Speculating on Symmetries

Hannah Otter Rogers

Speculating on Symmetries

Intersecting Epistemologies of Art, Science, and Design

Design has long been understood as a field where art and science meet. Indeed, it seems that many forums and new institutions for art and science to come together are opening, but perhaps this is only a matter of making that collaboration explicit, when in fact, it has a long history. Art, Science, and Technology Studies (ASTS) is an interdisciplinary field that brings together insights from the humanities, social sciences, and creative practices to explore how knowledge and innovation are constructed, circulated, and contested. Among its interests are the tracing of longer histories of art and science and actor's efforts to produce the social, object, and knowledge networks that constitute them. ASTS draws its methods and many of its central concerns from Science and Technology Studies (STS), which examines the cultural, political, and social dimensions of scientific knowledge and technological systems. When applied to the field of design, ASTS provides a powerful framework for critical reflection, ethical inquiry, and creative experimentation. Indeed, concepts from design, including user studies, design participation, and critical design are all present in ASTS work as it is currently understood, yet there is much more room for design in thinking about all aspects of STS but especially art-science.

In STS scholar Maja Horst's recent essay, "The Art, Science and Technology Studies Movement: An Essay Review," published in *Social Studies of Science* in 2024, she examines the emerging field of ASTS through a selection of recent publications. Horst focused particularly on the use of art for public engagement with science and technology by drawing on several new books in art-science: *Routledge Handbook of Art, Science, and Technology Studies* (Rogers et al. 2021), *Dialogues Between Artistic Research and Science and Technology Studies* (2023), edited by Henk Borgdorff, Peter Peters, and Trevor Pinch, *Making Art Work: How Cold War Engineers and Artists Forged a New Creative Culture* (2020) by Patrick McCray, and *Art, Science, and the Politics of Knowledge* (2022), by the author. Horst discussed

how recent publications in this area have reinvigorated STS's engagement with science-society relations and supported renewed interest in public communication about science and technology. Horst has described ASTS as a movement offering diverse perspectives and methodologies inside STS, emphasizing the value of artistic approaches in understanding and communicating scientific and technological issues.

The notion that art and science occupy separate epistemic realms is a convenient stereotype today built on historical institutional roots that have created unsustainable boundaries, which are unsustainable under observation. Following the groundwork laid by Karl Marx and further developed by Walter Benjamin—who is credited with extending materialist analysis into the realms of cultural production and the reception of media and art—it becomes clear that the material conditions of production play a crucial role in shaping the forms and content of culture, in both science and art. If science and art are both contingent upon these shared conditions, then it follows that the human activities involved in art and science may exhibit symmetrical features, revealing structural and epistemic parallels between these domains. To further this point inside STS, Barnes, Bloor, and Henry (1996) have called for symmetry when studying science: to be agnostic to judgements about the veracity of knowledge claims in favor of studying the practices of knowledge production and verification. ASTS has built on this notion to suggest that art and science might be compared in a similar way: by highlighting their shared and departing features over any

attempt to assess their respective knowledge claims (Rogers 2022).

Philosopher Max Black distinguished models and metaphors as distinct yet related modes of representation with differing epistemic functions (1962). For Black, while models are primarily employed in scientific contexts to simulate, simplify, and predict phenomena, metaphors operate mainly within linguistic and literary domains to reframe and generate new conceptual insights. These functions and more can be mapped onto artistic making as well. Black's interaction theory of metaphor emphasizes the dynamic interplay between a primary subject and a secondary subject, producing emergent meanings beyond literal substitution. Models, by contrast, serve as analogical tools that allow empirical testing and refinement of knowledge claims (Black, 1962). Despite these differences, both models and metaphors rely on selective similarity and play constructive roles in knowledge production. Their shared capacity to transform understanding highlights the creative dimensions of representation in both science and language.

In practice—in the field, in the lab, in the studio—we observe the cross-contamination of models, metaphors, methods, and materials. From the perspective of ASTS, the boundaries between these domains are porous, often performative, and always negotiated and maintained by actors (Rogers et al. 2021). This essay outlines a selection of five overlapping practices that trouble the art-science binary and which bear further exploration in ASTS: materiality, representation, knowledge/social networks, institutional conditions, and experimental research. I will close with some thoughts about the way that design and ASTS may intersect or at least help each other by considering art and science in a new light.

Materiality

Both artists and scientists are materially bound. The laboratory pipette and the sculptor's chisel are not symbolic, but constitutive: they co-shape the knowledge they help produce. We have long passed the moment when we can assume that science deals only in abstraction and art only in effect. Instead, we might say with Barad (2007) that knowing is a material-discursive practice, where apparatuses—human and nonhuman—participate in the production of phenomena. Art engages with materiality not only through form, but through political and ecological histories. Scientific tools—petri dishes, graphite, radiation—are similarly situated. In this way, the materials of art and science become co-agents in knowledge production (Daston, 2004). What counts as knowledge, or even perception, is conditioned by the affordances and constraints of these tools. A brushstroke can inscribe colonial extraction as much as a microscope can obscure ethical entanglements. Thus, materiality, in its physicality, form, symbolism and instrumentality, is not merely technical; they are epistemological and political acts.

Representation

ons what can be known, what can be felt, and how knowledge circulates. Both art and science wrestle with the ethics of representation—who speaks, who observes, and what is being spoken for. This shared concern makes representation a productive site for interdisciplinary inquiry. In both science and art, representation operates not only as a process of making the invisible visible but also as a system of signs—where meaning is produced through substitution, reference, and framing. These dual logics—rendering and referring—raise ethical and epistemological questions about the status of knowledge and its conditions of production. If science renders the world through equations, and art through images or language, both are engaged in representational labor. For instance, STS has examined the role of inscription devices—tools that allow scientists to materialize abstract or imperceptible phenomena into evidence (Latour & Woolgar, 1986). Artists too render the unseen into material forms. The meanings and configurations of representations in these two knowledge networks do sometimes differ, but the fact that each group tells us something using something else (an experiment, image, configuration of people and objects, sonification, etc.) is a constant. Whether it is the visual code of microscopy or a bio-art installation critiquing white goods in the laboratory, representation serves as both translation and transformation.

While science may visualize cellular structures through microscopy, an artist might stage a bio-art installation that interrogates the authority of the lab or the neutrality of scientific tools. In both fields, representation is not simply a mirror of reality; it is a mediated and mediating act that both translates and transforms. Whether through an equation, an image, or a configuration of bodies and objects, representation links presence and absence, sense and meaning—sometimes through visibility, and other times through symbolic displacement.

There is no lone genius—scientific

Knowledge networks are social networks

or artistic—who exists outside of social formation (Halpern and Rogers 2021). Whether it is the collaboration of a research team or the curation of an artist's residency, networks shape what counts as knowledge and who counts as a knower. In STS, such assemblages are called actor-networks (Latour, 2005), highlighting the distributed nature of agency. Funding bodies, institutional gatekeepers, informal peer groups—all of these determine the circulation of work in both domains. The infrastructure of knowledge is not merely a background condition, but an active participant. Art-science collaborations often expose these dynamics more clearly than single-discipline work can. The organization of art and science networks includes informal and formal groups at every conceivable scale with every imaginary organization from hierarchical to anarchist. These knowledge networks are fundamental to our understanding of what art and science are.

Institutional Conditions

tions both serve as critical spaces for knowledge creation, experimentation, and public engagement, yet they operate through distinct traditions, goals, and methodologies. Both institutions prioritize innovation and often foster interdisciplinary collaborations, especially in today's increasingly hybrid fields like STEAM (Science, Technology, Engineering, Arts, and Mathematics). They provide infrastructure such as laboratories, studios, galleries, and museums, alongside platforms for education, research, and dissemination. Both types of institutions increasingly intersect, reshaping boundaries and enriching cultural and scientific understanding. It should be noted that plenty of art-science institutions have been developed from festivals like Ars Electronica and institutions like the Waag Society to bio-art labs and art-science salons.

Spaces—labs, studios, galleries, classrooms—are not interchangeable containers. They afford certain kinds of inquiry and inhibit others. Galison (1997) describes laboratories as "trading zones" where actors with different cultural grammars can collaborate. This concept also describes many hybrid spaces in art-science work, from bio-art labs to speculative design studios. Moreover, access to space is unevenly distributed. Who gets to enter the lab or the museum, who is excluded, and on what terms? These are structural questions, and they are STS questions. Spatial politics are central to how knowledge gets made and how it circulates.

Experimental Research

Experimentation is not exclusive to science, and in fact, many of the most compelling scientific practices resemble studio processes. Artistic experimentation, by contrast, is often characterized by its resistance to standardization—what Pickering (1995) might call the “dance of agency.” Instruments developed for scientific purposes (e.g., PCR machines, telescopes, data visualization software) increasingly appear in artistic practices. These instruments are not simply borrowed; they are repurposed and reinterpreted. The status of the experiment in the arts, however different the practices of such experiments may be, is similar: the idea contains in its conjecture/expectation and an event/time bounded period in which the experiment takes place and is considered.

The word experiment is not newly emerged in the world of the arts. William Wordsworth calls his poetry in his *Lyrical Ballads* (1880), intended to explore the relationship between imagination and cognition/perception, “experiment of the mind.” The concept of experimentation served as a foundational mode of creative inquiry for a number of artists, particularly those whose practices redefined artistic norms and expanded the formal and conceptual boundaries of modern art. The most famous example is probably Marcel Duchamp’s explanation of his ready-mades as experiments, but even before this instance the word experiment circulates through both art

and science. Zurich Dadaist Sophie Taeuber-Arp employed an intentional interdisciplinary experimental strategy by integrating textile design, choreography, marionette construction, and geometric abstraction (Boadella 2021; Schjeldahl 2021). Her work consistently destabilized the boundary between craft and fine art, challenging gendered hierarchies related to aesthetic values. Photographer Claude Cahun's artistic practice, centered primarily on self-portraiture and experiments in gender, treating the photographic medium as a performative laboratory where identity was not fixed but fluid, constructed, and mutable (Doy 2008; Shaw 2017). Between the 1920s and 1930s, Cahun created striking self-portraits in which they adopted a variety of roles, costumes, and masks—frequently playing with androgyny, ambiguity, and theatricality. By doing so, Cahun challenged the dominant cultural norms of gender and the rigid binaries of male/female. Robert Rauschenberg, American artist known for his experimental approach that blurred the boundaries between painting, sculpture, and performance, treated his studio as a laboratory, embracing chance and spontaneity to explore new artistic possibilities. He viewed art-making as an ongoing experiment, constantly pushing the limits of materials and ideas. His innovative practices influentially foreground process and materiality over strict aesthetic rules. In an interview with the Smithsonian Archives of American Art, Rauschenberg explained that his definition of art invoked the concept of experimenting: "I think the whole idea of art is experimenting with new ideas and new materials" (1979).

Equally contemporary artists have described their work using the language of experiments, particularly those whose work engages directly with scientific concepts. For example, Danish-Icelandic artist Olafur Eliasson's studio exemplifies a departure from the traditional notion of the artist's workspace as a site of individualistic creativity. Rather than embodying chaotic individualism, it functions as an organized, collaborative environment supporting a substantial cohort of co-workers. Beyond reflecting the individuality of its proprietor, such studios differ in their modes of operation and the stages of artistic production they accommodate. As Gramelsberger as observed, Eliasson's studio represents a novel model, which Cole calls a "transdisciplinary studio," encompassing a large design office, a series of test spaces, a workshop, an archive and library, as well as an extensive network of studio spaces that host the Institut für Raumexperimente (Institute for Spatial Experiments) (Coles 2012; Gramelsberger 2016). Eliasson, known for immersive installations that blend art, science, and environmental awareness frequently refers to his works as experiments in perception, using light, water, mirrors, and air temperature to explore how individuals experience space and nature. He describes his studio as functioning like a laboratory, and he collaborates with engineers, architects, and scientists: "I see my studio as an experimental place where things unfold, rather than a place to execute fixed ideas" (2007). Similarly, Heather Dewey-Hagborg is a bio-artist and critical technologist whose work engages genetics, identity, and surveillance. Her 2013 project, *Stranger Visions*, involved collecting DNA from found objects like gum or hair in public spaces and using that data to create speculative 3D-printed portraits. She framed the project as: "An experiment in public bioethics and an artistic intervention into the politics of genetic information" (2014).

Experimental research, in particular, emerges as a powerful conceptual and methodological bridge. The legacy of the "experiment" as both a scientific and artistic practice challenges assumptions about how knowledge is tested, failed, revised, and shared. From Wordsworth's poetic experiments of the mind to Duchamp's ready-mades and contemporary bio-art projects by artists like Heather Dewey-Hagborg, the experimental impulse transcends disciplinary boundaries. ASTS, when attentive to these overlaps, has the capacity to frame the arts not as supplements to science, but as co-equal knowledge practices. In rethinking how we categorize and support these experiments, ASTS can help scaffold more equitable, inclusive, and reflexive modes of inquiry across disciplines.

ASTS and Design

Design is often perceived as a solution-driven, future-oriented practice. However, groundbreaking work in other directions hailing from art and architecture have been influential in ASTS. For example, Dunne and Raby's critical and speculative design books (2001; 2013), Stephanie M. Tharp and Bruce M. Tharp's *Discursive Design* (2019), as well as design groups like Superflux (2019) are reshaping some quarters of design. Design and technology have received considerable treatment in STS. For example, through speculative design, artists and designers create conceptual objects or scenarios that provoke thought, raise questions, and imagine alternative futures. These practices often blur the boundaries between fiction and reality, using the language of design not to predict the future, but to challenge its inevitability.

Such works aligns with ASTS, which seeks to destabilize dominant narratives about progress, efficiency, or neutrality in science and technology. Speculation is not the absence of evidence but the presence of patterns. It is the willingness to dwell in the conditional, to embrace the subjunctive. Speculative methods, as developed in STS (Wilkie, Michael, & Plummer-Fernandez, 2017), allow researchers and artists to imagine futures, alternatives, and counterfactuals. Art has always speculated—on death, justice, the cosmos. Science speculates too—through theories not yet tested, models not yet built. When art and science meet in the speculative, they can produce not just hybrid objects, but hybrid epistemologies.

One important influence in the area of ASTS through design is Laura Forlano, a scholar in design and social science, who explores the intersection of Science and Technology Studies (STS) and design through various lenses, emphasizing the importance of integrating critical perspectives into design practices. Forlano collaborates with Carla Sedini on the concept of “more-than-human trading zones” in design research and pedagogy. This approach examines how critical STS concepts can be woven into art and design practices, and conversely, how design methodologies can inform STS. The focus is on creating hybrid languages and objects that bridge these fields, fostering experimentation and reimagining of boundaries. Forlano incorporates critiques from critical race and decolonial theory to ensure that emerging design perspectives promote equality and justice for both human and nonhuman actors. By engaging with STS theories and methodologies, she examines how designers can play a crucial role in addressing ethical and political challenges posed by emerging technologies in urban futures.

Adding to these discussions, artistic methods combined with social science tools can challenge designers to go beyond surface-level problem-solving by interrogating the underlying assumptions, values, and power structures embedded in their work. Rather than asking only what works, ASTS invites designers to consider what it means, who it affects, and what alternatives are possible. This shift in perspective is crucial in a world where technologies—from AI algorithms to wearable devices—profoundly influence daily life, often in ways that reinforce existing inequities or create unforeseen consequences.

Conclusion: Toward Epistemic Reciprocity

The exploration of overlapping practices across art and science reveals that these domains, while often institutionally and methodologically distinct, are more interconnected than conventional boundaries suggest. Through an ASTS lens, we recognize that materiality, representation, networks, institutional frameworks, and experimental methods are not discipline-specific, but rather shared zones of inquiry where knowledge is collaboratively made. Artists and scientists alike manipulate materials, models, and metaphors that are embedded in political, ecological, and epistemic histories. Their representational strategies—whether sonic, graphical, textual, visual, conceptual, physical, or experiential—shape how phenomena are perceived and what truths become legible. Social and knowledge networks co-produce authority and access, with institutional infrastructures playing a critical role in shaping research trajectories and public engagement.

ASTS and design share rich potential for mutual benefit, rooted in their overlapping concerns with materiality, experimentation, and knowledge production. ASTS, with its critical lens on how scientific and technological knowledge is socially constructed and circulated, offers design practitioners and scholars a deeper understanding of the sociopolitical

contexts and power dynamics embedded in design processes and artifacts. This perspective encourages designers to be even more reflexive about their practices, attending not only to functionality and aesthetics but also to ethical implications, user agency, and the broader societal impact of their work. Conversely, design brings to STS a hands-on, practice-oriented approach that complements the more theory-driven and analytical tendencies of STS textually-oriented scholarship. Design's emphasis on prototyping, iteration, and speculative thinking can serve as a method for ASTS scholars to explore "what if" scenarios and alternative futures in a tangible way.

This experimental orientation, drawn from both art and science traditions, aligns with ASTS's interest in situated knowledge and the co-production of science and society, providing innovative ways to communicate and intervene in scientific and technological debates. Together, ASTS and design can cultivate hybrid methodologies that integrate critical inquiry with creative practice, fostering new forms of public engagement and participatory research. Such collaborations can challenge traditional disciplinary boundaries, enrich epistemologies, and produce artifacts and narratives that are both intellectually rigorous and experientially compelling. Ultimately, the intersection of ASTS and design opens pathways for socially responsive innovation that is critically aware and materially grounded.

ASTS brings to design a deeper understanding of the ethical and political dimensions of innovation. Of course, design knows it is never neutral; it reflects and shapes social norms, identities, and behaviors. Indeed, design may be a subtle form of mind control: offering actors pathways for actions which are reinforced by the material conditions of their environment but which may never rise to the surface of consciousness. ASTS encourages designers to be mindful of the socio-technical systems in which their work operates, paying close attention to issues such as surveillance, accessibility, sustainability, and inclusivity. For example, a designer working on smart home technologies might, through an ASTS lens, examine how such systems reinforce gendered labor, compromise privacy, or privilege certain user assumptions. Moreover, ASTS promotes interdisciplinary collaboration, something design is already very much accustomed to, as it further encourages designers to engage with scientists, engineers, policymakers, and communities in ways that are respectful, critical, and creative, while holding their viewpoints under the light of symmetry and offering a layering of perspectives rather than a hierarchy of voices.

Differences surely exist between art and science, and they are most often social. For example, issues of reproducibility are divergent in the sciences and the arts, yet a comparison of their features highlights some overlapping issues. The reproducibility crisis in science highlights fundamental challenges in the production and validation of scientific knowledge, emphasizing how scientific facts are socially constructed and contingent upon methodological and institutional contexts (Latour & Woolgar, 1986). Work under the auspices of Open Science or Metascience purport to address these issues, yet their proposals involved fundamental changes to scientific work methods and suggest changes to the social structure of science (Peterson 2018; Peterson 2019). On the other hand, studies within Science and Technology Studies (STS) reveal that replication failures are not merely technical errors but reflect deeper issues such as incentive structures, publication norms, and the material-discursive practices that shape what counts as evidence (Knorr Cetina, 1999; Fujimura, 1996). The crisis exposes how trust in scientific results depends on networks of actors, instruments, and standards that co-produce stability in knowledge claims (Shapin, 1995). Consequently, initiatives for transparency, data sharing, and methodological reform must be understood as interventions within these sociotechnical assemblages rather than purely procedural fixes (Latour, 1987; Rheinberger, 1997). Addressing reproducibility thus entails critical reflection on the practices and power relations embedded in scientific knowledge production.

On the surface, the reproducibility crisis in art differs fundamentally from that in science, as artistic works are typically valued for their uniqueness, contextual specificity, and subjective

interpretation rather than for empirical replication. The materiality of artworks, the artist's intent, and audience reception all play crucial roles, emphasizing that replication in art is often an epistemic and aesthetic process rather than a strictly empirical one (Benjamin 1968). Further issues arise in areas such as performance art, conceptual art, bio-art, and digital art, where documentation, re-enactments, remediations, or digital copies challenge notions of originality and authenticity (Jones, 2012). In these practices, the "reproducibility" of an artwork involves negotiation between fidelity to the original and creative reinterpretation, complicating traditional ideas of replication (Auslander, 2006). Thus, art's crisis of reproducibility is a different set of problems, yet the preoccpuation with reproducibility remains. Further studies are needed to highlight the complex interplay between authenticity, meaning, and cultural context.

Many other potential differences and overlaps remain to be diagnosed, but the foremost difference, which needs mention here, may be the political economy of art versus science, both in terms of public and private funding, institutional building, and resource access, but also in the public's understanding of the underpinnings of such support. Scientific work is often economically justified through its utility; art often resists or complicates utility as a metric of value. Rather than using art to illustrate science or science to legitimate art, ASTS encourages epistemic reciprocity. That is, the recognition that both fields are invested in world-making practices—material, representational, institutional, and speculative. In attending to their symmetry, we do not erase difference, but render it meaningful. To use the language of STS, art and science are co-produced (Jasanoff, 2004). Their methods, tools, and outputs are entangled, and their futures are, perhaps, best imagined together.

[1] Ars Electronica: https://ars.electronica.art/news/en/; Waag Society: https://waag.org/en/about-waag/

References

Auslander, P. (2006). Liveness: Performance in a mediatized culture. Routledge.

Barad, K. (2007). Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning. Duke University Press.

Barnes, B., Bloor D., and Henry, J. (1996). Scientific Knowledge: A Sociological Approach. Chicago: University of Chicago Press.

Benjamin, W. (1968). Theses on the philosophy of history (H. Zohn, Trans.). In H. Arendt (Ed.), Illuminations (pp. 253–264). Schocken Books. (Original work published 1940)

Benjamin, W. (1968). The work of art in the age of its technological reproducibility (H. Zohn, Trans.). In H. Arendt (Ed.), Illuminations (pp. 217–252). Schocken Books. (Original work published 1935–1939)

Black, M. (1962). Models and metaphors: Studies in language and philosophy. Cornell University Press.

Boadella, S. (2021). Sophie Taeuber-Arp: A life through art (T. Lewis, Trans.). Skira.

Borgdorff, H., Peters, P., & Pinch, T. (Eds.). (2023). Dialogues between artistic research and science and technology studies. Routledge.

Coles, A. (2012). Site-specificity and transdisciplinary studios: Olafur Eliasson's Institut für Raumexperimente. In The Transdisciplinary Studio (pp. 1–20). Sternberg Press.

Daston, L. (Ed.). (2004). Things that talk: Object lessons from art and science. Zone Books.

Dunne, A., & Raby, F. (2001). Design noir: The secret life of electronic objects. Birkhäuser.

Dunne, A., & Raby, F. (2013). Speculative everything: Design, fiction, and social dreaming. MIT Press.

Eliasson, O. (2007, June 1). Interview with Olafur Eliasson on his pavilion in the park for the Serpentine. The Art Newspaper. https://www.theartnewspaper.com/2007/06/01/interview-with-olafur-eliasson-on-his-pavilion-in-the-park-for-the-serpentine

Dewey-Hagborg, H. (2014). Stranger visions: Genetic surveillance and the future of privacy [Video]. TEDxWomen.

Doy, G. (2008). Claude Cahun: A Sensual Politics of Photography. I. B. Tauris.

Galison, P. (1997). Image and logic: A material culture of microphysics. University of Chicago Press.

Gramelsberger, G. (2013). A laboratory view of art. In M. Schwab (Ed.), Experimental systems: Future knowledge in artistic research (pp.102-111) Leuven University Press.

Horst, M. (2024). The art, science and technology studies movement: An essay review. Social Studies of Science, 55(1), 1–22. https://doi.org/10.1177/03063127241270917

Jasanoff, S. (Ed.). (2004). States of knowledge: The co-production of science and social order. Routledge.

Jones, A. (2012). Performing the real: Documentary theatre and archival practice. Palgrave Macmillan.

Latour, B. (2005). Reassembling the social: An introduction to actor-network-theory. Oxford University Press.

Latour, B., & Woolgar, S. (1986). Laboratory life: The construction of scientific facts. Princeton University Press.

McCray, P. (2020). Making art work: How Cold War engineers and artists forged a new creative culture. Harvard University Press.

Peterson, B. (2018). “Why Philosophers Should Care about the Reproducibility Crisis.” Synthese, 195(7), 2791–2815.

Peterson, B. (2019). Scientific evidence and experimental practice. In P. Humphreys & C. W. Savage (Eds.), The Oxford handbook of philosophy of science. Oxford University Press.

Pickering, A. (1995). The mangle of practice: Time, agency, and science. University of Chicago Press.

Rauschenberg, R. (1979). Interview with Robert Rauschenberg. Smithsonian Archives of American Art. https://www.aaa.si.edu/collections/interviews/oral-history-interview-robert-rauschenberg-12932

Rogers, H. S. (2022). Art, science, and the politics of knowledge. MIT Press.

Rogers, H. S., Halpern, M. K., Hannah, D., & de Ridder-Vignone, K. (Eds.). (2021). Routledge handbook of art, science, and technology studies. Routledge.

Schjeldahl, P. (2021). Sophie Taeuber-Arp’s crafting of abstraction. The New Yorker.

Shaw, J. L. (2017). Exist Otherwise: The Life and Works of Claude Cahun. Reaktion Books.

Superflex. (2019). We are all in the same boat. Hatje Cantz.

Tharp, B. M., & Tharp, S. M. (2019). Discursive design: Critical, speculative, and alternative things. MIT Press.

Wilkie, A., Michael, M., & Plummer-Fernandez, M. (2017). Speculative method and Twitter: Bots, energy and three conceptual characters. Sociological Review, 65(3), 550–566. https://doi.org/10.1177/0038026117703908

Wordsworth, W. (1800). Preface to Lyrical Ballads (2nd ed.). In M. H. Abrams (Ed.), The Norton Anthology of English Literature (Vol. 2, 8th ed., pp. [insert page range]). W. W. Norton & Company.

hannahstarrogers@gmail.com

Hannah Star Rogers

HSR!

www.hannahstarrogers.com

Text: Hannah Star Roger
Layout: Alina Suchan