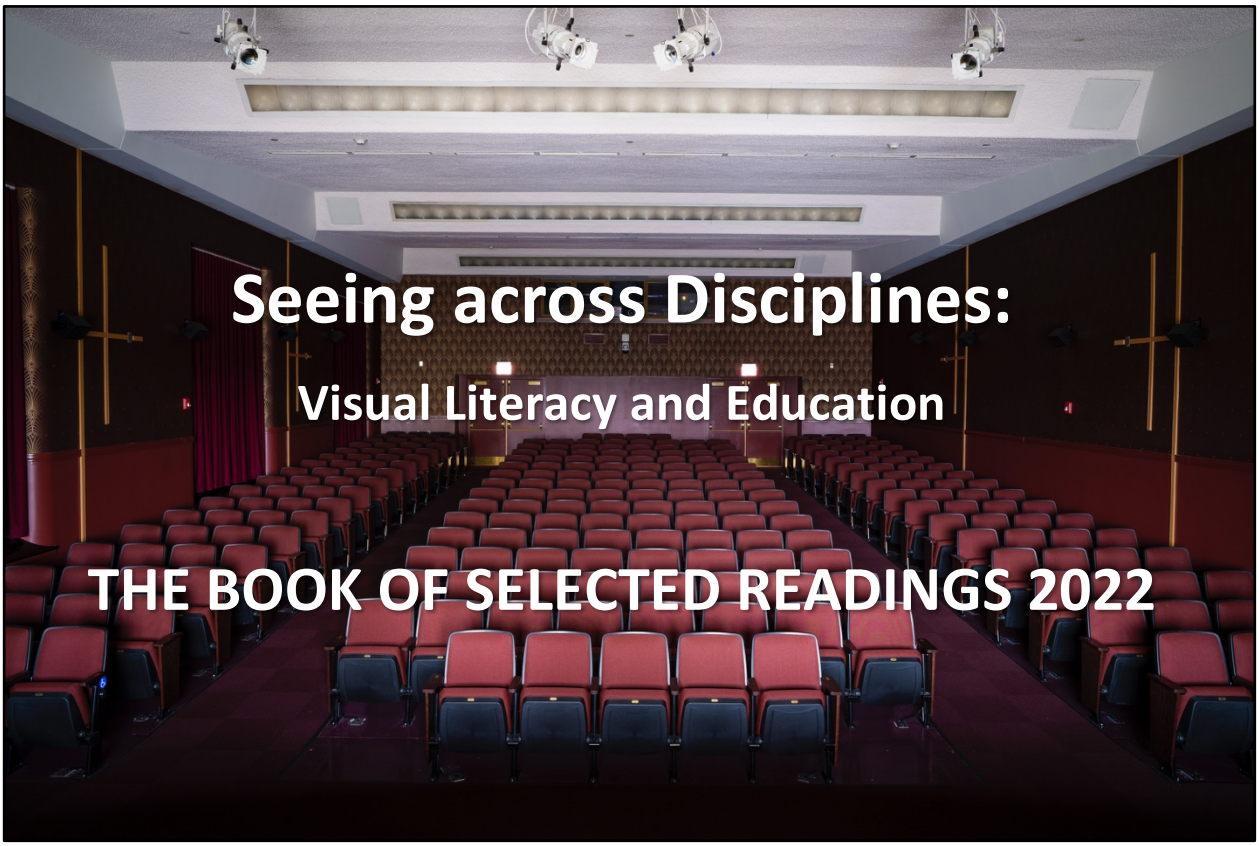

Seeing across Disciplines:

Visual Literacy and Education

THE BOOK OF SELECTED READINGS 2022

Edited by

Jung Lee, Stephanie Beene, Xiaoning Chen, Wanju Huang,

Lee Okan, and Filipa Rodrigues

International Visual Literacy Association

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Cover Art:

"Public Library", created by Eric Sung, was selected for the 1st place at the International Online Juried Art Exhibition at the 2021 IVLA annual conference.
The image is from "Monuments of Memories for Our Times" series which is made with a dedicated consideration to the complexities inherent to the "monument." In "public Library," Sung explores documenting vacant community infrastructure as monument of current times to archive the impact of Covid-19.

About the artist:

Eric Sung is an artist and photographer who is an associate professor in the Art and Art History Department at Providence College and the founding director of a cutting-edge program in Business and Innovation. Sung's work was recognized by numerous awards, exhibitions, and presentations around the globe. Recently, his work was awarded by the National Endowment for the Arts (NEA) Research Grant. Professor Sung is a leader in connecting the arts with real- world public problems, and it is in that vein that he is known not only as a public scholar, educator, and artist, but also as a genuine community builder and uniter.

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The Book of Selected Readings Editorial Philosophy

IVLA is an eclectic organization of professionals working toward a fuller understanding of how we derive meaning from what we see and how we interact with our visual environment. IVLA members represent a wide range of disciplines including the arts, sciences, education, museum, library, communication, business, videography, photography, instructional technology, health, and computer applications.

Each year, members come together at a conference held in conjunction with a university, museum or organization to present their ongoing work and to share perspectives in a multidisciplinary forum. Characterized by many different voices, and cross-fertilization of ideas, interests and values, discussion is a lively mix of scholarship, creativity, and applications. Since the founding of the organization in 1968, this dynamic interaction between practitioners and theorists has been IVLA's greatest strength.

The Book of Selected Readings (BSR) is a peer reviewed collection of papers, selected from the presentations at the annual IVLA Conference. It is meant to reflect the spirit of the ongoing conversation among its diverse members and to promote new perspectives in its readers. Included in *the BSR* are creative ideas in the making, works in progress that invite further thought and the results of long-term scholarly research.

What makes *the BSR* special, like the members of IVLA who have contributed to it, is that it represents this broad range of interests and reflects some of the most diverse thinking in the field of visual communication. In addition, *the BSR* truly presents the international perspectives. For the 2022 BSR, 12 published articles came from 7 difference countries, such as Netherland, Syria, Russia, Brazil, Egypt, Canada as well as USA.

We are proud to present these multi-faceted works for your consideration.

International Visual Literacy Association
Publications Committee
First stated in 1998

Jung Lee, Editor-in-chief 2022

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Jury Procedure

This book has been compiled using a peer review procedure to guarantee a high-quality publication. The procedure began with planning the International Visual Literacy Association's annual conference. Part of the conference planning procedure is to appoint a proposal review committee that blindly review papers to be presented at the conference. Authors who have papers accepted at this state of the evaluation are invited to present their papers at the annual conference.

All presenters are then permitted to submit their conference papers for possible publication in *the Book of Selected Readings.* These papers are submitted to the editor-in-chief. The editor-in-chief and editors of *the Book of Selected Readings* are elected by IVLA board members for three-year terms.

Each manuscript has been blindly reviewed at least three different editors assigned by the editor-in-chief. The authors receive editors' comments and submit the revised papers for the final review. For the 2022 BSR, 12 papers were accepted for the book. The rejection rate for this year's publication was approximately 30% based on the number of papers submitted for publication. The rejection rate is considerably higher if you consider the review at the conference level.

Please request further information about the review process from:
Jung Lee, Editor in Chief of *Book of Selected Readings 2022*
leej@stockton.edu

Editors' Choice Award

Each year the editors of the Selected Readings choose papers that they judge to be exemplary words of research and literature. The editors are asked to list papers that hold their interest or those they find memorable. Winning papers are awarded the Editor's Choice emblem shown at the bottom of this page.

This year's honor goes to **Maaike Wessels-Compagnie**. Maaike's paper Designing an Information Comic is, most of all, engaging. While reading the article, the audience feels that she is talking to you. The paper format is unique, combining text and comics. One reviewer commented that this paper is relevant and important in current visual literacy and graphic novel/comic studies. Not only is the format unique, but also the content is rich. The paper demonstrates her journey of translating formal academic prose — Mayer's design principles for effective multimedia instruction — into the visual language of comics via comic dialogues of expert informants. Through Maaike's journey, she also teaches how to design an information comic. The appendix of the paper shows the end product comics.

The author will receive a certificate of recognition at the next IVLA Annual Conference to be held from August 10-12, 2022 in Jyväskylä, Finland. Congratulations for the excellent paper.

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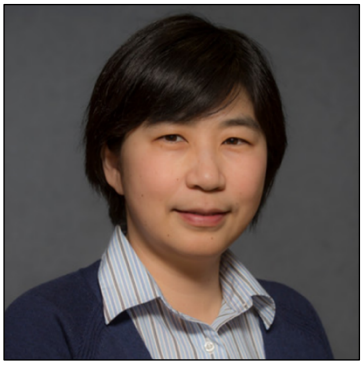

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International Online Juried Art Exhibition

Since 2020, during the annual conference, IVLA has held an international online juried art exhibition. The exhibition is open to 2D works and videos (5 min max), including but not limited to painting, drawing, photography, prints, collage, screen art, and related digital media. The exhibition is publicly available on an online, virtual 3D exhibition platform. In 2021, 97 works from 17 different countries were submitted. Jurors selected art works to be displayed, and, of those, which works would be awarded or honored.

For the 3D exhibition, the works have been curated by a panel designated by IVLA and staged in a virtual architectural space. Thus, the actual presentation of the work in the virtual gallery is not neutral; in fact, it is also a collaborative VR 'experiment' with the artists. The installation itself is subject to further conceptual and historical speculation.

You will see the 2021 awarded and honored art works in this Book of Selected Readings.

Jurors:

Petronio Bendito
Associate Professor, Visual Communication Design Purdue University
Exhibition Co Chair, Exhibition Installation, Coordinator

Karen F. Tardrew
Associate Professor, Learning Sciences Chair, National Louis University
Exhibition Co Chair, Exhibition installation team

Peter Carpreau
Head of the Department of Old Masters, Museum Leuven
Exhibition Juror, Exhibition Narratives

Dana Statton Thompson
Research and Instruction Librarian & Associate Professor Murray State University
Exhibition juror

Kate Ogden
Professor of Art History, Stockton University
Exhibition juror

Alison Huftalen
Head Librarian, Toledo Museum of Art
Exhibition juror

Debra Davis
Professor of Art, University of Toledo
Exhibition juror, Exhibition installation team.

Geri Chesner
Associate Professor, National Louis University
Exhibition Installation

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2ND PLACE

3RD PLACE

HONORABLE MENTION (Alphabetic order by artist's last name)

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Designing an Information Comic

Maaike Wessels-Compagnie
Rotterdam University of Applied Sciences, Netherlands

Abstract

This study revolves around the idea that using the visual language of comics to communicate scholarly knowledge benefits learners in higher education. The researcher transformed the written academic prose of pages 58-70 of Mayer's Multimedia Learning *(2009) into a 12-page information comic with help of expert informants and found that it is possible to create an information comic that communicates academic ideas provided the researcher has 1) a high level of visual literacy, 2) accepts that intersemiotic translation always leads to new meaning, 3) accepts that emotion will become part of the final product, and 4) accepts that it takes considerable time to create the imagery. Based on the literature, experience and expert feedback, the researcher identifies 12 possible steps for the design of information comics and six reasons why information comics demonstrate great potential for learning.*

Keywords: Information Comic, Academic Communication, Multimedia Learning, Emotive Design.

Introduction

We live in a visual culture where images have become central to communication and meaning-making (Felten, 2008), yet most academic knowledge is offered to students in verbal form. Why? “If students are to create meaning through visual interpretations, then teachers need to create didactic designs that support development of visual literacy abilities of the students” (Pettersson, 2020, p. 37). To demonstrate that scholarly knowledge can be communicated more visually I translated formal academic prose into the visual language of comics. I chose to redesign the content of *Multimedia Learning* (Mayer, 2009) because it revolves around the idea that people learn better from words and pictures than from words alone. I focus on the pages that deal with how multimedia learning works. The resulting information comic will introduce students to the idea that there are more ways into knowledge than the print-based tradition of wordy papers (Ball, 2004) and increase their visual literacy (Cohn, 2003).

My research questions are:

1. How can I translate the written academic prose of page 58-70 of *Multimedia Learning* (Mayer, 2009) into the visual narrative of a digital information comic?
2. How can I simultaneously create a learning tool for students in higher education?

Exposing students to comics might even encourage them to use it as a means of expressing themselves, as the PhD comic does (Figure 1). Comics are fun!

Figure 1
The PhD comic, a comic about grad school experiences (Cham, 2015)

Note. Retrieved from: https://phdcomics.com. Copyright 2015 by Jorge Cham

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Review of the Literature

The following sections will take you through some of the pertinent literature on visual language in comics, information comics in relation to multimedia learning, and — because a verbal text is reimagined into the comic format — intersemiotic translation.

Visual Language of Comics

The existence of visual language has been confirmed by numerous studies (e.g., Avgerinou, 2001, Moore & Dwyer, 1994; Pettersson,1989). Visual language is holistic, must be learned, may improve learning, is not universal, and often needs verbal support (Avgerinou & Pettersson, 2011). The idea that comics are written in visual languages of their own may be controversial (Grennan, 2017; Hick, 2012) but many aspects are systematic and conventionalized (Cohn, 2013; Jüngst, 2010). Comics are multimodal texts. Meaning flows between two semiotic systems. “The image includes reference to the text and the text is referring to the image” (Gignoux 2005, cited in Aktulum, 2017, p.34). Eisner (1985) illustrates how meaning of the visual affects meaning of the verbal in comics by combining five facial expressions with five sentences (Figure 2). All 25 combinations have a different effect on the reader. Effective multimodal authors move the emphasis backwards and forwards between the various modes to convey the required meaning (Cope & Kalantzis, 2009).

Figure 2
Interaction between visual and text (Eisner, 1985: p.110)

Information Comics as Multimedia Learning Tool

Information comics are didactic-instructive instruments that help the reader to acquire knowledge (Jüngst, 2010). Well-designed information comics are likely to facilitate learning because “people learn better from words and pictures than from words alone” (Mayer, 2001, p.1). Mayer calls this the multimedia principle. He proposes 12 design principles for effective multimedia instruction (Appendix I).

Rasch and Schnotz (2009) call the multimedia principle into question. They suggest that adding pictures to text is neither beneficial nor harmful for learning, and that learning from text only could be more efficient. Is it possible their learners spent more time with the visuals because they enjoyed it? The role of emotion in instructional design is gaining attention (e.g., Mayer & Estrella, 2014) as affective processing is found to be linked to learning (e.g., Plass & Kaplan, 2016). Information comics popularize knowledge transfer and make extensive use of emotive elements in both text and image (Jüngst, 2010). They have the potential to increase readers engagement as well as foster scientific literacy (Eilam & Poyas, 2010; Farinella, 2018) and visual literacy (Cohn, 2013), a skill that must be learned (Avgerinou & Petterson, 2011) and is of critical need in today’s universities (Kędra, 2018).

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Some readers may have the conviction that comics are for children and that knowledge is oversimplified (Jüngst, 2010; McCloud, 2000), but artist-researchers like Farinella (Figure 3) and Sousanis (Figure 4) show that the comic format is suitable for communicating academic knowledge. Their success illustrates the idea that the ideal writing process occurs when researcher and creator are the same person. This shortens the distance between the idea and its translation (Eisner, 1996; Jüngst, 2010; Tatalovic, 2009).

Figure 3
Neurocomic, (Farinella & Roš ,2013: p. 45), nominated for best science book of 2014

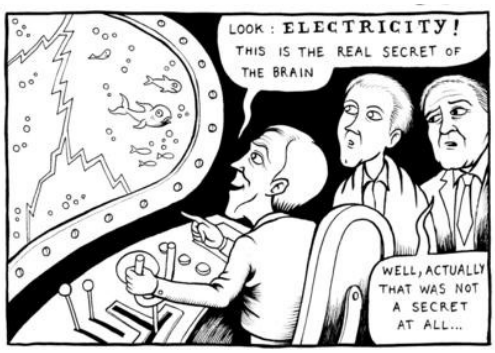

Figure 4
Unflattening (Sousanis, 2015: p. 6), winner of the 2016 Professional and Scholarly Excellence award

Intersemiotic Translation

Texts can exist in any medium. They may be verbal, non-verbal, or both. Each medium comes with its own affordances and limitations. “All texts are an assemblage of signs constructed (and interpreted) with reference to the conventions associated with a genre and in a particular medium of communication” (Chandler, 1994. p.1). When a text is taken from the original context — the prototext — and recontextualized into a new form of expression — the metatext — you must make interpretive choices (Farahzad, 2009). This means that translating a text always leads to new meanings (Alvarez et al., 1996; Bassnet et al., 2006; Eco, 1986). Van Leeuwen (2008, p. 17) describes four different possible transformations in the process of recontextualization: substitutions, deletions, rearrangements, and additions. Jakobson (1959) makes a distinction between interlingual, intralingual, and intersemiotic translation:

1. Intralingual translation or rewording is an interpretation of verbal signs by means of other signs of the same language.
2. Interlingual translation or translation proper is an interpretation of verbal signs by means of some other language.
3. Intersemiotic translation, or transmutation, is an interpretation of verbal signs by means of signs of nonverbal sign systems

Creating the information comic will be an intersemiotic translation. Intersemiotic translation is a complex form of action. Dusi (2015) describes it as “A transcultural, dynamic and functional event caught between the requirement to remain faithful to the source and the need to transform it into a text that is understood and accepted in the target culture” (p. 183). Queiroz and Aguiar (2013, 2015) propose two models of Intersemiotic Translation, Figures 5 and 6. They base their models on Peirce’s (1931) famous idea that signs are a unity between Sign (S), Object (O), and Interpretant (I). (S) is the form in which the sign is presented, (O) is what the sign represents, and (I) equals the sense made of the sign. Meaning is the consequence of the triadic inter-relations of S–O–I as a whole.

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Figure 5
First model: Triadic relation in which the sign (S) is the translated work, the object of the sign (O) is the object of the work, and the interpretant (I) is the translator sign (Queiroz & Aguiar, 2015)

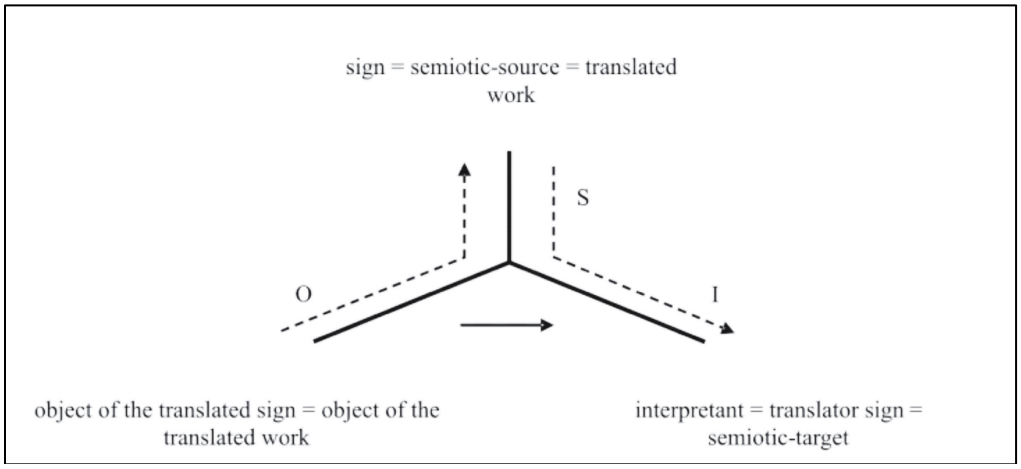
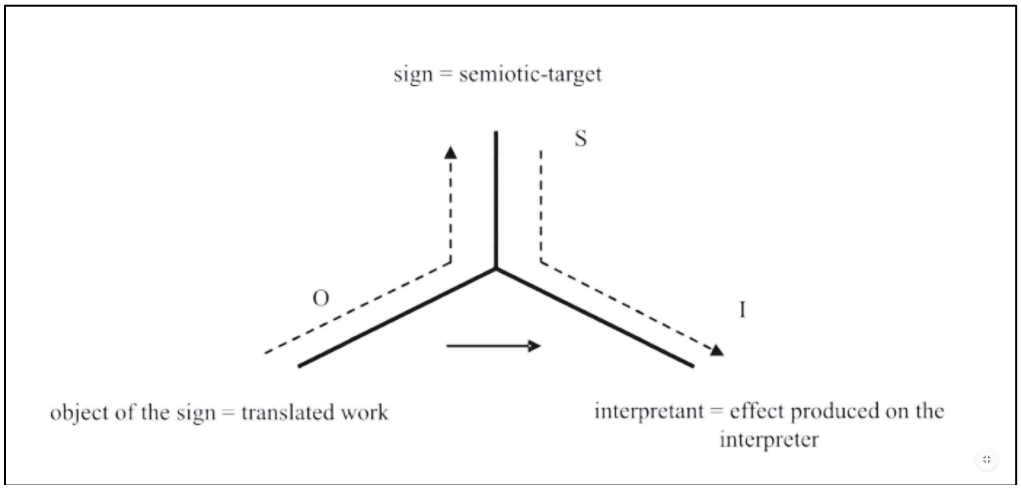


Figure 6
Second model: Triadic relation in which the sign (S) is the target, the object of the sign (O) is the translated work, and the interpretant (I) is the interpreter (Queiroz & Aguiar, 2015)



Methodology

I intended to produce an information comic on *Multimedia Learning* (Mayer, 2009), and arrive at a rationale for translating formal academic prose into a visual narrative. Data consisted of the comic, notes in my research journal and written feedback from different experts. The data itself gave rise to the theory that was constructed through qualitative analysis, in line with the constructivist model of grounded theory (Charmaz, 2006). This approach was chosen because of its unforced, interpretative accounting for all the data. After all, design is iterative, intuitive, and hard to capture in a model. A possible risk was that the emergent theory is not transferable to other situations and eventually becomes a narrative rather than an explanation.

Methods for Data Generation and Data Analysis

I translated page 58-70 of the prototext into the metatext. The design of each page was influenced by what the previous one revealed about the potential of visuals as information carriers. The research journal documented the different stages of drawing, feedback from expert informants, and my own developing

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understanding. The expert informants were selected based on their potential to yield insights from the perspective of multimedia learning, the cognition of sequential images, comic design, and working with students in higher education (Table 1). McCloud looked at the completed metatext as a stand-alone comic to answer my question about realism. Brown and Dr. Jüngst commented on the pages throughout the design process. The other experts were asked for general feedback and received the completed metatext and a PDF of the prototext. Two experts received a specific question. I asked Dr. Mayer if his ideas were represented correctly and Dr. Jüngst if she considered the final product an information comic.

Table 1
Overview of informants.

Angle	Field of Expertise	Name
Multimedia Learning	*Educational psychology*	Richard Mayer
Teaching in Higher Education	*Lecturer in Multimedia Learning*	Susan Brown
	Lecturer in Education	Amanda Banks-Gatenby
Comic design	*Neuroscience, cartoonist*	Matteo Farinella
	Comics theorist, cartoonist	Scott McCloud
Cognition of sequential images	*Psycholinguistics*	Neil Cohn
	Sociolinguistics, Semiotics	Heike Elisabeth Jüngst

Ethical Issues

Multimedia Learning (Mayer, 2009) is a copyrighted text. Translating parts into a visual narrative count as an adaptation of the work, which is a restricted act according to section 21 of the Copyright Designs and Patents Act (1988). Adaptations that are used as illustration for teaching do not need permission from the copyright holder, but only when use is considered “fair” (UK Copyright Law - CopyrightUser.org, 2020). Fairness is not defined in law. Fairness is usually judged by how much work is adapted, to what audience the work is communicated and the impact on the market value/salability of the original. The issue was solved by the copyright owner, Richard Mayer, who kindly agreed to let me use his work for research purposes.

Results and Discussion

The prototext was successfully transformed into the metatext, the information comic (Appendix II). I was able to translate the written academic prose of pages 58-70 of *Multimedia Learning* (Mayer, 2009) into the visual narrative of a digital information comic (RQ1) and simultaneously create a learning tool for students in higher education (RQ2). Subsequently, I formulated guidelines based on experiences in the developmental process.

Meaning

To create the information comic I had to substitute, rearrange, delete, and add to the prototext. The academic meaning is left intact. Figure 7 illustrates how academic meaning of the comic is determined by the content of chapter three — “The science of learning” — through mediation of the book *Multimedia Learning* (Mayer, 2009). The author of the prototext, who is the expert on both content and book, checked the comic and gave his approval on the design. Ensuring the quality of meaning from the perspective of the student is more complex (Figure 8). How are students affected by the comic as it tries to convey the academic meaning of the prototext? Will it help them engage in the learning process? I applied Mayer’s design principles and had experts review the design, but how the comic affects students remains hypothetical until it is tested on participants.

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Figure 7
The sign is the translated work, the object is the object of the work, and the interpretant is the translator sign (Queiroz & Aguiar, 2015)

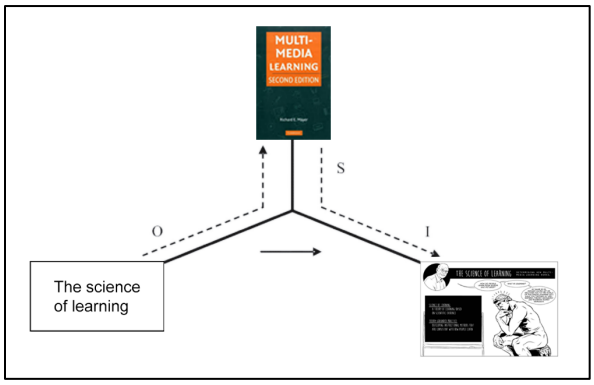
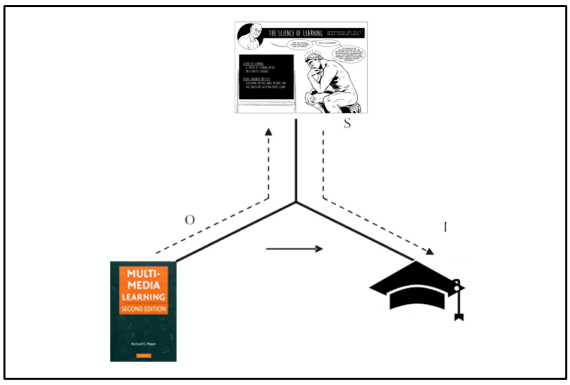


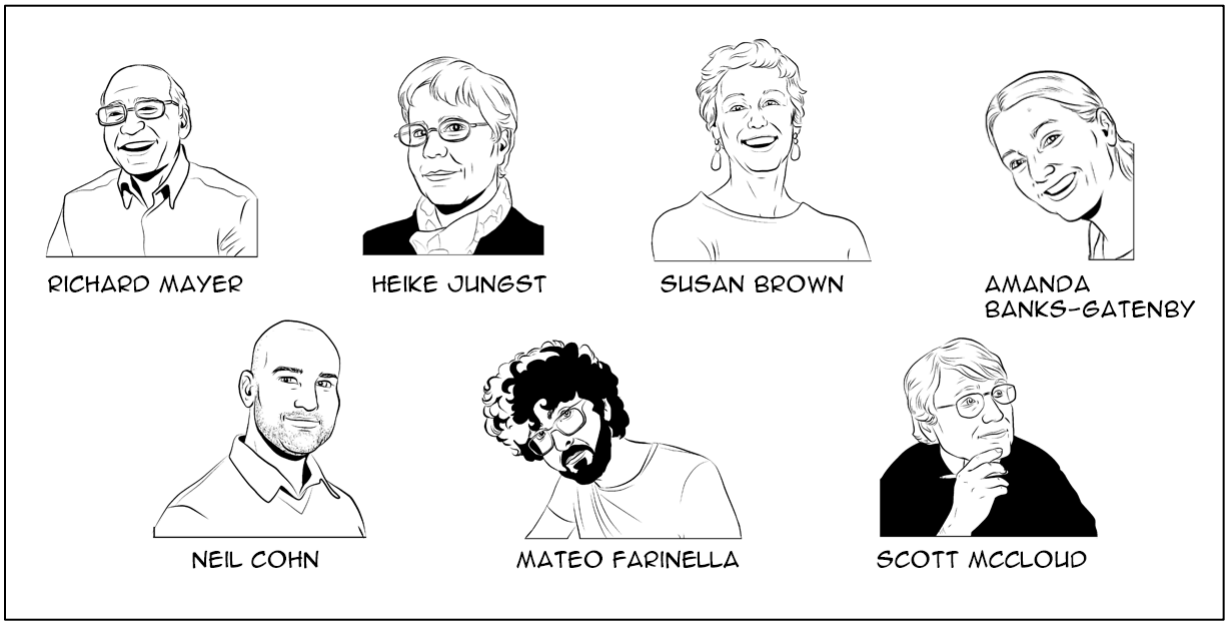
Figure 8
The sign is the semiotic target, the object is the semiotic source, the interpretant is the effect on the interpreter (Queiroz & Aguiar, 2015)



Critical Walkthrough

The following sections will be a critical walk-through of the comic. Pages are discussed in groups of three. I organized the information based on the themes that the thematic analysis of my research journal and expert feedback revealed: 1) visual language, 2) hidden agenda, 3) visuals, 4) navigation, 5) copyright, 6) emotive design and 7) format. When I quote an expert and use a speech bubble combined with a portrait this means it involves a direct quote from their feedback. If the quote is put in the main text, it is a quote from their academic research. Figure 9 shows the different experts and their portrait.

Figure 9
Expert portraits



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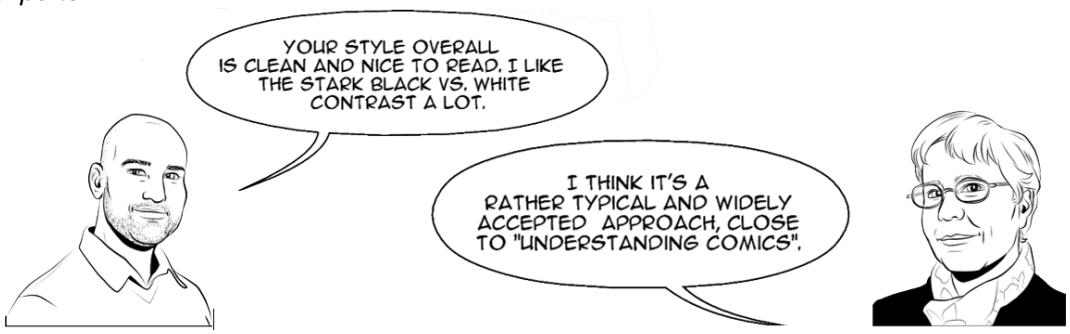
Page 1-3

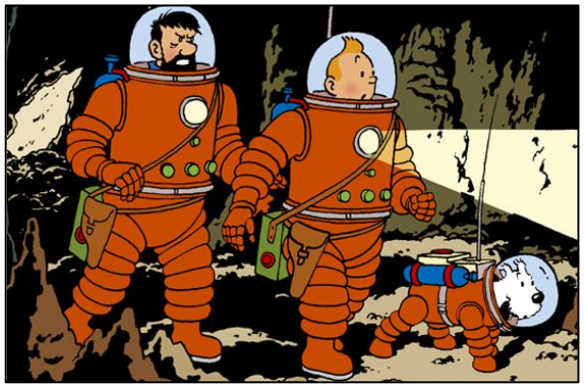
Visual Language. *Design started with making basic choices. Portrait or landscape? Color or black and white? Portrait is the traditional print-based orientation. I chose landscape so the comic can be viewed on a computer screen without scrolling. I chose black and white because this simplification limits options and requires explicit, well thought-out design decisions. This went over well with the experts.*

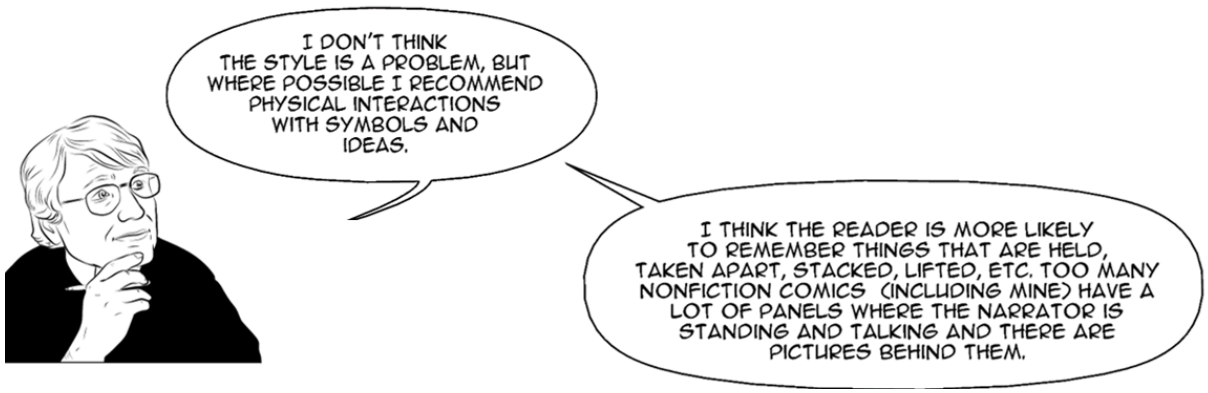


Speaking of *Understanding Comics* (1993), I use a high level of realism. McCloud wrote that it is easier to identify with more abstracted characters. He says too much detail makes a person too aware of the messenger to fully receive the message (Figure 10). Realism disassociates. The famous artist Hergé played with this idea by placing his abstracted character in realistic backgrounds (Figure 11). Readers can identify with Tintin and go on a "real" adventure. I tried to make both my characters and setting relatable for students by making it look "real." Was that a mistake? I asked McCloud if my iconic approach would get in the way of the academic message. He expected it would not but had a tip.

Figure 10
Understanding Comics (McCloud, 1993: p.36)

Figure 11
Explorers on the moon (Hergé, 1954: p.34)





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Hidden agenda. All information comics have a hidden agenda. Often, they are about political correctness (Jüngst, 2010, p. 89). My first agenda is proving that the visual language of comics can communicate academic thinking. Figure 12 shows the initial design for page 1. I experimented with the idea of "science minions," little assistants that would help Mayer make his points. I abandoned this because it felt clownish, and I want the comic to be taken seriously. "It is necessary to establish credibility" (Eisner, 199, p. 86). I included Rodin's *Thinker* (1881), Figure 13, a famous piece of art that is linked to thinking. Having this much male presence on page one concerned the experts. Where are the women in science? This taught me to be mindful of political sensibilities, especially on the first page.

Figure 3
Sketch with science minions

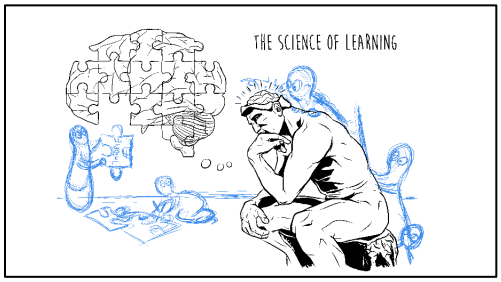
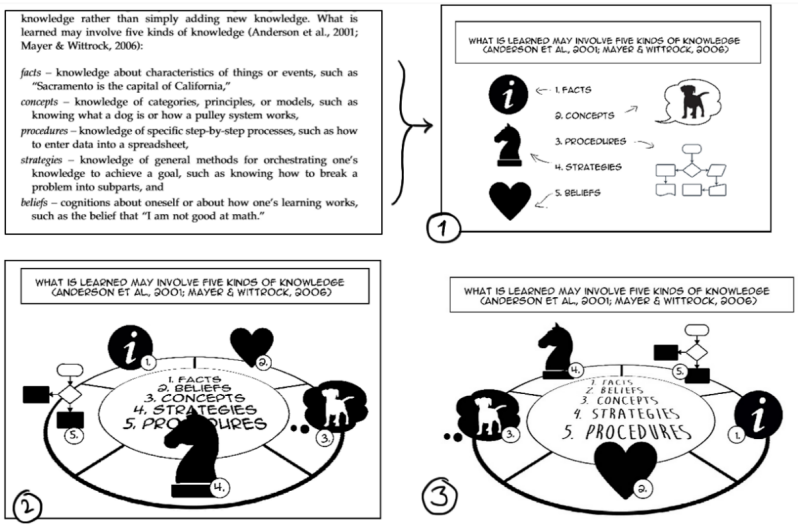


Figure 13
The Thinker (Rodin, 1881)

Visuals. Figure 14 visualizes the idea development for panel 2 on page 2. The prototext describes five kinds of knowledge in 96 words. I managed to delete 91 words by creating icons with labels. When a reader engages with the panel (s)he must decide how the visual is linked to the textual**.** This image caught the attention of several experts.

Banks-Gatenby liked the fact that the panel requires the reader to actively engage in knowledge comprehension.

Figure 14
Phase 1, 2 and 3 for panel 2, page 2.



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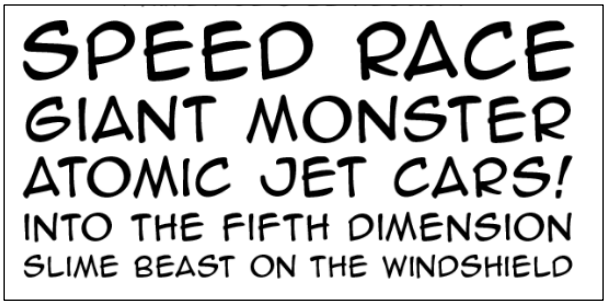
This is in line with Mayer's active processing assumption.

Brown wondered about the relation between prototext and metatext. The icon for concept uses a dog because Mayer used a dog as an example in the prototext ("the Mayer"). This raises the question if the comic is a stand-alone learning tool (yes), or if it serves as an introduction to the academic text.

Jüngst pointed out that "Introduction to…" stories are not considered information comics. I moved away from the prototext for the other icons. Those icons worked for all experts. This taught me that my interpretation of the text is important and that it is okay to deviate from "the Mayer."

Navigation. Cohn approached Figure 14 from his expertise on the structure and cognition of sequential images. He felt that ease of navigation was hindered by not placing the labels directly near the icons. He is correct. I chose aesthetics over function and should not have done this. It confuses instructional design and causes extraneous cognitive processing (Mayer, 2009, p. 79).

Figure 15
The type font Anime Ace (Blambot, 2001)



Copyright. Comics need clear, sans serif text types. I used Blambot's "Anime Ace" (Figure 15). Blambot provides high quality lettering for publishers like Marvel Comics. They support the independent comic community and offer some of their fonts for free (Blambot Comic Fonts & Lettering, 2020). If my comic were published by a mainstream publisher, I would have to purchase a commercial license.

Part of the comic consists of traced images. Adaptation right applies to literary, dramatic, and musical works, not to artistic expressions. I used images that were labelled as free-to-use and adapt by Creative Commons. Creative Commons is a non-profit organization that helps overcome legal obstacles to the sharing of knowledge and creativity. They provide standardized licenses.

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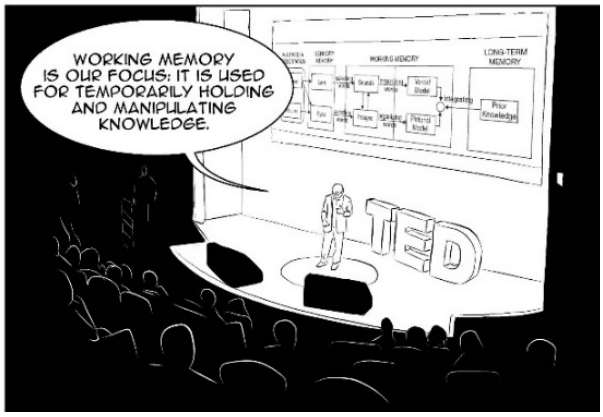
Page 4-6

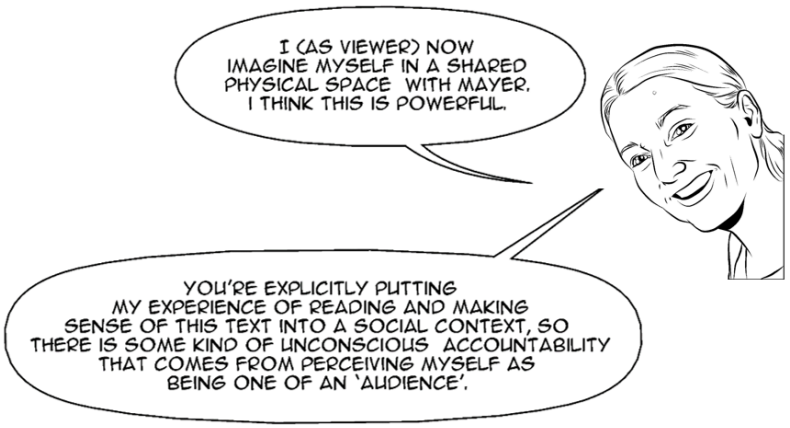
Emotive design. Information comics use emotive elements to motivate the reader and arouse interest in the given text. Packalèn and Odoi (2000) point to the importance of personalizing the comic by using the target group's own surroundings and culture. This makes associations and suggestions more believable. I considered the donor genre — the genre adopted for the information comic, for instance a biography — and settled on a TED Talk. TED is a non-profit organization that posts short, accessible talks online (TED: Ideas Worth Spreading, 2020).

On page 4 the reader discovers (s)he has been part of the audience all along. First the image of the girl is pushed back, indicating a screen. Then an information graphic emerges. After this the logo appears, and you see Mayer standing in a spotlight. Then you see the audience (Figure 16). Audience members function as focalizers, characters that are meant to invite identification from the reader (Jüngst, 2010, p. 76). Focalizers show model behavior, like the well-prepared lady in the audience on page 5. The academic orientated audience from the TED Talk fits nicely with the intended target-group of the learning tool, students in higher education.

Figure 16

Mayer addresses the audience.

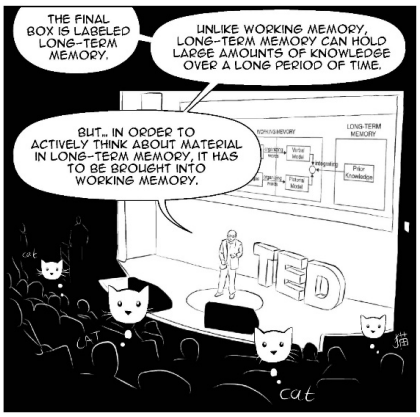




The undeniable expert in the room is the character of Mayer. He is the authority on the subject. His character is designed to physically resemble Mayer, but also to resemble a human being. As such he is credible, but not infallible. On Figure 17 he loses the audience's attention. They are all distracted because the idea that you see a *"*cat*"* when you hear the word *"*cat*"* really needs to be explored. I imagine future readers will try this as well, further connecting them to the audience.

Figure 17

The audience is distracted.



Format. I use the TED Talk format as the donor genre for my comic. I expect students are familiar with TED Talks, for instance though TED Ed — the educational part of the platform — or social media. It is not without controversy. In 2010 statistician Taleb called TED a "monstrosity that turns scientists and thinkers into low-level entertainers, like circus performers." It appears comics and TED Talks have something in common. Because of the entertainment factor some critics view comics as an invalid format for information transfer as well (Jüngst, 2010:53; McCloud, 2000). The TED Talk idea was well-received by the experts.

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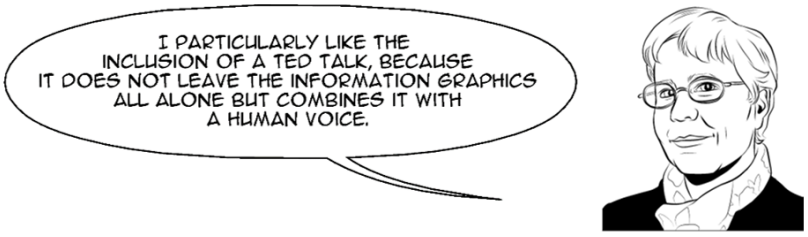
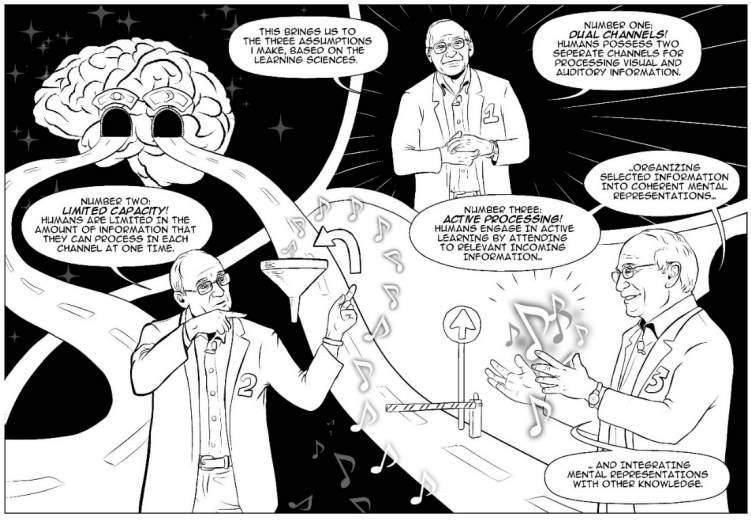


Mentioning the human voice brings Mayer's design principles to mind. The Voice Principal is about spoken narration in a friendly human voice. Since information comics have no audio, this does not apply. During the design phase the Personalization Principle was used: *People learn better from multimedia presentations when words are in conversational style rather than formal style*. This is a social consideration, intended to increase the learner's motivational commitment.

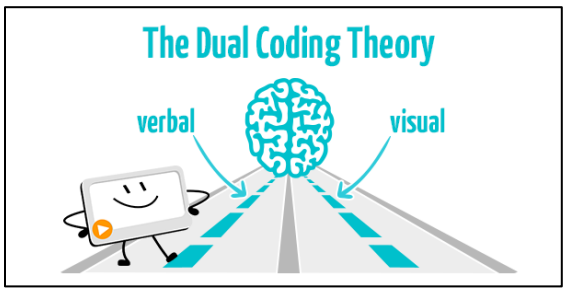
Visual. I interrupted the TED Talk setting with a more imaginative décor, Figure 18. The academic ideas discussed on this page are abstract, and this gave me the freedom to try a more artistic approach. I used a rounded gutter instead of a straight one to emphasize the difference with the previous pages. Mayer visually brings the reader into his universe (hence the stars) when he explains the underlying assumptions of his cognitive theory for multimedia learning. The two pathways into the brain symbolize dual channels. The barrier gate and funnel symbolize the limits of human cognition. The music notes create a symphony to symbolize the integration of mental representations with another knowledge.

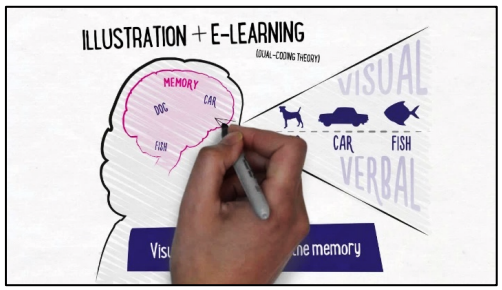
Figure 18
Imagination on page 6



The idea of the two roads to visualize dual coding came quickly. It made sense: two different pathways into the brain. When I searched for dual coding, I learned I was not the first to do this (Figure 19). If this were an art project I would have minded. Originality is valued in art. Visual language is different. The more a visual has been used, the more likely people will understand it.

Figure 19
Two examples of similar visualization of dual coding.





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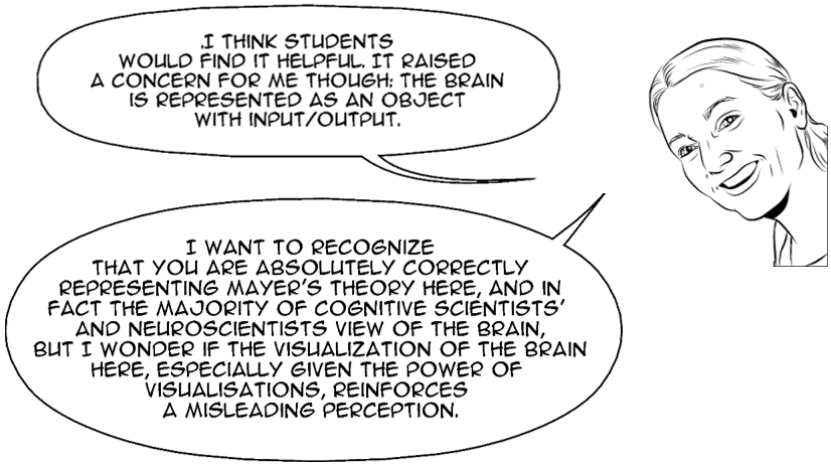
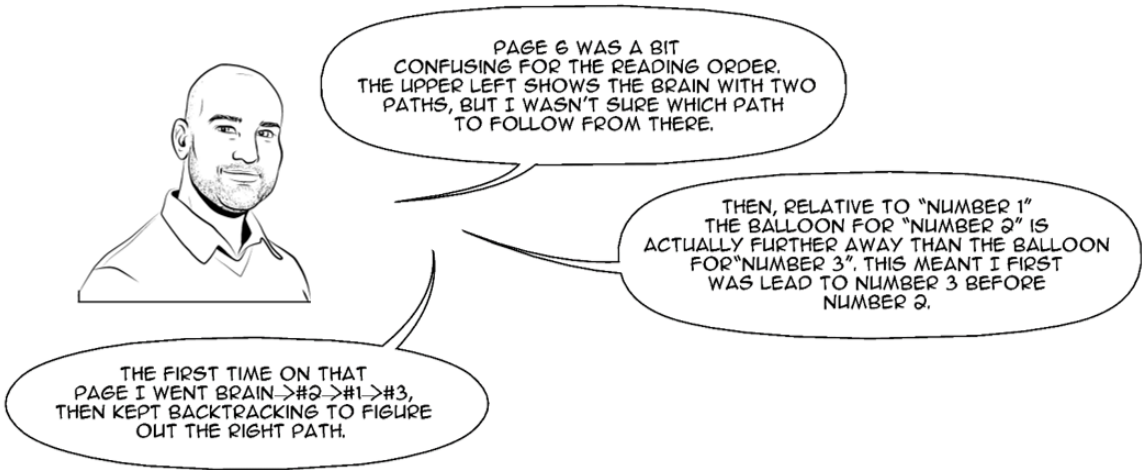
Banks-Gatenby thinks page 6 clarifies the academic content. She also identifies a risk.



Banks-Gatenby's thinking comes from new research about the human brain. While I do not intend to critique the prototext, she does identify a potential problem: the danger of the problematic metaphor. Metaphors make abstract scientific concepts more relatable to the wider public, but can also distort and oversimplify (Baake, 2003). Comics are an intrinsically metaphoric medium (McCloud, 1993; Sousanis, 2015). The use of metaphors in information comics requires careful consideration.

Navigation. Page 6 is relatively difficult to navigate. The roads leading to the brain transcend the panels which might confuse the reader. The external compositional structure of the panels involves blockage, so the strategy of following the gutter to establish the correct reading order does not work. I tried to minimize extraneous processing by following Mayer's signaling principle: *People learn better when cues that highlight the organization of the essential material are added*. There are pointer words like "number one," "number two," and "number three." The reader may also follow visual clues: the numbers on Mayer's jacket. This is not immediately obvious, so I expected feedback on reading comprehension. Aesthetics and learning are once again at odds. To my surprise the only expert that responded to the issue was Cohn. This may mean that the other experts did not struggle with navigating the page layout, or just did not mind.



Page 7-9

Format. *Scientific illustrations are often integrated as "pictures in the picture" (Figure 20). The more such an illustration tends toward the abstract, the more likely they will lack the emotive charge that is so typical of comics. Emotive content is never fully eliminated (Jüngst, 2010, p. 175).*

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Figure 20
Integrated illustration

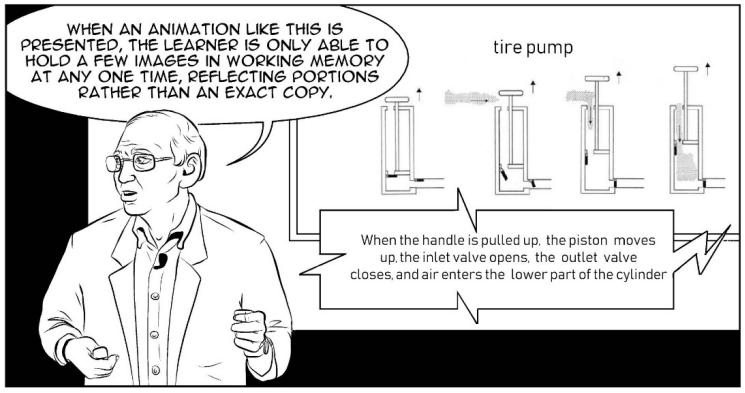
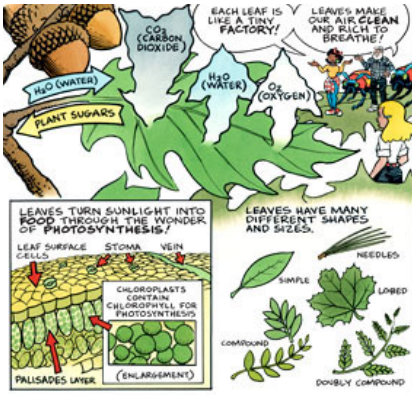
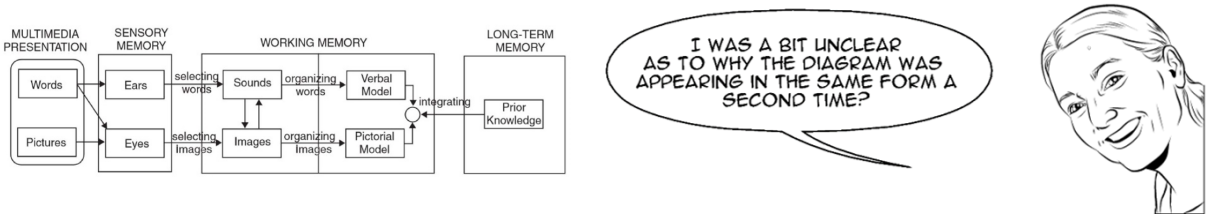


Figure 21
Popularization (Deschaine, 1998)

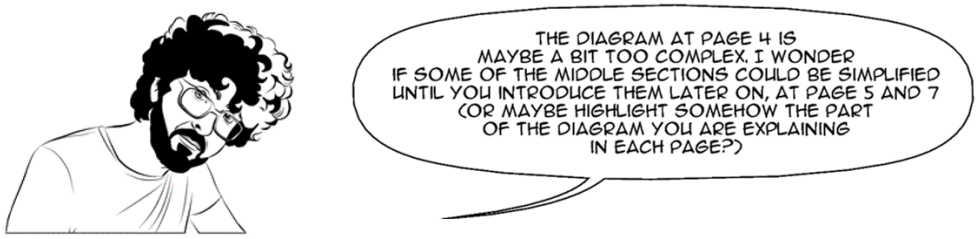


Scientific illustrations can be popularized (Figure 21). I chose not to do this because students' visual literacy should be high enough to decipher diagrams. If that is not the case, this is a good opportunity to train the skill. Because scientific illustrations are not designed to be part of sequential images they may disrupt the navigational flow, risking the reader merely glances at them. I tried to solve this by using repetition. The scientific illustration on Figure 22 appears on pages 4, 5 and 7. Classroom experience is the second reason for repetition. Brown informed me that her students find this particular infographic hard to understand, so I took my time to explain the content. The repetition did not go unnoticed.

Figure 22
Repeated scientific illustration



Could this annoy students? Farinella offers a solution.



I agree. The information density is too high. Mayer describes a common feature of visual signaling that can be useful in cases like this: graying out. "When a particular component is being described, it is shown in a "magnifying glass" and the rest of the picture is greyed out" (Mayer, 2009, p.112). Graying out the part about working memory would increase clarity on page 4. The whole diagram could be shown on page 5. Page 7 is about the diagram's arrows (selecting, organizing, and integrating). They are placed right through the outer lines of the boxes. Erasing those lines would remove clutter and highlight the arrows.

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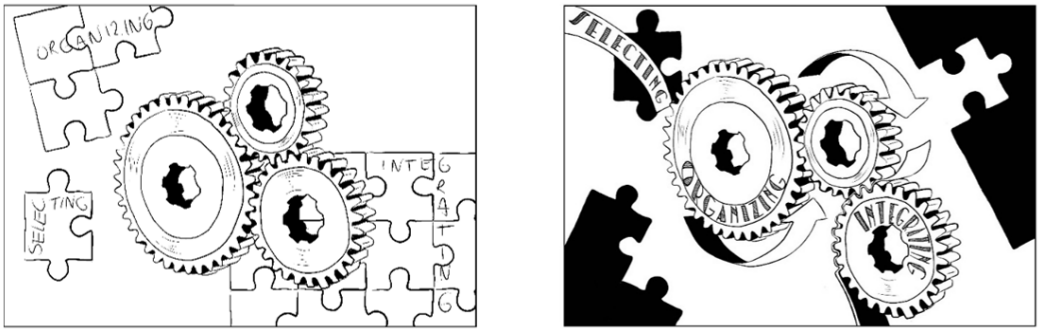
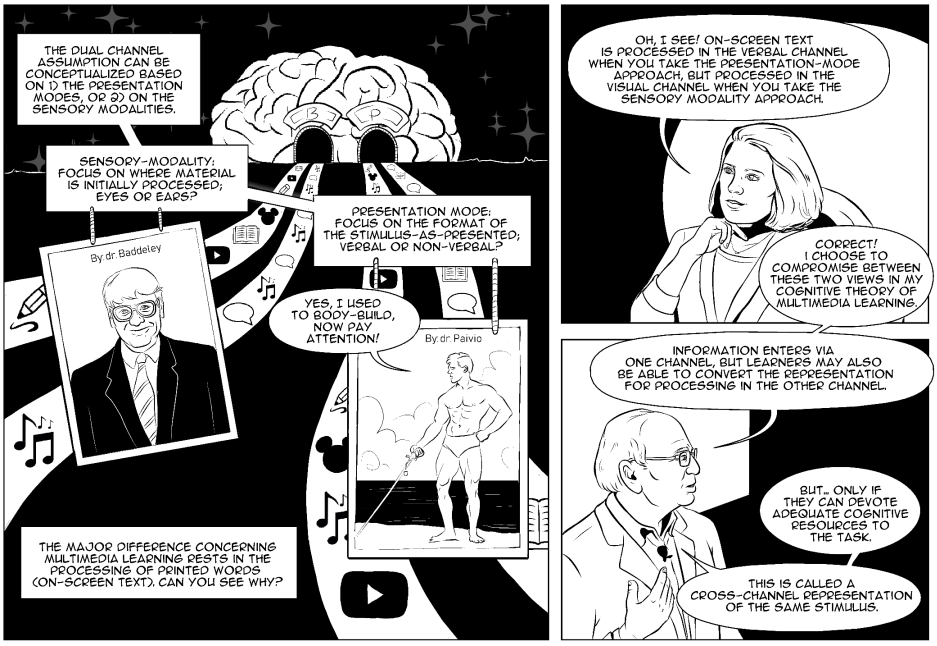
Visual. How would I visualize “cognition”? Using Google to research a term via the image search function is a good trick to visualize common understanding. Google mostly came up with cogs, so I decided to use that image. The next step was to visualize “selecting,” “organizing,” and “integrating.” I integrated verbal text into the drawing and combined it with symbolic representation (Figure 23). A single puzzle piece represents “selecting,” the three connected pieces point to “organizing” and the nearly finished jigsaw on the upper right is my translation of “integrating.” A graphic look contrasts nicely with the line drawing of the cogs, so I turned the puzzle into silhouettes. This created a serene, balanced feeling. I like the harmony of page 7. I believe it helps students to focus.

Figure 23
Cogwheels represent the abstract idea of cognition, first idea (left) and final image (right).



Hidden agenda. Readers approach comics with the expectation to be entertained, but what counts as entertaining? A picture which has an emotive content or emotive quality need not work in an emotive way on all readers (Jüngst, 2010, p. 173). The first panel of page 8, Figure 24, shows icons on their way to either gate “B” or gate “P.” “B” stands for Baddeley, “P” for Paivio. Both scientists hang from the narrative caption. I made Dr. Baddeley look a bit goofy and objectified Dr. Paivio, who was as bodybuilder before he became an esteemed academic. In retrospect I regret both jokes. I feel they are not fitting to the academic content and are encouraging the reader to not take the comic seriously.

Figure 24
Page 8 of the comic.



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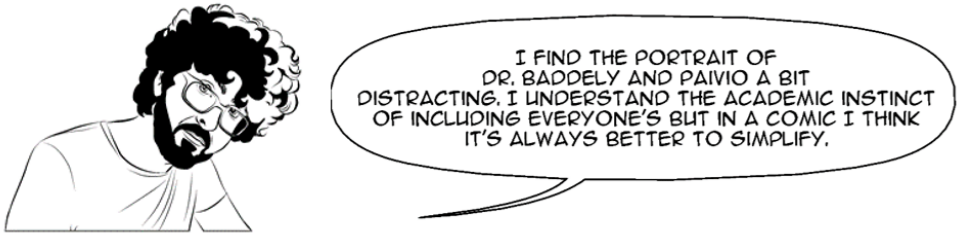
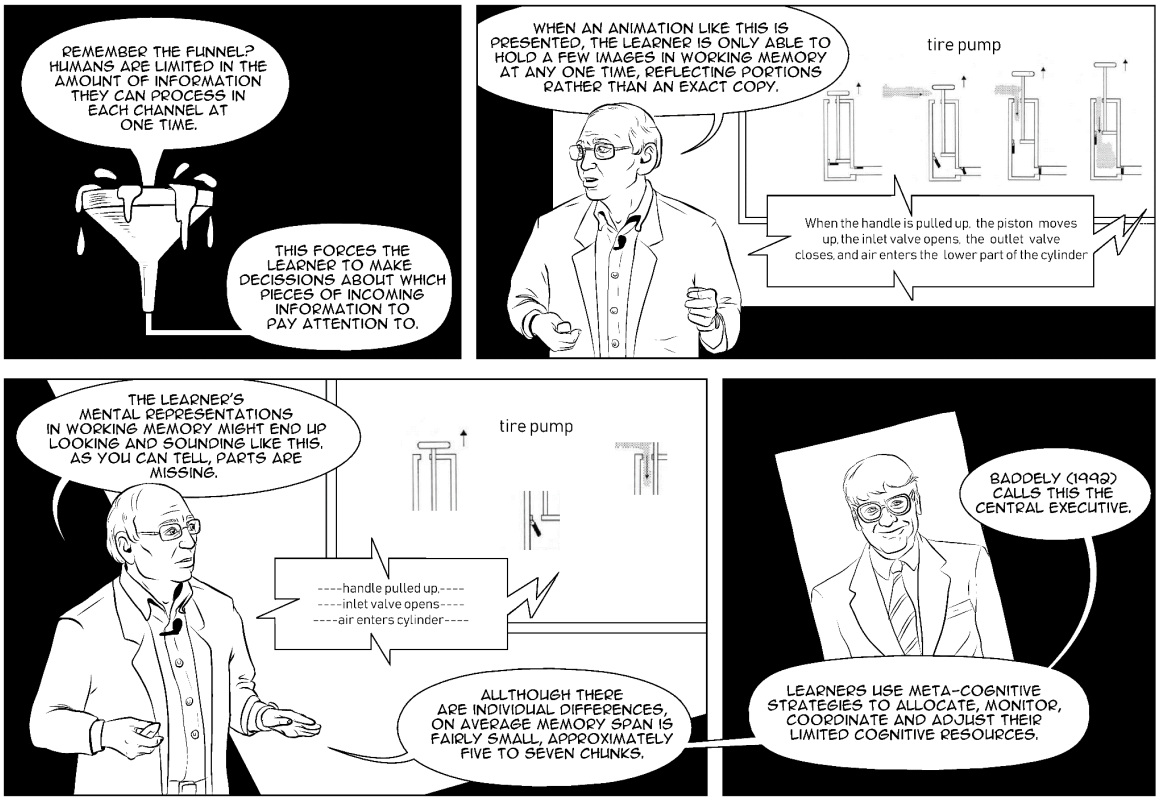
Visual Language. Page 8 has words and visuals competing for space. The experiment was unsuccessful. Mayer's Coherence principle states that *people learn better when extraneous words and pictures are excluded rather than included*. Farinella says it is better to keep things simple as well.

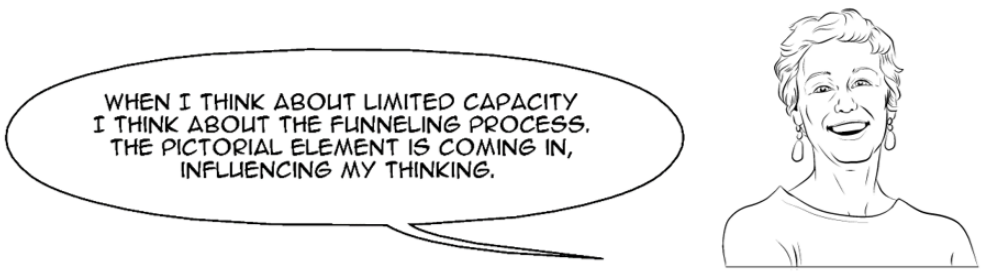


I chose a more sober approach for page 9, Figure 25, and think this works much better.

Figure 25
Page 9



Visuals are a terrific memory aid. Brown describes how she links the image of the funnel — also used on page 6 — to the limited capacity assumption. This demonstrates its mnemonic power.



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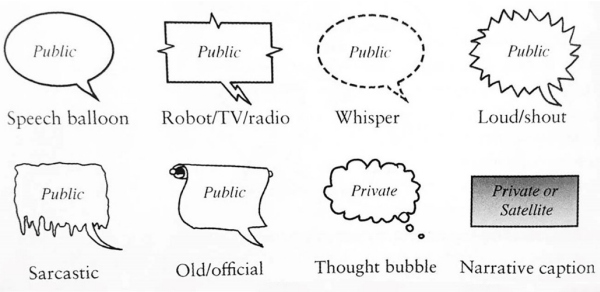
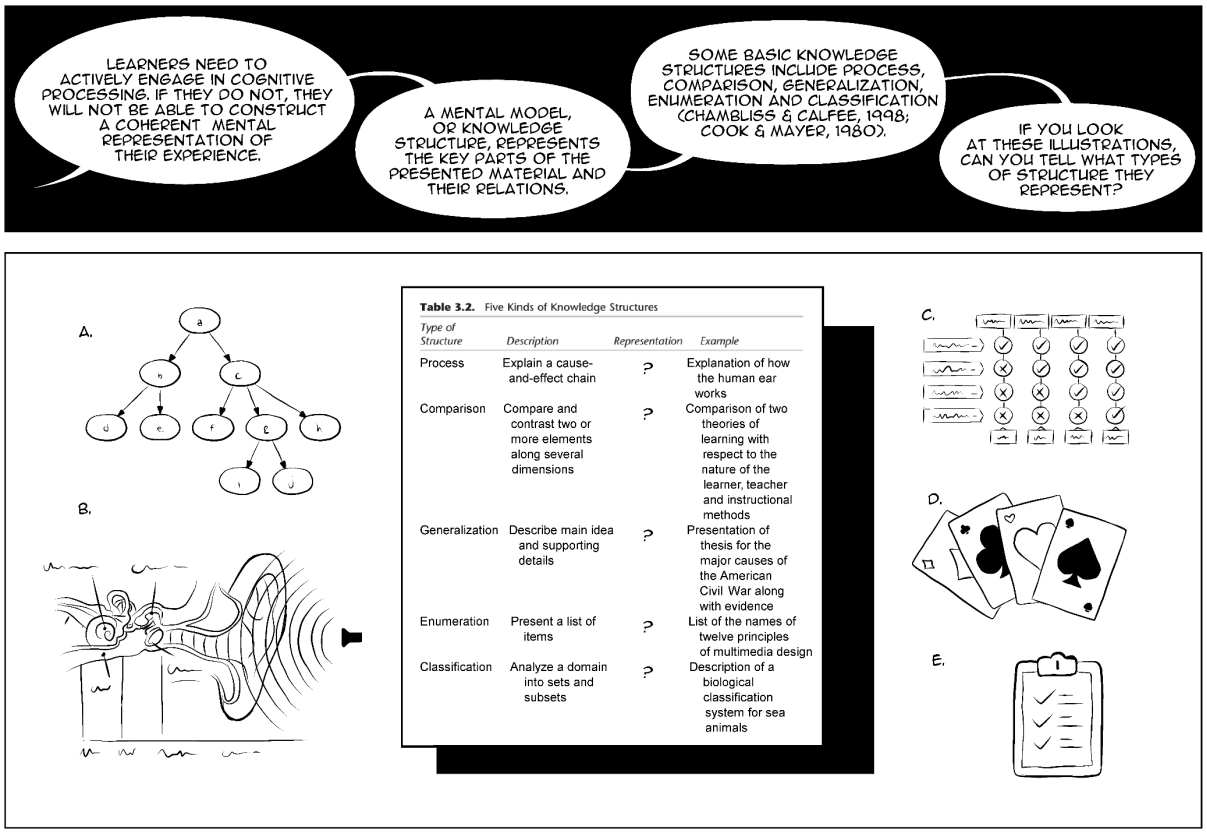
After activating prior knowledge, Mayer discusses an experiment he did with a tire pump animation (Mayer & Anderson, 1991). I copied the original visuals into the comic. I needed some way to distinguish between the text that was spoken by Mayer's character and the narrated text that comes from the screen. Luckily there are comic book conventions regarding this. Figure 26 shows a collection of different surface manifestations. The robot/TV/radio carrier fits. I used a different font to strengthen the difference between the narration and spoken words.

Figure 26
Different types of carriers (Cohn, 2013: p.36)



Page 10-12
Visual language. Lines have a hierarchy; thicker lines indicate nearness or suggest larger scale by pushing thinner lines to the background. I used this quality to create depth or emphasize parts of the drawing. The contour of a face for instance is usually more pronounced by the curve of the cheekbones. The effect is subtle but gives the comic a professional appearance. Lines are also important for a sense of style. Everything the artist copies in from other sources (e.g., video stills) should be traced, even line drawings as this brings unity to the page. Figure 27 shows a panel which consists of diverse imagery that is brought together by the line art.

Figure 27
Page 10 of the comic



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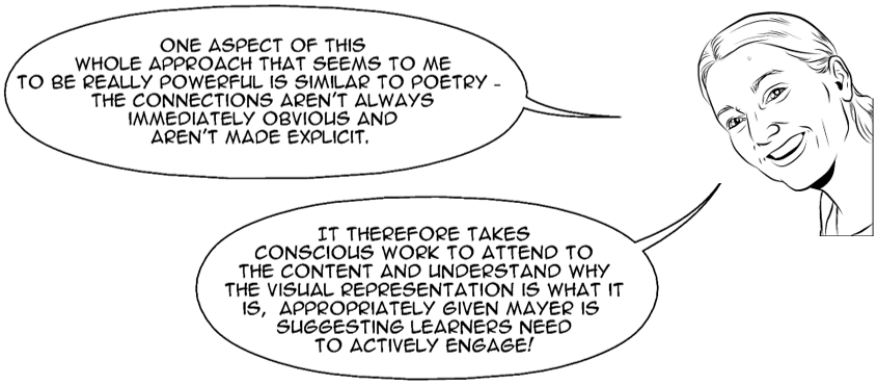
I did not include humans on this page. At least, not as visuals. Readers are invited to engage with the page as learners: can they connect my visualizations of knowledge structures to the description in the infographic? The part of the info graphic that contained the representation is "grayed" out. Page 11 gives learners the solution, so they can check their answers.



This activity invites the reader to think about the different ways you can visualize something. It took Brown around four minutes to connect the visuals. Longer, shorter, skipping the exercise, it is all possible. In comics the reader is the one that decides the pace (Eisner, 1996, p. 50). Mayer's segmenting principle is built into the format. All visuals are their creator's interpretation of the message. I wonder if the activity will make students aware of this.

Format. Did I succeed in creating an information comic? I sought approval from Dr. Jüngst, who literally wrote the book on information comics. She considers the final product an information comic.

The comic reminds Jüngst of the German comic *Die große Transformation* (Figure 28) which also uses talks as the donor genre. She wrote: "*That's a compliment!" Die große Transformation* is a visual representation of the 2011 Sustainability report of the German Advisory Council on Global Change. The linework is more loose than mine and there are graytones, but the comic has a high degree of iconicity and covers a serious topic in a scientific tone.

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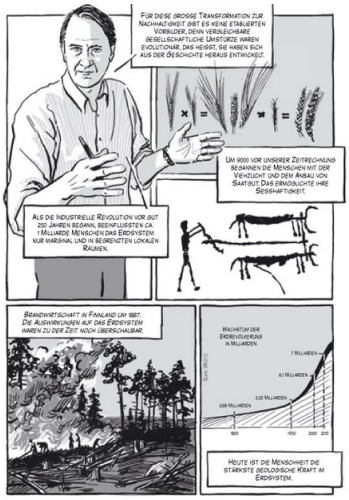
Figure 28
Page 50 of Die große Transformation



Die große Transformation is a digital comic. Jüngst (2010: p.9) talks about the transcendent, not for keeping nature of print-based information comics. These comics are often linked to educational campaigns, only given to the intended target group, and discarded afterwards. Publishing comics online is more sustainable. If the website is maintained, online comics will stay available. Farinella hosts a website that lists science comics.

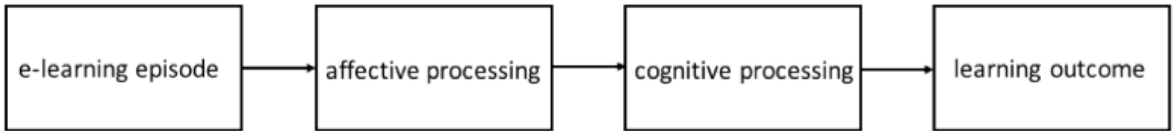
My final note on "format" is about the varying amounts of pages and information density an information comic can have. *Die große Transformation* has 138 pages and is text dense. Neurocomic (Farinella & Ros, 2013) has 136 pages but is dominated by visuals (Figure 29). My comic has a high information density but consists of only 12 pages. Jüngst (2010, p. 271) says that short texts may seem more attractive to students and are the ideal choice if the comic is meant to be read and discussed in a lesson. I would advise using my comic this way.

Figure 29
Page 11 of Neurocomic

Emotive design. Mayer liked the comic.

Emotion is an aspect of learning. Affective processing and cognitive processing are linked (e.g., Duffy et al., 2018; Loderer et al., 2018). Figure 30 visualizes Mayer's cognitive-affective model of e-learning: "an affective-cognitive model of academic learning which incorporates both affective processing and cognitive processing during learning: the learning episode causes an emotional reaction in the learner that affects cognitive processing during learning and leads to a learning outcome." Mayer wrote that my comic could be an example of emotional design.

Figure 30
A cognitive-affective model of e-learning (Mayer, 2020)



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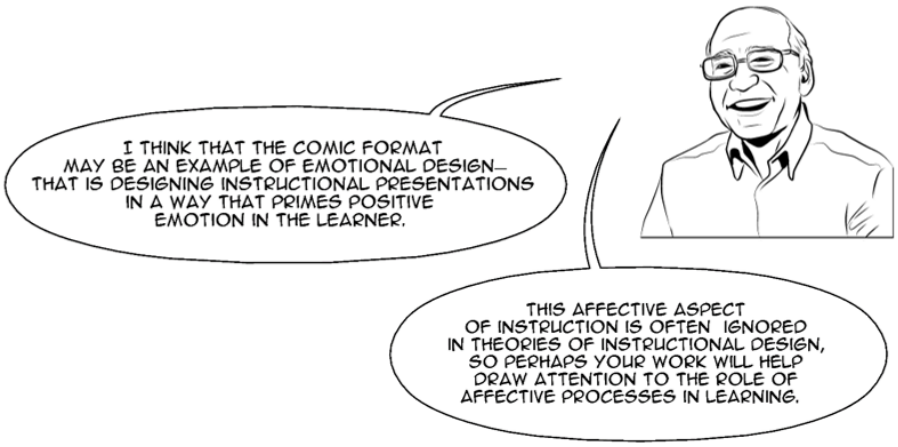

Jüngst mentions emotion throughout her book. In the introduction of *Information comics* (2010, p. 4) she wrote:

*"*The basic assumption underlying this study is that the comics format makes more extensive use of emotive elements than other formats*."*

When I asked her about the design aspect of comics, she agreed with Mayer.

Reflections

The information comic uses 70% less verbal text to communicate meaning than the original book. The prototext consists of 4203 words, two figures, and two tables. The metatext consist of 1279 words, one figure, and one table. Table 2 compares the verbal text of the prototext with the verbal text of the metatext. Stating that visuals took on two-third of the subject matter is too simplistic because the visual language of comics depends on intersemiotics. Text is needed to convey meaning, just in smaller amounts. This may benefit learners with low verbal literacy skills or dyslexia. Images provide context to the words that go with it. This gives the learner a guide for processing information.

Table 2

Corresponding pages, wordcount and percentual difference of metatext and prototext.

Page metatext	Page prototext	Wordcount prototext	Word count metatext	%
1	58/59	390	71	18
2	59/60	243	91	37
3	60/61	349	126	36
4	61/62	260	106	41
5	62	513	142	28
6	62/63	21	81	386
7	62/63	287	75	26
8	64-66	686	161	23
9	66/67	615	166	27
10	67-69	461	76	16
11	69/70	344	93	27
12	70	34	91	268

Guidelines for design. There are things to consider before committing to the design process. It is important to realize that creating visuals is a time-consuming endeavor and the researcher must be visually literate to be able to do it. Researchers not only need to understand and use images, but

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they also must create them as well. The researcher also needs to accept that creating new meaning cannot be avoided and that emotive elements will become part of the final product. It helps if the researcher enjoys working with comics.

In accordance with the lessons learned during the design of the comic I propose 12 guidelines for (re)creating academic information in the visual language of comics:

1. Familiarize yourself with the academic content.
2. Solve potential copyright issues.
3. Match the donor genre and narrative to your target audience.
4. Consider intentional and unintentional hidden agendas.
5. Approach experts for feedback.
6. Put content first and aesthetics second.
7. Keep it simple.
8. Employ emotion to motivate and connect your readers.
9. Always consider the implication of visual metaphors.
10. Use cliches, you are not creating autonomous art.
11. Carefully guide the reader's gaze.
12. Check your work with relevant proven scientific principles, like Mayer's multimedia design principles (2004, 2009).

Conclusion

This study revolves around the idea that using the visual language of comics to communicate scholarly knowledge is possible and benefits learners in higher education. I transformed the written academic prose of pages 58-70 of Mayer's *Multimedia Learning* (2009) into the visual narrative of a digital information comic with support from expert informants. The main finding of the study is that it is possible to create an information comic that communicates academic ideas, provided that the researcher has a high level of visual literacy, accepts that intersemiotic translation always leads to new meaning, accepts that emotion will become part of the final product, and accepts that it takes considerable time to create the imagery. These factors may be part of the reason why even scholarly knowledge around visual literacy is mostly communicated through verbal language.

As expected, the comic never reached the purely pictorial. Text is needed to guide the readers understanding but its volume can be reduced significantly. The metatext needed 68% fewer words than the prototext to communicate meaning, including the words that had to be added to make the comic function as a learning tool.

Emotion is a major factor in the comic format. The role of emotion in instructional design is currently gaining attention. This is a promising line of further investigation. Testing the comic on students may help to draw attention to the role of affective processes in learning and might contribute to an affective-cognitive model of academic learning.

Based on experience and expert feedback the researcher identifies 12 possible steps for the design of information comics. All guidelines are suggestions that could be starting points for further research. It is important to continue research into information comics since information comics show great potential for learning because a) Comics puts knowledge transfer in a popular format, b) Comics tap into affective processing, c) Comics use both verbal and visual language, d) Comics are self- paced, e) Reading comics increases visual literacy, and f) The restricted space for verbal text may serve the needs of dyslexic students and students with low verbal literacy skills.

The main limitation of this study is that the effectiveness of the comic as a learning tool is purely hypothetical. Testing may reveal that it affects students differently than theorized. A limitation of the comic is that the recognizable features from the present-day world might outdate the comic in the future, making it less effective as a learning tool. That being said, testing the comic, like creating the comic, sounds like a fun way to learn!

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Appendices

Appendix I: Mayer's design principles for effective multimedia instruction

Table 1
Principles for reducing extraneous processing.

Principles for reducing extraneous processing	
Coherence principle	People learn better when extraneous words, pictures, and sounds are excluded rather than included.
Signaling principle	People learn better when cues that highlight the organization of the essential material are added.
Redundancy principle	People learn better from graphics and narration than from graphics, narration, and on-screen text
Spatial contiguity principle	People learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen.
Temporal contiguity principle	People learn better when corresponding words and pictures are presented simultaneously rather than successively.

Table 2
Principles for managing essential processing.

Principles for managing essential processing	
Segmenting principle	People learn better when a multimedia lesson is presented in user-paced segments rather than as a continuous unit.
Pre-training principle	People learn better from a multimedia lesson when they know the names and characteristics of the main concepts
Modality principle	People learn better from graphics and narration than from animation and on-screen text.

Table 3
Principles for fostering generative processing.

Principles for fostering generative processing	
Multimedia principle	People learn better from words and pictures than from words alone.
Personalization principle	People learn better from multimedia lessons when words are in conversational style rather than formal style.
Voice principle	People learn better when the narration in multimedia lessons is spoken in a friendly human voice rather than a machine voice.
Image principle	People do not necessarily learn better from a multimedia lesson when the speaker's image is added to the screen.

Appendix II: The Comic

The following pages show the comic in the intended order, 1-12, and in the intended orientation, landscape, but slightly smaller than the intended size, A4.

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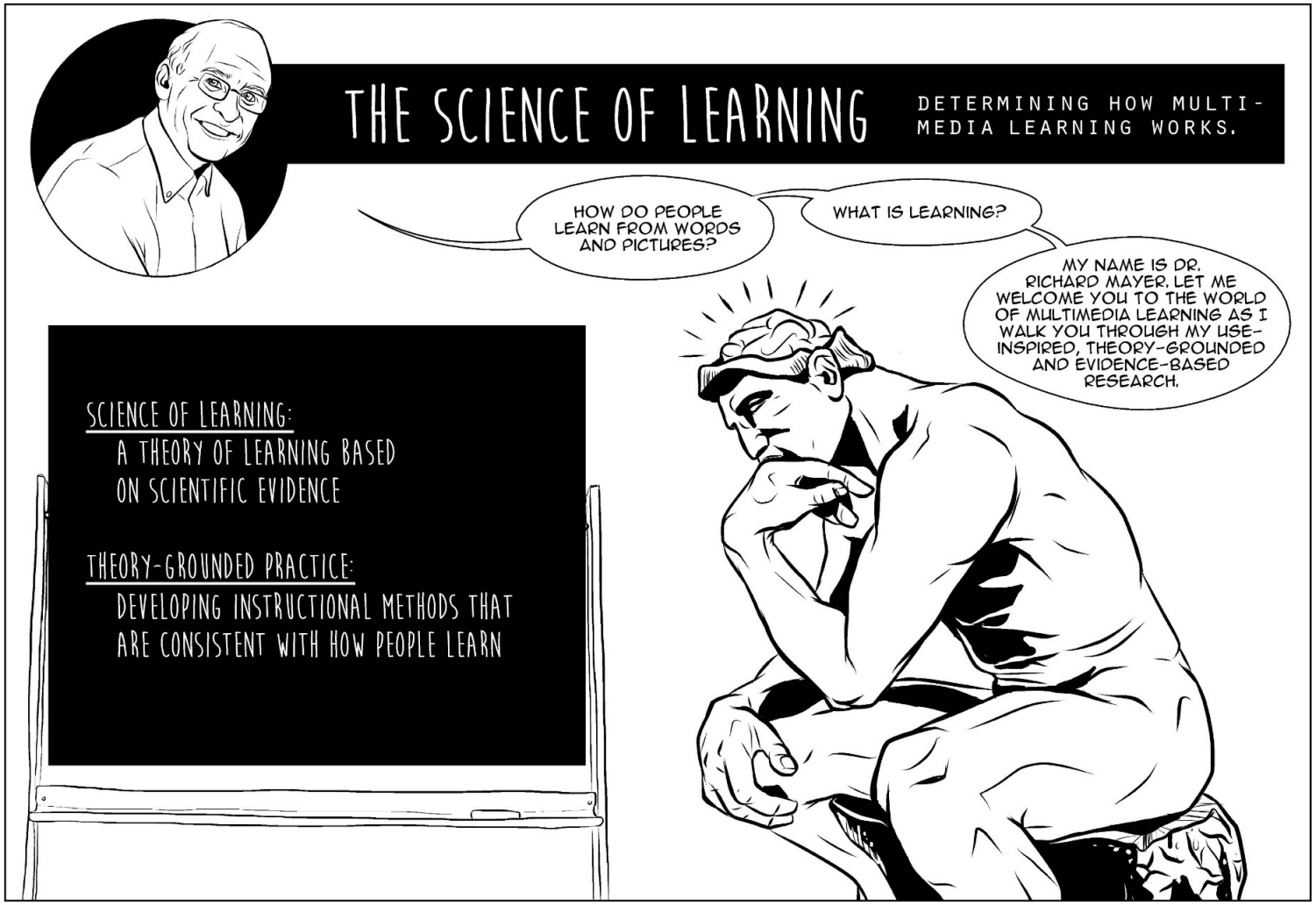
Page 1



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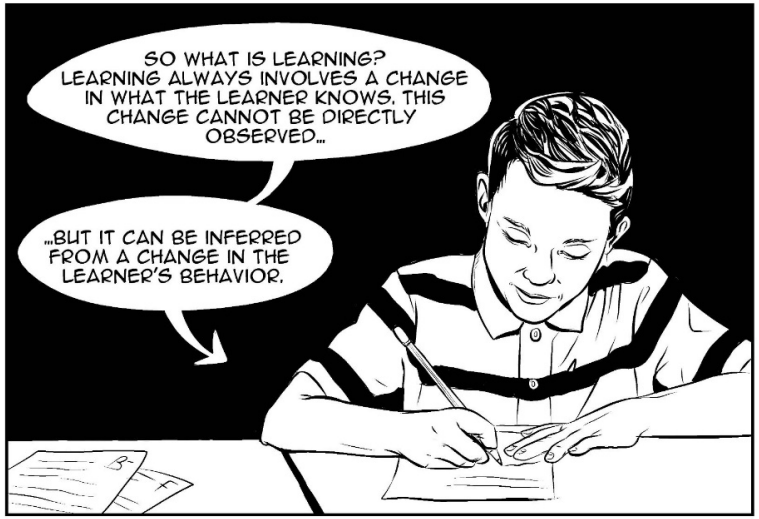

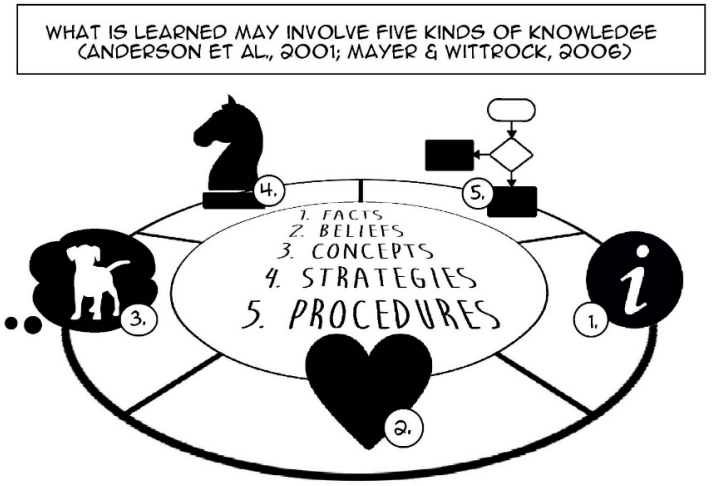

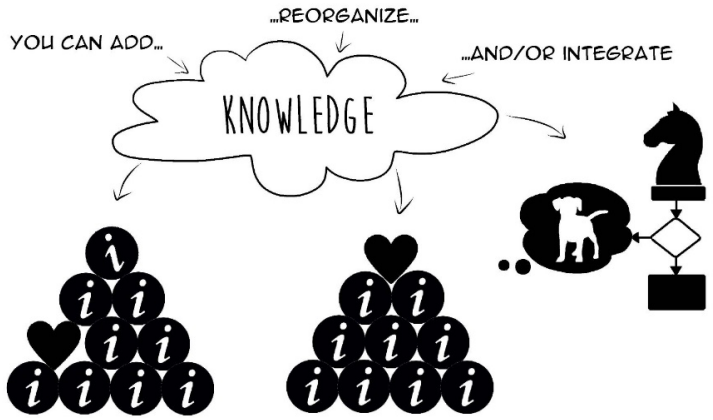

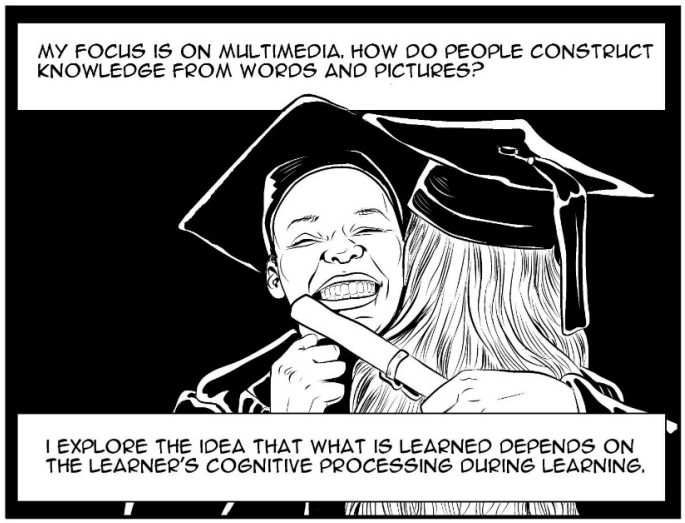

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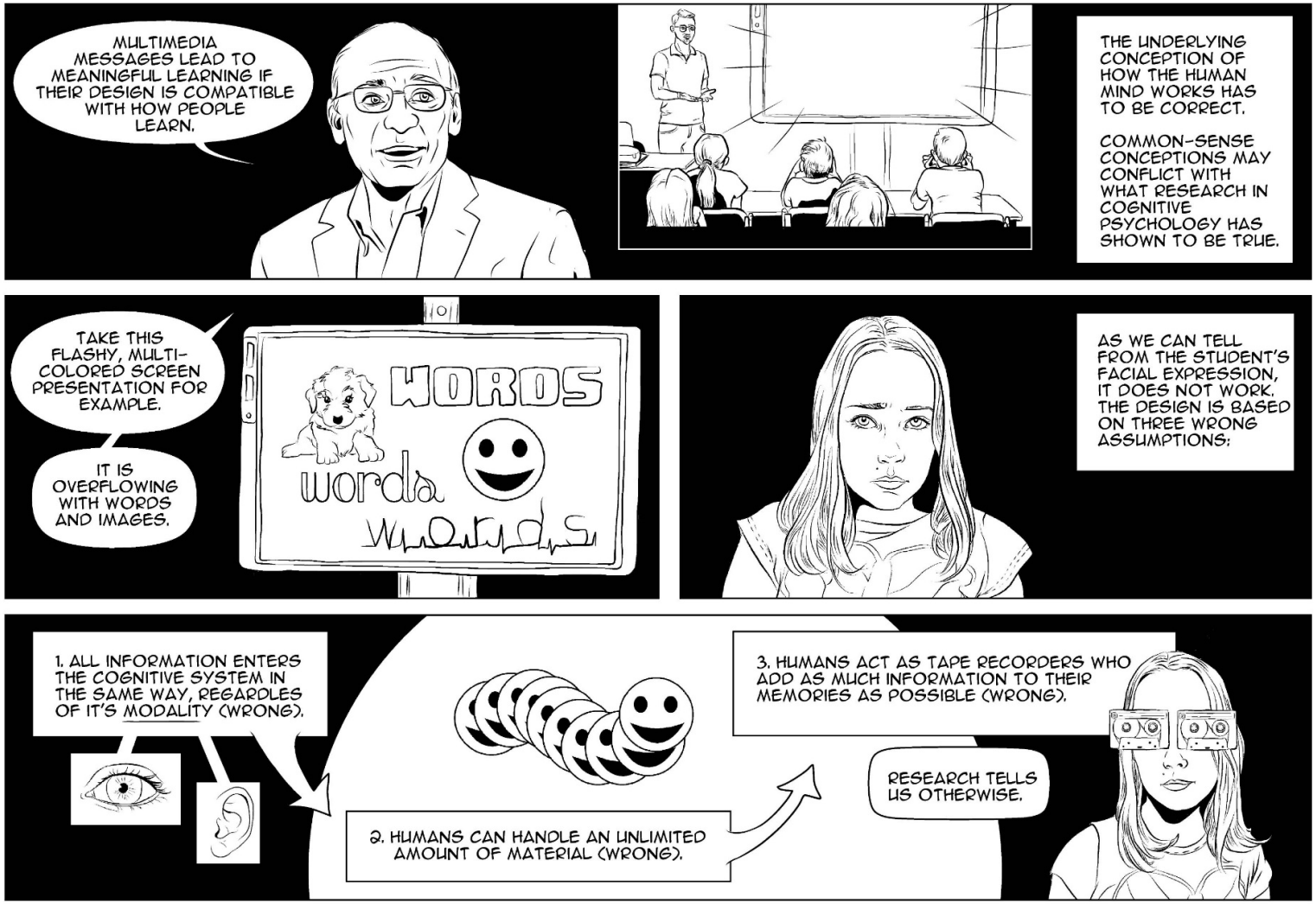

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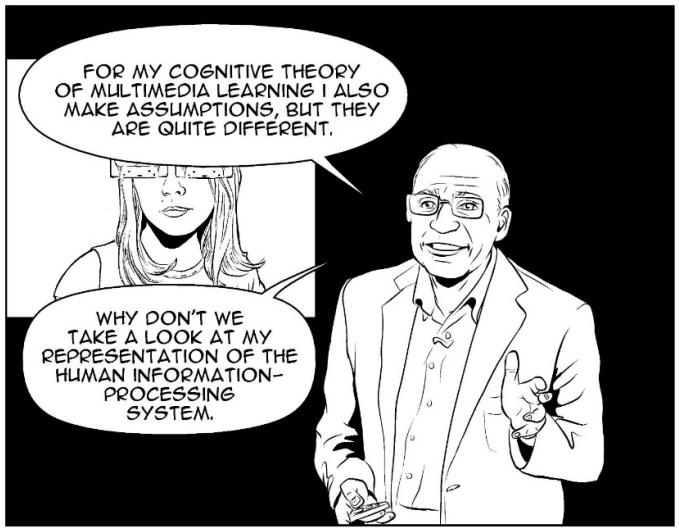

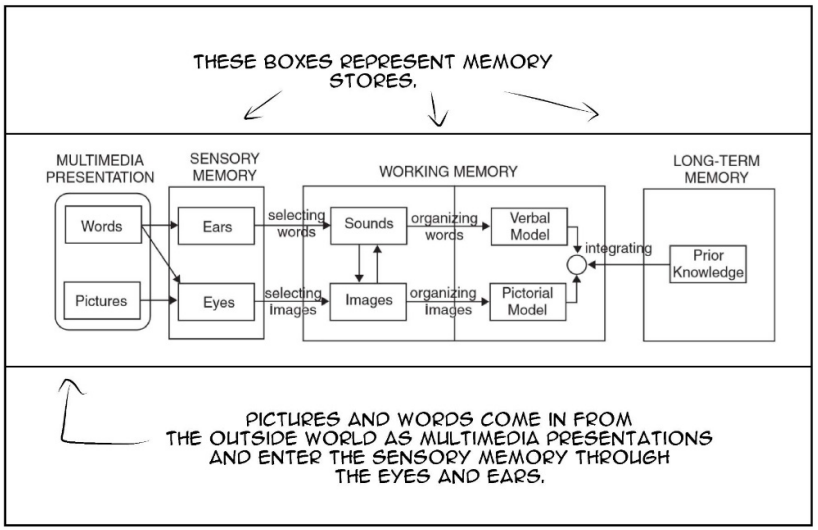

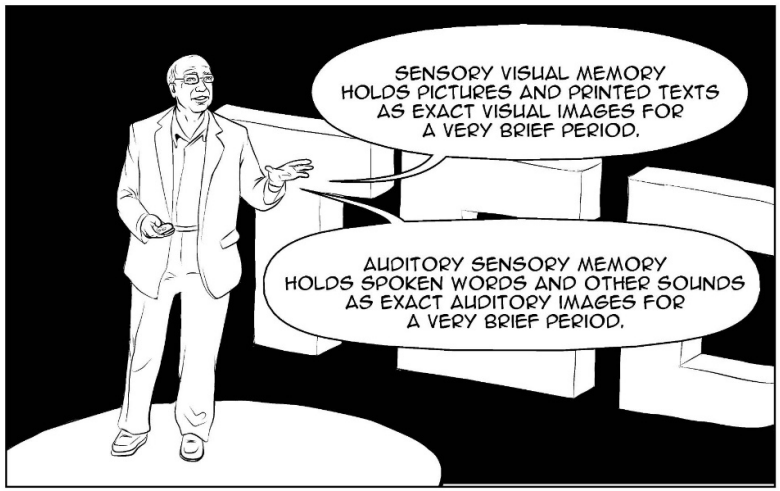

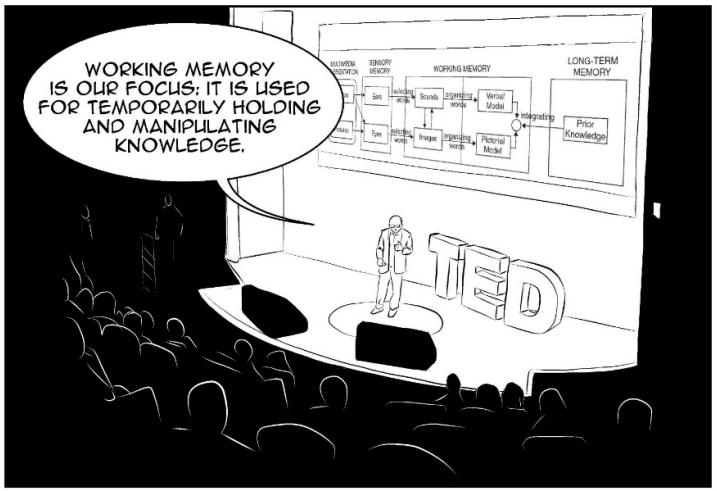

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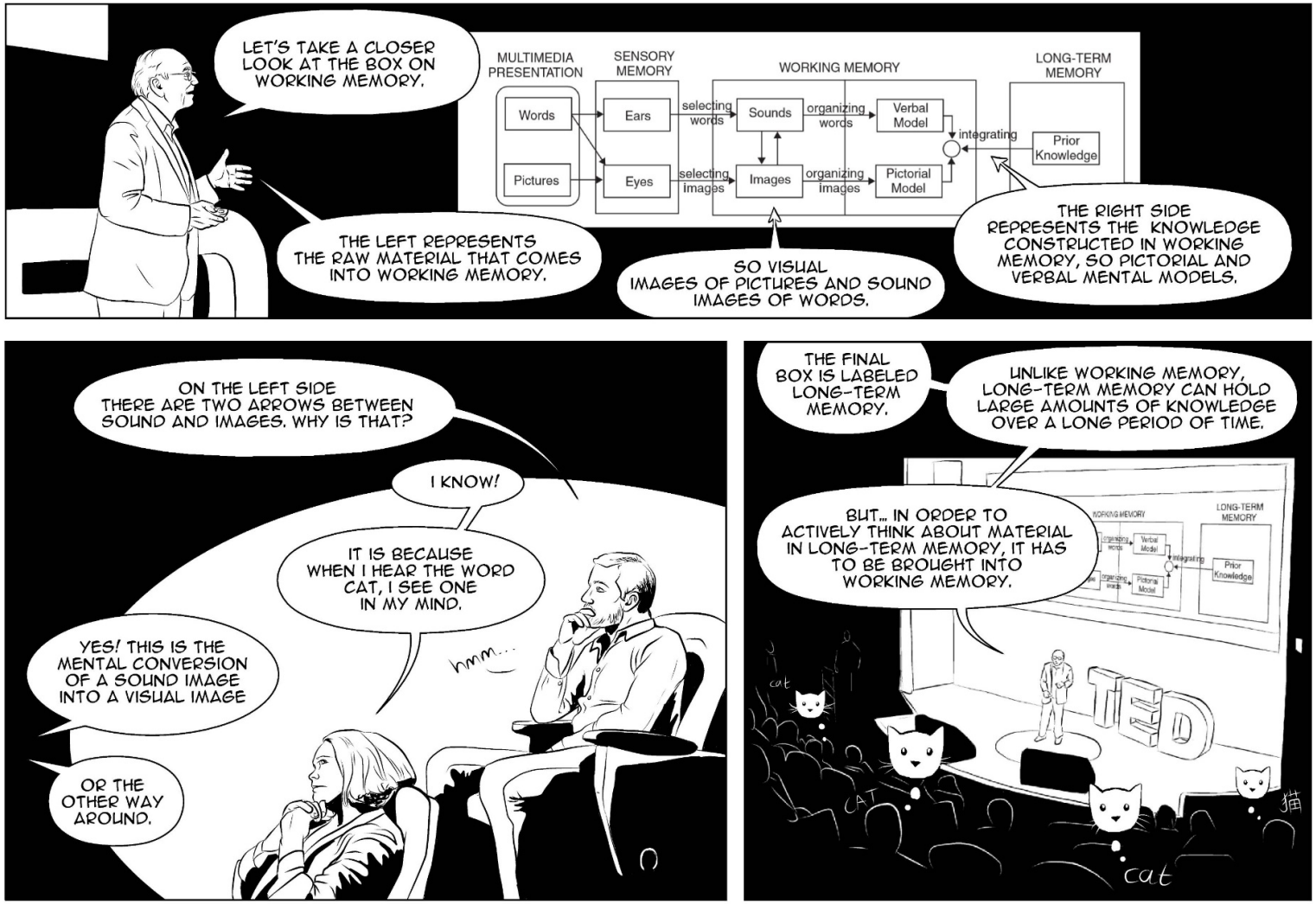

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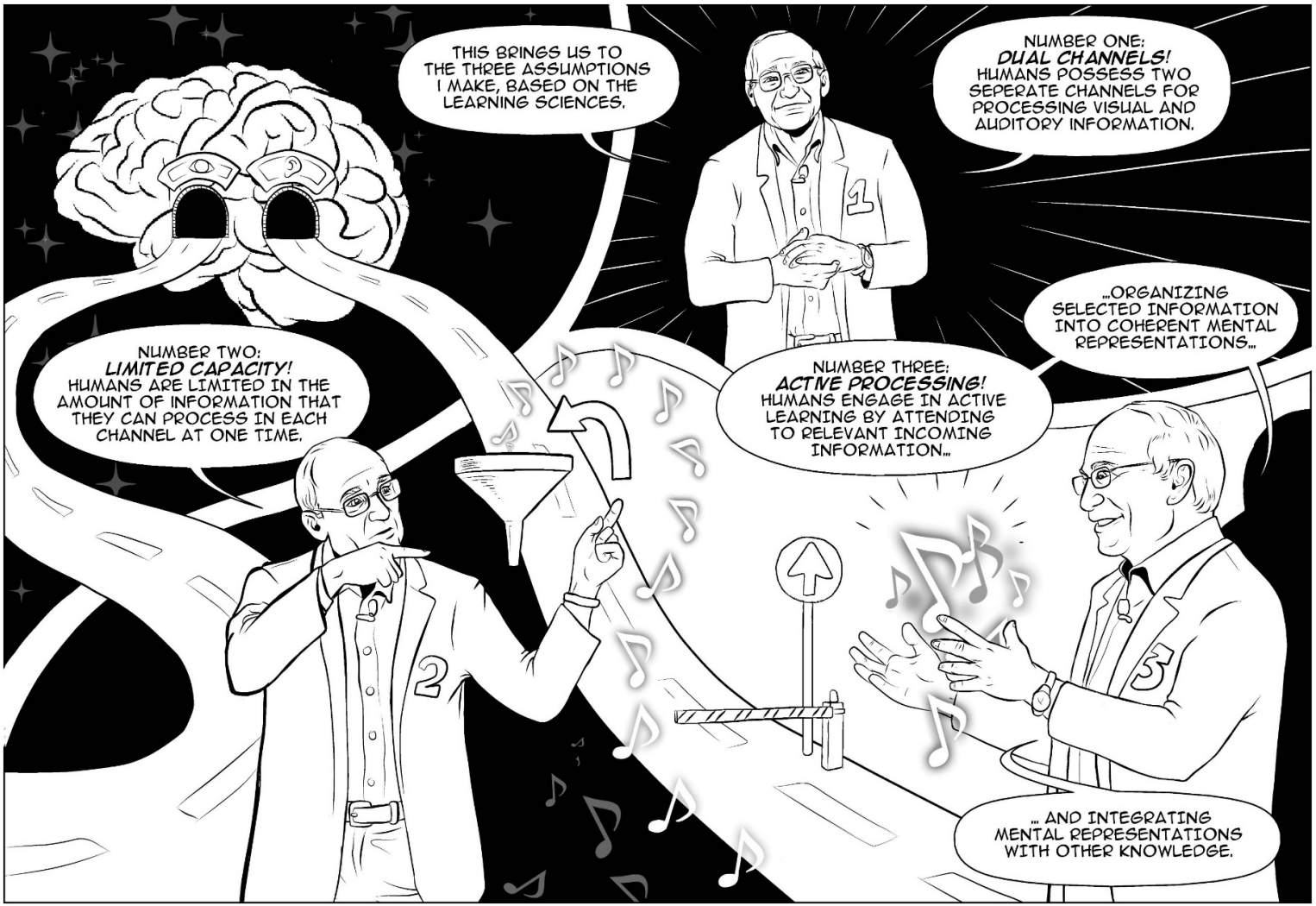

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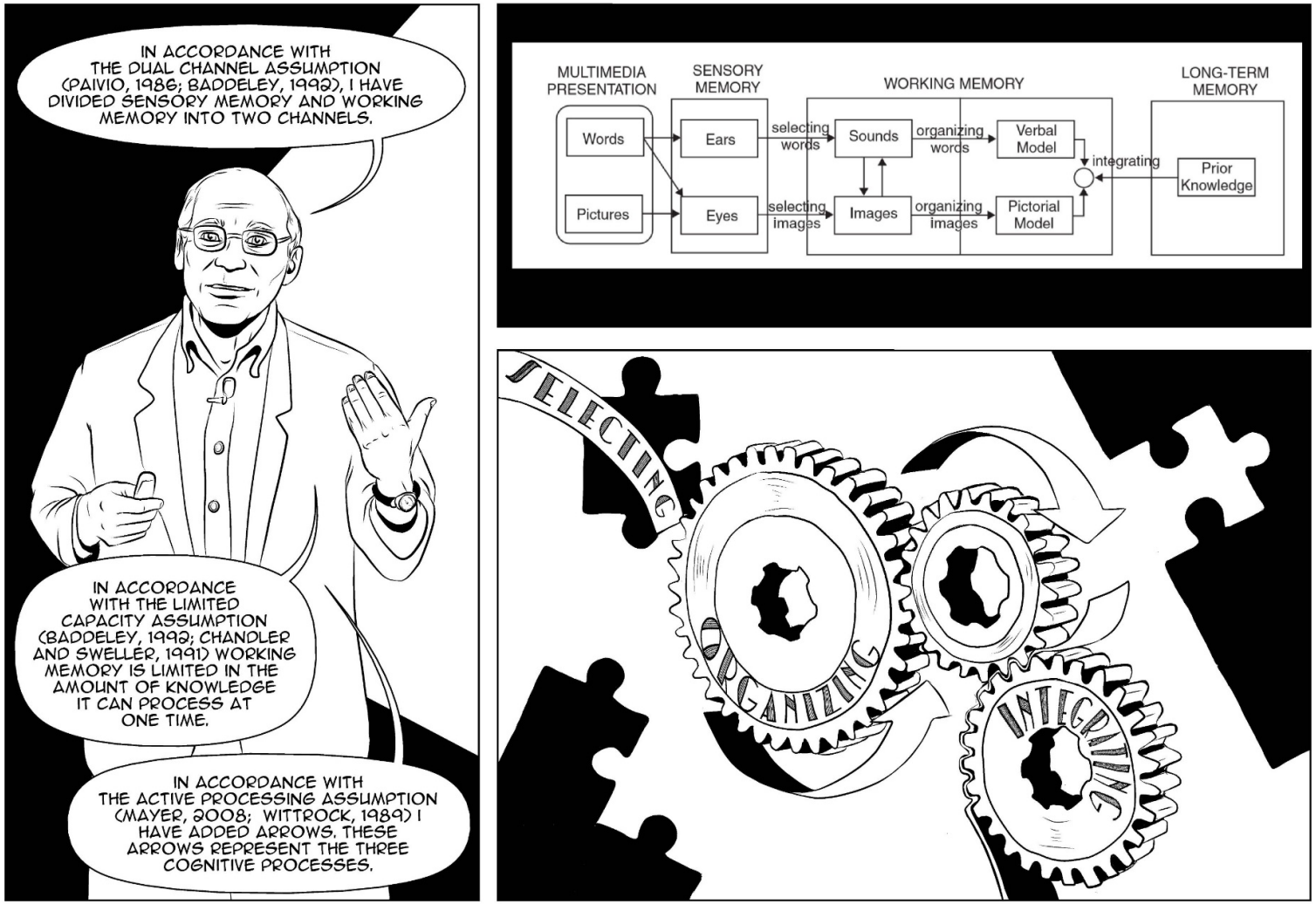

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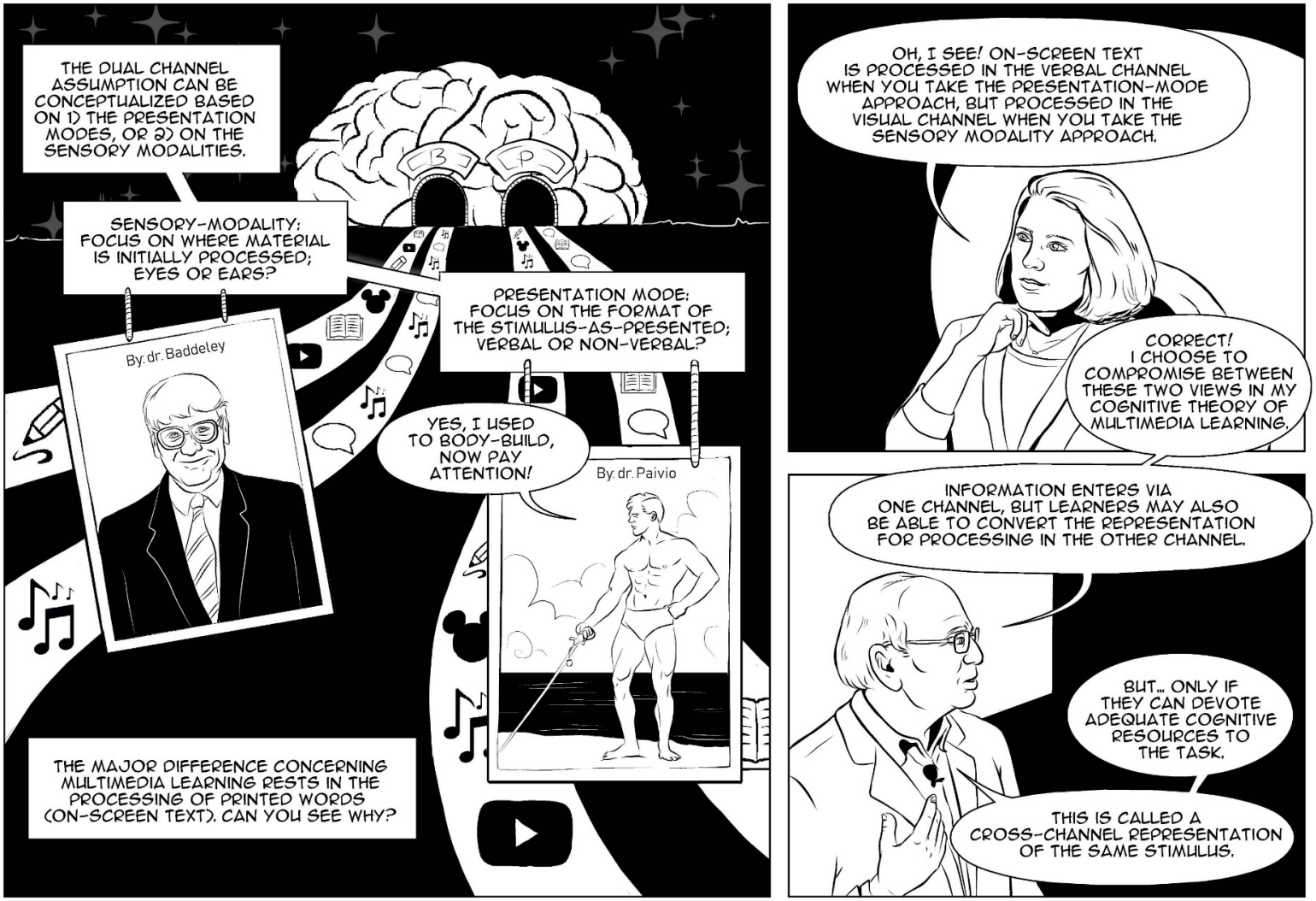

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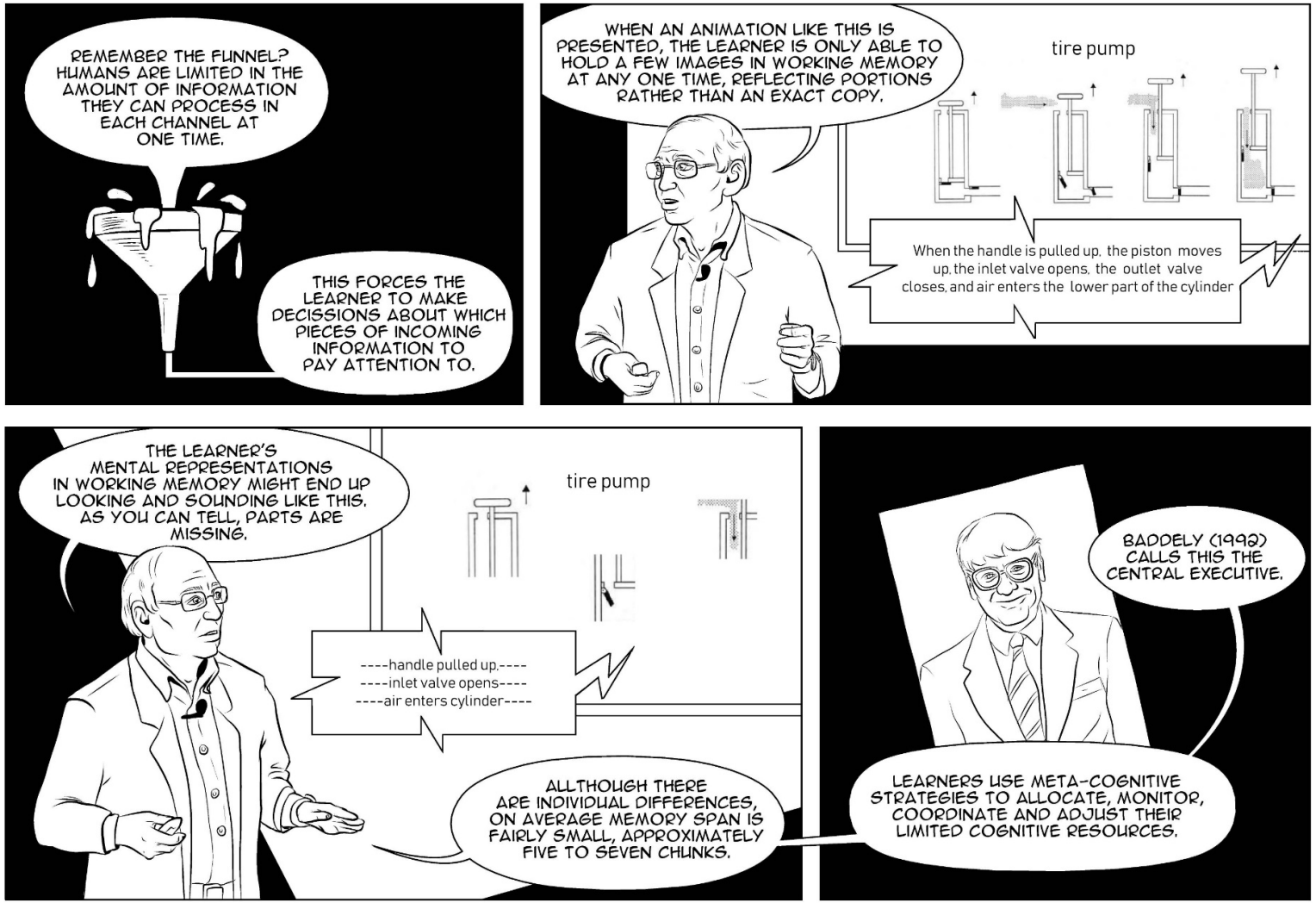

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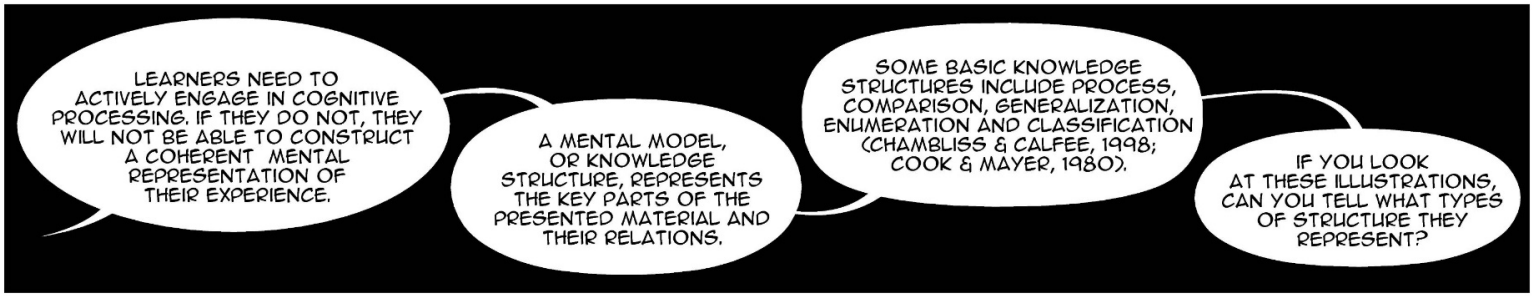

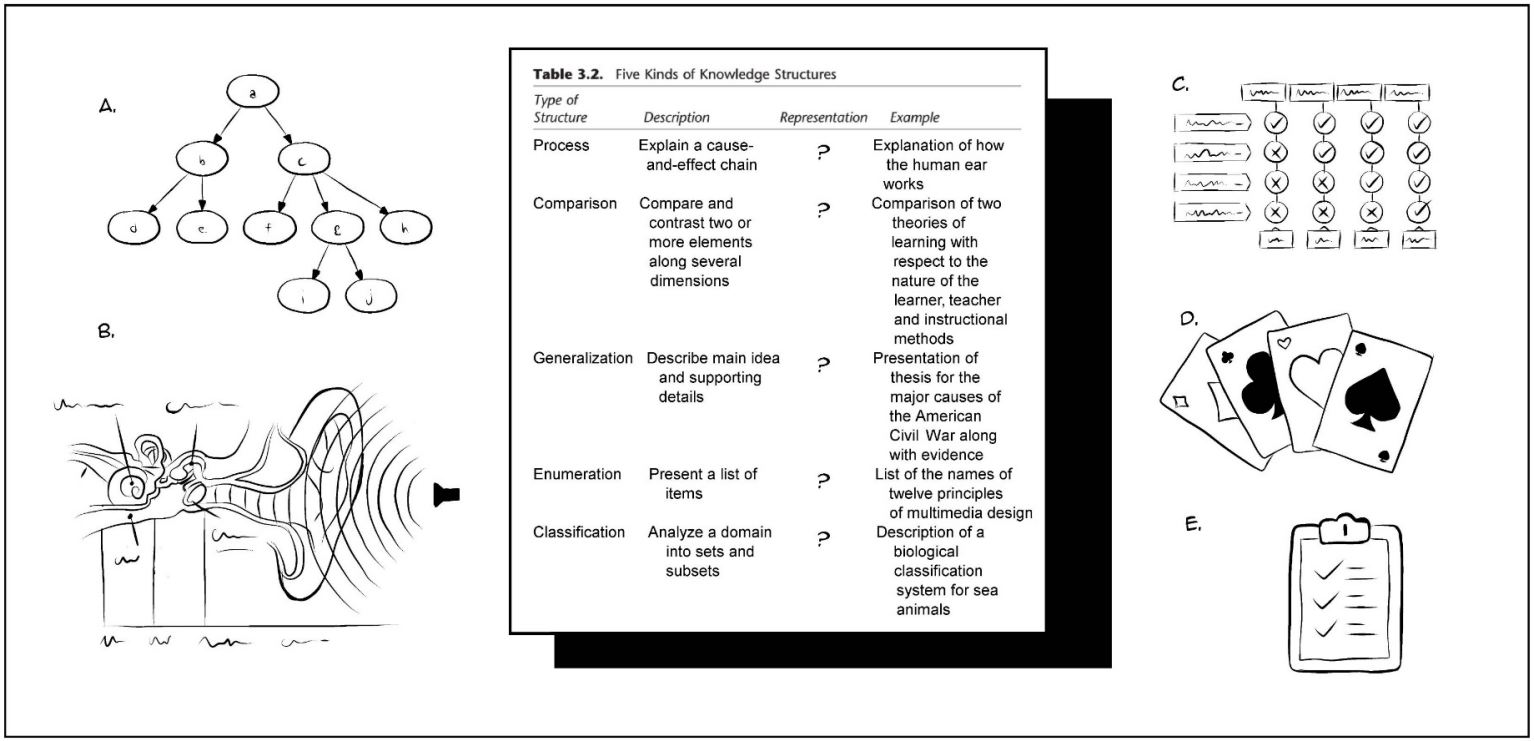

Table 3.2. Five Kinds of Knowledge Structures

Type of Structure	*Description*	*Representation*	*Example*
Process	Explain a cause-and-effect chain	?	Explanation of how the human ear works
Comparison	Compare and contrast two or more elements along several dimensions	?	Comparison of two theories of learning with respect to the nature of the learner, teacher and instructional methods
Generalization	Describe main idea and supporting details	?	Presentation of thesis for the major causes of the American Civil War along with evidence
Enumeration	Present a list of items	?	List of the names of twelve principles of multimedia design
Classification	Analyze a domain into sets and subsets	?	Description of a biological classification system for sea animals

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Page 11

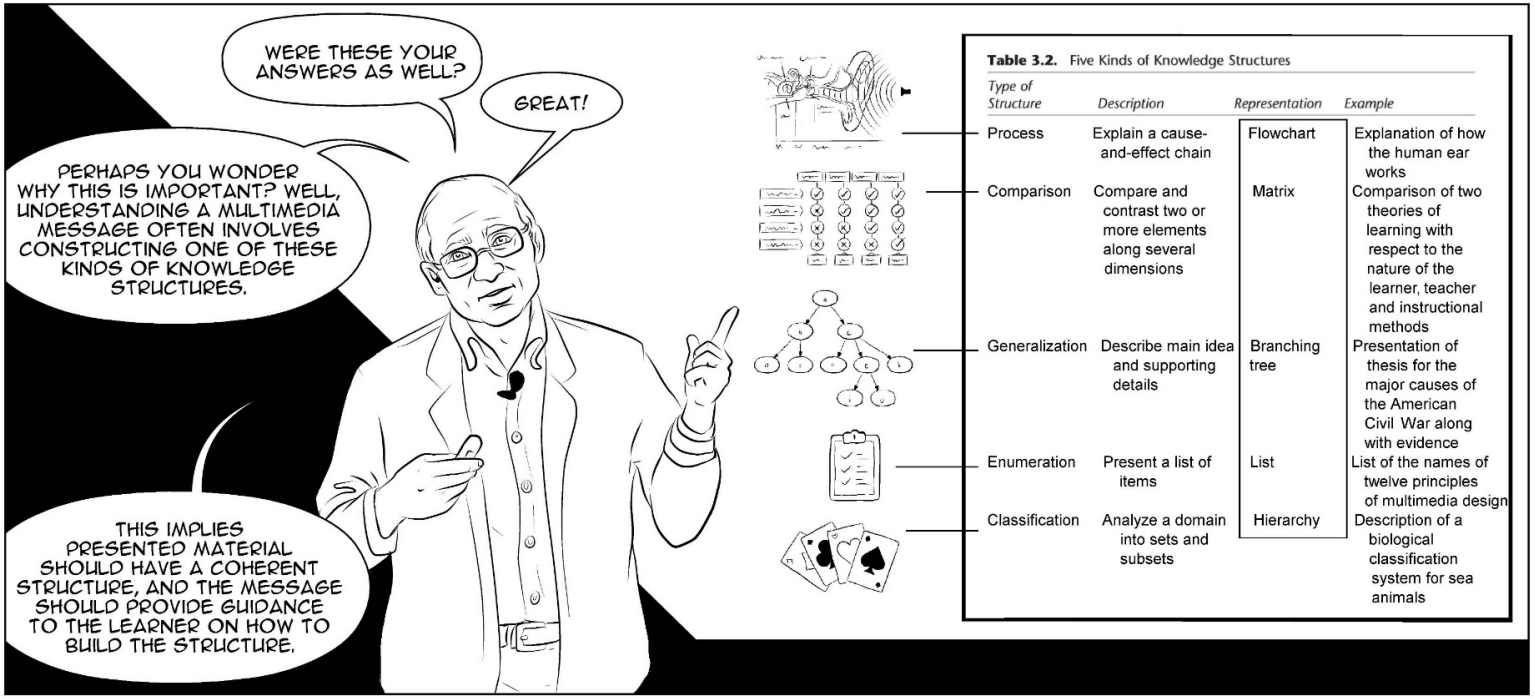
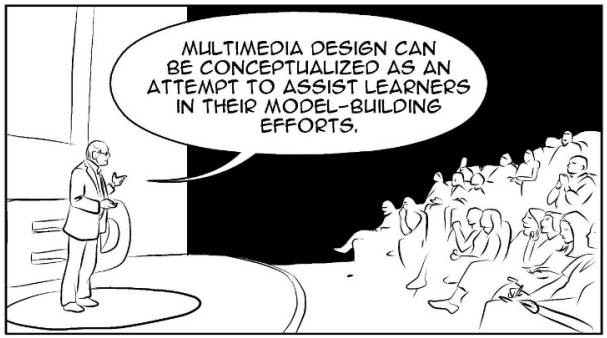
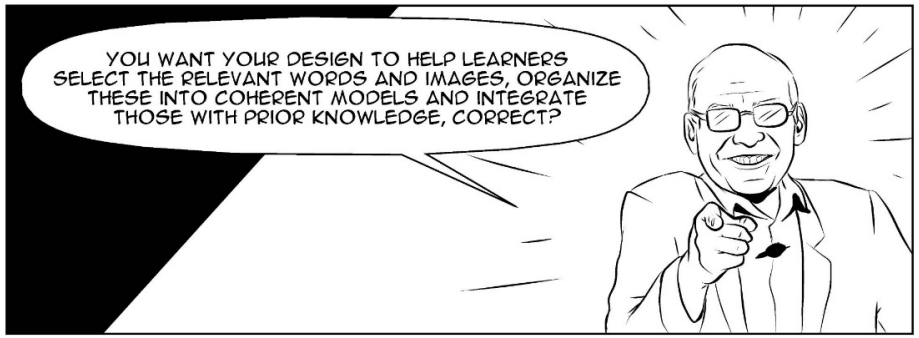


Table 3.2. Five Kinds of Knowledge Structures

Type of Structure	*Description*	*Representation*	*Example*
Process	Explain a cause-and-effect chain	Flowchart	Explanation of how the human ear works
Comparison	Compare and contrast two or more elements along several dimensions	Matrix	Comparison of two theories of learning with respect to the nature of the learner, teacher and instructional methods
Generalization	Describe main idea and supporting details	Branching tree	Presentation of thesis for the major causes of the American Civil War along with evidence
Enumeration	Present a list of items	List	List of the names of twelve principles of multimedia design
Classification	Analyze a domain into sets and subsets	Hierarchy	Description of a biological classification system for sea animals





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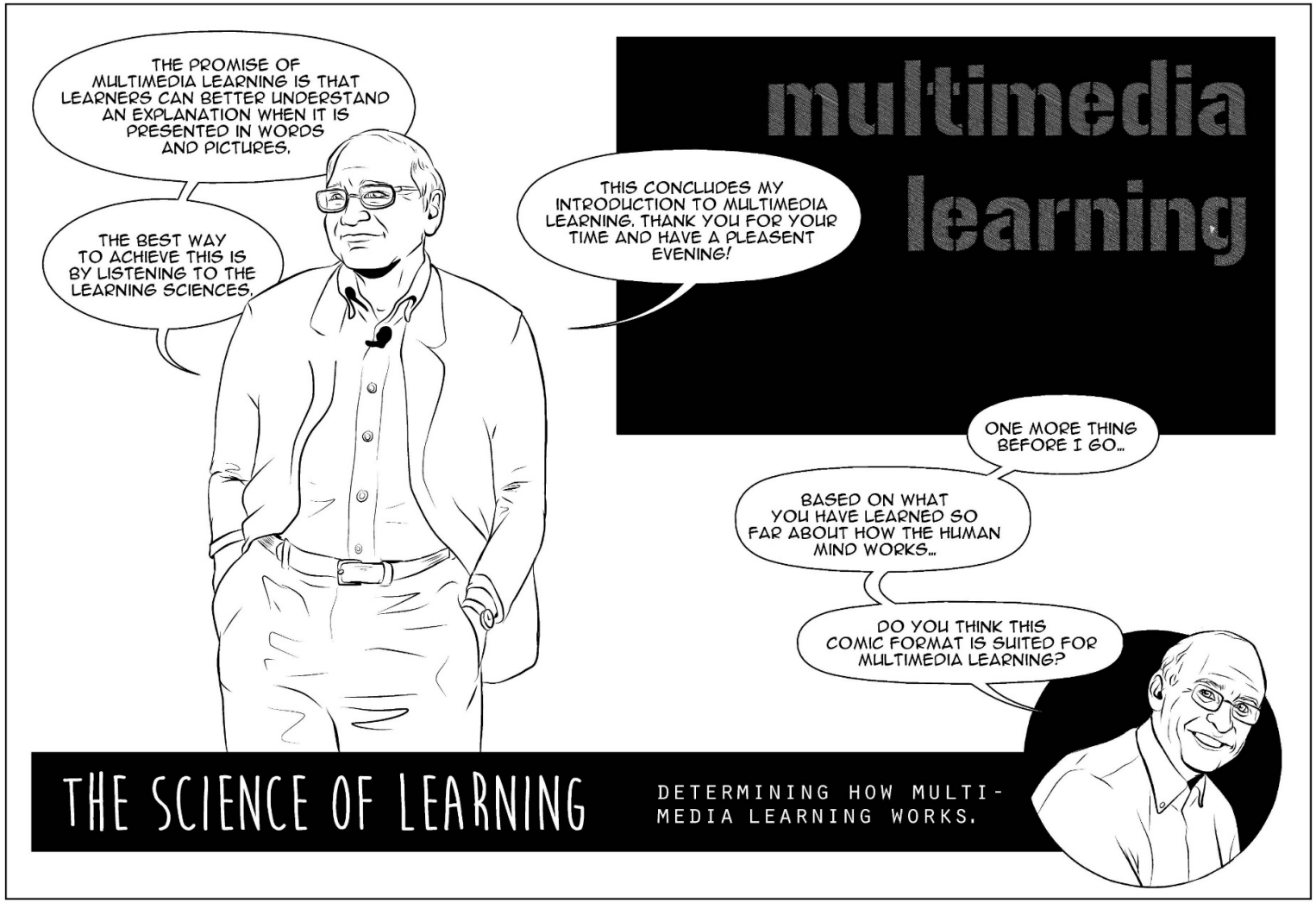

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The Allegory and Metaphor in Visual Arts

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Abstract

Throughout the history of civilizations, the language of visual art has expressed the hidden concepts under the apparent forms and the invisible deduced through the visible. Furthermore, this process takes place through various mediums to convey complex and abstract ideas and meanings through symbols, allegories, and metaphors. Additionally, all those mediums represent hidden meaning and veiled language, a meticulously packaged lesson ready to reveal itself. This research will provide a new method of seeing and interpreting the creative experience of visual art from many aspects by monitoring and studying the development of symbolic thinking through theories of reading, receiving, and interpretation. This, in turn, requires the necessity of dealing with the artwork as a concept and not just looking at its formal aspects only. Thus, this calls for a reconsideration of visual and conceptualism metaphors and tropes in artists' practices, using metaphorical structures as one of the most important ways of contemporary thinking.

Keywords: Conceptual perspective, allegory, metaphor, visual arts

Introduction

Much of our collective memory and history is rooted in narrative, an art form unique to the human experience. How we tell our stories, feelings, and thoughts varies, from oral poetry to literature to music to visual art. This process takes place through various mediums to convey ideas. For example, such a process could be elaborated using the illustration of complex and abstract meanings through symbols, metaphors, and allegories. They all represent hidden meaning and veiled language that are just waiting to be deciphered and examined by the recipient of the work. Thus, the narrative approach became one of the modern critical approaches used to explain and interpret the aesthetics of art and literature.

The Evolution of Visual Narrative and Visual Language

Visual narration means an act, a story, or a concept that is built and told through the use of visual media such as the use of still photography, illustration, or video, and can be enhanced with graphics, music, sound, and other sounds (*Visual Narrative*, 2014). Furthermore, this visual narration has developed from the traditional narration, whose first beginnings appeared in ancient civilizations and reached their extent in the Coptic, Byzantine, and Islamic arts. Moreover, with the advent of modernity, narrative representation disappeared, and modern artistic trends rebelled against familiar narrative topics, which involve stories of history, religion, and literature. As the attention in that modern era became focused on issues of form and color, from Impressionism to Surrealism, Abstraction, Dadaism, and Conceptualism.

As a continuation of this rebellion, the postmodern and contemporary era began, which is considered a mixture of multiple movements, artistically and culturally. Affiliation with such an era is a position to criticize various aspects of modernity or the phenomena that have spread in relation to it. This postmodern and contemporary era was characterized by (Nagy, 2018):

- the generation of meanings and the availability of multiple levels of interpretation
- the avoidance of consumed and repeated literary and artistic forms
- the absence of pure facts or agreed-upon fixed meanings
- the deconstruction of the narrative structure and the confusion of reception processes using fragmentation methods
- the ironic character and the inclusion of many controversial experimentation techniques, with the use of overlaps and metaphors from common literary and artistic works within the structure of the narrative imagination
- the creation of a narrative text of multiple styles, languages, and ideological perspectives

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Conceptual Vision of Metaphor and Allegory in Artwork

Throughout the history of civilizations, the language of visual art expressed the hidden contents and concepts under the apparent forms, and the invisible deduced through the visible. That would raise questions and stir minds searching for interpretations and proposals revealing the content, which is subject to continuous changes throughout history according to the change in culture and societies' thought. Consequently, that would cause a change and alteration of the reading and appreciation systems. So, in the visual arts, it is possible to notice the huge differences in the methods of establishing, implementing, understanding, and reading artworks from Rubens to Baroque and from Baroque to Futurism. Also, from the difference in ways of producing artworks by icon makers to the methods of producing artworks by expressive abstractions like Jackson Pollock and Yves Klein. That would lead to a transformation of the methods of perceiving content, understanding the meaning, and the ways to extract the significance of the visual discourse (Dahman, 2000).

Early drawings were created as a visual language to help convey religious or political opinions and beliefs and, therefore, they must be accurate and easy to understand and read. In the beginning, especially during the Classical and Middle Ages, allegorical artworks referred to biblical tales. For instance, a group of religious symbols was used to tell the story of Christ's birth or the Annunciation scene, such as the lamb, the dove, the flower, or the ray of light, which shows the necessity of seeing the world in a way that transcends reality. It allowed the artist to create an elaborate world of narratives and play with the world of metaphors and allegories instead of the direct and superficial expression of the act of encoding.

For example, Sandro Botticelli's *The Birth of Spring Primavera* – shown in Figure 1 – is one of the most famous illustrations of the allegorical and mythical image, referenced by many classical and contemporary texts, open to endless interpretations by critics and art historians.

The meaning of the *Primavera* remains a mystery. It is a work that can be read according to various levels of mythological, philosophical, and historical interpretation, where Botticelli's accuracy in depicting many types of flowers and plants conceals a complex symbolism.

Taking the scene as a whole is probably best understood in light of allegorical meaning. The allusions to spring and the month of May, the scene of a suitor's pursuit, and the three graces point to the idea of a springtime marriage. The painting would have been placed in Lorenzo di Pierfrancesco's bedroom (Zirpolo, 1991). His wife would have seen it for the first time after their wedding, so the idea of Cupid targeting the pure Three Graces with his arrow takes on a particular meaning considering conjugal love (Zirpolo, 1991). Some suggest that the work stands as a metaphor for the idea of Neoplatonic love (Dizdar, 2015). In which meditation on *Primavera* and the complex structure of mythological associations that arise from its metaphorical meaning leads to an unconscious merging of symbolic relationships within and between males and females. That would enable the beholder to overcome traumatic experiences by structuring them in line with a worldview (Dizdar, 2015).

According to another hypothesis, *Primavera* is a metaphor for metamorphosis. *Primavera* has been said to embody the Neoplatonic philosophies and writings of the third century that were adopted and popularized by the physicians of their time. In Renaissance Italy, Neoplatonist artists and thinkers sought to synthesize or draw parallels between the beliefs of classical antiquity and Christianity. Venus, for example, has been considered the classic embodiment of both earthly and divine love and is thus a precursor or parallel to the Virgin Mary.

In his depiction of Venus, Botticelli presents the shape of the curvature of the branches behind the figure as a kind of halo, and her stomach bulges out in what some consider a depiction of pregnancy. Furthermore, Venus raises her hand in a gesture of appreciation and invitation that mirrors Mary's gestures to the angel Gabriel in contemporary Annunciation scenes, including Botticelli's *Annunciation* in 1481, as shown in Figure 2.

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With this change in mind (Venus to the Virgin Mary), one can begin to recognize the pattern of transformation throughout the painting, including the transformation of Cloris into Flora, the transformation of winter into spring, and the conceptual transformation of literature into visual art.

Figure 1
Primavera by Sandro Botticelli, 1477-1482, Florence.

Figure 2
Cestello Annunciation by Sandro Botticelli, 1481.

Besides these references to familiar mental or pictorial images from everyday experience to illustrate several rhetorical concepts, several terms used in classical rhetoric were originally metaphors from the

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visual experience. The transparent or polychromatic could describe the diction, but the correct understanding of the visuals was presumed rather than objective. In general, classical discourse did not branch out into a whole visual art discourse, with occasional references to mental and pictorial images and metaphors from the visual experience.

Additionally, metaphor is one of the basic categories in the ancient rhetorical heritage that oscillated between the description of the ancient rhetoric and its normative complexity. Rhetoricians have always categorized it within the investigations of rhetoric, which in their definition means to include the same meaning according to multiple ways with clarity of indication. Furthermore, metaphors are based on the philosophy of similarity, which is conditioned by a pattern of verbal and mental clues that modify the speech from the path of the real signification to the path of the performance of the figurative sign. Metaphors have rich capabilities that allow understanding the literary discourse, whether textual or visual, in its totality and comprehensiveness, which modernists realized when they sought to root the theory of the artistic image and deepen its applied aspect. Moreover, in response to the development of this interpretation system, writers and artists began to create literature and art that was supposed to read allegorically in contrast to the Bible and the classic works of Greek and Latin literature, which had a symbolic effect. Although we do not rely on this complex system today, allegorical symbolism underlies many modern assumptions about how a text or piece of art indicates meaning.

Moreover, allegory is a complex metaphor, or series of metaphors, combined and used in films, visual arts, or literature. It is often used to give abstract ideals (truth, beauty, etc.) a concrete form, sometimes by embodying these ideals as characters within work so that the reader can easily understand and build a philosophical, moral, or political point of view.

The metaphor and the allegory, which rhetoricians and critics saw in the early classics as just a decorative linguistic tool whose role was limited to decorating the literary text, is an essential process and a product of thought. The power of metaphor lies in its ability to enhance the understanding of the meaning of experience, the metaphor determines reality in art and language. Moreover, metaphor urges the receiver to look beyond the literal meaning, to generate associations and benefit from new, different, or deeper levels of meaning. Metaphors, by their generative nature, are those launched by the conceptual system towards a new understanding, and thus, a new meaning or a new idea can be placed in a much wider setting for inspiration or influence.

Sometimes concepts may be deceptive, abstract, and difficult to interpret. Hence, metaphors and allegories provide an external expression for conceptual designations that may be difficult to translate literally, whether in language or images. The rhetorical use of the spirit of the artwork and the metaphor must be united in the overall sense. Additionally, the metaphorical image here is conducive to the purpose. It expresses this purpose, and it cannot be cut off from the organic unity or the artistic experience, but the consideration of sensory similarity between the two parties must be transcended. It is realized that the potential of the metaphor must be related to the feeling, and this metaphorical process often creates divergent meanings, as the attributes of one entity are transferred to another, by comparison, substitution, or because of interaction.

Artists construct ideas in the creation process that can be described as figurative expressions. The figurative expression occurs when domains are mapped to each other resulting in new meaning taking shape in a work of art, whether it is planned, entirely unplanned, or somewhere in between. Artists' working methods open the possibility of metaphorical visions while immersing themselves in materials and techniques. The inner passion of artists to express themselves always stems from their conceptual system by exploring and investigating their creative vision in some way or form. Since artists think conceptually, metaphors are inevitably created by communicating ideas through the medium used. The argument is most clearly laid out according to the viewer's perception of a piece of art. This is because artists make metaphors while expressing themselves, but what they really want is to simply externalize a piece of art so that the viewer can experience the work and provide its interpretation. Before exploring viewers' perception of metaphors that communicate through art, it is important to state what the artist wants the viewer to "see." The artist wants to generate other metaphors for viewers. Artists only wish to integrate the viewers' conceptual system with the artwork so that the latter can form personal connections with the piece of art.

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Artwork Analysis and Theory Application

By focusing and using the theories of reading, reception, and interpretation as an analytical model in re-vision and awareness of the current artistic work research, this paper can reach actual results. Whereas the theory of interpretation and reception emerged as a result of a reaction to the omission of the role of the reader and its neutrality in reading the literary text, this theory came to achieve a balance between the elements of the creative literary process (work, writer, and recipient). These theories seek, in their entirety, to involve a broad and actual audience to develop their aesthetic taste through strong communication with artistic texts.

This, in turn, contributes to broadening the perceptions of critical reading of the recipient through the process of deconstructing and interpreting the text. In addition to studying the relationship between the signifier and the signified and then linking the signs according to semantic systems that form the main axis of the meaning that the recipient reaches through understanding, intuition, and perception. And whenever the recipient re-reads, he will discover other meanings that he did not realize the first time.

Looking at the period of modernity, one of its most famous artists, Van Gogh, deliberately used elements in an allegorical sense and made better use of metonyms, metaphors, and similes. He also deliberately created connections and benefited from new, different, and deeper levels of meaning. The artist expressed the human being by declaring visible extents that carry within them non-virtual connotations and suggestions, such as his shoes, vases, and daily needs. Still, he gives them a metaphysical dimension that frees them from their realism. By looking at the famous Van Gogh *chair painting* (Figure 3) and Gauguin's *chair painting* (Figure 4), we discover the psychological and metaphorical differences and the rhythm of dealing with life, ambiguity, and complexity on the one hand, and simplicity and optimism on the other hand. It was an analogy in adjectives or verbs, and empty chairs were frequently used as personifications of the people who possessed them. These ideas lead to much discussion of the idea that the accompanying paintings may have been intended to represent the contrasting moods of the artists as they are portraits of two very dissimilar people who never find unity. And when placed next to each other, their tumultuous differences and problems fade away, and the essential spiritual connection emerges, and it is not unreasonable to interpret the chairs as representing Van Gogh's conception of Gauguin. With the most elegant elements, he chose to represent Paul Gauguin.

Figure 3
Van Gogh's Chair by Van Gogh, National Gallery, London

Figure 4
Gauguin's Chair by Van Gogh, Van Gogh Museum, Amsterdam.

In a fast-moving world, it can sometimes seem that the only constant is the change, and this makes keeping up with knowledge of topics and events a challenge (Charman & Ross, 2006). With the developments at

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that time in the course of art and its abandonment of realistic representation and its tendency towards abstraction, surrealism at this time can always be considered an excellent example of the metaphors created in works of art. Many artists in this direction used symbols, images, shapes, or materials that represent a philosophical and spiritual idea. Marcel Duchamp's ready-made works, Marguerite's drawings, and Dali's works are just a few examples we can use to present visual metaphors through art.

One example of metaphors created by artists is Duchamp's way of describing the conceptual system of thinking towards creating art and thus creating metaphors through it. He suggests that the ability of the human mind to transmit experiences/memories helps artists to express themselves. At the same time, it places the viewer facing the "transformation phenomenon" at the point where the viewer transforms the artist's inert material into a work of art. But, again, the viewer's intelligence of perception operates unconsciously and imposes the artwork's aesthetic value. How does the human mind create — by acting conceptually — metaphors to perceive the surroundings? Visual thinking is how the brain translates everything it sees into concepts that always lead to metaphors as it tries to describe the world through cognitive processes.

Contemporary art today is an eclectic arena and, as such, allows for a variety of different approaches and styles, with shifting periods and civilizations. Many examples of artists using everyday consumables to reflect on current pressing issues. For instance, British artist Sarah Lucas uses sculpture and installation to promote allegorical tropes in art, creating sculptures that use everyday objects and consumables — such as old furniture, food, tights, and cigarette butts — to present uncomfortable truths about sex, gender, and death. For example, in her work *Two Fried Eggs and a Kebab*, she uses food to discuss sexual politics. For instance, eggs and kebabs could be translated into the breasts and genitals of women. Additionally, the table, tabletop, and four legs could be used to show the body and the four limbs of a human, resulting in a sculptural representation. It is undeniable to "woman as an object" and the sexism that Lucas felt as a young artist, and it is unclear whether this anthropomorphism is an attack on the societal characterization of the female body as consumable or simply as a receptacle where men make their deposits or is more personal to think about. In this representation of the artist's own body and sexual experiences, this model serves as a critique of sexual attitudes toward women, as two fried eggs and kebabs illustrate Lucas' desire to play with metaphors of street language. This shift in subject matter makes us realize that the principle of using the symbol has not always remained the same (Figure 5).

Figure 5
Two Fried Eggs and a Kebab by Sarah Lucas, 1992.

The bed is no longer a place of comfort or privacy in Mona Hatoum's production. While she molds the bed like a soft mattress, any suggestion of comfort is rejected by the steel plate material she has chosen to build the artwork, turning the sense of family comfort into a state of anxiety. These steel plates are usually associated with their decorations in industrial engineering or military defenses. Mona Hatoum is among

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many artists who masterfully create metaphors using materials and objects, causing endless discussions with viewers' perception and their conceptual system for perceiving ideas, events, feelings, and thus metaphors. Many of the traditional connotations associated with the bed metaphor (such as comfort, privacy, and serenity) are rejected in this work. She presents images and material more commonly associated with pain, discomfort, torture, and abuse, with references to social and political oppression. It appears in such works the contradiction of feeling and the ambiguity of the meaning, which are sought as ends in themselves. The limit did not stop at the unfortunate repercussions of the conditions of the immigrants from the occupied lands, but their companion in their migration to countries that support this occupation. As soon as you think about comfort, the decorated metal will leave a painful imprint on the body of anyone who lies on it, in a reference by the artist to the extent to which migrants feel pain in places and countries other than their own.

Figure 6
Divan Bed by Mona Hatoum, 1996.

Therefore, metaphor and allegory are a rich way to study and read the components of the artwork, color memory, and the secrets of the expressive visual language. Its apparent and implicit connotations, aesthetics, and use value extracted from it can be used to re-vision and analyze contemporary visual artworks. Modern semantic perceptions made metaphor an essential value, representing a semantic innovation and automatic creation of new meanings. Metaphor is also considered an argument based on the structure of reality and redrawing its scenes, based on the creation of similarities that are not ready in reality, and the suggestion of the moral energy generated by the artistic structure of the partial metaphorical image in its total framework, which works to expand and multiply levels of understanding and interpretation. The inspiration is not limited to the creator but includes the recipients, who increase their interpretive ability and pushes them to search for the essence of the artistic image. This inspiration is also used for a specific expressive purpose, such as generating meaning and exaggerating its description, or for an artistic purpose, such as brevity in the image, improving its position in the recipient, and highlighting familiar things in an artistic image, in a manner different from what is customary, and discovering the new hidden relationships between things, phenomena and events.

Conclusion

Based on this, metaphor is an essential tool for understanding the world, thinking about it, and talking about it. It is necessary to emphasize that metaphor is not only a linguistic issue but, instead, the product of a relationship between its forms and thought. As a means of communication highlights the artistic meaning, it goes beyond its traditional meaning towards the eloquence of the image, and the resulting significance and meaning, to understand the part through understanding the whole, and to employ our feelings, experiences, behavior, and aesthetic awareness within a social and cultural system. They are structures that reflect deeper moral, spiritual, and political meanings and speak of life, death, love, virtue, and justice.

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Visual Edutainment to Engage Online Learners

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Abstract

A challenge exists to engage college students in online learning courses in a meaningful way. To achieve engagement, a course used visual edutainment themes to introduce weekly objectives in the course. This paper provides an overview of the approach and the theoretical basis for this strategy. Visual edutainment can produce learner interaction; improve retention; help provide meaningful, motivational, and memorable learning experiences; engage learners; and decrease the cognitive load of a learning experience. Suggestions for other applications and a synopsis of the Pecha Kucha (PK) style of presenting are also included. We found that using edutainment themes to engage online learners is well received and using PK Create as a tool for students to develop Pecha Kucha presentations is a simple approach.

Keywords**:** E-Learning, Edutainment, Engagement**,** Pecha Kucha, Visual Literacy

Introduction

What if there was something instructors could do to capture the attention of students in an online asynchronous course? What if a new approach could help them to retain the information? What if they not only retained the information but actually "learned" the intention of instruction? What if such an approach was not only fun and educational, but also included enticing visuals and entertaining music? Would educators change the traditional methods to support a constantly learning environment?

When Dr. Amy Ackerman, the first author, began developing an online e-learning course for graduate students in the instructional technology program at a comprehensive public university in the USA, she knew it was vital to set an example for the best strategies for online learning. How could she design the course to engage these students? What could she do to capture their attention each week?

In this paper, we begin with the problem statement followed by the objective and purpose. The paper then provides a definition and origin of the term, edutainment, along with an overview of the theoretical basis for using edutainment in education. Subsequent topics include engagement via visual edutainment, Pecha Kucha to illustrate a course example of edutainment themes, alternate applications for using visual edutainment themes to engage online learners, results, and summary and conclusions.

Problem Statement

Although overall numbers of students enrolled in higher education are dropping, the number of students enrolling in online courses is growing (Lederman, 2021). COVID–19 has accelerated this growth (Lederman, 2021). With the growth of e-learning in higher education, ensuring the effectiveness of that education is essential. According to Karthik et al. (2019), effective e-learning is dependent on the design and construction of the learning experience. It boils down to this: How can instructional designers ensure that e-learning experiences are effective?

According to Allen (2016), one strategy for creating effective e-learning experiences is to create experiences that evoke learner emotion. This emotional stimulation can help with the retention of information (Allen, 2016). Course designers should consider ways to stimulate the emotions of learners, so they are not merely clicking through course content to get it done.

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Objective and Purpose

The objective of this paper is to demonstrate how to use edutainment to increase attention and retention in interdisciplinary online learning modules by framing content in classic visual themes. Edutainment is the use of class materials or multimedia to entertain and educate (Pojani & Rocco, 2020).

The purpose of this paper is to provide examples of visual edutainment themes to introduce weekly objectives in an online graduate course in an engaging manner. Together with graduate assistant Mary Jane Murphy-Bowne, Dr. Amy Ackerman presented this approach in a Pecha Kucha style format at the 53rd annual International Visual Literacy Association (IVLA) Conference, November 5, 2021. This paper shares an overview of the approach and the theoretical basis for this strategy. To assist the reader, the paper includes a synopsis of the Pecha Kucha style of presenting.

Engagement via Visual Edutainment

Origins

Walt Disney (see Figure 1) used the term Edutainment in 1954, referring to any medium to educate and entertain (Disney, 1954). Disney's documentary series *True-Life Adventures,* a 13 series of nature films that were shown in public schools for decades, perfectly illustrates this idea (The Walt Disney Family Museum, 2012). Although Disney coined the term, some feel that Ben Franklin started the practice in his *Poor Richard's Almanac,* teaching while amusing readers with puzzles and math lessons (Beato, 2015).

Figure 1
Walt Disney

Definition

How can we define Edutainment for online students in the 21st century since technology allows for so much more than film and puzzles? Edutainment can be defined as the use of any classroom materials, media, technology, or activities that are enjoyable while being educational (Pojani & Rocco, 2020). Edutainment became popular in the '80s. It was often derided as a way to diminish rigor or force educators to become performers (Pojani & Rocco, 2020). However, Niemann et al. (2020) showed that Science Slams, a visual form of science communication in Germany, provide significant scientific content for participants while entertaining them. See Figure 2 for a science slam example. The reason for the success of edutainment lies in the theoretical basis for using it.

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Figure 2
Science Slam Example

Theoretical Basis for Using Edutainment

To understand why edutainment works, we will explore the work of five educational theorists and how they apply to the use of edutainment as a learning strategy. The five theorists we address are: Piaget; Allen; Morena and Mayer; Dwyer; and Sweller.

Piaget - Accommodation Mode of Learning

Jean Piaget's Accommodation Mode of Learning is one way to explain why edutainment works. Piaget discussed two modes of learning assimilation and accommodation (Pojani & Rocco, 2020). While assimilation is associated with memorization, accommodation involves the learner interacting actively with content. Accommodation, therefore, is the mode of learning that is more likely to be retained (Pojani & Rocco, 2020).

In edutainment, learning content using media is provided in a way that produces learner interaction. In this way, edutainment can be associated with better learner retention.

Allen - Meaningful, Memorable, Motivational

Michael Allen (2021), considered a pioneer of e-learning, has more than 45 years of experience designing effective online learning experiences. According to Allen (2015), the key to success for all training experiences is to make sure that the experience is meaningful, memorable, and motivational. A meaningful course should be valuable to the learners and applicable to what they need to know (Allen, 2015). Content is memorable when it engages the students, providing authentic real-world applications, simulations of skills needed, the opportunity to solve problems, and presenting novel situations (Allen, 2015). When we think of motivation in online learning, it should not just be about earning a grade or certification. Motivation truly happens when learner behaviors can change, and performance can improve (Allen, 2015). Carefully selecting media as edutainment in a learning experience can contribute to the content being meaningful, memorable, and motivational.

Moreno and Mayer - Cognitive-Affective Model of Learning with Media - Emotional Design of Digital Material to Impact Learning

Another model may also explain the benefits of edutainment. Moreno and Mayer (2007) developed a model to explain the impact of images and sounds combined with verbal explanations to solidify learning. This Cognitive-Affective Model of Learning with Media (CATLM) is displayed in Figure 3.

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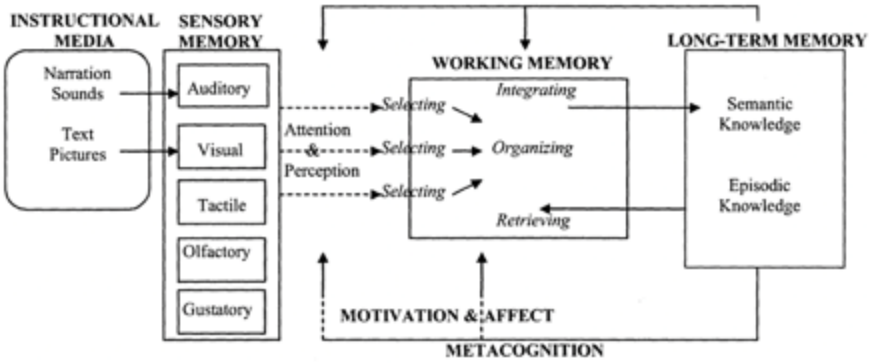
Figure 3
CATLM



Reprinted by permission from Springer Nature: Nature/Springer/Palgrave. Educational Psychology Review. Interactive multimodal learning environments. Roxana Moreno et al, 2007.

This model explains that the combination of a verbal explanation with images and sounds forces learners to organize both types of information. This stimulates long-term memory (Moreno & Mayer, 2007). Edutainment easily provides a way to combine informational types to engage learners.

Dwyer - Visual Literacy and Learning

Francis M. Dwyer, professor emeritus from the Pennsylvania State University, worked on extensive research in the field of instructional technology (The Pennsylvania State University, 2007). Aspects of this visual learning research also support the use of edutainment. The use of visuals helps students focus on important information (De Romero & Dwyer, 2005). The use of visuals in a learning experience also increases the effectiveness of the session and improves student motivation (Üyesi, 2019). Dwyer and other researchers even developed the Program of Systematic Evaluation (PSE) to explore deeply the impact of visuals in learning design resulting in more than 160 studies (Dwyer, 2007). As there is a visual component of edutainment, this visual component can not only contribute to student visual literacy but can also increase the effectiveness of learning and student motivation.

Sweller – Cognitive Load

If including visuals in the form of edutainment can help students focus on important details in a learning activity, it is important to understand why John Sweller's Cognitive Load Theory can help explain.

John Sweller developed Cognitive Load Theory in the late 1980s (The Education and Training Foundation, 2021). Sweller proposes that humans have a limited ability to hold information in working memory; providing visual and verbal information together can reduce the stress on working memory (The Education and Training Foundation, 2021). When designing a learning experience, controlling cognitive load when providing complex information is so important. It is essential for helping transfer information to long-term memory (Mavilidi & Zhong, 2019).

Now that the theoretical basis for using edutainment has been discussed, the next topic is using Pecha Kucha to illustrate the use of edutainment in a course example.

Pecha Kucha to Illustrate a Course Example of Edutainment Themes

In this section, we address the description of Pecha Kucha (PK), overview of a tool (PK Create), benefits for students, example, and results.

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Description of Pecha Kucha as a Presentation Approach

Pecha Kucha, meaning "chit chat" in Japanese, presents information with a visual focus. According to PechaKucha.com (2021), this storytelling presentation style was developed by two architects in 2003. It has grown into a worldwide phenomenon. The idea is to tell a story with 20 slides, talking for 20 seconds for each slide. A key element of Pecha Kucha is that slides should rely on visual images rather than text to convey the story. A focus on visual images may also help prevent cognitive overload.

Overview of Tool Used for the IVLA Presentation

For our IVLA presentation, we used the free Beta tool, PK Create, available at PechaKucha.com to prepare our presentation. This tool enables the 20 images to be uploaded and an audio recording to be created either using the tool or by adding an audio file created elsewhere. The convenience of this tool is that the slide timing is automatic. We discovered this is a challenge when using PowerPoint and automatic slide progressions while recording the presentation. If using a MAC and having PowerPoint through Office 365, the automatic slide progression feature is overridden when recording the presentation. Even using a PC, the workarounds are involved.

Benefits for Students

There are benefits to using Pecha Kucha as a presentation activity for students. When students use this style, they must know their content, rather than read from slides. The emphasis on visuals also supports visual literacy. McDonald and Derby (2015) showed that when using this with undergraduate business students, it improved the student's presentation skills by helping them to condense their thoughts. In student reflections following this study, most students reported this style helped them to avoid filler words like "um" (McDonald & Derby, 2015). McDonald and Derby (2015) compared before and after student surveys and showed that a significant number of students found this activity helped them to understand course material ($p<0.10$).

Using independent samples *t*-test, Warmuth and Caple (2021) compared traditional presentations and Pecha Kucha presentations and showed audiences significantly understood the material better with the Pecha Kucha format. There was a significant difference in the audience experience in understanding the material covered between a Pecha Kucha presentation ($M = 6.09$ $SD = .78$) and a traditional presentation ($M = 5.59$, $SD = 1.18$); $t(66) = -2.10$, $p = .040$ (Warmuth & Caple, 2021). Using multiple-choice questions, Warmuth and Caple (2021) also compared the immediate and delayed (2 weeks) retention of information for presenters and audience members who participated in traditional or Pecha Kucha presentations. They showed significantly improved immediate retention in presenters who used the Pecha Kucha format ($p = .025$) (Warmuth & Caple, 2021). For audience members, they showed both significantly improved immediate retention ($p = <.001$) and delayed retention ($p = .003$) (Warmuth & Caple, 2021).

Example in an Online Graduate Course

Having provided an overview of the use of edutainment in education and established theoretical theories to support the use of edutainment, we will now provide details about how edutainment was used with visual themes in an online graduate course at a public university in the USA.

Description of E-Learning Course

The featured course is E-Learning. This is a master's level online elective course for the Instructional Technology program. The goal of the 14-week online asynchronous course is to provide interdisciplinary students with the tools to design effective e-learning experiences and improve visual literacy. If you are going to do that in an online course, you must practice what you teach. For this course, the first author, Dr. Ackerman, identified a song consistent with the theme of a weekly module in the course. The edutainment themes were introduced as music videos to support visual literacy development. We will look at each of these major themes, the songs selected, and the objectives for the module. Some modules extended over multiple weeks so we will present the weeks where a theme was introduced.

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Theme Examples and Discussion of Content Associated with Each Theme

It is important to note the cultural backgrounds of students at this university since the references used were primarily western centered. In 2019, the population of students was as follows: 66% white, 14% Latinix, 9% African American, 7% Asian, 3% mixed races, and 1% international students (Deloitte Datawheel, 2021).

The theme for week 2 was setting the foundations for the course. One of the major activities of this module was to create a puzzle using e-learning terms and concepts. What better song than *It's a Puzzlement* from the *King and* I? See Figure 4 for the weekly themes.

During week 3, the Pet Shop Boys introduced the module with *On Social Media.* This week students explored components of an online community.

Week 4 was popular with the Seven Dwarfs belting out "Heigh-Ho, Heigh-Ho" as students set to work exploring Michael Allen's success strategies for online learning.

Do you believe in magic? During week 5, students did as they explored the way interface elements can impact motivation for online learning.

Aretha Franklin sang about "chains" during week 6 as students explored ways to use hyperlinks to enhance student engagement in online courses.

Consider 76 trombones or assessment instruments. During Week 7, *The Music Man* set the stage for students to create quizzes for online learning. Students also selected a song of their own this week conveying a personal life view about e-learning. Mary Jane Murphy-Bowne, the second author, selected "Under Pressure" by Queen when she took the course. That is always how she felt about multiple-choice exams as an undergraduate student.

By week 9, students were busy creating an educational game or learning module. What better song to introduce the week than Nat King Cole and *It's All in the Game?*

The full Pecha Kucha presentation can be viewed at
https://www.pechakucha.com/presentations/interdisciplinary-themes-as-edutainment-in-online-learning

Connection to the Theoretical Basis

Using visual edutainment themes in this way can be connected to the educational theories previously discussed. When module themes are introduced in this manner, students interact with the content. This is consistent with the accommodation mode of learning. Certainly, this is a memorable way to introduce the goals of a module, honoring Michael Allen's suggestion for effective e-learning. The combination of images and auditory stimuli should help students organize the information for long-term memory consistent with CATLM. The use of strong images to introduce the content also helps students develop visual literacy by looking for information present in images. Finally, this approach reduces cognitive load. The message is presented in a way that uses images and music and relies only on a minimum of text.

Results of Using Visual Edutainment Themes to Engage Online Learners

Students who were enrolled in this e-learning course responded favorably to the visual edutainment approach. AB, an enrolled student, reported that it was a fun way to connect the content to learn with a song. She shared about being more "engaged, connected, and curious" about what was involved in the upcoming module. AB teaches preschool-aged children and reports that using music to teach this age group is natural. However, it was helpful for her to see how it could also be used with an adult audience.

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Figure 4
Weekly Themes

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Another graduate student, AT, was inspired to try this approach with his middle school science students. About the experience in INTC 5560, AT reported in his reflection journal: “My aha for this week was how engaging it can be to connect something seemingly unconnected (such as a dwarf from Snow White) to an educational concept such as a Simple Success Strategy. I am planning on using this type of connection to encourage engagement on a project and creativity in the future.”

Mary Jane Murphy-Bowne, the second author, shared the approach with her husband who teaches high school English. He loved the idea of using PK Create to help students become better presenters. He plans on using the same idea for a project for his junior year AP English and Composition students.

The first author, Dr. Ackerman, has also started to assign a project in her undergraduate Digital Cultures class using PK Create. Mary Jane Murphy-Bowne has used it to provide a quick overview of textiles for her sustainable fashion course.

Alternate Applications for Using Visual Edutainment Themes

Now that a course example has been illustrated via PK Create for using visual edutainment themes to engage online learners, the next topic in this paper is to provide additional suggestions for the reader.

Other applications exist for using visual edutainment themes with students of all ages. Perhaps these visual edutainment themes could be used as an introduction at the beginning of a course, or a mid-way checkpoint, or even as a self-reflection. When offering online synchronous activities, visual edutainment themes might be used when students collaborate in virtual break-out rooms during group assignments. Dr. Ackerman would quote the Carpenter’s song here - “We’ve Only Just Begun.”

Summary and Conclusions

This paper focused on edutainment from the visual literacy perspective. We discussed a definition of edutainment and its origins. Topics also included an overview of the theoretical basis for using edutainment in education. We demonstrated how to use visual and music themes to introduce modules in an online course and some student reactions to this approach. The authors found that using edutainment themes to engage online learners is well received. We recommend visual edutainment themes to help create online learning experiences that are meaningful, memorable, and motivational.

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Seeing Across Disciplines: An Experiment in Visual Literacy across Higher Education

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Abstract

Visual literacy touches all academic disciplines, yet integrating it into higher education across curricula is challenging, particularly because visual literacy is traditionally associated with specific disciplines such as art, education, and communications. We describe an interdisciplinary faculty-led effort to bring visual literacy into the entire curriculum at the University of Toledo in collaboration with the Toledo Museum of Art. Given the value of ACRL visual literacy student learning outcomes to students of all majors and the complexities of introducing new courses, we chose a flexible model of curriculum modules that faculty could adapt as needed. We supplemented curriculum modules with the visual literacy exercises developed by the TMA. We used multiple venues to make faculty aware of these resources, including presentations at faculty meetings, workshops, and open houses. The history, design, promotion, and success of this effort are discussed.

***Keywords*:** visual literacy, higher education, institutional partnerships,

Introduction

Visual literacy provides compelling value to all academic disciplines because it fosters close observation, critical thinking, reflection, and communication of visual information (Kedra & Zakeviciute, 2019). Furthermore, the dominance of visual information in the digital age makes visual literacy imperative for 21st-century learners (Hattwig et al., 2013). The breadth of theory and approaches to visual literacy has driven a need for definitions and learning goals (Kedra, 2018). In Europe, the *Common European Framework of Reference for Visual Literacy* has provided these definitions and goals (Wagner & Schonau, 2016). In the US, the development of student learning objectives for visual literacy has provided a framework for bringing visual literacy into higher education (Thompson & Beene, 2020).

However, integrating visual literacy into the curricula across higher education is challenging outside of the disciplines in which it traditionally resides, such as art, education, and communications. Elsewhere, it plays a recognized but smaller supporting role or an unrecognized role altogether. For example, in the sciences, diagrams are used to explain complex relationships and processes, and charts and graphs depict quantitative results of experiments. In the health professions, patient observations are critical to diagnosis but rarely recognized as a skill that can be developed through visual literacy.

In some cases, the broad value of visual literacy to all majors has been recognized and embedded in the general education curriculum. Skidmore College leveraged external funding to revise its general education curriculum to great success (Benzon & Hauser, 2019). More commonly, others have scattered efforts across the curriculum (Blummer, 2015).

In a review of visual literacy initiatives in academic institutions, Blummer (2015) identified five categories of strategies: instructional scaffolds, individual faculty creation of activities and assignments, lectures and readings, programs and courses, and research initiatives.

We describe an interdisciplinary faculty-led effort to bring visual literacy into the whole curriculum at the University of Toledo (UToledo) in collaboration with the Toledo Museum of Art (TMA). Further, we detail the nature of this effort and what has and has not worked in five sections: 1) Setting the Stage: History of the Collaboration, 2) Building the Team, 3) Addressing Practicalities: Design of the Visual Literacy

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Initiative, 4) Generating Interest: Strategies to Engage Faculty, and 5) Success: What Does It Look Like?

Setting the Stage: History of the Collaboration

The history of art museums is anchored in visual literacy. At their core, they engage visitors to understand imagery that has been produced throughout history, regardless of geography. In 2010, with the arrival of a new director, Dr. Brian Kennedy, the Toledo Museum of Art (TMA) renewed its commitment to teaching visual literacy by designing a curriculum that could have widespread application beyond the museum's walls. Grounded in art education and art history, TMA developed a foundational framework for a visual literacy curriculum. This framework includes a foundational vocabulary (the elements of art and principles of design), a thinking routine for exploring works (the Art of Seeing Art), and four distinct modes of visual interpretation (formalism, semiotics, ideology, and hermeneutics). The TMA then developed a series of exercises and lesson plans to enable participants to practice and apply visual literacy concepts directly in the museum's galleries.

As the curriculum began to mature in 2015, the TMA established its first partnership outside of the museum with the Campbell Institute of the National Safety Council to measure the impact of visual literacy on safety training programs within the field of environmental health and safety (EHS). Museum staff collaborated with EHS professionals from organizations such as Owens Corning, Cummins Engines, and DTE Energy to assess the impact and effectiveness of visual literacy skills integrated into existing safety training programs. This initial collaboration was proven so successful that in 2018 the museum created the Center for Visual Expertise (COVE).

Around the same time, the TMA began conversations with UToledo about a partnership anchored in visual literacy. The collective aim was to embed visual literacy across the curriculum, making the content and resources available for faculty, staff, and students across a broad range of disciplines. The museum has a longstanding relationship with UToledo, dating back to the early days of university art classes taught in the museum's classrooms. UToledo's Center for Visual Arts sits in a Frank Ghery building connected to the museum's east wing, where faculty and students alike have ready access to the galleries and collection (see Figure 1).

Figure 1

The University of Toledo main campus (top), the Toledo Museum of Art (middle), and the University of Toledo Department of Art on the museum campus (bottom). The main campus and museum campus are approximately 3 miles apart in Toledo, OH.

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In 2017 a group of faculty and staff from UToledo and TMA, led by university president Dr. Sharon Gabor, and museum director Dr. Kennedy, convened to discuss ways this collaboration could unfold in the subsequent months.

Earlier that year, an elective in the UToledo College of Medicine and Life Sciences curriculum, “Art and Medicine: Using Visual Literacy to Improve Diagnostic Skills,” had been launched in partnership with TMA (see Figure 2). Students’ responses to the course confirmed the value of the course to them:

> *Visual Literacy is necessary to be an excellent physician, with observation and communication the keys to success. I am fortunate to have taken this course that gave me firsthand experience of enacting visual literacy techniques in practice for art and patient images. Observation is the most powerful tool of the physician; visual literacy and the implementation of objectivity only serve to enhance this instrument for the betterment of the physician’s skills and the patient’s care. (A. Beleny, personal communication, November 2019)*

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Figure 2
Medical students in the UToledo College of Medicine and Life Sciences elective, "Art and Medicine: Using Visual Literacy to Improve Diagnostic Skills," in the Toledo Museum of Art galleries.

The two institutions co-developed and taught an Honors College seminar, "Visual Literacy," for the first time in fall 2018 (see Figure 3). The course integrates the hands-on visual literacy curriculum developed by the museum with the university's visual literacy theory and art history expertise. The three-credit course is designed for undergraduate students of all academic majors and meets once a week. In the course, we discuss visual literacy theory and application readings, practice visual literacy activities in TMA galleries, design a semester-long team project of visual literacy modules, and complete self-reflection and summative assessments. Students responded enthusiastically to the course:

> *I learned a series of skills focusing on how to interact with the world around me. More importantly, I learned how to draw meaning out of the world around me by looking. Looking by reading, viewing, trying, describing, analyzing, interpreting, and all other means of experiencing not just that which has been designated to be art by an institution, but at everything around me. (T. W. Glaza, personal communication, December 2019)*

Figure 3
Students and faculty in the honors college seminar "Visual Literacy" in the Toledo Museum of Art galleries.

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The development of these courses provided early momentum and proof of concept. In 2018, a formal memorandum of understanding (MOU) was signed by UToledo and TMA to officially launch a partnership to advance visual literacy across the curriculum (see Figure 4).

Figure 4
The Visual Literacy Initiative logo and the signing of the MOU by Dr. Gaber and Dr. Kennedy.

VISUAL LITERACY

THE UNIVERSITY OF TOLEDO

Toledo Museum of Art

Aside from the two courses listed above, the initial phase of the MOU was to bring together a group of faculty and museum staff to begin developing visual literacy modules that would be ready to use by spring 2019. At this time, we also proposed that our two organizations would co-host the annual conference of the International Visual Literacy Association (IVLA) at the end of the initial three-year MOU.

Building the Team

To form the Visual Literacy Initiative Team, we first identified the many informal collaborations existing across and within the institutions. The UToledo Department of Art taught Museum Practice and Museum Education courses and supported the Art in Medicine elective. Two previous UToledo presidents served on the Toledo Museum of Art's board of directors. In 2014, TMA began collaborating with the College of Education faculty on an early childhood research project. The Honors College took students to the museum as part of their first-year interdisciplinary humanities class, and the TMA was a frequent destination for their Learning Community. There were ongoing collaborations among the UToledo Department of Art and other units on campus, especially with the College of Engineering, which had also provided its faculty with COVE training.

TMA and UToledo faculty and staff engaged in these efforts, and new participants who answered a general call began meeting regularly. The group had a wide range of academic backgrounds, including the arts, humanities, and sciences. Individuals came and went as their interests and availabilities changed. All, however, were united in their view that visual literacy is not just about art appreciation; it's also about professional skills and student engagement for all majors.

This framing of the value of visual literacy in developing professional skills resonated on a campus with five STEM professional colleges - Engineering, Pharmacy, Nursing, Health & Human Services, Medicine & Life Sciences - in addition to the colleges of Arts & Letters, Natural Sciences & Mathematics, Business, and Education. The value of visual literacy in fostering student engagement resonated with an intensive campus focus on undergraduate student retention.

For a year, the group met monthly to share and develop their understanding of visual literacy (see Figure 5). These meetings were a mix of visual literacy activities and discussions. Because of the range of familiarity with visual literacy concepts and the variety of subject-specific language used to describe them, it was critical to provide time for free-ranging discussion. Additionally, we provided lunch, which facilitated

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a more extended meeting time. The meetings were held in different locations, including the Department of Art, College of Engineering, and the TMA, to bring awareness to participants of the resources available across the two institutions.

Figure 5
Faculty and staff from the TMA and UToledo met regularly to learn from each other, brainstorm ideas, and develop visual literacy curriculum modules.

Addressing Practicalities: Design of the Visual Literacy Initiative

The next step for the group was to figure out how to integrate visual literacy into the curriculum of all majors. This work required addressing constraints posed by the traditional structure of public higher education: disciplinarity, limited flexibility in curriculums, and general education requirements met by undergraduates taking courses counting for university course credit before beginning their university experience.

Public universities in the US are structured around academic disciplines because accreditations,

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certifications, and other similar educational needs depend on them. As a result, colleges and departments, majors and minors, and the distribution of physical, human, and fiscal resources are determined and maintained by disciplinary boundaries. Inherently interdisciplinary fields, cross-cutting programs, and informal interactions across disciplines are exceptions to this model, and UToledo is lucky to have many of each kind.

As a mid-sized, public research university with comprehensive programs, many undergraduate majors at UToledo have curricula permitting few electives. In addition, because of professional practice, internships, and/or clinical experiences required in the last two years of their degree programs, many students must complete all of their general education requirements by the end of their second year in the program.

Many undergraduates arrive with university course credit they acquire from taking advanced placement (AP), international baccalaureate (IB), and college courses as high school students. As a result, many undergraduates begin their university experience with some of their general education requirements already met and a semester or more of university credit.

With these realities in mind, the group concluded that mandating new course requirements was not an option for bringing visual literacy into the curriculum. Instead, they created an approach to provide faculty with ways to embed visual literacy in their courses.

We reviewed the existing ACRL visual literacy student learning outcomes (Association for College and Research Libraries [ACRL] 2011) and focused our discipline-wide effort on these ACRL visual literacy student learning outcomes (SLOs), reworded slightly.

> In an interdisciplinary, higher education environment, a visually literate student can:
> 1. Make a sustained observation of visual images
> 2. Interpret, analyze, and communicate the meanings of images and visual media
> 3. Use images and visual media effectively
> 4. Evaluate images and their sources
> 5. Determine the nature and extent of the visual materials needed for a project
> 6. Find and access required images and visual media effectively and efficiently
> 7. Understand major ethical, legal, social, and economic issues surrounding the use (and creation) of images and visual media
> 8. Access and use visual materials ethically
> 9. Design and create meaningful images and visual media

Given the broad value of these SLOs to students of all majors and the complexities of introducing new courses, we decided to develop a flexible model of curriculum modules that any faculty could adapt as they found useful. Modules were developed by interdisciplinary working groups of faculty and museum staff and vetted among the working groups.

The following modules were created, with their learning objectives in parentheses.

- What is Visual Literacy?
- Fair Use, Plagiarism, and Appropriation
- Image Search and Analyzing Context
- Finding and Evaluating Sources
- Anatomy of a Photograph
- Reading Social and Cultural Contexts
- Infographic Interpretation and Creation
- Visualizing Data

The curriculum modules were supplemented with visual literacy exercises developed by the TMA and

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converted to PowerPoint presentations. These exercises focus on the first two learning objectives: 1) Make sustained observations of visual images, and 2) Interpret, analyze, and communicate the meanings of images and visual media. They can be implemented flexibly in the classroom, ranging from 15 minutes to an hour.

Assessment of student learning is always complicated, and for several reasons, it was even more so with our module approach. First, we were already asking faculty to find time and place in their syllabus to include visual literacy and were now asking them to assess modules in addition to the course-level assessment they are required to do. As a result, we had to rely on their goodwill and/or personal motivation to contribute to the assessment effort. Second, to facilitate the adoption of visual literacy modules, we encouraged faculty to use them flexibly and insert specific examples relevant to their courses. As a result, any assessment may not be assessing the same module. Despite these limitations, we pursued a plan of student self-reporting. We asked students to complete a pre-module self-assessment to estimate their competency on the SLOs and a post-module self-assessment of the change in their competency and to answer several open-ended questions on the SLOs. We gathered these results electronically in a web form. Completion was sporadic, except for one course that used the same module every semester with a faculty who encouraged student completion of the assessment. We also asked faculty to provide feedback on their use of the module. Still, participation was very low, probably because of confusion about responding when they had used only a portion of the module or had modified it.

We then redesigned the assessments using only a post-module format for students and sought IRB approval to publish the results. The post-module assessment had the same design for students as the original, in which students estimated their change in competency and answered open-ended questions on SLOs. As before, we asked faculty using the module for feedback on how they used it in their course. Currently, we are collecting data while encouraging participation in the study.

Generating Interest: Strategies to Engage Faculty

The faculty and staff involved in the visual literacy initiative were knowledgeable and enthusiastic about the potential of visual literacy to enhance student learning and success. To generate interest early on, we hosted a talk by Sunni Brown, the author of “The Doodle Revolution,” and Wendi Pillars, author of “Visual Note-Taking for Educators.” Both spoke about the power of visual thinking in learning. Additionally, we created a Visual Literacy Group on Blackboard, our course management system, and invited participants in our activities to join in disseminating modules and exercises. We wanted the site to serve as an introduction to visual literacy and a source of ideas for introducing visual literacy into syllabi. Currently, we have about 12% of UToledo faculty in the group.

Multiple venues were then used to make faculty aware of these resources, ranging from presentations at college and department faculty meetings to workshops and open houses. We visited college faculty meetings of all of the UToledo colleges to present the value of visual literacy to their students and highlight the available resources. The presentations were customized for each college to incorporate discipline-specific reasons and examples. We also provided presentations on visual literacy for new faculty during their orientation. In addition to visiting faculty members’ classrooms, we collaborated with the UToledo University Teaching Center to offer faculty workshops and host visual literacy information on their website. Because of the benefits of visual literacy exercises and modules in developing engaged learners and a sense of classroom community, we also provided resources for faculty teaching First-Year Experience courses. Individual units also incorporated visual literacy more deeply into their curriculum. For example, the Department of Art developed a new course on Data Visualization, while the Honors College developed a First Look program based on a common first-year experience exemplified by First Read programs. This course provided students with opportunities to reflect on their ways of looking at the world. The Art Department and Honors College continued their successful collaboration with the Visual Literacy seminar, which became cross-listed with Art History.

The events of 2020 in the US, including George Floyd’s death, civil unrest, and the Covid-19 pandemic, refocused our visual literacy efforts in two ways. First, we realized that we could facilitate student discussions of racism and social injustice through visual images, which was already a focus of one of the modules developed by one of the honors faculty and used extensively in their courses. Second, we

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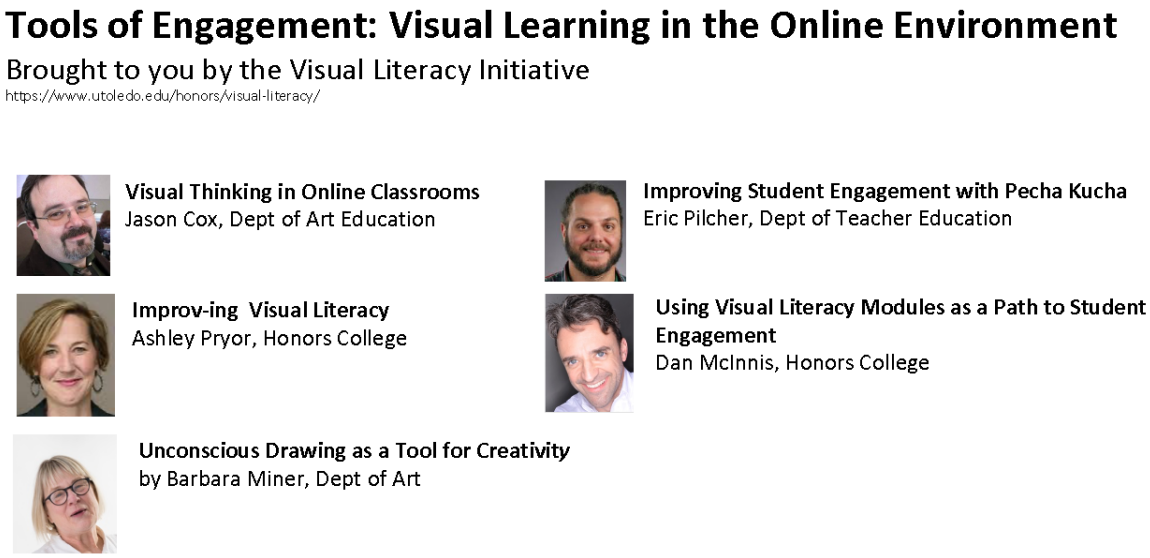
realized that we could support faculty with little experience teaching online when the pandemic-driven pivot occurred with skills in using visual images in their online teaching. At the suggestion of the art education faculty, we developed a workshop series to encourage faculty to take advantage of different kinds of visual resources to engage their students in a time of strong disengagement because of the pandemic (see Figure 6).

Figure 6

When the pandemic forced all instruction online, the Visual Literacy Initiative provided faculty with tools to enhance their online teaching.



Finally, as a culmination of our Visual Literacy Initiative, our two institutions planned to host the 2020 International Visual Literacy Conference in Toledo. When the pandemic made an in-person conference impossible, we were able to host the 2021 conference instead, in the hope that it could be in-person. Although that wasn't possible, the planning of both events engaged and energized the faculty and staff and provided an opportunity to reflect on what we had accomplished in the last four years.

To summarize, we have used a wide range of approaches to disseminate an understanding of and appreciation for visual literacy across campus. The approaches included 1) three courses (Art in Medicine, Visual Literacy, Data Visualization), external speakers (Sunni Brown, Wendi Pillars), 3) curriculum modules & exercises, 4) resources for first-year experience courses, 5) faculty and staff workshops and open houses, 6) seminar series, 7) ongoing engagement of the TMA with early childhood education faculty and students, and 8) co-hosting of the 2021 IVLA conference. In terms of Blummer's categories of strategies (Blummer, 2015), we used four out of five: instructional scaffolds, individual faculty creation of activities and assignments, lectures and readings, and programs and courses.

Success: What Does It Look Like?

Our goal was to create a community of practitioners across academic disciplines to bring visual literacy skills into the curriculum of UToledo. We have been partly successful, as 14% (127) of UToledo faculty have opted into the Visual Literacy Group in our course management system. However, we don't yet fully understand how they are using and integrating the modules and exercises within the curriculum. This lack of understanding is likely a result of two factors. First, faculty adoption of visual literacy in the last two years has not been as rapid and widespread as it was initially, likely due to the pandemic. Second, the highly flexible approach may discourage faculty participation in assessment. The measures we established to track use have not adequately captured how faculty have adapted modules for their classes, as we

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continue to receive feedback anecdotally. We are now rethinking assessment approaches that capture the flexible use of visual literacy approaches across campus.

As in any collaboration, there has been give and take in the roles of the two institutions, with one or the other taking the lead. In some cases, this was driven by the faculty's responsibility to develop curricula. We made this work by embedding TMA staff as active participants in module development teams, presenting to UToledo Education faculty, and co-teaching the Visual Literacy Honors Seminar. In other cases, the museum led with the provision and revision of visual literacy activities and exercises, which had long been a part of their museum curriculum.

We can identify at least four factors that have made this collaboration between UToledo and TMA successful. First, the leaders of both institutions shared a vision of the benefits to both institutions. Second, a co-leadership model for the Visual Literacy Initiative with a representative from each institution who explicitly focused on collaboration as part of their job responsibilities facilitated buy-in and accountability. Third, we were able to identify a core group of interested faculty and staff. Last, two consecutive donors' provision of seed money allowed us to support a part-time student assistant at UToledo and cover miscellaneous expenses like lunch for participating faculty, and staff. Together, these factors fostered this interdisciplinary, inter-institutional collaboration to the benefit of both.

Although the Visual Literacy MOU has officially expired, we are excited about future opportunities now that we have a foundation for deeper collaboration between the two institutions. Visual Literacy will remain at the core of TMA's practice and has become a component of the deeply engaged student learning that remains a priority for UToledo. A continued partnership supporting these foci will be integral to remaining relevant in the twenty-first century. As the general public and students have a growing list of competing demands and priorities, engaging them in more intuitive, interactive, thought-provoking, and practical ways will be critical to individual success and development as active members of a democratic society.

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Learner-Generated Visualizations and Their Evaluation: A Generative Learning Perspective

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Abstract

According to the generative learning model, learning with understanding is a generative process. During this process, humans construct meanings by creating mental structures to store and retrieve new information and building processes to relate new information to prior knowledge. This article provides a theoretical framework of learner-generated visualizations from text through the lens of generative learning and discusses the evaluation of student-generated work, movie trailers. Once students generate their own visualizations, evaluating their products is complex. To facilitate this evaluation, we adapted Richard Mayer's SOI Model (Select, Organize, and Integrate) describing the cognitive stages involved in generative learning in multimedia development. The application of the model to the evaluation of student work and an analysis of student reflections is discussed.

Keywords: Movie Trailer, Generative Learning, SOI model

Introduction

A college professor, desiring a break from grading papers, decides to see a movie. Sitting in the theater, she waits for the movie to begin. After viewing the obligatory commercials for refreshments, the professor watches the previews of coming attractions.

As the images fly off the screen, she begins thinking about how effective these movie trailers are, how they entice moviegoers to return to see these upcoming releases. She begins to wonder about the process through which these trailers are created. The work entails several important skills, such as developing a clear understanding of the movie's plot, characters, setting, and themes. In addition, the creators must consider the trailers' purpose: to convince viewers that returning to the theater to watch this movie is a worthwhile investment of time and money. Finally, they must have the technical and creative skills necessary to translate the message into a short video. Therefore, producing a movie trailer involves a great deal of learning and applying what is learned to develop a product.

At this point, the professor begins to connect some of her classes. For example, in courses that involve significant reading, she could ask students to create digital media trailers for an imagined movie version of a book they have read. In putting together these trailers, students would go through the same process as professionals and possibly reap educational benefits.

This idea raises many questions regarding an activity like this one, including those surrounding the learning process and how students would experience that learning. Why should we expect that creating multimedia movie trailers would result in positive learning outcomes? What skills would students develop, and how would they respond to this activity.

Why Use Movie Trailers in Classroom

We adapted the generative learning model (Wittrock, 1974a, 1974b, 1989; Wittrock et al., 1975) for the movie trailer creation activity. We connected generative learning and related theoretical models with the practice of student-created movie trailers by reviewing findings in visual literacy and digital media learning.

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Generative Learning

According to the generative learning model, learning with understanding is a generative process. During this process, humans construct meanings by creating mental structures to store and retrieve new information and building processes to relate new information to prior knowledge (Wittrock, 1974a, 1974b). The key to generative learning theory is that learning is an active process: "The mind, or the brain, is not a passive consumer of information. Instead, it actively constructs its own interpretations of information and draws inferences from them" (Wittrock, 1989, p. 348).

The generative learning model has applications to many knowledge domains, including mathematics (Wittrock, 1974b), science (Bobek & Tversky, 2016; Fiorella & Kuhlmann, 2020), social studies (Wang et al., 2020), and reading (Wittrock, 1989, Wittrock et al., 1975). Given our focus on applying generative learning to transform a written text into a movie trailer, we focus primarily on the connections to the act of reading.

People remember information they read when they generate relations within a text and between the text and their prior knowledge and experience (Wittrock & Alesandrini, 1990). Note that the associations between stimuli and prior knowledge are idiosyncratic, based on individuals' prior experiences (Wittrock, 1974a, 1992). For example, when two different people read this chapter, undoubtedly, they will take away different meanings based on their backgrounds.

The generative learning model comprises four essential components: generation, motivation, attention, and memory (Wittrock, 1989). Generation involves the active construction of the organizational structures and the connections to prior knowledge. As applied to reading, this generation requires the reader to be motivated and willing to spend the time and effort needed. Attention focuses on the generation of relevant text and related stored memory. Finally, memory includes "preconceptions, metacognition, abstract knowledge, and concrete experience" (p. 348).

In one of his many works on applying generative learning theory to the process of reading, Wittrock (1989) challenged the conventional wisdom that writing is constructive, whereas reading is merely imitative. He argued that "Good reading, like effective writing, involves generative cognitive processes that create meaning by building relations (a)? among parts of the text and b) between the text and what we know, believe, and experience" (p. 347).

The generative learning model is significant due to its part in the paradigm shift from behaviorism to cognitive psychology and its role as a precursor to constructivism (Tobias, 2010). Moreover, the model and its descendants have enduring significance, as we will show in establishing its relevance to the movie trailer activity.

Wittrock made clear that, although generative learning was developed to serve as a model of cognition, its raison d'etre was to promote effective teaching and deep learning (Wittrock & Alesandrini, 1990). For example, creating summaries of written material, according to generative learning theory, should result in improved comprehension and understanding because "generative teaching activities induce learners to construct relevant representations that they would not compose spontaneously [emphasis added]" (p.369). This idea - that learners would learn more effectively by being asked to create summaries using innovative representations - provides theoretical support for creating movie trailers as a pedagogical technique.

Visual literacy and generative learning

Based on the Association of College and Research and Libraries targeted toward higher education, "Visual literacy is a set of abilities that enables an individual to effectively find, interpret, evaluate, use, and create images and visual media" (ACRL, 2011, p. 1). According to this definition, visual literacy involves both the consumption and the production of visuals.

Learner-generated visualizations have been explored in several domains (e.g., Edens & Potter, 2003; Gobert and Clement, 1999; Hall, Bailey, & Tillman, C.,1997; Van Meter, 2001). When learners translate text-based information into a visual-based format, the activity may promote deeper processing of the material and more complete and comprehensive mental models (Craik & Lockhart, 1972).

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The cognitive benefits of having students create visuals to summarize readings are well documented. First, when asked to draw, learners may benefit because of the generation effect (Foos, Mora, & Tkacz, 1994). Increased mental effort in drawing and generating novel representations results in improved learning. Second, drawing involves generating a different representational form; it requires the learner to transform ideas from text into a visual. Creating a novel image often results in inferences regarding the text, resulting in deeper understanding (Chi & Wylie, 2014; Chi, 2009). Third, as the image is being created, learners externalize their mental images, which results in cognitive offloading that can be beneficial, especially with the increased cognitive load associated with complex texts (Sweller et al., 1998; Ainsworth, 2006).

How does visual creation intersect with generative learning? In a study using two types of graphic organizers in an online learning environment (Wang et al., 2020), Chinese middle school students were presented with a short reading comparing the climates of two regions in China. In one group, students were provided with the text only. In the second group, they were also given a filled-in graphic organizer containing several attributes or criteria to compare the climates in the two regions. In the third, they were provided with a blank area to create their attributes interactively and then perform the comparisons.

First, students in both graphic organizer groups outperformed the text-only group in retention and comprehension tests, and they reported more learning satisfaction and less difficulty. Second, students in the interactive group outperformed those in the filled-in group in comprehension and showed deeper processing. The second result, especially, demonstrates the value of visualization in the context of generative learning. Referring back to the four components of generative learning, the students in the interactive group generated their own attributes, were relatively more highly motivated and used the attention they paid to these aspects of the reading to integrate the new information with prior knowledge in memory more successfully.

How does visual summarization compare with other modalities? Bobek and Tversky (2016) presented students with information about ionic and covalent chemical bonding in a study of middle school students. One group summarized the information in written form and another by creating visuals. For both students with high and low spatial ability, those who created visual explanations outperformed those who produced written ones.

In the first of two experiments with university students in Germany, Schmidgall et al. (2019) presented students with a text about biomechanics. Among the treatment groups, the students who created drawings outperformed those who wrote summaries and those who merely read the passage regarding knowledge transfer. This finding supports the claim that visualization in the act of drawing supports higher-order thinking (van Meter & Firetto, 2013) . In the second experiment, students who drew or observed a drawing developed outperformed those who formed mental images but did not transform them into drawings. This finding provides evidence of the critical role played by externalization as another underpinning of the value of drawing as a learning tool (Schwamborn et al., 2010).

These two studies demonstrate that visual explanations can increase learning compared to verbal explanations. Would combining visual with oral presentation, for example, be associated with improved learning? Indeed, the act of summarizing can be carried out using a combination of modalities. The authors had students read a scientific text in a study regarding college students' understanding of the respiratory system (Fiorella & Kuhlmann, 2020). One group taught the material by explaining orally, a second created drawings, a third created drawings while explaining orally, and a control group merely reread the material. In follow-up tests of retention, transfer, and drawing, all experimental groups outperformed the control group on all measures. Moreover, the group that drew while explaining orally outperformed all other groups. The authors argued that students in this group produced more detailed oral explanations and drawings, which led to their superior performance. Combining presentation and visual creation inspired the movie trailer activity.

Multimedia learning and generative learning

Richard Mayer extended generative learning strategies into multimedia learning. The SOI model (Mayer, 1996) describes the cognitive processes underlying learning strategies that result in meaningful learning, "where the goal of learning is knowledge understanding - as measured particularly by transfer tests" (p.

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359). This view considers meaningful learning to be sense-making and the result of three processes: Selecting, Organizing, and Integrating. In this chapter, we focus on translating a reading into a multimedia movie trailer as a method of sense-making.

As applied to the process of making sense out of an expository passage, the first step of the SOI model, Selecting, involves deciding what is important and storing this information in short-term memory. The second step, Organizing, entails connecting the various pieces of information in short-term memory and forming a coherent whole. In the final step of sense-making, Integrating, the organized knowledge in short-term memory is related with analogous, organized knowledge in long-term memory. One can see the SOI model as an elaboration of generative learning theory with clear connections to generation, attention, and memory (Fiorella & Mayer, 2016).

Much of the early work in multimedia learning focused on the design of multimedia presentations, in which the learner is a passive recipient. For example, researchers investigated the relative effectiveness of combining different media in a study of Australian students in a trade school (Tindall-Ford et al., 1997). Students who received audio and visual instruction outperformed those who received visual instruction only on tasks requiring transfer of knowledge.

Other researchers began to consider the learner as a more active participant in multimedia learning. In a study of American university students, Mayer and Chandler (2001) found that even the most straightforward learner interactions with multimedia positively impact cognitive processes and learning outcomes. They posited that simple interactions would reduce cognitive load (Sweller, 2011; Sweller and Chandler, 1994) and thereby assist learners in constructing coherent mental models that would lead to meaningful learning outcomes. They found that students who could control the pace of a narrated animation performed better on a transfer test than those who could not. In another study at the same university (Mayer et al., 2003), students who were able to ask questions and receive answers regarding an instructional multimedia presentation outperformed those who were not able to interact with the same presentation on a transfer test.

Whether or not the learner is interacting with multimedia to develop understandings, the measures typically used are tests of their ability to transfer the knowledge by applying it to new content. In contrast, in the movie trailer activity, learners are translating their knowledge into a new medium. This process involves the construction of an external representation, like drawing, but now, using multimedia.

The differences between a learner-constructed external representation and a prefabricated one are crucially important. According to Cox (1999), the former "consists of dynamic iterations and interactions between external models and mental models as the learner constructs a personal version of the presented information" (p. 347). Therefore, we claim that the process of developing a movie trailer based on a written narrative is much more than a simple transference to a new situation; it is a unique translation to a new representation. In terms of SOI theory, according to Fiorella and Meyer (2016):

> *The act of translating across representations encourages learners to select the most relevant information for inclusion in the new representation, organize it into a coherent structure by building connections among the elements of information selected, and integrate it with existing knowledge by fitting the new structure with an existing structure. (p. 732)*

In summary, empirical research in visual literacy and multimedia learning, along with generative learning and SOI models, supports the claim that learners who create unique movie trailers from reading will develop a deep understanding of the text. They will experience the generation effect due to the increased mental focus. By transforming the text into a novel representation, they will draw valuable inferences. Finally, externalizing their imaginings will reduce cognitive load.

Project Description

Background

This project was implemented at a comprehensive, public university in the northeastern United States. One of the authors has used a movie trailer-making activity in a general course for first-year undergraduate

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students for more than five years. This course is one of many different types of first-year seminar courses, and all first-year students take one during their first year. Although each first-year seminar course is independent with different content taught by a different instructor, two of the main goals are to help first-year students gain familiarity with academic life and empower them to become independent thinkers. Each year, the university selects a recommended book across first-year seminar courses, and each instructor chooses a way to integrate the book into the course. In some years, the book is fiction and, in others, non-fiction.

In her first-year seminar course, “Introduction to Digital Literacy”, the author uses the recommended book for the first digital format project. In this assignment, students are asked to create a Hollywood-style movie trailer, based on the required reading, during the first month of the semester and present it in class. Students are encouraged to read the book as if it were a movie script and imagine what kind of movie they would make while reading.

Movie Trailer Assignment Details

To create a movie trailer, the author asks students to use PowerPoint (PPT) to create the movie trailer because most entering college students know the basics of PPT and feel comfortable with using it. PPT animated files can be saved as movie files and updated on YouTube. If they know how to use a movie editing program, such as iMovie, they can use it instead. The movie trailer must integrate visuals, narration, and music and should be 30 seconds to 1 minute long.

After reading the book, they develop a movie script. The movie script is revised and elaborated while developing the actual movie trailer. In order to have them feel they are making an authentic movie trailer, the comprehensiveness of a movie trailer from the start to the end was emphasized. For example, it should start from the green Motion Picture Association rating screen (e. g., PG 13) to the ending screen (e. g., “coming soon to a theater near you”).

After making the movie trailer, they upload the file to YouTube and present it in class. After presenting it in class, the last step is writing a reflection report about what they have learned from reading the book to watching class presentations.

As we have argued, developing a movie trailer should make students motivated and experience active learning, two of the components of generative learning (motivation and generation). From the start, students should be intrinsically motivated to read the book because they do it from a movie director’s perspective. While reading the book, they think about the genre, plot, casting, setting, props, etc. By asking students to focus on these details, these activities address the two remaining components of generative learning, attention, and memory.

Outcomes

In this section, we give a brief description of some of the products students created to explore the extent to which their constructions demonstrate the distinctiveness of their understandings of the readings. Next, we connect student processes to the SOI model. Finally, we provide a detailed report of their reflections on the activity to infer their satisfaction with the activity and provide evidence of their perceptions of the uniqueness of their work.

First, as expected, students chose different genres from the same book. For example, from the 2020 book Binti, the genres that students chose to vary from suspenseful thriller to romance to animated movies (see Figures 1, 2, and 3)

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Figure 1.
Suspense movie trailer from Binti

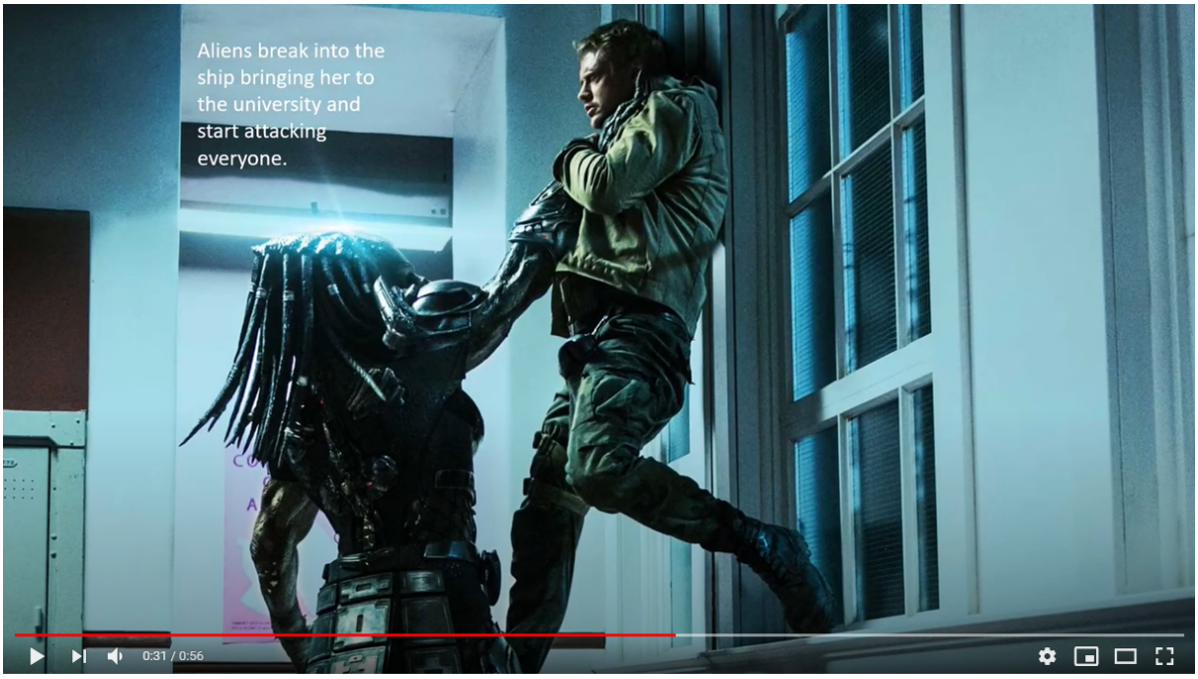

Figure 2.
Romance movie trailer from Binti

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Figure 3.
Animated movie trailer from Binti

Even within the same genre, the format was varied. Mostly, the trailers were picture/video-based ones. However, some used their own animation from paper-pencil drawings, and some actually performed and videotaped their own trailer scenes (see Figures 4, 5, and 6).

Figure 4.
Picture/video with text

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Figure 5.
Animation from paper-pencil drawings

Figure 6.
Videotaped performance

Also, students selected different parts from the book to make their movie trailer. Especially when the book was fiction, each story differed and demonstrated a different interpretation.
Having viewed the student-created video clips, we found clear evidence of their unique text interpretations. Although it is impossible to present the movie trailers in this chapter, the screenshots alone support this claim.

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How did the students' processes relate to generative learning and, in particular, the SOI model? Table 1 contains the SOI model's three stages, and associated processes students carried out while developing, presenting, and reflecting on their movie trailers.

Table 1.

SOI model and learner processes while constructing a movie trailer from the book

	Selecting	Organizing	Integrating
SOI Stage Definition	• Focus on the relevant pieces of information	• Organize the information into a coherent representation	• Connect new information with prior knowledge
Relevant Learner Process	• Select their genre • Decide which parts of the book would serve as the movie plot	• Collect all materials and put them together • Develop a storyboard	• Refine their trailer in their own make-sense interpretation • Present and reflect on the activity

Among the data acquired over several years, we selected reflections from students in two different semesters, one where the book was fiction, Binti (Okorafor, 2015), and the other where it was non-fiction, Factfulness (Rosling et al., 2019). We analyzed these reflections to identify processes related to the SOI stages: Selection, Organizing and Integration.

Selecting
Students began to visualize their interpretations by selecting the parts of the book they wanted to emphasize and production details (genre, music, cast, etc.).

> *First, I chose the genre of movie I wanted to create. When I settled on suspense and coming of age, I moved on to choosing my cast.*
>
> *After reading Binti, I knew that I wanted my trailer to be suspenseful and a little scary. Selecting this theme is when I really started to get excited about this project.*
>
> *While deciding through the many different themes I could have picked, I finally chose to go the sad route.*
>
> *I was beginning to stress about the video clips I was going to choose for the trailer since there is not an actual movie for this book. I made sure I had picked the right mood for the trailer that would hook the viewer.*
>
> *I had to create an outline of what I wanted in my trailer; then, I had to find the right music that fits the mood that I wanted to set..*

Organizing
After making initial selections, students put together materials, organizing their interpretations.

> *Slide by slide, I added different pictures, figures, and text to create a stronger storyline and flow within my movie trailer.*
>
> *My movie trailer was a romance trailer and a fantasy based on a non-realistic outcome. . . I was*

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very excited to create a trailer that was successful within my theme and my sounds.

The focus of portraying characters from my perspective is the most important.

Picking the clips was the hard part to connect with the theme. The clips were hard because I had to make sure I cut it [sic] at the right time, and it all flowed.

The final product of my trailer was my second attempt at the trailer. My first time didn't flow too good [sic] and didn't include much color [sic] to it.

I felt like I did not do the book enough justice, so I scrapped the first sketches. I started all over again, and I spent a couple of days on and off doing the sketching, base coloring, and shading. While drawing, I jotted ideas down for animating in PowerPoint... While video editing, I added transitions to fade in different parts of the music, cut a lot of the pauses in the clips, and added newer animations when I saw that some parts were lacking.

Integrating

We observed two aspects of the integration stage. First, students refined their interpretations of the text by connecting to their prior knowledge, attitudes, beliefs, and experiences. Examples follow.

It made me think thoroughly about the novel. I know I would not be able to personally do what she (Binti) did. ... I realized how much thought has to go into even just a trailer script.

I related to something that I love and show [sic] how it is also connected to what the book's topic was about.

By creating my own trailer, I felt like it gave me insight on how to take something I read and turn it into something I can put on a screen.

I thought that Factfulness wasn't a good book for making a movie trailer since it's not fiction and more of an informative book. Surprising [sic], the movie trailer project made me realize you can do anything with a book, no matter what type it is.

I was able to not only account for the plot of the novel yet was also able to reflect on what I saw from reading the novel. I was able to create an image in my mind of what I pictured this novel to be if it were to be turned into a movie.

Second, most students commented on their impression of each trailer's uniqueness. Students integrated their understanding of the book with their prior knowledge and experiences, leading to idiosyncratic movie trailers. This uniqueness provides generative learning that promotes active learning and deep thinking. In addition, their comments demonstrate widespread satisfaction with the activity. Here are some examples.

When watching my classmates' trailers, I realized that not a single person had the same or similar trailers to one another. I liked that because it showed me how we are all different and how we all took this opportunity to do whatever we wanted with the novel we read, and we all did something different with it.

Everyone took the book in a different direction for the trailer. It was cool to see how everyone else responded to the task.

I made mine into a futuristic theme, and many other people turned it into a suspenseful trailer. It was interesting to get to see everyone else's take on the book and on the project

I loved how everyone interpreted Binti in different ways.

After watching the various movie trailers by my peers, it was very interesting to see the different

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aspects and points of view that they chose.

While presenting during our class, there was [sic] countless projects that blew me away. The dedication each person put into the trailer blew me away as well as the creativity of each project shock [sic] me. No trailer shared clips, music, or transitions. They all had their unique feel to it [sic].

Factfulness was not my favorite topic to make a movie about, but you can really see just how many different directions any specific subject can be taken when looking at everybody's presentations.

In summary, while working on this activity, students visualized their own movie trailer by selecting details (genre, plot, etc.), included specific content and identified the connections among content, and then developed unique representations. The following reflection from a student demonstrates the overall outcome as a generative learning activity.

I loved being able to have a blank canvas but an idea behind it (Factfulness as a guide). I loved the idea of being able to showcase my interpretation of the book to other people. When someone reads an article or a novel, or even one sentence, they can have many thoughts on what it means. I was able to show my thoughts on what Hans Rosling was trying to represent in his book. I really enjoyed the book, so creating the movie trailer was almost like turning it into real life, but I had a say in the deeper meaning. Putting your own spin on something is so fun to me because it shows the way a person thinks and how they take things.

Conclusion

Because, for young adults, an image-dominant, screen-based world is the typical environment, they are intuitive visual communicators (Felton, 2008; Mayer, 2014). However, Felten (2008) argued that leading books on pedagogy in higher education rarely cover the usage of visuals or visual technologies to promote deep learning instead of using images as mere illustrations. Zull (2002) argued that faculty should utilize visuals to help students learn. This activity facilitates learning by using various visual forms to represent what they know. "Learners are not neutral observers; rather, it is their positionality within the forest that dictates what tree they see, how they perceive these, and their ability to discern the connections among these." (List et al., 2020, p.6)

The movie trailer activity demonstrates the value of using novel representations to develop deep understandings. Our work is similar to Min's (2019) research, which explored how undergraduates represented research papers as multimodal brochures. Min's study documented undergraduate students' ability to apply visual literacy skills by transmediating text-based information into a multimodal format.

The purpose of our project was not to determine any particular cause-and-effect relationships but rather to explore the kinds of creations particular students would produce and gather some insight into their impressions of the experience. Accordingly, we did not implement any of the usual components of an experiment, such as control or randomization. So, the results of this exploratory study can not be generalized. Instead, they might be used to provoke further examination.

In this project, we studied whether the movie trailer activity would provide further evidence of the idiosyncratic nature of knowledge construction. We considered the impact of this sort of assignment on student satisfaction with their learning. As expected, students developed a wide variety of movie trailers, suggesting they each constructed a unique understanding of the reading. In addition, they reported a great deal of enjoyment in engaging with the reading in this novel way. However, we did not measure whether they developed a comprehensive, coherent understanding of the book concerning retention or knowledge transfer. It is possible that they selected only a few parts of the text that they understood or liked for inclusion in their trailers. Therefore, it would be helpful to study the possible effects of a movie trailer activity on these learning outcomes.

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A Critical Visual Analysis of Chinese and Chinese American Representations in Picturebooks

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Abstract

One of the primary visual sources children are exposed to is the illustrations in picturebooks. This study examines visual representations of Chinese people and Chinese Americans in contemporary picturebooks. It seeks answers to how and why the Chinese and their culture are represented in these books through a critical visual literacy lens. Ten sample picturebooks were analyzed. The findings demonstrate progress in representing diverse Chinese and Chinese American characters in contemporary picturebooks; however, many visual representations still reinforce stereotypes of Chinese people and Chinese Americans, consistent with the dominant social discourse. Implications for developing culturally rich and dynamic Chinese characters in future picturebooks are discussed.

Keywords: critical visual literacy, picturebooks, Chinese/Chinese American representations

Introduction

Asians are the fastest-growing of the four largest racial and ethnic groups in the U.S., covering 5.7% of all population (U.S. Census Bureau, 2020). Among all Asian ethnic groups, the population of Chinese living in the U.S. has reached 10 million (U.S. Census Bureau, 2020). However, racism against Asian Americans is longstanding and complex. According to *NPR news,* more than 9,000 anti-Asian incidents have been reported since the start of the Covid-19 pandemic (The Associated Press, 2021). “Stop AAPI Hate,” a nonprofit organization that tracks incidents of hate and discrimination against Asian Americans and Pacific Islanders (AAPI), also reported shocking numbers regarding Asian hatred. According to a recent national report, the Chinese have experienced more hate incidents (43.5%) than all ethnic groups surveyed by the organization (AAPI, 2021, p. 2). Of all hate incidents, 48.1% included at least one hateful statement regarding anti-China and/or anti-immigrant rhetoric (AAPI, 2021, p. 2).

As with all forms of social discrimination, racism toward the AAPI is frustrating. As teacher educators, we believe it is critically important to increase exposure to the voice and history of the Asian American community. Children’s literature is one of the primary sources of learning about the world. According to Martha Crippen (2012), children’s literature

> ... provides students with opportunities to respond to literature; it gives students appreciation about their own cultural heritage as well as those of others; it helps students develop emotional intelligence and creativity; it nurtures growth and development of the student’s personality and social skills; and it transmits important literature and themes from one generation to the next. (para. 1)

As the above quote shows, culturally authentic children’s books can help teachers and students better understand the culture, tradition, and value of diverse racial and ethnic groups (Bishop, 1990; Short & Fox, 2003).

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In this chapter, we purposefully use the term “picturebooks” as we strongly believe that visual and print are equally important components (Chesner, 2019; Pantaleo & Walker, 2017; Serafini, 2014). Separating “picture” and “books” in the term “picture books” does not do justice to the essential role visuals play in the meaning making process. We explore the concept of cultural authenticity from the perspective of visual literacy by critically examining visuals representing Chinese and/or Chinese American characters in picturebooks.

Literature Review

The American Immigrant Council (2021, para. 3) reported that 44.9 million, or one in seven residents in the United States, were immigrants in 2019. The increasing number of immigrants coming to the U.S. brings cultural diversity, including classroom settings, requiring teachers to provide instruction that can meet the needs of diverse students. Multicultural children’s books are essential to providing a window for children into the cultural heritage of others. These books serve as a mirror for children to reflect on their own lives and experiences, and they allow children to walk into the story and become a part of it (Bishop, 1990). However, one concern is that a majority of the published children’s books are still centered on the White, middle-class, heterosexual world (Boyd et al., 2014).

A common theme in multicultural children’s literature research is the cultural authenticity and representation of underrepresented racial and cultural groups (Braden & Rodriguez, 2016; Kalisa, 1990; Naidoo, 2008; Roberts et al., 2005). This group of studies focuses primarily on content analysis of texts. In a study exploring the portrayal of African culture in picturebooks, Kalisa (1990) pointed out that African folklore represents the most common literary form, whereas other forms of oral traditions are virtually nonexistent. Moreover, picturebook illustrations provided a misconception about African cultures through exaggerating traditions and clothing (p. 36). These picturebooks contributed little to help children develop an accurate picture of the diversified and rich African traditions. Roberts et al. (2005) examined contemporary American Indian cultures in children’s books. They found that even though there are many good books on the myths and traditions of Native Americans, there is an overreliance on historical perspectives focusing on American Indian characters and cultures. They suggested that teachers include books that can present American Indians authentically and respectfully, such as depictions of American Indians in everyday tasks of living, presentations of individuals as part of communities or as fully human, with varied physical features and roles (Roberts et. al, 2005, p. 2). Nadidoo (2008) studied award-winning picturebooks depicting diverse Latino subcultures in the U.S. The findings showed that the portrayal of gender roles between male and female Latino characters was unbalanced; hence, those books failed to represent the complete social and cultural mosaic of the Latino people (Nadidoo, 2008, p. 29). Similarly, Braden and Rodriguez (2016) examined picturebooks having significant Latinx content. By using critical content analysis, they reported four insights in those picturebooks: English was privileged in the text; the presentation of Latinx culture lacked depth and breadth; traditional gender roles were highlighted without considering the diversity in Latinx families; and the assumption that there is a Utopian society, exhibiting near perfect qualities (p. 62).

A few studies are investigating the representation of Asian Americans, their culture, and traditions in picturebooks (Cai, 1994; Cha, 2009; Jan-Thomas, 2013; Pang et al., 1992; Rodriguez, 2018; Yokota, 1993; Wee et al., 2015). These studies suggested that Asian culture is only presented at the surface level; oversimplified topics and stereotypical elements prevail in picturebooks. Hence, there is an urgent need for authors and illustrators to depict realistic stories and authentic illustrations to reflect the current, everyday life of Asian Americans. Further, stereotypical images such as slanted eyes are frequently used to portray characters from the Chinese cultural background. However, when artists are conversant with their own culture or have direct experience with a particular culture, they are less likely to misrepresent culture in illustration.

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As text and illustration in picturebooks transact and transform with each other (Sipe, 1998), they are equally important in representing cultures and subcultures, traditions, and individuals. Several studies have focused on visual representations in picturebooks and their value in teaching visual literacy. Cai (1994) pointed out that picturebooks often confuse images from other cultures with those from Chinese culture. Nikolajeva (2012, 2013) studied how words and images in picturebooks are not only powerful implementations for visual literacy but also pathways for children's emotional development. Meanwhile, Papen (2020) suggested using dialogue between teachers and students to enhance critical visual literacy so that children could have a better and more thorough understanding of the visual content. Serafini (2010) has also argued that, as we move from a print-dominant era to a post-typographic epoch dominated by visual images and multimodal texts, teachers should expand their perceptual, structural, and ideological perspectives on literacy instruction to prepare readers to better comprehend multimodal texts (p. 100-101). In keeping with this insight, a few researchers have suggested guidelines and criteria for selecting multicultural picturebooks. Pang et al. (1992) recommended selecting picturebooks based on whether they have a strong plot, historically accurate and culturally pluralistic themes, positively portrayed their characters, set the story in the U.S., and authentically illustrated their characters. Similarly, Yokota (1993) presented five criteria for selecting multicultural books: 1) cultural accuracy, 2) rich cultural details, 3) authentic dialogues and relationships, 4) in-depth treatment of cultural issues, and 5) inclusion of members of a minority group (p. 159).

We have identified a few gaps in the field. First, there has been a lack of studies critically analyzing Chinese Americans compared to other minority groups in children's literature (Harada, 1995; Hsieh, 2018; Lowery, 2000). Secondly, most studies focus primarily on content analysis of text, and only a small number of studies explore the significance of illustrations in picturebooks and visual literacy instruction (e.g., Cai, 1994; Kim & Serrano, 2017; Nikolajeva, 2012, 2013; Painter et al., 2014). Third and finally, limited studies employ the lens of critical visual literacy (e.g., Papen, 2020; Serafini, 2010). This study intends to fill the gaps by examining how Chinese and Chinese Americans are visually represented in picturebooks through the lens of critical visual literacy. We hope the study results may add to the courageous conversation on how picturebooks contribute to the construction of social discourses about race and ethnicity, and in the long run, provide insights on promoting social justice.

Theoretical Framework

This study adopts critical visual literacy as its theoretical framework. Critical visual literacy brings together two fields of study: visual literacy and critical literacy. Visual literacy refers to learned skills to construct meaning from visual representations in order to compose visual communication (Avgerinou, 2001). Visual thinking is one of the critical skills that cut across all the visually related tasks. Critical literacy (Comber, 2015; Freire, 1972; Janks, 2014) is an approach that moves readers beyond literal meanings to examine the ideas, positions, and values embedded in the context of information.

Critical visual literacy is defined as the skills necessary to take an active stance in exploring the use of visual modes and other semiotic systems, such as text, examining how they create meaning (Papen, 2020) in social, cultural, and political contexts. Thus, critical visual literacy investigates the power relations illuminated by visual production and perception (Chung, 2013; Kim & Serrano, 2017; Santos Costa & Xavier, 2016). Guided by a critical visual literacy framework, we intend to carefully examine how illustrations are constructed to represent Chinese and Chinese American characters, paying particular attention to questions such as: Who are represented? How are they represented? Why have they been represented this way? Whose voices are presented and whose are excluded? Whose interest does the visual representation serve? (Janks, 2014).

The Study

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This qualitative study examined how Chinese people, Chinese Americans, and their cultures were represented in picturebooks. Both researchers were born and grew up in China and pursued our advanced studies in the U.S., becoming faculty within the fields of language and literacy education in higher education institutions. Considering our cultural backgrounds, the focus of the study was on Chinese and Chinese American characters as represented in picturebooks. Two research questions were: 1) How are Chinese, and Chinese Americans represented in contemporary picturebooks? and 2) How is the Chinese culture represented in these picturebooks?

The data sources were the illustrations from the selected picturebooks. The selection criteria were: 1) the books were targeted for the grade level of Pre-Kindergarten through third grade; 2) the books featured Chinese and/or Chinese Americans as the primary character(s); 3) the books were contemporary fiction and nonfiction, and 4) the books were available in the U.S. We referred to databases such as the award-winning picturebooks from the Asian/Pacific American Librarians Association (2021), the Cooperative Children's Book Center (CCBC, 2021) diversity statistics, and local libraries (e.g., Naperville Public Library in IL and San Jose Public Libraries in CA) to identify appropriate picturebooks for this study. We were able to locate 30 books that met all the criteria. In the field of multicultural children's literature, the majority were in the genre of traditional literature, where stories were set in ancient times with flat characters (Short & Fox, 2003). We purposefully focused on contemporary picturebooks since these books depict characters in an everyday context to which young readers can easily relate.

This chapter reports findings from ten representative picturebooks out of the 30 that met our selection criteria. We determined the genres of the picturebooks using the literary genres guide from the California Department of Education (2021). Out of the 30 books, 26 were fiction, and the remaining were nonfiction. These books were further categorized into four groups: 1) Authored and illustrated by Asians or Asian Americans with stories set in the U.S.; 2) Authored and illustrated by Asians or Asian Americans with stories set in China; 3) Illustrated by Asians or Asian Americans, and 4) Illustrated by non-Asians or non-Asian Americans. Ten picturebooks were randomly selected from each of these four groups. The ratio of books in each group in the ten sample books was identical to that in all 30 picturebooks. The titles of the ten picturebooks, genres, and the group they belong to are:

- Authored and illustrated by Asian/Asian Americans with stories set in the U.S.
  - *Eyes that Kiss in the Corners* (Ho, 2021, realistic fiction)
  - *Popo's Lucky Chinese New Year* (Loh-Hagan, 2017, realistic fiction)
  - *A Big Mooncake for Little Star* (Lin, 2018, realistic fiction)
  - *Jenny Mei is Sad* (Subisak, 2021, realistic fiction)
- Authored and illustrated by Asian/Asian Americans with stories set in China
  - *A New Year's Reunion* (Yu, 2013, realistic fiction)
- Illustrated by Asian/Asian Americans
  - *I Dream of Popo* (Blackburn, 2021, realistic fiction)
  - *Queen of Physics* (Robeson, 2019, nonfiction, biography)
  - *Nine Months: Before a Baby is Born* (Paul, 2019, nonfiction & fiction)
- Illustrated by non-Asian/Asian Americans
  - *Made in China* (Oelschlager, 2008, realistic fiction)
  - *I Hate English* (Levine, 1995, realistic fiction)

To analyze the illustrations, we started with codes adapted from Naidoo (2008) and added new ones using the grounded theory (Corbin & Strauss, 1990). Specifically, we individually took notes on the visual representations of the main characters in the ten books. We then used the constant comparative analysis

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to go through our notes and keep a running list of emerging codes commonly used by both of us. If one of us included a code that the other didn't have, we discussed why it was significant and whether we could reach consensus to add it to the list. After we finalized the codes, we grouped them into the categories of visual content analysis and visual semiotic analysis. Sample codes are presented in Table 1.

Table 1
Data Analysis

Categories	Codes
Visual Content Analysis	Gender, age, physical appearance (shape of eye, shape of face, hairstyle, type of dress, body build, and posture), social-economic class, characteristics, interaction with family vs. others
Visual Semiotic Analysis	Literal and symbolic representations of Chinese and/or Chinese American peoples and cultures, cultural traits, and moral attitudes, the relationship among characters

We also took detailed notes to capture the qualitative nature of codes, such as the physical features of the main characters and how they interacted with others. The following section presents findings organized by research questions and significant themes.

Findings

The first research question, "How were Chinese and/or Chinese Americans represented in contemporary picturebooks?" was answered by quantitative and qualitative data.

Out of the ten selected picturebooks:

- 100% had young female main characters
- 70% interacted with family only, and 30% interacted with others
- 90% were from a middle-class background, and 10% was from a working-class background

All the main characters in the ten books were female. We determined the gender of the characters primarily by looking at their physical features (e.g., long vs. short hair) and clothing (e.g., dress vs. shirt). The print in the book provided a way to confirm the gender categorization. A more in-depth analysis revealed the main characters' physical appearances in the categories of: 1) skin tone, face, eye shapes, hair, and dress styles; 2) body build and posture; and 3) characteristics. Further, we examined who the main characters interacted with and where they interacted with others.

The main characters generally had a peach/light brown skin tone. When a White character was present, the skin tone of the leading Chinese character appeared to be slightly darker. No significant skin tone variation was noted among the Chinese characters in the same book except the father figure in *A New Year's Reunion* (Yu, 2013). As a blue-collar worker, the father had a much darker skin tone than the mother and the daughter.

All ten main characters appeared to have monolid eyes with somewhat different shapes: Almond-shaped (4), upturned (3), round (2), and small dot/line (1). A slight variation was noticed in the face shape. Eight of the ten main characters had round faces, one had a long face, and the other had a square-shaped face. All

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ten main characters had black straight hair, with six at medium length and four with a short, bob hairstyle with bangs. Half of the main characters wore pigtails or a bun as an adult (e.g., Robeson, *Queen of Physics,* 2019). In addition, seven of them had general, everyday clothing, while the other three had traditional Chinese style dresses (i.e., Qipao). It was also noted that even the characters wearing general clothing had something in red such as a hairpin or neckline of the dress.

Concerning body build and posture, most of the main characters were positioned in a family unit, so the dichotomy of body build between children and adults was apparent. There was no significant difference in the limited cases where the main characters interacted with peers outside the family unit. A noticeable example of posture changes was in *I Hate English* (Levine, 1995). The main character, Mei Mei, appeared much more relaxed and happier when in a Chinese-speaking environment. In contrast, she seemed tense when expected to communicate in English.

Likewise, in eight out of ten picturebooks, the ethnicity of the main characters was essentially tied to the plot. Some characters were able to express who they were and show pride in their physical features (e.g., Ho, *Eyes that Kiss in the Corners,* 2021), culture (e.g., Loh-Hagan, *Popo's Lucky Chinese New Year,* 2018), and language (e.g., Levine, *I Hate English,* 1995). Other characters had to rely on others (e.g., the father in Oelschlager, *Made in China*, 2008, and the science community in Robeson, *Queen of Physics,* 2019) to confirm their identities and acknowledge their value.

In terms of who and where the main characters interacted with others, the data indicated that the majority (7) interacted with their family (including their immediate family members and grandmas), and the rest (3) interacted with others outside of their family circle. When the main characters interacted with their families, their family members appeared to be Asian as they had the visible physical features such as black hair, brown eyes, and peach/light brown skin tone. One exception was *Made in China* (Oelschlager, 2008), where her White parents adopted the main character from China. This gives the viewer the impression that Chinese people and Chinese Americans are a closed ethnic group uninvolved in things like interracial marriage. In the three picturebooks where the characters interacted, some interracial interactions included friendships and mentorship. In *Jenny Mei is Sad* (Subisak, 2021), a special friend who appeared to be a black girl of similar age helped cheer up Jenny Mei. In *I Hate English* (Levine, 1995), a White teacher helped Mei Mei to overcome her negative attitude toward the new language. In *Queen of Physics* (Robeson, 2019), Wu Chien Shiung engaged with her Chinese peers (female students) in China and other male scientists from diverse ethnic backgrounds in the U.S.

We identified a variety of characteristics based on the main characters' facial expressions, positioning in relation to other characters, and the use of visual elements such as line, color, shape, and symbol. For instance, there were multiple scenes where we saw the back or the side of Jenny Mei and her eyes were looking down or to the side (Subisak, *Jenny Mei is Sad*, 2021), indicating she was sad. Another example was that Wu Chien Shiung was portrayed as intelligent by scenes where she had her head buried in books, raised her hand to answer questions while others were not, and was surrounded by mathematical numbers as she engaged in math work.

The visual depiction of the setting was often the scenes of a U.S. middle-class neighborhood (nine out of ten picturebooks) where the main characters and their families lived in a house with a spacious living room, a well-equipped kitchen, and individual bedrooms. One of them also included scenes from Chinatown (Levine, *I Hate English,* 1995). The other picturebook was set in a small town in China (Yu, *A New Year's Reunion,* 2013).

To answer the second research question of how Chinese culture was represented in the illustration, we

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found that 80% conveyed literal and symbolic representations of culture while 20% didn't. The overall tone for the picturebooks featuring holiday celebrations was festive, highlighted through the wide use of the red color and the characters' facial expressions. Other than that, a variety of tones such as being sad, lonely, happy, exciting, and proud were shown through warm vs. cool colors, facial expressions, and positioning of the characters. The literal representations of culture included cultural products and practices associated with holidays. For example, in *Popo's Lucky Chinese New Year* (Loh-Hagan, 2017), viewers can see dumplings, fish, red envelopes, and dragon/lion dances. In *A Big Mooncake for Little Star* (Lin, 2018), mooncakes were a critical visual component on most of the pages. Further, Chinese scripts were often seen in the background, elaborating the setting in Chinatown. An example is *I Hate English* (Levine, 1995). In contrast, symbolic representations of culture were present in many picturebooks. For example, many characters wore something in red. The color red symbolizes good luck, and Chinese people typically wear red for the new year and special celebrations. In addition, the grandmas in two picturebooks wore jade jewelry, a symbol for good luck and prosperity in Chinese culture: *I Dream of Popo* (Blackburn, 2021) and *Eyes that Kiss in the Corners* (Ho, 2021). In the latter, many figures from Chinese classic literature were depicted, such as the monkey king, illustrated as a stuffed animal in the main character's bedroom. In comparison to the literal representations of culture, the symbolic representations may be well appreciated by cultural insiders and inspire the curiosity of cultural outsiders. Notably, *Jenny Mei is Sad* (Subisak, 2021) and *Nine Months* (Paul, 2019) were the two picturebooks that did not include specific references to culture except for the physical features of the characters and/or their ethnic names in the text. The ethnicity of the main characters was incidental to the story because their ethnicity did not form the basis of the plot.

Overall, two themes emerged from the findings. First, a small variety of Chinese and Chinese American main characters were visually represented in picturebooks with contemporary settings. All the main characters in the sample were young girls who primarily interacted with family members. A few were engaged in interactions with people from cultural groups other than their own. The characters' ethnic identities were signified by physical features, such as black straight hair, monolid eyes, peach/light brown skin tone, and culturally specific products and practices shown through the visuals. The main characters varied in their characteristics, voice, and agency. Secondly, Chinese culture was prominent in most of these picturebooks. It was visually represented by the color of red, products such as dumplings and lanterns, and practices such as family reunion and lion/dragon dance. These were primarily surface-level signifiers (CLPE, 2021) that rarely delved deeper into cultural values and perspectives.

Discussion and Implication

This section sheds light on the findings through a critical visual literacy lens, enabling us to analyze how the visual mode was used to represent Chinese people and Chinese Americans, and explore why they were represented in specific ways and whose perspectives were missing. Further, the implications of the study will be discussed. Five key points will be discussed below.

First, it is worth celebrating the increasing number of contemporary picturebooks featuring Chinese people and Chinese Americans as the main characters. Compared to other ethnic groups, Chinese Americans are significantly underrepresented in children's literature despite their strong presence in U.S. society. A similar trend was reported in the U.K. (CLPE, 2021). Many of these picturebooks were authored and illustrated by cultural insiders, which adds new perspectives in understanding the lived experiences of Chinese people and Chinese Americans. The findings from this study demonstrate a small yet steadily increasing variety of main characters and their families from the Chinese ethnic group.

All main characters in the ten picturebooks were young Chinese girls. These girls varied in how they looked physically and their characteristics. Some girls were sad and helpless, while others took the initiative to problem-solve and make their voices heard. Traditionally, Chinese, and other ethnic groups from eastern

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Asia, are portrayed stereotypically with slanted eyes, round faces, and yellow skin tone (Wee et al., 2015). A case in point is the political cartoon titled *The New Religion* created by Valtman in 1966 (Figure 1), where all Chinese men and women are shown with slanted eyes, identical facial expressions, and outfits. In the top center of the cartoon, Mao Zedong, the founding father of the People's Republic of China, is featured wearing Mawashi, a traditional Japanese Sumo wrestler outfit. In contrast, our findings are considered a significant breakthrough to dispute the stereotyped image of Chinese people and Chinese Americans with biased physical features and submissive characteristics in the dominant social discourse.

Figure 1.
The New Religion (Valtman, 1966).

Nevertheless, the work is far from done. A concern regarding the balanced representation of female and male characters is that none of the ten picturebooks featured a male main character. The concern regarding unbalanced representations of gender was also brought up by Nadidoo (2008). In the scenes where a family was portrayed, the father figure was either absent or had minimal interaction with the main character. The Chinese are historically referred to as the "Sick man of East Asia," a phrase coined as early as October 17, 1896, in the British-run *North China Daily News* newspaper (Sick man of Asia, 2021). This derogatory reference to Chinese men remains relevant to the present, as the *Washington Street Journal* recently published an article titled "China Is the Real Sick Man of Asia" on February 3, 2020 (Mead, 2020), reviving the speculation that China should take responsibility for the cause of the Covid-19 global pandemic. Given the intensified racial and ethnic relations in the current social and historical context, young children should instead be exposed to a wide variety of Chinese characters, especially strong and powerful Chinese males, to fight against deeply rooted systemic racism.

Furthermore, most characters exhibited lifestyles from a middle-class, suburban setting. We cannot help but wonder about the experiences of Chinese from other socioeconomic classes or settings. In addition, there was no signifier to their specific ethnic group, given that China has 56 ethnic groups with unique languages and cultures. For instance, one of the researchers is from the minority group of Hui (Chinese Muslim). Her cultural upbringing, such as traditional clothing and dietary habits, differs significantly from the majority of Han people. The gaps of developing a sophisticated understanding of richness in culture have not been successfully bridged by Chinese characters' diversity and experiences. Diversity among main

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characters in non-traditional family structures, disabilities, and mixed racial backgrounds is critically needed. Interestingly, one of the illustrators came from a mixed racial background (Subiasak, the author and illustrator of *Jenny Mei is Sad*). We would like to encourage more illustrators with diverse backgrounds to share their own nuanced experiences in their artwork.

Thirdly, authors, illustrators, and publishers should portray Chinese people and Chinese Americans interacting with people from diverse cultural groups. Our world is becoming increasingly diverse, and all children need to develop intercultural communicative competencies to prepare for their schooling, career, and lives. The examined picturebooks demonstrated Chinese main characters interacting solely in the context of family. On rare occasions where people from other racial and ethnic groups were shown, they stayed in the background and hardly engaged in close interaction with the main characters. One exception was Jenny Mei, who demonstrated the appreciation of a strong relationship with a black girl in *Jenny Mei is Sad* (Subisak, 2021). Chinese Americans do not live in isolated communities that are close-minded about embracing diversity. Therefore, more picturebooks should reflect such a reality.

Moreover, we strongly recommend expanding cultural representations beyond the traditional, superficial signifiers associated with holiday celebrations such as red envelopes, lanterns, and lion/dragon dances. In addition, such surface references to cultures may overgeneralize the entire culture by one set of products and practices. For example, many picturebooks portray dumplings as a staple for the Chinese New Year celebration. However, one of the researchers grew up in southern China. Her experience of celebrating the Chinese New Year with family never involved making or eating dumplings, a practice primarily done in northern China. *Popo's Lucky Chinese New Year* (Loh-Hagan, 2017) set a good example to present other cultural practices, such as offering food to ancestors and providing a perspective on why writing in red ink is not culturally appropriate even though red is a lucky color. Cultural values can be presented visually by exploring the what, how, and why of cultural products and practices.

Finally, we call for more authors and illustrators to create picturebooks where Chinese people and Chinese Americans are not confined by the cultural boundaries predetermined by their ethnicity. For instance, most Chinese people wear modern clothing, so it is uncommon to see Qipao unless it is a special occasion. Also, many young people in China celebrate western holidays such as Halloween and Christmas. Likewise, Chinese Americans who call the land of the free their new home have adapted their cultural traditions based on their resources and experiences. Cultural adaptations have not been represented in any of the reviewed picturebooks.

Most importantly, the majority of the picturebooks overly rely on the character's ethnicity as the basis of the plot, highlighting culturally unique celebrations and challenges. Roberts et al. (2005) recommended portraying American Indians with more everyday roles in picturebooks. Along the same lines, we urge picturebook artists to represent the full spectrum of the lived experiences of Chinese people and Chinese Americans by creating more picturebooks that show the characters engaging in everyday activities just like other people. *Nine Months* (Paul, 2019) is a powerful example where a Chinese family excitedly waited for the arrival of a new baby.

Conclusion

Although the sample size is small, the findings from this study provide insights into how Chinese people and Chinese Americans and their cultures are visually represented in contemporary picturebooks. The critical visual literacy lens is a valuable framework to help us examine the power relations embedded in the sociocultural context and to enable us to identify future directions. Picturebooks are widely used in classrooms, and young children draw meaning primarily from illustrations. Understanding the importance of representing a diversified and pluralistic culture helps rupture prejudices and stereotypes. In the long

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run, it leads to a deeper appreciation of how different ethnic groups contribute to our diverse society. We hope the study's findings can be beneficial to those interested in picturebooks, particularly classroom teachers, to be more critical when selecting picturebooks that represent diverse ethnic groups and their cultures.

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Visual Learning and Multiple Temporalities

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Abstract

The articulation between different temporalities and spatialities is an important field of discussion for understanding historical information. When considering the Brazilian high school context, specifically the humanities curriculum, this paper discusses the use of a didactic tool for visualizing temporality to enhance the visual literacy of teachers and students as primary and secondary target groups, especially from a synchronic-diachronic perception of historical time. We investigate how the articulation of the multiplicities of time and space might mediate strategies for teaching and learning history, considering visual language in a currently changing curriculum for high school. To this end, we briefly describe the tool's design in the previous phases of our research and its connection to curricular demands, data visualization, and traditional historiographical models. Through user evaluation, we discuss the reception of the tool among teachers and students, as well as the implications for cultural learning. The research was instigated by the distancing many students feel when attempting to place themselves within a historical narrative. During the learning experience, it is essential to understand how history is constructed by the participation of groups and individuals and not by distant, impersonal forces; this broadens the discipline of history to include the narratives of students' lives. In addition, we understand that these social perceptions, which include those of time and space, are lived through multiple languages and cognition channels and are mediated by the teachers. Thus, visual language acts as a mediating device for teaching and learning information literacy so that all narratives can be more easily addressed and all learners are perceived as active agents of social change.

Keywords: data visualization, didactic tool, timeline, history, high school

Introduction

As the title of Bernard Darras' book (1996) provokes, "in the beginning was the image"[1]. Darras questions the role of visuality in human expression, which unveils infinite possibilities in the intersection between visual language and all knowledge domains during various stages of education. Inspired by this premise, Brazil's new proposal for the high school curricular base, as standardized by the Common National Curricular Base (BNCC), foments dialogue between languages and the technologies that make use of them. As described in the normative document, "it is necessary to ensure that young people have learned to work in a constantly changing society, to prepare them for professions that do not yet exist, to use technologies that have not yet been invented, and to solve problems that we do not yet know" (Brasil, 2018, p. 473).

BNCC addresses how the described contemporary challenges extrapolate technological issues and dive into the fluidity of social and cultural relations, as well as the linguistic aspects individuals use to construct their own realities (Brasil, 2018). Following the BNCC guidelines, we propose a specific investigation regarding visual language and its significance in learning processes within the high school context.

As defined by Horn (1998), visual language corresponds to the integration between graphic-verbal (words) and visual (images and forms) elements as an independent form of communication. These elements have specific dimensions and types, and their use is subject to syntax, semantic and pragmatic implications, as well as spatial relationships (such as proximity and similarity). It is the integrated symbolic and contextual use of the elements that establishes communication (Horn, 1998). While Horn (1998) argues that visual language gives rise to visual culture, Freitas (2017) explains that visual language was highly favored by the increasing demands for contemporary information. That, reciprocally, boosted new spheres of culture and

1 *Au commencement était l'image* (Darras, 1996). Translated by the authors.

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visual culture. New relationships with the digital universe and emerging technologies also motivate new approaches to the school environment. As promoted by the BNCC, it is necessary to recognize and use them to explore new possible and compatible languages. In this regard, visual language is an essential intermediate point for the learning process.

In Brazil, high school usually includes 15 to 19 year-olds (Brasil, 2018), an age group rapidly developing cognitively. For Conyers (2016), this propensity for cognitive development makes this school phase favorable for deepening study methodologies and thus challenging existing classroom pedagogies. To this end, Conyers highlights several strategies, including encouraging languages preferred by students to engage them in metacognition and, consequently, aiming for learning about their own lives and interests.

Access to visual language is as necessary as other languages to address information in a systemic and open approach. For instance, schematic language might be as viable as verbality in humanities. According to Risler and Ares (2013), visual language provides students with the insertion of expressive dimensions of knowledge, such as aesthetics and symbols, which directly dialogues with creativity. Making space for visual resources implies the creation of a school culture that is more inviting to new ways of thinking about knowledge, with greater facility in understanding "meanings and its forms" (Coutinho & Lopes, 2011, p.9). In this way, promoting access to visual literacy also becomes a matter of information literacy, the first implying the critical exploration of visuality for communication and the second on educating for the understanding of information in given situations of need (Coutinho & Lopes, 2011).

During the high school years, this linguistic approach also becomes necessary as a strategy for contextualization information. Schmidt and Garcia (2005) explain that students during this phase are highly sensitive to the world and its processes of change. When what is learned in school does not resemble what is lived outside of it, learners might experience disconnection in their education. For the discipline of history, when the student does not understand that the school-taught narrative is compatible with their own, they might face distancing from the social, political, and cultural processes that govern society. Our approach aims to understand which nuances of visual language can be approached in order to contextualize the learning of history, considering the transdisciplinary pedagogies proposed by the high school curriculum.

For that, the subjects of history pose an interesting challenge since secular models of information visualization have been important tools in historical learning by mediating social and physical time and space. Both information visualization and historiographical methods for analysis highlight visual complexity through visual language. Global history, for example, a specific historiographic approach, articulates sequential time (diachrony) with simultaneous time (synchrony) as a way of mapping complex networks of influence and provides evidence of how languages can be integrated into data visualization tools.

Inspired by BNCC's educational itineraries and structural themes regarding articulation between time and space, and the global history case of visuality as didactic mediation, this study focuses on how multiple temporalities might enhance learning in a high school context. To comprehend how this approach might bring new perspectives to visual literacy within the discipline of history, this paper aims to investigate how the proposal of a didactic tool, conducted in the previous phases of this research, might trigger different learning strategies. Considering Brazilian history teachers and high school students as primary and secondary target audiences, we seek to establish a bridge between both research components, utilizing multiplicities of time and space as a visual cognitive strategy aligned with information design methods and data visualization models.

First, this paper discusses the curricular demands for the new Brazilian high school curriculum and its relationship with incorporating new languages into the desired cognitive skill set. Then, we seek to explain the methodological conceptualization of the didactic tool, especially regarding previous models of information visualization and its functions. Finally, we discuss our research methods for user evaluation. We discuss our results based on qualitative data, which foments preliminary hypotheses regarding the use of the tool in its respective use context.

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Visual Learning of Historical Time and Space

Visual Language, the Brazilian High School Curriculum, and Social Perceptions of Time

According to Pereira et al. (2019), Brazilian high school is often a collision point of expectations regarding the positioning of young apprentices in society. Resulting from a series of curricular reforms in the past decades, this particular step in primary education has again received significant attention in the past five years, facing a new curriculum that drastically disrupts all previous attempts. This new curriculum presented schools with a merged model organized around transdisciplinary itineraries and a new organization of disciplines. This model transitioned schools from independent and discrete school subjects, often organized around multidisciplinary themes in dialogue with one another.

Although opinions mostly praised implementing a more personalized approach, the new curriculum has been faced with skepticism. Questions address how to implement such a contrasting pedagogy since the new curriculum requires more workload for students and teachers and new didactic material. A greater challenge is the increased role of many traditional disciplines and the impacts this change might have on an unstable educational system.

As delimited by the normative document for education in Brazil, BNCC, high school itineraries are structured around themes. This paper concerns access to information for youth, focusing on the transition from the discipline of history to part of a wider field of knowledge: the humanities itinerary, consisting of a merging of history, geography, philosophy, and social sciences. For the humanities itinerary, this study focuses on the relationship between time and space. The humanities curriculum emphasizes individual learning competencies, highlighting the intention of bringing multiple languages into the teaching-learning process. A few of the mentioned languages include schematic, iconographic, cartographic, and pictorial, which convey a more visual understanding of information.

The curriculum considers high school to be a phase of critical deep learning and reflection, integrating information obtained in the previous years of primary education. Students are expected to deepen sensemaking practices by understanding, interpreting, and generating information. Although significant efforts are directed toward rethinking high school pedagogies and languages, it is necessary to consider what Coutinho and Lopes (2011) call, in the Brazilian context, a mismatch between the classroom and contemporary languages and their forms of presentation. For them, the mismatch in bringing “non-school languages” (Coutinho & Lopes, 2011, p. 7) into school highlights a gap in the dialogue between the reality of the classroom and life outside of it.

For Scheimer (2010), this new paradigm between languages, the tangible (analogical) and the digital, has had a significant impact on teachers, especially history teachers, from internal and external transformations:

> We can cite as external causes: changes in society, scientific revolution, and changes in the culture of an era. As internal causes, we can mention the exhaustion of traditional theories and models, which lead to the search for new alternatives, student involvement with the media, and the demand for classrooms that contribute to this reality. (Scheimer, 2010, p. 4).

For some, it becomes easier to visualize the external timing of events, processes, and structures permeates everything around them rather than internal causes. The contrasting nature between what is learned and what is applied in students’ lives, might be particularly challenging for learning history (Schmidt & Garcia, 2005). There is hardly any space for exploring the nuances of students’ experiences outside the “single narrative” in the chronology of events, which implies a distancing of the student as a historical agent. This factor leads to a motivational mismatch between the student's needs and the governing “forces” of history, which are camouflaged under a historical reality that is not always accessible to their experience. This paper aims to answer whether a more literal visualization, aligned with teaching methods, might be a mediation tactic for all involved.

Structuring a Graphic Space for Learning Historical Time

This research was conducted and rooted in the changing context of the Brazilian high school curriculum, which is considering demands for new linguistic perspectives for approaching information literacy. Based on information design and data visualization methods, the research revolves around the practical

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applications of time visualization within the field of social humanities, especially in the discipline of history. We considered these applications with teachers, students, and researchers and outlined a didactic tool for visual learning.

The proposed tool was shaped by user requirements, high school curricular demands, semantic use, and representation of data within the field of history, as well as historiographical visual models based on global history. In semantic terms, consolidated visual models, such as timelines, timetables, schematic maps, etc., acted as guiding points for cognitive models that might be more familiar to users when considering visual language. The proposal was also constructed from requirements extracted from similar initiatives of temporal visualization, as we previously described in Oliveira and Bueno (2021). In this particular paper, we investigate a diverse range of time-space visualization tools and extract patterns regarding the representation of information. Some of the investigated aspects comprise the configuration of the time axis, specific time scales, digital affordances for mediating usability, color schemes, pictorial patterns, etc. The study shows that, across the decades, representations of time and space have been improved by reducing the level of data complexity, which was especially impacted by the transition from print to digital devices, the latter supporting more graphic diversity and customization.

We highlight the fundamental contributions of Braudel (1990; as cited in Ribeiro, 2010), Jordheim (2014; 2012), and multiple authors to the conceptualization of a more concrete perception of historical time, considering its abstract nature. From a more structural standpoint, time might be illustrated as a complex system of layers (multi-temporalities) organized according to their duration. While long-duration occupies the structure's base, short-term events occupy the top and thus articulate comprehension of time according to its social time and transformation expression. From a narrative standpoint, this visualization might unveil the contradictions that emerge when applying physical time logic to human experience, as discussed further in this paper. Nevertheless, structural models, such as layered models, offer a solid visual approach from an information design perspective when confronting different areas of study.

As a matter of visual literacy in high school, special attention was necessary to reduce complexity when analyzing preferred models for time visualization. For that, Engelhardt's (2007) and Meirelles' (2013) constructs on the presentation of graphic language were fundamental to addressing the horizontality of diachronic time in a Western setting, considering the reading direction from left to right. In this case, Chavez and Garcia (2014) also highlight that Brazilian students tend to prefer a diachronic, sequential presentation of events in history since didactic books, booklets, and classes tend to be structured that way. Because of this Western tendency, a new vertical axis emerged after establishing horizontal diachrony as a starting point, along with layers of duration for adding a systemic dimension to time visualization. Estaville Jr. (1991) and Silva (2012) describe this verticality as the axis of simultaneities (synchronism) that cross sequential time in time frames to be specified by each context, which adds a third dimension for information.

Considering the low complexity of the tool, the final conceptualization of its graphic space allows two different diachronies since this is the minimum number for allowing a synchronic time frame. It also became imperative to consider that teachers, overall, do not feel comfortable producing diverse graphic language (Coutinho & Lopes, 2011) or utilizing complex graphic language in technological devices.

Therefore, structuring the graphic space of the tool followed a few practical-theoretical guidelines, which are described below:

- Establish the concept of diachrony as a horizontal axis and the concept of synchrony as a perpendicular or vertical axis. It is important to recognize the interdependence proposed here between the two axes and how systemic learning might be aligned with BNCC competencies;

- The graphic space is segmented into two diachronies, adding a fourth dimension of comparison: one for local/national contexts and one for global contexts. Although this option is deeply influenced by global history historiographic practice, this choice is also aligned with time-space delimitations for the humanities itinerary in BNCC. Timelines still might work as a system of layers of duration, hence displacing long duration to the bottom and events to the top;

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- Distortion of linearity is then considered as a method for delimiting the graphic space in a finite structure that revolves around itself, oriented from left-right reading, similarly to volvelles. As Helfand (2002) described and was complemented by Krzywinski et al. (2009), the circular model offers different levels of data resolution, which acts as a mediator for complexity. Distortion of horizontality (diachronism) also displaces the synchronic axis in a radial configuration.

Figures 1, 2, and 3 illustrate the proposed graphic space and its organization:

Figure 1
Organization of the tools graphic space according to national or global contexts and layers of time for each diachrony.

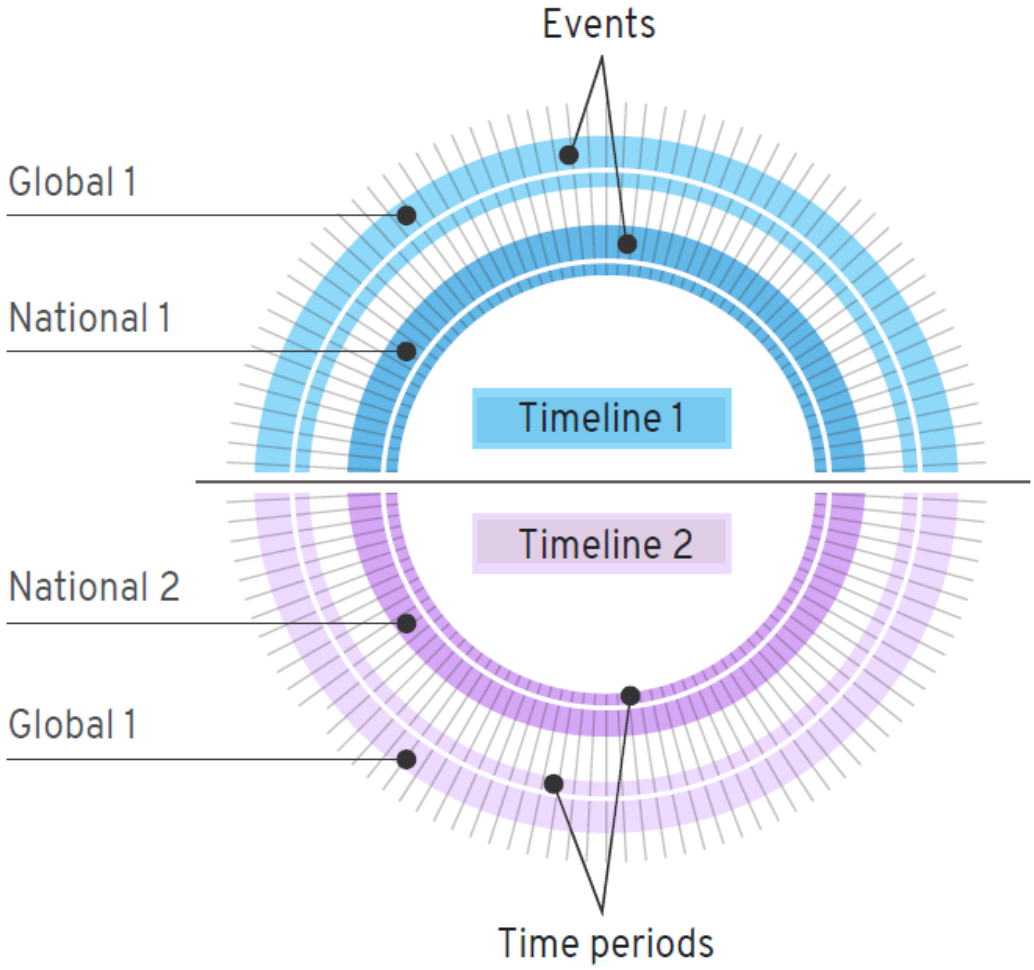

Figure 2
Placement of synchronic and diachronic axes in the tool's graphic space.

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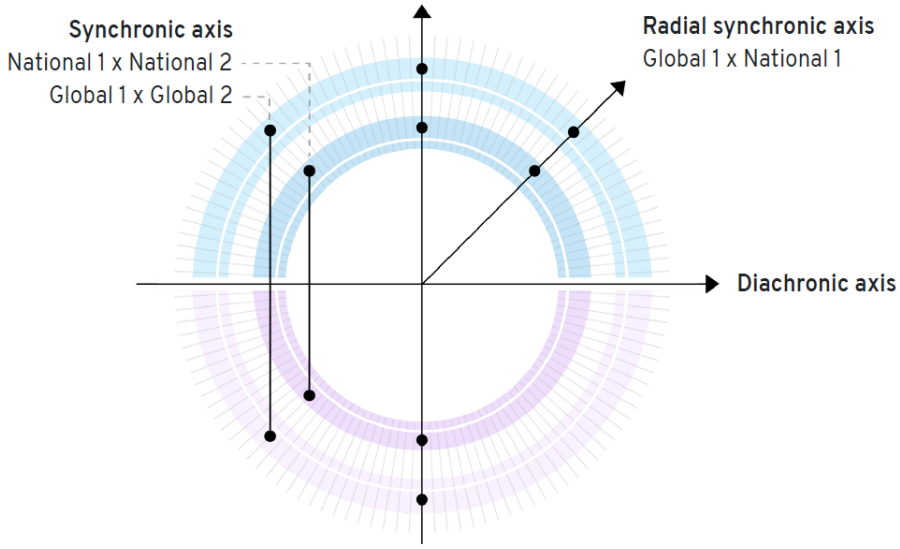
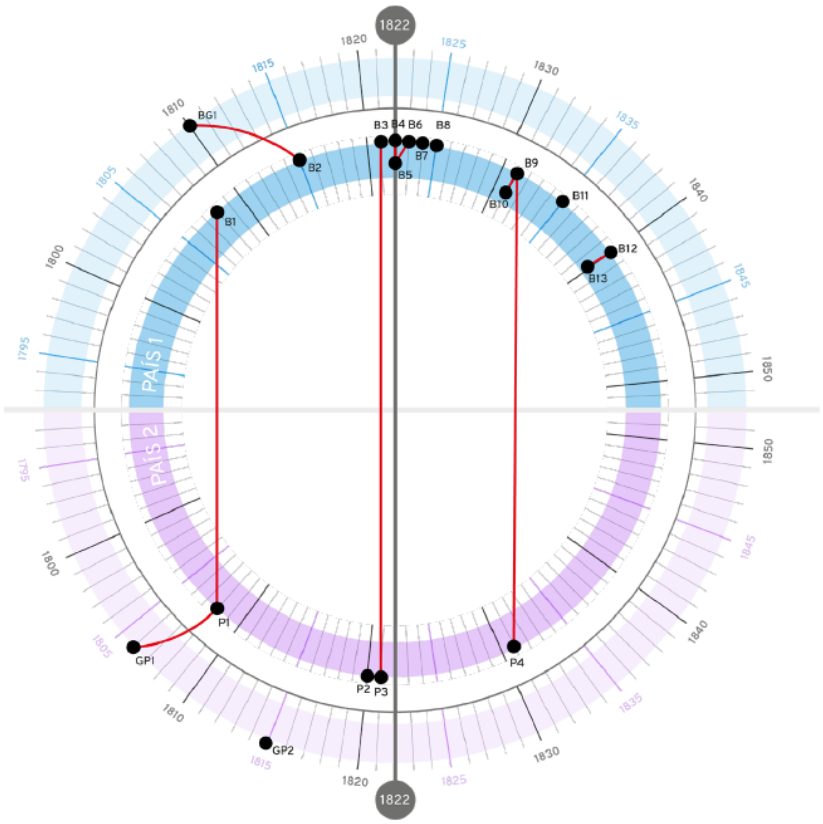


Figure 3
A preliminary version of the tool's use. Codified dots consist of events connected by red segments indicating relations between them.



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After structuring the graphic space, we proceeded to user evaluation in order to understand how teachers and students relate to this particular visualization tool in a school context. We describe the evaluation methods in the following section.

User Evaluation

Methods

Although aligned with consolidated models of time visualization, the layers of information in the graphic are also based on punctual interventions on linearity and placement of axes. This approach is complemented by curricular demands, including spatial frames of local and global contexts. However, while individually, each requirement is aligned with a particular approach to historical data, it was still unclear whether, altogether, the composition would operate on a significant logic for users. We conducted user evaluation with the target audiences, focused on two main objectives and dynamics:

- **Dynamic 1:** given basic instructions on the tool's functioning, investigate if teachers and students were able to read and interpret the information presented on the tool's graphic space through a set of comprehension questions;

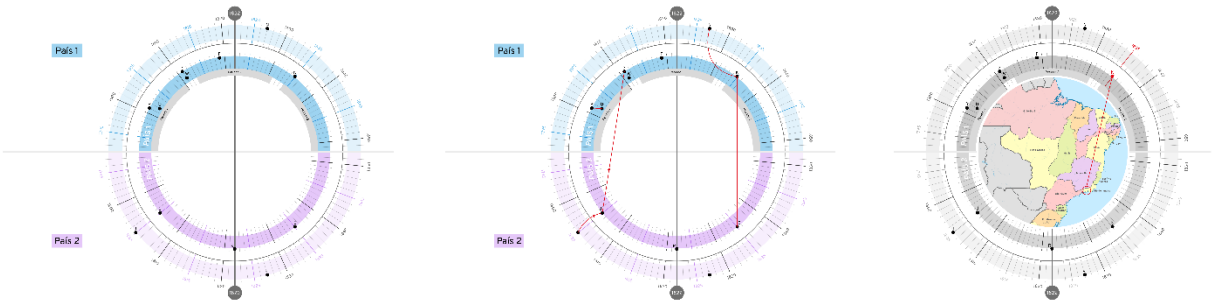
- **Dynamic 2:** from a given dataset, investigate if they can generate a graphic representation in the empty graphic space through a short task analysis.

Considering the pandemic as a limitation for interaction between researchers and users, we opted to evaluate with a control group consisting of three high school history teachers. To compare the dynamics with students, the control group also included one high school student.

Each participant was consulted individually through a one-hour online call. The provided datasets included random codified events around a specific time frame, revolving around 1822 (the year of Brazil's independence from Portugal). Each dynamic was conducted remotely through collaborative websites, such as Miro and MURAL, while participants were asked to verbalize their actions when completing dynamic 2. In the end, participants were invited to offer feedback and express specific moments of their experience. Figure 4 illustrates three different visualizations presented to the participants during the first dynamic:

Figure 4

Board with three different visualizations presented to participants during dynamic 1 for comprehension evaluation.



Preliminary Results

During the first dynamic, all teachers understood the overall purpose of the tool, mainly providing correct answers for each comprehension question. However, some challenges were directly associated with the visualization of simultaneity between events in two different situations, such as global and local in the same context or local and local in two different contexts.

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It is important to address that, although the dataset was composed of a set of codified, unnamed events and periods around specific dates, teachers were able to recognize real events that could be associated with each dot in certain time frames. In this case, it was interesting to observe how previous knowledge was a solid base for confronting new visual methods, considering how, in order to bring new languages to the classroom, especially non-verbal ones, teachers must often break a cycle of the languages they were confronted with during their own learning experiences.

During the second dynamic, teachers faced difficulties regarding text legibility and contrast, which were corrected in the following phases of the study. Aspects that required more attention included difficulties in comparing synchronic and diachronic axes, as well as reading date marks, which were prioritized when promoting final adjustments to the tool's space.

Once again, teachers immediately expressed how certain codified events felt familiar because of certain dates, considering the 1822 time frame. While marking spatially and temporally close events, participants often externalized that "something very interesting was happening" in a particular context. This expression may imply that, although they may not have had experience with the tool, graphic language offers an intuitive communication based on graphic variables offered by consolidated tools, such as maps. In this case, Bertin's (1967) contribution to the semantics of graphics representing spatiality allows us to wonder if the rupture with traditional timelining is more of an exercise of visual literacy as a pedagogical practice, rather than a radical, repetitive challenge of "reinventing the wheel", as Helfand's (2002) book title on volvelles might suggest.

When evaluating the student, the results were similar as they faced no significant difficulties while interpreting or constructing the visualization and addressed each question or task with agility. Unlike the previous participants, who experienced technical difficulties in the collaborative website, the student seemed familiar with the affordances of the digital devices, such as the ability to zoom in and out, despite not having previous experience with it. Conducting the process remotely presented challenges already mapped by authors such as Coutinho and Lopes (2011) regarding the insecurities of bringing digital technology to school.

Although more confident in mastering the graphic language of the tool and utilizing the digital devices available, this particular student also felt more confident in promptly interpreting the data and making sense of the connections between what was being presented. However, they could not make intuitive associations with actual events in the same way the teachers did. In this way, previous knowledge of visuality and digital technology might have acted as a mediator between the proposed model and the presentation of information for them, perhaps complementary to how teachers experienced these factors, and vice versa. In conclusion, for now, we question if the teaching-learning dynamic could be enriched by bringing teachers and students together to collaboratively create the visualization until developing enough familiarization with it. Otherwise, we could present a mutual obstacle for both parts and require a second mediation device, such as an explicative guide or a tool kit.

Time Visualization for the Learner: The Continuum Between Structural and Narrative

The early process of the tool's conceptualization required an approximation with historiographical practices to extract visual models already familiar to the visualization of historical time and space. However, this approach also required considering the challenges faced by history as social science, especially regarding how one might confront the perception of space-time. According to Burke (1992), temporal information can be treated as a narrative expression or a structural construct. The narrative expression is focused on a micro-frame, considering the narrative as an intrinsic dimension of the succession of events in social time (Burke, 1992). The structural construct is a more macro-frame, with the time of events (short-term) only becoming significant when inserted into the time of structures (long-term, hence the layer at the bottom of multi-temporalities) (Burke, 1992).

With that in mind, we highlight that, while the proposed didactic tool is deeply rooted in visual models with rather "crude" graphic language and thus promotes straightforward and structural connections between its graphic elements, we find it helpful to discuss visual learning on its own terms. In the tool, events are

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marked as dots, periods as thick lines, and connections between them are indicated through rigid lines that imply a cause-consequence relation. When compared to Burke's (1992) definitions of narrative and structure, we understand that the tool's visualization offers a simplistic representation of the complexity of events. While we find this simplification consistent for a mediation tool in the high school context, it might limit the creative interaction between the teacher or learner and the graphic language. The narrative becomes reductionist by delimiting rigid structures and elements, and users might understand that their interpretations are not relevant to the final visualization. Additionally, we understand that the different focuses, micro-, and macro-frames, are relative to the approach for the study of the past (Burke, 1992) but are not necessarily favored equally in the tool's graphic space.

Likewise, Burke (1992) also proposed that narrative and structure might act as two extremes of a continuum, with a wide margin for possibilities in the middle. Some teachers participating in the early phases of the study explained that there seems to be nothing wrong with the regular timeline as a tool for enriching the experience of historical learning. On the contrary, the challenge is utilizing it critically to allow students to ask why they face such a linear, arithmetic perspective of time when each individual conceptualizes time frames according to their own experiences as human beings (Pschetz & Bastian, 2018).

Although we find it counterproductive to map the exact intended uses of the tool expressed by teachers and students, the alternatives raised by the participants were surprisingly diverse. The range of ideas brought to us during and after the evaluation involves multimodal aspects of visual literacy, offering a visual alternative for learning and an experience of social expression and critical thinking. Expanding the discussion in this direction recognizes that visual language is widely open to cultural context.

Participants suggested that the graphic space should be projected or printed on more extensive surfaces to create a collaborative discussion space. While describing bringing students to write and draw on the chalkboard, one teacher found it interesting that a delimited space with clear rules and perhaps a graphic toolkit might help mediate the relationship with learners. In some sense, we speculate that a rigid time structure can provide more agency for users in developing visual literacy by defining a more direct path for constructing the visualization in accordance with linear, horizontal timelines present in didactic books in Brazilian high school. In this way, we might assume that by "intuitively" knowing how to fill in the data, teachers and students would be more comfortable interacting collaboratively with graphic language, but further investigations with the tool are necessary to address this hypothesis.

Based on the BNCC requirements, participants suggested remixing the timelines with their perceptions of lived experiences in order to historicize them. In the early stages of the research, while consulting a diverse range of alumni of different ages, we learned that, both in the private and public school system, at least a quarter of the participants could not understand themselves as part of a historical narrative. For them, the past occurred long ago and was far away from their realities. It is motivated by this premise that the duality between narrative and structure becomes such a critical approach since individuals' lives operate through the narrative lens (Burke, 1992).

Recognizing that a structural tool might not suit the critical learning challenge faced by teachers in a moment of curricular change is an important starting point for considering the next steps. Not only does positioning students' diachronies in the synchronic frame mediate critical learning through visuality, but it also triggers autonomous visual expression and metacognition.

As Padovani (2012) depicted, significant learning comes as a sum of active channels incognition. Mental models are not necessarily composed of straight lines, symmetric dots, standardized color schemes, or perfectly organized axes and layers of time. Indeed, it is necessary to expand the tool to other methods of visual representation of information and rupture with the rigidness of statistical visualizations. In this case, we glimpsed methods such as collective mappings (Risler & Ares, 2013) and line-expression drawing (Orland, 2002).

As described by Orland (2002), line-expression drawing reinforces the semantic potential of the line, a borrowed approach from psychology, in which individuals are invited to express their own journeys (e.g., professional, personal, academic journeys) as continuous lines. In the tool's case, dots, lines, and areas,

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as basic graphic elements, are then subject to this semantic potential, supporting the use of graphic variables (e.g., texture, form, opacity) to signify properties of visual language. The connection between events, for instance, symbolized as straight lines with arrows, might then be twisted, broken, braided, distorted, or rotated. Each author is free to interpret its symbolic meaning as a part of historical learning, thus utilizing visual language as a connector to their previous knowledge, which is also outlined by cultural learning (Boughton, 2007).

Another consideration is collective mappings, community-driven regional maps, which often foment social mobilization debates, as conceptualized by the Argentinian group Iconoclasistas (Risler & Ares, 2013). The process is mediated by visual resources, such as iconographic kits. The results are often dense with plenty of data and hand-drawn registers, which show the nuances of the debate among participants. Over printed maps, collaborators compose their own geographies of time and space, reinforcing debates over anti-colonial information models. In this particular case, we understand that expanding the collaborative nature of the tool and its semantic structure is an essential dimension for dealing with information inside the social humanities.

Finally, Pschetz and Bastiani (2018) argue that design dialogues with time visualization are based on the same assumptions raised by Jordheim (2012): that it is necessary to recognize time in its multiplicity in order to understand the complexity of different socio-cultural realities of human societies. Such a position can be understood as a reaction to globalization's universal and mechanical time, an imposition of impersonal time. Recovering social time while simultaneously discussing its universal nature "allows a more specific focus on issues of ethics, equality, power and social coordination" (Pschetz & Bastian, 2018, p. 170). Reaching such a transformative sphere with visual language is a challenge for contemporaneity.

Conclusion

The challenge of a holistic education is a broad, open question to which multiple answers seem to fit but to which few seem to function in reality. Although new curricular demands within Brazilian high schools reaffirm the compromise with the diversification of languages, structural and cultural aspects challenge their rhythms and implications of teaching and learning relations.

When proposing whether visual models would help mediate this transition for the humanities curriculum, we argue that no direct response is sufficient to address the full complexity of the question, albeit the promising results from this study might indicate optimism in reconciling historical literacy and visual literacy. Our research indicated that users were eager to use prior knowledge and experiences – with information, technology, etc. – to form a solid base for facing these challenges. Therefore, visual language might be rooted in intuitive learning because of consolidated models, and perhaps this learning can be redirected toward other sorts of data.

Finally, we expect to deepen our understanding of these preliminary observations and expand our experimentations with the proposed tool and graphic language as the shifting new curriculum is gradually and officially implemented in 2022.

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Footnotes

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Visual Literacy and Reflective Visual Journals

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Abstract

This paper explores the contribution of reflective visual journals to our understanding of visual literacy. The discussion is based on a phenomenographic analysis of 232 reflective visual journal entries and a thematic analysis of nine interviews with student participants in an undergraduate visual culture class. Reflective visual journals require students to reflect on, analyze, and produce their own images in response to their learning about visual culture. The paper calls for a systematic study of visual reflection as a visual literacy experience. It discusses "concept re-enactment," a visual reflective practice that results in the performance of a concept or an argument. This practice complicates our assessment of visual literacy skills as concept re-enactment is not fully captured by students' visual production. This study, therefore, argues that concept re-enactment reveals visual literacy as a multidimensional experience involving practices that are neither fully "visual" nor captured by the notion of visual competence.

Keywords: Visual reflection, reflective visual journals, visual skills, visual competencies, concept re-enactment

Introduction

For nearly 50 years, the definition of visual literacy has been contested ground, dominated by discussions of visual competencies, abilities, and skills. Fransecky and Debes (1972) laid the foundation of future scholarship by defining visual literacy as "a group of vision competencies" that "when developed, enable a visually literate person to discriminate and interpret the visual actions, objects, and/or symbols, natural or man-made" (p. 9). More recently, the Association of College and Research Libraries (2011) defined visual literacy as "a set of abilities that enables an individual to effectively interpret, evaluate, use and create images and visual media" (para. 2). Contemporary discussions of visual literacy have challenged the original emphasis on abilities and skills to focus on practices that promote enhanced representation, diversity, and inclusion (Thompson & Beene, 2020). For instance, Serafini (2014) defines visual literacy as "a contextually grounded array of social practices enacted in particular settings for particular purposes" (p. 20). As Serafini (2014) contends, this is a shift from a view of visual literacy as a set of abilities that individuals acquire to a focus on what individuals do (p. 19). While this focus on practices certainly enriches the discussion of visual literacy, this paper proposes visual literacy practices as constituting a learning experience.

In a comprehensive review of definitions of visual literacy, Kędra (2018) identified three main groups of visual skills discussed in the literature: visual reading skills, visual writing skills, and "other" visual literacy skills (p. 74). The first group encompasses a wide range of reading practices such as understanding the grammar of visual language, the interpretation of components of images, the evaluation of visual messages, and the translation of visual messages into verbal language. Visual writing refers to image production for self-expression or visualization of abstract concepts. Finally, under the broad label of "other visual skills," scholars have identified visual thinking and the visualization of concepts as some of the abilities that are not easily captured by visual reading and writing.

Kędra's comprehensive review makes evident the absence of direct references to visual reflection in discussions of visual literacy. Therefore, the goal of this paper is to bring visual reflection to the center of the discussion of visual literacy because it reveals visual literacy as a multidimensional learning experience rather than a set of competencies or skills. This conceptualization of visual literacy as a multidimensional experience is already present in discussions of visual literacy within the field of visual culture, such as Dallow's (2008) definition of visual literacy as a "visual complex," an experience that is "complex, multidimensional, and embedded within a range of visual, cognitive, aesthetic, and nonvisual (emotional, ethical) dimensions" (p. 101). Therefore, to illustrate visual literacy as a multidimensional experience, I will discuss undergraduate students' experience of visual reflection in a visual culture class.

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Visual reflection

Visual reflection is a learning experience that involves reading, writing, thinking, and feeling with and through images. Bertling (2019) defines visual reflection as the use of visual imagery "where subject matter, materials, techniques, and compositional elements can communicate meaning metaphorically" (p. 28). Discussions of visual reflection often approach visual reflection as a pedagogical strategy in art teacher education (Bertling, 2017; Hofsess, 2015; McDermott, 2002). In this context, visual reflection facilitates students' growth as reflective practitioners (Schön, 1991). While significant, these studies conceptualize visual reflection as pedagogical rather than as a visual literacy practice or experience. A noticeable exception is the work of Loerts and Belcher (2019), which explores the development of more complex views of literacy through visual journaling in an undergraduate education program. The study includes semi-structured interviews with teacher candidates who report having experienced a broader sense of literacy through visual journaling.

The Association for Colleges and Research Libraries' *Visual Literacy Standards for Higher Education* (2011) briefly refers to reflection as a desirable learning outcome in the training of visual production. However, like the scholarship on visual reflection in art teacher education, the view that reflection is a strategy to consolidate visual production skills ignores the potential of visual reflection as a visual literacy experience.

Studies on visual reflection rarely examine visual reflection as a means to facilitate visual thinking. Arnheim (1997) defines visual thinking as the process of visualization necessary for thinking. It is a process through which we discover and express the structure and relationships between components that constitute our observed reality. Arnheim's (1997) definition is closely aligned with Dewey's (2007) view of reflection, which he describes as "an act of search or investigation directed towards bringing to light further facts which serve to corroborate or to nullify the suggested belief" (p. 9). Both visual thinking and reflection require the learner to observe and dissect experience to produce new meaning. In the case of visual reflection, the communication of meaning is done through visual means. The discussion of visual reflection as a process in which visual thinking happens allows us to think about visual reflection as a learning experience and not as a set of competencies or skills.

Reflective visual journals

Reflective visual journals combine reflection and visual expression in various media (Loerts & Belcher, 2019). They also promote critical and analytical skills while encouraging the articulation and development of students' voices (Hyland-Russell, 2013). Visual journals provide access to students' lived experiences and perspectives on their own learning (Grenfell, 2013; Sinner, 2011). Researchers also report that students who complete visual journals engage deeper and more holistically with course material even when they are not used to producing images (Deaver & McAuliffe, 2009; Hyland-Russell, 2013).

Visual journaling is a central technique of visual reflection (Bertling, 2019). However, as noted earlier, the discussion of visual journaling experiences rarely focuses on how visual reflection assignments might contribute to the development of visual literacy, even if reflection is assumed to be at the core of visual competencies such as interpretation, evaluation, and decoding. Similarly, discussions on reflection practices in education, including student journals, tend to focus on written reflection and seldom explore the potential effects of visual reading, writing, and thinking on student reflection (Andresen, Boud & Cohen, 1995; Langer, 2002; Mezirow, 1998; Schön, 1991).

This study contends that reflective visual journaling is not solely a pedagogical technique but a space where visual thinking happens. By focusing on 232 reflective journal entries completed by undergraduate students in a visual culture class, this study asks: What do reflective visual journals tell us about undergraduate students' visual literacy experiences? What are the competencies and skills that students mobilize in the production of their reflective visual entries? And more importantly, what can we learn from visual reflection, regarded as a visual literacy experience?

The study of undergraduate visual skills

Since the 2011 ACRL *Visual Literacy Competency Standards for Higher Education*, research on the teaching and learning of visual competencies in higher education has noticeably expanded, constituting most research

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studies in visual literacy (Thompson & Beene, 2020). Many of these studies discuss the impact of students' visual literacy training on areas such as meaning-making (Bowen, 2017; Gadelshina, Cornwell & Spoors, 2019; Thomas, Place & Hillyard, 2008), the development of students' identity (Sakr, 2019), science learning, particularly among biology students (Arneson & Offerdahl, 2017; Wiles, 2016), and the development of professional skills (Bentwich & Gilbey, 2017; Johnston, Parker & Fox, 2017; White, Breslow & Hastings, 2015; Yeh & Cheng, 2009). A common observation in many of these studies is that undergraduate students lack basic visual literacy skills despite being "digital natives" (Prensky, 2001). Students seem to struggle with both visual reading and writing skills (Brumberger, 2011; Metros, 2008). The situation is aggravated by a widespread academic emphasis on visual theory and analysis over undergraduate students' visual production and reflection (Elkins, 2008; Metros & Woolsey, 2006).

While many studies of visual literacy in higher education revolve around the impact of specific pedagogical strategies and artifacts to improve undergraduates' visual literacy skills, only a few prioritize students' perspectives and experiences. This paper highlights students' perspectives by asking:

> What are students' experiences of learning visual literacy through reflective visual journals? How do reflective visual journals contribute to students' learning of visual literacy?

Method

The present study was conducted between Spring 2020 and Winter 2021 in a second-year visual culture class for communication studies majors at a research-intensive university in Western Canada. The course is one of the few dedicated to discussing visual methods and visual culture theory in the program. The majority of students registered in the class are Canadian, in their early twenties, and have little experience in professional communication. The class emphasizes visual reading skills (e.g., image analysis, interpretation) despite the recent introduction of reflective visual journals.

A complete reflective visual journal consists of eight entries; each introduces an image produced by the student in response to a scholarly argument discussed in class and a brief written rationale that discusses the image produced (200-300 words). Students submit four entries on week six and the remaining four entries at the end of the term. Each entry requires students to reflect on a specific topic of visual culture discussed in class, analyze the images they produce for each entry and evaluate the impact of visual reflection on their learning.

An informed consent process occurred at the beginning of the Spring 2020 and Winter 2021 terms. Students were invited to share their reflective visual journal assignments and participate in qualitative interviews with a research assistant. The aggregated and anonymized data comprised 232 reflective visual journal entries and nine semi-structured interviews with students conducted over Zoom. Students were asked about their general experience completing reflective visual journals and their evaluation of the impact of the activity on their learning and the development of visual literacy competencies and skills. Participants were also asked to define visual literacy and visual reflection.

The reflective visual journal entries were analyzed using phenomenography, a method that consists of identifying and describing practices that constitute a collective experience, in this case, reflective visual journaling (Marton, 1981). The phenomenographic analysis consisted of coding learning behaviors as defined by Bloom (1956) (e.g., comprehension, application, analysis, synthesis, evaluation), feelings and emotions, visual production practices, and reflective practices present in students' images and written rationales. The initial coding followed the analysis of potential relationships between the different groups of practices identified (e.g., cognitive, emotional, visual, reflective).

The interview transcripts were analyzed thematically. The analysis involved the identification of surface and latent themes in the verbatim transcripts.

Discussion

Visual reflection as the experience of visual thinking

The thematic analysis of the qualitative interviews with student participants confirmed some of the anecdotal evidence that points to a systematic marginalization of visual literacy in academic education. The central theme that emerges from the transcripts is novelty: students regard reflective visual journals as new

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because they involve image production. This novelty is the reason behind students' initial apprehension and anxiety, feelings which were soon overcome when students discovered that the process of visual reflection facilitated the understanding of abstract concepts:

> It was certainly a new experience, I think it really allowed me at least to engage with a very creative medium […] So I think going with a creative visual journal [,] or reflective visual journal really enabled me personally to engage with the content […] So yeah, I think it created a little stronger understanding [,] I guess.

Reflective visual journaling facilitates understanding by prompting students to visualize abstract concepts and make connections to personal experiences and knowledge:

> When I usually do readings […], I'm writing things down like what's the main argument and like, you know, things like that. But this time around […] I also had to look for different things […] because we have to like [to] make something physical out of it, you know, something that we can see like in the world, you really have to connect it more.

Some students also regard the production of reflective visual journals as facilitating the retention of concepts. This retention is, for many, the result of engaging in practices, such as the visualization and analysis of images, that are unfamiliar and require a more active engagement with the subject matter. In fact, for many of the students interviewed, visual reflection required them to read, think, transfer knowledge, and translate their ideas into visual form. This finding seems to echo Arnheim's (1997) call to reconcile the perceptual and intellectual realms and consider that thinking always involves visualization. In this context, visual reflection is a learning experience that invites students to engage in visual thinking.

The phenomenographic analysis of the reflective visual journal entries confirmed students' views of visual reflection. The visual reflection exercise led to the identification of multiple cognitive practices, such as analysis, evaluation, verbal reflection, visual argumentation, and emotions connected to both the subject matter in the written entry and those triggered by creating their visualizations. The analysis of visual production practices revealed that students could produce independent visual arguments by editing pre-existing images, creating collages, drawing, and taking photographs. However, most entries introduced images that were dependent on a written rationale to communicate an argument. This is not a surprising finding considering that reflective visual journals were new and unfamiliar for most students because they required the visualization of arguments. In sum, the centrality of verbal communication in students' visual reflection entries and their initial uneasiness with visual argumentation and reflection point to a systematic marginalization of visual literacy training in their undergraduate education (Bowen, 2017; Crouch, 2008; Elkins, 2008).

This initial phenomenographic coding of practices did not show any conclusive link between the complexity of students' visual argumentation and reflection and the quality of the visual output. In fact, many of the visual entries in reflective visual journals were not skillful in a conventional sense as they did not show strong drawing or digital composition skills. However, some of these entries visualized deep and sophisticated arguments and reflections. This finding challenges some conventional assumptions about visual production skills, which reduce visual production to craftmanship (Metros, 2008).

The phenomenographic analysis poses the question at this stage: Is a student's visual output the best indicator of visual literacy? And most importantly, can visual literacy be measured purely by evaluating competencies and skills? The lack of evidence of any direct link between the depth and complexity of the visual argumentation or visual reflection, and the quality of the image production, suggests that reflective visual journals may not directly improve visual production or craftmanship in the short term. However, the identification of visual reflective practice and *concept re-enactment* may complicate our understanding of undergraduate visual literacy and the role that visual reflection plays in visual education.

Concept re-enactment

The phenomenographic analysis of visual reflection revealed a practice that is present in just 15 entries out of 232 but that questions the definition of visual literacy as a set of competencies and skills. *Concept re-*

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enactment is an instance of visual reflection in which students engage in visual practices to experience a concept and/or emotion. As shown in Figure 1, the images resulting from *concept re-enactment* vary in quality. In this case, the student is responding to Susan Sontag's (2004) "Regarding the torture of others," first published in *The New York Times Magazine* that denounces the Bush administration's efforts to silence the scandal triggered by the publication of images of the torture of prisoners in the hands of the American military in Abu Ghraib. The figure conveys the student's attempt at digitally recreating a particularly well-known image from the series, which depicts a hooded prisoner balancing on a stool, his arms outstretched.

Figure 1
Example of concept re-enactment (planned)

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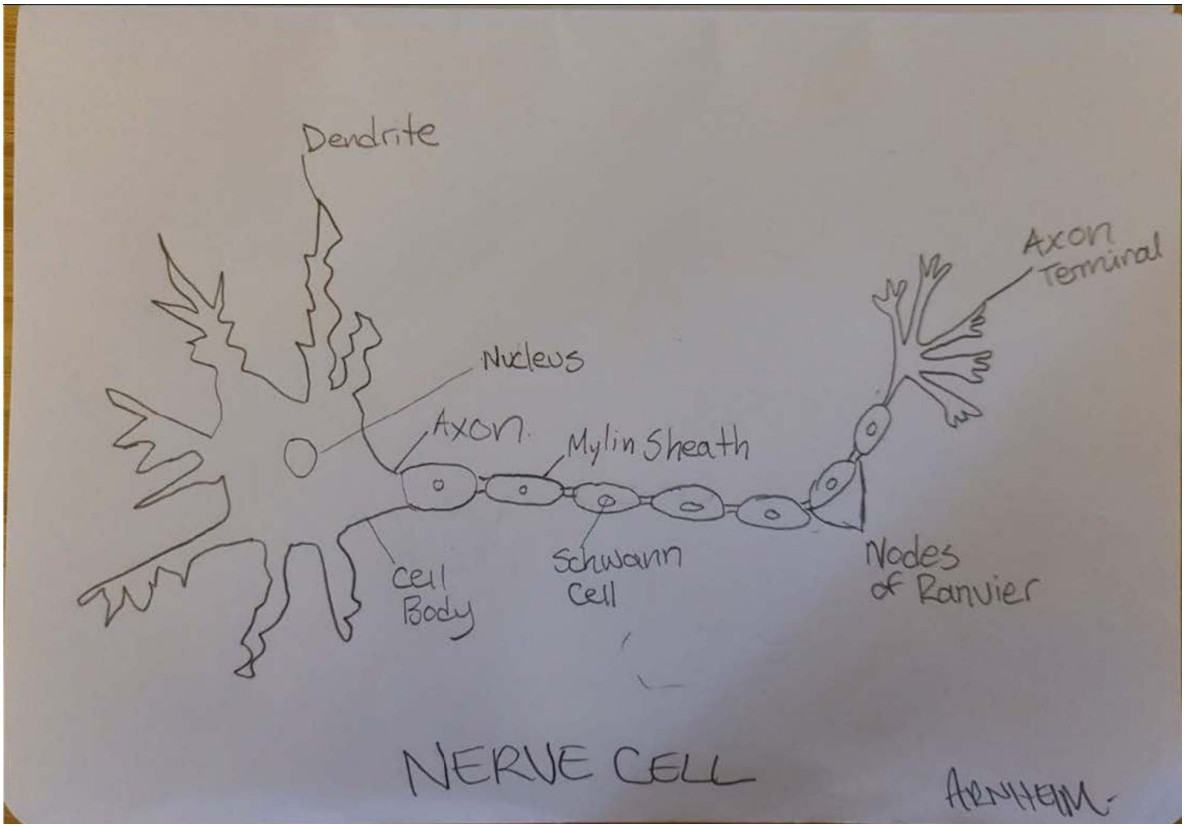
At first sight, the image does not seem particularly well-executed, but the reading of the accompanying text reveals that it is just a trace of a more complex process of visual reflection that happened before and during image production. The student reconstructs the image to experience the act of producing an image of torture and, thus, responds to the journal's prompt for that entry: "What are the ethics of seeing?" The written text also indicates that the reflection was planned as a *concept re-enactment*:

> My experience of creating this image was calming, as I found myself beginning to become more comfortable with my relationship towards the original photograph throughout my experience of appropriating it. This offers a controversial thought that the perpetrator may have begun to separate themselves from the real act through the appropriation of the act through being photographed.

Concept re-enactment is not always planned. In Figure 2, the student engaged in an unplanned performance of Arnheim's principles of visual education: "observing, thinking, and forming" (Arnheim, 1997). Unlike the previous example, there was no explicit discussion of a planned re-enactment, even if the student felt the need to go "through the motions" to respond to Arnheim's argument.

Figure 2
Example of concept re-enactment (spontaneous or unplanned)



The act of drawing a nerve cell allowed the student to perform Arnheim's principles. Nothing in the figure suggests that this is a performance – instead, the image is conventional and shows rudimentary drawing skills. However, the student acknowledges having a better understanding of Arnheim's discussion by drawing this image:

> I mentioned above that the act of drawing this image helps to reinforce the "abstract" learning I have done about the nervous system. It gives context to that knowledge. It also helped me to see what Arnheim was talking about. I felt his ideas on perceiving, thinking, and forming were also a bit

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> abstract, but through going through the motions on making this drawing and reflecting back on [it], I was able to see what he meant.

This spontaneous re-enactment reveals visual reflection as a process that is not fully captured by the characteristics of the student's visual production. The student draws the image responding to Arnheim's (1997) discussion of the importance of visual thinking in science education. Arnheim (1997) highlights the importance of teaching students to observe and illustrate scientific phenomena to foster their understanding and thinking of scientific knowledge and processes, so it is not surprising that the student reproduces a scientific diagram possibly learned in high school. However, this initial connection becomes experiential once the student reflects on the act of drawing the nerve cell:

> When I see, and specially [*sic*] when I draw a nerve cell [,] the different pieces and their purposes become apparent. I can see the nodes of Ranvier, where electrical impulses jump and understand how the nervous system can work so quickly.

Both examples of *concept re-enactment* clarify that visual reflection is multidimensional and involves visual reading, writing, and thinking skills. However, an enumeration of these skills is not sufficient to capture the visual literacy experience facilitated by visual reflection.

An interesting aspect of *concept re-enactment* is the presence of what Adrienne Rich (2021) has called "thinking through the body." This means that when students engage in *concept re-enactment*, they don't just ponder or contemplate but embody concepts. This embodiment of reflection suggests that visual reflection might encourage some students to move beyond Western and patriarchal modes of knowing that privilege objective observation and abstract reasoning to engage with feelings and sensations anchored in the body (Michelson, 1996). For instance, a student responded to a reading that discusses the mediation of photography by taking a selfie and reflecting on the distance between the experience of taking a photo and the feeling of being objectified by it. The student notes:

> I am not used to being both a viewer and a subject of a photo as it's being taken [;] it is a strange form of labour trying to wrangle your own body and surroundings into an acceptable position to take a photo. I spent a lot of time fiddling with the angles of the mirror to get them in the right position to reflect me on both sides. It felt a bit surreal honestly [.] I usually avoid photos because they make me feel self-conscious and can make my anxiety flare up a bit [;] that feeling wasn't as pronounced when I was creating this image since I avoided including my face.

The written entry describes the physical struggle of framing the body before the camera. This experience of physically *laboring* to achieve the desired result enhanced the student's understanding of how technologies of vision shape our bodies and minds. In this context, the visual reflection becomes an opportunity for the student to relive and bring awareness of knowledge that is already "rooted in the body" but may have been untapped until then (Michelson, 1996). In this context, the image does not document but serves as a *trigger* and *trace* of performance.

The analysis of *concept re-enactment* suggests that visual literacy extends beyond the students' ability to read and write visually. When students visually perform a concept, they engage in experiences that require them to produce, analyze, evaluate, feel, and perform with and through images. The practice of *concept re-enactment* also reveals visual literacy as a complex experience that revolves around visual texts but is not limited to them. This practice has direct consequences on assessment, as the focus may have to move beyond what students *do* with images to how students *experience* visual thinking.

Conclusion

The analysis of reflective visual journals and students' views of visual reflection make evident that visual reflection is a powerful learning experience that facilitates students' understanding of abstract concepts by promoting visual thinking. Visual reflection also contributes to students' learning by inviting them to engage with concepts in a more personal and concrete way.

Regarding the potential of visual reflection to improve visual competencies and skills, the data analysis did not yield any clear link between visual reflection and proficient visual reading and writing. This dissociation between the depth and quality of visual reflection and the quality of the images produced suggests that students' visual outputs do not fully capture the experience of visual reflection. There is more

in the experience of visual reflection than the production of images. However, the fact that visual reflection promotes visual thinking and, in some instances, the performance of concepts in visual terms (*concept re-enactment*), indicates that visual reflection enables experiential learning through engagement with visual skills and competencies. Future studies of visual reflection should explore the long-term impact of frequent visual reflection on the development of visual skills.

The fact that visual reflection is a visual literacy experience in which visual texts are not always central invites us to reconsider our assessment of visual literacy focused on visual competencies and visual texts. If visual literacy is something we learn by doing and not only a set of skills, being visually literate should also be measured by the complexity of the practices we engage in and the risks we are willing to take rather than just by the proficiency of our visual reading and writing at a particular moment.

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Cognitive Empowerment

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Abstract

Due to the exceptional situation left by the war in Syria, a huge number of Syrian refugees are lacking the proper education. As a result, the International Cultural Academy has decided to take the initiative to design a special program based on the elements and tools of visual language to help these refugees raise their awareness and capabilities and thus compensate for the severe shortage in the knowledge field. This training program is designed in an unconventional way, so that it is dealt with interactively, and there is still a room for development. We started working on this program short time ago relatively, through workshops that included refugee women from several countries, and the result was very positive, but we still need more time so that we can evaluate performance and accurately monitor the results.

Keywords: Visual Literacy, Visual Language, Education for Syrian Refugees.

Introduction

Since the beginning of my professional photography, I raised the slogan of spreading the culture of the image. I worked and participated in many exhibitions inside and outside Syria. I was keen to participate in festivals in particular because the viewership rate is high due to the large numbers of visitors, which achieves the goal of the slogan that I raised since the beginning of my profession. When I moved to Turkey due to the war in Syria at the beginning of 2014, I started thinking about how I could be useful and help refugees in general and Syrian refugees in particular.

Before I started my journey with visual training, I observed the general situation and researched the problems related to education. The idea of visual education came first, through the beginning of my work in 2015 in a humanitarian organization called (Al-Sinkari Foundation for Humanitarian Works, which later became “Onder Organization”). It had several development projects aimed at helping Syrian refugees. It also held training courses in several cultural, artistic, and sports fields, including a training program on photography. The organization commissioned me to establish the photography program based on their knowledge of my experience of more than 35 years in the field of photography.

I did not want to teach the traditional program for photography because I felt that I would not add anything new to this field. Especially since anyone who wants to learn photography techniques can learn that easily through the Internet where there are thousands of videos about this subject. So I thought of a more useful job which is a training program that would integrate teaching photography techniques with the rest of the cognitive visual education tools, and create a simplified program for training. It was based on my experience in documentary photography. The fact that this type of imaging is intertwined with all topics related to all walks of life will make it unique and add more value than traditional photography programs.

I had several challenges with this program, which is identifying the appropriate segments and age groups. Bearing in mind that the logistical possibilities were limited, and we could not train all those who needed it. In addition, there are very few organizations specialized in these programs especially photography, and the courses were short, unsustainable, and did not achieve the desired benefit.

Therefore, and based on these data and information, I began to work and was able to identify two things: 1) The segment most in need of education; and 2) Creating a new method for training for the new program. However, two of the most peculiar challenges were historical and unusual.

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Part One (The Historical)

Since the mid-sixties of the last century, educational curricula in Syria and at all schools and universities levels have only been developed or renewed to a very small extent, with a complete absence of visual development in terms of explanations within schools or educational books in general.

Even the new information that is supposed to be constantly updated within the purely scientific materials was not updated in the way it was supposed to be.

For example, in many countries, educational curricula are modified almost every year, according to scientific developments and new discoveries for each subject taught in mathematics, physics, chemistry, and natural sciences. However, it did not happen in Syria, and it led to that me and my son having studied the same curricula with an updated difference of no more than 5% for all the subjects I mentioned earlier.

In addition, there are no pictures, charts, or any graphs within the book for any of the important scientific materials explaining the subject to be taught, and if any it is poorly printed and colorless.

Likewise, there is no development of educational methods or models. For example, the math or science teacher and through their entire teaching carrier will not undergo any courses to develop his/her teaching methods, and no modern experiences are added. Thus, the situation remains as it is, and unfortunately it is not only limited to the teaching field but across all fields even with sensitive professions like doctors.

Of course, all of what was previously mentioned applies in one way or another to most Arabic-speaking countries in varying degrees. The general line of education is almost the same for everyone as backward indoctrination education systems, devoid of any visual culture as well.

All the prestigious universities in the Arabic-speaking countries, such as Damascus University, Cairo University and Baghdad University, have lost much of their scientific status as an academic classification during the past 50 years. Almost all of them have sank to the bottom of the global ranking of universities worldwide. It is even mentioned in the periodic annual reports issued by United Nations organizations in this regard, for example there are 6 Arabic-speaking countries are outside the education quality table: Iraq - Libya - Sudan - Yemen - Somalia - Syria.

Part Two (The Unusual)

After the popular uprising for change, democracy, and the creation of decent livelihoods for people started in 2011 in Syria that was followed by the war. Millions of Syrians were displaced inside and outside Syria. Over 6 million of them left the country mainly for neighboring countries like Turkey, Jordan, and Lebanon in addition to several other European and non-European countries.

Turkey had the largest share of these forced refugees, and their number has reached approximately 3,600,000 refugees so far according to the latest statistics of the United Nations in 2020, distributed among all Turkish regions and cities.

We can see the extent of the problem with this huge number of war victims. These victims need all the necessities of life including food, housing, social services, health, education, and means of integration to adapt and get used to their new life and integrate with the host society.

Despite all the efforts of the Turkish government to help these refugees, many problems have not been resolved. The most important one is finding job opportunities for those who are able to work (most of them are young people with incomplete education). The other important problem is the inability to secure educational opportunities for everyone due to administrative reasons related to the regulations and laws of the Turkish government on the one hand, and the lack of interest in education among good segment of refugees on the other hand.

The most difficult barrier for all of these refugees was the language barrier. Despite the commitment of a large segment of them to education, but many of them were also unable to learn until, and from different age groups especially women for several reasons mostly economical and social.

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The social ones are related to customs, traditions, inhibitions, and taboos which still strongly control the Syrian refugee communities.

Hence, everyone had to work to find solutions to this intractable problem, and despite the presence of many humanitarian organizations that responded to help find a solution to this problem, almost everyone failed and could not achieve any real and tangible success.

Visual Training Program Phase I

My work on the training project started on 01/04/2015. At that time, I started preparing a detailed and integrated project plan. I wanted to combine visual culture with conventional education in photographic techniques.

The preparation period took about 20 days, and this of course was not enough time to prepare a project like this, but it was enough for the beginning, and then building and completing what was missing later.

I continued gradually working on building the program, and every time I finished one stage I moved to another stage. The duration of each stage is three months, and each new stage is linked to the previous stage in terms of basic information, which came extensively in the later stage.

As a final result of that period, a visual training curriculum based on an academic basis was established based on an unconventional group interactive method with the primary goal being capacity development. The program information was as the following:

- A class with 25 students maximum between 15 and 25 years of age.
- Work on this program started on 20/04/2015
- The duration of the program for one stage is 3 months
- 3 hours per day, 6 days a week, during the summer.
- 6 hours per day, on weekends during schools.
- The largest number of students came to us during the summer holidays, and was divided into two groups.
- The materials included in the tutorial schedule were as follow:
  - Photography training classes
  - Photoshop training sessions
  - Psychological support classes based on photography as a support material (for students who came from war zones)
  - Life skills development and teamwork training
  - Practical photography sessions inside and outside the classroom
- Various excursion classes that include different places such as:(Museums - archaeological sites - libraries - old neighborhoods and markets)

After the first stage, the second, third, and four stages were designed and developed, which included advanced information in all program subjects. Following the basic stages, there were different qualitative stages that included different topics for the students who went through the whole program.

The graduation project for any stage of the program was an exhibition and a documentary film on a specific topic to be worked on in the last two weeks for each stage. Of course, the subject of each stage was commensurate with the technical and cognitive level reached by the students and differed according to the stage. The subjects of the exhibitions were varied and included nature, heritage, archaeological sites, and portraits. I must add also that I noticed the passion of this age group for learning photography, and the exceptional ability to absorb and learn.

I work on this program until June, 15, 2019, because the organization decided to reduce the budget and stop all programs inside Turkey for logistical reasons.

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Immediately after that, I received a grant from Baytna Syria for a period of three months from 20-06-2019 until 20-09-2019 to do a visual project with a group of Syrian youth all of whom were my former students.

The topic and title of the project, Brilliant Souls, was determined by the students (*Empowering Syrian Civil Society*, n.d.). It represented the situation of Syrian children and the extent of their suffering in the countries of asylum, and the launch of a symbolic global message to help them.

The project was implemented on time and the result was a photographic exhibition executed by the group in a wonderful and professional artistic way, which generated a very good positive echo among Syrians and Turks. In addition, many Syrian and Turkish media and social media covered the exhibition's activities. However, due to the emerge of Covid-19 epidemic, work and physical contact stopped, and I had to pause work the training program.

Visual Training Program Phase II (Renamed later to Visual Literacy Program)

After the work stopped physically, I began to think about finding a training program that could be conducted either physically or online. The program would be broader in knowledge with greater benefit. I also considered publishing the program to reach as many people as possible especially youth of both sexes, and women in particular.

In late 2019, an agreement was reached between me and a friend residing in Germany to establish a cultural academy that conducts international artistic and social development activities, with the aim of exchanging cultures, artistic knowledge, and experiences between peoples of different backgrounds. In addition, it will help integrate immigrants and refugees into their new societies.

Indeed, the International Cultural Academy was established through a specialized team, and various work programs were designed, including photography, theater, cinema, plastic art, caricature, story, poetry, and human development.

Among the tasks entrusted to me was the design of a visual technical educational program for the Academy, which helps to raise the cognitive abilities. Meanwhile, at the beginning of 2020, I worked on another project through a six-month grant, with a cultural entity called Cultural Spaces supported by several European and Turkish parties and led by the German Goethe Institute.

Through this project, I began to thoroughly experiment with this program, and to develop it theoretically and practically. For detailed information about the project (see Appendix)

Summary

Through our goals in the International Cultural Academy in general and the Visual Literacy Program in particular, we always strive to develop our cognitive skills in a sustainable manner, and to provide the latest information to our students. Our main target is young people of both sexes in the first place. They are the least fortunate segment of the refugees in obtaining education and knowledge, and we hope to achieve this goal.

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Appendix

General information about the project:

- The project was implemented with a group of refugee youth of different nationalities: (Syrians - Iraqis - Palestinians - Yemenis - Somalis - and Turks)
- The number of participants were 85 young women and men.
- The topic and title were chosen by the participating group, “Eye in the Eye”.
- Project topic: The extent to which refugees are integrated and adapted to their new communities (pros and cons).
- The output of the project was a virtual photographic exhibition, executed symbolically through the type of silhouette photography, which gained more than 8000 views (*Eye in the eye*, n.d.).

After conducting the program I and the supervising team decided to expand the program and make it more comprehensive. We named the program “Capacity Building With Light (Abstract Awareness)“ and agreed to divide the program into two parts:

- The first part: an artistic educational channel on YouTube, which works to spread visual awareness in several ways.
- The second part: A training program for visual literacy based on scientific materials designed to raise cognitive abilities and intellectual skills, and to develop positive visual awareness that helps develop thinking, behavior, and problems solving skills.

Phases of the Project

1- Youtube Channel (Phase 1)

I have studied and prepared the type of materials, style, topics and method that I am going to present. I also studied similar materials and programs and started the channel on 01/16/2020. The goal of creating the channel is to spread visual awareness through cognitive, cultural, artistic, and aesthetic principles.

The episodes were divided into three main categories, educational, cultural, and introductory. The educational episodes included different lessons to teach techniques and types of photography, and later video shooting, and cinematography. Cultural episodes were concerned with teaching understanding and reading the image in various fields. While the introductory episodes were about artistic experiences of Syrian, Arab and foreign photographers, who have various artistic experiences in various types of photography, which contribute to raising the artistic and aesthetic taste of the recipient by watching different creations, and from different cultures that add a lot to the viewers' cognitive experiences in the visual field.

2- Training Program (Phase 2)

The training program curricula consisted the following chapters:

Chapter One (Visual Language):

- Define visual language.
- The psychological, educational and educational dimension.
- Requirements for learning visual language.

Chapter Two (Units, Elements and Tools of Visual Language)

Chapter Three: The Light.

- Light concept.
- Types of light.

Chapter Four: Color Theory (the concept of color and its connotations in all aspects of life).

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- The color wheel: concept and meaning
- Psychological meaning of colors.

Chapter Five: The Concept of Composition

Chapter Six: Body language.

Chapter Seven: Symbolism, Indirection, and Suggestion

Chapter Eight: The Conceptual Picture

So far, the program has been tested on two women's groups with promising results, and the program is still ongoing as pilot program for the coming periods to monitor and measure the results and the benefits.

Results of the project:

1- Phase 1 Results (Youtube Channel):

- The number of episodes of various content reached over 100 episodes.
- The number of views of the channel has reached over 62,000

2- Phase 2 Results (Training Program):

- The number of the beneficiaries of this training program during the period from 20-04-2015 until now has reached 483 male and female students, the percentage of females is 67%.
- The success rate achieved according to the educational standards set is 84%.
- Most of the students entered universities in various branches, with a number of academically superior students even over local Turkish students at the level of Turkish states.
- The groups consisted of Syrian, Palestinian, Iraqi, Yemeni and Somali refugee students in Turkey.
- Many students are still practicing different artistic activities in the field of visual arts, including drawing, photography and cinema.
- The program was also introduced online for 60 refugee women of different nationalities and countries of asylum (Syrian - Palestinian - Kurdish - Iraqi - Sudanese - Eritrean - Somali)

What is required to continue developing this program in a sustainable manner?

- Finding information, experiences, and academic researches that can add new values to the program.
- Creating modern and tested cognitive tools and functions for the program.
- Creating quick and effective virtual means of publishing that achieve the goal with a great benefit.
- Generating new ideas that are practical and easy to understand.
- Finding sustainable financial support for the continuity of the program.

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The Holding Project

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Abstract

The authors argue that community-engaged arts practices like The Holding Project can and should be brought into closer alliance with each other and can be mutually beneficial. We suggest that the 2011 Visual Literacy Competency Standards are entrenched in a Western Enlightenment worldview. While the values undergirding these worldviews may be valuable in some contexts, they are not universally shared and serve as an inadequate foundation for collaborative, community-engaged arts projects. Further, the 2011 Standards and the proposed "Framework for Visual Literacy in Higher Education" (ACRL-VLRT, 2021) currently under review may not go far enough to model a more inclusive and egalitarian approach to community-engaged work. We hope that by calling attention to the implicit Eurocentric bias inherent in the 2011 standards, we can make a small contribution to the ongoing efforts within the visual literacy community to support "social justice through visual practice" (ACRL-VLTF, 2021).

Keywords: ACRL, Community-Engaged Art, Competency Standards, Eurocentrism, *The Holding Project*

Introduction

In the spring of 2021, during a conversation among collaborators, Lee Fearnside (writer, artist, independent curator, and educator), Ashley Pryor (philosopher, artist, educator), and Barbara Miner (artist, educator) about the state of the world and the direct impact that the COVID-inflamed upsurge in race-based hate crimes was having against members of the AAPI (Asian American and Pacific Islanders) and on American society, we decided that we should respond to these traumas through our art. As three white artists of European descent, we were sensitive to our outsider status. We were aware that we could not "speak for" any community to which we did not belong.

And yet, we also felt action in response to this situation was critical; that saying or doing nothing was to ignore and give silent approval to the ongoing violence. We had been down this road before as we grappled with an appropriate response to violence against Black Americans, members of the LGBTQIA+ community, women, and members of other identity groups living in the United States. We considered our personal experiences with violence and marginalization, and we reflected on the increasing polarization of American society that continues to make it difficult to share these experiences. We decided that art could provide a safe space for community dialogue about feelings of safety and unsafety and how these feelings about community shape individuals' lives.

We knew that we did not want to create a work that spoke "AT" people; instead, whatever work we created had to speak "WITH" people. We needed to create a mechanism for our community to make their voices visual, and we wanted to create a vehicle for "holding" those voices. This was the genesis of *The Holding Project*. As educators, all of whom had been engaged in some way with promoting visual literacy, we also decided that it was important to review and take into account the best practices outlined in the 2011 ACRL Visual Literacy Competency Standards. Standard Seven spoke to the role that visual literacy might play in educating learners about "ethical, legal, social, and economic issues surrounding the creation and use of images and visual media, and accesses and uses visual materials ethically" (Hattwig et al., 2011, n. pag.) However, we found the Standards of limited value for our project. While the ACRL Visual Literacy Competency Standards are useful for thinking through Western paradigms of image ownership, copyright,

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and appropriation, the Standards were not conducive to designing a community-engaged arts project in which the borders between artist and community participants are in continuous flux and play.

This paper will explore some of the challenges that community-engaged arts practices like *The Holding Project* pose to the 2011 Visual Literacy Competency Standards. We will consider how the Standards may unintentionally hinder collaborative or community-engaged arts projects and how the proposed "Framework for Visual Literacy in Higher Education" (ACRL, 2021) addresses many of the concerns we raise in our critique. We believe that visual literacy and community-engaged arts practices can and should be brought into closer alliance with each other and that this relationship could be mutually beneficial. Through designing *The Holding Project*, and referencing the older Standards for appropriate benchmarks, we have come to believe that the 2011 Visual Literacy Competency Standards are deeply entrenched in Western Enlightenment and Romantic worldviews. While the values undergirding these worldviews may be valuable in some contexts, they are not universally shared and serve as an inadequate foundation for collaborative, community-engaged arts projects. In fact, the 2011 Standards and the updated Framework currently under consideration may not go far enough to model an inclusive and egalitarian approach for community-engaged work. We hope that by calling attention to the implicit Eurocentric bias inherent in the 2011 Standards, we can make a small contribution to the ongoing efforts within the visual literacy community to support "social justice through visual practice" (ACRL, 2021).

About The Holding Project

The Holding Project consists primarily of community response cards, but also face to face dialogic interactions between and among the artist-facilitators and the rest of the community. We consider *The Holding Project* to be an evolving, community-engaged arts project that is enriched both by its reference to the Visual Literacy Competency Standards as well as best practices associated with community-engaged arts projects. This final section will discuss how our process toward building a meaningful partnership with our community expanded our thinking about visual literacy's role in community-engaged arts.

Each of the artist-facilitators has been involved both formally and informally to promote visual literacy within our various professional domains of concern. Each of us has likewise been concerned with access issues within higher education and within our local art community. We understand that many points of our critique of the 2011 ACRL Visual Literacy Competency Standards apply equally to many of the built-in assumptions inherent in higher education, the art world, and even within aspects of *The Holding Project.*

To date, *The Holding Project* has tried to negotiate two sets of competing and sometimes conflicting demands. On the one hand, the facilitator-artists felt the urgency of a timely response to the cultural crisis that impacts our community (acts of violence committed against some members of our community) and the sense (and felt obligation) that we should bring our experience and artistic expertise to create a work that would invite broader community participation. On the other hand, given our ethnic/racial outsider status, coupled with our commitment to fostering truly dialogic and democratic art practices, we knew that this project exceeded the customary relationship of artist and community and that consequently, we would need to reimagine and relinquish control over many aspects of the project, to better reflect community responses and needs.

From the outset, we were determined to make *The Holding Project* as accessible and interactive as possible. Likewise, the structure needed to convey our seriousness of purpose and commitment to the project. While ideally, we might involve the community in this initial design process, our decision to create the holding structure reflects our desire to balance the committed need to create a timely response to the crisis at hand while still creating something that was visually appealing to attract interest and participation.

After multiple internal discussions, we decided that an infinitely expanding accordion book structure that could hold community responses would best serve as a vehicle for sharing community reflections concerning safety and unsafety. We made test book constructions using various materials and different weights of paper. We dyed torn paper and looked at edge quality. We created paper pulp and pulled sheets of hand-cast paper to use for the individual pockets stitched to our book's pages. We wanted each material choice to emphasize tactile qualities appealing to the human hand. Further, we wanted the final artifact to be very obviously handmade and not machine-made to underscore the time and attention the three

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facilitators were willing to dedicate to the project. We understood this work as an aspect of building community trust. The act of hand-creating the paper sheets, stitching parts of the book together, and hand-stamping our little response cards was intended to indicate to our community that we were committed to the importance and respect we held for the dialogue we hoped to foster through the project. We were intentional in our desire to start the dialogue by conveying to the community that their responses to the project were precious. Our project was created from the heart, and our process had to mirror that origin.

As we considered ways to encourage community participation in this project, we took our cue from successful community-engaged photography projects like Photovoice, and Therapeutic Photography programs, to create open-ended questions to get at the heart of the overarching concept: “What makes you feel safe? What makes you feel unsafe?” We then stamped hundreds of little cards with our queries and added a small paper band (think of the little paper fortunes from cookies) around the cards with: “Did you know” facts about kindness, interracial empathy, art as a tool for social change, and guides for selecting anti-racist, age-appropriate books for children.

The Holding Project was accepted for presentation at the Arts Commission’s “Momentum,” a city-wide arts weekend in downtown Toledo in September 2021. At the “Momentum” event, participants at the festival were offered materials, i.e., papers, pens, glue, scissors, to use when completing their cards. Pryor, Miner, and Fearnside were on hand to engage in dialogue about the project and our desire to have a positive impact through civil discourse with the community as participants filled out their cards. Additionally, as part of the display, didactic materials were included about groups that support AAPI people and resource materials for learning more about the significant questions of race and inclusiveness.

After the initial presentation of *The Holding Project*, the artists approached the Toledo Lucas County Public Library system, which includes 20 library locations, with the idea of situating the project in each branch library. As the project aligns with the educational, community support, and engagement goals of the Library, it was welcomed. The artists created 20 “kits,” including a 4-page sample of the final accordion book-form, a response card collection box, response cards, colored pencils, and didactic materials about the project. The kits were distributed to each of the library branches for a display period of two weeks and two “meet the artists” events were held.

As a result of the original pilot and the library installations, *The Holding Project* has gone through additional design iterations, morphing in response to feedback from our audience/participants and continued research and reflection on the part of the artists. Gathering community responses to build civil discourse and offering alternatives to negative interactions continues to be of paramount importance; it is the underpinning of the entire project. The artists intend to build on the welcome received from the community. Finally, we seek to provide the community with additional opportunities to reflect on their experiences surrounding community safety, provide a mechanism through which they can express things they might otherwise be afraid or unable to say, and make these expressions visible in order to foster community dialogue and understanding.

The structure of *The Holding Project*--the book serving as a container for multiple voices from the community--connects effectively to the proposed *The Framework for Visual Literacy in Higher Education* document (ACRL, 2021). Our project encourages exploration of social justice by incorporating a diverse set of voices and building reciprocal relationships through gathering responses and displaying the finished work, which includes those responses at the Library. The artists of *The Holding Project* designed the project “acknowledging the limits of their knowledge, and seeking to understand better their worldviews, biases, and perceptions, as well as those around them, learners can become conscientious contributors to a more just world” (ACRL, 2021). There were 133 response cards submitted at the Library locations. The majority of cards (60%) responded to the prompt question “What makes you feel safe?” while 40% responded to the prompt question “What made you feel unsafe?”. Most respondents wrote only words (62%), 27% wrote words and included images, and 11% of respondents drew images only. The majority of the images (69%) were representational, while 31% were abstract or non-objective.

The response cards were coded and analyzed for themes and patterns. The most consistent response (43%) to “What makes you feel safe?” was family or friends. Other significant responses included 13%

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indicating community (for example, “my neighbors looking out for me”); 8% indicating emotions (for example, “love”); and 6% indicating a physical place (for example, “my bed” or “my home”). The responses to “What makes you feel unsafe?” were more dispersed. The most consistent response was person-to-person violence (17%), followed by weapons (11%). Other responses of note were social ills, such as racism or white supremacy (11%) and being alone (9%). Interestingly, a similar percentage of responses indicated that law enforcement made them feel safe (2%) as unsafe (3%). Only one response indicated that disease made them feel unsafe. Sadly, 6% of cards responded that LGBTQIA+ people made them feel unsafe, which, if nothing else, suggests an opportunity for education. These responses were the genesis for brainstorming the next phase of *The Holding Project*. The artists continue to consider how to respond to community concerns about safety and use *The Holding Project* as an opportunity for social justice.

The Holding Project and the Community-Engaged Arts Movement & The ACRL Visual Literacy Standards

The Holding Project is a collaborative project both for the artists and between the artists and our community partners. At the heart of the project is an invitation to community members of the Greater Northwest Ohio region to reflect on the meaning of recent acts of violence toward members of the AAPI community specifically and continuing acts of violence in our communities more broadly. As artists grounded in different disciplines and arts practices, we brought a wide set of skills together when designing our project to convey a visually compelling invitation to our community and encourage broad participation in the project. *The Holding Project* is ongoing because of the very nature and magnitude of the issues it seeks to address. As we move through different stages of the project, we have had to make continuous adjustments to our own assumptions and biases about artistic practice, the relationship of artist(s) and audience, and what a genuinely community-engaged arts project can look like. In brief, we have had to radically rethink and decenter our self-understanding of the artists’ roles in the project to make room for a more expansive understanding of community–shared artistic practice. Even at this early stage in the project, we are inclined to understand our role as artist-facilitators rather than as *the* artists creating the project.

While an exhaustive account of what constitutes community-engaged arts practice exceeds the scope and purpose of this article, we recognize that this emergent form of arts practice is unfamiliar to many and warrants a brief overview to provide context. Community-engaged arts projects seek to establish meaningful relationships between the community and sponsoring artists or arts organizations. As Sholette and Bass (2018) observe in their preface to *Art as Social Action: An Introduction to the Principles and Practices of Teaching Social Practice Art*, social practice or community-engaged art employs “the varied forms offered by the expanded field of contemporary art as a collaborative, collective, and participatory social method for bringing about real-world instances of progressive justice, community building, and transformation” (Sholette & Bass, 2018, n. pag.). Hallmarks of successful community-engaged arts projects include, but are not limited to, the following elements:

- Building relationships with the community
- Creating projects that are mutually beneficial to the sponsoring artist(s) and community participant artists
- Collaborative design/implementation
- Designing a project maintenance plan
- Providing the community with significant access to and “authorship” of the final artwork

General interest in and practice of community-engaged arts projects has gained increasing visibility as legitimate art practice. New funding opportunities through national and regional arts commissions and foundations, as well as in the emergence of new programs like Arizona State University’s Herberger Institute for Design and the Arts, Portland State’s MFA program in Art and Social Practice, and other prominent universities and college programs reflect the interest in community-engaged arts projects. There is now an abundance of scholarship (Borwick, 2012; Chonody, 2014; Grant, 2016; Sholette & Bass, 2018) as well as practical application (*Clothesline Project*, 2013; *Photovoice*, 1999; *Project Row Houses*, 1991; *The Laundromat Project*, 2005) to inspire and guide community-engaged arts projects. *The Holding Project* benefitted from consulting these projects. Our attempts to align our project with the 2011 ACRL Visual Literacy Competency Standards were less successful.

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While the ACRL Visual Literacy Competency Standards may provide valuable guidelines for thinking through the social and ethical implications of images that individuals create, we found they were less helpful for strategizing and staging levels of community engagement. The reasons for this are two-fold: 1) the majority of references to image creation imply that a single agent is at work in image-making/artistic production (and not a collective or community group), and 2) references to “ethical, legal, social and economic issues" appears imbricated in a Western, Eurocentric, Enlightenment orientation--a worldview that is not universally shared.

ACRL Visual Literacy Competency Standard Seven states that the visually literate student “understands many of the ethical, legal, social, and economic issues surrounding the creation and use of images and visual media, and accesses and uses visual materials ethically” (Hattwig et al., 2011, n. pag.). Despite the implication that these “ethical, social, and economic issues” are universally applicable, the actual learning outcomes associated with the Standard betray a distinct historical bias concerning the way that ethics, the law, social and political structures are conceived and framed: namely, a western Enlightenment view. While a robust description of western Enlightenment thinking exceeds the scope and purpose of this paper, an abundance of scholarship on this topic identifies the following intellectual commitments and social dispositions as being central to this worldview (Bristow, 2010; Munck, 2000; Outram, 2019; Reill & Wilson, 2004):

- A belief that the rights, responsibilities, and freedoms of the individual are the primary unit of social and political concern
- A belief in the primacy of universal human reason and truth (that the truth is potentially accessible to all, and at the same time identical for all)
- A belief in scientific progress and tendency toward skepticism concerning “irrational” ways of knowing such as religion, spirituality, and art
- A cultural belief that land can be owned, and the tendency to prioritize the protection of private property above and beyond claims to the commons
- A tendency toward tolerant pluralism (especially as related to divergent religious practices within Christianity)

While it is true that individuals and communities outside the West (or indigenous communities that are located geographically within the West) may hold some of these intellectual commitments and social dispositions, not all do. There is ample evidence within the world-historical record to suggest that not all societies are primarily organized around the rights and responsibilities of the individual, or the belief that land is reducible to a commodity that can be bought, sold, and owned, or that ideas and artistic production are the “property” of the individual who first expressed them (Kly, 1989; Scott, 1992; Shohat & Stam, 2014).

The preponderance of learning objectives associated with Standard Seven (eleven out of twelve) speak directly to a western Enlightenment social and political preoccupation with property and privacy rights--and by extension, copyright, licensing, citation and attribution. For example, we find: The visually literate student “recognizes one’s own intellectual property rights as an image creator” and “states rights and attribution information when disseminating personally created images” (Hattwig et al., 2011, n. pag.). While we appreciate the need to continually educate the community about intellectual property, the ethics of cultural appropriation, and copyright law, as community-engaged artists, we believe it is equally important to balance this western Enlightenment ethical framework with other viable, alternative models for assessing mastery of learning objectives. In the West, for instance, artist collectives, guilds, found art, outsider art movements, and collage communities provide alternative models of social organization and production that do not prioritize the individual, property rights, privacy, or the legal instruments of their guarantee (Borwick, 2012; Federici & Caffentzia, 2014; Finkelpearl, 2013). With few exceptions, the performance and learning indicators attached to Standard Seven seem to address learners as consumers and would-be critics of images rather than learners as image-makers, collaborators, or artists. Of the twelve learning outcomes associated with Standard Seven, only three speak directly to the process of creating images, either by individuals or by communities; the remaining outcomes concern the proper legal attribution and dissemination of images and ideas. While these learning outcomes do not necessarily exclude collaborative, community-engaged projects, the heavy emphasis on copyright and attribution does not invite

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it. While Standard Six, “The visually literate student designs and creates meaningful images and materials,” does address the learner as an image-maker or artist, the implied model of the creator/artist appears to be entrenched in a Romantic, Eurocentric concept of the artist. In this conception, the artist is an individual who creates *for* a community and not *with* a community (Borwick, 2012; Gorodeisky, 2016; SantAnna, 2017; Tayirova-Yakovleva, 2014). Standard Six likewise provides little guidance for fostering community collaborations or community-engaged arts projects where any one particular individual’s contribution to a project may be more complex and murky and is not of central importance to the outcome.

Finally, we consulted the 2011 ACRL Visual Literacy Competency Standards, in particular, Standard One, “The visually literate student determines the nature and extent of the visual materials needed” and the correlated performance indicator, “The visually literate student defines and articulates the need for an image” (Hattwig et al., 2011, n. pag.).

We found that this Standard, while initially appearing broad enough to meet our needs, actually fell short. As it is currently framed, the Standard limits the materials to a solely image-based work/project. It does not address the critical work to be done as outlined elsewhere in the Implementation and Use of Standards by including language about multimodal presentations that appeal to other senses and other materials (Serafini, 2017).

Shifting Paradigms in Visual Literacy and the Proposed ACRL Framework for Visual Literacy in Higher Education

As Thompson and Beene (2020) observed, since 2011, there has been a significant “emerging shift in the paradigm of visual literacy” (abstract). A 2019-21 empirical study of “stakeholders in a range of roles and disciplines” indicated that scholars and practitioners of visual literacy had become increasingly aware of the vital function that visual literacy could play in pursuing “social justice through visual practice” (ACRL-VLTF, 2021). As such, the newest, third draft of the proposed framework suggests that “ the pursuit of social justice must be recognized as integral to all aspects of visual practice” (ACRL-VT, 2022).

In recognition of this “paradigmatic shift,” in 2018, the ACRL Image Resources Interest Group (IRIG) convened a Visual Literacy Task Force (VLTF) charged with “re-envisioning” the 2011 Visual Literacy Competency Standards. The result of their work is the proposed new companion document, “The Framework for Visual Literacy in Higher Education,” that better reflects the scope of concern and practice within the Visual Literacy community today. The proposed framework not only explicitly addresses the role that visual literacy can play in promoting social justice, an element that was noticeably absent in the earlier ACLR Visual Literacy Competency Standards, but the very approach--creating a new framework, rather than simply revising “Standards” speaks to some of the concerns we addressed above. By moving away from a list of competency “Standards" and to a framework that describes “knowledge practices” and “dispositions” that are conducive to developing skills in visual literacy, the proposed companion document avoids some of the pitfalls of importing the western, Eurocentric biases inherent in the Visual Literacy Competency Standards. The proposed framework supports the ways that visual literacy “empowers learners to (re)assess images and media with an eye toward decolonization, diversity, representation, and inclusion” (ACRL-VLTF, 2021).

While we were unaware of the VLTF’s proposed framework when we launched *The Holding Project*, we find that several knowledge practices and dispositions support our community-engaged arts focus and will be valuable points of reference as we move into phase two of the project. The proposed framework encourages practitioners to:

- identify as both consumers and creators of visuals, acknowledging how positionality, bias, experience, and expertise inform the interpretation and communication of visuals;
- identify as contributors to a more socially-just world by intentionally and ethically including a diversity of voices in their visual media projects;
- prioritize ethical considerations for the cultural and intellectual property when creating, sharing, or using visuals;
- reflect on the dual role that visuals may play in either fostering or subverting harmful, restrictive, social, or cultural norms
- value the ways that different ways of knowing and being, including cultural, traditional, and

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Indigenous knowledge, may be represented in visuals

As stated above, we find the proposed framework goes a long way to addressing some of the concerns we identified above. Not only does the framework explicitly address the critical role that visual literacy can play in "pursuing social justice through visual practice," the framework implicitly makes room for collaborative visual practices, such as *The Holding Project*, by "valuing different ways of knowing and being" (ACRL-VLTF, 2021). As the Romantic notion of the individual artist (or author) has had such a stronghold on the Western imagination both inside and outside the academy, we would encourage more specific language to acknowledge the legitimacy and power of collaborative work as one of the dispositions or knowledge practices within the new framework.

Conclusion

Community-engaged arts and visual literacy are natural partners. Both practices care about images' vital role in shaping culture(s). The ACRL Visual Literacy Standards attempted to provide a shared set of universal standards. The problem is that the very attempt to standardize and regulate competency created an implicit bias for an ethical system that favors a Western Eurocentric Enlightenment model that privileges individual expression/creation and property rights over collective practice and shared commons, which may sometimes be in tension with the mission and spirit of community-engaged practices (Caffentzis & Federici, 2014; Matarasso, 2019).

As a highly decentralized field of practice (by design) and emergent field, community-engaged arts has yet to regularize and regulate practice by setting competency standards. This omission may be strategic, as the attempt to codify standards is subject to the same problems that we see at play in the 2011 ACRL Competency Standards. On the other hand, as community-engaged arts practice gains traction and moves into institutions like museums and higher education, it may become more critical to have a set of standards or best practices to protect vulnerable communities from predatory, careerist bad actors. We urge consideration of a broad range of image creation and interpretation methodologies, including community-engaged art, to refine the new "Framework for Visual Literacy in Higher Education " so it can be nimble enough to be relevant to practices today and in the future.

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Game Projects in Multipurpose Museums

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Abstract

Great Museum Game (GMG) are short-term art educational projects carried out directly in museums in the context of museum collections. GMG is a synthesis of tabletop and role-playing game forms designed to immerse participants in creative activities, providing mobilization of cognitive motivation and creative will, activation of imagination. The games have no competitive purposes. The participants create their own artistic reality in the context of the museum, give birth to new ideas, metaphors, and images. The games are aimed on motivated teenagers from 14 to 18 years old, engaged in artistic activities on a permanent basis. Five GMG-format projects will be presented in this research.

Keywords: museum pedagogy, game technology, immersive projects in a museum, contemporary art in a traditional museum, creative education, epistemological constructivism

Introduction

I consider a developed imagination — the ability to construct metaphors, to create unexpected collisions of meaning, and to find a plastic and media embodiment for all this — as key properties of contemporary artistic intelligence. Artistic intelligence, based on cultural memory, turns into a generator of new meanings, and manifests itself primarily in sign-symbolic forms.

The new model of art education that I am developing with my associates is based on the rotating principle of changing cognitive attitudes between the student and the teacher, which I define as “memory / project.” The teacher constantly changes his or her position of expert to that of researcher-projector, engaging in creative dialogue with the student.

The rotational principle of “memory / project” allows not only the development of students' artistic thinking, but also the most effective correction of this process. Speaking of memory, I mean a specific memory associated with the creative experience of the embodiment of one's metaphors.

“Creative memory” is formed in the process of implementation of individual ideas in the context of appropriation of historical and cultural experience. It is not enough to learn about the existence of some images, ideas, and metaphors, but it is necessary to become a participant in the process of artistic interpretation, to embody new metaphors (Lakoff, 2004).

The most generalized view of the evolution of art allows us to see that the original purpose of all visual activity is to be an instrument of thinking, giving meaning to human life through the use of signs. This understanding of the original destination of art forms the basis for a new model of artistic education, which directly depends on the sign-symbolic sphere.

The rotational principle “memory / project” is based on the inner need of each of us to develop our own semantic space with the help of a sign-symbolic heritage. I am sure that the “archeology” of signs has a great future. This is a powerful way to develop an individual’s worldview.

The process of model formation occurred spontaneously at the expense of various requests for educational products of sign-symbolic content oriented at the project forms of education and practical application. These were electronic educational systems, virtual constructors, textbooks for schools, training programs for teachers, and workshops for a variety of target groups and different contexts. One of these areas has become large-scale game projects in multipurpose museums.

The Emergence of the Idea and the Development of the Concept of Museum Games

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In 2004, the Studio of Art Designing began to develop a new format of museum projects — playful art projects in big museums. This format was born in the process of preparing the next museum plenary session in the State Hermitage Museum (St. Petersburg). The immensity of a museum, its immense spaces filled with an infinite variety of images, ideas, artistic experiences and historical associations put any visitor in a very difficult position. To understand this museum "space" in a short period of time is impossible. But it seemed to us that the use of a creative game will allow us to grasp "at a glance" a rather wide field of museum content, form in our students the inner necessity to perceive the cultural heritage as the main source of their own artistic ideas (Figure 1).

Figure 1
Grotesques. State Hermitage. St. Petersburg (2004, 2009)

Today we define these museum projects as immersion play forms. Immersion — immersion in creative activity by means of game methods, provides mobilization of cognitive motivation and creative will, activation of imagination, triggers the process of internal dialogue.

The basis for the development of the content of our museum projects is the history of ideas, which has its origins in the iconology of Erwin Panofsky (Panofsky, 1924). The history of ideas is an opportunity to see a holistic picture of the world in which scientific knowledge and artistic creativity are equal producers of meanings. The history of ideas reveals the meaning and place of each thing in this picture. Is it necessary to say that any museums, where things are kept and made sense of, are spaces where ideas live? For our projects, the history of ideas is not an end in itself, because the study of things and images for the artist has a practical purpose — to activate the mechanism of creativity, to create a context for their own discourse.

We have named our creative museum game projects GMG (Great Museum Game), indicating in the name the scale of these projects designed for large universal museums (Figure 2). We address universal museums, or combine several museums simultaneously, in a project to gain a holistic view of complex phenomena, making connections between things spread over time and circumstance in different museum spaces.

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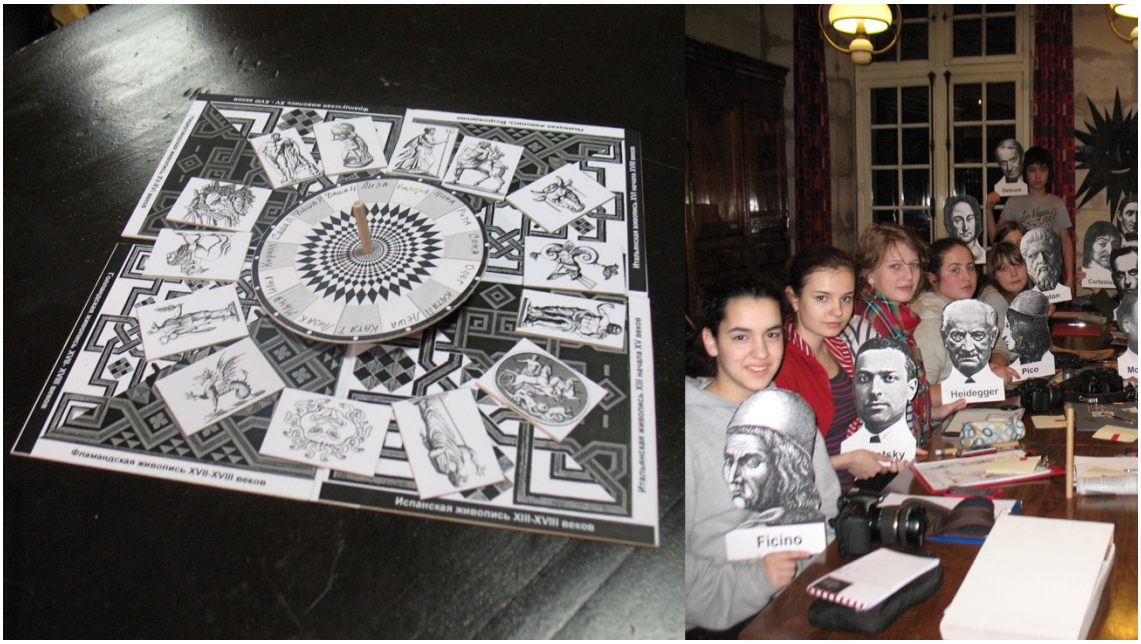
Figure 2
L'amour. Louvre Museum, Paris, 2013. The final of the game.

What is the Great Museum Game (GMG)?

GMG is a short-term but intensive form of art educational projects, carried out directly in the museum, based on museum collections. GMG is a synthesis of tabletop and role-playing forms, providing immersion in the content of the project and developing the creative process (Figure 3).

Figure 3
Play set for Grotesques (State Hermitage) and the drawing of the role-playing masks of philosophers (Louvre Museum).



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GMG is a generator of new visual metaphors. GMG is always different games. Each project is unique in content, organization, toolset and design. GMG has no competitive goals. Everyone wins at GMG. Participants create a new artistic reality, give birth to new ideas, metaphors, and images.

We treat this activity as the most topical artistic practice, as a creative method for a new era. Analyzing our experience of museum game projects, we tried to formalize their general organizational and content characteristics. Thus, each project includes three modules.

Game module:

- tools for drawing game moves (board game or digital tools);
- navigation (most often it is a map of the museum, on which the player projects his/her route);
- role mask and character attributes, - visual game design.

Information module:

- lectures and collective discussions,
- independent search for information (sources of different types - Internet, books, communication with museum researchers),
- analysis of the spatial and object environment.
- Representational module:
- search for metaphors explaining and expressing the meaning of the phenomena highlighted in the process of perception of the museum context,
- development of individual visual means of expression,
- special tasks for mastering technical means of expression (digital photography, video, computer tools for image editing, etc.)
- analysis of the results of the game moves (reviews of the completed tasks).

The main body of the games' participants are motivated teenagers between the ages of 14 and 18 who are engaged in artistic activities on a regular basis. Although both younger students and adult participants, our colleagues, take part in the games. And such an expansion of the age of the participants enriches the content of the projects.

A Brief Description of Several Projects

GMG. Grotesques. The State Hermitage Museum. St. Petersburg (2004, 2009)
The two games with the same name, which were realized in the Hermitage at different times, are similar but have fundamental differences. Both games are devoted to the foundations of the imagery of European art, which has its origins in Antiquity (the collection of Ancient art is on the first floor of the museum) and has developed during subsequent ages (second floor of the museum). In the course of the game the contents of the collections of the first floor and second floor of the Hermitage were integrated (Figure 4).

The playing field for these two games was a schematic plan of Raphael's Loggias — a strip of thirteen successive squares, to which the fields of the halls were placed in random order to the left and right. The player received his assignment by going through several drawings — getting the sequence number of loggias, choosing the side of the exit from it, the number of cells in the hall. Therefore, the board game consisted of several tools for step-by-step navigation — game stones and two wolves with their own fields. Such complexity of navigation was perceived by participants with special interest.

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Figure 4
Grotesques. State Hermitage. St. Petersburg (2004, 2009)

All participants in these games were given two roles each and performed two functions — the role of the mythological character who lived on the first floor, and the role of the keeper of the room of Western European art on the second floor of the Hermitage (Figure 5).

After the casting of the role masks on the first floor the characters were directed to the second floor where the tasks invented by the custodians of the halls were played out. Each museum room included in the game had a figurative description, including color and light, sound and smell, associated with the art of the era and the works kept in the room. The hall was transformed into a figurative context into which the character and his or her attributes fell. And this collision between the character and the context had to be portrayed. This was the creative task.

In the first version of the game, the answers to the task were drawings, in which the mythological character partially changed his or her appearance when placed in the context of the hall. The second version of the game offered the construction of a "grotesque" from the attributes of an ancient character and elements of the context. In this game the "grotesque" was assembled according to the compositional schemes used in the paintings of Raphael's Loggias. Twelve such schemes were selected. It is not about graphic schemes, but about the most different ways of connecting the elements of the image - ornamental, symbolic, optical, etc. The scheme the player also received as a result of the drawing.

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Figure 5
Play set. Grotesques. State Hermitage. St. Petersburg (2004, 2009).

Each day there was a change of mask and a drawing of tasks. In the end, each role-mask combined a set of seven to eight drawings created by different authors. The drawings pertaining to each mask were assembled into vertical strips of "new grotesque." A collective work was created, all parts of which were of equal importance to the participants of the game.

The most significant result of the game was the game itself, the process of intellectual struggle and discovery.

GMG. Labyrinth." State Hermitage Museum. St. Petersburg (2010)
We developed a completely different game design for mastering the collection of primeval art from the collection of the State Hermitage Museum (St. Petersburg). We supplemented the Hermitage collection with several sections from the collection of the Peter the Great Museum of Anthropology and Ethnography (Kunstkamera). That is, the game developed on the territory of two museums.

Once in the game, the participant found oneself in the center of the "labyrinth" and had to undergo initiation — to overcome twelve obstacles, guarded by formidable spirits — the lords of Darkness, Fire, Sleep, Wind, Water, etc. It was only possible to overcome the barrier by finding things in the museums' exhibits that people invented and made to control the powers of these "spirits." To use the "magic" things it was necessary to understand the craft — how to make and use these things.

No role masks were used in this game, each player was him or themself. As an introduction to the game, we used a puzzle object — a disassembling frog figure whose body parts were divided among the "spirits." And for navigation we used an image of a labyrinth (Figure 6).

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Figure 6
Labyrinth. State Hermitage Museum. St. Petersburg (2010). Play set, work with the museum collection, folding book page.

The sequence of obstacles in the labyrinth was played for each player individually, so each participant got into his individual labyrinth. The players plotted their way through the labyrinth in a pop-up book, sketched "magic things" found at the exposition, depicted schemes of their devices, created a visual narrative, telling about the use of this thing, and recorded ritual appeals to the spirits (Figure 6). The result of the museum's "initiation" was twenty fold-out books, from which the participants in the game assembled a large labyrinth in one of the Hermitage halls (Figure 7).

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Figure 7
Labyrinth. State Hermitage Museum. St. Petersburg, (2010). The final of the game.

The Number π. Philosophers. Louvre Museum, Museum of Arts and Crafts of the City of Paris. Paris (2011)
The game "The Number π. Philosophers" based on the collections of two Parisian museums, was dedicated to the history of philosophy. π was an irrational number that became a symbol of the unattainability of rational exact knowledge. It was a game in which there was no boundary between scientific and artistic knowledge of the world, but the history of ideas unfolded.
The ancient Egyptian Senet game was used as the prototype of the role-mask board game. Beginning with this image, the game aimed to find visual metaphors that responded to the game tasks.

The game masks were portraits of European thinkers of different eras: — Diotima, Plato, Aristotle, Descartes, Leibniz, Kant, Hegel, Nietzsche, Wittgenstein, Vygotsky, Arendt, Deleuze, Sontag etc. Each player received a philosopher's mask and a scroll with a text, which briefly described the key ideas of this philosopher, the basic concepts of his theory, and his worldview. This text became a filter for evaluating the ideas and images encountered by the player in the course of his/her acquaintance with the museums.

Every day each player received text message with a task, which consisted of a Latin term with a short commentary, and the name of the room in the museum where he had to work. The Latin term had to be illustrated from the point of view of their game mask, using the museum resources — objects and images. Examples of terms: "ANIMA, the soul; the opposite of flesh," "ESSE, being, existence," "FORMA SEPARATA, a separate, detached form," etc. The selection of terms came at random from a prepared terminological base. The process of drawing, preparing and sending tasks to the players was automated with the help of a computer program placed on the Internet and optimized for mobile devices. This tool allowed for very quick draws and sending individual assignments to participants on their phones in the form of a text message (Figure 8).

The answer to the task was a graphical sheet, with a predetermined structure, on which the players entered their information and made sketches in the museum. Three goals were intertwined in this game: to comprehend the collections of two large museums, to learn about the history of philosophy, and to creatively construct visual metaphors.

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Figure 8
The Number Pi (Philosophers). Louvre Museum, Museum of Arts and Crafts of the City of Paris (2011). Play set, the final of the game, the smartphone with an app for playing.

L'amour. Louvre Museum, Paris (2013)
The boundaries of the deceptively familiar world are constantly changing. One of the boundaries, indicative of the tectonic transformation of our civilization, becomes visible when we ask the question "What is love? The game "L'amour" is a search for answers to the question "What is love?" in the world's largest universal museum, the Louvre, whose spaces contain the millennial memory of humanity. The Louvre is filled with images of the strongest human aspirations that affirm life, and therefore have to do with love. These are the will to power, the struggle against death, the desire for luxury, the energy of eros, beauty as an argument for eternity. But the main "archaeological" basis of our project in the Louvre was the culture of Courtois, synchronous with the time when Philip Augustus XII built the fortress. Courtois-ness, which turned love into

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an object of ethical and philosophical perception, remains today the most striking experience in the creation of a mega-symbolic phenomenon called "Love."

The symbolic images and rituals created by the Courtois authors link antiquity to the Middle Ages and sprout into the present day. Symbolism of the Courtoise culture was used in the design of the game — the symbolism of flowers and plants, the image of the garden, which has become for us a metaphor of the Louvre Museum.

The role masks of the game were the characters of the 13th-century French allegorical poem "The Romance of the Rose" – Reason, Wealth, Hope, Sweet-tongue, Pretension, Fantasy, Magnanimity, etc. (Lorris, Guillaume de, XIII c.). Traps for the players were their encounters on the playing field with Love's Longing, Madness, Illusion, etc.

Description of several masks.

- Wealth: – la Richesse.
  Richesse brings out the value of phenomena in everything, focusing on luxury, "gold," expensive jewelry as symbols of wealth.
  The key concept is [gold].

- Hope: – l'Espérance.
  All phenomena are conceptualized in terms of the presence or absence of hope for development, achievement of happiness, a happy outcome, good luck.
  The key concept is [future].

- Un Regard Langoureux.
  Expressiveness of mimic "masks", information conveyed without words - by gestures, intonation, gaze (arsenal of silent cinema).
  The key concept is [mimicry].

- Concealment: – la Sournoiserie.
  Secrecy needs ciphers, codings, cryptography, a secret language of colors and gestures, hints, and complicated allegories.
  The key concept is [cipher].

The board game was a model of a garden with a rotating tower, set on a board for the game of the Four Seasons (or matter - Fire, Air, Water, Earth), described by the troubadour and king of Castile Alfonsus the Wise in 1283 (Figure 9).

The board was divided into four parts by color and values. At the corners of the playing field were installed symbolic figures of these matter - Bishop (air, spring, green), Knight (summer, fire, red), Castle (autumn, earth, black), and Lady (winter, water, white). And on the wall of the "garden" on the outer side were placed the vices - Hate, Treason, Selfishness, Stinginess, Envy, etc.

All this created a strong emotional motivation and an active intellectual context for the players, being an immersion tool. The development of the game could be monitored by filling a separate field (magnetic board) of one hundred cells with "colors," which served as a display.

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Figure 9
L'amour. Louvre Museum, Paris (2013). Work with the museum collection and the play set.

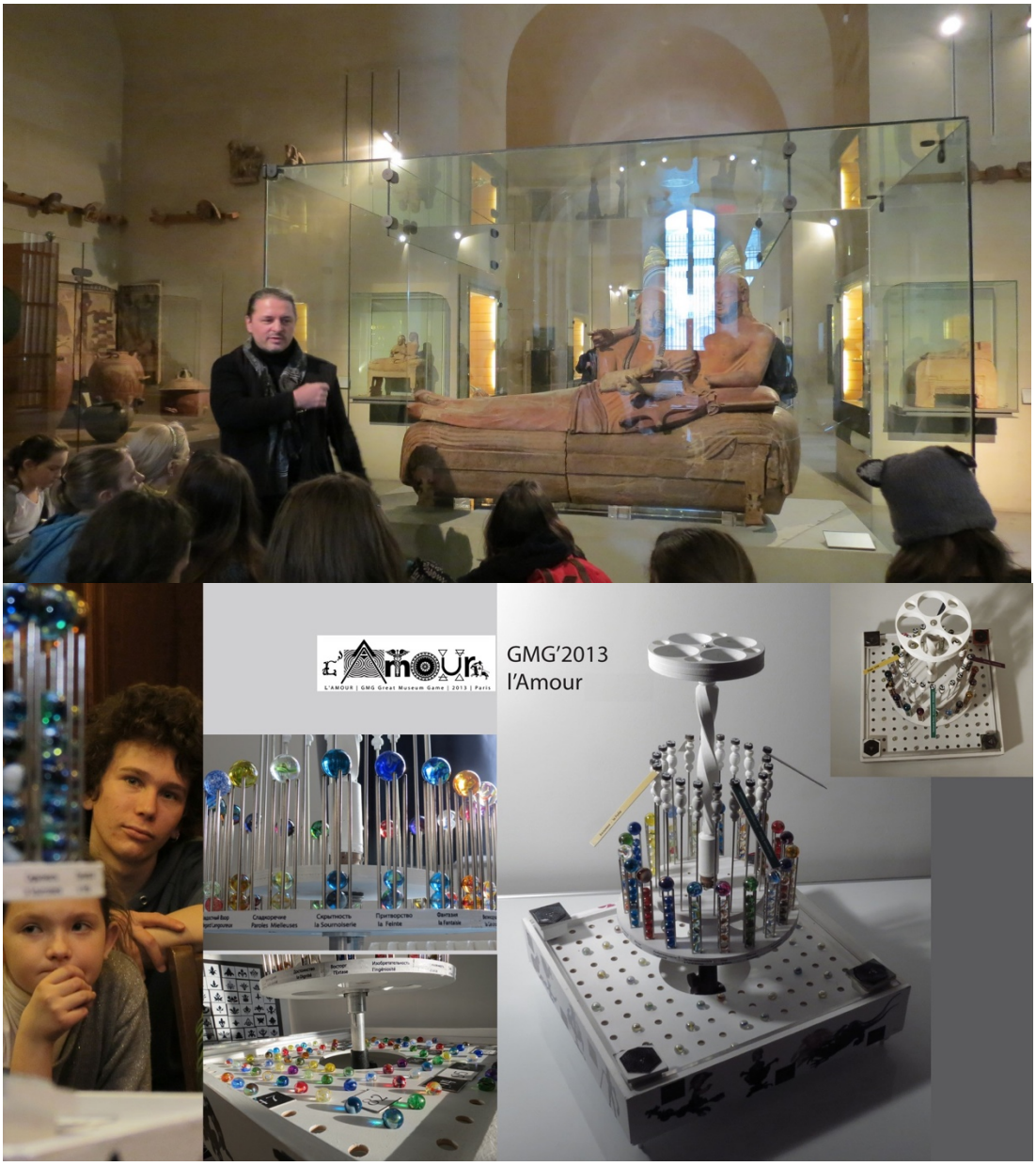

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Figure 10
L'amour. Louvre Museum, Paris (2013). The final of the game.

The goal of the game move was to create a graphic sheet where the player's answer to the question "what is love?" would be inserted. Changing role masks and the museum context brought new meanings, new metaphors every day. So, in the process of the game an original complex of visual metaphors, describing the most complex semantic phenomenon — "love" — was cultivated (Figure 10).

The participants of the game created 120 works (texts + collages from sketches + photos). All the works, laid out on the floor in one of the Louvre halls (Figure 10), formed a large "panel", which we later digitized, printed, and showed at the Russian Museum Forum "Intermuseum" in 2013 (Figure 11).

Fortunatus. State Hermitage Museum, St. Petersburg (2019)
The connection between antiquity and the Renaissance and all subsequent times is clear. But how to make this connection visible, represented by concrete names, ideas, events, images, works of art? How does the contemporary artist find his or her place in the artistic tradition today?
Fortunatus is a name common in ancient Rome. The poet Joseph Brodsky refers to the generalized image of the ancient Roman "Roman friend" (Brodsky, 1976) through the centuries. The name "Fortunatus" has become a symbol of such a connection through the ages.

Works of painting by ancient Greek artists have not survived. But descriptions of their works, brief information about the lives of artists, anecdotes and impressions remain. The connection of the times in the European tradition of painting was carried out through the study of these texts on ancient art written by ancient Roman authors. The subjects of the works and the artistic methods of the European artists of the Renaissance and subsequent times were formed on the basis of these texts.

Each artist of antiquity developed his own idea of painting, which, centuries later, began to determine the direction of the development of European art. The idea of the game "Fortunatus" is the search for Greek traces of these directions (paths) in the works of art represented in the collections of the State Hermitage from the Renaissance to the early 20th century.

From the descriptions left by Pliny the Elder and several other authors, we have developed role masks of "ancient painters," there were twenty-eight names in all.

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Figure 11
Stand with GMG projects at the Russian Museum Forum "Intermuseum" in 2013.

During the raffle each participant in the game received a name folder of an ancient painter. The folder contained a mirror plastic profile to separate a sheet of paper into two parts and a text with the character's "legend," briefly describing his artistic discoveries and significant works (Figure 12).

Each profile is a copy of a profile of a “capitello” or cornice of one of the famous antique architectural monuments. In our project the profile is an ekphrasis, a projection of the ancient world. The profiles are made of mirror material. Mirror means reflection, duality, a boundary state between matter and immaterial likeness, an imaginary world. But most importantly, the mirror represents the idea of the interconnectedness of phenomena in the history of European art.

The mirror profile of the “capitello” in the player's folder was designed to divide a sheet of paper into two parts. In one part the player placed the information that they received by writing down concepts and metaphors, and making sketches. The other part of the sheet was for free imagination, for images that appeared in the context of museum impressions.

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Figure 12
Fortunatus. State Hermitage Museum, St. Petersburg (2019). Work in the halls of the museum.

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The system of consecutive rotation of the profiles during the change of the holder ensured that all the drawings were assembled into a single structure (Figure 13).

A necklace with stringed game cubes was used for the drawing. The necklace is a metaphor for the continuity of the European artistic tradition. The necklace is untied, the cubes are scattered — the game begins. Each player receives a die from the necklace with the monogram of one of the ancient artists.
Each subsequent drawing performs a change of masks and allows participants to get acquainted with different artistic concepts.

Figure 13
Fortunatus. State Hermitage Museum, St. Petersburg (2019). The final of the game.

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A total of six drawings were planned and, accordingly, the folder of each ancient artist had to contain six drawings. And each participant of the game could meet only six characters. All in all, about 180 graphic sheets were created (Figure 14).

Figure 14
Fortunatus. State Hermitage Museum, St. Petersburg (2019). Fragments of the panel. Entire panel.

The outcome of the game was the assembly of all the drawings into a large graphic work, which, thanks to the use of templates, was perceived as a single whole — a giant sketch presenting the new information picture of the world created in the course of the game.

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Conclusion

The ability to create poetic metaphors was a necessary skill for a free citizen in ancient Greece. Without developed imagination, it was impossible to create a bizarre world of medieval manuscript books and stone sculptures of cathedrals. In the era of the formation of craft cities, creative development was directly aimed at mastering the formation of the universal abilities of the intellect.

But there were times when the creation of metaphors, fantasy and the universality of the intellect became unnecessary, redundant. Then 'art education' was reduced to copying ready-made samples, thoughtless reproduction of compositional schemes, and the aesthetic ideals of the past became a dogma.

In Russia, this process was accompanied by the rooting of intellectual limitation as a social norm, which was embodied in philosophical and aesthetic naturalism, in intellectual helplessness, in the absence of philosophical problems.

The changes that have taken place in the artistic culture of Russia in recent decades have practically not affected the sphere of art education as a whole, and my appeal to visual semiotics is due to the desire to change this state of affairs. In this sense, museums are the main spaces in which the semantic content of the future can be constructed.

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Learning to See Differently

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Abstract

Visual literacy takes for granted that humans are the main perceivers and decipherers of visual stimuli into meaningful information. The focus of this paper is to introduce the idea of a non-anthropocentric visual literacy and explore how it could help us better understand the myriad species that coexist with humans on Earth, their interactions with one another, and our interactions with them. Our work attempts to visualize the world beyond our vision — in the infrared and the ultraviolet. Using photography, we have imaged our world to translate what is visible to non-humans into the visible for humans. The information contained in these images reveals "hidden stories" about how organisms interact and make decisions, perhaps helping us to envision a more responsible future not only for our own species but also for the tens of millions of other species with whom we share the Earth. In sum, we propose that learning to see the world as other organisms do should be a part of visual literacy study and practice.

Keywords: Anthropocene, cognition, photography, non-visible spectra

Introduction

Visual literacy is "a set of abilities that enables an individual to effectively find, interpret, evaluate, use, and create images and visual media" (Hattwig et al., 2011, p. 1). This standard definition of visual literacy includes two key features. First, it is clearly anthropocentric. The "individuals" who perceive, decipher and interpret visual stimuli and information are assumed to be human beings. Yet, virtually all other organisms—including animals, plants, fungi, and microbes—perceive and respond to visual stimuli in ways that could be categorized or modeled as "interpreting" or "evaluating" their information content.[i] The focus of this paper is to introduce the idea of a nonanthropocentric visual literacy and explore how it could help us better understand the myriad species that coexist with humans on Earth, their interactions with one another, and our interactions with them.

Second, the core actions of visual literacy—the processes of finding, interpreting, evaluating, and using visual information—are like the interactive processes within complex systems leading to emergent phenomena.[ii] Learning how to approach, engage with, and think deeply about complex systems is an emerging frontier in education (e.g., Bolt et al., 2021; Chua et al., 2017; Talanquer et al., 2020; Thomassen & Stentoft, 2020). Our work uses new approaches to thinking and learning about complex systems (Chua et al., 2017) to suggest methods for uncovering and learning the multifarious "hidden stories" behind the images and visual media we are confronted with daily.

Specifically, imagery and visual media are seen and interpreted on several levels. These levels are encapsulated in the three prompts posed in the "Stories" thinking routine of Chua et al. (2017).

1. What is the story that is presented?
2. What is the untold or hidden story?
3. What is your story?

Applied to imagery and visual media, the viewer should first ask: what is the message or idea that is being conveyed? Secondly, the viewer should ask a series of more probing questions, such as: what additional data or other information went into creating the imagery; what ideas, perspectives, or events were emphasized or de-emphasized, and why; what information was left out, and was its omission innocuous or did it contribute to meeting a particular agenda; and who (or more expansively, what other species) is (are)

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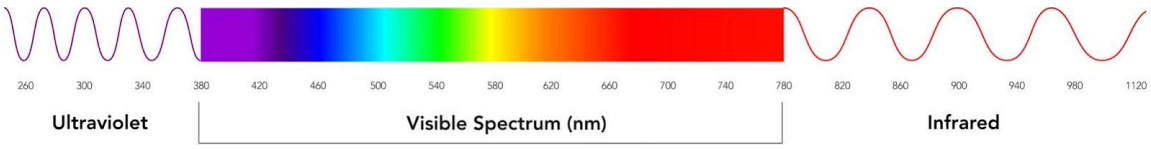
advantaged or disadvantaged by the presentation? Thirdly, viewers should be invited to revise the imagery: How might I re-imagine (or re-image) it?[iii]

Human Vision

The ways in which humans process visual information is a complex process that is not reducible to the digitized systems that we have created to make images of the world. How we perceive the world has more to do with how we process the visual stimuli we receive rather than with how individual photons hitting a sensor through a digital-camera lens are quantified. That is, we are more like a cognitive processing engine,[iv] and the way we construct an image of the world in our minds is a result of the collective evolutionary history that we share with all other organisms.[v]

An example of how humans respond to warning stimuli triggered by visual recognition is by avoiding red-colored objects in the wild, such as those of red baneberry or coral snakes. These responses result from a combination of learned and innate understanding of our perceived threats. Note that we rarely respond to images of coral snakes in the same visceral way as we do to these snakes in real life, and that not all red berries are poisonous and should be avoided; contrast red baneberries with raspberries. The processing depends on the visual stimulus or image and context and additional learned information (Cauchoix et al. 2020).

Figure 1
Ultraviolet, Visible, and Infrared Spectra



Note: The ultraviolet spectrum between 260–380 nanometers (nm) is visible to many organisms. The human visible spectrum is 380–780nm. The near-infrared spectrum that can be detected with the silicon-based camera sensor chips used by almost all digital cameras ranges from 780–1100nm. Graphic by the authors.

Our visible spectrum sets boundaries on what we perceive visually and on our cognitive processing of them. Humans have a three-cone color-vision system that enables us to see colors ranging from violet (380 nm) to red (780 nm) (Figure 1).[vi] For example, when we look at Figure 2, we “see” the green leaves (reflecting light at ~550 nm) and the azure sky (at ~500 nm). These perceived colors and their relationships help inform our understanding of the scene, which we may interpret as a warm sunny day with few predators and as an image that we may consider to be aesthetically pleasing. However, this understanding and interpretation is limited to the wavelengths we perceive and does not represent anything other than a human-based assessment of this environment.

Non-Human Vision

Most other organisms respond to visual stimuli in systematic ways that have meaning for their existence (Holland, 1992; Bräuer et al., 2020; see Footnote ii). For example, blue jays are averse to the warning colors of orange-and-black monarch butterflies (Brower et al., 1968). Another example is vines that move toward relatively bright openings in a forest canopy. Even though these responses are light-based and we can appreciate and understand the visual stimuli and the processing mechanisms of other organisms, their modes of cognition, and associated physiological or environmental constraints are foreign to our typical way of thinking (Bräuer et al., 2020).

But most other organisms have evolved to have different visual receptors that are sensitive to wavelengths that we cannot see. Thus, they see the world in ways that are completely invisible to us but perceptible and meaningful to them. For example, where we see a pink wild geranium (Figure 3, left), a bee whose visual system also perceives ultraviolet radiation (below 380 nm) instead sees a contrasting target that signals

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where nectar is available amid a contrasting inedible background (Figure 3, right).

Figure 2
Saplings, Visible Spectrum

Note: Original digital image © by the authors, 2021.

Visual responses also differ because of evolutionary differences in visual systems and receptors between humans and other organisms. How can we understand and comprehend these differences? In *What is it like to be a bat?* Thomas Nagel (1974) distinguished between asking what it would be like for a person to have the optical system of a bat (and thus see "like a bat") and asking what it would be like for a *bat* to see as a bat itself does. This is a relevant distinction, because to know what it might be like for a bat to be a bat would involve more than looking at a sonar display. Rather, it would require seeing the world through the visual and cognitive processing systems a bat uses to perceive and interpret the world. Bräuer et al. (2020) similarly emphasize the importance of "biocentric" cognition, noting that different organisms have evolved cognitive processing mechanisms through different pathways. They conclude that psychologists and educators are unnecessarily myopic in assuming there is only one type of cognition and that it is restricted to humans.

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Figure 3
Wild Geranium

Note: Image in visible spectrum (left) and ultraviolet spectrum (right). Original digital images © by the authors, 2021.

Recognizing and appreciating differences in cognitive understanding, such as visual literacy, of humans and other organisms requires a general definition of cognition (see Footnote iv and at least the distinction identified by Nagel (1974). First, we must understand the sensory inputs that bats (and other organisms) perceive. Second, we should understand (and replicate, for example via artificial intelligence) their underlying cognitive processing engines. We focus on the former in this article; Bräuer et al. (2020) review progress in the latter, especially in the context of biocentric (as opposed to anthropocentric) cognition.

Capturing imagery outside of the human-visible spectrum

We begin our approach to understanding non-human visual literacy by developing a system for making images of the same environment in multiple spectra, including those spectral ranges where other organisms see and discern useful information invisible in the human visible spectrum. This system gives us a chance to see what imagery is being presented to organisms that "see" different wavelengths of reflected light. These information-rich images then act as the starting point for further investigations of how these organisms might react to or interpret visual stimuli in the context of their environment.

From decades of scientific research, we know that other organisms "see" reflected ultraviolet (wavelengths below 380 nm) or infrared (wavelengths beyond 780 nm) light (Figure 1). Although we cannot directly see reflected light (radiation) in these wavelengths, we can mathematically transform ultraviolet and infrared images into images that reflect light in our own visual spectrum. Such transformed (or "mapped") images can be gray-scaled or artificially colored. We work with the former, which are similar in appearance to desaturated, monochrome photographs. The same image appears very different to us in visible color, desaturated monochrome, and transformed from infrared or ultraviolet images. The infrared version appears to "glow," whereas the ultraviolet version appears "drab and chilly" (Figure 4).

Transforming reflected wavelengths ordinarily invisible to us into digital images creates an artificial representation of the various wavelengths of light reflected by these objects. The images do not represent the world as seen or interpreted by organisms that directly sense ultraviolet or infrared wavelengths. These wavelengths may be interpreted by organisms that sense them as "colors" or they may trigger some other type of stimuli in their processing systems (Bräuer et al., 2020). However, creating remapped images acknowledges that these wavelengths exist and could include information that appears to be beneficial to other organisms. These images also allow us to think about a world beyond our vision that we cannot process or contextually understand. Although these stimuli and interpretations are challenging for us, observations and experiments on how organisms respond to such imagery can provide clues to how they interpret their visual world (Bräuer et al., 2020; Cauchoix et al., 2020).

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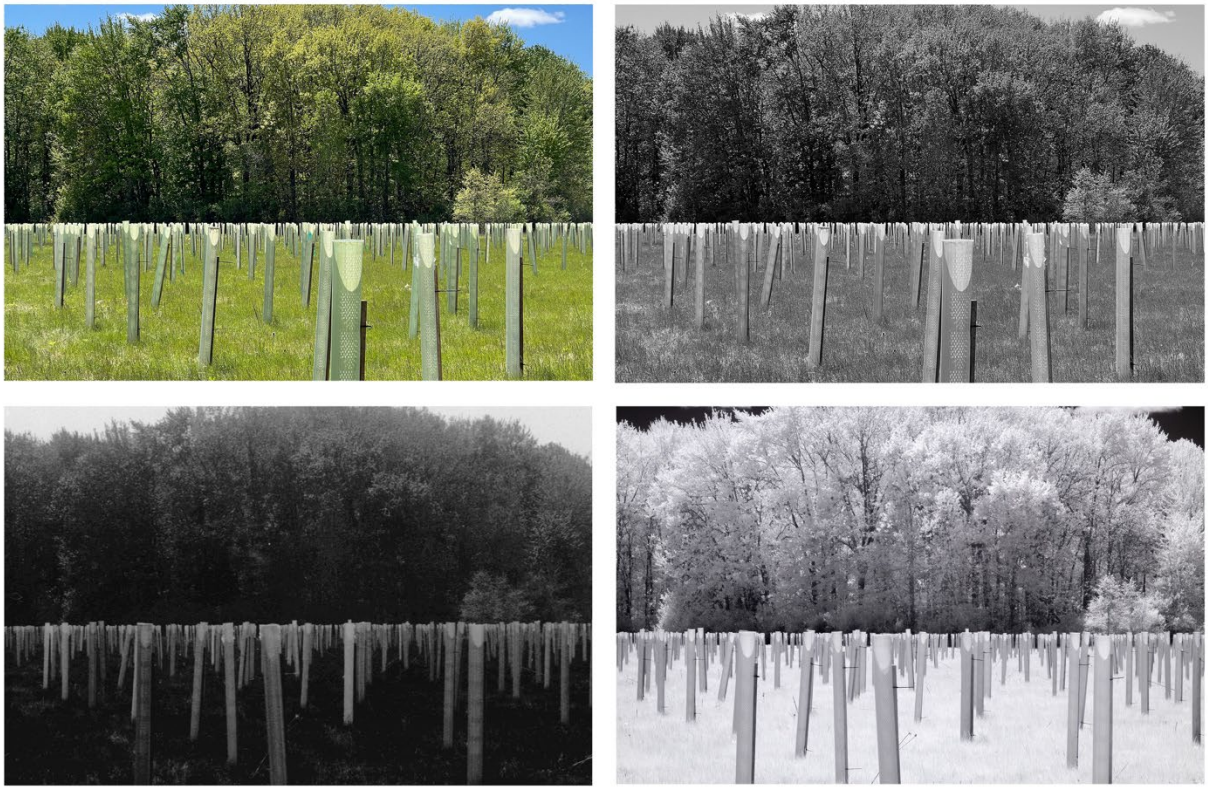
Figure 4
Saplings



Note: Clockwise from top left: Visible light; Desaturated visible; ; Infrared light (mapped to visible) Ultraviolet light (mapped to visible) light. Original digital images © by the authors, 2021.

For example, bees collect nectar from flowers with targets that are visible to them because they "see" in the ultraviolet (Figure 5). When we use a camera to capture an ultraviolet image of a flower (Figures 3, 5), we collect the first bit of information we need to understand the visual literacy of foraging bees. But a visually literate bee also is collecting and processing other information—not all of which is visual[vii]—that it uses to "decide" whether to go to the target and collect the nectar. This additional information includes the presence of surrounding flowers and potential predators or the distance it will need to fly back to its nest. Although other sensors might collect this (and other) contextual information, it usually is not easily captured by an optical (digital) camera; a purely optical system of understanding perception is inadequate for understanding non-human visual literacy (Bräuer et al., 2020). However, knowing that bees can perceive information that is invisible to us provides the starting point for intuiting their visual literacy.

At the other end of the spectrum, some snakes use their pit organs to sense infrared radiation (a.k.a. heat). More precisely, snakes sense temperature differentials between the background and their usually mobile prey. Thermal imaging technology has revealed the resulting stimulus (the image) and the snake's potential response to it (attacking the prey) (Figure 6). In short, the ability of snakes to collect and cognitively process information contained in infrared imagery allows them to be visually literate about what to us is darkness.

These two examples illustrate the potential for understanding alternate visual literacies of other organisms. Context and other factors also play a role in their visual and cognitive processing systems (Bräuer et al., 2020) and we refer to these factors as "intentionality." However, we recognize that our perception of apparent intention and actual intention (in a human sense) are two very different things (Bräuer et al., 2020; Holland, 1992; and Footnote i).

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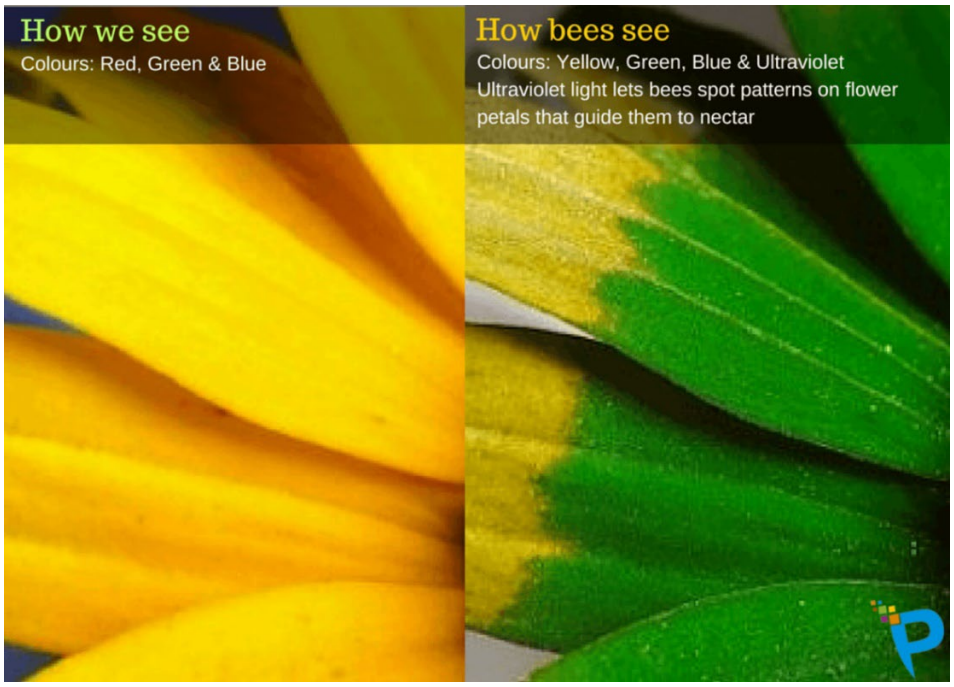
Figure 5
Human Vision versus Bee Vision



Note: In the right image, the flower is remapped from the full range of wavelengths that a bee can see into false colors used to map ultraviolet wavelengths into the human-visible spectrum. Some of the wavelengths visible to bees overlap our human-visible spectrum (left). The remapped image allows us to see the bees' "target." Image by Dr. Klaus Schmidt reproduced from http://www.punditcafe.com/science/human-vs-animal-vision-cat-bee-snake-shark-dog-vision/ (CC-BY)

Intentionality

Visual literacy is not just a practice of parsing and interpreting an image as presented. Rather, visual literacy requires that we reveal an image's "hidden story" (sensu Chua et al., 2017) by examining its context and further evaluating the intentionality of the image's creator. For example, "fake news" (Figure 7) is faked for a reason. Choosing to accept it as truth or dismiss it as false takes more than just viewing the image or video. The choice we make is a cognitive decision conditioned on our own perspectives or biases and an understanding of the intentionality of the faker.

By extension, there is also cognitive processing from observation to action for organisms (Bräuer et al., 2020). Other organisms rarely intentionally create images, but they do process their visual world, respond cognitively, and make what we view as "decisions"—like bees collecting pollen or the snake attacking its prey—based at least in part on what they "see." There undoubtedly are characteristics of nectar-bearing objects that also occur on other objects that bees do not approach or warm objects that snakes do not attack. Understanding what factors and contexts determine the ultimate "decisions" of other organisms remains an active area of research in many disciplines.[viii]

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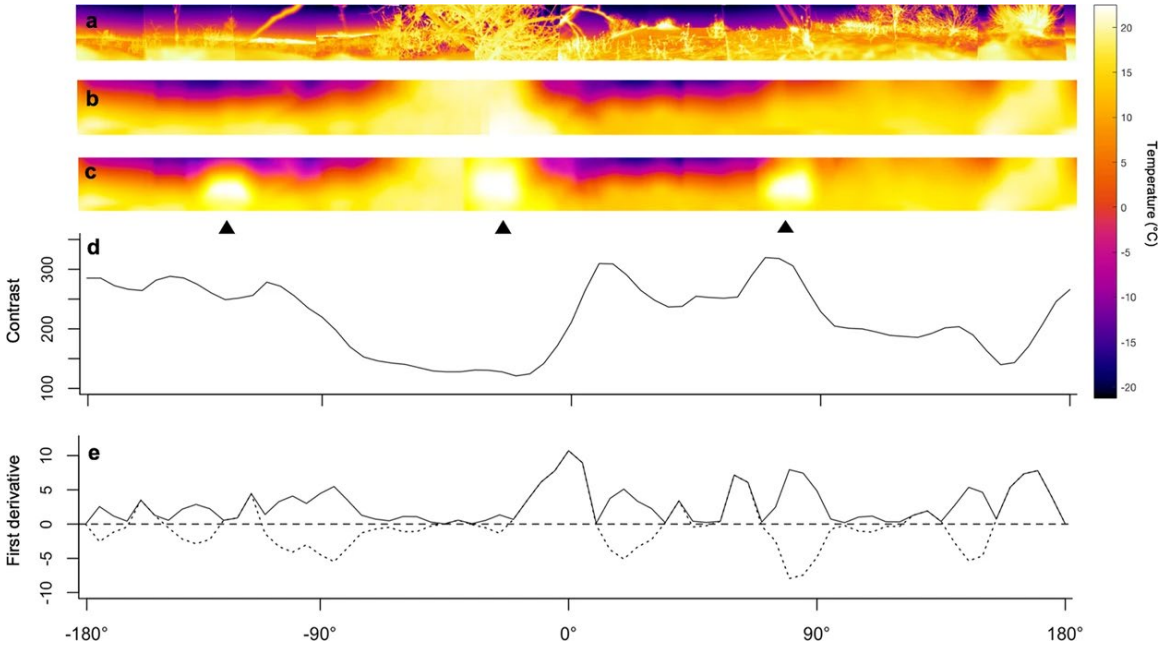
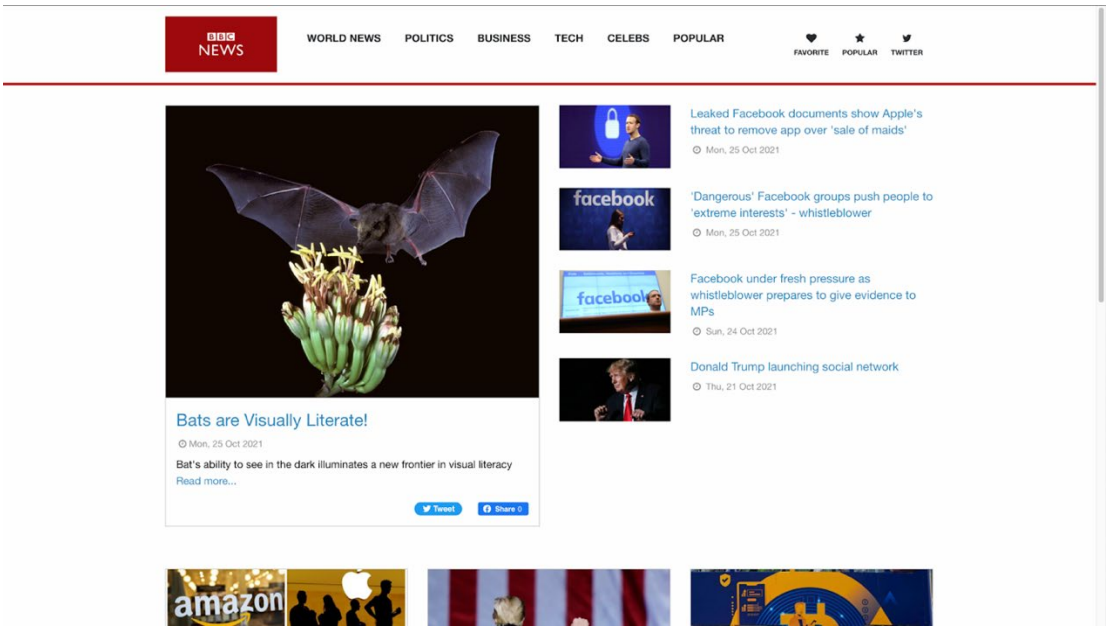
Figure 6
Infrared-sensing Snakes Select Ambush Orientation Based on Thermal Backgrounds



Note: In this figure, thermal imagery illustrates that a sidewinder rattlesnake "sees" a strongly contrasting warm kangaroo rat (bright dot indicated by the triangles in panel **c**) as it moves across and contrasts with a thermally variable landscape. Composite digital image reproduced from Figure 2 of Schraft et al. (2019), CC-BY-4.0.

Figure 7
Fake News Article



Note: Digital image generated 25 October 2021 by the authors.

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Organisms in their own context

Our 80–100-year lifespan is one of the central contexts through which we interpret images and other world phenomena.[ix] But few organisms share our lifespan. What might that mean for their visual literacy?

Like our exploration of saplings and geraniums (Figures 3 and 5), we have examined and imaged the world's longest-living singular organism, the Great Basin bristlecone pine (Figure 8). The oldest of these trees is nearly 5,000 years old. They live in cold, dry, inhospitable-to-us environments on mountains and mountaintops at elevations of 9,500–11,000 feet (3,000–3,500 meters) above sea level (e.g., Ferguson, 1968; Bailey, 1970). The trees are visually distinctive because as they age, encounter threats in their environment, and are damaged, some sectors of the trees may die but others live on. The resulting, contorted trees appear to be barely alive, sculptural objects that nonetheless continue to grow and reproduce for centuries or millennia (Ferguson, 1968).

The set of images shown in Figure 8 depicts the trees in their environmental context—at high elevation on cold, dry mountaintops in Nevada, USA—as they would be seen in the human-visible spectrum and in the ultraviolet and infrared (remapped into our visible spectrum). The images in these spectra alone may not reveal any new information. The ultraviolet and infrared images could be perceived as variations on a standard black-and-white print that uses information from the human-visible spectrum Still, the ability to compare the images across spectra asks a viewer to consider what or who may be perceiving these trees in ways different from us.

From our point of view, the desaturated visible-light image (Figure 8, top left) reveals a scene with tonal relationships that map precisely to the perceived brightness of the full-color visible image (Figure 8, top right). The relationship between colors we perceive as bright and warm (yellow, orange, red) and the lighter gray-to-white values assigned in the desaturated image allows us to make sense of the objects in the scene, even though we cannot discern any exact colors. Rather, we quickly understand (cognitively process) the relationships between tones and imagine the color relationships that represent our experience in the world.

When we look at the remapped ultraviolet (Figure 8, lower left) and infrared (Figure 8, lower right) images, these known relationships between value and color no longer exist. The remapped ultraviolet image shows us a pale sky without a shading gradient. Such a sky appears unearthly because we expect to see a tonal shift from a light gray at the horizon to a darker gray as we look upward. The foliage in the trees also is remapped into a singular gray tone without any of the natural variations we expect to see in the visible spectrum, in which leaves would reflect more than one hue of green. Even the bark of the tree appears to be washed out in the remapped ultraviolet image. Any evidence of variation in the hue of the bark—an indication of a living tree—has been stripped away.

The remapped infrared image has dramatically different relationships in its tonal values and contrasts. We perceive dark skies with less gradation, strongly set back from intense, bright whites of the foliage. These bright whites indicate light that has been scattered and highly reflected from the tree's needles (Knipling, 1970). The bark of the tree, though slightly less varied and brighter than it appears in the desaturated visible-light image, shows a large amount of detail and tonal variation, matching our visual assumptions about a living tree more closely.

Just as we needed additional environmental and hidden contextual information to understand what a bee or snake understands and "sees" in invisible wavelengths, we also need to uncover the deeper story hidden within a tree. The biological and environmental causes of a tree's visible traits rarely are visible—at least to us humans—from exterior inspection. Rather, both the tree's age and clues to its highly variable growth rate and proximate causes are revealed only by looking inside the trees and then analyzing the data using statistical tools and computer models (Figure 9).

Imagery and visual media also can reveal relationships between the images themselves and between the images and topics or issues of broader societal relevance.[x] For example, the photographs of flowers taken in the ultraviolet spectrum (Figures 3 and 5) touch on concepts ranging from aesthetics (e.g., Is it as

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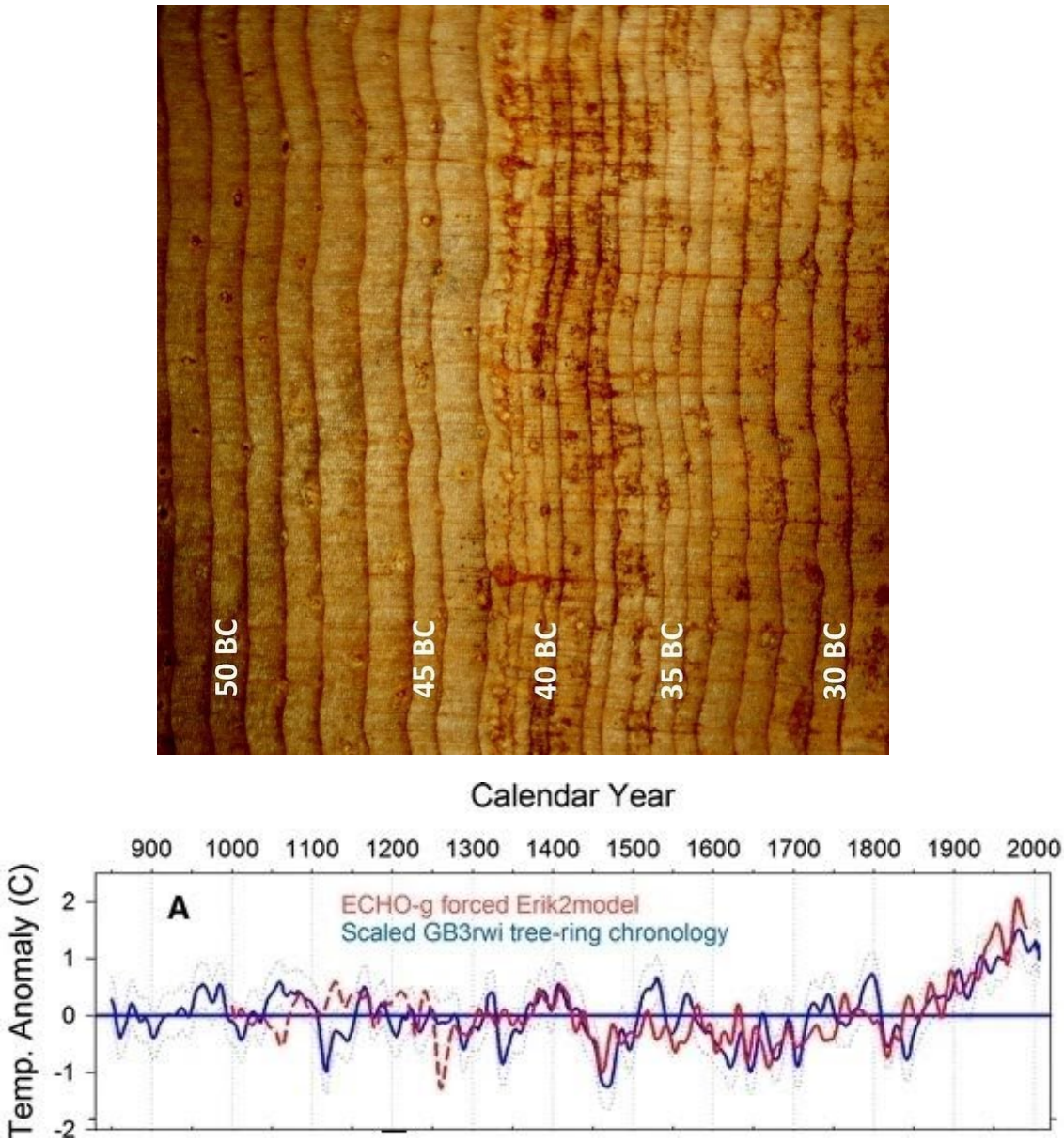
beautiful to me as the photograph taken in the human-visible spectrum?), through biodiversity (e.g., What animals see flowers this way?), or the rapid decline of bees and the pollinator crisis (e.g., How is our world diminished when there are no longer any animals that can see flowers this way?).

Figure 8
Great Basin Bristlecone Pines

Note: Clockwise from top left: Visible light; Desaturated visible; ; Infrared light (mapped to visible) Ultraviolet light (mapped to visible) light. Original digital images © by the authors, 2021.

https://doi.org/10.52917/ivlatbsr.2022.022

Figure 9
The Long-term Invisible Context of Bristlecone Pines Made Visible



Note: Top: A cross-section through a tree core taken from a bristlecone pine in the Snake Mountains, Nevada, USA. The light areas between the darker lines are annual growth rings—how much the tree grew in diameter each year. Narrower growth rings indicate slower growth than wider ones, and the width is used by dendrochronologists (literally: "tree timers") to infer the climate and growing conditions in each year. The extremely narrow growth rings after 44 BCE are associated with a large volcanic eruption. Photo credit: DRI Science; CC-BY-NC-ND 2.0. Bottom: an approximately 1000-year independent reconstruction (model) of global temperature (red line; values indicate difference ["anomaly"] between the modeled temperature and the long-term [1000–1990] global average) is paralleled almost exactly by the tree-ring widths of bristlecone pines from Nevada and California (blue line). Although the actual bristlecone pine tree-ring record extends more than 4,500 years into the past, this particular climate model only extends back to about 1000 CE. Image reproduced from Figure 5A of Salzer et al. (2014); CC-BY 4.0.

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Conclusion: The Value of a Nonanthropocentric Visual Literacy

Why is it important to image and understand the world in ways that reflect how other organisms see, sense, and cognitively process it? On the one hand, understanding nonhuman senses and cognition are of interest (Bräuer et al., 2020). Of more immediate concern, the dual threats of the climate emergency and rapid biodiversity loss (Pörtner et al., 2021) illustrate that we rarely see or understand ourselves and our impacts on the world around us. An expanded visual literacy that includes the other tens of millions of Earth's species could help us envision a sustainable future.

The unattributed adage that "you can't understand someone until you've walked a mile in their shoes" is the foundation for empathy. Similarly, taxonomists—scientists who describe and name new species—often assert that people will be more willing to protect other species (i.e., biodiversity) when we know their names. We would extend this to say that to understand and empathize with other species, we need to see the world through their eyes. Cognitive scientists increasingly agree that only a few ways of thinking differentiate humans from other species (Bräuer et al., 2020). Imagination and abstraction are seen as unique to humans (Egnor, 2015), but it is not clear how we can differentiate the appearance of imagination from its actuality (Holland, 1992). If we cannot distinguish between what a person thinks it is like to see like a bat and what a bat thinks it is like to see like a bat, does it matter in terms of expressing visual literacy? And if we persist in centering cognition in an anthropocentric fashion—that is, cognitive scientists "tend to overrate cognitive skills that are human-like and assume that certain skills cluster together in other animals as they do in our own species" (Bräuer et al., 2020, p. 1)—we will continue to fail to imagine independent evolution of cognitive processing systems.[xi]

In terms of its contribution to visual literacy, the most valuable and successful imagery and visual media that is created or collected and processed by artists, scientists, educators, and media professionals should reveal to the extent possible hidden stories and encourage relational thinking. If we are to better understand how the interactions between organisms on our planet work, we need to be able to see and think in terms outside our own. If we learn to see and understand what a bee or a snake "sees," we can reveal hidden worlds. A tree may initially appear to us as only a source of lumber and shade, but for other organisms, it is a shelter, a source of food, or a connector of fungi, among many other functions. We can be told these facts, but it takes a more impactful approach with images of the world that we can learn to understand to generate a more useful response. We think that response can come from the re-presentation of the real world in accurate but out-of-the-ordinary methods. Although we know that our images cannot reveal the full extent of these hidden worlds, they allow us to begin to imagine the information we are missing and the information we may lose forever as biodiversity declines. At the same time, understanding the processes by which other organisms see, live, and interact with the world de-centers humans as the sole beneficiaries of slowing the dramatic changes to the global climate system that we have caused.

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Footnotes

[i] For example, Holland (1992, pp. 24-25) notes that "we rarely think of anticipation, or prediction, as a characteristic of organisms in general, though we readily ascribe it to humans. Still, a bacterium moves in the direction of a chemical gradient, implicitly predicting that food lies in that direction. The butterfly that mimics the foul-tasting Monarch butterfly survives because it implicitly forecasts that a certain wing pattern discourages predators. A wolf bases its actions on anticipations generated by a mental map that incorporates landmarks and scents."

[ii] While noting that there are many different definitions and uses of "complex systems," Ladyman et al. (2013) coalesce these into a tentative definition of a complex system as "an ensemble of many elements which are interacting in a disordered way, resulting in robust organisation and memory" (p. 57), in which memory is "the persistence of internal structure" (Ladyman et al., 2013, p. 59; after Holland, 1992; and Manson 2001, p. 410).

[iii] Editing, revising, and remixing of posted imagery and visual media should always conform to copyright guidelines or options provided through Creative Commons licensing (Creative Commons, n.d.).

[iv] "Cognition" refers to "adaptive information processing in the broadest sense, from gathering information through the senses to making decisions and performing functionally appropriate actions, regardless of the complexity of any internal representational processes that behavior might imply" (Shettleworth, 2000, p. 43). "Engine" is used here in reference to the Middle English definition of *ingine*, a

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product of ingenuity, which is separate from the purely mechanical connotations to which the modern term refers.

[v] Lyon (2021) provides an approachable summary of the evolution of cognition. Bräuer et. al. (2020) and Cauchoix et al. (2020) offer more technical reviews of current thinking on the topic.

[vi] This assumes neither enhancement of color vision in humans through tetrachromacy ("Tetrochromacy," 2022) nor color-vision deficiency ("color blindness") caused either by a genetically determined problem in the development of one or more of the sets of the eye's color-sensing cone cells or by damage to the eye, optic nerve, or areas of the brain responsible for processing visual input ("Color blindness," 2021). Additional pre- and post-processing of images and educational materials would be needed to ensure that individuals with color vision deficiency could accurately interpret the content and context of imagery and visual media.

[vii] For example, although it has long been known that honeybees use optically-processed information to track the polarization of sun as a navigational tool, Liang et al. (2016) discovered that bees also can detect the magnetic polarization of the earth and use this additional information to navigate to and from the hive. Similarly, dogs use smell (olfaction) far more than they use vision to "see" their worlds (e.g., Gazit and Terkel, 2003). An even more extreme example is the single-celled, aneural ("brainless") slime mold *Physarum polycephalum,* which uses mechanical sensations to sense the locations of objects in its environment and make "decisions" about which direction it grows based on those locations. Murugan et al. (2021) suggest that this slime mold is using its entire single-celled body as a distributed sensor array and substrate for computation and cognition. Walecki (2021) provides a lay summary of Murugan et al.'s technical paper.

[viii] A recent related example is in Reichert et al. (2021). Vernouillet (2021) provides a readable summary of Reichert et al.'s (2021) technical article.

[ix] For example, our perception of "rapid" climate change and environmental "tipping points" assumes a particular temporal scale (Bestelmeyer et al., 2011).

[x] Extended from the *Thinking with Images: Uncovering Relational Patterns* thinking routine in Chua et al. (2017).

[xi] Ironically, such a failure of imagination is a decidedly nonhuman trait. See Egnor (2015).

APA citation format (7th edition) for this publication:
Zeigler, E. & Ellison, A. M. (2022). Learning to see differently. In J. Lee, S. Beene, X. Chen, W. Huang, L. Okan, and F. Rodrigues (Eds.), *Seeing across disciplines: The book of selected readings 2022* (pp. 146-159). International Visual Literacy Association.
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https://doi.org/10.52917/ivlatbsr.2022.031

1st Art Exhibit Award

Public Library (2021)

Eric Sung
Providence College, USA

50 x 40 x 3 inch (h x w x d)
Photography

The image is from “Monuments of Memories for Our Times” series which is made with a dedicated consideration to the complexities inherent to the “monument.” In “public Library,” Sung explores documenting vacant community infrastructure as monument of current times to archive the impact of Covid-19.

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APA citation format (7th edition) for this publication:
Sung, E. (2022). Public library. In J. Lee, S. Beene, X. Chen, W. Huang, L. Okan, and F. Rodrigues (Eds.), *Seeing across disciplines: The book of selected readings 2022* (p. 160). International Visual Literacy Association. https://doi.org/10.52917/ivlatbsr.2022.031

https://doi.org/10.52917/ivlatbsr.2022.032

2nd Art Exhibit Award

Young Boy (2021)

Deborah Orloff
University of Toledo, USA

16 x 10.5 inch (h x w)
USD
Photography

Using abandoned family pictures as subject matter, Elusive Memory deals with the complicated relationship between photography and memory. Recently I've been thinking about what happens when we lose family photos and the stories associated with them. Are these histories irretrievably lost? My newest pieces are intimate, small-scale photographs made with shallow depth of field to deny the viewer most of the visual information photos normally reveal. These images allude to lost stories, identities, and cultures - especially in situations of forced migration (as was the case for my ancestors who fled Ukraine during the Russian pogroms) - and the universal experience of struggling to recall details of a past for which no records exist. In their final presentation, banal objects become simulacra for lost family histories and speak to the ephemeral nature of memory.

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Orloff, D. (2022). Young Boy. In J. Lee, S. Beene, X. Chen, W. Huang, L. Okan, and F. Rodrigues (Eds.), *Seeing across disciplines: The book of selected readings 2022* (p. 162). International Visual Literacy Association. https://doi.org/10.52917/ivlatbsr.2022.032

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3rd Art Exhibit Award

Stems (2021)

Susan Jane Britsch
Purdue University, USA

48 x 36 inch (h x w)
Photography

My current work juxtaposes tools of creation: human-made tools drawn from the history of my family and natural tools drawn from my home environment…a blossom just broken from its stem running through a machine that repairs and constructs...or reconstructs. This juxtaposition results in a dialogue of eras and artifacts, involving as interlocutors my mother, more distant ancestors, and myself. Each image thus links memory—both lived and imagined—with immediacy. Time spent at home during the pandemic has accentuated this intimacy, creating a liminal space inhabited by love, treasure, careful work, and other lifetimes no longer present but alive to me now.

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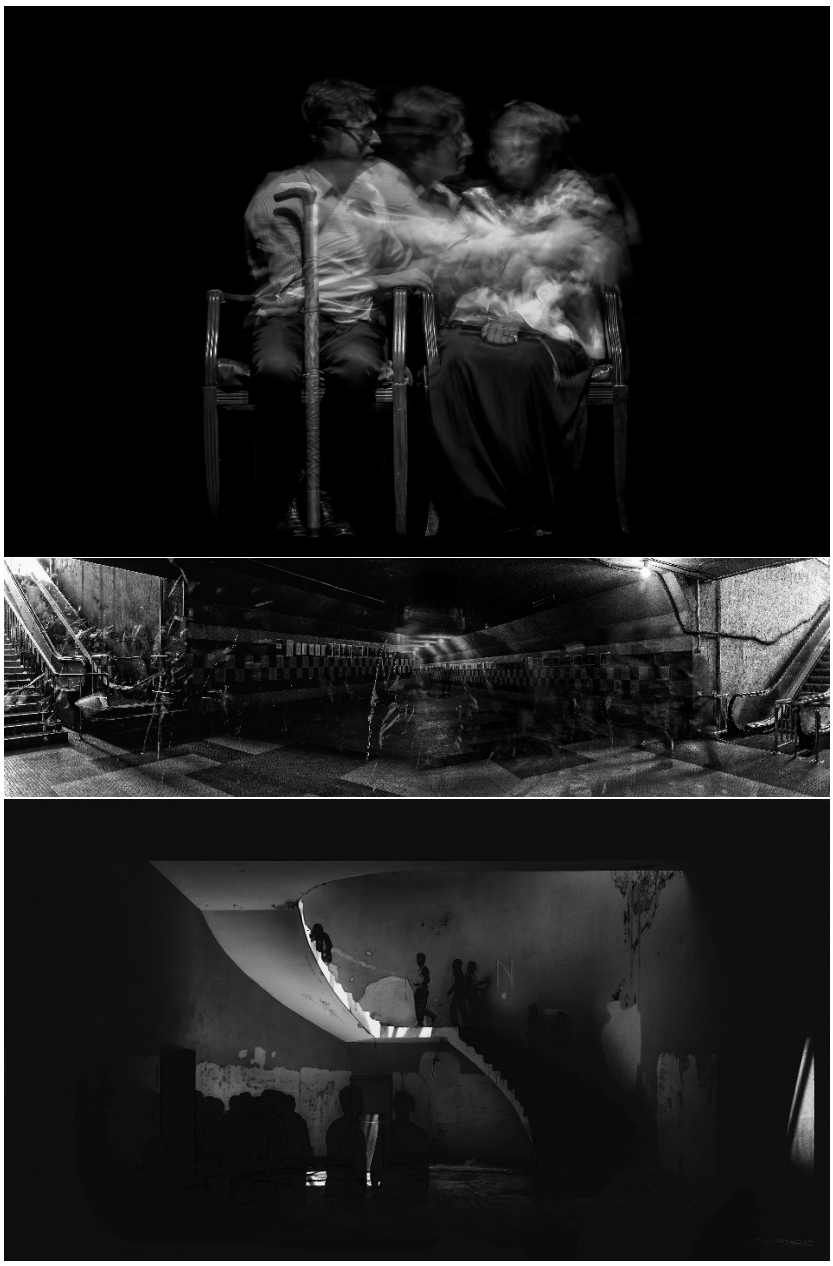
Britsch, S. J. (2022). Stems. In J. Lee, S. Beene, X. Chen, W. Huang, L. Okan, and F. Rodrigues (Eds.), *Seeing across disciplines: The book of selected readings 2022* (p. 164). International Visual Literacy Association. https://doi.org/10.52917/ivlatbsr.2022.033

https://doi.org/10.52917/ivlatbsr.2022.034

Honorable mention

Sonder, Seclusion (2021)

Faizan Adil,
Independent Artist, Pakistan



Digital Photography

Sonder: The realization that each random passerby is living life as vivid and complex as your own.

Seclusion: The state of being private and away from other people.

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Each society evolves with a new paradigm and generations. In each era, human isolation is increasing with the passage of time. A human rush and psychological warfare can be seen in daily routine. Inner chaos and remorsefulness, are not being addressed by a person or society. An absolute phase that every human faces in his life.

The mentioned brief is used in the fine art scam photographic work experiment.

Originally, This project is a reflection on the research paper of Ar. Zain Adil based on Light, Space, Time & Gravity.

APA citation format (7th edition) for this publication:
Adil, F. (2022). Sonder, Seclusion. In J. Lee, S. Beene, X. Chen, W. Huang, L. Okan, and F. Rodrigues (Eds.), *Seeing across disciplines: The book of selected readings 2022* (pp. 166-167). International Visual Literacy Association. https://doi.org/10.52917/ivlatbsr.2022.034

https://doi.org/10.52917/ivlatbsr.2022.035

Honorable mention

Cloud and Rain behind the Glass (2021)

Daniele Bongiovanni,
Academy of Fine Arts of Macerata, Italy

50 x 50 cm (h x w)
Oil on canvas (50cm X 50 cm each)

Through my works I try to bring my interiority to the outside, while my painting is also based on the ''landscape'', revised in a spiritual and emotional key. I don't portray reality, my creations are the representation of my thought, my subject is nature and sometimes man. My work shows the progressive birth of things, the ''progression'' is my favorite subject.

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Bongiovanni, D. (2022). Cloud and Rain behind the Glass. In J. Lee, S. Beene, X. Chen, W. Huang, L. Okan, and F. Rodrigues (Eds.), *Seeing across disciplines: The book of selected readings 2022* (p. 168). International Visual Literacy Association. https://doi.org/10.52917/ivlatbsr.2022.035

https://doi.org/10.52917/ivlatbsr.2022.036

Honorable mention

Brookshire: Borderlands (2021)

A metaphorical representation of migrants in Texas

De Ferrier
Independent Artist, USA

19.5 x 25.5 inch (h x w)
Manipulated image, hands-on approach

This body of work is informed by my own experience of constant migration. My lens based photographic practice is grounded in the images of my current 'home' where the iconic silos and rice dryers of Texas dominate the landscape. The actions of shooting, dissecting, cutting, folding and concealing these images mimics the vilification of migrants across the globe. Utilizing a hands-on meditative approach leads to a transformation of folded and constructed imagery that creates metaphors of hidden, unjust truths. My interest is in the materiality and physicality of the photograph, which becomes an object in itself. Journeys and borders are explored, then recreated with silo imagery. The intent is to invite the viewer in while gently touching upon very sensitive issues related to migration.

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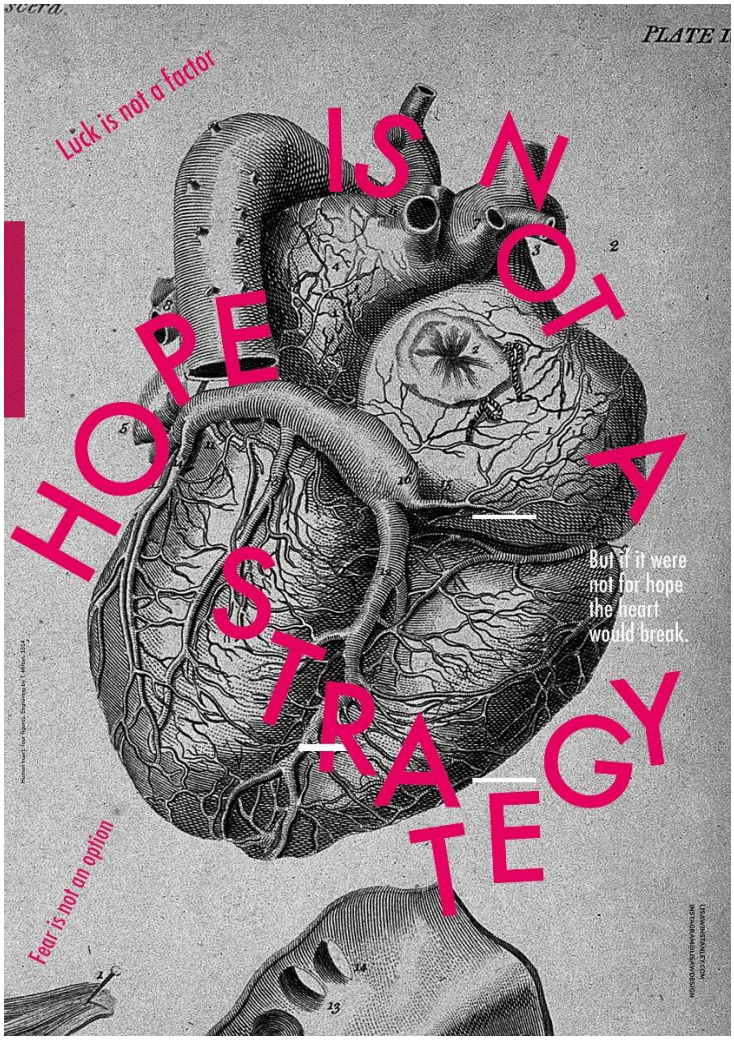
APA citation format (7th edition) for this publication:
Ferrier, D. (2022). Brookshire: Borderlands. In J. Lee, S. Beene, X. Chen, W. Huang, L. Okan, and F. Rodrigues (Eds.), *Seeing across disciplines: The book of selected readings 2022* (p. 170). International Visual Literacy Association. https://doi.org/10.52917/ivlatbsr.2022.036

https://doi.org/10.52917/ivlatbsr.2022.037

Honorable mention

Hope is not a strategy (2021)

Lisa Winstanley
Nanyang Technological university, Singapore



100 x 70 cm (h x w)
Digital Poster: Experimental typography combined with historical etching

Hope is easy. It fills the heart with optimism. It allows us to imagine a better space or time. It is optimism in the face of apathy or despair. Hope is pure and good. However, hoping for the best is often a form of inertia when what is needed is action. What is needed is to deal with reality and to plan, prepare and move towards a better future, rather than to remain static in the hope that everything will be ok. The place where we *can* situate hope is when all the preparations have been made and the hard work has been put in, and yet even then, with all that in place, you can do your best but that does not entitle you to positive results.
Hope Is Not A Strategy.
But if it were not for hope the heart would break.

https://doi.org/10.52917/ivlatbsr.2022.037

APA citation format (7th edition) for this publication:
Winstanley, L. (2022). Hope is not a strategy. In J. Lee, S. Beene, X. Chen, W. Huang, L. Okan, and F. Rodrigues (Eds.), *Seeing across disciplines: The book of selected readings 2022* (p. 172). International Visual Literacy Association. https://doi.org/10.52917/ivlatbsr.2022.037