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NEWS RELEASE

Guggenheim Museum's Initiative for Conserving Computer-Based Art Restores Seminal Web Artwork *Unfolding Object* (2002) by John F. Simon Jr.

(NEW YORK, NY – November 19, 2018)—Through Conserving Computer-Based Art (CCBA), a research and treatment initiative to preserve software and computer-based artworks in the museum's permanent collection, the Solomon R. Guggenheim Museum has completed the restoration of *Unfolding Object* (2002) by John F. Simon Jr. (b. 1963, Shreveport, Louisiana). Originally commissioned by the Guggenheim, *Unfolding Object* is one of three seminal web artworks in the collection, including *Brandon* (1998–99) by Shu Lea Cheang, which was restored by the CCBA in 2017, and *net.flag* (2002) by Mark Napier.

Unfolding Object enables visitors from across the globe to create their own individual artwork online by unfolding the pages of a virtual "object"—a two-dimensional rectangular form–click by click, creating a new, multifaceted shape. Users may also see traces left by others who have previously unfolded the same facets, represented by lines or hash marks. The colors of the object and the background change depending on the time of day, so that two simultaneous users in different time zones are looking at different colors. For the composition of *Unfolding Object*, Simon drew inspiration from sources including work by artists Vasily Kandinsky and Paul Klee, and the writing of theoretical physicist David Bohm, explaining how Bohm "talked about an unfolding universe. . . . Reality is only where your attention is." At a time when the internet's potential for audience engagement and interactivity was just being realized, Simon embraced those new possibilities. But because the Java technology used to develop this early internet artworks is now obsolete, the work was no longer supported by contemporary web browsers and not easily accessible online.

The CCBA team, consisting of conservators and computer scientists in dialogue with the artist, analyzed and documented the artwork's original source code and aesthetic and functional behaviors before identifying a treatment strategy. The team determined that a migration from the obsolete Java applet code to the contemporary programming language JavaScript was necessary. In place of a

complete rewriting of the code, a treatment that art conservators would deem invasive, the CCBA team developed a new migration strategy more in line with contemporary conservation ethics, "code resituation," which preserves as much of the original source code as possible. With this approach, blocks of the original code were copied and "resituated" into the restoration code, reanimating the artist's program while requiring little or no modification of the original code. One artwork behavior, however, could not be addressed without changing the original code. Over the years, *Unfolding Object*'s increasing number of visitors led to a darkening of unfolded pages, which over time resulted in a deep black object within a few clicks. The team decided to slow the rate of darkening by changing the multiplication factor that determines the brightness gradient in a nonlinear way. The revised algorithm darkens the color more gradually for the first few steps, and in later steps it moves toward black slowly.

Another unexpected challenge in the restoration involved re-creating the depiction of shapes and lines in *Unfolding Object*. The original artwork features a sharply defined image, where each pixel can be seen individually, resulting in staircase-like steps in the pixelation of diagonal lines. However, Canvas 2D, JavaScript's graphics library for drawing shapes and lines, smooths out the images, resulting in a blurred impression of the pixelated shapes. An alternative graphics solution had to be found to re-create the original aesthetic. To accurately compare how different graphics solutions impacted the rendering of *Unfolding Object*, the CCBA team wrote a program that allowed different versions of the restoration to be run side by side.

As a result of the comparison, the team decided to use WebGL, a JavaScript library for programming custom graphics rendering systems. The fine-grained control it offered made it better suited to reproduce the pixelated effects needed for this restoration.

Detailed documentation of the original and restored code will simplify the maintenance and study of the artwork in the future. The CCBA team's work on Simon's piece restores visitor interactivity inherent in the work and allows a continued history of visits to accumulate within *Unfolding Object*. New audiences can now explore this pioneering web art commission by visiting the work's original URL, unfoldingobject.guggenheim.org.

The restoration of *Unfolding Object* was supervised by Joanna Phillips, Senior Conservator of Time-Based Media, Solomon R. Guggenheim Museum, and Professor Deena Engel, Department of Computer Science at the Courant Institute of Mathematical Sciences, New York University. The programming was executed by Karl Toby Rosenberg, former NYU computer science student (class of 2017), and supported by Jonathan Farbowitz, CCBA Fellow at the Guggenheim. A blog post co-authored by the research team, which includes an artist-narrated video, is available at guggenheim.org/blogs/checklist.

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About the CCBA

A longtime pioneer in the field of contemporary art conservation, and one of the few institutions in the United States with dedicated staff and lab facilities for the conservation of time-based media art, the Guggenheim established the Conserving Computer-Based Art initiative in 2016. This multiyear project was created to research and develop better practices for the acquisition, preservation, maintenance, and display of computer-based art. By addressing the challenges of preserving digital artworks, including hardware failure, rapid obsolescence of operating systems, and artists' custom software, CCBA is tasked with the conservation of computer-based artworks in the Guggenheim collection to ensure long-term storage and access to the public. The CCBA initiative is an opportunity for the Guggenheim to facilitate cross-institutional collaboration toward best-practice development, and CCBA integrates the museum's ongoing work with the faculty and students of the Department of Computer Science at NYU's Courant Institute for Mathematical Sciences.

About the Solomon R. Guggenheim Foundation

Founded in 1937, the Solomon R. Guggenheim Foundation is dedicated to promoting the understanding and appreciation of art, primarily of the modern and contemporary periods, through exhibitions, education programs, research initiatives, and publications. The Guggenheim network that began in the 1970s when the Solomon R. Guggenheim Museum, New York, was joined by the Peggy Guggenheim Collection, Venice, has since expanded to include the Guggenheim Museum Bilbao (opened 1997), and the Guggenheim Abu Dhabi (currently in development). The Guggenheim Foundation continues to forge international collaborations that celebrate contemporary art, architecture, and design within and beyond the walls of the museum, including the Guggenheim UBS MAP Global Art Initiative and The Robert H. N. Ho Family Foundation Chinese Art Initiative. More information about the Solomon R. Guggenheim Foundation can be found at guggenheim.org.

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