

**INTERSECTION OF PRINT AND DIGITAL
MEDIA IN THE POETRY OF
AMARANTH BORSUK**

AND

**PANI BORUTA AND OTHER STORIES
(AUGMENTED REALITY STORIES)**

**By
Elissavet Pournara**

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University of Western Macedonia

**Supervised by Dr. Tatiani Rapatzikou
(Associate Professor, Aristotle University of Thessaloniki)**

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ABSTRACT

The present thesis focuses on how the print book intersects with the digital medium in the poetry of Amaranth Borsuk. This project constitutes an attempt to examine how the form of the book interacts with and complements while at the same time is complemented by augmented reality as seen in Borsuk's *Between Page and Screen* (2012). The theoretical part of this thesis sheds light on how the book is influenced and transformed by digital technologies, and how reading habits are being reformulated. Some of the key terms discussed in this project are digital poetry, artists' books, cybertext, augmented reality, human reader, and machine reader. This thesis draws on theories by Jessica Pressman, Johanna Drucker, Helen Papagiannis, Espen Aarseth, Stephanie Strickland, and Christopher Funkhouser. The creative writing component of this thesis with the title *Pani Boruta and Other Stories* explores the opportunities that augmented reality offers in the area of storytelling. The creative writing project consists of an augmented reality book that contains fifteen short stories that are based on Polish aphorisms and proverbs.

KEYWORDS:

augmented reality; storytelling; experimental poetry; artists' books; short stories

INTRODUCTION

I first got acquainted with Amaranth Borsuk's work during the e-poetry festival that was held in London in 2013. During the festival, Borsuk introduced her poetry book *Between Page and Screen* as well as commented on its print and digital composition. What made this whole experience unique was that her book, despite its augmented reality composition could still be held and read. Borsuk herself admits that "because of its codex form [...] *Between Page and Screen* is immediately legible as a book – even if its 'texts' cannot be read by human eyes" ("*Between Page and Screen*" 169).¹ Since the publication of this project, Borsuk has been involved in the composition of solely digital projects, print poetry collections, intermedia works as well as a theoretical body of work.² What again brings all these endeavors together is her ability to connect literary practice with technological media in a very sophisticated and linguistically rich way. To respond to the creative possibilities that can emerge from the combination of different media, I have decided to embellish the discussion of Borsuk's *Between Page and Screen* with the creation of my own augmented reality project with the title *Pani Boruta and Other Stories*.

To begin with, *Between Page and Screen*³ was created in 2012 by Borsuk in collaboration with the programmer Brad Bouse and constitutes an augmented reality project. *Between Page and Screen* consists of a book that on its pages square black and white markers are printed. These markers are to be scanned by the computer's

¹ The book contains augmented reality markers instead of normal text.

² Among Borsuk's works, one finds the print poetry collections *Pomegranate Eater* (2016) and *Handiwork* (2012), as well as the intermedia project *Abra* (2014) in collaboration with Kate Durbin and Ian Hatcher.

³ *Between Page and Screen* was included in the third volume of *Electronic Literature Collection* in 2016 that was edited by Stephanie Boluk, Leonardo Flores, Jacob Garbe, and Anastasia Salter. *Electronic Literature Collection* is a publication of the Electronic Literature Organization (ELO) that anthologizes prominent works of electronic literature. So far, it has published three volumes. The first volume (2006) was edited by N. Katherine Hayles, Nick Montfort, Scott Rettberg, and Stephanie Strickland. The second volume (2011) was edited by Laura Borràs, Talan Memmott, Rita Raley, and Brian Stefans.

web camera, which facilitates a series of augmentations to appear on the computer screen. The readers need to access *Between Page and Screen*'s website to read the book. In her essay "*Between Page and Screen*," Borsuk points out that *Between Page and Screen* "merges the book art and e-poetry traditions, trespassing the boundary between print and digital, old and new media" (165). As a result, this particular book is an exemplary manifestation of the intersection of print and digital media practices. On how the idea of her book *Between Page and Screen* was conceived, Borsuk states that it "arose from a curiosity about the way the changing nature of text's material form inflects our reading practices" (165) due to the use of augmented reality technology. Consequently, when the readers open the book to read it, they realize this is impossible without the aid of the digital eye of the web camera. The augmentations that constitute the "poetic content" of the book are accessible only through the application of a different reading mechanism. In the case of *Pani Boruta and Other Stories*, this mechanism becomes visible due to the proverbs and aphorisms that appear in Polish as well as the illustrations that the readers need to scan to reveal the English translation and unlock the bilingual stories respectively.

Returning to Borsuk's work, I believe I should explain why I have decided to engage with it. First of all, her poetic writing is characterized by a unique poetic voice and scholarly sensitivity due to its attention to language's playfulness and the metalinguistic associations it creates. Borsuk is aware of her dual role as scholar and poet, and claims that her work "has always paired a critical interest in how poems make meaning with the creative endeavor of writing them" ("*Between Page and Screen*" 165). She points out further that she "read[s] critically to write better, and [she] write[s] creatively in order to be a better critic" (165). This defines to a wider extent her creative practice and constitutes one of the reasons why her work has

attracted my scholarly attention as well as her very particular function as a poet, bookmaker, and scholar. The research presented in the MA thesis is indebted to postmodern experimentation but the exploration of this connection lies beyond the scope of the current project.

It is worth mentioning at this point that I find that Borsuk's work is in line with Johanna Drucker's work, a major theoretician in the field of bibliographic studies, materiality, and visuality. This enables one to look at important theoretical observations made by Drucker and apprehend their application to a certain extent to Borsuk's own work. In particular, Drucker in her work *The Century of Artists' Book* (1995) comments on the creative nature of the book, and the self-reflexive quality an artist's book provides. This idea considered alongside Borsuk's work leads one to understand that the book is not only to be held and read, but also to interact with. In the case of *Pani Boruta and Other Stories*, this becomes apparent firstly, when the readers have to unfold the front and back covers to read the title of the book as well as information about its author. Secondly, this realization is made more obvious when English speaking readers are confronted with the Polish proverb and aphorism and need to scan the print page with the digital device to access the English translation. When the readers are faced with the illustration, they need to repeat the same process to reveal the voice-over narration and a series of 3D virtual objects.

Turning our attention to Borsuk's works once again, one can see how Borsuk experiments with and enhances the book form through the incorporation of certain digital technologies in her writing practice. On her personal approach to the book, Borsuk claims: "As a poet, scholar, and book artist working at the intersection of print and digital technology, I have long been fascinated by the book as a malleable medium for artistic inquiry and by writing technologies as spurs to authorship" (*The*

Book xii). Working at the intersection of these technologies, Borsuk is able to extract the benefits of both, which widens her creative scope and imaginative potential of her writing. This is highlighted further by the title of her own book, *Between Page and Screen*, which places emphasis on the “tension between our reading and writing interfaces in which one may feel torn ‘between’ a love of print [...] and recognition of the affordances of the digital” (“*Between Page and Screen*” 170). However, Borsuk overcomes any limitations delving instead into the numerous creative possibilities, as will be shown in the chapters to follow, that the print and the digital media can offer to an artist if they are viewed not separately but together. This is exactly what drives *Pani Boruta and Other Stories*: the pairing of analogue and digital media, as well as of machine and human languages. *Pani Boruta and Other Stories* is a bilingual project on the level of human languages. On the one hand, the human readers are able to decode the Polish proverbs and aphorisms with the aid of the digital device that reveals the information in English. On the other hand, the pages that contain the illustrations work on two levels simultaneously: as visual interpretations of the stories and as markers for augmented reality.

For the purposes of this thesis, Borsuk’s work *Between Page and Screen* is viewed alongside certain theoretical concepts, such as ergodicity, cybertextuality, reading habits, digital poetry, bookishness, and augmented reality. As for the key theoreticians this thesis resorts to, these are Espen Aarseth in the area of ergodicity and cybertextuality, Johanna Drucker as regards bibliographic studies, and Helen Papagiannis in the field of augmented reality. All these help build a framework within which the *Pani Boruta and Other Stories* creative component has been conceptualized and created.

Chapter One focuses on the theory of augmented reality as brought forward by the theoreticians Jay David Bolter and Helen Papagiannis. It discusses how the technology of augmented reality works, the distinction between the first and second wave of augmented reality, and last but not least how *Between Page and Screen* exhibits particular characteristics as an augmented reality book.

Drawing on Johanna Drucker's theory about artists' books, and Jessica Pressman's about bookishness, Chapter Two sheds light on viewing the book as a material entity rather than a mere object. In this chapter, I argue that the artists' book form in connection to the augmented reality book, as exemplified by *Between Page and Screen*, highlights the operational bibliographic codes and the self-referentiality of the book, while it brings into the discussion the machine as an additional reader in the reading of Borsuk's book.

Chapter Three delves into Espen Aarseth's theory of ergodicity and cybertextuality in relation to the reading operations that take place in *Between Page and Screen*. Additionally, I examine *Between Page and Screen* as a work of digital poetry under the theoretical insights offered by Christopher Funkhouser and Stephanie Strickland.

Chapter Four focuses on the creative writing component of this dissertation: *Pani Boruta and Other Stories*. This creative writing project utilizes the augmented reality medium to narrate fifteen stories that have been inspired by a series of Polish proverbs and aphorisms. This chapter sheds light on how this creative writing project has been brought together. Due to the technological nature of the project and the

difficulties regarding access to it, a video documentation of *Pani Boruta and Other Stories* has been uploaded online.⁴

This is a thesis in creative writing that attempts to provide a theoretical framework about the intersection of print and digital media with a commentary on Borsuk's *Between Page and Screen*. Having as a point of departure a work of electronic poetry that is also a poetry book in augmented reality, my creative project focuses not on the creation of poems but on stories that are specifically written for the medium of augmented reality.

⁴ ⁴ The video documentation of *Pani Boruta and Other Stories* is available here: <https://youtu.be/DPjkBkDGpuk>.

CHAPTER ONE

Exploring Augmented Reality in *Between Page and Screen*

Borsuk's *Between Page and Screen* makes use of the computer's web camera to capture and then project onto the computer screen the readers who are holding the book while trying to animate the augmented reality-assisted black and white coded square markers included in it. Jay David Bolter in his entry "Augmented Reality" in *The John Hopkins Guide to Digital Media*, defines augmented reality (AR)⁵ as "a constellation of digital technologies that enable users to display and interact with digital information integrated into their immediate physical environment. AR is the technological counterpart of virtual reality [VR]" (30). In contrast to virtual reality, augmented reality, "acknowledges the physical world rather than eliding it" (30). In his article entitled "A Survey of Augmented Reality," Ronald Azuma defines an augmented reality system as having three particular characteristics: "1) combines real and virtual 2) interactive in real-time 3) registered in 3-D" (2). As far as the definition of augmented reality is concerned, in her book *Augmented Human: How Technology Is Shaping the New Reality* (2017), Helen Papagiannis argues that it is most commonly defined as "a digital overlay on top of the real world consisting of computer graphics, text, video, and audio, which is interactive in real-time. This is experienced through a smartphone, tablet, computer, or AR eyewear equipped with software and a camera" (22). This chapter will shed light on the theoretical foundation of augmented reality and discuss it in relation to *Between Page and Screen*.

⁵ Bolter explains that "AR and VR are often classed as examples of mixed reality (MR) on a spectrum described by Paul Milgram in 1994. The spectrum indicates the ratio between the amount of information provided by the computer and the amount coming from the user's visual surround. At one extreme there is no computer input (only the so-called real environment); at the other, the computer is providing all the visual information, and possibly sound as well, to constitute a complete 'virtual environment' or 'virtual reality.' AR lies in between these extremes, but typically far more of the user's view is constituted by the actual visual environment and the computer adding relatively little information" (30).

On how augmented reality operates, Papagiannis points out that it

works by tracking a target in the real world using a camera and software on an enabled device like a smartphone. These targets can include things like an icon, an image, an object, a sound, a location, or even a person. The target input data is processed by the software and compared against a database of potentially corresponding information. If there's a match, an AR experience is triggered and content is superimposed on top of reality. (23)

In *Between Page and Screen*, there is no use of a small and portable device like a smartphone; the readers need to use a computer instead. The targets of *Between Page and Screen* are print square black and white markers that are located at the center of the book's individual pages.

Papagiannis explains that in augmented reality “you remain in your physical world and the virtual enters your surroundings by way of a pair of see-through digital glasses, a smartphone, a tablet, or a wearable computer. You still see and experience the real world around you with all of your senses, it just now becomes digitally enhanced and alterable” (20). Papagiannis' words make one wonder what possibilities this technological medium opens for literary and creative writing practices. In *Between Page and Screen*, the readers' physical surrounding space is initially reflected, but once the augmentation takes place, the reflection on the screen becomes black and white, with the augmented text appearing on top of the marker (see Fig. 1).

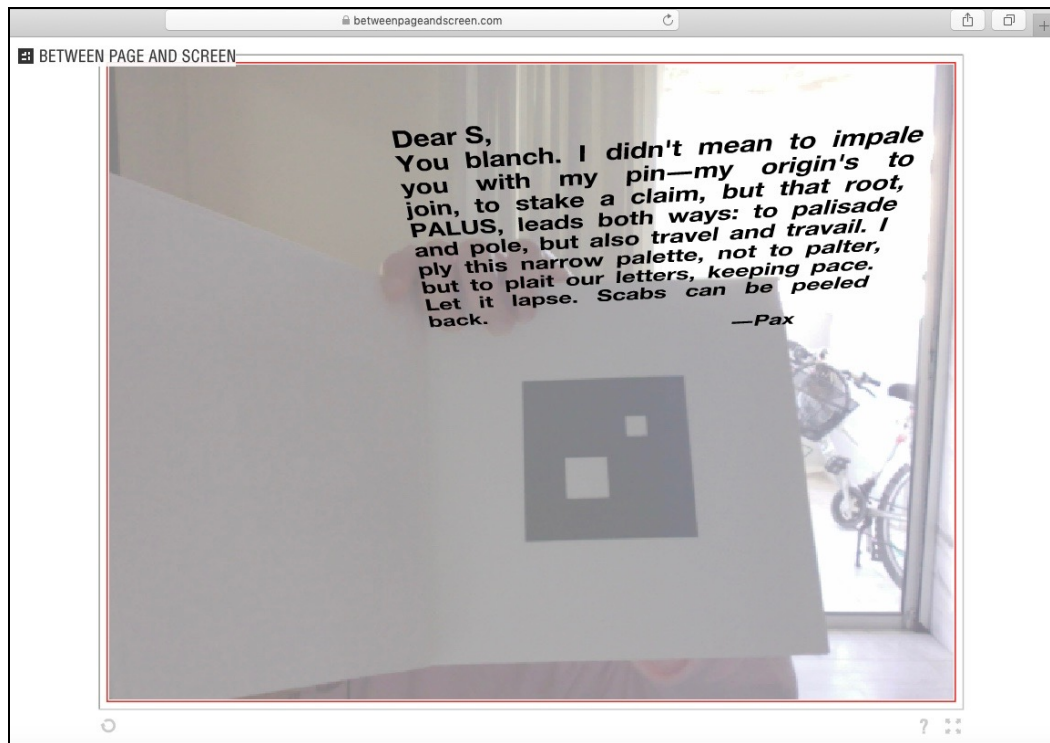


Fig. 1. Screenshot of *Between Page and Screen*. Permission granted by
 Amaranth Borsuk.

Due to the effect of having a reflection of the world on the computer screen, the readers are facing problems with reading the text that appears as an augmentation. The text is very unstable and it takes some trial and effort to find the correct angle to hold the book in front of the camera, while at the same time the readers need to stay absolutely still, since any movement could potentially disturb the augmented text. This could potentially discourage the readers from engaging with the text and reading it. But this is also the point of this book, to make the readers interact with the book in a different way, while they are also reflecting on the ways they read.

On the affordability and availability of augmented reality, Papagiannis observes that “[w]e are well overdue to revisit what AR is and what it can become, especially with AR no longer limited to academic research facilities. AR once required highly specialized equipment, none of which was very portable. But with the number of sensors in your smartphone today, you have the power of AR in your

pocket” (25). The equipment that one needs to experience augmented reality is not difficult to acquire if one takes into account the availability of smartphone devices. As for the creator and developer of augmented reality applications, there is a free version of the software Unity⁶ that can be used. This is the software that I resorted to for the creation of the creative writing component of this thesis. This software offered me the opportunity to import, scale and position the 3D models on the markers themselves as it will be explored in greater detail in Chapter Four.

Papagiannis distinguishes between two waves of augmented reality technology that exist so far. She refers to the first wave of augmented reality as “Overlay” and argues that it “was all about a digital layering on top of reality. “Overlay” included examples like a 3-D model of a baseball player virtually appearing on a baseball trading card” (27). On how the first wave works, Papagiannis says that “you were also required to download and print a specific image or target to trigger the AR experience” (27). *Between Page and Screen* and the creative project for this dissertation, *Pani Boruta and Other Stories*, belong to the first wave of augmented reality and make use of printed markers in their effort to place emphasis on the intersection of the print book as a material object and the digital device.

Papagiannis distinguishes a second wave that is where current technological innovation is heading towards, and names it “Entryway.” This second wave of augmented reality creates “a more immersive, integrated, and interactive experience” (27). The point where the second wave of augmented reality differentiates itself from the first one has to do with the individual user who becomes “the context that defines the experience” (27). Since “Entryway” works based on personalized context, it

⁶ Unity is a game engine for the creation of virtual and augmented reality experiences. For more info see <https://unity.com/>.

manages to move “beyond printed targets toward a new spatial understanding and deeper intelligence of [one’s] environment” (27). In contrast to “Overlay” that focuses on particular print markers, Papagiannis explains that in “Entryway” “[t]he entire world becomes a trackable target. In Entryway, we break through the limitations of overlays in the first wave, stepping into a new sensory awareness and heightened interaction with our world and each other” (27). Belonging to “Overlay,” *Between Page and Screen* places emphasis on the surface of the material page of the book in the way an early work of augmented reality does, which is the augmentation a print marker triggers. Although an “Entryway” work does not exclude the possibility of a material book object, it relies more on personalized context that “Overlay” technologically lacked. If *Between Page and Screen* was conceived as an “Entryway” augmented reality work, it would be a different project with different capabilities and it would potentially have addressed different concerns relating to the practice of reading than “Overlay” does. What this observation highlights has to do with the awareness of technological constraints and how these can function as creative inspiration for a project that takes these constraints as prompts. For the purposes of this dissertation, I am interested in and will be looking at the first wave due to the opportunities the first wave offers to explore in relation to the pages of a print book.

In his book *New Directions in Digital Poetry* (2012), Christopher Funkhouser views augmented reality writing as a seldomly practiced technique as regards digital poetry (226). He also points out though that augmented reality “is poised to make an impact on the genre” (226). Indeed, the number of augmented reality works that have been produced so far is very low and even fewer if one considers poetry. One look at the three anthologies of *Electronic Literature Collection* confirms Funkhouser’s observation. Funkhouser claims further that augmented reality “merges real and

virtual image streams to project poems and tell stories” (226). In the case of *Between Page and Screen*, the readers are introduced to the stories told by P and S, standing for page and screen respectively, but its most important contribution has to do with the insights it offers into the making of these stories which gives to the particular project a metafictional quality. Funkhouser claims that augmented reality works “entice viewers to become physically involved; their design and content compel us viscerally by altering and by feeding new stimuli into our immediate surroundings. Our literary experience begins to include precisely where we are” (226). The design of *Between Page and Screen* compels the reader to find out a way to read it since the print book on its own is not possible to be read, and to unlock the content that exists in the augmentations. While in *Pani Boruta and Other Stories*, one realizes that the inability to read and understand one language can be overcome by reading the book through the eyes of the digital device, and that the story comes alive through a digital mode of storytelling that includes music, voice-over narration and 3D objects.

In her essay “*Between Page and Screen*,” Borsuk claims that with Bouse, her collaborator,

were drawn to marker-based AR precisely because it requires both a printed page and networked screen in order for the text to take shape. The thing [they] think of as the book’s content, its text, in this case, does not exist on either page or screen, but in the augmented space between opened up by the reader, who places the two in dialogue and in whose hands they might learn to exist. (170)

The augmented space, as it features in *Between Page and Screen*, is exactly the space where print and digital interweave, and this is what the reader is invited to experience through the augmented reality poetic practice. Borsuk claims that “[w]hile the process

of writing the poems and engaging the print and digital components of AR allowed us to explore book's significance in its particular moment, the goal of the project is not to resolve the question of page or screen but to revel in the magical, surprising, coded and intriguing between space activated by the reader" (174). This comment provides the opportunity to reflect more broadly on the medium of augmented reality and the affordances it provides for writers and artists, whose works create more food for thought about the use of digital media in literary practice to ponder on. Considering this in connection with *Pani Boruta and Other Stories*, one can argue that augmented reality provides opportunities not only for the pairing of different arts – book, visual, digital – but also for the artist and writer to practice those skills connected to them.⁷

This chapter has looked at some theoretical points concerning augmented reality technology with regard to *Between Page and Screen*. One of the most important ones is the differentiation made by Papagiannis between the two waves of augmented reality: "overlay" and "entryway." The chapters to follow will pay attention to different components of augmented reality that are no other than the book as part of the analogue element, and the digital content as part of the virtual.

⁷ This is very much in the spirits of the STEAM education initiative. The acronym stands for Science and Technology interpreted through Engineering and the Arts, all based on Mathematical Elements.

CHAPTER TWO

The Revival of the Book through Artist's Books

Johanna Drucker concludes her seminal study *The Century of Artists' Books* (1995) by commenting on the very essence of the definition of what a book is. In particular, she says:

A book is an inhabitable universe of image and thought and language, a mute space of unrealizable dreams and manifest desire for form. The book is a passage of time, an expandable space, a fluid sequence of elements whose discrete identity becomes absorbed into the reality of a seamless experience, a static set of units whose unresolvable differences return the viewer to the cells of its interior spaces in a contradictory act of engagement and transcendence. (363)

The book is presented here as a living organism. It has “cells” and it forms a cosmos of its own that is open to re-inscription, serving as a space that waits to be filled in with various graphical language formations, typographical layouts and designs. It is exactly this point that the current chapter will attempt to shed light on as regards Borsuk's augmented reality book and its qualities as an artist's book.

Borsuk argues that “[t]he thing we picture when someone says ‘book’ is an *idea* as much as an *object*. As the history of the book's changing form and its mechanical reproduction reveal. It has transformed significantly over time and region” (*The Book* 111, emphasis in original). This also reminds of Drucker's own comments about the book as an object and as a symbol, inviting us to think of how a book works, rather than of how it looks. In her book *What Is: 9 Epistemological Essays* (2013), Drucker poses a timely question: “Can the book of the future be saved from cult status as a fetishized icon?” (110). Considering Borsuk's and Drucker's

observations, one comes to the realization that the functionality of the book can be appreciated if its print make up is seen in relation to other media as is the digital in the case of the current thesis.

In her essay “The Virtual Codex from Page Space to E-space,” Drucker declares “the book as a performative space for the production of reading” (220). Such a remark reveals that even nowadays the book is not seen as a technology but as a decorative object which overshadows its dynamic constitution. Drucker argues further that the book “is not an inert thing that exists in advance of interaction, rather is produced new by the activity of each reading” (221). This is exactly the case with *Between Page and Screen* constituting an example of a work that provides a dynamic reading every time its pages are scanned by the web camera. This confirms Drucker’s comment that “the book thus serves as a field of possibilities, waiting to be ‘intervened’ by a reader. The space of the page arises as a virtual program, interactive, dialogic, dynamic in the fullest sense” (221).

With the advent of digital technologies, emphasis has been placed on the revival of print book technology. Jessican Pressman in the article “The Aesthetic of Bookishness in Twenty-First-Century Literature,” has introduced the term of “bookishness” to discuss “the fetishized focus on textuality and the book-bound reading object” as “an emergent literary strategy that speaks to our cultural moment” (465). With these words Pressman highlights the importance of the book being treated as something multi-dimensional, dynamic and adaptable. The cultural moment that Pressman refers to includes the strong presence of digital devices and the book object needs to find its position in the current developments. One could argue that *Between Page and Screen* constitutes an example of bookishness with attention paid to the very structure of the codex. *Pani Boruta and Other Stories* pays attention not only to

the book's ability to present printed text, but takes advantage of the visual qualities of the illustrations that are complemented by the digital augmentations. The illustrations provide a visual interpretation of the stories by the illustration artist and the digital augmentations that include a voice-over narration, soundtrack and virtual 3D objects bring an additional layer that composes the augmented reality experience.

In her article, Pressman explains that the term "bookishness" refers to the books that retain their vibrant identity, renewed by the influence exerted on them by digital technologies. In addition, she points out that the fear of their potential extinction due to "the threat posed to books by digital technologies [has] become a source of artistic inspiration and formal experimentation in the pages of twenty-first-century literature" (*Aesthetic* 465). The book that is informed by digital technologies, Pressman argues, "will not become obsolete with new reading platforms, but rather, will change and develop new incarnations and readerships; it will come to serve certain kinds of literary needs and literary desires – specifically, those related to its book-bound physicality and potentiality" (467). Considering these remarks in tandem with *Between Page and Screen*, one could claim that augmented reality provides excellent opportunities for a dynamic development of the book form, literary writing and storytelling.

In documenting the history of the book and underlining the importance between its successive forms, Borsuk claims that

[t]he book, after all, is a portable data storage and distribution method, and it arises as a by-product of the shift from oral to literate culture, a process that takes centuries and is informed through cultural exchange, both peaceful and forcible. In the development of the book from clay tablet to codex, each medium's affordances – the possibilities for use

presented by its form – facilitate certain kinds of expression. (*The Book 1*)

The transition from oral to a written culture that Borsuk mentions here maybe compared to something similar happening nowadays with transitioning from print to digital culture. Such changes Borsuk mentions can take centuries, but with the development of current technology, this process has sped up. Change, Borsuk claims, can come by peace and by force depending on the technological developments occurring each time. The form of the book follows these changes, it adopts as history shows, and adjusts to the socio-cultural, economic, communicative and creative needs created. This constant flow of developments and changes comes into opposition to the view of the book as a “fetishized icon” as Drucker says in *What Is*, in other words as a decorative object. A book is a technology that has certain functionalities, although people tend to neglect this aspect of it.

Thinking about the book in the context of artistic creation, one should take into consideration Drucker’s definition about “[a]n artist’s book [having] to be more than a solid craft production or [falling] back into the same category as the livre d’artiste or fine print work. An artist’s book has to have some conviction, some soul, some reason to be and to be a book in order to succeed” (*Century* 10-11). With this remark she highlights that “an artist’s book should be a work by an artist self-conscious about book form rather than merely a highly artistic book” (21) and she goes on to emphasize the qualities that distinguish an artist’s book from any other book type: “To remain artists’ books, rather than book like objects or sculptural works with a book reference to them, these works have to maintain a connection to the idea of the book – to its basic form and function as the presentation of material to a fixed sequence which provides access to its contents (or ideas) through some stable

arrangement” (123). On the basis of what has preceded *Between Page and Screen* maintains this spirit by inviting readers to actually read the poems with the aid of the digital device. *Between Page and Screen* does not set aside the book form for the sake of the digital elements. On the contrary, the medium of the artist’s book elaborates the basic book form with a digital layer that aids the book to highlight its essential role in reading it.

Borsuk adds to Drucker’s theorization of the artist’s book that an artist’s book “uses its content to interrogate book form, as an instructive paradigm for thinking about the way forward for digital books. Rather than inscribing a teleological story of ever-improving legibility, distribution, and engagement, the book’s mutations tell us about our highly contingent cultural ideals of authorship and art” (*The Book* xiv). On how the artist’s book form works in *Between Page and Screen*, Borsuk claims that “*Between Page and Screen* utilizes the self-reflexivity of artist’s book form along with the affordances of augmented reality to address the embodied and dialogic nature of reading. Through the book itself and a number of paratexts, we have endeavored to create opportunities for readers to hold language in their hands” (“*Between Page and Screen*” 166). The readers of *Between Page and Screen* are invited to explore a book that contains part of the language of the machine that is the key to unlocking the human language text that resides in the augmentations. The material book is turned into a signifying device for both humans and machines.

In his book *Scripting Reading Motions: The Codex and the Computer as Self-Reflexive Machines* (2013), Manuel Portela discusses the form of the book as a kind of machine on which certain bibliographic codes are at work. He notably mentions that “[a]rtists’ books expose and explore the structures and conventions that turn the material book into a signifying device. They show how textuality is not only a verbal

and visual phenomenon, but also a function of a particular bibliographic operation or code” (11). In the case of *Between Page and Screen*, one can certainly trace certain functions that address both human and machine readers as well as materials, as is the case of the black and white markers, and augmented reality technology. When *Between Page and Screen* is seen through the eyes of the computer’s web camera, the book’s page is decoded to the computer screen as an augmentation. The bibliographic codes that operate in the book such as the position of the text on the page are mutated as the page expands as an augmentation to the whole screen (see Fig. 2). The layout of the page/screen as well as the perspective are mobile and not stable since their appearance is dependent on the way the book is held and positioned by the reader in front of the camera. All these endow *Between Page and Screen* with certain qualities that draw on artist’s books but at the same time are unique in augmented reality technology.

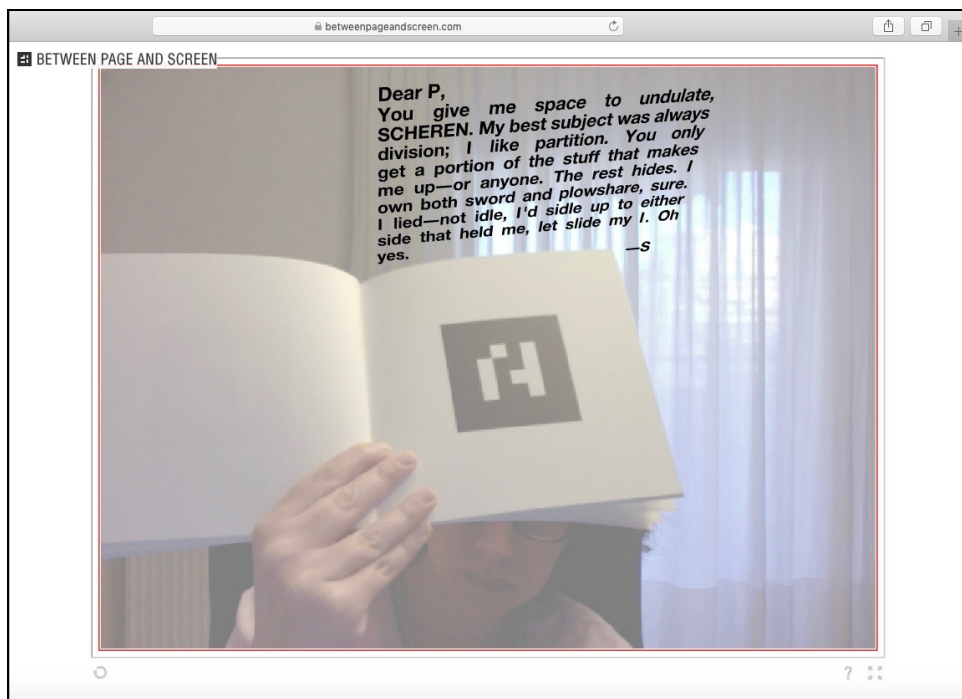


Fig. 2. Screenshot of *Between Page and Screen*. Permission granted by Amaranth Borsuk.

The way that Borsuk comments on artists' books paves the path for the intersection of the book and the digital medium "remind[ing] us that books are fundamentally interactive reading devices whose meanings, far from being fixed, arise at the moment of access. The commodification and industrialization of print creates the illusion of text's fixity and meaning's stability. But books are always a negotiation, a performance, an event" (*The Book* 147). This disrupts the illusion of books being one-dimensional or static. *Between Page and Screen* reminds its readers of its operational capacity since, in order to read it, they need to proceed into actions that go beyond the simple turning over of the book's pages. Likewise, *Pani Boruta and Other Stories* that constitutes the creative writing part of the current thesis needs the digital device in order to be read in its entirety. Otherwise, the reader can access only the print content of the book, which includes the Polish proverbs in the Polish language and looking at the illustrations. To access the audiovisual and English-language content, the English-speaking reader needs to combine the print book with the digital device and scan the pages.

On the exploration the current chapter has provided, one realizes that the artist's book constitutes a rich and dynamic book form. It not only aids to think about the book as both an object and an idea, but it also encourages creative liberties when it is brought into contact with digital technology.

CHAPTER THREE

Ergodicity, Cybertextuality and Reading Digital Poetry in

Between Page and Screen

In his book *Cybertext: Perspectives on Ergodic Literature* (1997), Espen Aarseth introduces the terms “ergodic” and “cybertext.” These terms are very important to the discussion of Borsuk’s work and to electronic literature to a wider extent. Aarseth explains that the word “ergodic” is “a term appropriated from physics that derives from the Greek words *ergon* and *hodos*, meaning ‘work’ and ‘path’” and that “[i]n ergodic literature, nontrivial effort is required to allow the reader to traverse the text” (1). In this chapter, I argue that Borsuk’s *Between Page and Screen* constitutes an ergodic work of literature because the readers need to navigate and work their way through it by trying out different ways to read and interact with its material and digital aspects. The failure to do so is part of the experience, as is for example holding the book in a wrong angle when interacting with *Between Page and Screen*.

In order to clarify the difference between the trivial and non-trivial effort that is required from the part of the reader, Aarseth highlights the presence of ergodic literature’s counterpart: “If ergodic literature is to make sense as a concept, there must also be nonergodic literature, where the effort to traverse the text is trivial, with no extranoematic responsibilities placed on the reader except (for example) eye movement and the periodic or arbitrary turning of page” (1). Such an argument, however, does not imply the inferiority of nonergodic literature as something “trivial” to any extent but enables one to discern more easily certain characteristics that are related to more interactive works.

As far as the term “cybertext” is concerned, Aarseth uses it “to describe a broad textual media category of any kind. Cybertexts share a principle of calculated production, but beyond that, there is no obvious unity of aesthetics, thematics, literary history, or even material technology. Cybertext is a perspective [he] use[s] to describe and explore the communicational strategies of dynamic texts” (5). Aarseth’s particular contribution with the term “cybertext” is that the idea of a dynamic text should not be confined only to electronic textuality but it may exist in print format as well. When texts do not share the same material technology, they can still communicate ideas of dynamism, and Borsuk’s *Between Page and Screen* as an augmented reality work illustrates Aarseth’s paradigm swiftly and auspiciously as it combines both print and digital features.

The concept of cybertext is not something that is characterized only by current digital technologies. Aarseth points out that the cybertext “is not a ‘new,’ ‘revolutionary’ form of text, with capabilities only made possible through the invention of the digital computer. Neither is it a radical break with old-fashioned textuality, although it would be easy to make it appear so” (18). Aarseth highlights the definition of cybertext as “a *perspective* on all forms of textuality, a way to expand the scope of literary studies to include phenomena that today are perceived as outside of, or marginalized by, the field of literature – or even in opposition to it” (emphasis in original 18). In other words, Borsuk’s work urges us to reconsider issues relating to books, literature, and textuality in a wider sense. Rather than seeing them in isolation, we are encouraged to explore the interdisciplinary potential and capabilities that emerge from the combination of analogue and digital technologies.

For Aarseth, the ergodic text can also be a “cybertext” that as a category also includes non-literary works such as games, and thus its reader oscillates between

“user” and “reader.” The distinction between users and readers is an issue for one to consider in relation to *Between Page and Screen* bringing to our attention a different mode that encompasses the older definition of “reader” with the qualities shared with a user of a digital device. In addition, the term “reader” is not restricted only to the human but encompasses the digital device that “reads” in its own way. Aarseth extends his thought further and argues that “[t]he cybertext reader *is* a player, a gambler; the cybertext *is* a game-world, it *is* possible to explore, get lost, and discover secret paths in these texts, not metaphorically, but through the topographical structures of the textual machinery” (4, emphasis in original). Although one cannot argue that *Between Page and Screen* creates “game-worlds” like a videogame, the readers perform actions as players do as regards their interaction with the proposed text.

Aarseth goes on to highlight that “[t]he tensions at work in a cybertext, while not incompatible with those of narrative desire, are also something more: a struggle not merely for interpretative insight but also for narrative control” (4). Although *Between Page and Screen* is a book of experimental poetry whose influences are drawn from concrete poetry and epistolary form among others, its narrative elements can be found on a metafictional level, on the very efforts of the readers to build their own and intimate reading of the work. On the demands Borsuk and Bouse’s book poses on its readers, Laura Shackelford in her essay “R(e)orienting Poetics and Lived Spaces ‘Between’” argues:

Between Page and Screen requires significant effort on the part of its readers and some dexterity as one discovers that holding the book upside-down projects the language-based visual animations right-side up. One also quickly realizes that even with perfect alignment and

poise, the textual animations (whether the text is dynamic or appears as a static image) require a remarkable, fleeting co-orchestration of hand, book, body, screen, web-camera, web site, machine-reading, animated projection, and linguistic and visual understanding that one cannot easily stabilize for more than a moment or two. (336)

The readers of *Between Page and Screen* need to be constantly paying attention to how they are holding the book, how strong the light is, and to what extent on-screen augmentations can be triggered or collapse. All these make one aware of the external factors that determine the experience the book can offer to its readers. As a result, Borsuk and Bouse's experiment brings the book in the readers' world because everything depends on their own actions and reactions.

In order to ensure the active participation of the readers, Borsuk has updated the final version of *Between Page and Screen* with extra features. Borsuk mentions that “[i]n order to draw out the centrality of the reader to the text and provide an opportunity for closer engagement with the materialities AR both facilitates and calls into question, we have developed resources that put the text more firmly into readers' hands: a printable PDF with binding guide and a web-based AR writing interface” (*Between Page and Screen* 172). She adds: “By printing and binding their own copies of *Between Page and Screen*, directly engaging the trial and error of assembly, readers may, perhaps, more deeply appreciate the ways the work's form and content reflect upon the shape of books past and present” (173). All these details underline the role readers are invited to play by being put into a position an ergodic text would call for, as is the case with the construction of their own copy. This participation does not happen on the level of authoring a story but on a level of interacting with its medium.

By printing and binding their own copies of the book, the readers invest more effort in accessing the work and enjoy the crafting of their book.

As regards the word “between” that constitutes a core term of *Between Page and Screen*, Borsuk argues that “[t]he term ‘between’ itself suggests both interposition and interconnection – a mediating role played by the reader, who sees herself peeping in on the unfolding conversation made possible by her presence” (“*Between Page and Screen*” 170). She also adds that *Between Page and Screen* considers this moment of tension between our reading and writing interfaces in which one may feel torn ‘between’ a love of print (in some cases even a fetishization of it) and recognition of the affordances of the digital” (170). As analyzed in the previous chapter, Borsuk wants to direct attention to the print and material quality of her book while raising awareness of its medium capabilities. As a result, the book is not simply looked at or admired but one is drawn to it due to the tactile interaction it offers. The book in *Between Page and Screen* invites a tactile engagement and allows the readers to hold it in different positions and to flip through its pages. This idea, of course, tips the scales in favor of seeing the book as an object to be held and touched, as a dynamic technology, and not as a “fetishized icon” or fetishized object that one is afraid to touch because of fears for its preservation.

The reading of electronic literature relates to the process of ergodicity which has very much to do with the way readers approach a digital text. In the case of digital poetry, Christopher Funkhouser defines it “as something other [...] presented on a computer, involving processes beyond those used by print-based writers, and that poetry made with computers has unusual qualities – representing something inventive and worthy of engagement” (*New Directions* 1). Digital poetry does not constitute a homogenous class of literary practice, and as Funkhouser points out, it is “a

conglomeration of forms that now constitutes a genre even though the creative activity itself – in terms of its media, methods, and expressive intent – contains heterogeneous components” (*Prehistoric* 1). As for moldability, it constitutes an essential element with regard to digital poems with Funkhouser arguing that they “exist in a state of being moulded, receiving shape, made to assume many forms – often seeking qualities that depict space and form so as to appear multi-dimensionally” (*New Directions* 5). As for the readers of this kind of poetry, they must, according to Funkhouser, “become mouldable, capable of reshaping [them]selves and [their] expectations on a text as a whole depending on what [they] encounter on the screen” (*New Directions* 6). What these observations point out to is that readers need to shift their expectations from print literature when encountering a text of electronic literature. In the case of *Between Page and Screen*, readers become or need to become adjustable to the demands it poses in relation to accessing and reading the poems activated on the screen. Funkhouser claims that “[e]ngaging with digital poetry requires more from readers, who face multimodal, human-to-machine transcreations where texts initially presented in one state transform into others” (*New Directions* 6). The reading of digital poems captures the transition from one morphological state to the next one with reading transforming from a mere activity of simple decoding into a sensory experience that escapes the confines of a printed page.

What is more, the reading of digital poetry depends on skills beyond the quick skimming of online reading. Funkhouser observes that the “[c]ontents of a digital poem require more than the interpretation of mere information – putting it at odds with normal approaches to consumption on the WWW” (*New Directions* 25). In *Between Page and Screen*, the readers need to coordinate their bodily movements for the reading of the works making sure the right angle is achieved in relation to the

book's position in front of the camera so that the augmentation does not collapse. In her essay "Born Digital," Stephanie Strickland points out that digital poetry "does things rather than says things. To read e-works is to operate or play them." This of course points towards a performative quality that is inherent in electronic poetry, and its readers should be prepared to interact with digital poems in a different way than with print poetry. Funkhouser adds that "gaining the best understanding of a digital poem requires efforts beyond what readers of print-based works are accustomed to, and alters critical parameters due to expansions of form brought on by the medium's components" (*New Directions* 27). This is an aspect also shared with ergodicity. Specifically, in *Between Page and Screen*, ergodicity is seen as bodily engagement with the book and as playful interaction. Funkhouser states the fact about the different literacies that are emerging: "Our literature and literacy have changed: previously we learned how to read in order to understand the contents of a book; with expanded modalities we need to re-learn how to experience the literary-artistic encounter" (Funkhouser *New Directions* 31). The works of Borsuk perform exactly this role and re-introduce the processes of reading by engaging the machine into the discussion.

Digital media have been blamed for a decrease in reading and the quality of deep reading. Borsuk underlines the fact that "we are not reading less, but simply differently" and that the book format is following this change and progress and points out that "[i]t seems only natural that the book should grow and change with us" (xiv). Borsuk's own creative work, as evidenced in *Between Page and Screen* demonstrates how reading has changed, along with the form of the book. N. Katherine Hayles, in her book *How We Think: Digital Media and Contemporary Technogenesis* (2012), discusses the various types of reading that have emerged due to the impact of digital technologies. She introduces hyper reading and explains that it is "often associated

with reading on the web” (24) and “includes skimming, scanning, fragmenting, and juxtaposing texts” (25); as for close reading, it correlates “with hyper attention, a cognitive mode that has a low threshold for boredom, alternates flexibly between different information streams, and prefers a high level of stimulation” (25). In the case of *Between Page and Screen*, the readers are expected to resort to both types of reading. At the beginning, the readers try out a way of holding the book so as to present a legible augmentation on the screen, and then a closer reading can be attempted.

It is important for one to consider that in electronic literature there are both human and machine readers. As Strickland points out, “[e]-lit is a result of feedback processes between humans and machines, between human intelligence and machine intelligence” (“Born Digital”). This point also matches her following observation, being in tune with Hayles’s remarks, in relation to reading where she says that “[d]eep, focused attention is what print readers are trained to have, but attention itself is being reshaped, becoming a mix of deep and hyper, or focused and mobilized” (“Born Digital”). All these highlight the importance of a combinatory way of reading where a human reader “must, in many respects, become a metareader, reading her reading, her reaction to this new reading condition in order to experience the work fully, to judge where the activity and point of work lies” (“Born Digital”). In *Between Page and Screen*, readers have the chance to reflect on their own process of reading. As seen in the creative part of this project, *Pani Boruta and Other Stories*, augmented reality technology does not only offer a combination of the ways the book is read and how the web camera reads but the reading of visual imagery as well. The readers combine the reading of a proverb and aphorism with the oral narration of the story and the 3D objects that appear on the screen of the digital device.

In her article “The Posthuman Reader in Postprint Literature: *Between Page and Screen*,” Pressman examines through her analysis of Borsuk’s work how reading is reshaped in the digital age. She argues that the practice of reading “thus includes a certain dexterity and knowledge of how to use the technologies involved, which means that you have to learn to read this book” (55). Learning to read *Between Page and Screen*, one needs to put considerable effort in familiarizing herself or himself with how augmented reality technology works. A similar argument is raised by Tatiani G. Rapatzikou in her article “Reading Machines and Reading Subjects in Amaranth Borsuk and Brad Bouses’s *Between Page and Screen*,” where she discusses human and machine interaction in poetic space as essential for the reading of the literary piece by pointing out that “such media-generated texts” demand on “the part of the readers the cultivation of different reading strategies and skills in addition to the different cultural attitudes and perceptions as to how human subjects and machines work together especially when it comes to accessing and evaluating” them (104). The cultural awareness about using a digital device in the reading of a print book is something that develops alongside the technical innovation that is taking place worldwide. In other words, minds change along with the tools.

Both the human and the machine are required in order to read in an augmented reality environment. However, it is not only the skills of the readers reading augmented reality that are combinatory; the demands that are posed on the creators of augmented reality stories are also diversified. The discussion of Borsuk’s *Between Page and Screen* in this chapter has highlighted that the creator of electronic texts needs either find a collaborator or to develop a number of skills himself or herself such as 3D modeling, audio editing, and video-making that differ from those of print literature writers. However, it is important to keep in mind that in traditional book

publishing there are also many tasks that are given to collaborators such as editors and graphic designers to name a few. *Between Page and Screen* was seen as an example of Aarseth's ergodic text that needs that active participation of its readers in order to be explored. Borsuk's project has inspired the composition of my own ergodic text with the title *Pani Boruta and Other Stories*, which is a collection of augmented reality stories. Just like *Between Page and Screen*, *Pani Boruta and Other Stories* requires the active participation of the readers, who, additionally, need to work through the Polish language as an additional ergodic layer.

CHAPTER FOUR

Creative Writing in Augmented Reality:

The Case of *Pani Boruta and Other Stories*

“My favorite collections would not just give me short stories but they would also tell me things I didn’t know about the stories in the book and the craft of writing. I would respect authors who did not write an introduction, but I could not love them as I loved the authors who made me realise that each of the stories in the anthology was written, actually made up word by word and written down, by someone human.”

– Neil Gaiman, *Trigger Warning* (2015)

The creative writing component of the present thesis entitled *Pani Boruta and Other Stories* is a bilingual augmented reality book in English and Polish (see Fig. 3). It is based on fifteen Polish proverbs and aphorisms that are typographically present in the book serving as interludes. The pages of the book in *Pani Boruta and Other Stories* work as dynamic interfaces with the addition of digital layers. In this chapter, I aim to take interested readers through a journey of how *Pani Boruta and Other Stories* has come together, its influences and inspirations, as well as my own personal reflections on its technical and writing challenges as a creator of this project.



Fig. 3. QR code that links to the documentation of *Pani Boruta and Other Stories*.

On the importance of storytelling, in her book *Augmented Human: How Technology Is Shaping the New Reality* (2017), Helen Papagiannis claims that “[w]e learn about the world through stories. The best stories and storytellers make you feel a sense of immersion like you’re really there living the story” (140). In the case of *Pani Boruta and Other Stories*, readers are taken to places that exist at the intersection of a print and digitally represented as well as a physical and virtual world. Papagiannis connects the art of storytelling with the augmented reality medium: “I see AR as a form of make-believe, creating a virtual story that can be visual, audible [...] The human ability to make-believe is an extraordinary power. It can give a visual or a voice to something that does not exist in reality, transforming a person, object, or place, and transporting you to a different time and space” (140). With her reference to make-believe, Papagiannis places emphasis on the power of storytelling. Considering these points in conjunction with the *Pani Baruta and Other Stories* creative writing project, one can notice that the use of music, voice-over, illustrations, and 3D virtual objects aims at facilitating the immersion of the readers into the world of the proverbs and aphorisms that form an integral part of Polish culture.

The process of bringing the proposed creative writing project together was developed in a number of stages each one posing various challenges. The first stage involved the reading of the book *A Treasury of Polish Aphorisms* (1997), which is a collection of Polish aphorisms and proverbs anthologized by Jacek Gałązka. The book *A Treasury of Polish Aphorisms* has a bilingual structure because it includes the aphorisms and proverbs in their original Polish language side by side their English translations. This is the structure I wanted to continue over to my creative writing project with the Polish and English texts placed one next to the other. On the basis of stories that were hinted in them, fifteen aphorisms and proverbs were selected and

functioned as writing prompts for the augmented reality stories. The aphorisms in *Pani Boruta and Other Stories* are printed with the Brygada 1918⁸ type font. I had the chance of learning about this font type in December 2018 during my visit to the Book Art Museum in Łódź, Poland. Jadwiga Tryzno points out that “Brygada typeface is a Polish gift for all users of digital scripts [...] Brygada typeface is a digital font, whose physical source is in a set of metal type casting matrices, which came from the Type Foundry in Warsaw at 16 Rejtana Street, closed in the 90’s” (20). The choice of using Brygada 1918 was influenced also by the fact that this type font was very much connected to Polish culture and national identity.⁹ Since *Pani Boruta and Other Stories* has been influenced by Polish culture, selecting a representative Polish type font looked as a right and fitting choice for the proposed project.

After the fifteen stories were written in English, I commissioned their illustrations to a Polish artist with whom I have collaborated in other projects in the past, Tomasz Dzieduszyński, who created fifteen illustrations, one for each story.¹⁰ On the process of creating the illustrations, Dzieduszyński claims that he “needed to capture the essence of the stories in a visual form. What is more – it also needed to be legible for the computer interpreting the illustrations as augmented reality markers. In order to make them good AR markers [he] tried to incorporate as many high-contrast, colorful and sharp features as possible” (see Appendix A). What this reveals is that the augmented reality markers do not only function as illustrations for the stories, but

⁸ Andrzej Tomaszewski points out that “[t]he Brygada 1918 type family is meant for public use and is available on the websites: <http://www.prezydent.pl/> and <http://nie-podlegla.gov.pl/>. The typeface has its entry in Wikipedia, where it can be downloaded (http://pl.wiki-pedia.org/wiki/Brygada_1918)” (59).

⁹ Tryzno considers Brygada 1918 as an important part of Polish national identity: “The font release into the public domain is significantly connected with commemoration of 100 years anniversary of the Independence of Poland. It is not only the name referring to the Brigades of Józef Piłsudski’s Legions, who won the fight for independence, that is significant. The research on the origin of the typeface named Brygada showed its connection to the historical need of having a national script after reclaiming and joining of the Polish land from three annexations where cyrillic fraktur and other styles of scripts were used without defined polish diacritic signs” (20).

¹⁰ In Appendix B, there are screenshots of the markers that function as illustrations for the stories, whereas in Appendix C, interested readers can see some earlier sketches of the markers and illustrations.

they also need to have particular characteristics in order to be efficient markers that are easily tracked by the web camera.

The impact of Polish art and culture can be traced on various levels in *Pani Boruta and Other Stories*. As it has already been mentioned, the choice of the Brygada 1918 typographical font has not been a random one but draws on Polish tradition. This is an element that Dziejuszyński has tried to highlight through his marker illustrations where “[he] also stylistically refer[s] to the history of Polish graphic design, especially to the aesthetics of the Polish School of Posters from the 60s and the 70s. For example – all the graphics are stylized to look a bit like they were made with folk art paper cutting, which was one of the techniques embraced by the School” (see Appendix A). This element is important for *Pani Boruta and Other Stories* because it references Polish Visual Arts.

Since Dziejuszyński has also been involved in musical compositions, I asked him to provide me with sixteen original musical tracks that I would match to a story. Each story was assigned one music track, and the sixteenth track was used for the aphorisms and proverbs that function as a prologue to each story. In this way, a unifying effect is achieved that connects the stories together under the same musical theme of their aphorisms and proverbs. Dziejuszyński points out that “the music wasn’t composed exclusively for the project. Instead, we decided to use a selection of [his] compositions from 2017 to 2019. All of them were small etudes prepared to train in different music genres and techniques” (see Appendix A). Each music track provides an additional layer to the stories since it helps set up each time a particular mood.

Based on the bilingual (English and Polish) conceptualization of the book *A Treasury of Polish Aphorisms* the *Pani Baruta and Other Stories* project derives from,

I also decided to create a bilingual (English and Polish) augmented reality book. This would also give me the opportunity to draw the readers' attention to a language other than English. This is because English tends to monopolize interest and attention, due to its many speakers and as the contemporary lingua franca. Dzeduszyński, being a native Polish speaker, in addition to the illustrations and music compositions has also contributed to the translation of the stories I wrote originally in English into Polish.

The next step involved the creation of the 3D models that would be used as augmentations for the stories. A free and open-source software (known as Blender¹¹) was used in order to compose 3D virtual models. Having no prior experience in this field, I had to develop some basic skills in 3D modeling. This process involved designing, digitally sculpting, scaling, and applying textures, materials, and colors to the models. The models would be exported in the format of fbx files. This has been a great challenge for a literary scholar to face. However, one of the challenges of this project is its interdisciplinary nature and the opportunities it offers for the use of free software enabling one to develop a different set of skills other than close reading of a print text. In the previous chapter, I referred to Hayles' distinction of different types of reading such as hyper reading. What is additional in *Pani Boruta and Other Stories* is that it delves also into the reading of visual imagery. The development of different reading skills as well as experimenting with different software has also given me the opportunity to have hands-on experience in a field that I have been studying from a theoretical point of view during my doctoral and postgraduate studies but now I had the opportunity to use on a creative writing level.

After composing the 3D models, I had to turn to Unity with Vuforia plug-in, a software for the creation of augmented reality applications. The illustrations that

¹¹ For more information see <https://www.blender.org/>.

Dzieduszyński composed would also function as markers for the *Pani Boruta and Other Stories* augmented reality project. Most of the illustrations worked well, however, some of them could not be tracked by the digital camera so they had to be further edited and modified. Dzieduszyński claims that the augmented reality engine “is colorblind and a lot of [his] contrasts depended on complementary colors used next to each other. This meant, that a clear edge between two colors (i.e. red and blue) was totally absent in greyscale” (see Appendix A). This reveals the complexity behind creating visual markers for augmented reality that function also as content illustrations for stories. The issue was resolved by analyzing the contrasts “as seen by the digital camera” and these were “digitally enhance[d] [...] to make them easier for Vuforia to understand” (see Appendix A.).

Once the tracking of the markers was resolved, the next step involved the design of the augmented reality book. The book was conceived as an artist’s book, meaning that emphasis was placed on the self-reflective qualities of the work. The front and back cover consist of an A3 size folded paper each that has been sewn into the signatures of the book. What potential readers would be expected to do when they can hold such a book is to unfold the covers in order to gain access to its content. As for the front cover, it provides information about the book in English (see Fig. 4), while the back cover does the same but in Polish (see Fig. 5) showing in this readers that this is a bilingual project. The same applies to the narrative itself with each story starting in English narration being followed up by its translation in Polish.

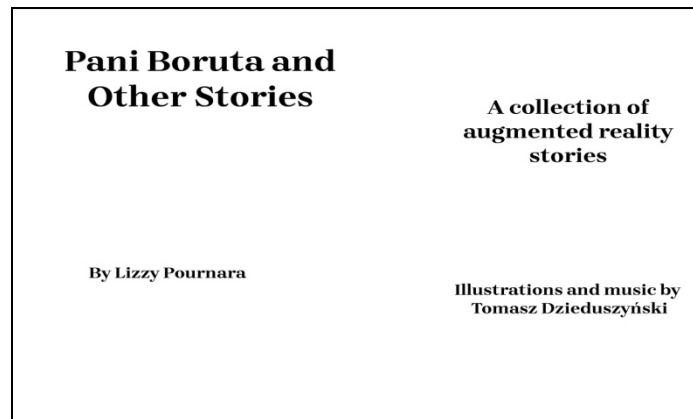


Fig. 4. Image of the front cover in English

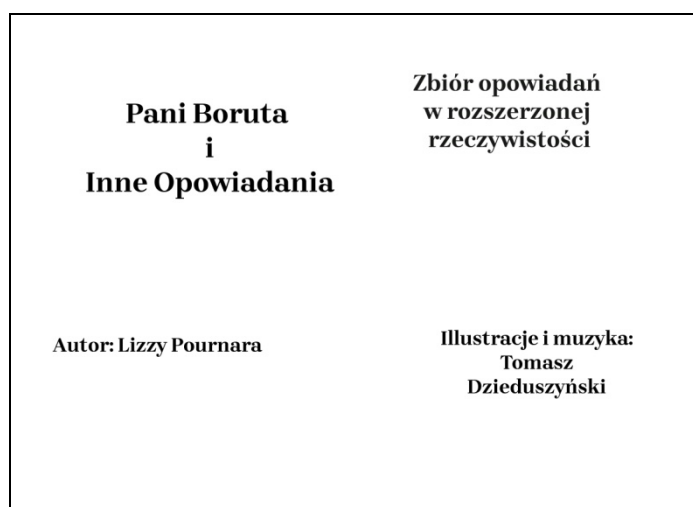


Fig. 5. Image of the back cover in Polish.

For the book design and pagination, the open-source software Gimp¹² has been used. Also, certain book components needed to be printed. This has helped so that A4 size pages could be folded into A5 size. As soon as this part of the process has been completed, the next step has to do with the sewing of the signatures. For this artist's book, I have chosen a western-style binding that does not make use of hardcovers while leaving the spine of the book exposed. A blue thread has also been used in order to bind the signatures and the covers together. The blue color of the thread was chosen so as to contrast the yellow of the covers.

¹² For more information see <https://www.gimp.org/>.

As for the recording and sound editing of the stories, this has been a lengthy process. The open-source software Audacity¹³ has been used for this part of the project also helping to match the music tracks to the stories. The next step involved the mixing and editing of the recordings and tracks so that a particular effect is achieved, such as the increase and decrease of the volume to create suspense. Once this step has been carried out, the files can be exported in an mp3 format. Features such as amplification, noise reduction, compression, and normalization have been used as part of the needed sound editing so that the voice-over would acquire clarity and the music track would not overtake it.

The last step has involved the combination of all the above elements with the help of the Unity software and its Vuforia plug-in for the development of the augmented reality application. Once the application was developed, a documentation of *Pani Boruta and Other Stories* played in Unity's player mode was filmed with the screen capture properties of the software QuickTime Player.¹⁴ This is an important component in the whole process since it enables the recording of the iteration of the project. The documentation of digital works is very valuable since their ephemerality constitutes them vulnerable to the passage of time; while efforts to access works of electronic literature may be impossible due to software updates, obsolete hardware and limited circulation.

Overall, the aim of this project has been to learn how to use augmented reality technology for the composition of stories. Augmented reality is a technology that requires a variety of skills. Thus being engaged in such a project as a writer and

¹³ For more information see <https://www.audacityteam.org/>.

¹⁴ The video documentation of *Pani Boruta and Other Stories* is available here: <https://youtu.be/DPjkbkDGpuk>.

literary scholar my aim has been to combine all needed skills with creative writing. This is exactly where the interdisciplinary potential of such a project lies in its ability to bring together writing skills, audio editing and recording, 3D modeling, graphic editing, bookbinding, knowledge of a foreign language other than English, and last but not least, the ability to co-operate with an external collaborator. Through this process, I came to realize how much effort goes into bringing together an augmented reality story and how demanding it is to apply all theoretical concepts to practice: ergodicity, cybertextuality, artists' books, book-making, augmented reality, and digital literature. Bringing this project to life, I have been able to get first-hand experience as regards the challenges, limitations, and opportunities such an endeavor offers to a practitioner. In addition to the technological and writing difficulties that had to be surpassed, I have also come to realize the complexities that a bilingual project poses even though the assessment of this part of the project lies beyond the scope of what has currently been carried out. What actually matters, as has been shown in the current chapter, is the extent to which a creative project's potential can be maximized if diverse tools and interdisciplinary methodologies as well as artistic collaboration constitute the core of its conceptualization.

EPILOGUE

This project has viewed augmented reality technology as a storytelling tool that rests at the intersection of print and digital media. The main research question this project has set out to answer is how we read, explore, approach, and create a story that does not only rely on print-bound textuality. Through the study of Amaranth Borsuk's augmented reality book *Between Page and Screen*, the complementary relationship of the print book with the digital medium has been examined. The aim of this project has been to shed light on creative writing with augmented reality in an effort to explore the combination of a book object, oral narration of stories, and the insertion of 3D models.

Bringing together the theories by Helen Papagiannis on augmented reality, Espen Aarseth on cybertextuality and ergodicity, Johanna Drucker on artists' books, Christopher Funkhouser and Stephanie Strickland on digital poetry, as well as Amaranth Borsuk's own theoretical reflections, I have attempted to discuss the ways in which the book form can be reinvented and reformulated or even enhanced and expanded with the use of digital media offering readers a far more engaging experience. As far as the creative writing component of this dissertation is concerned, the aim has been to write stories that are native to augmented reality environment, meaning that they have been composed specifically for augmented reality technology. Apart from co-operating with an external collaborator, for the composition of *Pani Boruta and Other Stories*, a number of skills had to be acquired and mastered to a certain degree, skills that go beyond those of a writer and literary scholar: 3D modeling, audio editing and recording, book-binding, video making to name a few. There is certainly room for future work on the field of augmented reality both theoretically and creatively. Anticipating the technological progress that is taking

place in the field of augmented reality, one could explore more interactive aspects of augmented reality that are based on the second wave of “Entryway” that Papagiannis mentions, in which personalized context plays a key role in how augmented reality operates. I hope this project will attract interest for future researchers and artists to the medium of augmented reality and the potential it hides when combined with print technology and storytelling.

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APPENDIX A

Interview with Tomasz Dzeduszyński

This interview was conducted via email on 17th May 2020. Tomasz Dzeduszyński has illustrated the markers for *Pani Boruta and Other Stories*, composed the music, and translated the texts from English to Polish. Dzeduszyński is currently working on his doctoral thesis at the Warsaw University of Technology, Poland, in the area of innovative, digital and multimedia tools for architecture and urban planning. He has participated in projects at the intersection of architecture, mechatronics, electronics, robotics, experimental literature, music, and graphic design. His research interests include parametric architecture, CAD/CAM, BIM¹⁵ methodologies, space exploration, astronautics, sustainability, and circular economy.

Lizzy Pournara: How would you introduce and define your artistic practice? What aspects of your artistic practice drew you to undertake the illustrations and music composition for *Pani Boruta and Other Stories*?

Tomasz Dzeduszyński: By profession I'm not an artist but an architect who treats art as a hobby. My parents are artists and designers, so I've always been drawn to various artistic projects. More diverse the better. I became especially fond of drawing, painting, music, modelling and crafting. All the above in traditional and digital forms. I found *Pani Boruta and Other Stories* very enticing due to its multidisciplinary character since it combines literature, augmented reality, visual arts, music, and artistic bookmaking in a single, coherent entity.

¹⁵ CAD stands for Computer Aided Design, CAM stands for Computer Aided Manufacturing, and BIM stands for Building Information Modeling.

Lizzy Pournara: As regards the process of translating the stories from English to Polish, are there points that are worth mentioning? Are there some aspects that have a special meaning in one language? Could you give some examples?

Tomasz Dzieduszyński: As with translating aphorisms – translating stories can be a bit tricky. Especially to someone with virtually no translating experience. Being a native Polish speaker definitely helped though. Some meanings got altered and sometimes new meanings emerged in the translation. For example – due to how the grammatical gender works in Polish in “*Once I faked virtue, now I fake desire*” I had to decide, whether the mentioned lover is male or female. The original story gave me an impression, that the depicted affair was a homosexual romance. Later, when I consulted the issue with the author, it turned out, that this wasn’t her intention at all. I left it as it is though.

Lizzy Pournara: How would you describe the process of creating the illustrations? What kind of tools did you use?

Tomasz Dzieduszyński: To me – making the illustrations was pretty similar to the process of translating. I needed to capture the essence of the stories in a visual form. What is more – it also needed to be legible for the computer interpreting the illustrations as augmented reality markers. In order to make them good AR markers, I tried to incorporate as many high-contrast, colorful and sharp features as possible. Unfortunately – what I didn’t check, was that Vuforia (the used AR engine) is colorblind and a lot of my contrasts depended on complementary colors used next to each other. This meant that a clear edge between two colors (i.e. red and blue) was

totally absent in greyscale. After the book was printed some of the markers didn't work at all (examples of the problematic ones were the devilish money bag, the taxi, and the Martian base). Fortunately, after we analyzed the contrasts, as seen by the digital camera, we managed to digitally enhance some of the features to make them easier for Vuforia to understand. In the end, none of the markers needed to be reprinted. The markers were hand-drawn on a graphics tablet and edited digitally in raster graphics editing software.

Lizzy Pournara: What were your influences in the composition of the music for the stories?

Tomasz Dzieduszyński: In fact, the music wasn't composed exclusively for the project. Instead, we decided to use a selection of my compositions from 2017 to 2019. All of them were small etudes I prepared to train in different music genres and techniques. I must say, that the author did a great job of selecting the fitting tracks and mixing them together with the narration. As it turns out, due to their diversity and shortness they fit the stories quite nicely. The set of inspirations for my etudes is very broad, but if I had to pick a few, I would mention Trent Reznor,¹⁶ Martin Molin,¹⁷ and the 80s pop music.

Lizzy Pournara: Did you include elements of Polish culture, such as folklore and architecture, in your illustrations and music composition that you would like to mention?

¹⁶ Trent Reznor is the lead musician of the Nine Inch Nails band.

¹⁷ Martin Molin is the lead musician of the Wintergatan band.

Tomasz Dzieduszyński: One of the notable examples is, of course, the Łęczyca Castle – home of the Diabeł Boruta. It illustrates the story entitled: “*Where the devil can’t manage, he’ll send a woman.*” The Łęczyca Castle is actually just 20min away from my place by car, so I feel a personal connection to this place. In my illustrations, I also stylistically refer to the history of Polish graphic design, especially to the aesthetics of the Polish School of Posters from the 60s and the 70s. For example – all the graphics are stylized to look a bit like they were made with folk art paper cutting, which was one of the techniques embraced by the School. The Polish School of Posters was very much connected to the Faculty of Architecture of the Warsaw University of Technology – especially with professors Stanisław Noakowski and Rudolf Świerczyński, who put much emphasis on the graphical, poster-like representation of not only their projects, but also the projects of their students. This aesthetic tradition continues today in the faculty. My aesthetic sense was very much influenced by this tradition during my studies, and I believe it is reflected in the illustrations I prepared. The Polish poster style would usually use strong-contrast, vibrant and uniform color patches, which despite being attractive aesthetically also should make for good AR markers. The Polish School of Posters would also refer to folk and historical motifs. These references are also present in the illustrations, through the representations of the Diabeł Boruta, the Łęczyca Castle, ancient mythology, or even vampires and witches. Also – despite being a commercial tool – the Polish posters had a very strong, artistic spirit. Often, the representations of the advertised product were not direct, as in western posters, but very abstract and symbolic. The representations in my illustrations are also often indirect because they put the triggering of connotations over their literal representation.

APPENDIX B

Screenshots of *Pani Boruta and Other Stories*

This appendix consists of fifteen screenshots from *Pani Boruta and Other Stories* that correspond to each one of the stories. On the left-hand side, there is a screenshot with the 3D model, and on the right-hand side, there is the corresponding marker for comparison. In the story that is based on the aphorism “a smile is half kiss” the illustration marker depicts humanity’s attempt to kiss the sun (see Fig. 2). A spaceship approaches the sun to “kiss” it. The spaceship is called the Parker Solar Probe. Because the sun does not have a surface, the probe will just fly “into” the corona of the sun, which is the outer layer of the Sun’s atmosphere. The 3D model was inspired by a draft version of the marker in which the spaceship had the shape of a cat (see Fig. 1).¹⁸

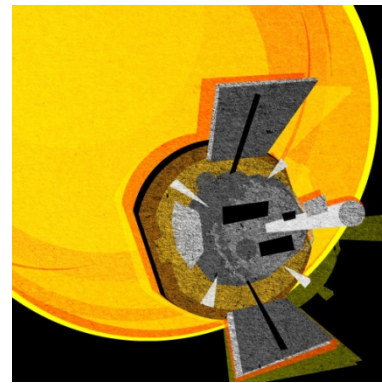
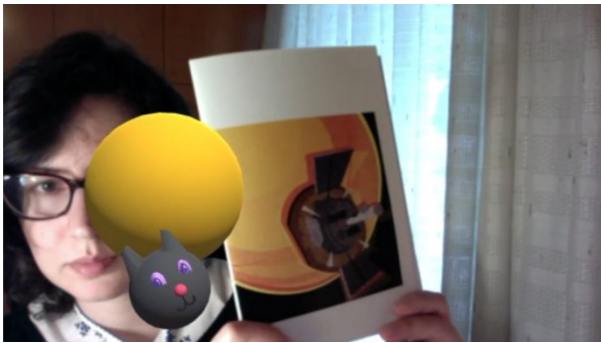


Fig. 1 and Fig. 2. Screenshots of “a smile is half kiss.”

The story that is based on the aphorism “better an ounce of luck than a pound of gold” contemplates the difference between value and gravity, and whether luck is more important than wealth. The illustration shows a caliper trying to measure a 4-leaf clover, the symbol of luck. It’s a humorous representation of a trial to quantify the “ounce of luck,” which could be compared to the “pound of gold.” The 3D model

¹⁸ See Appendix C.

brings to life the suitcase that the man was sitting on containing two bags of gold and a walking stick (see Fig. 3 and Fig. 4).

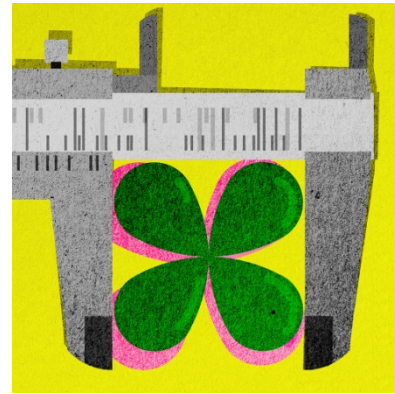


Fig. 3 and Fig. 4. Screenshots of “better an ounce of luck than a pound of gold.”

The story that was prompted by the proverb “where the devil can’t manage, he’ll send a woman” features Pani Boruta, who steps into the shoes of her husband, the Devil Boruta, who is taken ill and is unable to get out of bed. The illustration was very much inspired not only by the folk stories about Diabeł Boruta, but also by the novel *The Master and Margarita* (1967) by Mikhail Bulgakov, where the flying broom symbolizes the absolute freedom. The 3D model is a representation of Devil Boruta’s castle in Łęczyca (see Fig. 5 and Fig. 6).

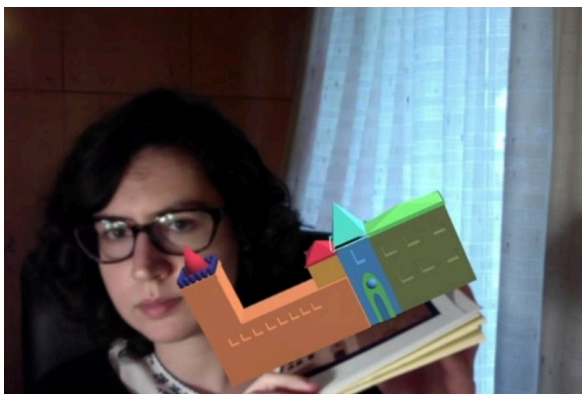


Fig. 5 and Fig. 6. Screenshots of proverb “where the devil can’t manage, he’ll send a woman.”

The story based on the aphorism “once I faked virtue, now I fake desire” plays with the word “ochota” that in Polish means “desire.” Ochota is also a district in Warsaw. The illustration in this case is a literal representation of the situation described in the story. The 3D model is a sign plate with the inscription “Ochota” (Fig. 7 and Fig. 8).

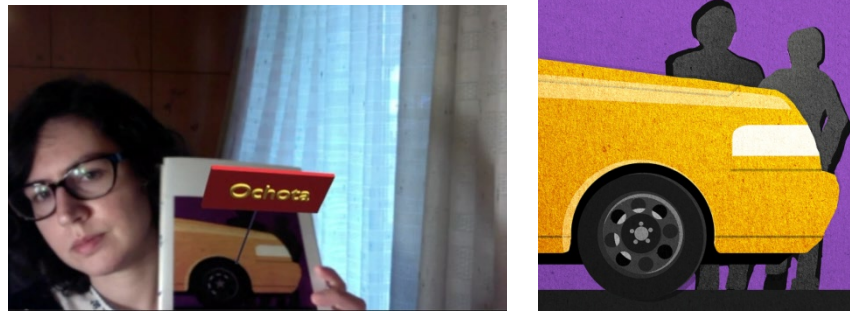


Fig. 7 and Fig. 8. Screenshots of “once I faked virtue, now I fake desire.”

The story based on the aphorism “the way is never long to one’s beloved” is about the dreams of a young woman to become a culinary artist. However, she ends up on Mars in a house build out of ice. The illustration marker depicts the house of ice on Mars (see Fig. 10).¹⁹ The 3D models on the other hand are objects of her earthly dreams to become a culinary artist (see Fig. 9). The music creates a nostalgic and sad atmosphere.



Fig. 9 and Fig. 10. Screenshots of “the way is never long to one’s beloved.”

¹⁹ For more information about Martian ice-structures see Dziejuszyński’s article entitled “Architectural Form of a Martian Habitat: Digital Analyses of Space Radiation and Insolation of Water-Ice Construction” (2020).

In the story based on the aphorism “the road to success is full of women pushing their husbands” I take the aphorism a step further by having the custom wives forcing their husbands to work and succeed. The 3D model in this story depicts the island with its underground basis for secret operations (see Fig. 11). In the marker, the woman is portrayed as a Sisyphus figure rolling her smiley husband up the hill (see Fig. 12).

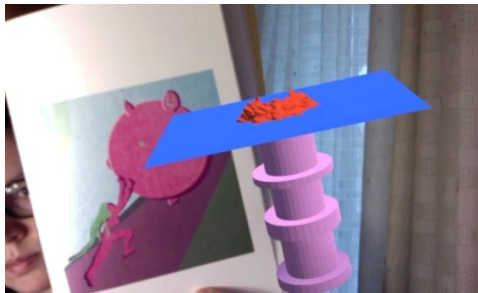


Fig. 11 and Fig. 12. Screenshots of “the road to success is full of women pushing their husbands.”

The aphorism “don’t trust the heart, it wants your blood” is taken quite literally in the story to describe the war that takes place inside a body (see Fig. 14). The illustration puts emphasis on the internal betrayal between the supposedly allied organs. The 3D model is a heart (see Fig. 13). The music provides a more relaxing type of jazz atmosphere to contrast the macabre situation taking place in the body.

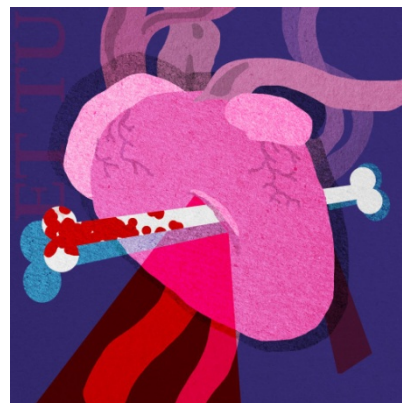
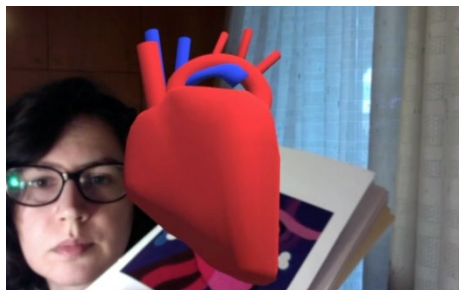


Fig. 13 and Fig. 14. Screenshots of “don’t trust the heart, it wants your blood.”

The story based on the aphorism “a whisper goes faster than a shout” takes place during New Year’s Eve. The 3D models in the story are objects that one traditionally associates with the New Year’s Eve celebrations: a bottle of champagne and two glasses that are positioned in a cheers way (see Fig. 15). The marker provides the background with the fireworks (see Fig. 16).



Fig. 15 and Fig. 16. Screenshots of “a whisper goes faster than a shout.”

The aphorism states that “there are more bloodsuckers than blood donors.” In my interpretation of the aphorism, I take the meaning of bloodsucker literally to refer to the folkloric beast of the vampire. The marker illustration depicts bloodsucking mosquitos outside the tower (see Fig. 18). The musical track of buzzing mosquitos intensifies the overall effect. The 3D model used for this story is that of a castle in the Carpathian mountains with two vampire bats flying outside (see Fig. 17).



Fig. 17 and Fig. 18. Screenshots of “there are more bloodsuckers than blood donors.”

The aphorism “friendship after love is like smoke after a fire” is interpreted in the story under the perspective of the relationship between Tobias and Lexie, who got divorced after a troublesome marriage. After this event, things seem to calm down since the flame is gone, yet what remains is the sweetness of smoke and friendship, as it seems in the fireplace that takes a central role in the story (see Fig. 19). The marker illustration depicts a bunch of logs burning on a fireplace (see Fig. 20).



Fig. 19 and Fig. 20. Screenshots of “friendship after love is like smoke after a fire.”

The story inspired by the aphorism “evil can afford all customs duties” is about hell that exists underground. I have chosen to represent evil with its manifestation of hell as a luxurious place run by a mafia that can afford to pay for extravagances (see Fig. 22). Evilness is redefined as not committing “crimes” but as overindulgence. The 3D

models are plain in order to draw attention to the kitchen supply aspect of the story (see Fig. 21).



Fig. 21 and Fig. 22. Screenshots of “evil can afford all customs duties.”

The aphorism states that “no snowflake in an avalanche ever feels responsible.” In this story, the snowflakes are depicted as carefree creatures that all they want to do is play. Little snowflake and her sisters play a game of race and as a result, they create an avalanche (see Fig. 24). However, at some point, the avalanche reaches a precipice and dissolves. As a result, little snowflake gets separated from her sisters and is jerked into the air. The 3D model depicts snowflakes (see Fig. 23).



Fig. 23 and Fig. 24. Screenshots of “no snowflake in an avalanche ever feels responsible.”

The story based on the aphorism “to smile, you need someone to smile as well” is a reflection on the profession of a teacher. Smiling is understood as an action-reaction rule (see Fig. 26). The 3D model is a literal transmitter (see Fig. 25). I wanted to create this mental image of the role of transmitter of the teacher. Knowledge is like the energy that the teacher transmits.

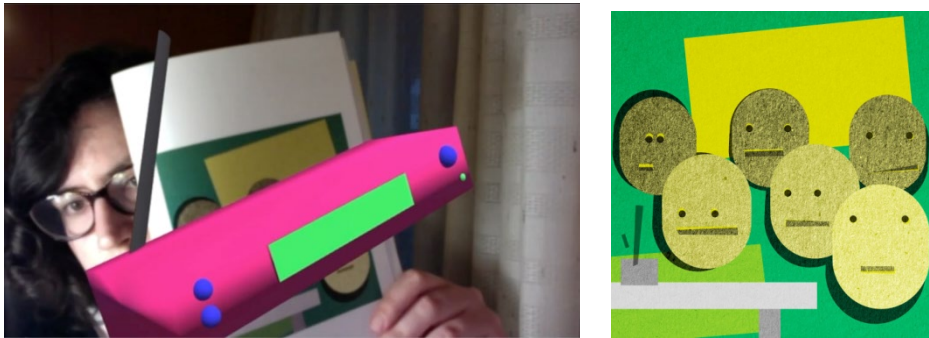


Fig. 25 and Fig. 26. Screenshots of “to smile, you need someone to smile as well.”

This aphorism states that “sometimes difficulties come because you expect them.” In this story, Howell is the owner of a patisserie, where he prepares very special delicacies. Howell is very keen on flirting with women. For that, he is always in trouble. The 3D model is that of the patisserie (see Fig. 27). The marker illustration depicts the lady with the long red hair that enjoys eating one of Howell’s desserts (see Fig. 28).



Fig. 27 and Fig. 28. Screenshots of “sometimes difficulties come because you expect them.”

The aphorism talks about “poets and canaries stop singing when paired.” In this story, when the poet and the canary exist in the same space they stop singing, they stop living. Julia and the canary do not survive but drown into the icy pond. The marker illustration provides the tragic quality of the story with the pen hovering in mid-air depicting the event of falling into the hole of ice (see Fig. 30). The 3D model represents the whole in the pond as very spiky and sharp like ice (see Fig. 29).

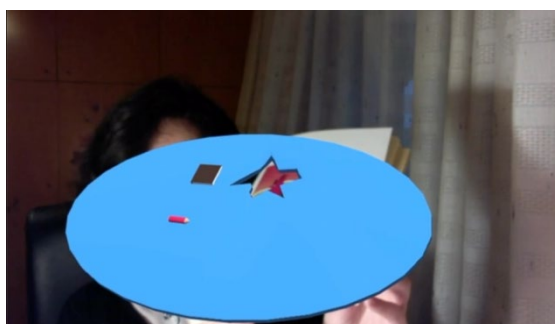


Fig. 29 and Fig. 30. Screenshots of “poets and canaries stop singing when paired.”

Appendix C

Early Sketches of the Illustrations by Tomasz Dzeduszyński



BIOGRAPHICAL NOTE

Elissavet Pournara is Postdoctoral Researcher at the Department of American Literature and Culture, Aristotle University of Thessaloniki (AUTH), Greece. She holds a Ph.D. in Contemporary American Poetry (2018), an M.A. in English Literature (2013), and a B.A. in English (2011) from the same university. In Spring 2016, she was a Visiting Scholar (Stavros Niarchos Foundation IVGS Award) at Sensorium Center for Digital Arts and Technology, at York University in Toronto, Canada. Her research interests focus on contemporary American poetry, digital literature, augmented reality, and creative writing. She is a member of the Multimodal Research and Reading Group of School of English, AUTH, as well as a member of the Hellenic Association for American Studies and the European Association for American Studies.