Pathos is the ability of a communicator to influence emotions in the

audience, build a relationship with listeners/readers, and inspire action. In this sense, it is inherent in women (80% of women surveyed, compared to 55% of men surveyed). While in a real meeting, both sexes seek to be themselves and tell memorable stories. In a virtual environment, both genders show only those features they deem important, using visuals – photos and videos. Women are more likely to hide their weak spots than men. Women, both in real and virtual environments, always communicate with the idea of helping their audience.

(3) *Logos* is inherent to men, but to a greater extent in a real environment than in a virtual – well-structured presentation, meaningful and appropriate; clear, with language and terms that the audience easily understands; achievable, applicable, useful and usable for the audience; logical, demonstrates causal links; realistic, trustworthy with facts, proven, convincing; contains measurable positive results; unique. The results of the actions taken justify the time, effort, cost and risk of taking action. The presentation focuses on the positive – it explains why something should be done instead of why not. The *logos* rely on logic, supported by arguments and evidence to convince the audience. Male presenters tend to overwhelm their audience with too many figures, facts and statistics, and risk losing their listeners/readers.

The three methods of persuasion proposed by Aristotle are used everywhere in business and personal life where there is an oral or written speech, and someone (presenter, communicator, author) wants to influence one or more audiences. The results of the study show that the *pathos* are inherent to women, and the *logos* of men. *Ethos* is also used by men and women with equal success as a method of persuasion, but through different techniques and for different purposes.

Despite the fact that the same methods of persuasion apply in the real and virtual world, we have seen the specifics of their use by men and women in the virtual world.

What are the main demographic characteristics of Bulgarians in Internet social networks?

According to focus group surveys, it is found that the majority of Bulgarians (76%) using social media and information technologies are up to 25 years of age. And logically – most of them are learners (61.2%). The percentage of women and men is 70/30. In the opinion of the surveyed, 72.4% of women using networks live outside of the capital city.

Which social networks are most used among Bulgarians?

There is no statistically significant difference in Facebook popularity between the two genders. There is also no significant difference in the frequency of use of social networks in different age groups as well as in the use of social networks in different parts of the day between men and women.

What are social networks for different age groups?

For the youngest users, social networks are a channel for communicating and maintaining friendship (79.5%), defining them as a means of spending their free time (74.2%). The same is valid for people aged 25-35 years as well. And the next age group, people aged 35-45 years of age, most define them as a channel for communication and friendship (77.8%). The opinion of the users over 45 years is unanimous – social networks are a channel for communicating and keeping in touch with friends.

What are the profiles of women social network users?

Women entering social networks to search for information are divided into two large groups – social networking and entertainment (87.2%) and non-entertaining (12.8%). 10.8% of women who do not use social networks for entertainment use social networks either during the

second half of the day or at any time of the day. Very few women are logged in on their favorite social network in the morning. The other relatively large group is characterized by the fact that women using social networks as an information channel in 57.6% of the cases live outside Sofia and, besides informing themselves, use social networks for entertainment.

For better segmentation of audiences in social networks, female users can be classified into separate, homogeneous groups:

- “Socially oriented” – they use social networks much more than the average user and primarily for interaction with friends and family, sharing (pictures, music, statements), having fun and looking for information.
- “Information-oriented” – they use social networks slightly more than the average user and enjoy to a very large extent all opportunities provided by social networks.
- “Unoriented” – they use social networks less than the average consumer. It can be said that social networks do not give them certain benefits, which can be interpreted as: these users have a social networking profile but do not take advantage of the opportunities they provide.

As a result of the research, it was found that the technological means of communication are used by both sexes with equal success, but with different preferences and goals, as follows:

Most men using social networks do not feel the need to have an account, but exclude the possibility that they do not have one at all. Contrary to expectations, even those men and women who have had a conflict within social networks are also unwilling to refrain from using them. They are clearly pleased with the fact that they have a lot to learn from social networks and accept them as they are, with all their advantages and disadvantages. An interesting fact is that 23% of women think that if the Internet ceases to exist, what is most lacking is social networks. Only 7% of the representatives of the strong sex share this opinion and, in most of them, a major gap will be felt in terms of administrative facilities, such as online banking. Women feel more need to share personal things and experiences, unlike men who prefer to use social media primarily for business purposes. Women use social networks more to connect with family and friends. Men, on the other hand, use social networks to gather more information and learn new things to increase their influence. Social media help them make surveys, gather the necessary contacts, and ultimately promote their status. The survey refutes some popular stereotypes about the way women use the Internet – 19% of women play online games, compared to a modest 8% of men, and 13% of men use content sharing sites like YouTube compared to only 7% women. Statistics show that women use the Internet to find bargains, the majority of men resort to the global network to supplement or expand their knowledge in certain areas.

The results of the survey among Bulgarian men and women are close to and largely consistent with the results of the *Men’s Health* survey (3,000 people, 1,377 men and 1,540 women surveyed). It also reaffirms Catherine Caputa’s (2014) view that for men one of the major goals of communicating is to secure status and authority, while women seek consensus and “community building“. Social networks such as LinkedIn and Facebook are becoming an integral part of our lives and help create and maintain contacts. Creating a wide and diverse network of contacts is part of building a successful personal brand.

The image created by men and women in online spaces is a result of the following actions: 30% of men and 24% of women surveyed on Facebook give wrong information about their status (dating, married, etc.). Men do so in order to leave a “loophole” to start or continue flirting, while women – in order to protect themselves from intruders. About 60% of women create new friendships through social media, and 70% of them are better acquainted with their friends and colleagues. Women surveyed say they pay less attention to the profiles of men who are significantly

older than them, and massively ignore profiles without photos. If the profile photo has a glass of alcohol, the chances of communication are drastically reduced. 70% of men and 50% of women claim to use the social network to flirt. Women are more jealous of their husbands after they have noticed something on his Facebook profile. It is found that the social network contributes to jealousy even in women, who are not naturally jealous. The subsequent reaction of the persons involved in such a conflict is to close their accounts in the hope that this is the general solution to the problem that has arisen, whether or not it is justified. Men are more likely to change their status in the social network and block their partner after they have split up while women continue to seek contact with their former partners.

The Internet media allow people to connect with others, exchange ideas, and offer access to information that would otherwise be difficult to obtain. Social media change the lives of women by not only changing their way of communication, but also making a significant impact on their culture and learning.

8. Findings and future research

Social media are key forms of communication in the lives of modern couples. Men and women use information technology at different times in their lives and for a different purpose. Women have a dominant role in using social networks. There are more and more couples who get acquainted and maintain their relationships through social networks. It also allows couples to maintain a more active communication with each other, understand where their mate is at any time, and thus strengthen their relationship. On the other hand, the study demonstrates negative trends that directly affect the relationships of couples and moreover, they even have a disastrous effect. Because of the diversity of the digital world, it is more difficult to maintain a relationship between a man and a woman. But with the development of technology and the massive use of social media, it is advisable to maintain respectability, tolerance, and persistence in our relationships, as in “good old times”.

Relationships between man and woman have found a place on the Internet but in a different form, which has lost some of their non-verbal characteristics. This is a serious minus of online communication. Women have found a chance to communicate online, without the limitations they encounter in a real environment. Barriers such as shyness, worries about appearance, speech, and other defects have taken on a totally different meaning in a space where the physical self is only a distant detail and continuation of the digital self.

Positive aspects of communicating through virtual social networks are the following:

- Women feel safe, where they find support and receive feedback.
- Through the writing process, women are tied to the topic they are writing, which is an important factor for reaching a sense of happiness and satisfaction.
- Collect in societies of common interest.
- Social networking increases the self-esteem of a woman, which directly affects the skills of presenting to the public in real life.
- Social networks make it easier to fight addictions – members of these networks develop the sense of community and self-identification with other members. So they accept open advice and find motivation for specific behavior.

Negative aspects of communicating through virtual social networks are the following:

- Excessive use of social networks can lead to narcissistic trends.
- Daily use of Facebook may lead to depression, anxiety and other mental disorders.

- Social networks can suggest a sense of social exclusion as a result of the continuous monitoring of “happy” friend’s photos. This, in turn, creates envy and lack of desire for contact with these friends, which leads to real isolation.
- The time women spend on social networks is directly related to the jealousy towards their intimate partner. The emergence of jealousy is based on the ability to obtain additional information about the partner's activity at a time when the couple is not together. Once the feeling has begun to increase efforts to monitor the partner in the virtual space, the time spent in social networks increases as well and logically reduces the real time spent with the loved one. Thus, the social network can lead to a complete change in the dynamics of intimate couples.
- The more friends we have on Facebook, the less socially oriented we become – collections and lunches with friends remain in the background. Real friends are diminishing, and our social skills are getting poorer.

Further research into the psychological effects of social media on women is necessary. Undoubtedly, this is a vast area of research, given the incredible speed of social networking, information and communication technology.

9. Conclusion

Social networks are an integral part of the daily lives of both men and women. Both sexes spend hours on the phone, computer or tablet, browsing through social media, hoping to learn something new, and to keep track of all the events happening in people’s lives from the “societies” themselves. The way and the quality of communication between the two sexes is changing. All social networking damages are clear – they sometimes complicate relationships with others, increasingly shake off live communication and open a new, unreal world, closing another. They are wasting vital moments of life, choosing consciously online communication with real communication.

Is there anything we can learn through the social network, is it the right formula to create a happy relationship, or is it a place we forget to be ourselves? Whether we turn our desire to say something to someone in a status quote, do we allow the keyboard to “speak” for us? Questions whose answers lie only in ourselves and do not depend on gender, status in society or age, or on what makes us different from others.

But for organizations, the role of social networks has another status. Knowledge is a strategic resource that can lead to a sustainable long-term competitive advantage. This knowledge can be effectively shared through social networks. For student organizations that seek to achieve the quality of shared knowledge, the inclusion of social media tools in day-to-day corporate activity is essential. There are numerous anti-discriminatory opportunities to use social media tools in each company: employee communication can be encouraged to support problem solving by seeking advice from an expert regardless of gender; converting the personal knowledge of both men and women into organizational knowledge. Knowledge is shared with new employees, regardless of their gender. Discussing professional issues with a diverse group of people that is composed of active practitioners in a specific area, regardless of their gender.

In Bulgaria, progress has been made in increasing access to social media through fast internet as well as in providing free data. But digital skills, improving people’s qualifications and digitizing business and public services remain weak. The latter hampers the further development of the digital economy in Bulgaria, and this in turn slows the economic growth of the country. The exchange of information and knowledge between men and women is an important part of knowledge management in the learning organization. Organizations in Bulgaria face the challenge of stimulating people to share their knowledge in social networks, exploiting the strengths of

Internet communication and striving to reduce the negative impact of the weaknesses in Internet communication between the two sexes.

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Abstract

The paper discusses the place and role played by the pictures and text in the digital era. The digital art has become an essential component of contemporary art and new tools currently available to artists are revolutionizing the way they think and create, and so, artistic projects that could not have been accomplished with traditional methods, are now possible through computer interfaces. The computers have facilitated the traditional processes, and also offered a whole new vision on the sketches and the idea forming process, allowing the artists to create many virtual versions of an artwork – a concept. In order to analyze the history of digital art, it is necessary to study the history of several disciplines: computer history as visual medium, the history of graphic design and computer history integrated in the visual arts. Often these disciplines coincide during certain periods, making the study even more difficult to conduct. This chapter presents a brief history of computer generated art, of deconstructive typography and the importance of information visualization. Some of the earliest known examples of computer-generated algorithmic art were created by artists such as George Nees, Frieder Nake, Manfred Mohr and Vera Molnar in the early 60's. As a conclusion, we emphasize the idea that artists should use the computer as a tool adapted to their will, but understanding its potential to host systems that might allow the creation of artwork or graphics. In this regard, the computer must be considered a generative tool with a potential that must be understood in the context of the artist's work and intentions.

Keywords: computer art, coding, algorithm, visualization.

1. Introduction

We hear often the assertion that we live in the midst of the post-digital era and that the contemporary art is based on new media, so, predictably, the computer has become a basic tool for the artist, but it is equally a tool for a surgeon, an architect or a biologist. Does the fact that the artist uses his computer make him a scientist, or can the surgeon become an artist? We started this chapter with this questioning on professional identity to emphasize that the technology does not produce art, but the artist is one who creates it, though there are many who hope that the new technological tools will replace eventually the talent, hard work and sensitivity that we are generically reuniting under the name “art”.

With the new possibilities offered by new technologies, the graphic artists find themselves faced with the opportunity to create unprecedented images and forms. While some graphic artists were rejecting the digital technology, scorning those who chose to explore it, many others chose to embrace this innovative tool that allowed them to correct mistakes, change colors,

texture and images, to overlay them, to make them transparent, broader, tighter, to combine them in unprecedented ways.

In the mid-1980s, the emergence of desktop publishing and the introduction of software applications created a generation of designers specialized in manipulating computer images and creating 3D images, something that could not be achieved before. Computer-generated graphic design has allowed the designers to instantly see layout effects or typographic changes without using any ink during the process. The computers not only have facilitated the traditional design process but have provided a whole new perspective on sketching and forming ideas, allowing the designers to create virtually countless variations of a work – concept.

The digital art has become an essential component of the contemporary art and the new tools currently available to artists are revolutionizing the way these artists think and create, with the result that artistic productions that would not have been possible to be created traditionally, are now possible through computerized interfaces. Obviously, a significant change also occurred in the distribution of works of art, through the emergence of virtual museums and art galleries. In addition, the artwork crosses the borders more and more easily, quickly penetrates in all the corners of the world, and becomes instantly accessible to viewers from spaces which are thousands of miles away.

“That being so, the artwork is added to the structure of what we call ‘networks’ - these means of communicating information that are passing now through satellites, cables, satellite dishes, optic fibers, and are scattered throughout the planet as a netting with multiple ramifications. What can be the impact of these new productions, designed directly for ‘canvas’, immaterial and ‘non-localized’, because they are located ‘everywhere’? Everything happens as if the image itself would lose what otherwise would have been its flesh, pigments, texture, density. The image becomes a ghost. The code triumphs” (de Mèredieu, 2005: 13).

The real beginning of the computer era happened in 1950, when the British mathematician and computer pioneer Alan Turing published a research describing what was later called the Turing test. The research explored the nature and potential of the development of human and artificial intelligence as well as the communications, while the first successful commercial electronic computer, UNIVAC, which was also the first computer for general use, was designed in the same year.

In the early years of using computers, access to this technology was a privilege that only researchers and scientists had. Their particular interests in certain areas of art or design and the results they have obtained from various experiments have attracted the attention of artists and arts students. Subsequently, the computers were integrated in architectural workshops, in design studios, and the universities integrated them into their study curriculum. The computer users, artists and scientists all the same, have also initiated the research of a new universe, a new environment of interaction for old and new art, establishing new forms, questioning the past, imitating traditional patterns and forms, or, on the contrary, breaking patterns and provoking the development of a new aesthetic code.

Currently, the technology is always a step ahead of us, and the use of the computer is part of our social practice, changing our way of interacting, giving another dimension to our own values, concepts and ideas, proving to be a challenging environment for the notion of art.

Probably many art historians believe that I agree with the fact that digital art remains difficult to fit into the historiography of traditional art. First of all, before any attempt to define it, it is appropriate to specify that the term digital art is often assimilated with the term computer art, or art generated by the computer.

To study the history of digital art, it is necessary to study the history of several disciplines: the history of the computer as a visual environment, the history of graphic design and

the history of the computer in the visual arts. Often, these disciplines coincide over certain periods, making the study even more difficult to perform. For example, the history of computer art and the history of graphic design are virtually impossible to separate during the first decade, the borders between them remaining permeable and lax. In addition, the research requires specialized technical knowledge from the researcher.

Another issue that makes the research difficult is the complexity of the digital environment and the rapidity with which it has developed in a very short period of time. Unlike other traditional tools that have not changed their function and form for hundreds of years, the computer has evolved dramatically in a very short time.

2. Coding and image

The digital art can be defined as a visual manifestation that takes into account certain aesthetic criteria and is composed of information edited on the computer.

There are two distinct categories of approach to digital art, depending on how it was created: the one in which the artist interferes directly with the image and the one in which the artist creates an algorithm that will itself generate images according to the input data. This second case may be subject to controversy because the author must rather have knowledge in the field of informatics on the one hand and on the other hand he does not get in touch with the visual form of his project until the end.



Image 1. Jared Tarbell, *Orbitals* (Variation B), 2004

From an aesthetic point of view, the digital technology interferes with the traditional art scene in two ways: approached as an independent environment and approached as a tool to produce works on traditional support.

It is therefore necessary to briefly present the pioneers of the digital art and the relationship between their works and the modern art. We will focus on the artistic activity of some reference names for the notion of computer art.

One of the first electronic artworks, *Oscillon 40*, belongs to Ben Laposky, a mathematician and American artist, being created in 1952. Thus Ben Laposky was the first to break the boundary between science and art when in the 1950s, photographed hundreds of waves, in

various forms, which he obtained and altered with the help of an oscilloscope and called them *Electronic abstractions* or *Oscillons*. Laposky exhibited his works 188 times in more than 100 cities in 37 US states and 16 other countries in the world. Thus, he initiated the conceptual transition from scientific representation to artwork.

A few years later after Laposky, an Austrian writer and scientist, Herbert Franke used random number generators to create works of art similar to those of Laposky.

Since the 1960s, computer use has begun to grow, and its indirect influence is beginning to feel in all spheres of society.

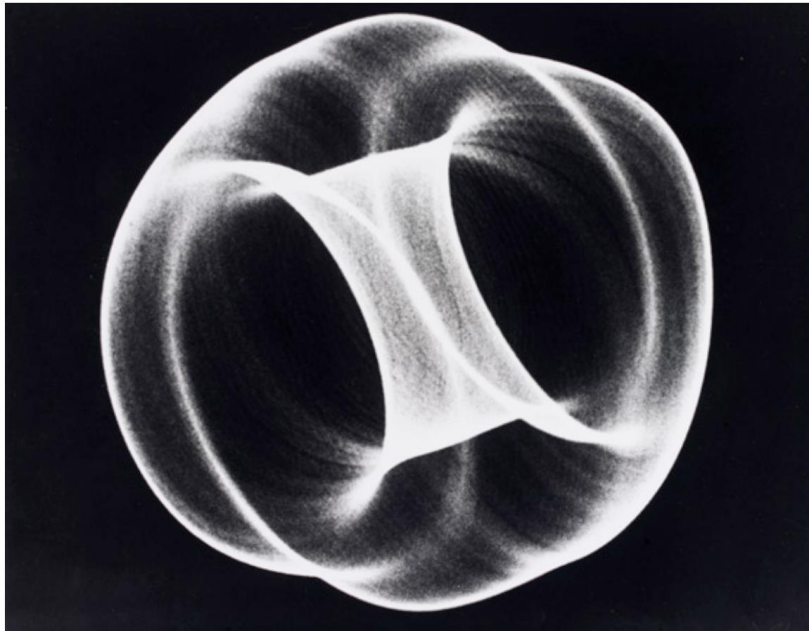


Image 2. Ben Laposky, *Oscillon 40*, 1952

Unlike the United States, where the attitude towards computer was predominantly that related to a tool, in Europe, especially in Germany, the computer was an apparatus incorporating the rules and formulas of art (Taylor, 2014: 90). For the Europeans, it was not just a matter of experimenting in graphic design, of determining aesthetic rules, but also a desire to see if the computer can generate aesthetic properties. According to this idea, the mathematician and computer pioneer, Frieder Nake, who saw the potential of the computer to be a universal image generator capable of creating any possible image, simulated drawings by Paul Klee, which inspired him to see in visual art programming, an aesthetic tension both at the level of detail and at the overall level. His simulations consisted of linear structural elements, but also of groups of complicated local agglomerations.

In 1963, Charles Csuri built a computer to create a series of drawings inspired by classical painting (Durer, Klee, Ingres, Picasso, Goya and Mondrian). In the same year, Ivan Sutherland created a device that allowed people to interactively create images on a computer screen.

In 1965, Stuttgart was the first city to host the computer-generated art exhibition, including works by Frieder Nake, A. Michael Noll and George Nees. The works were exhibited at the Technological Institute (the current Technical University of Stuttgart) in February, and then at the Wendelin Niedelich Gallery in November. With artists such as Frieder Nake or Vera Molnar, the computer-generated art was already shaping its own aesthetics.

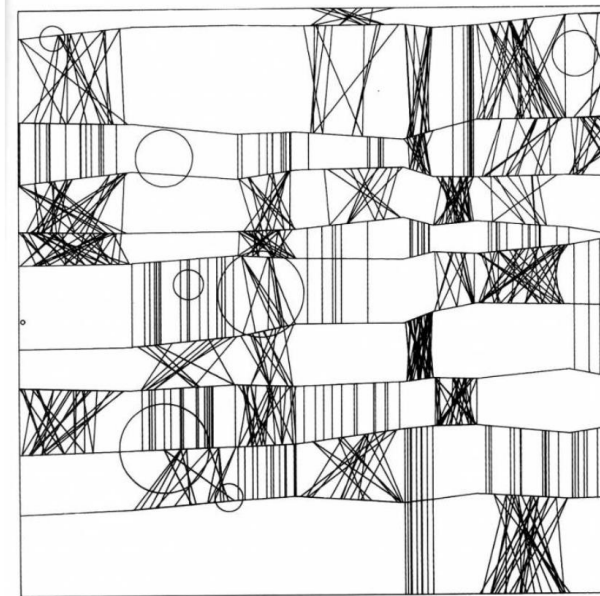


Image 3. Frieder Nake, 13/9/65 Nr. 2 (*Paul Klee's homage*), 1965, drawing plotter

In 1968, the Museum of Modern Art in the United States bought from Charles Csuri for its permanent exhibition the computer artwork entitled *Hummingbird*. In the same year was organized the first digital art exhibition, entitled *Cybernetic Serendipity*, hosted by the London Institute of Contemporary Art, having as its declared goal to investigate the role of cybernetics in contemporary art.

A year later, SIGGRAPH - Special Interest Group on Computer Graphics was created, organizing annual conferences on computer graphics, involving tens of thousands of professionals. Dozens of research papers are submitted each year. On a large scale, SIGGRAPH is considered to be the most prestigious forum for the publication of computer graphics research.

The digital art continued to progress, and in the '70s it was already quite common for artists to use the computer to create art. The audience also began to become more aware that art could also be created by using the computer, and the interest in the digital art continued to grow

In 1971, the Museum of Modern Art in Paris organized the first personal computer art exhibition of the artist Manfred Mohr. A few years later, in 1975, Europe's first inkjet printer was used by Herbert Franke to print a series of images of his. The patterns and colours were among the first mass productions of this kind. Even today they are available for purchase.

Among the many emerging artistic techniques, at the intersection of traditional art and new media, there is the algorithmic art or generative art, as it is called. The algorithmic art is a form of artistic creation based on the use of algorithms to generate visual images. Unlike traditional artworks, which are static and fixed, the algorithmic artworks are versatile and evolutionary, and can vary infinitely depending on the data input, they can be changed depending on certain variables. Throughout this research we have been able to see how in the Dada movement was promoted the art as a result entirely determined by hazard, while the Surrealist automatism freed the creative energies of the unconscious. However, the procedure for obtaining this random character in computer art differs from the procedures used by artists in the avant-garde movements. The artists had to define precisely the parameters in which the random character would be manifested, so it was an *a priori* thought process, programmed and controlled by the artist. For the artists, the random nature was rather a “*metaphor of creativity, being in fact an effective means and a machine-made creation methodology*” (Taylor, 2014: 92).

Some of the first known computer-generated algorithms were created by the above-mentioned artists George Nees, Frieder Nake, Manfred Mohr and Vera Molnar in the early 1960s. These artworks were made by a computer-controlled plotter, being thus computer-generated art, but we cannot yet speak of digital art.



Image 4. Jean-Pierre Hébert, untitled, 2001

For an artwork to be considered algorithmic art, an algorithm designed by the artist must be included in its creative process. In this case, the algorithm represents the detailed design and execution recipe of the artwork. The artists who have created algorithmic art have been recognized under the generic name of algorists, name by which they began to identify themselves in 1995 at one of the SIGGRAPH conferences. The co-founders of this form of art are considered Roman Verostko and Jean-Pierre Hébert, the latter having the merit of being the inventor of the term and definition of this form of art, which, not surprisingly, was also given as an algorithm:

```
if (creation && object of art && algorithm && one's own
algorithm) {
include * an algorist *
} elseif (!creation || !object of art || !algorithm || !one's
own algorithm) {
exclude * not an algorist *
}
```

The process of writing an algorithm to generate a work of art is comparable to the writing of a musical score for a symphony. It is not enough to know programming and math, it requires vision, passion and a lot of aesthetic sense to create art, and programming is just a tool that supports the artist to accomplish the work. By using random numbers to determine when and where to place graphics, the artists have achieved new aesthetic configurations, new variations in shapes and images, and ultimately being able intervene to choose the parameters in which the most interesting object is produced.

The art of algorists uses a computer to execute the result in a physical environment chosen by the artist according to his preferences and interests, based on computer skills adapted

to the characteristics of the materials chosen by the artist. They conceptualize their works both formally as a visual structure expressed in instructions and in physical form. From this point of view, the algorists create art made on a computer, but not based on it.

Former Benedictine monk and distinguished professor at Minneapolis College of Art and Design, Roman Verostko used the computer to generate floating diaphanous color veils, or multi-colored lines amalgamation, suggesting bizarre insects, or calligraphic writing in unknown languages, a fusion of human intelligence and mechanical precision. His series of works generically entitled *Diamond Lake Apocalypse* is an algorithmic reinterpretation of *Illuminated Manuscripts*. Created in the form of an open book, with the left and right pages, the works are deliberately designed as precious objects in the tradition of illuminated manuscripts.



Image 5. Roman Verostko, *Pathway*, 1993

Just as medieval monks transformed the word written into “enlightenment,” in the same manner, in this era, a graph plotter transforms an algorithm into a precious object. With the help of his plotters, the artist transforms his workshop into an electronic scriptorium, celebrating digital procedures in the form of illuminated scriptures. His workshop overlooks the Diamond Lake, which gave him the inspiration for the title of the series. The gold leaf, the element present on each work, manually applied by the artist, refers to the formal relationship with the enlightened manuscripts of the medieval period.

The works of Jean-Pierre Hébert, which are like fluid silk fabrics, illustrate eloquently that a computer can generate new visual possibilities and aesthetic explorations, and all this is a purely artistic process. Hébert develops a fascination for algorithmic formulas, however, he also appreciates paper and ink, preferring to exhibit his works in the form of drawings, probably because the paper provides a larger and more complex execution than the computer screen.

The dense textures of his works are built in an extremely elaborate manner, from lines at small distances from each other, resulting in various geometric shapes. The light and darkness also play an important role in some of his works. Hébert’s involvement in the programming part, using the system for visual purposes, is an example of conceptual use of the computer in art. This use is an operational one, the computer being just a tool that serves rather to extend the artistic expression area. The flexibility of the computer allows him to be the central point or the main creative tool, but without leading to specific forms or restrictions. The totality of the image, system, tools and context depends on the instructions provided to the processor in the form of a code.

“So my process is to compose, to choreograph a continuum of drawing and painting using algorithms that I code to serve my purpose. my work is freed from the physical constraints usual to drawing, so that I experience no limit in size or complexity, no muscle cramps, no fatigue, no visual strain; I can draw hair thin lines of extraordinary length, include them in networks, or model them in any shape and size I want; I can subject them to forces, fields, transformations; I can move beyond two dimensions to higher forms of space, and allow chance, time, sound, and all levels of additional information to be part of the work. I enjoy this freedom immensely, and I present some examples dating from the mid seventies to date” (jeanpierrehebert.com/10s.html).



Image 6. Jean-Pierre Hebert, *Mount Tai in blue mist*, 2000

The artist transforms the mute material into a sense vehicle, processing its structure into shapes. The tools used to create art also become more than mechanical objects, and the resulting product is not an inherent property of their function, but a result of artistic thinking.

3. Complexity of information visualization

The people, from their birth, interact with the multitude of networks every day, from complex systems such as transport routes and communications networks, to less conscious interactions, frequent on social networks. Complex networks are everywhere. It is a structural and organizational principle found in almost every field we can think of, from human genes to power systems, from trophic chains to market share values. Currently, dozens of researchers around the world decode the networks around us using interfaces.

Visualisation, in the sense of a presentation, is not a new phenomenon. It has been used in maps, scientific drawings and date more than a thousand years ago. Examples are China’s map (1137 BC) and the famous chart of the invasion of Russia by Napoleon in 1812, drawn by the French engineer Charles Joseph Minard. This classic chart, drawn in 1869, is considered to be one of the most successful graphic representations so far, precisely because of the simplicity and the amount of information it contains.

The beige colored line represents the French army, or the so-called Grand Army (422,000) invading Russia in June 1812. The width of this line represents the size of the army at

different moments in time. In September, the French army arrived in Moscow, but at that time the French army was practically destroyed, remaining with no more than 100,000 people. The route of Napoleon's retreat is indicated by the black line, which corresponds to a chart indicating the temperature at different moments in time.

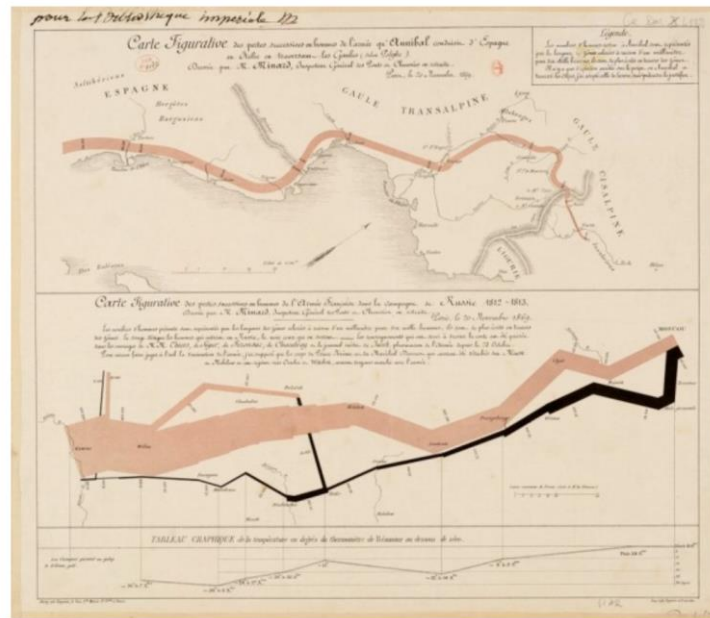


Image 7. Charles Joseph Minard, *Napoleonic Invasion of Russia*, 1869

Visualisation of information or scientific data is a branch of computer-aided graphics and a user interface that deals with the presentation of interactive or animated images designed for users to understand and evaluate data. For example, scientists interpret huge amounts of data, laboratory simulations, or sensor results. The *data mining* field provides many abstract visualisations related to these types of visualisations. Often, scientists and engineers collaborate with graphic artists and designers to create more powerful data visualization systems. This complex inter-connectivity of information has "contaminated" many artists in traditional areas such as graphics or painting.

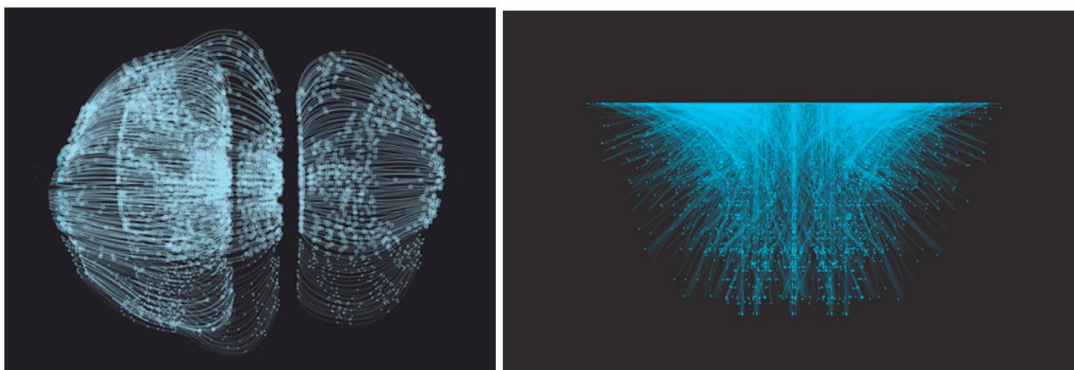


Image 8. Tatiana Plakhova, *Networks*, 2009

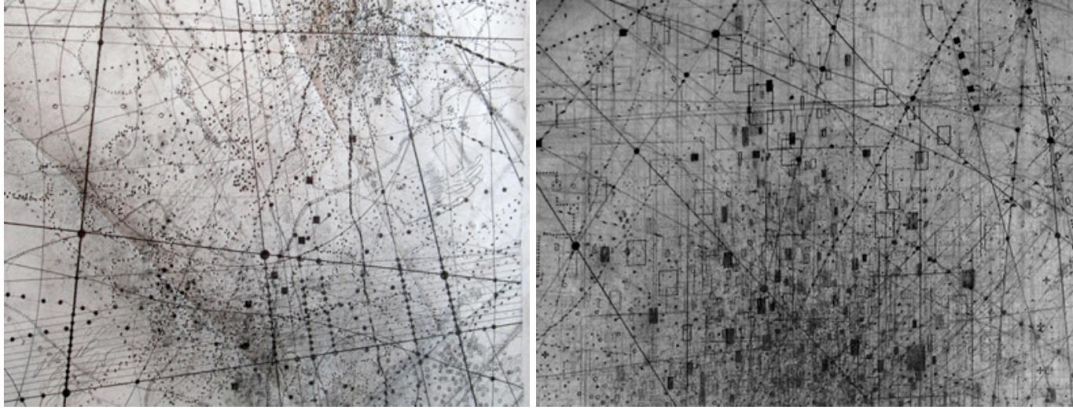


Image 9. Emma McNally, *Drawings*, 2009

Emma McNally's work shows us her preference for the complexity and theory of visualization systems. It is remarkable when this adoption takes the form of randomized algorithms in generated art, but it is even more astounding when it is expressed through manually drawn illustrations.

These charcoal drawings make us think of a mapping of imaginary routes. These intersections and nodal connections between lines, points, geometric shapes create an image of cyberspace and its networks.



Image 10. Mario Freese, *Air lines*, 2009

Unlike the above mentioned authors above, Mario Freese creates these visualisations based on existing databases.

Air lines is a project aimed at mapping air routes around the world. Each scheduled flight on any given day is represented by a line from the take-off point to the destination airport, forming a network of thousands of lines.

The computer graphics has been used since its beginnings to study scientific issues. However, initially the lack of graphic power often limited its usefulness.

There have also been numerous books and research articles on visualization in recent years. Some of the most popular scientific visualisation examples are computer generated images that show real spacecraft in action, in vacuum, beyond the Earth, or on other planets. Dynamic forms of visualization, such as animation used in education, have the potential to enhance the learning capacity.

Beyond the distinction between interactive visualisations and animations, the most useful classification is probably the one made between abstract scientific visualisations and model-based visualisations. The abstract visualisations are completely conceptual constructions in 2D or 3D. These forms are completely arbitrary. The model-based visualisations are either data overlays on real or digitally reconstructed images based on reality, or are digital constructions of a real object, starting directly from the scientific data.

The scientific visualisation is usually made with specialized software, although there are some exceptions. Some of these specialized programs have been launched as open source software, many of them having their origins in universities.

The functional visualisations are more than statistical analyses and calculation algorithms. They need to be understood by the user and require a visual language system that includes color, shape, line and composition, to be able to communicate clearly and appropriately, being somewhat similar to the alphabet-based and character-based languages used globally by the people.

4. Conclusion

As a conclusion, we can point out the fact that the artists must make the computer a tool adapted to their will, but understanding its potential to host systems that allow the creation of works of art or graphics. The use of computers is part of a social practice that has already changed our concepts, explanations and values, and will continue to do so. In this sense, the computer must be considered as a generative tool, with a potential that must be understood in the context of the artist's work and intentions.

The computer managed to be included in the design courses of the art universities everywhere. The use of computers is part of a social practice that has already changed our concepts, explanations and values, and will continue to do so. However, computer-generated art will truly be integrated and accepted only when it loses its "unnatural" status, because of the way it was created. Undoubtedly, there is no way to return to the pre-digital world, even for the visual arts, still on the brink of this digital explosion. As artists and scientists, we are researching a new universe in which previous art and new art come in contact. Indeed, new art forms collide with established forms, question the past, and submit new values to their beneficiaries. The new sometimes starts out disguised as the traditional, mimicking accepted models and conventions. Other times it simply suggests a totally new aesthetic code.

Whatever its origin would be, computer-generated art carries the stamp of human creation, regardless of the degree of mediation made by and through the machine. It is our responsibility, and within our means, to master it, to make the best out of it.

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