

issue №6, December 2018

брой №6, декември 2018г.

CAx

САХ ТЕХНОЛОГИИ

технологии journal списание

ISSN 1314-9628

CAx technologies

- PLM
- CAD/CAM/CAE
- Intelligent Systems (incl. Web Intelligence)
- Modeling and Simulation
- E-Engineering with Internet Applications

- E-Learning
- Digital Humanities
- Business Management Systems
- CAx in Medicine
- Other



Computer Aided Technologies

GA Calculator

Calculations :-)

N	Name	Type	From	To	Period
1	c1	0	1	1	0
2	c2	0	2	10	0
3	c3	0	2	10	0
4	c4	0	2	10	0
5	c5	0	2	10	0
6	c6	0	2	10	0
7	c7	0	2	10	0
8	c8	0	2	10	0
9	c9	0	2	10	0
10	c10	0	2	10	0

Code snippet:
`$fitnesspro=$weight[$c1-1][$c2-1]+$weight[$c3-1]+$weight[$c3-1][$c4-1]+$weight[$c5-1]+$weight[$c5-1][$c6-1]+$weight[$c7-1]+$weight[$c7-1][$c8-1]+$weight[$c9-1]+$weight[$c9-1][$c10-1]+$weight`
`else {$fitnesspro=10000000000;}`

EDITORIAL BOARD

Honorary Chairman:

BOYANOV Kiril, Acad., DSc., *Bulgarian Academy of Sciences, Bulgaria*

Chairman:

TUDJAROV Boris, Prof., Dr., *Technical University of Sofia, Bulgaria*

Members:

ANDONOVA Anna, Assoc. Prof., Dr., *Technical University of Sofia, Bulgaria*

ANISIC Zoran, Prof., Dr., *University of Novi Sad, Serbia*

AOMURA Shigeru, Prof., Dr., *Tokyo Metropolitan University, Japan*

BUBENCHIKOV Aleksey, Prof., DSc., *Tomsk State University, Russia*

BOTZHEIM Janos, Assoc. Prof., Dr., *Tokyo Metropolitan University, Japan*

DURIDANOV Ludmil, Dr., *New Bulgarian University, Bulgaria*

GOTSEVA Daniela, Prof., Dr., *Technical University of Sofia, Bulgaria*

HRISTOV Valentin, Assoc. Prof., Dr., *Technical University of Sofia, Bulgaria*

IVANOV Stanislav, Assoc. Prof., Dr., *New Bulgarian University, Bulgaria*

KUBOTA Naoyuki, Prof., Dr., *Tokyo Metropolitan University, Japan*

LAZAROVA Milena, Prof., Dr., *Technical University of Sofia, Bulgaria*

LOO Chu Kiong, Prof., Dr., *University of Malaya, Malaysia*

MAHDY Hatam, Dr., *Future University, Sudan*

MITREV Rosen, Assoc. Prof., Dr., *Technical University of Sofia, Bulgaria*

MLADENOV Valeri, Prof., Dr., *Technical University of Sofia, Bulgaria*

NAKOV Ognyan, Prof., D.Sc., *Technical University of Sofia, Bulgaria*

NIKOLOVA Irena, Assoc. Prof., Dr., *Technical University of Sofia, Bulgaria*

PAPAKOSTAS Dimitrios, Prof., Dr., *Alexander Technological & Educational
Institute of Thessaloniki, Greece*

PENCHEV Vasil, Assoc. Prof., Dr., *Technical University of Sofia, Bulgaria*

PETKOVA Radka, Assoc. Prof., Dr., *Technical University of Sofia, Bulgaria*

SAVOV Simeon, Dr., *University of Mining and Geology "St. Ivan Rilski", Bulgaria*

SHTRAKOV Stanko, Assoc. Prof., Dr., *South-West University, Bulgaria*

TRIFONOV Roumen, Assoc. Prof., Dr., *Technical University of Sofia, Bulgaria*

TASHEV Tasho, Prof., Dr., *Technical University of Sofia, Bulgaria*

TATENO Toshitake, Assoc. Prof., Dr., *Meiji University, Japan*

YU Hui, Dr., *University of Portsmouth, United Kingdom*

The papers are reviewed by editorial board members and/or external reviewers.

Publisher: Technical University of Sofia, ISSN 1314-9628

Publisher Address: Bulgaria, Sofia 1000, Kliment Ohridski blvd. №8, Technical University of Sofia



Публикациите се рецензират от членове на редакцията колегия и/или външни рецензенти.

Издателство на Технически университет – София, ISSN 1314-9628
България, София 1000, бул. “Климент Охридски” №8, Технически университет – София



CONTENTS

1. **Evolution of programming languages** 5
Daniela Gotseva, Yavor Tomov, Petko Danov
2. **Mathematical modelling of a construction manipulator performing horizontal rectilinear motion** 11
Miroslava Ivanova
3. **Digital Humanities in the Age of Visual Immediacy** 27
Ludmil Duridanov
4. **Linearized mathematical model of a construction manipulator performing a horizontal rectilinear motion** 33
Rosen Mitrev, Miroslava Ivanova, Ivan Ivanov
5. **Design of system for remote control of electrical appliances over the Internet** 43
Aleksandar Hristov, Rumen Trifonov
6. **Experimental determination of the mechanical characteristics of laboratory jaw crusher with directly drive of the movable jaw** 49
Simeon Savov
7. **Random generation of four-bar linkages under Grashof's conditions for the needs of evolutionary optimization algorithms** 59
Boris Tudjarov
8. **Mathematical modelling of the dynamical behavior of a heavy manipulator with freely suspended payload** 65
Rosen Mitrev
9. **Windows calculator of Markov chain characteristics** 75
Valentin Hristov, Rosen Mitrev, Boris Tudjarov
10. **MySQL scripts evaluation with Moodle and Virtual Programming Lab** 83
Ivaylo Chenchev

- 11. About some experimental X3D applications for web-based modeling and simulation** 89
Boris Tudjarov, Valentin Hristov, Ivan Stankov
- 12. ICT evaluation in a learning process into classroom** 97
Amoussou Dorothee, Adelina Aleksieva-Petrova

Digital Humanities in the Age of Visual Immediacy

Ludmil Duridanov

New Bulgarian University, Sofia, Bulgaria
E-mail: duridanov@gmail.com

Abstract. *In the last decades a new web based visual language has been developed by young people 'grown up digital' who inhabit online spaces as their "first home" and have caused a "resurgence" of older social rituals to communicate. The multidisciplinary Digital Humanities program at New Bulgarian University embraces the challenge to explore the life of social algorithms which determine online migration and mechanisms of perception of crucial parts of daily life cycles both at home and at work. Recently created hybrid processes open various opportunities to navigate in collaboratively created online spaces, where project-based activities turned the DH program into a Creative Lab. Here learning-by-doing under the guidance of experienced lecturers with different background and philosophical reflections on "digitally born" aesthetics and ethics of the world to come go hand in hand, thus generating a "sacred marriage" between the two as a new vision for the future.*

Keywords: *Digital Humanities, Social Psychology, Artificial Intelligence, Digital Immigrants, Digital Natives, American Dream, Visual Communication, Visual Arts*

1. INTRODUCTION

During the last three decades the expanding internet technologies and social networking have changed the way we live in and things we take for granted. The 4.0 visual revolution – carried out to the next level of social interaction 4.0 by the 'digitally born' kids [8] – navigates on the waves of exponential growth of social technologies, based on the discoveries made in the previous centuries. The new visual language becomes a social elixir to drink at home and at the marketplace, because it merges familiar social rituals of older traditions. It touches upon the VIII. – VI. BC iconic language of vase and fresco painting, the so-called 'early free style' of Ancient Mediterranean cultures, developed by means of carving figures and designing sculptures; it experienced the sacred marriage of 6000 – 3500 BC Thracian script of amulets and 3500 – 400 BC Egyptian hieroglyphs, found in stone carving, gold armory design and sets of chalices. A turning point in the setting of that 'visual language of the East' was shaped through the Early Christian centuries, molded through V. – IX. AD Byzantine theological disputes and political fears about profaning the political vision [6] and culminated in the XVI. AD Russian Orthodox tradition of icon painting. Breaking up with the Gutenberg 'abstraction standards' of thinking developed by XIV. AD book printing and distribution, as well as with all the consequences following from the dominance of 'linear reading' since XVI. AD, the 4.0 social revolution released the "killer instinct" of socially bound trends and focused on a variety of visual ways to approach things 'on the beat'

wherein instant gratification developed 'fine-tuned' feedback visual signals to communicate micro-emotions.

2. THE 21ST CENTURY VISUAL LANGUAGE

The emotional shortcuts of a new generation of 'addictive technologies' are being embedded into each game scenario that furthers "playing the game" in close-to-real simulated environments since 2004. Social Media "earthquakes" and digital fluidity [8] work together as dynamic communication principles to evolve social interaction with friends "between *perception* and *experience*" ([29], 41; [30], 43), YouTuber Live Streaming Events and gamer communities. All that drives up the instant tension of being emotionally involved in a "world to come". The digital transparency of presenting things transforms traditionally developed social roles and turns the passively experienced reality into a pro-active immersive VR environment of a 'game playing kid'. By entering the "machine zone" ([5], 27; [14], 218) people experience the innocent pleasure of a child and "forget" about the physical or legal restrictions, becoming spontaneously responsive to a world beyond our "physically given" everyday life. Everything there sounds like a dream, because it is not real and carries a strong accent to disrupt the silo mentality of multinational corporations into a peer-to-peer networking "play zone" [19], [25].

Embracing the application challenges of emerging social technologies, the Digital Humanities program was introduced in 2014 at

New Bulgarian University and ever since it keeps exploring two American dreams, running side by side through globally distributed algorithms and digital services worldwide, by using the project-based approach:

- ✓ The first one – which takes up more and more place in everyday life – is the social revolution of the ‘digitally born’ kids who have migrated into the 3.0 / 4.0 digital spaces, building their ‘first home’ where they feel secure ([8]; [30],129) as a Minecraft scenario, with an upcoming romance to “get connected with friends and family”.
- ✓ The second one is running within globally distributed environments of optimized corporate production, sales and services developed by global players, such as Apple, IBM, Amazon, HP, Atos/Unify/Siemens etc. which also nourishes the golden romance of an American dream “to come”. Evolving in conservatively oriented social milieus, it is marked by cutting edge technologies, such as AI and embedded robotics, wherein “social interfaces” of distributed project collaboration are about to be aligned.

So, the first point, the Digital Humanities lecturers, research fellows and students at NBU are focused on, is to collaborate on the “extraction” of recent developments of a universally coined ‘visual language’. By using project-based activities as a turntable they get multidisciplinary processes described and categorized into the elaborated standards of the ‘digital immigrants’ whose first home is not – in 4.0 immersive virtual environments.

The crucial moment is to get the “extraction” of young students’ interactive behavior, with recently developed Pavlov reflexes of multitasking as an “operation tool” to communicate (with a missing out syndrome). Designing 2D / 3D simulated environments or web based mini-games brings to the fore the multi-skills, knowledge and ideas a ‘game playing kid’ requires in order to evolve and to produce a peer-to-peer “visual shortcut” of their behavior. The academic bridge between ‘digital immigrants’ and ‘digital natives’ is about to be built ‘on the beat’ connecting DH participants on all *three levels*:

- rapidly changing social technologies,
- experimental behavior, as well as
- intuitively developed everyday behavior of mobile communication users.

Working together on the manufacturing of “light products” synchronizes the cognitive processes on all three levels. We elaborated it as a ‘social algorithm’ to follow at the DH Lab where all the program participants collaborate after an idea has been initially introduced by the “proactive designer” who can be a student or a lecturer.

Starting with a vision (based on the [VR idea of the movie Disclosure, 1994](#)) to build a “hybrid model” of a digital library, where young people can meet online in virtual corridors searching for knowledge in 2D/3D simulated areas and game spaces as a “time travel” on a map/timeline, the Digital Humanities program at NBU has developed into a Creative Lab during the last three years. It faces the challenges of navigating between the useful “outdated model” of *HUMANITIES COMPUTING* and the mainstream of *DIGITIZING ARTS AND HUMANITIES* ([2], 40; [31], 9-22) exploring the “right steps” in *HUMANIZING BIG DATA* processes [32] as well as in the developing *AI ASSISTIVE TECHNOLOGIES* to help with suggested consumer choices. Google and Facebook algorithms are assisting users in modeling the ‘digital body language’ (as defined by psychologist [Vanessa van Edwards](#)), e.g. the visual modes to drive consumer attention on the web, referred to as ‘algorithm culture’ [28]. Exploring web user behavior [AI assistants](#) (Apple’s Siri, Amazon’s Alexa, Microsoft’s Cortana, [Google Duplex](#), [Roomba](#)) create ‘filter bubbles’ for everyone highlighting things they suggest as a “must-be-seen” [24]. The vision of the new language – explicitly proclaimed in word processing by WordStar (1978) and Microsoft Word (1983): “What you see is what you get” – touches upon older haptic and tactile channels of visual anthropology [13], [17]. It brings an update of social rituals and requires to be explored in the continuous context of civilization history, such as the one-hand two-finger touch, known as texting and defined recently as a “fingered speech” and a new language by Columbia University linguist [John McWhorter](#) [18]. Writing on a smartphone resp. holding it with two fingers appears to be one of the oldest intuitively developed human ‘mobile technologies’ (as stressed by John Napier [20], [21], [22]). The “separation” of thumb and index finger can be dated back to 380 million years ([35], 102; [1], 28), but it is only the human brain that has “created” the evolutionary aspects of a hand as a touch, multi-skills “mobile technology” (and a ‘main tool’ to write in the new visual language, incl. painting, writing “in images”, carving, sculpting, as well as other crucial acts, such as a multi-device for fighting, driving, cooking etc.). The smart

application of human hands has been recently updated with a hypnotically based, soft-touch 'smartphone technology' in the 21st century. The technological disclosure has not been tackled until now in experimental psychology and ICT research, even though the concept of the "visualization act" had already been assumed in IX. AD Byzantine context and Ancient Art Scholarship as a *Bildakt* ([11], 102; for a detailed study see Duridanov [6]). A few concerns have been expressed recently ([16], 36) focusing on the emerging changes in the hand by using computers, tablets and smartphones by psychologists as well as assumptions how they "swipe" the boundaries of one's spontaneously shaped identity as a 'transient object' today. Trapped in "science corridors" digital immigrants are scratching the surface of the hypnotic impact of the "well connected hand" which "does what it likes", as a Goldstein patient suggested around 100 years ago [12]. At the DH Creative Lab at NBU we are not just "intuitively" following the crumbles left by various disciplines and research approaches, to use a metaphor from the Hansel and Gretel fairy tale here. We navigate across disciplines to find out 'what's for real' and that covers our *final multidisciplinary objective*.

On the one side, web animation researchers and practitioners are bringing the 'digital natives' or justifiably said next generation 'digitally naïve' [9] students into the actual perspectives and provoke their ideas to set up the next "playground" under their guidance and show how "visual presence" in 3D environments could be followed (e.g. we can easily follow a virtual promenade with Boris Tudjarov's Android App, zoom in and out details, and make a stop by looking down with the 360° Virtual Reality glasses). Psychology and therapy lecturers (like Rumen Petrov, Ivo Popivanov and Methodi Koralov) assist by throwing light and explaining on the organization dynamics of social groups and project management processes. In their seminal discussions they are focused on the perceptual schematics and dynamics of the 21st century 'visual language' and its relevant mechanisms. The interdisciplinary field of cognitive psychology "playing with" sound, sight and motion to get 2D/3D storyboard and visual scenarios is conceiving a bunch of "Hollywood co-production" multi-skills. Introduced as Applied Media Aesthetics in the early 1970-ies by UCL California professor and camera man, Herbert Zettl, the interdisciplinary concept evolved over the last 40 years in the [eight editions of his groundbreaking book](#).

One of the interesting DH Creative Lab initiatives is to look for satisfactory 'uncanny valley' animated solutions for children with Autism Spectrum Disorders (as often stressed during seminal discussions with our late DH lecturer Tsvetomora Nikolova; for a detailed study see her [monograph \[23\]](#)). The usual way to approach the "uncanny abyss" between natural human visuals and technologically simulated ones as in Pixar movies do not comply with their specifically tuned perceptions. ASD kids often perceive human emotional expressions as disturbing and "messy", because of the oversensitive "zooming effect" of certain emotional features, and miss the point to recognize their meaning "as a whole", i.e. to identify it as a basic emotion. Since 2018 we have been working on catching with a cam of relevant "instant stories", aiming to highlight socially relevant real-life emotions (joy, anger, sadness, surprise). The inception of our idea follows a peer-to-peer suggestion by Ani Andonova as ASD therapy savvy and founding Director of an ASD daily therapy center in Sofia. Step by step we are developing the "building blocks" – relevant to set up an educational game played on a smartphone or tablet by ASD children to "learn" basic emotions of human behavior. Appropriate synchronization of ALL THREE COGNITIVE LEVELS is a strong issue, so that the ASD kids can discover all dimensions "simulated" as in real life (not isolated as in a science lab):

- THE VISUAL LANGUAGE containing facial expressions, relevant hand gestures and body motions, whereby relevant signals spotted as flashing micro-gestures are crucial for the lead perception of ASD kids.
- THE HUMAN VOICE – SOUNDING NATURALLY (not a computer simulated voice) is a "strong accent" of our game, opposed to the choice of a "virtual tutor" of ASD children with a computer-synthesized voice (as conceived by the Oregon University project [7], 92). The 'natural voice' of a young DH female student being recorded with the words (sad, happy, angry, surprised) points out the emotional context. It has also been considered as a "good solution" after reflecting also on the Google team solution to set up a 'natural voice' of a Google Assistant supported by a variety of native voice speaker recordings.
- THE ABSTRACT COGNITIVE DETECTION is "double-secured" by an *emoticon* – which is really hard to be detected by ASD kids – and a *written word* (sad, happy, angry, surprised) flashing below as a "subtitle" in the learning mode. This is also backed by

another double-securing case back in the Byzantine history, where the visualization act of icon-painting was completed with an epigraphic 'name inscription' ([27], 226) to avoid confusion and 'recognition errors'. That way the 'visual language' of the icons has "bound" *abstract writing* and *painting* by "indexing" them with an *identity stamp* ([6], 116-117).

Supporting the visual language of the game, we produced a small animated girl joyfully jumping up and exclaiming "Bravo!" (with the recorded voice of our DH student, Stefana Sardareva) as instant gratification for the ASD kid succeeding to recognize the basic emotion by "reading" the body language in the video recorded "instant story".

Bridging the "uncanny abyss" of interactive gamer perception is another focus of our DH program. History is a "serious narrative", because it "retells about things that have happened" (assumingly we trust Aristotle's standpoint in his *Poetics*, Ch. 9). But we have to deal with a variety of its "distorting mirrors" which display differently the moment of our choice, e.g. the global times before the Trojan war (as the "First Global War" in World History). Approaching the stories about the legendary travels of the Argonauts we "clean up" the visuals (vase-paintings, ritualistic cups and dishes, frescoes, sculpted monuments, stone carvings, inscriptions, tomb plates and architectural settings). Parallel to that our efforts are focused on the various levels of digital storytelling of the selected game events. We build accompanying mythological narratives using the method of extraction of "direct evidences", evaluation of "indirect stories" and inception of a modern myth about history ([26], 19-23) "after the end of the grand narrative" ([30], 43). The "dressing style" of the game characters should be authentic (following the "science update" on the selected source data) and ensure a "game compliance" between "statically selected" *plot* and *dynamic storyboard* as well as *dynamic dialog interaction* following the rules of object-oriented programming and gamers' aesthetic perception (which equals an *Overton window* primed by playing within immersive game environments). Keeping that in mind we could suggest how a magical character, such as Orpheus (who equals a prophet like Moses) would look like with a fancy haircut, historically authentic hat and a dress, "hacking" the 'uncanny valley' feeling. Would it be more appropriate to stick to "direct evidences"?

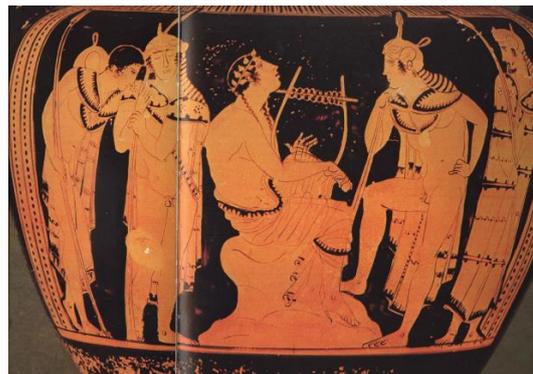


Fig. 1 Typical "direct evidence":
Orpheus playing the lyre
(Ancient Greek vase, ca. 450 BC)

Does a historically authentic popular "direct evidence" prompt a gamer or better said, can *science data* provoke gamer's spontaneous responsiveness without being artistically "invented" like that?



Fig. 2 and 3 Thracian Orpheus "invented" for the game / designed by our DH student Diyana Tsenova (following Ancient "direct evidence")

How do Ancient Greek and Roman Times lend a helping hand to jump over the 'uncanny valley'? Has the 'visual language' of the Late Roman Empire not continued to be a "living dialect" of our 21st century games' perceptual schematics and dynamics? How can flying "uncanny creatures", such as the mythical sirens, "seduce" gamers if they are used to "seeing them" with fish tails, having received a sexy half-maiden - half-fish design since the VII. – VIII. AD ([10], 50-51):



Fig. 4, 5 and 6 Sirens designed for the game by our DH student Diyana Tsenova (following authentic Ancient visuals)

Would a visual compromise combining a fish tail and wings be a better solution to “jump” over the ‘uncanny abyss’?



Fig. 7 Siren with wings and dragon tails (Rouen/France, ca. 1510 - *Les abus du monde*)

3. CONCLUSION

Speaking about Digital Humanities we will be missing the point if we do not consider the bigger picture justifiably framed by the French-Canadian historian at the Sorbonne, [Milad Doueïhi](#) ([3], [4]) wherein the social life of digital capital within exponentially expanding digital economy prompts a variety of ‘embedded social constraints’ of everyday life on the wings of rapidly introduced smart technologies. In the context of history [LA GRANDE CONVERSION NUMÉRIQUE](#) as highlighted by Milad Doueïhi and [REASSEMBLING THE SOCIAL](#) as an iteratively functioning NETWORK CULTURE analyzed by French sociologist at the Sorbonne, [Bruno Latour](#) [15] reminds the inception of a modern language “implicitly created” by Martin Luther for a globally functioning banking system during his “Bible translation” stay in the Wartburg castle. Interdisciplinary reading of Max Weber’s sociological ideas, left as the “Hansel and Gretel crumbles” in his *Protestant Ethics* [33], could easily bring us to land on a “reconstruction” of the big picture. Our DH Creative Lab is not merely prompting a collaborative environment as a MULTIDISCIPLINARY WORKSHOP. It is a place where lecturers and students with a different professional background have connected their joint efforts on reflecting about the essentials of a “digitally born” applied aesthetics within organically expanding 21st century communication trends. They are flagging the ethics of a new social belief that anyone is involved in this matter and actively participates in the global changes by the way they live and “program” things at digitally migrating work and home places. The anthropological perspective of having a “first life” by inhabiting (not just visiting)

online spaces already transpires. It is not about “reversing” the way we (*digital immigrants*) approach and do social engineering in science and culture, but just about *altering* it in a “hybrid version” so that we can feel, share and communicate pro-actively with the next well-connected ‘digitally naïve’ generation to come by enhancing a *permanently developing visual language*.

REFERENCES:

1. Bergman, J., The Human Hand: Perfectly Designed, *Creation Research Society Quarterly* 2013, No. 50, 25–31.
2. Berry, D., Fagerjord, A., *Digital Humanities: Knowledge and Critique in a Digital Age*, Polity Press, Cambridge 2017.
3. Doueïhi, M., *La grande conversion numérique*, Seuil, Paris 2008. [annotated Bulgarian translation by our DH lecturer Vladimir Marinov, Golemijat digitalen obrat, NBU, Sofia 2011]
4. Doueïhi, M., *Pour un humanisme numérique*, Seuil, Paris 2011.
5. Dow-Schüll, N., *Addiction by Design. Machine Gambling in Las Vegas*, Princeton University Press 2012.
6. Duridanov, L., [Ein Paradox des Ikonoklasmus. Das ursprüngliche Bedeutungsfeld von GRAPHEIN](#), Zornitza Verlag, Plovdiv 2001.
7. Duridanov, L., Giagtzidou, A., Tsenova, D., Ivanov, Iv., [Education Sentimentale of Game Playing ASD Kids](#), *Proceedings of the National Conference on "Education and Research in the Information Society"*, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Association for the Development of the Information Society, Plovdiv, 2017, 89-97.
8. Duridanov, L., [Getting Immersed in the 21st Century #Digital #Fluidity with BA Minors Across Disciplines](#). *NBU Yearbook Telecommunications* 2018, vol. 5, 2018, 110-118.
9. Friedrich, A., *Digital Naive. Der Digitale Wandel in Unternehmen aus der Sicht des soziologischen Neo-Institutionalismus*, 2016.
10. Gerdjikova, V., *Uncanny Magic and Image Shift of the Mythical Sirens*, *Studia Balcanica* Vol. 31 *Mirabilia: Wonders and Beasts*, Sofia 2016, 46-60. [Bulgarian]
11. Gladigow, B., *Epiphanie, Statuette, Kultbild. Griechische Gottesvorstellungen im Wechsel von Kontext und Medium*, *Visible Religion, vol. 7. Genres in Visual Representations*, Leiden / New York 1990, 98-121.
12. Goldstein, K., Gelb, A., *Psychologische Analysen hirnpathologischer Fälle*, Barth Verlag, Leipzig 1920.
13. Kirschenbaum, M., *Track Changes. A Literary History of Word Processing*, Harvard University Press 2016.
14. Kucklick, Chr., *Die granulare Gesellschaft. Wie das Digitale unsere Wirklichkeit auflöst*, Ullstein Verlag, 2016² Berlin.
15. Latour, Br., [Reassembling the social. An Introduction to Actor-Network-Theory](#), Oxford University Press, New York 2005.
16. Leader, D., *Hands: What We Do with Them – and Why*, Penguin, New York 2016.
17. Manovich, L., *Software takes command: extending the language of new media*, Bloomsbury, London, New York 2013.
18. McWhorter, J., *The Language Hoax. Why the World Looks the Same in Any Language*, Oxford University Press, New York 2014.
19. Mohapeloa, T., [Effects of silo mentality on corporate ITC's business model](#), *Proceedings of the 11th International Conference on Business Excellence*, Walter de Gruyter, Berlin, New York 2017, 1009-1019.
20. Napier, J. *The Prehensile movements of the human hand*, *Journal of Bone and Joint Surgery*, Vol. 38B, No. 4 (November 1956), 902-913.
21. Napier, J., *The Evolution of the Hand*, *Scientific American*, Vol. 207, No. 6 (December 1962), 56-65.
22. Napier, J., *Hands*, Revised by Russell Tuttle, Princeton University Press 1993².

23. Nikolova, T., The Hypothesis of the 'uncanny valley' and the animation cinema, NBU Sofia 2014. [Bulgarian]
24. Pariser, E., The Filter Bubble: What the internet is hiding from you, Penguin, New York 2011.
25. Ribeiro, Fr., Giacomani, A., Trantham, M., [Dealing with market disruption. Seven strategies for breaking down silos](#), PricewaterhouseCoopers Executive Summary, London 2016.
26. Rushkoff, D., Present Shock: When Everything Happens Now, Penguin, New York 2013.
27. Schönborn, Chr. v., L'icône du Christ. Fondements théologiques élaborés entre le I. et le II. Concile de Nicée (325-787), Éditions universitaires Fribourg/Suisse 1976.
28. Seyfert, R., Roberge, J., Algorithmenkulturen. Über die rechnerische Konstruktion der Wirklichkeit, Transcript Verlag, Bielefeld 2017.
29. Simanowski, R., Abfall. Das alternative ABC der neuen Medien, Mathes & Seitz Verlag, Berlin 2017.
30. Simanowski, R., Facebook Society. Losing Ourselves in Sharing Ourselves, Translated by Susan H. Gillespie, Columbia University Press, New York 2018.
31. Smithies, J., The Digital Humanities and the Digital Modern, Palgrave Macmillan Publishers, London 2017.
32. Strong, C., Humanizing Big Data: Marketing at the Meeting of Data, Social Science and Consumer Insight, Kogan Page Ltd., London, Philadelphia 2015.
33. Weber, M., [The Protestant Ethics and the Spirit of Capitalism](#), translated by Talcott Parsons, Routledge, New York 2001³.
34. Zettl, H., [Sound – Sight – Motion. Applied Media Aesthetics, Cengage Learning](#), San Francisco State University 2017(8th ed.).
35. Zimmer, C. 2012. The common hand. *National Geographic* 221 (5), 98–105.