



A Festival of Futures: Recognizing and Reckoning Temporal Complexity in Foresight

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Abstract

The future is too often constructed as a linear continuation of past and present, a trajectory that clearly leads from now to then, thus partially stripping it of its complex and unexpected nature. Tempting as it is to conceptualize the future as a neatly unfolding pattern, such a commitment to linearity narrows the range of plausible futures imagined and offers a false sense of certainty. Instead, we contend, what is needed are foresight tools that seek not to *know* futures, which is ontologically fraught, but to *excavate* the multiple temporalities packaged in narratives, expectations, and actions. There are multiple and wide-range temporalities and knowledges that come to bear in shaping the future and our ideas of it. These temporalities engage memories, imaginations, and promises that manifest in important yet hard to capture ways. Drawing from experimentation at *Emerge*, a public art, science, and technology festival at Arizona State University, a case is made that opening up nonlinear futures through the materiality and experiential basis of art and design serves to generate the conceptual space to explore multiple timescapes and better engage anticipatory capabilities. As a new mode of foresight, *Emerge* represents a shift to mediated futures (Selin 2015) that construct concrete and ideational spaces designed to explore potential futures and perform anticipation. Such work demonstrates the crucial and evolving role that foresight methods can play in fostering anticipatory capacities such as reflexivity, perspective-taking, and responsible decision-making.

Keywords

Anticipation · Foresight · Art · Design · Futures · Materiality · Temporality

Introduction

With all the talk and attention on the future, we are still too often rooted in a mode of thinking indebted to a notion of progress. This notion is tied to the imaginary that things improve as time moves forward. Social progress is seen as the result of continuous material, industrial, and scientific advancement (Marx 1987). Modern societies are perceived as moving inevitably in a forward, positive, and better direction (Adam and Groves 2007; Selin 2008), where “standing still means falling behind” (Adam and Groves 2007, p. 1). Progress, closely aligned with technological acceleration, is presumed desirable as innovation both drives and is spurred by society’s imaginations of what it means to live a fulfilled (i.e., fully filled) life (Rosa 2013). Under this guise, efforts to peer into the future become a matter of

seizing opportunities, of using the competitive advantage that comes from being the first to colonize the future. Doing so is supposed to allow you to shape the future in specific ways. In policy-related discourses, future making is often tied to technological innovations staged as means to overcome societal crisis or secure economic gain. Fostering fast technological advancement is sometimes even described as a ticket to the future (Felt 2015).

In a wider sense, we can see what Appadurai aptly called “trajectorism” at work, i.e., “the trap of thinking within the optics of ‘trajectories’” (Appadurai 2013, p. 223). Trajectorism points to a “deeper epistemological and ontological habit, which always assumes that there is a cumulative journey from here to there, more exactly from now to then, in human affairs [. . .]. Trajectorism is the idea that time’s arrow inevitably has a telos, and in that telos are to be found all the significant patterns of change, process and history” (p. 223). Planning and working toward achieving specific futures is deeply tied to this ideal (Felt 2016). Trajectorism thus invites linear notions of time and how it flows. Time, however, and our ability to know the future, is much more complex than any trajectorial framing or linear model can account for. As Adam (2004a) explains, “to be human is to be extended in time: past and future” (p. 1). Adam and other scholars of the sociology of time note that temporality is not exclusively defined by a forward-facing orientation. Rather, it is marked by creative vision, anticipation, and imagination, as well as memories, contracts, and obligations, thus creating deep entanglements of past and future. Time does not only draw a linear tract from A to B. Humans interact with time in multiple ways – in future horizons or geometries that reference different patterns of temporal movement (Adam and Groves 2007; Konrad et al. 2017).

These reflections suggest that remaining in a logic of trajectorism and favoring a linear notion of time is structurally and socially problematic. They draw our attention to the fact that we live in a rich tapestry of multiple times, flows, and rhythms with disparate impacts and interpretations. Poli (2017) writes, “groups, classes, and entire societies have their own ‘preferred’ times, those that better manifest the pace of their internal dynamics” (p. 22). Or to say it with Jeremy Rifkin (1987): “Every culture has its unique set of temporal fingerprints. To know a people is to know the time values they live by” (p. 1). Some experience time as cyclical in the rotation of seasons, crops, and plantings. Others experience time as circular in the repetition of rituals, traditions, and collective celebration (Konrad et al. 2017; Poli 2017). Science fiction author William Gibson has said “the future is already here. It is just not evenly distributed yet” (Kennedy 2012), suggesting futures live in the present. In each case, the future is ripe for knowing as a nonlinear and multiple entity.

How might we best recognize and reckon with this rich tapestry of multiple times? This chapter explores alternative modes of recognizing and reckoning with unruly timescapes (Adam 1998) in order to add to conversations occurring among foresight practitioners and within futures studies. By opening up spaces to explore the multiplicity and entanglements of temporalities through a series of art/science collaborations that took place in 2017 in Arizona at *Emerge: A Festival of Futures*, we invite the reader to explore with us how embracing alternative epistemologies can

have the potential to create new modes of understanding the complex relations of pasts and futures.

This work appreciates that the human experience of time is linked to particular ways of knowing. This, in turn, frames and is framed by specific social and cultural contexts as well as normative practices and views (Adam and Groves 2007; Rosa 2013). The temporal landscapes we assume give structure to how we see and act in anticipation of a future to come as well as our individual and collective memories of the past. As Rosa (2013) notes, “. . .the manner of our being-in-the-world depends to a great degree on the *temporal structures* (Zeitstrukturen) of the society in which we live. The question how we want to live is equivalent to the question how we want to spend our time, but the qualities of ‘our’ time, its horizons and structures, its tempo and its rhythm, are not (or only to a very limited degree) at our disposal” (Rosa 2013, p. xxxix). We can point to particular practices, institutional apparatus, social conditions, and modes of acceleration that collectively help to cement a linear experience and support wider trajectorial thinking. Many encounter time as forward-facing thus granting legitimacy and meaning to a more narrow accounting of temporality. The west is particularly enamored with a notion of the future as open, empty, and available to colonize through scientific and technological advancement (Adam and Groves 2007; Marx 1987; Mumford 1934). Social good and quality of life are presumed products of continued innovation to make more time and more progress. Under this model, acceleration becomes a virtue as the pace of modern daily life increases to reach a future assumed better (Mumford 1934; Selin 2008; Rosa 2013).

It seems essential to create new spaces to think with time. Such niches and spaces allow us to explore and reflect upon the dissonance between human experiences of timescapes (Adam 1998) and the ideals and temporal structures we live by in order to adhere to notions of progress. These niches and spaces also allow us to address questions such as: What is missed by not questioning dominant models of time? How could we expand our notion of time and our ability to engage the future in its multiplicity? How can we confront the linear notion of progress and reimagine other possibilities? This piece takes one step forward in producing some answers to this set of questions. We argue that how we know and anticipate the future is too narrowly conceived and make the case for appreciating a more eclectic rhythm of time. We structure this view by exploring how the future can be seen from an analytical, conceptual, or resource-based standpoint depending on your ontological commitment. With each commitment come different tools, or epistemic objects, that support sense-making efforts. While many of the proliferating tools articulate an analytical future – a future where progress is seen as an inevitable good – we see this as a limiting construct and seek to open the processes of future-making so as to allow other forms of knowledge to thrive. These “other” devices make use of different creative resources, embrace temporal dissonance, and attempt to hybridize (rather than solely reconcile) different ways of knowing.

Knowing the Future

Confronting a linear notion of time requires a capacity to know the future in different ways. To begin, it is helpful to acknowledge that the future is not readily accessible, at least not to unmediated human cognition. Futures take form in relationship to certain actors, cultures, and institutional systems who come to know and define their existence relative to their position in the present and their reconstruction of the past. Dominant temporal orders get scripted (Akrich 1992) into the meaning-making apparatus of culture and are made tangible through organizational forms, reified in our technological devices and infrastructures, and embedded in economic systems. Temporalities are thus agents in the complex processes coproducing technoscientific and social orders. In discussing futurity and temporality, futurists, such as Polak (1973), describe “images of the future” as forming a momentarily stable collage of shared expectations and anticipations. Yet, these serve only as mere representations of an always fleeting object. The future is more accurately considered ontologically indeterminate (Selin 2008), although able to be captured and characterized through different representational techniques to grasp at its wisps. Indeterminacy stems from difficulty in knowing or stabilizing the future as an “object” or “thing” because it is constantly in the process of being constructed, contested, and reconstructed in reference to one’s current position (Selin 2008; Brown et al. 2000).

Despite our inability to fully grasp the future, it does a significant amount of work for us in shaping individual and collective desires, fears, and actions. How the future is defined, characterized, and represented actively matters. For example, defining the future as an *analytical object* – a “not yet” approachable through logic – creates a future that is knowable and attainable if only with the right lens. One of the developers of scenario planning in the 1970s, Pierre Wack, saw the methodology as one for seeing the “forces” driving reality as objective entities (Selin 2007). These trajectorial forces are discoverable if the right mental model and tool kits are applied. Through the right practices of *seeing* and *knowing*, then, the future can be greeted as a concrete object able to (re)shape expectations, hype, promises, and fears about what will come. Conversely, viewing the future as a *conceptual object* shows it to be constitutive of social reality. Individuals “. . . view, imagine, and act upon their own futures. . .” (p. 474) in reference to culture-specific norms, practices, and perceptions (Konrad et al. 2017). The future does work as a conceptual object by bringing to bear concerns like risk, uncertainty, and other topics relevant to context-specific social experience (Giddens 1991). A third way to see the future is as an object codified as a *resource*. Through this ontological lens, the future does work as vantage point. It deploys desirable or feared futures into the present to steer current decision-making and action. In a mundane way, each decision, large and small, is predicated on (tacit or explicit) visions of the future (Selin 2006). Thus, the future as resource draws attention to the generative nature of futures acting in the present.

Whether engaging the future as an object of analysis, concept, or resource, different sets of tools and representational techniques can be drawn upon to anticipate and appreciate it. Looking to design studies, we might consider tools or representational techniques that allow us to understand certain futures as “epistemic

objects” (Luck 2007; Ewenstein and Whyte 2007). Epistemic objects are artifacts or objects that embody and impart knowledge about a particular subject or object through use and engagement. A material illustration or digital graphic, for example, can be considered an epistemic object because it imparts subject and content information through physical interactions such as drawing, editing, discussion, or observation. Dominant ways of knowing the future pair linear epistemic objects with practices that make the future a predictable entity (Konrad et al. 2017; Adam and Groves 2007; Selin 2008). From a positivist scientific vantage point, for example, prediction, projection, and modeling provide access to the future through computation and quantitative analysis. Similar linear constructs can be seen in population projections (Isserman 1984), climate models (Pirtle et al. 2010), and path-dependent technologies (Selin 2006). Interestingly, there is tension between an open future, subject to colonization, and an imminently knowable future, rooted in linearity and graspable through proper (verifiable, repeatable, etc.) analysis. In the latter model, retrospective data is used to construct a temporally forward-looking assessment that assumes the future is similar to the past, and as a result, is knowable (Selin 2008; Brown et al. 2000).

Linear modes of knowing are useful. They serve a particular function in engineering, planning, and science by creating certainty in operations and systems designed to extend into the future. At the same time, popular quantitative epistemic objects – climate models, economic forecasts, and other representational artifacts – often strip the future of messiness, masking complexity for the sake of usability. Predictive tools become non-negotiable as a result. They structure our engagement with the future down to a limited number of model runs, numbers, or decimal points, when a more accurate representation of futures may include ephemeral and esoteric components existing outside the quantitative device. These tools attempt to predict the future rather than know it through its multiple complexity.

Modes of Troubling

Future-oriented practitioners and academics attempt to trouble the linear model through foresight practices that open up other representations of temporality and other conceptions of change. Scenario construction, backcasting, and other methodological and foresight tools are designed to engage “other ways of knowing” (Selin and Pereira 2013) and representing the future. The futures cone (Voros 2003; Hancock and Bezold 1994), for example, provides a widely used framework for engaging possible, probable, plausible, and preferable states in the near and distant future. The heuristic draws upon subjective judgments in the present to construct and explore potential futures that range in content and time. The cone may be successful in supporting alternative future pathways and showing that multiple futures are possible. However, it does little to break out of trajectorial thinking, of drawing straight lines into the future. In the conical model, time moves from left to right to generate futures rooted in the here and now. The resulting trajectories are forward-facing and closely aligned with the linear notion of time. As Ramírez and Selin

(2014) point out, the shape of the future has no more likelihood of being a cone than being a teddy bear. To be clear, we are not positing that the futures cone (Voros 2003; Hancock and Bezold 1994) is a poor model for foresight. We believe that the cone has significant value in thinking about the future. Indeed, a simple explanation of the objectives of foresight is to expand the cone's trajectory and explore more broadly a diverse array of possible futures. However, here, we are simply suggesting that the heuristic does not engage the multiplicity of time but rather stays within the comfort of linearity. We instead seek to trouble. We must therefore press on to develop epistemic objects and physical and conceptual spaces that allow us to open the future in all its temporal diversity.

Complexity science is one such frame that helps to problematize the types of causal relations that linear constructs support (Adam 2005; Urry 2016). Complexity science is a science of relationships and interactions. It investigates linkages between a system's parts, whole, and the environment it operates within. The science disrupts a linear orientation by demonstrating that system behavior is not rooted in direct cause and effect relationships. One cannot determine how certain events will disturb the system and its multiple parts (Urry 2016). Nonlinear shifts and unpredictability gives way to a messy and unordered sense of time (Adam 2005). As a result, "time is not viewed as a dimension along which systems move. Rather, systems are constituted through their becoming, through process" (Urry 2016, p. 60). By having us think in systems, we focus not on lines, but on interlocking circles. Just as complex systems evolve, change, and adapt over messy time spans, so do futures. In confronting time as an agent of process, not progress, complexity science expands how a system can be known and what constitutes its existence. New modes of inquiry, modes that allow the system to be known in different ways and through different lenses, open up as a result. In a similar vein, we argue that knowing the future ought to better confront the linear model of time so as to recognize the complexities and systemic character of contemporary innovation. As Adam and Groves (2007) suggest, time is much more layered and cyclical, and even unruly than a line permits. And so too, our perceptions of the future are much more layered, complex, rambunctious, and cyclical. If the task is to see anew and (re)imagine the possibility space, we ought to try to release ourselves from the confines of linear time.

(Re)Knowing the Future

While some elements of the future are amenable to prediction, much of what is interesting about the future cannot be easily quantified. Incalculable futures are often the subject of foresight. In these cases, knowing the future is not about prediction. Rather, "knowing" becomes the more humble and honest pursuit of "appreciating" (Ramirez and Wilkinson 2016). Exploring the future is about seeing anew or seeing the familiar as strange by engaging different perspectives. The future becomes a site for wading in ambiguity with one's imagination and creativity in order to notice and appreciate complexities and possibilities that were previously unavailable.

Accessing diverse futures requires new experiences, new ways of assembling elements and different tools that support this kind of reflection, such as epistemic objects, that scaffold learning through the conversion of tacit knowledge into the explicit (van der Heijden *n.d.*). Scaffolding enables us to place new and unfamiliar experiences within the realm of the familiar. It attaches “. . .new experiences to existing cognitive structures. [However,] to articulate our tacit knowledge, we need an outside agent to confront our unconnected bits of empirical knowledge with the knowledge structure in the wider group or society” (van der Heijden *n.d.*, p. 6). While the original intent of the passage configured the agent as a human (most likely an external consultant), we press forward to suggest that this outside agent can be material. We argue that material-based epistemic objects can serve as scaffolding to convert tacit to explicit knowledge and make the temporally complex approachable. Materiality allows individual and collective users to traverse the future with increasing fluidity, both in terms of temporality and as a “not yet” that can be anticipated and performed.

Futures-oriented work has taken a material turn in recent years (Selin 2015; Selin et al. 2015) to show how objects and artifacts engender new ways of knowing and articulating the “not yet.” Art and design play a large role in this, allowing for the physical building and prototyping of possible, plausible, preferable, and probable futures. Materially born objects and artifacts can serve as tools to test, anticipate, and articulate how the future might look, who and what will be included, and how daily life might differ as it unfolds (Selin and Boradkar 2010). Such intentionally designed objects built to foster inquiry contain and perform “scripts” that provide access to ideas and worlds inscribed into their design (Akrich 1992; Selin 2006, 2008; Salter et al. 2017). Composing a short story will trigger different imaginations than hacking or rendering a photograph that envisions a future city street. A prototyped tool will foster different questions about producer and consumer relations and aspirations than those evoked by a theatrical play that enacts domestic life 50 years from now. Designed objects – epistemic objects (Luck 2007; Ewenstein and Whyte 2007) – are mechanisms of opening up. They embody “other ways of knowing,” modes not solely rooted in quantitative knowledge, but knowledge derived from observation, intuition, visualization, representation, and analysis. The resulting new affordances within the tool can help expand how we see and know human futurity. We argue that they can serve as scaffolding; material agents that help make the unknown increasingly familiar. With this in mind, we turn to objects born of art and design, as agents that operate outside linear confines, to rethink how our perceptions of the future might be better triggered in the present. In doing so, we move to demonstrate how to perturb time, to tease out the ways in which we live in multiple timescapes, and explore how this multiplicity might be better represented in the present.

Emerge: A Festival of Futures

We look to *Emerge*, a public art, science, and technology festival, to better understand how the future might be constructed and articulated outside a linearly inclined worldview. *Emerge* is an annual event (Selin 2015; Davies et al. 2015) at Arizona State University, designed to provide members of the public a space that allows them to construct, elaborate on, and project plausible futures in imaginative ways. The public is invited to interactively explore the future space through performance and play, art and experiment, designed artifacts, and cognitively inclined foresight. Tools and methods are coproduced with artists, scientists, humanists, designers, and others selected to exhibit future-oriented work in a curated space. *Emerge* explicitly seeks to harness different types of transdisciplinary knowledge and unleash novel ways of knowing, and in doing so, trigger new ideas about alternative futures. To engage with *Emerge* is to become empowered to question and study imagined futures and to reflect on which futures the individual and collective does or does not want (Emerge 2017h).

In 2017's edition focused on *Frankenstein*, *Emerge* directors and curators, Cynthia Selin, Ed Finn, and Jake Pinholster with curatorial support from Dehlia Hannah and Hannah Star Rogers, sought to design what Hannah calls "performative experiments" (Kirksey et al. 2016) that reveal relationships between creativity and responsibility, promote forward-looking reflection, and prompt consideration of the social, ethical, and political implications of emerging technologies. Exhibitions include art installations, experiential and interactive exhibits, narrative theater, performances, and real-time or staged scientific experiments. *Emerge* strives to explore the potential consequences of scientific, technological, and social decision-making in present space and time. The hope is that diverse publics are prompted to acknowledge their agency and refute the inevitability of technological and scientific advancement today. Fundamental to the experiment is staging opportunities to rethink progress as a conceptual and linear agent.

Emerge 2017 was part of a broader bicentennial celebration of Mary Shelley's *Frankenstein; or, The Modern Prometheus* (1818), an enduring work that persists in sparking imagination around the relationship between the humans and their technologies. Curator Hannah writes, "*Frankenstein* is a tale animated by 'a love for the marvelous'—an impassioned drive to discover the far reaches of the world and the boundaries between science and magic" (Hannah 2017). The thematics of *Frankenstein* challenge audiences to consider responsible innovation, creativity, and technological change (Shelley et al. 2017). Through *Emerge*, we sought to bring issues of temporality to the forefront, by inviting audiences to revisit the historic story and examine interconnections between the past, present, and imagined futures. Thus, *Emerge 2017* provided a unique opportunity to examine and trouble the linear notion of time by creating a physical and conceptual space and materially informed experiences that allow the future to be known differently.

Some of the exhibits featured at *Emerge 2017* are presented below with an eye toward how they manifested temporal disruption. The brief descriptions draw from a combination of event observation, artist conversation, and online exhibition

descriptions produced by the artists and curatorial team. Exhibits are organized into four temporal relationships to make explicit the reordering of time that took place at *Emerge*. These relationships include future past, past future, present future, and future present (drawing from: Adam 2004b, 2007, 2008; Adam and Groves 2007). Each temporality implies a different way of knowing and viewing the future, and as a result, a different responsibility to it and a different sort of confrontation of the linear mode. Using materiality to articulate imagined futures was central to shifting and constructing time in different ways and speaks to *Emerge's* methodological invention: the carefully choreographed and constructed social and spatial environment that supports an unrestricted, more open and experiential sense of futurity.

Future Past

Future past, the first temporal relationship featured at *Emerge 2017*, harnesses past visions, achievements, and accomplishments of individuals as a means to connect current actions to historic choice, or historic future-making. Bringing the past into the present, future past constructs time as an interconnectedness between all generations. This stance "...locates our actions and inactions in a seamless web of environmental interdependence that reaches all the way to the birth of stars and an indefinite future" (Adam 2007, p. 10). Futures past is highlighted in the work of *An Experiment on a Cloud in an Air Pump*, *Neurocomic and Beyond*, *Radio Healer*, and *Paradise Lost: Transfix at the Salton Sea* described below. These exhibits engaged and acknowledged their future's deep connection to history. Each brought the past into the present to demonstrate temporal interdependence, and thus challenged the linear mode of time.

An Experiment on a Cloud in an Air Pump

Artist Rupert Nesbit created a tableau vivant of Joseph Wright of Derby's 1768 painting, *An Experiment on a Bird in an Air Pump*. The original historic painting reveals norms surrounding scientific knowledge production, testing, and experimentation in the seventeenth century, while representing sociocultural order and roles through character positioning (Emerge 2017a). At *Emerge*, Wright's historic painting was brought into the present, reimagined, and then restaged and replicated using contemporary *Emerge* artists and Karolina Sobecka's *Cloud Services*. Artist positioning articulated how social norms and scientific practices relating to authority, innovation, and technology have simultaneously changed and persisted since the seventeenth century. Here, the traipsing in time became a provocation and ontological resource from which to assess current technoscientific practice.

Nesbit's direct incorporation of historic scientific vision, achievement, and practice places his work within the domain of future past. Using material modes of painting and performance, he explored "...new subject positions, forms of social authority, gender expression, and divisions between expert and audience that are

emerging as modern distinctions between the arts, sciences and technology begin to blur in the 21st century” (Emerge 2017a). His work provided space for visitors to question the inevitability of progress and confront the notion that life improves as time moves forward. Running the past parallel to the present allowed the audience to consider, through near side-by-side comparison, the positive and negative implications of contemporary scientific practice and how it might change in the future.

Neurocomic and Beyond

Artist and neuroscientist, Matteo Farinella, and collaborator Dr. Hana Roš, crafted hand-drawn comics and scientific illustrations to explore neuroscience and new developments within the scientific field. Comics brought scientific history into the present through art and illustration to communicate, educate, and inform participants about the brain. Viewing the past, present, and future as an interconnected timeline, their illustrations were leveraged to demonstrate “. . .the kind of imagination that is required to generate new ideas in science and raise important questions about how we should communicate scientific ideas” (Emerge 2017l). Farinella and Roš’s comics illustrate the future of science as one increasingly connected to history. Engaging future past, Farinella and Roš brought the past into present day media to highlight what role history might play in propelling future scientific thought. In doing so, they endowed participants with a particular sense of agency. As readers of the comic, visitors used their imagination and judgment to perceive and then re-perceive history as once a future in-and-of-itself as well as a current foundation for tomorrow’s possibilities.

Radio Healer

Edgar Cardenas, Randy Kemp, Ashya Flint, Mere Martinez, Rykelle Kemp, Cristóbal Martínez, Melissa S. Rex, Devin Armstrong-Best, and Raven Kemp form *Radio Healer*, a Xicano and Native American collective based in Phoenix, Arizona. The group of “hacker-artists” merge art and science to “. . .create indigenous electronic tools, which they use with traditional tools to perform a reimagined ceremony. Through their immersive environments, comprised of moving images, tools, regalia, performance and sound, the collective bends media to position visual and sonic metaphors that make the familiar strange” (Emerge 2017n). In line with the logic of future past, *Radio Healer* brings history into current practice to envision an altogether different future that draws directly upon traditional knowledges, tools, ceremonies, and practices (Emerge 2017n). Here, the future is constructed as a conceptual object constitutive of social practices and symbols. The collective demonstrates identity and autonomy through the adaptation and reconstruction of historic and contemporary materials toward future use.

Paradise Lost: Transfix at the Salton Sea

Dancer and performance artist Rachel Bowditch and photographer Chris Loomis, presented *Paradise Lost: Transfix at the Salton Sea*. The embodied and theatrical exhibit moved physically across the ASU campus projecting video and photographs of Transfix at the Salton Sea, “. . . an abandoned resort town in California—once a thriving destination, now a toxic environmental disaster” (Emerge 2017p). Bowditch and Loomis drew from the site to materialize a future that is “desolate” and in “perpetual summer.” The performance engaged projection and photography to bring past decision-making and failed vision into the present. Their goal was to capture and share “. . . haunting images as a stark reminder of the cause and effect of the boom and bust economy” (Emerge 2017p). Through the lens of future past, Bowditch and Loomis’s work highlights temporal interdependence by reenacting the consequences of past decision-making in the present. The emphasis on cause and effect might be interpreted as quasi-analytical. Given Wack’s notion that forces driving reality can be known through the proper lens (Selin 2007), the destructive impact of certain development was seen and known anew through the illustrative lens of performance, media, and photography.

Past Future

Past future, a second temporality at *Emerge*, acknowledges the future as in-progress and already underway. Past future exists in political or material form, yet remains invisible because it does not register using empirical means (Adam and Groves 2007). Time is perceived as a continuum that consistently builds upon itself. The present and future are comprised of past actions, failures, and successes placed upon one another (Adam 2008). At *Emerge*, past future can be seen in *Frankenbucha*, *Documentary Biotechnology*, *Frankenstein for Families*, and *Democracy as a Service* described below. Each exhibition made tangible a future already underway; a future that builds upon the past and current action and decision-making. In troubling the linear notion of time, these exhibits engaged time to question whether real-time “progress” is actually inevitable or necessary.

Frankenbucha

Dr. Athena Aktipis, Assistant Professor in the Psychology Department at Arizona State University, presented kombucha’s two life-forms at *Emerge*. These life-forms include a biofilm and liquid, two unique products created from one organic substance. For Aktipis, kombucha’s life-forms are an opportunity to explore how through collaboration “symbiotic communit[ies] of yeast and bacteria. . . can help to fight off pathogens that single species of microbes cannot” (Emerge 2017j). This work is part of Dr. Aktipis’s Conflict and Cooperation lab. At *Emerge*, kombucha was used to make visible the opportunities and responsibilities associated with

modes of “making” already underway. Engaging past future, the public was invited to see how on-going biological processes, in particular processes that make two from one, might be built upon to promote individual and collective health now and into the future (Emerge 2017j).

Documentary Biotechnology

Filmmakers Regan Brashear and Jamie LeJeune explored the social implications of augmenting the human body and genetic patterns in two films. *Fixed: The Science/Fiction of Human Enhancement*, which also included co-editor Josh Peterson and associate producer Hannah Swenson, explored concepts, concerns, and the promissory nature of engaging science and technology for human enhancement (Emerge 2017e). Similarly, *Whose Future? The Promise and Perils of Human Gene Editing* explored the implications, risks, and ethics of gene editing through a social lens. In line with past future – an acknowledgment and making visible of futures in-process – *Documentary Biotechnology* generated space for visitors to reflect upon and question the pace and definition of technological progress and advancement today. Here, the future served in a dual-capacity. On the one hand, the films underscored how the future is constitutive of social life and how current decision-making with regard to corporeality and human existence charts a particular path forward. On the other hand, each documentary challenged the normative trend, harnessing the future as a resource from which to evaluate whether current decision-making will result in a desirable future and for whom.

Frankenstein for Families

Presented by the School for the Future of Innovation in Society and the Center for Science and the Imagination at Arizona State University, *Frankenstein for Families* provided interactive activities to create informal discussion about technological and scientific imagination, responsibility, creation, and creativity as a basis for present and long-term decision-making (Emerge 2017k). Futures underway were brought to light by engaging activities that spoke to what it means to create, be human, and take responsibility for the products we disseminate (Emerge 2017k). In *Frankenstein for Families*, the future served as a resource to evaluate futures in-the-making. Materiality played a significant role in this piece as the exhibition promoted a logic that “. . .as citizens with access to incredible tools for creation and transformation of the world, we not only need to understand the fundamentals of science and technology, but also to develop the skills to actively participate in the policy discussions that surround these fields” (Emerge 2017k). Demonstrating this logic, design activities ranged from a Scribbler, where kids engineered a pen and were prompted to consider who made the drawing, to Frankentoy, an interactive game that generated discussion around the ethical considerations of bioengineering. Here, epistemic objects served

to open up the future as something of our own doing with social, ecological, and technological implications and consequences.

Democracy as a Service

Electoral practices are integral to the American public's articulation of desirable and preferred futures. At *Emerge*, Jonathon Keats revealed a ballot system to confront "... challenges of political gridlock, bureaucratic corruption, and unreliable officials..." (Emerge 2017d). Merging computer science and biotechnology, Keats sought to question the government's continued reliance on the physical realm in contrast to multinational corporations, such as Google and Amazon, who deploy cloud-based services to achieve efficiency and participation (Emerge 2017d). In materializing and reimagining the electoral process, Keats made tangible the ongoing, deeply embedded, and socially constitutive practices of political future-making.

Future Present

Future present, a third timescape at *Emerge*, "...positions us with reference to deeds and processes already on the way and allows us to accompany actions to their potential impacts on future generations" (Adam and Groves 2007, p. 196). Illustrating human agency in future-making, future present makes assumptions about the "not yet" to frame current decision-making. The far future is imagined and brought directly into the present. *BioDesign Challenge*, *Parlor of Futures*, TM[*Tomorrow's Monster*], *Cloud Services*, and other exhibits at *Emerge* engaged future present by imagining and materializing distant futures in real time. Inhabiting these futures fostered reflexive interaction and conversation about how we might take responsibility today for tomorrow. The public was invited to directly confront the linear notion of progress through the articulation of futures that may not be socially or technologically progressive.

BioDesign Challenge

Led by Daniel Grushkin, *BioDesign Challenge* merges art, design, and science in a yearly competition challenging students to imagine, research, and articulate tomorrow's uses and applications of biotechnology (Emerge 2017b). Two winning student design projects were exhibited at *Emerge 2017*. They included *Stabilimentum* and *Starter Culture Kit*: "*Stabilimentum* is a couture mask that filters air using live spiders and the electrostatic properties of their silk. *Starter Culture Kit* is a bio-materials starter kit designed to introduce makers to the expansive world of bio-materials, which include bioplastics, mycelium and silk proteins, which can be propagated and shared among makers" (Emerge 2017b). Prototypes were tactile, interactive, and deliberate in their design of a speculative future. Grushkin's

intention was to plant a far-future in the present by displaying speculative objects. In doing so, the public was prompted to consider what it actually means for biotechnology to be next or up and coming. As a result, the future became an epistemological and ontological question open to the potential of products, biotechnology, and ripe for considering which worlds we might choose to design and inhabit as a society.

Parlor of Futures

Drs. Denisa Kera and Lauren Withycombe Keeler blended foresight methodologies, including scenario planning, divination, and forecasting, to innovate a novel way of staging discussions about the future. Their exhibit presented an opportunity for *Emerge* guests to engage with pairs of tarot cards reimagined from the seventeenth century Tarot of Marseille. The first deck worked to prototype the future using cards outfitted with DIY electronics, aesthetic circuits, paper microfluidics, and revamped symbols. Focused on controversies related to emerging science and technology, the deck was designed to creatively question, discuss, and evaluate a variety of pressing issues relevant to current and future times (Emerge 2017m). The second deck, born from the Future of the American Dream project, sought to open up conversation about hopes and fears for the country's future (<http://futureoftheamericandream.com/>). Discussions were designed to empower participants to consider if and how desirable or undesirable futures may be pre-set through a divine or otherwise predetermined lens. In practice, the cards were a mundane mechanism to reorder contemporary knowledge and provide a format to prompt thoughtful discussion. In a playful and provocative guise, the card play fostered inquiry into the implications and consequences of present decision-making and sociotechnical change, uncertainty, and transformation.

Fly Blimps

David Bowen's *Fly Blimps* merged insect and machine to investigate a future where relationships between the natural and technological are increasingly integrated. Three helium blimps were powered and driven by average house flies. The flies' movement triggered autonomous sensors that moved the blimps in space. Bowen's blimps contained the "...food, water and light needed to keep the flies alive and active. The chambers also contain sensors that detect the changing light patterns produced by the movements of the flies" (Emerge 2017i). Bowen's blimps were conceived as "...separate but intersecting community vehicles. The flies exist in their own self-contained and self-sustaining worlds, collectively creating an amplified and exaggerated expression of group behavior" (Emerge 2017i). Time was considered cyclical and durational within this piece. Space and movement operated in cycles and flows existing in the present. Here, the future became an object to be hacked through the intertwining of systems and natural human rhythm. The public

was prompted to consider plausibility and possibility of future relationships between nature and technology associated with technoscientific advancement.

Electric Breath

A multifilm series curated by Meredith Drum, *Electric Breath* presented *Frankenstein* in multimedia. Drum's series engaged film, video, and animation to make visible the complex relationship between modernity and technology (Emerge 2017g). Films depicted "...monstrous avatars struggling to thrive in, or escape from, virtual worlds to animal-headed humans narrating a drowned city" (Emerge 2017g) to generate a "satirical, dreamy and dystopian" future. Drum's curation brought fictitious, assumed, and questionably desirable futures into the present as a way for audiences to imagine and reflect upon the trajectory of present decision-making.

™ [Tomorrow's Monster]

Drs. Jake Dunagan, Jason Davids Scott, and Stuart Candy invited participants to inhabit a far-off future. Their fully immersive speculative space involved the creation of a fictional Center for Science, Gods and Tomorrow (CSGoT, ~seesgot), where participants were introduced to a part-brokerage part-scientific organization that sells and purchases human DNA. In this world, human DNA is a private commodity held by multinational organizations. The fictitious entity combined "...cutting-edge science and technology from structural biology, materials science, robotics, and meta-intelligence into creations that challenge our moral traditions, our political formations, and our market mechanisms" (Emerge 2017o). Future narrative, images, visual representations, and public speech from 2036 were used to construct the future world. Participants were challenged to inhabit CSGoT and consider its social implications. Materializing 2036 in the present, the far future became a knowable reality and a tool to confront and question contemporary political and social choice in relation to scientific development.

Edibleskin

Artist, designer, and researcher Ali Schachtschneider, developed *Edibleskin* as an exercise in imagining the future of fashion. Her work articulated "not yet" fashion as a function of the human body where clothing is grown and consumed as edible skin. Schachtschneider engaged "...biotechnology and biomaterials to explore an alternative future where the relation between living and non-living, things and bodies, is expanded and blurred" (Emerge 2017f). Designing with scobie, the by-product of kombucha, Schachtschneider used her work to comment on the relationship between body and materiality, and in particular, issue a critique of the fashion industry as

related to sustainability and body image. Schachtschneider engaged time as process, an unfolding and generating of growth. Bringing speculation into the present, the future became a resource from which Schachtschneider could invite "...critical discussion of the ways in which we shape biotechnology in relation to everyday life" (Emerge 2017f).

Cloud Services

Karolina Sobecka presented *Cloud Services*, an investigation into the complexity of the sociopolitical and environmental practices that societies engage to create and share knowledge, meaning, and values (Emerge 2017c). Within *Cloud Services*, an infosphere of digital data and information is hosted by and stored in clouds. Access is structured by society's relationship to nature, and as a consequence, "...information arrives when the weather arrives, making the weather, once again, not incidental but essential to our lives" (Emerge 2017c). Sobecka's speculative future and technology was developed by fictitious founders in "... a response to the ecological crisis, leading to an emergence of new structures of power arising from countering the ideal of speed, access on demand, and operability" (Emerge 2017c). Her work sought to reimagine human-ecological relationships. It provided participants an opportunity to question and evaluate their future-orientation, as well as the direction of technological progress, risk, material systems, and on-demand notions of temporality.

Present Future

The fourth orientation at *Emerge*, present future, is a "...future that is pictured, planned, projected, pursued, and performed in the present" (Adam and Groves 2007, p. 32). Underlying this view is the perception that the future is a continuation of the past – that it unfolds from it. Knowledge from past patterns, events, and happenings inform human decision-making. Present future is largely linear in contemporary practice and draws primarily from quantitative and dominant knowledge forms (Adam and Groves 2007). Here, humans have significant agency in crafting futures (Adam 2010). *Emerge* as a curated collection of public-facing foresight stands in for present future yet attempts to break the linearity presumed in Adams and Groves's construct. Dehlia Hannah, providing curatorial direction for *Emerge*, describes the event as being "...organized around the idea of using the past to reframe our sense of the present and inspire imagination of possible futures" (2017). She describes exhibitions as scenarios "...for which we must prepare ourselves affectively, politically and technologically. For this, we must temper our fear of the unfamiliar with a sentiment of wonder at what might be possible in worlds to come" (Hannah 2017). Tempering our fear as Hannah (2017) writes, we argue, requires making space for futures to come into being so that we might grapple with plausibility, responsibility, agency, and decision-making.

With this in mind, we turn to *Emerge* as a space to think with and articulate the temporality of future present through nondominant means. “Other ways of knowing” and representing were featured to help public audiences clarify, articulate, and test futures not obviously accessible in everyday life. Complexity and uncertainty were grappled with rather than reduced. Imagination, plausibility, and speculation opened up a diverse collection of knowledge and fostered conversation about what can and should be and for whom. Information was shared through epistemic objects, experiences, and exhibitions. These objects were intentionally designed to bring past and present information to bear in imagining tomorrow. With each tool came a different way of manipulating, knowing, and confronting the linear mode. The result was a space that allowed the future to be opened up in all its multiplicity.

Material Scaffolding

Emerge 2017 provided access to new temporalities – future past, past future, present future, and future present. Exhibitors manipulated perception, material, scale, temporal gaze, space, and orientation to generate new material ways of knowing and anticipating our social world. *Emerge* provided a literal and figurative space to traverse past and future, while considering the implications of present decision-making. Perhaps most importantly, however, the exhibition empowered individuals through tactile and social experience to build capacities to better consider which futures they find worth inhabiting. Temporalities were shifted and the linear mode of time and progress was troubled in doing so. The result of this troubling was an opening up of new material experiences and ways of knowing the future. *Emerge* constructed a space that scaffolded existing senses of time to reimagine new temporalities.

In architecture, scaffolding is a temporary structure used to support the renovation or construction of a building. In psychology, scaffolding is figurative, a frame which an individual can model from or use to learn particular behaviors. It is a handhold for a learner to master a new skill. In the case of *Emerge*, materiality is helpful to scaffold an individual’s capacity to think about time and its movement outside of linear confines. When we use a common artifact or form – an experiment, an open house, a comic book, an article of clothing – we provide a scaffold that is familiar and perhaps mundane, but we layer other, new meanings upon it. These scaffolds can be conceptual, but we believe that in particular the material, experience-based intervention *Emerge* aims to make can be evocative in new ways, triggering an affective or even corporeal response rather than only a cognitive reaction. Material modes of troubling result in perceptual and intellectual gains. Better, more open thinking and increased reflexivity stem from modes of knowing that challenge or subvert the linear viewpoint. These modes are additive. They expand the number of voices, knowledges, and perspectives available for conversation and debate. They provide an opportunity for nondominant, yet equally relevant, practices of anticipation to come into being.

The benefits of material scaffolding manifest in new understandings of what the future might hold. For example, climate is typically treated as separate from IT. In Sobecka's *Cloud Services* participants were offered a visceral experience of those two elements intermingling and an opportunity to seriously imagine social, ecological, and technological relationships that might emerge. TM[*Tomorrow's Monster*] reframed the normal trope of a lab open house to illustrate the promise and peril that future technologies may hold. In *Neurocomic and Beyond*, history is redrawn to bring past events into the present and future tense. Their work repositions memory to allow for a renewed utility and interpretation of our scientific past.

Ultimately, the future is about the present. We engage it as a means to make better choices today; better in the sense of being aware of the multiplicity of options, as well as reflecting the "collateral futures" (Felt 2013; see also Law 2011 on collateral realities) that are the unavoidable consequences of choosing one future over others. Making better decisions here and now requires engaging modes of knowing and knowledges that challenge or subvert a too simplistic linear mode and reframe futures in all their ontologies. Harnessing the multiplicity of futures requires bending, flexing, and disjointing. We must imagine and articulate moments different from today in order to gain perspective, not to simply excite or perturb but to develop ways that enable us to make better choices today. The point is to open up new pathways of thinking, new opportunities to notice existing mindsets, and experiment with "other ways of knowing." *Emerge 2017* used materiality and design to open up a space of experimentation and to scaffold new experiences that supported engaged learning. In this sense, it opened up a richer layering of time and futures that help serve the purpose of anticipation in fostering greater reflexivity, perspective, and responsible decision-making and action.

Summary

Dominant epistemologies tend to construct the future as a manageable and linear entity. These constructions, although useful and practical in many respects, are also powerful means to control and colonize "the future" in specific ways. They reduce the complexity and novelty inherent in any attempt to know and plan for futures. It is essential to reflect upon which complexities get wiped out and which are taken care of, as these are the moments where power relations find their manifest expressions. Direct relationships between cause and effect, prediction and outcome, and means and ends are often assumed and enacted as a result. The future, however, exists outside of a worldview inclined to follow the logic of trajectory.

With this in mind, *Emerge 2017* made an effort to create two kinds of spaces to perform anticipation in new ways: (1) a physical space for materially engaging with the not yet in novel ways, and (2) an understanding of the future as a space in and of itself to be continuously (re)arranged and explored. Both allowed experimentation with different arrangements and choices in order to explore the many different futures that could potentially emerge from contemporary and past choices. When using the notion of space in this context, we follow a relational understanding of

space (e.g., Löw 2016), stressing that space is created through two sets of practices: spacing and synthesis. The first refers to the physical (re)arrangements of different human and nonhuman entities. The second refers to the making of connections between these entities, thus forming “spaces through processes of perception, ideation, or recall” (Löw 2008, p. 35). This means that in order to allow for different futures to emerge, one needs, on the one hand, a physical space in which people can engage with, explore, and experiment with different temporal arrangements. Simultaneously, a conceptual space needs to be opened up in which the future, constructed as an idea, receives active reflection. Spacing means to imagine and reflect on different potential arrangements of humans and nonhumans, while synthesis draws visitors’ attention to how different collectives (could) make sense of any of these possible arrangements. Supporting both processes means creating a space where the frequency with which innovations are produced to bring about “the future” matters less than the direction in which those innovations potentially lead us (Felt et al. 2007).

Exhibitions of art, design, and performance support such efforts to imagine how the future might be constructed in a temporally diverse terrain that engages memory and imagination as much as planning and projection. *Emerge* is thus a temporally and socially diverse space where multiple knowledges do work to open up more robust and eclectic forms of anticipation. In pulling out the temporalities manifest through the performative experiments of *Emerge*, we highlight the inherently fundamental, but often invisible, variables and timescapes involved in doing and undoing specific futures through engagement. In doing so, we point to the productive and significant potential of art and design in supporting different kinds of anticipatory practices outside of the commitment to linearity and trajectorism found in mainstream discourse.

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