

Revisualizing Science: An art historical exploration of medieval scientific manuscripts

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Over the past three-and-a-half years as an art history and math/stats student, I have consistently had to defend my choice of majors. My peers in my math and statistics classes often scoff at my choice to also study art history – many do not understand why I would dedicate so much time to art history when they think mathematical skills are so much more valuable. On the other hand, the students in my art history courses like to regale me with horror stories of past math classes that have caused them to hate the discipline and avoid quantitative work like the plague. When in these situations, I am always happy to explain why both disciplines are important to me and why I do not think they are that different. Both fields use a combination of subjective and objective analysis to try to understand the world around us. For instance, where an artist might contemplate the concept of spacetime using a painting or sculpture, a mathematician would use numbers and equations. Despite my explanations, examples, or experience, however, students in both fields seem uninterested in understanding how their work in art or science may be connected to, or benefit from, the other.

Though these personal interactions happen in the microcosm of a math or art history classroom at USU, they indicate a much wider social issue. STEM and humanities are not seen as compatible. A person can be an artist or a scientist – right brain or left brain. This idea, however, is merely a modern stereotype. Of course, there are artists and scientists in the world who are adept in both fields, such as Vera Meyer, a microbiologist who creates fungus-inspired sculptures.¹ But these individuals are the anomaly, not the standard. Historically, things were different. For much of Western history, it was not only common, but expected, that an artist, scientist, or scholar had a range of skills spanning the sciences and humanities. Figures such as Leonardo, Michelangelo, or Dürer are well-known for their scientific, engineering, and artistic pursuits. It is difficult and complex to articulate exactly why, in the modern era, STEM and humanities disciplines are considered so disparate when in the past they were so intertwined. And as someone who has dedicated my whole college career to both fields, I feel a personal responsibility for bridging the gap between STEM and the humanities and helping my peers understand the importance all academic disciplines serve in the development, continuation, and improvement of the modern world.

As a long-time writing and math tutor, clear expressions of technical ideas are important to me and I believe that a mutual improvement in the communication of scholarship, research, and ideas from both STEM and humanities disciplines would help bridge the gap between the fields. If everyone understood each other's work more clearly, we would be able to draw more interdisciplinary connections. Not only do I think that improved communication will help connect humanities and STEM students, but I also believe that humanities and STEM fields have a lot to offer in improving the communications of the other. Ultimately, I want to know how artists and scientists can combine their knowledge and skillsets to improve communication and increase educational capacity.

My proposed research seeks to answer this question through a study of historical scientific manuscripts from the medieval and early modern periods. When it comes to communication methods, there was no medium more common, historically, than the book. Books have been the primary purveyors of information since antiquity. Not only have books reigned supreme as

¹ Roberto Garbero, "The Greatest Scientists are Artists Too," Biomedcentral, 2019.

communicators of information, but they also exemplify the interdisciplinary type of communication that I am interested in researching. Books represent a unique medium where text and image have long been combined to educate and inform. As an art history student, I am particularly interested in the visual aspects of historical scientific communication. I want to know in what ways scientific thought and research were visually communicated in books and how these methods differ in contemporary texts. By studying the books from eras where the sciences and humanities were so interconnected, I hope to gain further insight into how the communication of scientific research complemented, or was complemented by, visual culture and how we can incorporate those ideas into modern scholarship and education.

Over the past two years, I have spent a considerable amount of time researching astrolabes, medieval computational instruments known for their beauty and artistic symbolism. I found this research on astrolabes to be an excellent way to explore and facilitate interdisciplinary dialogues between humanities and STEM fields. I loved that project, but through my research, I was struck by how difficult interdisciplinary communication truly is, yet it cemented my belief that improvement in this field is crucial. As I have recently finished that research, I am looking to spend the next, and final, year of my undergraduate career engaging in a new project to take my interdisciplinary research interests a step further through an exploration of books and manuscripts. I want to take what I have learned about STEM and humanities communication over the past four years and put it to the test by curating a public exhibition of Special Collections' books and manuscripts.

My interest in historical manuscripts stems from an art history course that I took in the fall of 2019. In this curatorial methods course, taught by Dr. Alexa Sand, I worked alongside the other students in the class to put together an exhibition of the objects in Merrill-Cazier Library's Special Collections. Though the theme of our exhibition was wide-ranging to encompass different types of objects, I focused on a 15th-century book titled *The Mirror of the World* – a text once believed to contain all human knowledge. The scientific nature of this book intrigued me as its communication of scientific concepts differed dramatically from the way I am used to learning science. At the time, there were several other books and manuscripts in the collection that I was interested in pursuing, but due to the limitations of the course, I could not research all of these objects. Through this new project, I hope to pick up where I left off last fall and use my last year of undergraduate research to conduct an in-depth study of these books. Through my analysis of these objects and associated literature, I hope to explore the following questions:

- How have artists aided in the historical advancement of scientific knowledge?
- What can be learned about effectively visually communicating ideas from artists?
- Has an increase in literacy contributed to changes in the way scholars and scientists communicate their research? How?
- How have the visual methods used to communicate science changed? Stayed the same?
- How can methods of visual communication from medieval and early modern manuscripts apply to the modern digital landscape?
- In what ways has the audience for scientific research changed?
- Who created these manuscripts and books? Was it just one person or many?

My proposed project will happen in two parts. The first is to study a large sample of historical scientific manuscripts from Special Collections and Archives. I am particularly interested in studying the visual methods used in these documents and comparing them to the ways scientific concepts are visually communicated today. Ultimately, I plan to curate an exhibition in Special Collections that displays these objects and highlights them in the context of visual science communication. I have contacted Jennifer Duncan, the Special Collections librarian, and she has agreed to allow me to conduct my research using the objects in Special Collections and has scheduled my exhibition to take place in Special Collections' Hatch Room in April 2022.

I plan to model my exhibition off of the exhibition my peers and I built in ARTH 4630. I know for this exhibit I will first need to choose a theme. This includes not only a conceptual theme but also a visual theme. I plan to enlist the help of a graphic designer with whom I can work to develop marketing materials and other visuals for the exhibition. I plan to fund the work of this designer with financial support from an URCO Grant or with Honors Research Funding. Next, to develop the physical exhibition, I will select 10-12 objects that support and exemplify that theme, write interpretive texts for each object (~80 words each), develop a didactic text for the exhibition (~100 words), and write a catalog essay for every book (~300 words each). For each object, I will compile a bibliography using the USU Library's resources and other online archives and review the materials using traditional literature review methods. I also plan to review literature related to book studies and the history of books and manuscripts to give me a wider contextual knowledge of the topics I am exploring. My goal is to research and write all exhibition-related texts by the end of summer 2021.

The second, and final, product of this research will take the form of a 5,000-10,000-word thesis that I will submit for my Honors capstone. The paper will incorporate the significant findings of my research for all of the objects I have focused on and articulate the conclusions I have made regarding the visual communication of scientific research. I want to specifically discuss what I have learned regarding these ideas of effective communication and what ideas I have to improve the visual communication of scientific ideas moving forward.

The public-facing components of research are important to me, and I value opportunities to share my findings and ideas. The exhibition itself is a powerful and unique means to present my research to the public in an interactive and visually interesting way. But aside from my public exhibition, I also plan to publish both my thesis and exhibition in a digital format. For my thesis, I plan to publish it in the USU Digital Commons, the Curiosity Research Journal, or a more wide-ranging journal such as the UC Berkeley Comparative Literature Undergraduate Journal or the Stanford Undergraduate Research Journal. I am also considering the idea of publishing my exhibit in some digital format, whether through formal online exhibition software or on a website devoted to the books and exhibition materials that I have compiled. Additionally, I plan to present my research at the USU Student Research Symposium and Utah Conference on Undergraduate Research.

Through my exhibition, paper, and their distribution, I hope to expose readers, listeners, and viewers to a different perspective on communicating scientific and artistic ideas and present the undeniable connections between art and science both historically and today. More significantly, however, my goal is that by interacting with my research, scientists and artists alike will feel a

connection with these objects and ideas, that will then connect them to each other, and help dismiss the myth that art and science exist in complete isolation, but instead can help support each other to create a more effective method of communicating and educating.

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Personal Statement

By Olivia Brock

As a USU student, I have been fortunate to take advantage of a variety of classes, ideas, and disciplines. Amid this diversity, however, I found myself drawn to art history and mathematics. Despite their differences, I find this mixture to be a good combination for my interests and skill set, and an intriguing pair for interdisciplinary discussions. The Caine Summer Arts Research Grant will allow me to contribute more meaningfully to these cross-disciplinary discussions by engaging in a scientific and artistic investigation of medieval and early modern scientific books and manuscripts. This grant will also help me facilitate my own interdisciplinary education, make me a valuable candidate for fellowships and museum internships, help me develop skills to successfully earn a PhD, and guide me into a future career as an educator.

Given my unique blend of majors, I consider myself in a good position to facilitate cross-disciplinary conversations among my peers; however, I rarely have the opportunity, through my classes, to explore and research the ways my fields connect. Therefore, I recognize that I must proactively seek out opportunities to contribute to these discussions outside of my traditional schedule, as I consider the development of these cross-disciplinary communication skills a crucial part of my undergraduate education, and one that I have to facilitate myself. Spending the summer engaging in this interdisciplinary research project, writing a paper, curating an exhibition, and presenting my work at the Student Research Symposium will help me develop written and oral communication skills to help bridge the arts and sciences at USU.

Beyond supplementing my schoolwork, participating in this fellowship will make me a more experienced candidate for fellowship applications, such as the Rhodes or Gates fellowships, which are on my radar at the advice of my mentor. I also intend to apply for a museum internship through the Smithsonian's Katzenberger Art History Internship Program next year, and spending the summer engaging in this project will show these institutions that I have experience in art historical research that will make me a valuable intern, which will ultimately help propel me into graduate school.

In the nearer future, the researching, writing, and presentation skills I will develop by engaging in this project – with the help of my mentor – will be of immense importance as I complete my honors thesis. And beyond this short-term impact, I have intentions to attend graduate school to obtain a masters and potentially PhD in education, where these scholarly research skills will be crucial for me to successfully complete a thesis and/or dissertation.

Working together, these experiences will ultimately prepare me to achieve my long-term professional goal of teaching, either at the secondary or, ideally, post-secondary level. I want to create a classroom environment that promotes communication and discussions between students of all interests, disciplines, and skill sets. In order to facilitate these conversations, I need to spend unobstructed time engaging with them myself, and learn how to present artistic and scientific ideas in a way that will make them accessible for everyone.