



JANUARY 30—MARCH 18, 2023 // CENTER FOR ART, DESIGN, AND VISUAL CULTURE (CADVC) // UNIVERSITY OF MARYLAND, BALTIMORE COUNTY (UMBC) // FEATURING "ALL ELEMENTS ARE FORGED IN THE HEARTS OF STARS: TAHIR HEMPHILL'S HIPHOP DATA SCIENCE," AN ESSAY BY DR. DAVID A. M. GOLDBERG

MARING MARKS

In a February 12, 2023, roundtable discussion associated with artist Lee Boot's "Abstracts & Artifacts" exhibition at the Peale Center, artist and technologist Tahir Hemphill described his artwork as pointedly systems-oriented: "I don't pick up a pen to make a mark on a page; I make systems that make marks."¹

Clear evidence for this claim appears in Hemphill's "Rap Research Lab" at the Center for Art, Design, and Visual Culture (CADVC), a temporary laboratory space and exhibition-form that chronicles his 2021-2023 UMBC faculty fellowship. In this presentation, Hemphill has set into motion several systems for learning, making, and evaluating (and reevaluating) the world. One example is a classroom forum, based within the galleries of CADVC, that supports new research by undergraduate students enrolled in his "Topics in Art and Technology" course, offered in partnership with UMBC Visual Arts and the Imaging Research Center. Another example is the "Mapper's Delight" curriculum, developed by Hemphill in partnership with Verizon Innovative Learning, which invites gallery visitors to explore augmented reality representations of data drawn from rap lyrics. Both these capacious system-based cultural productions are forums for unfolding research that result in mark-making of different sorts: one research project for Hemphill's class proposed a network graph of lyrics about fine artists (an update to his 2014 "Picasso Baby"); the data collected in the "Mapper's Delight" app will create plot points for generating 3D-printed sculptural mappings of GPS coordinates associated with lyrical references to places. The abundance of mark-making in Hemphill's "Rap Research Lab" follows a condition of laboratory practice that Bruno Latour and Steve Woolgar characterized as a "strange mania for inscription," in their Laboratory Life: The Construction of Scientific Facts, an anthropology of the scientific lab that notes the excess of paper (writing, recording, instructing) that surrounds and results from acts of scientific work. ("The desk thus appears to be the hub of our productive unit.")² Hemphill has similarly observed the

ways that certain forms or formats of inscription suggest cultural value, by documenting, archiving, or literally framing objects of cultural importance. In his "Shoutouts" series, for example, Hemphill draws from the ephemeral spoken word of participants in a 1990 broadcast of Ralph McDaniels's "Video Music Box," a long-running television show and important platform to musicians and their expanded networks of industry players and fans. From this footage, which includes appearances from groups such as De La Soul and A Tribe Called Quest, Hemphill has excerpted specific quotes to transcribe in text, then print, mount, and display in large frames—a form of inscribed tribute to the passage of time recorded in the video.

In presenting Tahir Hemphill's "Rap Research Lab" at CADVC, our team was invited to rethink and rearrange our familiar systems to make room for new practices. Insurance procedures usually designated for fine arts objects, for example, had to be adjusted to accommodate the presentation of curricular materials, technological apparatuses, and artworks in process, many of which were expected to change over the course of the exhibition. These very positive adjustments to our procedures will have lasting effect, as CADVC becomes increasingly nimble in responding to similar active and experimental practices going forward. In this sense, we may understand Tahir Hemphill to have created a system not only for making marks, but also, indeed, for making entirely new systems, some of which have yet to reveal themselves even at the time of this writing (two weeks after the exhibition has opened its doors to the public). It is abundantly clear already that Tahir Hemphill has left his mark on our Center, and we are the better for it. On behalf of CADVC, I wish to thank artist Tahir Hemphill, and essayist David A. M. Goldberg, for their contributions to this booklet documenting "Rap Research Lab."

1 // This comment is paraphrased. Tahir Hemphill shared this information about his work in the online forum "Roundtable Discussion with Artists, Scientists, and Engineers," organized by the Peale Center for Baltimore History and Architecture and presented via Zoom on February 23, 2023.

2 // Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facta* (1979; repr., Princeton, New Jersey: Princeton University Press, 1986), 48.

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EXHIBITION + WORKSHOP

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"TAHIR HEMPHILL: RAP RESEARCH LAB" AT CENTER FOR ART, DESIGN, AND VISUAL CULTURE, UMBC. JANUARY 30–MARCH 18, 2023. **EXHIBITION IMAGES. PHOTO: TAHIR HEMPHILL.** "TAHIR HEMPHILL: RAP RESEARCH LAB" AT CENTER FOR ART, DESIGN, AND VISUAL CULTURE, UMBC. JANUARY 30–MARCH 18, 2023. EXHIBITION IMAGES. PHOTO: ANDREW WALTERS.

FEBRUARY 23,



ROBOT ARM DEMONSTRATION, WITH DR. FOAD HAMIDI, UMBC HUMAN-CENTERED COMPUTING, AND TAHIR HEMPHILL, UMBC VISUAL ARTS, 2023. PHOTO: TEDD HENN.



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FMFMTS KF FORGEL FARIS TAHIR **HEMPHILL'S HIPHOP DATA** SCIENCE

"YOU SEE, OUR LOAS ADAPT TO CHANGE. WE HAVE A NEW LOA WITH VERY SPECIAL APPETITES. THIS 1 POSSESSES A TECHNOLOGICAL BENT." —Ishmael Reed, *Mumba Jumba*

Tahir Hemphill is from a once-upon-a-time generation that can count Black Panthers among their family members; remember video game arcades and Commodore computers; bear witness to the devastation of crack, mass incarceration, and HIV; was aware of *all* the rap that was being commercially released in a given month; and have Spike Lee, Public Enemy, N.W.A., *Daughters of the Dust*, the Rodney King Riots, and Freaknik contextualize their HBCU experience. This combination of cultural perspectives informs his approach to a constantly evolving crossroads between Hiphop and technology that produced spray cans, turntables, drum machines, and samplers as paradigm-shifting precedents in the history of Black media-making. His prints, sculptures, videos, data-delivery platforms, augmented and virtual reality applications, artificial intelligence experiments, and pedagogy are all informed by a Hiphop framework that prioritizes doit-yourself pragmatism, crew-based collaboration, aesthetic innovation, and straight-up hustle. This short essay positions Hemphill as a key and exemplary contributor to making data



"TAHIR HEMPHILL: RAP RESEARCH LAB" AT CENTER FOR ART, DESIGN, AND VISUAL CULTURE, UMBC. JANUARY 30–MARCH 18, 2023. EXHIBITION IMAGES. PHOTOS: TEDD HENN. science a new core practice or "element" of Hiphop culture, where it might join deejaying, breakdancing, emceeing, and writing (graffiti).¹

The foundation of Hemphill's work is his Rap Almanac: a searchable archive of millions of rap lyric transcripts whose semantics, sentiment, and structures have been statistically analyzed using custom and commercial algorithms. He makes this data meaningful by creating visualizations that favor the preservation and articulation of cultural knowledge over the fetishization of a given technology or medium. For example, his "Maximum Distance. Minimum Displacement" series (2017-ongoing) uses a robotic arm with a light pen to draw paths between all the locations on planet Earth that a rapper mentions in their lyrical corpus (in the order they were recorded), thereby rendering a unique glyph or network. "Max. Min." images and conceptual objects are deeply meaningful, practical, and above all: fly. Every rapper-celebrity or unknown, no matter their subject matter or degree of sophistication-has a geolocative graph associated with their lyrics that is waiting to be revealed by analysis. Such undiscovered patterns and structures are the raw material of the contemporary data scientist's dreams, but their specific resonance with the *vévés* of Haitian Vodou, the *pantas* riscados of Brazilian Candomblé, and the elaborate signatures of Hiphop graffiti diverges from and challenges the broader corporate projects of commercial surveillance and the digitization of all human output.

Two decades of creative experimentation have not exhausted Rap Almanac as a resource because the corpus of rap lyrics is constantly growing and the algorithms that can be used to analyze it are evolving. Hemphill consistently identifies points that are ahead of the intersection of these two developmental curves, as demonstrated by projects like "Max. Min." and a machine learning experiment called Rapbot. Two to five years ago some aspects of rap's form and content could challenge and confound the capacities of commercial algorithms. For example, analyzing rap's various and often regionally and historically differentiated terms for "gun" required contextual knowledge that natural language processing (NLP)² algorithms lacked. Rapbot used Rap Almanac content as an exclusive source of training data, and though it rarely rhymes and tends toward incoherence, various qualitative dimensions of rap such as tone, a first-person perspective, and the syntax of bragging are readily recognized.

Even a specialized algorithm like Rapbot doesn't replicate the puns, intentional misdirections, and onomatopoeic tricks that emcees use to enrich, transform, and extend basic grammar and syntax (what Rakim described as the "blurs and slurs and words / that don't fit in a rhyme / why waste time").³ However, in the beginning of December 2022, OpenAI released ChatGPT, a conversational interface for GPT-3: "a large-scale language processing model . . . that uses deep learning algorithms to understand and generate natural language."⁴ I asked it to "write a rap about Tahir Hemphill, the Hiphop data scientist and artist," and here are a few couplets:

WE ROCK THE MIC WITH DATA AND ART

TAHIR HEMPHILL, THE HIP-HOP DATA SCIENTIST RAPPING AND CODING, THE PERFECT COMBINATION BRINGING THE CULTURE OF THE STREETS TO INNOVATION

TAHIR HEMPHILL, THE MASTER OF BOTH WORLDS CREATING ART AND KNOWLEDGE, OUR MESSAGE IS HEARD WE BREAK DOWN BARRIERS AND STEREOTYPES DATA SCIENCE AND HIP-HOP, THE PERFECT SYNCH

Both algorithms successfully evoke the first-person braggadocio and confidence that characterize rap as a form. ChatGPT effectively expresses the contrast between the concepts of data science and art and appears to know who Hemphill is and what he does,⁵ but Rapbot's output has a culturally specific quality that bears the traces of actual rappers' styles. The output of generalist and specialist algorithms may not be directly comparable, especially when their cultural contexts are simultaneously segregated by wealth and resources on the one hand and entangled by the relationship between Black cultural output and commercial digitization on the other. OpenAI's large language models will eventually ingest all rap lyrics, and they will be able to express any idea in any rapper's style.⁶ Hemphill's projects are considered and crafted in the spirit of Hiphop producers using recording technology and a repertoire of innovative compositional strategies to reconfigure fragments of music into new works with cultural, aesthetic, and commercial value. Similarly, Hemphill samples the techniques and technologies of natural language processing, robotics, and 3D printing to make work that is not only *about* Hiphop, but *is* Hiphop.

I GET THE FACT YOU CAN TELL YOU

WHAT YOU WANNA TELL ME THAT YOU'RE CRACKING THE BACK I GOT THE SHOT SHOTS CAUSE I'M STRANGE THAT I GOT THE SNAPS I SEE YOUR SEEN AND TIME TO SEE IT WE CAN SEE THE STREETS THEY SAY I DO IT TO THE RAP BUT SEE ME WHAT I SEE IS THE START OF THE STREETS and relationships in large datasets of natural language text, in order to develop algorithms and models that can understand and generate human-like language." ChatGPT prompt: "Explain the use of statistics in natural language processing. One sentence." Submitted December 2, 2022, chat.openai.com.

3 // Eric Barrier and William Griffin, lyrics to "My Melody," 4th & B'way Records, 1986. 4 // ChatGPT prompt: "What is GPT-3, in one sentence?" Submitted December 2, 2022, chat.openai.com.

5 // ChatGPT produced similar results when I used a made-up name ("Bobby Two-Rags"). 6 // For example: "Explain general relativity to me in a Rakim's style," which is akin to text-toimage generators that can be given prompts to emulate a given visual artist.

DR. DAVID A. M. GOLDBERG

Dr. David A. M. Goldberg is a San Francisco-based critical technologist who came of age in the era of the Commodore 64 and the birth of Hiphop. Raised by musicians, artists, and teachers, he thinks, writes, and designs in pursuit of progressive goals in a world that doesn't always follow progressive rules. Goldberg's cultural lens was cut from a matrix of liberal arts and hard science, and his research addresses the intersections of race and digital culture. As a lead product designer for Disney Streaming's Inclusive Design team, he works toward innovating customer-centric products grounded in the ethical use of metadata and algorithmic transparency and also focuses on attending to the authentic experiences and desires of underrepresented folks. He holds degrees in computer systems engineering (Howard University), visual criticism (California College of the Arts), and a has a PhD in American studies (University of Hawai'i at Mānoa).

^{1 //} These are the irreducible elements of what I call the Orthodox Model of Hiphop that scholars and practitioners tend to agree on, especially in the context of narratives that address racial, cultural, and geographic origins and primacy.

^{2 //} Natural language processing uses "statistics to analyze and model the patterns

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