

DAAD Year-Long Research Fellowship Proposal
More Matter and More Art: The Entanglement of Physics and Performance
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Abstract

The twentieth century saw fundamental changes in the relationship between representation and reality, rooted in Enlightenment thought, that are still playing out today. In the case of experimental and theoretical physics, this shift is linked to the emergence of relativity and, especially, quantum mechanics. Coterminous with this, in the case of theatre and performance, the shift can be seen in anti-realist movements from expressionism to Dada. Some historians and philosophers of science have used theories of performativity to help them wrestle with what science *is*, how it is made, what it says about the world, and who gets to claim those things. Scholars coming from the disciplines of theatre and performance who write about science and theatre, on the other hand, treat science as the domain of fact and theatre's only potential role as the representation of that fact to an audience. Through an examination of historical and contemporary experimental practice in both physics and performance in Germany and the USA, two scientific and cultural global centers, my dissertation makes a fresh intervention from the field of performance studies into the attempt to understand how matter and meaning affect one another. My project proposes that the methods and theories used in performance studies—a field that emphasizes embodiment and materiality—can be applied with just as much rigor and impact as scientific theory and practice to questions about the nature of reality.

Project Description

Science is commonly considered an exposition of objective facts, the arts an expression of subjective individual truths. When theatre intersects with science, it is commonly a one-way interaction. Science imports theatre language as metaphor (Bruno Latour's actor-network theory), or scientists use theatrical means to popularize their theories (as in the case of the nineteenth-century optical illusion and stage sensation known as Pepper's Ghost). Theatre artists tell a dramatic story based on the history of science, as in Bertolt Brecht's *Life of Galileo* and Michael Frayn's *Copenhagen*, or engage metaphorically with scientific theories—the approach of theatre company Complicité, for example, and of Richard Foreman.

As an undergraduate triple-majoring in physics, philosophy of science, and creative writing, I wrote plays like this myself. Physicists who came to see them thought they were clever, endearing educational tools. I'd been aiming at paradigm-shifting art. Wanting to believe that encounters between physics and theatre could be a two-way street, I saw my plays as thought experiments with the same kind of potential explanatory power wielded by philosophy of physics texts. In the end, my physics training nudged me in different directions. My interest in putting thought experiments onstage became a practice in what is known as performance as research, or the application of performance techniques to evaluate research questions—not focused in particular on science, but on an understanding of performance practices as generative of knowledge. In the early 2010s, for example, I co-developed a series of performances in public spaces in Belgrade and Pittsburgh as a means of investigating public space use and the effects of so-called revitalization in these two cities. A decade later, my dissertation returns to the questions that got me thinking about theatre and performance as research in the first place.

Few scholars have the background to perform an analysis that engages physics and performance at a level that can produce something of value to both. In my dissertation I want to bring my unique interdisciplinary background to bear in order to broaden the active role performance can play in understanding the entanglement of matter and meaning. What happens when contemporary experimental practice in physics and in performance are read diffractively through one another—when we look at experimental design in high-energy particle physics that involves massive international teams of scientists alongside the project design of a large-scale international theatrical co-production? When we consider how a choreographer develops a dance with a live chicken alongside how a physicist learns to manipulate a sensitive imaging instrument? When we consider the relationship to reality and to representation theorized as post-dramatic theatre (Lehmann 1999) alongside the attempt to clear up the same relationship in quantum physics via the many-worlds interpretation?

Karen Barad, a philosopher, theoretical physicist, and feminist theorist, points out the pitfalls of analogical thinking (i.e. making a surface-level analogy between uncertainty/complementarity in quantum mechanics on the one hand, and human intent on the other, can lead to a fallacy that both misunderstands the science and warps our ideas about human agency). Performing a legitimately transdisciplinary inquiry into matter, experiment, and objectivity, Barad *does* theoretical physics and performance theory, together. She uses her theory of agential realism both to rework Judith Butler's theory of performativity—which challenges representationalism by understanding, for example, gender as a “doing” rather than an essential quality that a person has—and to develop a new interpretation of quantum mechanics (Barad 2007). Agential realism argues that matter and meaning co-make one another in an ongoing, reciprocal process, not limited to the sciences. Theories of performativity help to understand how this works. The “mangle of practice” (Pickering 1995) similarly opposes a representative idiom for science (in which nature consists of a bunch of facts and rules that wait passively for science to uncover them) with what he calls a performative idiom (in which nature is a field full of agency continually acting on and interacting with human beings).

Barad and Pickering's studies, though interdisciplinary, nevertheless are produced by science scholars and when they do look at practice, they draw their case studies from scientific experiment—in other words, not considering the performativity of performance. On the other hand, theatre and performance scholars, when they attempt to link modern and contemporary physics with performance, position the latter as expressive rather than active, a way of popularizing science at best (Halpin 2018; Johnson 2012; Schmitt 1990). But the use of theories of performativity in science studies is highly active. Niels Bohr, father of the Copenhagen interpretation of quantum mechanics, insists that it is crucial to think of an experiment as a “phenomenon”: an entire setup that includes instrument/apparatus, observer, and subject (Bohr 1961; Barad 2007). Grappling with the challenge modern physics poses to objectivity and realism in science without throwing out the existence of an objective reality altogether means tackling the entire phenomenon as a complex system involving human and nonhuman actors and materials, all of which have agency. Through emphasizing that material entities are constituted through action, that their apparently fixed and inherent properties are forms of “doing,” thinking with performativity helps science scholars understand how to take the agency of matter into account. Performance scholars and practitioners could use their own facility with theories of performativity and other specialist understandings of the body to deepen such analyses of the relationship between matter and meaning, but this is a road left almost entirely untraveled. This is where my dissertation intervenes.

My dissertation will be organized into three sections with a total of five chapters containing historical and contemporary case studies. In the first, single-chapter section, **Representation**, I look at how performing artists and physicists have grappled with challenges to realism and changing notions about representation over the past century. I start with German case studies from the early

twentieth century (for physics, Heisenberg, Einstein; for theatre, Brecht, expressionism), moving to US American case studies from the mid-century (Nevada Test Site, Richard Feynman, the wartime expansion of academic physics; Richard Foreman, Wooster Group). This section lays important theoretical groundwork for the remainder of the project by outlining a history of representationalism in physics and performance and the primary challenges to it. **Experiment**, the next section, moves into present-day practice and plays with an inversion of the common understandings of physics and performance. It comprises two chapters, one focusing on performance projects that function as technologies (such as Michael Kliën's *Parliament*), the second on contemporary physics case studies that foreground science's dimension as creative, cultural production.

My project's final section, **Phenomenon**, looks at contemporary artistic and scientific production as entire phenomena in the Bohrian sense. Two chapters focus on several case studies that offer views into how matter and meaning are entangled in practice. More than the other two sections, it requires me to zoom out and consider national and global contexts. The first chapter in this section focuses on intra-national flows of scientific and cultural knowledge within Germany and the USA; the second, on international circulation of these forms of knowledge between the two countries.

My research combines theory and history of physics and performance with field work (scientist and artist interviews, visits to laboratories and theatres, observation of experimental setups and rehearsal rooms). Methods of investigation I plan to use include archival research, site visits, viewing and analyzing contemporary performance work, and interviewing scientists and artists. Support from the DAAD fellowship will allow me to conduct the research, interviews, site visits, and field work necessary to identify and finalize German case studies for the "Experiment" and "Phenomenon" sections, and to conduct archival research supporting my historical case studies in the "Representation" section.

Past Research and DAAD Research Plans

The Justus-Liebig University Giessen will act as an appropriate home base during my DAAD year, where I will be housed at the Institute for Applied Theatre Studies / ATW – Institut für Angewandte Theaterwissenschaft and supervised by Prof. Dr. Bojana Kunst, with the ability to travel for field work and visits to sites and archives. The ATW mixes performance theory and practice in a combination that is rare in Germany and, simultaneously, highly influential: prominent experimental performance groups like Rimini Protokoll have emerged from the program. My project aligns well with "applied theatre studies," and I will have the chance to share my research with ATW faculty and students while I am there through participation in Prof. Dr. Kunst's seminar for Ph.D. candidates and through the development of a "performativity of physics" workshop in the department.

I spent a year in Berlin as a Fulbright Scholar in 2010-11, pursuing independent research into the (then brand-new) post-migrant theatre movement. Beyond this grounding in the German theatre scene, which gives me a good starting point for my research in performance there, there are a number of reasons for choosing Germany as my primary international research site. If I am reading physics and performance in the early and mid-twentieth century as expressions of their contexts, Germany is foundational, from the number of scientists responsible for modern physics (Einstein, Heisenberg, Max Born, etc.) and the many key theatrical movements that originated there that have helped produce modern theatre (expressionism, Epic Theatre), to Nazism and the effect it has had on both science and art. Today, Germany leads Europe in federal science funding and is robust in financial support for the arts as well, with its unique state-funded theatre system a source of

continued national pride. This makes it a hub for the kind of international projects in both performance and physics on which I want to focus.

For the 2020-2021 academic year, I was awarded the competitive Arts and Science Connect Fellowship through The Graduate Center, CUNY. Supported by this fellowship, I will complete and defend my dissertation proposal by January 2021. In the spring semester I will be at work on research and writing for my dissertation's first section, which I anticipate will require the most theoretical heavy lifting. Throughout the same academic year I am also a participant in the Laboratory for Social Choreography at Duke University, run by Michael Kliën, whose social choreographic project *Parliament* acts as one of my case studies in the second section and whose performance methodologies I have researched and written about since 2016.

In late spring and throughout the summer of 2021, I will write the first chapter in "Experiment," supported by my year-long engagement with Kliën's Laboratory. Simultaneously, I will turn my research focus to the second chapter of "Experiment" and both chapters in "Phenomenon." This research consists primarily of fieldwork: site visits, interviews, observation of practice. I will conduct interviews with physicists and staff and, where possible, site visits to US American centers that specialize in astrophysics and high-energy particle physics, as well as to labs and centers that take an explicitly feminist and/or anti-colonial approach to scientific research. These visits will allow me to get a sense of the institutional surroundings of contemporary experiment in physics: its rehearsal rooms, its stages. My DAAD year will build on and continue this work with German research centers and contemporary German theatre companies and performing artists. Archival research relevant to the German case studies in the "Representation" section will be possible as well. While in Germany, I will also be editing "Representation" and writing the second chapter of "Experiment" and first chapter of "Phenomenon." On my return to the USA, in fall 2022, I will write my final chapter, with the intent to defend in winter 2022.

The pandemic creates an uncertain situation for anyone doing research, but particularly when that research involves fieldwork concerned with live, in-person interaction and events. These elements of my research will need to adapt to the situation a year from now, which is a difficult one to predict. But as my research precisely engages how it is that conditions, practices, and underlying realities mutually shape one another, whatever happens will provide rich ground for inquiry and comparison. If, for example, travel or in-person fieldwork are impossible in 2021/22, it will become necessary (and fruitful) for me to consider changing notions of matter and of "doing" in both theatre and physics in light of the pandemic. COVID-related developments in what counts as matter are already becoming visible through livestreamed performances in empty theatres, online conferences and collaborations and interviews, digitized archives—these and much more will constitute a new arena for study in the case of unsafe travel. As our world negotiates what it is we can do virtually for our own collective safety, it is crucial to remember that our matter, our material selves, are not escapable; and that this matter is inextricable from the meaning we make. This is not only at the heart of my research project, it is an understanding that is vital to the collective project of making a livable world.

Selected Secondary Literature

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