Physical Research: Professional Dancers Exploring Collective Possibilities in a Solidifying Substrate

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Abstract: This paper reports on ethnographic work that explores professional dancers' practice, "physical research," as a members' phenomenon. The practice of physical research enables this company to explore their unknown expressive potential as an ensemble through an iterative process of creating and refining collective, full-body movements. As a case of ensemble learning that foregrounds artistic agency, physical research supports a community of learners (1) to be comfortable and open with "unknowing," (2) to engage playfully and "absurdly" in their inquiry and (3) to persist collectively in their inquiry over long stretches of time. These three aspects, each difficult to foster and lauded in learning environments, are grounded in the creative and physical nature of physical research. Here and in ongoing work, I argue that this practice can inspire the design of formal and informal learning environments.

Introduction and framework

I engaged in a 2-year (and ongoing) ethnographic study of a professional dance company, Novel Tectonics, in order to better understand how they used their bodies to investigate ideas through their collective expressive potential. This ethnographic work has identified a practice that Novel Tectonics referred to as "physical research" and explored it as a members' phenomenon (Keifert & Stevens, 2019). The artistic director, Clark, and all 13 dancers met three hours a day, five days a week as they engaged in choreographic research projects that spanned months or even years. On their website, the company's rehearsal space is described as a "research lab" where they engage in physical research to develop new "movement vocabularies" for choreography that draws on the movement instincts of the dancers to create and explore novel structures (or tectonics) together.

Why engage in physical research?

In order to understand physical research as a members' phenomenon (Keifert & Stevens, 2019) it was important to understand why these dancers participated in this practice. Not all contemporary dance companies frame their work as *research* or describe their studio as a lab. While this is not unique to Novel Tectonics, these dancers still chose to work in this company for years even though this job was not enough to make ends meet, they all had other jobs (most taught dance to kids). In interviews with the dancers, two themes emerged that spoke to their motivation to continue participating in physical research: (1) their artistic agency was foregrounded and valued and (2) they felt it expanded their expressivity as a group, something they could not do on their own.

One of the dancers in the company, Darius, explained that unlike in his previous experiences dancing professionally, in Novel Tectonics, "I feel like our relationship to the choreographer is like we're partners." In contrast to working in other professional dance companies, here choreographers positioned dancers as their partners, acknowledging their agency and ability to contribute to the creative process, and framing this as a joint endeavor. Physical research leveraged dancers' physical choice-making in a way that framed their inquiry as a partnership between choreographer and dancers. This is seen in collective persistent inquiry (Sengupta-Irving & Agarwal, 2017), in which groups remained engaged in mathematical problem solving over long stretches of time by, "not giving up on each other." For Novel Tectonics, collective persistent inquiry was supported through generative cycles of physical research between the choreographer and dancers.

Dancers also noted how it was important that engaging in physical research meant exploring the unknown limits of their joint expressive potential. When describing Sarah's process as resident choreographer, Darius noted that, "it's different than what I think the standard is because Sarah is like openly and knowingly being unknowing in the room." Through the practice of physical research, the artists in Novel Tectonics continually developed their capacity as an ensemble to explore their unknown expressive potential, something that none of these artists could explore individually. As a case of ensemble learning, in which participants are "learning things that you cannot do alone," (Ma & Hall, 2018 p. 508), participating in physical research requires multiple participants. Thus, dancers did not separate learning how to be members of the company from learning how to use their bodies as a medium in physical research. While dance practices have been studied and written about as inquiry (Blumenfeld-Jones, 1995; Kirsh, 2010; Lerman, 2014; Snowber, 2016), this literature highlights achievements of individual bodies, focusing on the sensations experienced in one's own body. In contrast, the intercorporeality (Meyer, Streeck, & Jordan, 2017) or withness described by these dancers

highlights the collective nature of physical research. Leveraging dancers' agency in a collective research process drove these dancers to continue to participate in years of physical research in this company.

Why study physical research?

A close study of physical research gives a dense case study of ensemble activity in which discoveries are made (one kind of learning, new cultural activity) and people develop a capacity to do something beautiful together (a second kind of learning, getting bodies into interactive coordination). Physical research offers a case of ensemble learning in which participant agency is foregrounded. This differs from Ma & Hall's (2018) case of a high school marching band where participant agency was expressed through the social infrastructure when students protested the sidelining of players, but not in the creation of The Show they performed. Physical research also offers a case of personally meaningful and consequential learning that, "coordinates meaning and activity across time, setting, and social participation […] changing one's relation to conceptual practice," (Hall & Jurow, 2015 p. 173). Conceptualizing physical research as a joint conceptual practice affords new understandings of embodiment, how multiple coordinated bodies moving together can be rich resources for consequential learning. "Physical research" is also an emic term. It is how Novel Tectonics members describe a practice central to them as a form of member's inquiry (Keifert & Stevens, 2019) and the reason they persevere (Sengupta-Irving & Agarwal, 2017). This paper conceptualizes professional dancers' practice of physical research through a case study of an episode from one rehearsal in order to better understand how dancers engage in a creative and persistent ensemble form of inquiry that leverages full body coordinated movements.

Methods

As a former dancer, I acted as a participant observer with Novel Tectonics in 1-2 rehearsals/week for two years. Rehearsals lasted for three hours during the week and I video recorded them and wrote field notes as well. This paper focuses on one rehearsal during Sarah's choreographic residency with the company (she was also a dancer in the company). In addition, I conducted a series of video elicited interviews with the artistic director of the company and some of the dancers, in order to better understand how members of the company, choreographers and dancers, understood key moments I noted in the data. These interviews were recorded using screen capture software on the computer that played the eliciting videos as well as an external camera in order to coordinate analysis of what participants could see and how they responded to questions. Video data from rehearsals as well as from interviews were analyzed using Interaction Analysis (Jordan & Henderson, 1995) in order to conduct close multi-modal, micro-genetic analyses of how dancers used their bodies to engage in physical research and to analyze their sense making during the interviews.

Analysis and findings

What is physical research?

Sarah used the term physical research early on in her interview and then defined it as, "the translation from the directives or the words or the proposals out of the mouth of the person who's leading the space, from their mouth to the recipients in the space and how the recipients translate that language through movement is the way that I define physical research." In this definition she conceptualized physical research as a dialectic relationship between the leader in the studio (choreographer) and the recipients (dancers), framing this as a complex process of translation between the two. Translating is a complex and nuanced process that leverages the agency, histories, and experiences of the translator(s) (in this case, the dancers) (cf. García & Wei, 2013).

Emphasizing the dancers' translation as coordinated physical movements, I draw on Goodwin's (2018) notion of substrate to define physical research as a dialectic process of inquiry in which participants iteratively respond to proposals in order to create a solidifying substrate (Figure 1). Here, the notion of substrate as the "local, public configuration of action and semiotic resources," available in interaction used to create shared meanings (Goodwin, 2018 p. 23) helps to identify the choreographer's utterances and movements as well as dancers' movements as ingredients to be used and reconfigured in the rich interactional cycles of physical research. Further, Goodwin argued that substrates organize co-operative action as temporal centers, making resources from the past relevant by transforming them in interactions that create "a constrained but open-ended framework for subsequent action" (Goodwin, 2018, p. 23). As movements and ideas circulated between the choreographer and dancers in the practice of physical research, the multi-modal components of this artistic substrate were transformed and influence the direction the inquiry moved towards.

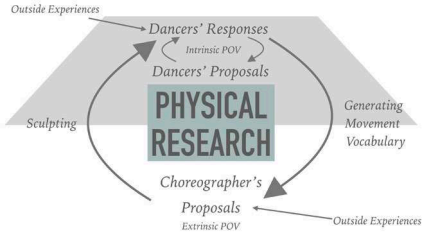

Figure 1. A representation of the components to cycles of physical research.

How do dancers engage in physical research?

The choreographer's initial proposal

As the leader and facilitator, the choreographer initiated physical research with a proposal. Sarah began her three-week residency by asking the dancers to write poems that anthropomorphized contradictions. A few days after later, she started rehearsal by sharing that she had picked vivid imagery from Darius's poem and wanted the dancers to create set pieces together as if a play were being performed for this imagery. The dancers stood in a clump on "the marley" (dance floor) as they waited for Sarah to read from Darius's poem. Sitting on a chair at the front of the studio Sarah uttered her initial choreographic proposal for the day: "warm water and red wine."

Generating a movement vocabulary: dancers' initial proposals and responses

Within seconds after Sarah uttered her initial proposal, the dancers transformed from an amorphous clump into a river of warm water (Figure 2E). A closer look at how this formed is depicted in Figure 2. The first dancer to make a proposal lay down on the ground (circled in Figure 2A) and then four dancers subsequently responded to this proposal, creating a river of warm water together (circled in dots in Figure 2A-D). The first three dancers to respond lay down on the ground one at a time, creating a line across the stage (Figure 2A-C). The fourth dancer to respond (Figure 2D) chose to give a vertical dimension to the tableau by bending over one leg in a T like shape above the dancers on the ground (Figure 2E). The dancers' chain of responses and elaborations model an ethos of "Yes And" used in improvisational comedy (Fey, 2011), in which participants never negate suggestions but only build off of contributions—affirming (yes) and then adding something new to the scene (and).

Figure 2. A dancer's first proposal and the subsequent responses from four other dancers.

When watching the formation of warm water during their interviews, Darius and Clark both commented on how the dancers were able to respond to each other and create such a complex formation within seconds. Darius commented on what it felt like as a dancer to make an initial proposal and to also respond to another dancer's proposal. Sometimes it could feel intimidating to make the first proposal for the group to respond to, but "then doom, doom, doom, doom, doom. You know *((snap))* like people accepting the offer," and responding quickly. Taking a more extrinsic perspective, Clark commented on the nuances of the spatial relations the dancers chose in their proposals. Using gestures to embody the entire ensemble of warm water, Clark's hands moved towards each other like magnets attracted to one another, illustrating how the dancers quickly created a "spatial relationship with each other" (Figure 3A). It is also important to note that her hands faced opposite directions and so did the dancers, some lying down facing the camera and one with her back towards the camera (Figure 2E arrows). Clark also moved her hands up and down to depict "the level change that happened," when the fourth dancer responded by bending over the establishing river (Figure 3B). These perspectives show how the complexity of the movement vocabulary (substrate) quickly developed.

Figure 3. Clark describing the initial water tableau (A-B). How it changed from subsequent sculpting (C-D).

Sculpting: the choreographer's new proposal in response to dancers' proposals

After the warm water stabilized and a movement vocabulary was generated, Sarah engaged in "sculpting," making new proposals to manipulate what that dancers had created thus far. Sarah asked the dancers to move their warm water on a diagonal rather than a line parallel to the edge of the marley, naming this sequence of movements in order to manipulate it (Figure 3 C-D): "Can my people who are warm water […] make this on a diagonal?" When watching this moment in her interview, Sarah shared what drives her to sculpt, "So often times in order to make a visual image more clear, it's like where am I directing the audience's eye?" Spatial rearrangements helped to highlight different aspects of movement vocabularies through the process of sculpting.

The research continues: sculpting affords new opportunities for proposals

As the warm water changed its spatial orientation to form a diagonal line, the dancers spread out. Instead of overlapping (similar to how Clark's hands overlapped and cupped together in her gesture in Figure 2A), dancers now lay on the ground feet to head. This spatial change afforded new opportunities for making proposals, as evident when the dancers grabbed each other's feet and waved them back and forth as they wiggled on the ground, creating a nice flow to their river of warm water (Figure 3D). In watching this moment, Clark commented that after "the shift in trajectory, they continued to wordlessly work together." Although it might be tempting to just lie down on the ground in a new spot as a part of the warm water, the dancers saw new spatial arrangements as an opening to continue their research, showing how Sarah's sculpting created constrained, yet open-ended opportunities for the cycle of physical research to continue.

Conclusion

In this paper I have described the temporal and social participation structures of physical research, highlighting how both the chorographer and dancers pursued their inquiry together. In this episode the process of physical research began in writing and reading poetry that seeded cycles of proposals and responses that created visual, ensemble movement vocabularies. Sequences of movements were named during sculpting as they were turned into material for choreographic design as the cycle continued. Through their practice of physical research, the members of Novel Tectonics collectively generated and manipulated full body, coordinated movements as a method of inquiry. Physical research as a practice elicited persistent inquiry and thus is a very promising design from which to build off in future work in the learning sciences (Vogelstein, Brady, & Hall, 2019). I am currently co-designing hybrid math/dance learning environments with the dancers in Novel Tectonics and middle school math teachers to physically explore choreography and mathematical operations. We are excited at the deep overlaps between these two learning environments which we have explored using *bridge terms*, words used in both choreography and mathematics (e.g. pattern, variation, sameness, and sequence), grounding our initial explorations and designs. Pilot activities in 8th grade math classes have grounded students' sense making about translations, rotations, and reflections in noticings across the generative variation groups physically researched.

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