

GLOBAL STANDARDS AND LOCAL SOLUTIONS: DANCE-AND-TECHNOLOGY PROJECTS OF PATRYK LICHOTA

A lack of funds can trigger unexpected creativity in technology and dance, including digital dance. Enforced self-sufficiency translates into a rise of cheap and simultaneously non-conventional technological solutions. As a result, artistic projects are often grass-roots initiatives of artistic collectives, which have to provide their own equipment — inexpensive and readily available tools and devices.

To illustrate this tendency, I would like to discuss dance-and-technology projects of Polish musician and multimedia artist Patryk Lichota, whose work and approach to art are deeply embedded in the DIY (do-it-yourself) ethic. “Designing controllers, instruments and sound mechanisms is one of the most developed tendencies among young artists,” claims Michał Krawczak (2014, p. 234). And he adds: “Self-making is a form of critical analysis, a strategy of cognition and of learning techno-culture” (p. 232). In his digital dance performances, Lichota harnesses technology to depict scientific discoveries and ideas. To achieve this goal, he employs devices designed for industrial and medical use. He tests different types of body-machine connection, inquiring about the possible benefits of these connections and exploring various dimensions of technology’s agency. As such, he can be considered a member of the “maker culture” (Hatch, 2014). What should not be overlooked, however, is a considerable impact of the socio-economic conjuncture on his creative practices.

DANCE AND TECHNOLOGY IN POLAND

Since 1989, Poland has witnessed a lot of changes. Joining the global system of economy and communication has deeply reshaped Poland’s cultural policies. Art is one of the institutions most thoroughly affected by the far-reaching transformations. In Western societies, new paradigms and aesthetic models were born during the cultural revolution of the 1960s. At that time, Polish cultural policies were deeply interwoven with those launched by the Soviet Union. Consequently, as Polish dance critic and curator Joanna Leśnierowska claims, “the only form of dance which was approved by the communist authorities was the classic Soviet ballet; there was no place for contemporary dance — one of the most democratic forms of art, associated with expression of individuality” (Leśnierowska, 2007, p. 328). As a result, dance in Poland is not popularly un-

derstood as an open and inclusive field of experimentation, or as a tool of cultural critique, but mostly as an unintelligible, sophisticated, and exclusive form of artistic (self-)expression. That makes the situation of artists seeking to combine the art of dance with new technologies even more complicated.

Above all, properly equipped research or rehearsal studios are few and far between in academic and artistic institutions, with what are referred to as “intelligent stage installations” even less available. This deficit goes hand in hand with challenges of fund-raising for independent interdisciplinary art projects. The major source of institutional support is provided by open competitions held by the Ministry of Culture and National Heritage. There are five official categories of artistic events, and many of the intermedia, multimedia, or transmedia art projects are hard pressed to meet the institutional criteria established for particular disciplines of art. At the same time, as the transparency of grant-awarding rules in regional and municipal competitions tends to be insufficient, funding often depends on the artists’ position in the local network of connections. Also, the practices of both private sponsorship in arts¹ and collaboration with computer companies are rather poorly developed. Since dance is not perceived as a cognitive practice, scientific laboratories rarely welcome collaborative science-and-art project involving researchers and choreographers. This prejudice is reproduced on the level of personal engagement: engineers and technology students rarely initiate interdisciplinary projects. An apparently universal diagnosis that “we live in the laboratory age” (Birringer, 2008, p. XXIV) does not seem to fit Polish realities.

To sum up, art and science projects are often developed with little or no external funding. As a consequence, producing digital dance performances turns into a grass-roots enterprise, and is obviously a huge challenge for the whole artistic team. Artists have to make the grade: to provide their own tools, various devices, and advanced software. Of course, despite all these difficulties, there are choreographers, dancers, and artistic collectives that take up the challenge of producing multimedia dance performances. Importantly, their number is constantly growing. Artists involved in these multimedia performances need access to relatively advanced stage infrastructure. When such access is lacking, they can respond in a variety of ways, but the two most common reactions are: either the artists decide to use easily accessible technologies of audio-visual projections, or they are stimulated by the scarcity of resources to experiment with home-made technology. The DIY ethos of the maker culture enters into an alliance with the need for creativity triggered by economic deficiency.

¹ The *Old Brewery New Dance* program initiated by Grażyna Kulczyk’s Art Stations Foundation in Poznan in 2004 is a notable exception.

The latter response appears when the artists not only want to enhance the (audio)visual layer of performance, but above all yearn to create an interactive space which is capable of embracing both the bodies and the technologies. Johannes Birringer recognizes five types of environments evolving in dance: interactive, immersive, networked, derived, and mixed reality environments (Birringer, 2003, p. 96). All technologies, devices, and strategies used in these environments constitute the global standard for dance and technology production. This is an important point of departure, because Birringer's classification helps us to situate the strategies and achievements of Polish dance artists in a wider context of the evolution of interrelations between dance and technology. Immersive environments require the most advanced technologies and more funding; networked environments (telepresence, videoconferencing, and telerobotics) and derived environments (motion capture-based reanimations of bodily movements) require broadband data transmission, among other things, and therefore are not achievable on every would-be stage.

The cheapest and most popular are interactive environments based on physical computing (use of sensors and microcontrollers to translate analog inputs to a software system, and to control devices and environments). Artists harness common and readily available devices to track motion, process the obtained data, and finally convert it into audiovisuals, usually in real time. The interaction takes place between the performer's body and the audiovisuals, with the interfaces provided by devices such as Wii Remote controllers used in *!GROT!* (2014) by Irena Lipińska, Paweł Janicki, and Magdalena Zamorska, or a popular Kinect motion sensor used in *frictionmakesfrictionmakers* (2013) by Ola Osowicz, Valentina Parlato, Patrick K.-H., and Oleg Makarov. There are also cyberdance projects involving audience interaction. The audience not only watches the mediatized performances, but also influences stage actions using chat applications. For example, in 2008, Paweł Passini and Tomasz Bazan staged *Taniec znaku — improwizacja butoh* (*Dance of the Sign — a Butoh Improvisation*). The performance was transmitted in real time, as were the performances of the Ja Ja Ja Ne Ne Ne collective (Magdalena Tuka and Anita Wach) — *Scenes of Vice, Horror, and Ecstasy* (2014) and *Webcam Girls of the Apocalypse* (2015, work in progress). Some artists use technology to explore the issue of image fragmentation and, more generally, voyeurism. A good example could be *LIVE BOX* (2008) by choreographer and dancer Konrad Jan Szymański and multimedia artist Michał Osowski. The dancer stays in the box, and the audience is given a choice: to participate in the performance by observing his actions through small holes with optical systems inside and windows with colored filters, or to watch a screen projection of video stills recorded inside the box. In both options, the perceived image is fragmented and deformed. Another example could be *MONadOLOGIA: Traktat o relacyjności* (*MONadOLOGY: A Treatise on Relationality*, 2014) by Aleksandra Hirszfeld, Marta Ziólek, and

Krzysztof Syruć. The dance performance, object-and-architecture construction, light, sound, and augmented reality installations make up an extensive project aimed to depict a dense network of interactions between human beings and the city. There are also collaborative projects with musicians working in the field of electro-acoustic, minimal, and generative music, whose main practice is employing moving bodies as a source of the performance's soundscape created in real time, such as in *Dancing for the Birds, They Watching Us* (2013) by Magdalena Przybysz and Sergej Maingardt.

In comparison to the solutions applied in these projects, Patryk Lichota's approach is quite exceptional. As a contemporary composer and musician — playing the saxophone, theremin, zither, bass guitar, and laptop — he is particularly interested in digital techniques of sound organization. He also experiments in the field of sound-and-image processing. In his recent projects, Lichota has introduced another instrument — a moving body. Interested in human perceptual and cognitive processes, he has created experimental stage environments: a sound-and-image feedback machine (*Strange Lóóp*, 2010), artificial skin made of light (*Lightskin*, 2013), a simple “responsive environment” (*AUDFIT*, 2014), and invisible architecture (*Echoclickers*, 2014).

Like other contemporary artists, Lichota explores the theme of coexistence and cooperation of human and non-human agents. His home-made technological systems choreograph the bodies of performers. The merging of the biological and the artificial raises questions about the authorship of the movement score. Who is the choreographer? Is it the dancer herself, or is it the technology? What is the status of the body then? Does it fade, or does it become just an automaton, a marionette? Or, perhaps the machine's soul obtains an opportunity of embodiment. Does the dancer share the agency with the machine, and therefore it is the cybernetic organism that is the actual performer? The classification proposed by Jennifer Parker-Starbuck (2011) might be very enlightening here. She proposes “a model akin to a strand of DNA, two thick threads — body and technology — twisting in a dance of mutual dependency” (Parker-Starbuck, 2011, p. 58). Analyzing the various modes of body-technology entanglement, she tracks the status of the body strand as well as that of technology. She recognizes three approaches to the bodies' presence in digital performances. The object bodies are the ones intended to be wiped out, made invisible, or in fact “disembodied.” The object bodies are defined as tools, empty bowels, or marionettes that serve the technology. Finally, she describes the subject bodies as

the already embodied intertwinements of cultural and somatic notions of bodies, bodies that are understood not solely through the ideas filtered through them, not overlooked or resisting disappearance, but bodies that, when subjected, emerge regardless to claim agency on stage, bodies that carry their own weight on stage amidst largely immersive technological landscapes. (Parker-Starbuck, 2011, p. 65)

Parker-Starbuck's model is a perfect point of reference for a soma-centric analysis of Lichota's dance projects.

PHYSICAL COMPUTING AND THE DANCER'S PRACTICE

While making use of interactive technology, Lichota does not aim to enrich dance performance aesthetically or formally. The reasons why technological implementations appear are usually conceptual and cognitive. The starting points for most of his projects are important issues of contemporary sciences and humanities, such as the philosophical theory of knowledge, the usability of interactive prostheses, or various modes of space perception. He creatively harnesses devices designed and produced for industrial and medical application, and also designs home-made interactive systems. Little by little, he is becoming a highly competent player in the field of home-made technology. His technological sets cannot be considered highly developed, but are very advanced in terms of home-made, DIY technology. His dance-and-technology projects require interdisciplinary collaborations with engineers and regular consultation from academics. Cooperation across disciplines is important due to the complexity of the issues dealt with in the performances as well as the advancement of the necessary tools.

Strange Lóóp (2010), developed in cooperation with dancers Marta Romaszkan and Magdalena Przybysz, is an interactive environment. The main inspiration for the performance was the phenomenon of feedback loops, a category essential to Douglas Hofstadter's theory of embodied mind (Hofstadter, 1979; Hofstadter, 2007). The author explains perception as a dynamic system of self-reconstructive elements responding to constantly changing environmental stimuli. He posits that consciousness emerges as a consequence of the evolutionary adaptation strategy: the neural system creates connections that strengthen whenever they are being employed. The more often something happens, the stronger the neural circuits are. Output signals alter input signals and circulate in a loop. Neural loops (circuits) contain additional information about how the perception system operates. Our consciousness emerges from metacognition — knowledge of the perception-and-cognition process — and should be understood as an epiphenomenon based on these feedback loops. Strange loops let consciousness recognize the way it functions. In the end, we can conceive the whole system as a body-environment organism.

Lichota interprets this concept using artistic means. To make the above-mentioned phenomenon more clear, cognitive scientists and theoreticians of contemporary culture were invited to the project. Before the shows, Edwin Bendyk, Tomasz Komendziński, Łukasz Przybylski, and Agnieszka Jelewska gave talks about Hofstadter's idea of a strange loop, the workings of the per-

ceptual and cognitive system, and the intersections of art, science, and technology. These lectures are important element of each and every performance.

The main goal of the performance is to demonstrate how human self-consciousness emerges from feedback loops. Therefore, the creative process has two principal aims. One is to trigger the audio-visual feedback loop, and the other is to create a narrative telling the story of the emergence of self-consciousness. Since perception is based on the actions of our bodies (mind is embodied), the concept behind the performance is movement as a depiction of the mind's workings. As the artist claims, "the stage design serves as an identification map, a model of perception" (Lichota, 2014, interview). The dramaturgy of the *Strange Lóóp* performance is designed to mirror the complicated process of stimuli-reaction in our neural systems. The feedback loops that members of the audience watch mirror the internal workings of the human neural system. Therefore, the audience witnesses the following stages of consciousness emergence: discovery of cognitive mechanisms and identification of space, one's own Self, and other people's subjectivity.

To prepare the technical equipment, the artists collaborated with the CAMSAT Company, which had indispensable tools — transmitters — to offer. The CAMSAT engineers explained not only how to use the devices, but also exactly how they worked. The artists report that the team was truly amazed and fascinated with the way the artists planned to use the products (Lichota, 2014, interview; Romaszkan, 2014, interview). Technologically, the performance was based on a complex system of devices working in loops. Lichota programmed video-and-sound feedback modulated in real time by two dancers' movement. The dancing bodies were accompanied by audiovisuals created in real time. "Two dancers are equipped with extended senses: camera-eyes and microphone-ears, their movement on stage triggering the feedback of live sound and moving image. The point of reference is a centrally placed speaker, which serves as a primary sound source — creating a relationship axis with the dancers. The parameters of the audio feedback are constantly altered by the dancers' movement through space" (Lichota, 2010^{website}).

The technologically augmented body could be considered cybernetic. It is a component of a complex system assembled of the body, computers, cameras, microphones, mixers, transmitters, speakers, and projectors, as well as wireless receivers, light-emitting diodes, LED tapes, neon rods, and meters of cable. The cyborg-dancers perform in feedback loops, with the environment determining the course of the performance. The sensorium is the membrane or the bio-interface. The body is a source of actions that change sound and vision while the new shape and behavior of the environment influence, in turn, the state and actions of the body. Technology deeply interferes with the dancers' actions. The dancers' bodies are patched (analogically to the term ap-

plied to computer music): “the technological patch modifies the qualities of the movement” (Lichota, 2014, interview).

As Romaszkan remarked, *Strange Lóóp* should be considered not simply a technology-based performance, but rather a meta-performance about technology itself, its function and capriciousness (Romaszkan, 2014, interview). At the beginning, the dancers attempted to understand how the technology works. The in-depth knowledge they acquired of the machinery applied caused them to give up initial attempts to choreograph a coherent narrative or expressive phrases. The scores they were working on appeared to be contradictory to the overall concept of the performance’s structure. The need to depict the idea of a strange loop by means of dance outweighed the dancers’ efforts to create a dramaturgically consistent performance (Przybysz, 2014, interview). Technological and conceptual requirements set the framework for dance improvisation. On the one hand, it restricted the dancers’ freedom, but on the other it induced a search for uncharacteristic, non-standard movements. They relied on their shared practical interest in specific movements of eastern martial arts, and choreographed the performance in real time. As Lichota claims, in the final version the improvised dance movement and dance partnering overlapped with functional movement (Lichota, 2014, interview).



Figure 1. *Strange Lóóp*, 2010. Photo: Andrzej Majos. Courtesy the artist.

Another example of cross-disciplinary mobility is collective work on the *AUDFIT* performance (2014). Lichota invited Romaszkan and automatics and cybernetics engineer Krystian Klimowski, who works in the field of physical computing and neuroprosthetics (e.g., muscle stimulators), to collaborate. Klimowski is also a theoretician interested in bio-feedback, HCI, Brain-Computer Interfaces, Functional Electro Stimulation, bionics, and cognition.

The goal of the project was sonification of movement — transformation of the moving body into a musical bio-instrument. In the early 20th century, Émile Jaques-Dalcroze studied the connection between sound and movement. Although he developed his eurhythmics as a method of musical education, it has had a far wider impact, particularly on European dance. As Percy B. Ingham (1915, p. 32) noted, “the aim of the training was to form means of expression, without consideration of what was to be expressed, to produce a highly trained instrument.” Body music certainly has a much longer history. Spanish researcher Francisco Javier Romero Naranjo has been exploring and publishing on body percussion for the last ten years. In his recent paper (Romero, 2013), he dates its foundation back to prehistoric times, and goes on to give a thorough review of the issue in academic literature including ethnography, dance studies, musical pedagogy, and neuroscience. Currently, in developmental, evolutionary, and neuropsychology, there is a growing number of studies devoted to innate musicality and the theory of communicative musicality (Malloch & Trevarthen, 2009). Another context for artistic experiments with movement sonification today is the rapid growth of bioelectronic engineering, including bioinstrumentation methods in medicine and neurosciences.

The *AUDFIT* performance is based on the application of physical computing to art. For the performance, Klimowski designed “an audfit” — an intelligent costume capable of reading dynamic changes in the position of the dancer’s body. With the help of nine wireless movement sensors, the numeric value of a movement’s vector was measured in three axes, and the obtained data was used to generate sound in real time. As Lichota announced, in the final version the data will also serve to create “a virtual body-map projected on the screen” (Lichota, 2014, interview). The technology used in performance could be described as a kind of motion capture. It has become customary to think about motion capture in visual terms: recorded actions become the matrix for moving, two-or-three-dimensional images (animations). In Lichota’s performance, the captured movement gets its aural representation (sounds) in real time. The movement sensors communicate wirelessly with the computer. Every movement or gesture is transformed into a different sound. The distance between the sensors mounted on the dancer’s body and the computer, and the changes in body position influence the strength of the connection. It demands constant vigilance from the dancer. The spatial situation (the distance and the body position) has a con-

siderable impact on the audibility, and hence on the dancer's choice of movements and gestures. While preparing the choreographic score, the dancer had to choose those arousing the strongest musical sensations. Acoustic requirements prevailed over free movement expression.

The performance's special value is the technique that serves to engage the audience. Members of the audience wear wireless Silent Disco headphones with transmitters equipped with three buttons corresponding to three sound tracks. The sound in each channel is based on the same, but differently processed data. The source of the sound is the dancer's body movement, but the spectators themselves choose the most preferable sonic environment accompanying the dance. This is a great tool in helping the audience to understand how deeply the sound changes the experience of the whole work.



Figure 2. *AUDFIT*, 2014. Photo: Jan Sadoch. Courtesy the artist.

Lichota is also interested in public space interventions. With *Lightskin* (2013), he took on the challenge of revitalizing space by means of performance. The event always takes place in abandoned city spaces after nightfall. The dancer (Marta Romaszkan) wears a light-costume fitted with thirty-six light channels. It is made of Lycra, with light-emitting diodes, LED tapes, three flexible neon rods, meters of cable, and a wireless DMX receiver with an aerial (conventionally used in drones). All the lights are connected to a power pack, and the costume communicates

wirelessly with a computer. Light is transferred to the costume of the dancer. Lichota adjusts the light and the sound in real time, synchronizing them with the dancer's body movement.

The design of this site-specific performance emerges from the interaction of four elements: the body, the light, the sound, and the architecture. At first glance, the body is wiped out: it disappears behind the beams of light, and organic sounds, such as breathing and thumping, are drowned out. But although it is almost invisible and inaudible, the body remains essential to the performance. By means of light diodes, tapes, and rods, the body is defined in its rudimentary form, just as in motion capture-based animations. "The light composition is the dancer's exoskeleton, a virtual body-map" (Lichota, 2014, interview). The artists pre-designed sixteen movement-light-sound sequences for the performance. At the beginning, they studied the possible arrangements of diodes, rods, and tapes embedded in the costume, looking for visually evocative patterns.

The dancer sets the light-exoskeleton in motion. Moving, she not only paints the environment with light beams, but also rearranges the architectural structure. She is a choreographer and a stage designer at the same time. Light and shadows reveal and obscure fragments of the architecture, the audience, and the dancer herself; the space and the bodies subsequently fall apart, and then defragment once again. The process of creating dance movements is, therefore, very intricate: when the dancer changes the dynamics of her body and its trajectory through space, the stage design alters. Her dance competence is employed not to inhabit, but to create the space.

In *Lightskin*, artists aim to stimulate the audience's perceptual system. The light *staccato* disrupts the continuity of the performer's presence. At the same time, the movement of the light-body affects the existing space, and creates a new space disturbing the viewer's perception of the surroundings. The interplay between the biological (the dancing body) and the technological (light and sound) deforms and re-forms the local space design and puts it in a state of constant flow. The place and the participants become an "elastic and active tissue" (Lichota, 2014, interview). The dance of the technologically augmented body re-creates forgotten urban spaces and makes them mobile and alive.



Figure 3. *Lightskin*, 2013. Photo: Krzysztof Wierzbicki. Courtesy the artist.

In another site-specific project, *Echoclickers* (2014), Lichota tries to create posthuman bodies that inherit the attributes of a human, an animal, and a machine. It was inspired by the workings of biosonar, particularly in bats. Importantly, there are also a growing number of blind people who have learned to echolocate as a substitute for their lost sense of sight. The aim of the performance is to provide the dancers with additional technological sensory prostheses.

The performers (Marta Romaszkan, Asia Gronek, and Krystyna Szydłowska) have their eyes covered, and wireless echolocators (kinetic loudspeakers and radio receivers) are installed on their bodies. Programmed in real time, sound structures (short and sharp sounds) are wirelessly transmitted from the computer to the body-mounted receivers. Clicks coming from the loudspeakers rebound off the surrounding objects and back to the dancers. Each of the three dancers is assigned specific tones of clicks. This unique code helps them to identify their own acoustic rebounds. They have also learned several warning sounds, e.g., sounds signaling information such as “you are approaching a pillar.”

Each dancer’s movement trajectory is calculated on the basis of the rebounded acoustic waves. They dance blindfolded, and the sound stimuli lead them through the space. The choreographic score is created in real time, and the quality and uniqueness of the performers’ movements reflect the technique and style preferred by each of them. Lichota takes care of the global topography of movement.

Technology subdues the bodies; the dancers are marionettes. The puppeteer uses sound instead of strings to control them: during the performance false communication creates a virtual space and leads the dancers through it. The architecture of the surroundings drawn with sound impulses is not an equivalent of the physical architecture. Having their eyes covered, the dancers remain in a reality consisting only of images of the surrounding architecture and objects. In *Echoclickers*, the artist problematizes the perception of space. The dancers move through the non-existing, unstable, and liquid surroundings. Lichota questions one's ability to recognize what is real, but in this case the performer's mind and body become the laboratory space.

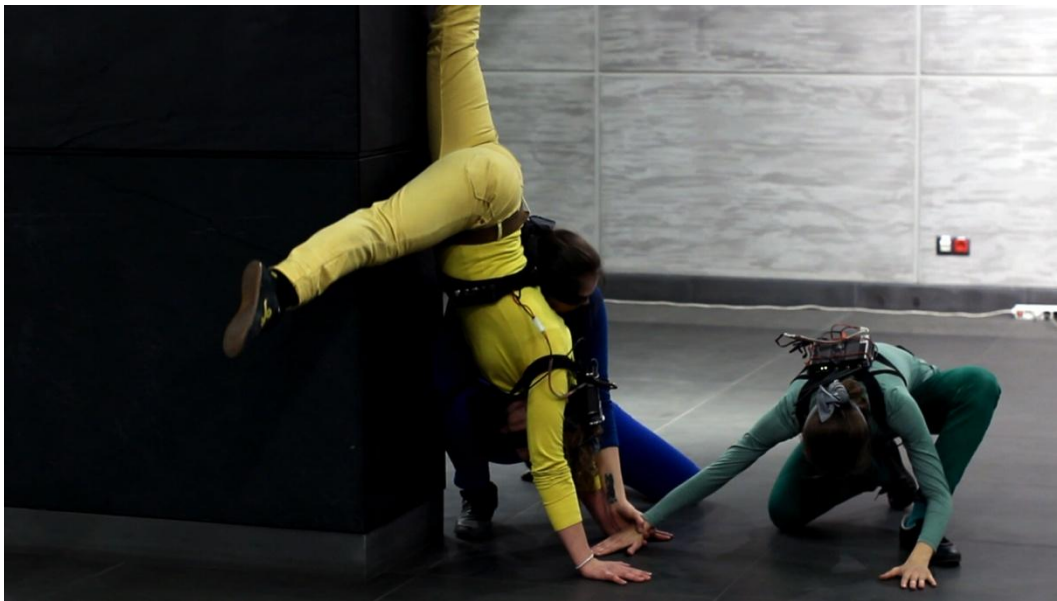


Figure 4. *Echoclickers*, 2014. Photo: Piotr Damian. Courtesy the artist.

CONCLUSIONS

Patryk Lichota collaborates with engineers and scientists to design the technological aspect of his stage projects. Being a musician, he carefully designs the sonic dimension of the event, which is always based on and linked to the activities of the body. He designs the stage sets and technologically advanced costumes, constructs the framework for the improvisation, and formulates a set of rules the dancer is supposed to follow.

Lichota objectifies the dancers' bodies. In the discussed projects, the performances of "object bodies" are subordinated to a general concept of the work and correspond to its technological requirements. The dancers' bodies are not completely wiped out, but their performance is entirely subordinated to the technology constantly present on stage, which acts as a choreographer and gains control over the performing bodies. The dancers act as a medium of someone or something else's expression. Their agency is suspended. Therefore, the dancers do not choreo-

graph the pieces, but situate themselves within given frameworks and create the technology-dependent body dramaturgy in real time.

In Lichota's works mobility manifests on two interrelated planes. In the creative process, it shows up in the movement of ideas circulating among the collaborators, whereas during the performance it resides in perceptive uncertainty, derived from continuous changes in aural and visual stimulation.

In Parker-Starbuck's model mentioned at the beginning, the subject bodies claim agency, and the interplay between their actions and those of the technology determines the course of the performance. Although Lichota's dance projects are conceptually refined, carefully designed, and technologically ingenious, they seriously limit the dancers' invention, which may only appear as a deliberate transgression (and destruction) of Lichota's original idea.

Literature:

- Birringer, J. (2003). Dance and interactivity. *Dance Research Journal*, 35/36 (2), 88-112.
- Birringer, J. (2008). *Performance, technology, & science*. New York: PAJ Publications.
- Hatch, M. (2014). *The maker movement manifesto: Rules for innovation in the new world of crafters, hackers, and tinkerers*. New York: McGraw-Hill Education.
- Hofstadter, D. (1979). *Gödel, Escher, Bach: An eternal golden braid*. New York: Basic Books.
- Hofstadter, D. (2007). *I am a strange loop*. New York: Basic Books.
- Ingham, P. B. (1915). The method: Growth and practice. In M. E. Sadler (Ed.), *The eurhythmics of Jaques-Dalcroze* (pp. 31-47). Maryland: Wildside Press LLC. <http://www.gutenberg.org/files/21653/21653-h/21653-h.htm>. Retrieved 23 May 2017.
- Krawczak, M. (2014). Media democratisation: Creative programming and the culture of makers. In A. Jelewska & M. Krawczak (Eds.), *Art and technology in Poland: From cybercommunism to the culture of makers* (pp. 227-238). Poznań: Adam Mickiewicz University Press.
- Lichota, P. (2016). *Tradycje hałasu w sztuce dźwięku* [Traditions of noise in the art of sound]. Poznań: Bogucki Wydawnictwo Naukowe.
- Leśniewska, J. (2007). Teatr tańca w Polsce [Dance theatre in Poland]. In D. Kosiński, et al. (Eds.), *Słownik wiedzy o teatrze. Od tragedii antycznej do happeningu* [A dictionary of theater studies: From ancient tragedy to happening] (pp.328-332). Bielsko-Biala: Wydawnictwo ParkEdukacja.
- Malloch, S. & Trevarthen, C. (Eds.). (2009). *Communicative musicality: Exploring the basis of human companionship*. Oxford: Oxford University Press.
- Parker-Starbuck, J. (2011) *Cyborg theatre: Corporeal/ technological intersections in multimedia performance*. Houndmills & Basingstoke: Palgrave Macmillan.
- Romero, F. J. (2013). Science & art of body percussion: A review. *Journal of Human Sport & Exercise*, 8(2), 442-457.

Interviews:

- Lichota, P. (2014). Open questions on artistic practice. Interviewed by Magdalena Zamorska. 31 January.
Przybysz, M. (2014). Open questions on artistic practice. Interviewed by Magdalena Zamorska. 31 January.
Romaszkan, M. (2014). Open questions on artistic practice. Interviewed by Magdalena Zamorska. 31 January.

Internet resources:

- Lichota, P. (2010). *Strange Lóóp*. http://www.strangeloop.pl/strangeloop_en.html. Retrieved 31 January 2014 (archive site).
Lichota, P. (2013). *Lightskin, description of video*. <https://vimeo.com/69623795>. Retrieved 3 March 2014.