Visualizing Data

A Conversation with

Mary Bates Neubauer
Monsoon (detail), 2006. Digital Lambda print, 36 x 36 in.
Artist, educator, and innovator, Mary Bates Neubauer, the recipient of the International Sculpture Center’s 2015 Outstanding Educator Award, bridges ancient and cutting-edge technologies. Trained and first hired as a foundry sculptor, she’s broadened her practice at Arizona State University’s sculpture program in the Herberger Institute for Design and the Arts, where she is a professor of sculpture. Far beyond casts, alloys, pours, and investments, she includes digital technologies that enhance traditional media to address the “big data” and virtuality that inform our world view. Collaborating with ASU’s Partnership for Research in Spatial Modeling (PRISM) laboratories, and its founder Dan Collins, as well as ASU’s Software Factory, Neubauer has been a pioneer in the use of rapid prototyping (RP) and computer-numeric-controlled (CNC) milling. With her “feet in the digital and casting worlds,” she was one of the first artists to cast metal works from digitally rendered maquettes, molds, and interim materials—transforming sometimes un-gratifying CNC foam and RP plaster into resplendent iron, bronze, and copper sculptures.

She’s created a body of work that gives form to abstract information as diverse as airport noise, university course meeting times, and annual rainfall. She recognizes the beauty of the mathematical model, as well as how such modeling becomes far more powerful when we can relate our experiences to it—in doing so, she anticipated other digital-data-driven contemporary art, for instance, Iñigo Manglano-Ovalle’s “Cloud Prototypes” and “Icebergs” and Norwood Viviano’s layered cityscapes. While Neubauer’s innovations certainly fit the research mission of a prominent university, they are also made in an environment of collaborative learning. As the sculpture program coordinator and person-in-charge of the ASU foundry, Neubauer shares not only her foundry expertise with her students, but also her abiding interest in questioning what these materials can become, what these processes can yield. While she doesn’t teach “digital art” per se, she encourages her students to engage many 3D tools in the sculpture curriculum. Just as important, she has modeled post-digital concerns for students, demonstrating that technology is less important than other content and concepts. Even while helping to establish digital technologies in the service of sculpture, Neubauer has communicated robust ideas about environmental concerns, scientific hermeneutics, and urban social dynamics.
William V. Ganis: What drew you to foundry work?
Mary Bates Neubauer: I was drawn to the excitement of the process and the material involvement. For me, there is a nice balance between the physical and the metaphysical, and I am able to think about my works and my practice through involvement in the hands-on making of the work.
WVG: You entered into one of the most “macho” areas of art-making— the foundry—and then started working in the field of digital technologies, which was also male dominated. Did you ever have to overcome discrimination or redefine the cultures in these programs?

Mary Bates Neubauer: When I started in the foundry, there were few women instructing in the field, and there was indeed a macho aura to the practice, which seems quaint and outdated now. Today, there are many women teaching in the field throughout the United States, and I hope that I have been able to be a role model. While I was sensitive to discrimination at a younger age, my skills proved my ability and gave me confidence and assurance. I have been in the field long enough now to feel that I have gained an extensive body of knowledge and can really contribute to teaching in the field. As for digital sculpture: while times have changed and things are more open for women, I sometimes do pick up on the old macho vibe in the studio. It doesn’t bother me; I just feel sorry that I let it get to me when I was younger. With my long experience, I just want to focus on getting my work done and my ideas realized, and I love collaborating with colleagues in the digital and foundry worlds, both male and female.
WVG: While I don’t necessarily think of your work as “feminist,” I do think that you broke some barriers. Do you think that you opened career or expressive possibilities for your students, male and female?
MBN: When I came of age in the ’70s, we women thought or were told that we could do it all and juggle everything. I entered graduate school with a one-year-old and a three-year-old, never thinking about how hard it would be. Looking back, I think it seems like too much, but I took everything as a challenge, with a will and optimism, and didn’t worry too much about the consequences or complications. I think that I have been a role model, but sometimes when I look at my résumé, I feel exhausted: How did I do all that? I was and am very driven and focused, and I don’t let things interfere with that focus or take me down. There is a price for this, but I believe that I served as an example to many generations of students.

WVG: Physical mathematical models have been around since the early 20th century, expressions of data sets and models of crystals and molecules. What gave you the idea to start modeling more complex and dynamic data sets? Info-graphics, especially Edward Tufte’s visualizations and teachings, became quite important in the 1990s and 2000s. Was his work important for you?

MBN: Tufte’s work and seminars made me aware of how one must be absolutely honest, even when expressing data in an artistic manner. My husband, a statistician, has also helped me in understanding how to arrange data and find trends and periodicities. But I was interested in numbers and data from a very early age, and I always had a sense that there were alternate ways to express geometries and sequences of numbers. My musical training also helped. The neurologist Oliver Sacks has written on this subject, and his article about the calculating twins and other numerical savants was very inspiring. Thinking back, I’ve drawn geometries since childhood and always had a sense that, when computing power advanced and came into its own, my work would make use of this power. Steven Wolfram, the creator of Mathematica, had an influence and was much discussed when I was starting with these projects.

WVG: I personally think of the RP and CNC plasters, plastics, and foams (especially the early ones) as drab. In the 2000s, I was drawn to the alternative materials of your cast works. Did you envision a transformation of these materials when you realized them in metals, or at least paint?

MBN: Yes. I always imagined transforming digital output into a better material. And, of course, I had the skills to do so, so I always saw it as simply the pattern material, not the final product. Recently, I have been working at the Digital Stone Project, where 3D files are realized in marble using a seven-axis robot. This adds another traditional sculpture material to the digital-media toolbox. Some recent exhibitions of 3D printing, however, have a pure and charming aesthetic—I’m thinking of the groundbreaking exhibitions that Mary Visser has organized at Southwestern in Texas and that Christian Lavigne, also of Ars Mathematica, has produced in Europe. I also really like the portability of sculptural images as 3D prints. Now we can send .stl (stereo lithography)
files anywhere in the world and have them printed on site, thus avoiding the problems and expense of international shipping. Also, 3D printing processes and materials are always improving. I’ve enjoyed bringing color into my work through color-printing processes such as those by Z Corp.

WVG: Engineers and industrial designers were already casting metals from digital processes in the 1990s, but what were the challenges you experienced in casting art materials from CNC and RP materials? What did you have to work out?

MBN: There were no challenges. Through my public art, I knew that outputters, fabricators, and foundries needed digital files and had begun working with them. I knew that I could burn out the plastics that 3D prints were made of and replace them with metal using the ceramic shell process; that I could easily make molds of prototypes for editioning; and that I could have larger sculptures milled for sand-casting from hard patterns. My very first enlargements for Styrofoam patterns, though, were made by tracing layer silhouettes on a computer screen to save money.

WVG: What do you think makes for effective art teaching? Is it necessarily the same as what makes good art?

MBN: No. There are gifted artist-teachers, and I can think of many wonderful painters and sculptors who taught or who took on students or apprentices, but I do not think that being an artist and being an effective teacher necessarily go hand-in-hand. I often think that my students learn more from undertaking a large project and apprenticing with me than I can teach in a classroom setting. I come from a long line of teachers, so perhaps this is an inborn talent. I seem to have an understanding of individual potential in my students and drive them to meet that potential so that they may have richer lives. I also make sure they read, think, write, travel, and expand their lives. Sometimes I feel as if I push them hard in this way.

WVG: You said that you thought of yourself as a synesthete of sorts. Could you give an example of this sensibility in one of your works? Does your work foster such synesthetic transformation or communicate synesthesia to others?

MBN: Yes. I cannot help it. The synesthetic transformation is the core that drives this work. In Monsoon, the weight and density of daily rainfall statistics recurring over the course of 30 years give a feeling of impending weather, impending rain. Moonrise and Moonset is ethereal. The more natural the process, the more beautiful and uniform the resulting piece. A series of images made from a chart of blood-sugar levels in an individual suffering from diabetes came out as chaotic—you can see the illness in the form. One of the more interesting visualizations was of a telecommunications company’s operational data. Things generally ran along smoothly, but when there was a period of difficulty for the company, this anomaly jumped out in a form that was otherwise regular and uniform.

I do get a feeling of color and form from the numbers. Some people pick up on it easily, others think it is too nerdy or don’t see a relationship. People get bored with long streams of numbers, big data, when they look at columns or charts. But numbers have life, and they give us crucial information about what is happening in the world—a pertinent example is climate-change statistics. My hope is that people will pick up on the rhythms and processes of natural and metropolitan functions that drive my selected number streams. Perhaps those streams will impact people in a visual and emotional way that will communicate what spreadsheets cannot. I feel as if we, as human beings, indeed have a latent capacity to understand numbers in many different and dimensional ways, not just in the linear and static way in which they are often seen today.

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