Shaping Experiment from the Inside Out: Performance-Collaboration in the Cognitive Science Lab

Sarah Klein and Tyler Marghetis

Collage of video stills from EXPF: Shaping Experiment. Sarah Klein and Tyler Marghetis (2015a).

As part of the "practice" and "performative" turns, Science and Technology Studies (STS) scholars directed their attention to local, tacit, and embodied practices by which science and its phenomena are enacted and maintained.[1] While much has been written about how scientists are performatively entangled with their research objects, STS scholars tend to reproduce empirical distance and transparency in their descriptions of scientific practice. That is, they do not take their own performances seriously enough. Performance Studies (PS) models how to take performance seriously through its radical centring of performance as knowledge-making and as a legitimate mode of scholarship, often figured against dominant, western, scientific modes of knowledge-making (Conquergood 2002). However, in its engagements with science, particularly with the cognitive sciences (Blair 2008; McConachie and Hart 2006; Shaughnessy 2013), performance studies has largely glossed over the performed, practical, and situated features of science itself in favour of working with compatible frameworks and concepts that organize zones of shared interest and mutual exchange, including conceptual blending, affect, embodiment, and mimesis. Here, we explore a possible configuration for STS and PS scholarship to take scientific performativity seriously and literally, by making performances together.

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This paper centres on an "experiment-performance" that we have dubbed EXPF. This performance took the laboratory-based experiment in cognitive psychology and sought to invert its implicit power relations. Each performance of EXPF began as a standard experiment: a subject comes into the laboratory, is greeted by experimenters, gives informed consent, and completes a standard computer-based psychology experiment. At that point, however, EXPF diverged from orthodox scientific methodology by transferring agency from the "experimenters" to the subjects. At the end of the experiment, before they were informed of its research goals, subjects were asked for suggestions on improving the experiment—and, before the next subject arrived to participate in the experiment, we had to implement these suggestions, whether they were about the nature of the experimental task ("add music!"), the attendant paperwork ("maybe ask if people are depressed?"), or even the experimenters' appearance ("wear white labcoats!"). What began as a standard laboratory experiment quickly transformed into our subjects' vision of what the experiment "should" look like. Subjects were no longer just targets of scientific inquiry, but active crafters of scientific activity.

EXPF, therefore, was an experiment about experiment. As the product of collaboration between an ethnographer of science (Sarah Klein, or SK) and a cognitive scientist (Tyler Marghetis, or TM), EXPF looped theories of performative entanglement and reflexivity into a collaboratively devised research apparatus that reflexively addressed the performative character of research practice in our respective fields. EXPF thus rearranged materials and practices local to the cognitive psychology lab to enact "response-ability"—between researcher and research subject (ethnographer of science and cognitive scientist), and between researchers and research subjects (experimentalists and experimental subjects).

Subjects, Objects, and Their Mutual Response-Ability

Cognitive psychology experiments require the ongoing enrolment of participants, who are regimented in subtle ways to perform both as data sources and as ideal subjects. Cognitive psychologists both rely on this entanglement to produce subjects' experimental performances and recognize it as an epistemic threat (Klein 2014; Morawski 2015). The configuration of contemporary scientific psychology that casts the subject as an epistemic threat is fairly recent (Danziger 1994; Morawski 2015; Martin 2013). Danziger and Martin both trace the rise and fall of nineteenth-century introspective practices of self-experimentation that configured the experimental psychologist as both subject and observer of mental phenomena: researchers experimented on themselves, and were seen as legitimate observers of their own mental phenomena. Subjectivity was subsequently bracketed or "banished" from experimental psychology as introspectionism declined and psychology sought to prove itself among the natural sciences (Danziger 1994; Martin 2013). The roles of subject and observer/experimenter were separated in experimental practice, and the field promoted externally observable and measurable responses over introspective accounts. Even as it worked to fashion itself as an objective science, scientific psychology could not banish subjectivity completely. Indeed, between 1950 and 1970, scientific psychologists experienced a period of "epistemological dizziness" as they confronted and critiqued their dominant research paradigm, allowing anxieties about the "experimenter-subject system" (Morawski 2015, 574) to surface and acknowledging the cultural (and causal) complexity of the experimental situation. Among these anxieties emerged a concern about how "expectancies" and "experimenter bias" shaped the performances of research subjects (Morawski 2015, 593; Rosenthal 1963, 2009; Rosenthal and Fode 1963). What STS scholars call "methodological entanglement" persists as a practical concern for cognitive psychologists today

when subjects alter their performance to conform to the perceived aims of the researcher, a set of phenomena psychologists call "expectancy effects."

At the same time as asserting scientists' entanglement with their objects, STS scholars tend to reproduce empirical distance in their own work, masking their performative entanglements with their research sites. Here, we begin with the symmetrical observation that both ethnographers of science and cognitive scientists are part of layered research apparatuses of observers and observed.[2] Operating from the (now widely accepted) principle that research practice is performative, and that researchers are entangled with our research objects, in the approach developed in EXPF, *we threw ourselves into this entanglement rather than attempting to know it only in order to limit it*. Instead of focusing on drawing a line between authentic and inauthentic phenomena, we actively intervened in experimental practice, manipulating and rearranging it. EXPF was an experiment in becoming response-able on multiple relational scales: the long-term, leisurely entanglement between the two collaborators as we conceived of and implemented this project; the more constrained timescale in which we modified each iteration of the performance; and the brief, punctate, but iterated encounters between us, our apparatus, and the ever-changing experimental participant.

Our performance thus aimed to intervene in this locus of experimental performativity. What if entanglement is not ignored or managed as a threat, but engaged as a resource? What emerges when, instead of intervening on submissive subjects, the experiment becomes malleable and responsive, conforming to subjects' impressions of and aspirations for science? And what would happen if, instead of being unobtrusively observed, experimental researchers were involved in studying their own practices?

The term "response-ability" that we take up here is a normative ethical position that we locate in feminist, posthumanist, and agential realist work on how to act and think (and research) with and within more-than-human worlds (Haraway 2007; Barad 2008; Despret 2008). Donna Haraway describes response-ability as an imperative to cultivate "a radical ability to remember and feel what is going on and performing the epistemological, emotional, and technical work to respond practically" (2007, 75). Cultivating the capacity to respond is not only for the researcher as a way to "remember and feel" their entanglement—it necessarily means cultivating the entity under study's capacity to respond. Response-able research creates set-ups and questions in which its research subjects are interested, and which allow them to become interesting.

Performance as Method: Research Design

We align EXPF with recent moves in STS toward design, "Making and Doing" and a "collaborative turn."[3] Our move to engage experimentally with and manipulate the situated materials and embodied routines of research is an example of what Yelena Gluzman (2017) calls "Research as Theatre" (RaT). For Gluzman, RaT is a way of taking performativity seriously by engaging with the theatrical properties of research: "theatre performance is central to the performativity of scholarship, allowing scholars to engage not only with the *fact* of performativity, but rather with the concrete, situated *processes by which scholarship is materialized*" (Gluzman 2017, 2). The RaT perspective, with which we identify EXPF, opens STS methodologically to intervening by re-staging the social and material mechanisms of scientific practice.

We draw on and hope to magnify underexplored affinities between two approaches: ethnomethodology[4] and performance art. Ethnomethodology is compatible with theories of performativity in locating the reproduction of social worlds not just in discursive formations, but also in the everyday, the ephemeral, and the embodied. Harold Garfinkel's insistence on local, context-embedded meanings and practices is exemplified in his remarks on the "awesome phenomenon" of everyday indexical action and expression (Garfinkel 1967, 11). Indexicality, for Garfinkel, describes the "incarnate" relationship of an utterance or action to its accumulated and ever-unfolding context. Garfinkel references unavoidably indexical scientific language (5) to exemplify how an indexical expression requires its context, but for Garfinkel, there is no context-free, "objective" expression, only indexical expressions enacted in and enacting different contexts.

The ethnomethodological approach typically manages the problem of the colliding, entangled worlds of the analyst and the worlds they analyze by requiring what Garfinkel (1992, 2002) called "unique adequacy," in which the analyst comes as close as possible to being a member in the community of practice under study.[5] While of course we drew and built on the familiarity we had with one another's disciplinary practices, our orientation was not primarily one of "uniquely adequate," if detached, observation. We turned instead to Garfinkel's well-known "breaching experiments" (1967), which encouraged intervention as a mode of revealing social worlds.

Garfinkel's breaching experiments were exercises developed for his students that encouraged them to disrupt or "breach" ordinary social situations to illuminate unwritten rules and implicit structural features, or "background expectancies" (Garfinkel 1967, 36) of those situations. Examples of Garfinkel's breaching experiment "assignments" included having students haggle with grocery store clerks, repeatedly ask for clarification during small talk, and behave as a lodger in their own homes. The notion that breach, breakdown, or disruption of ordinary activity can reveal its implicit indexical properties both precedes and pervades Garfinkel's work,[6] but what distinguishes his breaching experiments is that they turn this principle into a method for making these implicit indexical features accessible to study. The disorder that a breach elicited would demonstrate how delicate "order" was, and how tenuous its maintenance. While breaching was developed mainly as a pedagogical tool and has never been the primary method for doing ethnomethodological analysis (Rawls 2002, 8), we maintain that breaching has empirical potential beyond its demonstrative function. We turn to another breaching tradition in performance art to further elaborate this potential as we take it up in our own project.

Performance studies makes something akin to a "breach" the rule rather than the exception, not only in its foregrounding of performative practices and embodied knowledges, but also in its simultaneous challenge to institutional categories of what counts as scholarship or research method.[7] We want to highlight compatibilities between Garfinkel's breaching experiments and avant-garde performance traditions that adopt strategies of disruption in order to reveal and critique aesthetic, political, and social norms by way of the formal conventions, routines, relations, and roles through which they are articulated. The performances of Adrian Piper are especially good examples of this, since they, like Garfinkel's breaching experiments, intervene in and reveal *indexicality* in the makeup of everyday reality. In drawing out these resonances, we aim to amplify the empirical functions of performance and the theatrical properties of research.

While it is possible to recognize reflexive strategies in many art movements (and individual works) on the basis that a movement or a piece reworks or challenges the style, technique, or strategies of its predecessors, we want to highlight a tradition in performance art that employs a strategy of

disrupting or rearranging interactional, institutional, or perceptual norms. Yoko Ono's "Cut Piece" (1965) and Marina Abramović's "Imponderabilia" (1977/2010) breach social norms of personal space, trust and intimacy by inviting (or impelling) audience members into novel intimate encounters, like being asked to cut, and entrusted with cutting, the clothing the performer is wearing (Ono 1965), or having to brush up against a performer's naked body in order to fit through a gallery's entrance (Abramović 1977). Adrian Piper's work, especially her "Catalysis" series (1972–73), not only enacts similar breaches but stages them in public and claims them as an empirical strategy. Piper's work stages direct encounters that call attention to the *here-and-now* of the cultural and perceptual resources activated in that situation, particularly resources used to enact and maintain categories of race and gender (Piper, 1989). The *here-and-now* out of which Piper composes her performances, she terms the "indexical present" (Piper 1990). Piper's indexicality resonates with Garfinkel's in its description of the relationship that holds together actions and their contexts and is likewise disrupted and revealed by breaching. However, Piper understands and accounts for the encounter differently.

Piper's "Catalysis" series explored the routines underlying xenophobia by disrupting perceptual and categorical boundaries as individuals encounter her in public. In these performances, Piper breached perceptual norms in public spaces by encountering their inhabitants in various states of abjection: her interventions included browsing through a bookstore after brining herself for days in a mixture of vinegar, eggs, and cod liver oil, walking across Union Square in Manhattan with her clothing covered in wet oil paint, and riding the bus with a red towel stuffed in her mouth (Lippard and Piper 1972). Piper does not understand these interventions primarily in terms of breaching behavioural norms, but rather as altering perceptual expectations. She writes of "Catalysis III" that in crossing Union Square covered in oil paint, she aimed "to behave normally and simply alter [her] physical appearance in the way that one would sculpturally alter an object with respect to material" (Piper 1996, 262). She writes of another performance, identifying it with her approach in "Catalysis": "Again, the idea is not to violate conventions of behavior but simply to set myself up as an altered object of perception, and explore those differences" (264). In the sense that she was manipulating variables of perceptual objects, Piper was working with methods not unlike those of a psychology experiment (though the variables she manipulated were embedded in a minimalist art tradition rather than a laboratory practice). To apply the terms of the shifting configurations of the psychology experiment in the nineteenth and twentieth centuries, Piper was not the subject and the observer (as with an introspectionist research configuration) but the observer and the "catalyzing" stimulus, and her "subject" was not simply the individuals she encountered, but the perceptual system she disrupted.

We locate EXPF as joining two empirical breaching traditions: an ethnomethodological intervention and a performance repertoire. Garfinkel and Piper each reveal the indexicality of everyday life/the indexical present through breaching, but their respective approaches suggest different configurations of who and what is being breached and where and how the indexical present is registered. Garfinkel asked students to take note of the responses of those in the situation, locating the breach in the activity and empowering the breacher with the empirical capacity to log its effects. When Garfinkel's student introduces a breach, they themselves remain unbreached, able to introduce the breach and catalogue what happens. Piper, on the other hand, did not describe these encounters primarily in terms of their effects on the people around her, saying she had *not* been "cataloging the kinds of reactions I have gotten" (Lippard and Piper 1972, 77). She describes, instead, a turn inward, becoming attuned, through these encounters, to "the boundaries of [her] own personality" (77). In Piper's indexical present, encounters are not reduced to responses to be catalogued but are

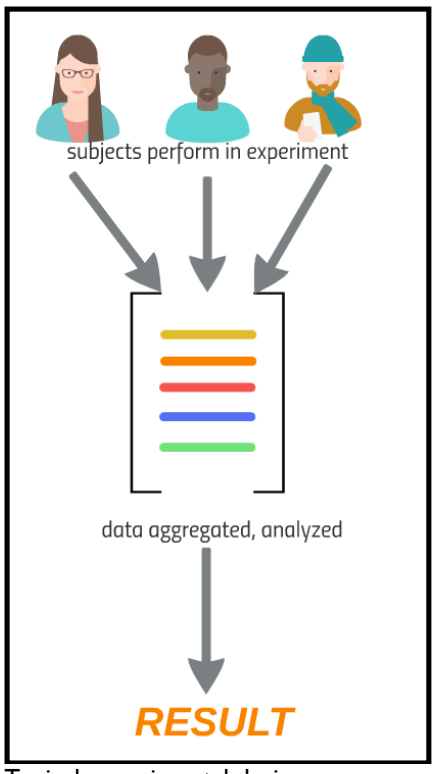
opportunities for phenomenological research on the limits of the socially constituted self. As catalyzing instrument and observer, Piper breaches not only the emerging context but also herself.

In EXPF, the system we aimed to breach was the agential-empirical structure of the experiment. Unlike the breaching experiments and interventions of Garfinkel and Piper, we aimed not to disrupt our participants' tacit expectations or perceptions directly but to channel these expectancies and experiences into a materially different relation with the experimental design. Bracketing any proper cognitive hypothesis, we instead made subjects' experiences and expectations—ordinarily ignored, redirected, or managed—into an independent variable, which would act upon the experiment's design, the dependent variable. The ethnographer and cognitive scientist, in the role of experimenters, had to make revisions following the subjects' suggestions, inverting the usual arrangement where the subject follows directions given by the experimenter in performing the experimental task.

Our breach of the experiment's agential-empirical structure rested on two connected features: the debrief and EXPF's iterative design. Debriefing after participation in psychological studies is an important convention, often required by and written explicitly into ethics protocols. The debrief typically involves the researchers asking the participant what they thought the experiment was testing before revealing its purpose and clarifying any questions they had (Kimmel 2004, 61–62). In addition to clarifying the experiment's purpose for ethical and educational purposes, this procedure may also provide valuable information to the researchers about participants' interpretation and experience of the experiment. This is often done to confirm that participants were *not* able to guess the experiment's true purpose: since participants are known to reshape their behaviour to conform to their interpretation of the experiment—part of the expectancy effect phenomenon called "demand characteristics"—hiding the experiment's true purpose can be considered methodologically critical. In fact, data from participants who guess the experiment's true purpose may even be removed from any analyses. Debriefing in typical cognitive psychology experiments, then, can have an ethical function for participants as well as an epistemic function for researchers in sorting good from potentially compromised data.

In EXPF, our lengthy debrief interview resisted the distinction between authentic and inauthentic data, instead aiming to channel the "distorting" power of the subject's impressions back into the experimental design, gathering impressions and suggestions that would become the revisions that we would implement before the next subject arrived. Debrief feedback became our key data and crucial mechanism for our performance, which encompassed the unfolding, iterative experimental activity as an agentially re-configured whole.

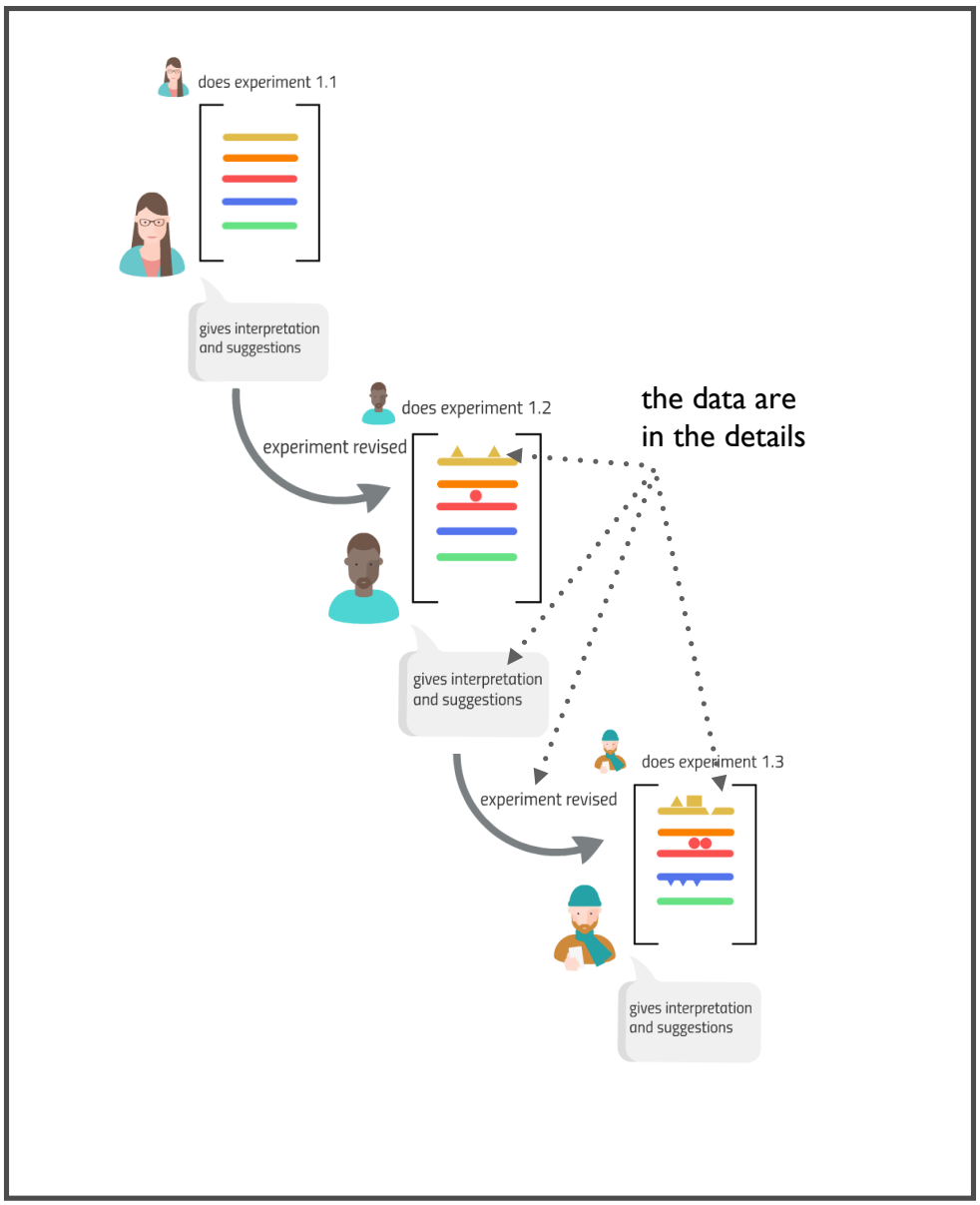
In a typical cognition experiment, all subjects run in the same experiment, with subjects distributed across two or more experimental conditions, data is aggregated, and, if all goes well, researchers get a statistically significant result that allows them to make a claim about cognition. In this model, *repetition* is what affords its statistical power to locate and stabilize cognitive processes inside of people. In contrast, for EXPF we turned to *iteration* to register indexical features of experiment that undergird its capacity for repetition.



Typical experimental design.

In order to do this, we found inspiration in research on cultural transmission that has adopted a novel methodology: "iterated learning." The iterated learning paradigm resembles the "telephone game" in which a message transforms as it is whispered around a circle. In an iterated learning experiment, the behaviour or messages produced by one subject are given to the next subject, creating " transmission chains" that distil the central features of social transmission and cultural evolution (Kirby 2014, 109). The way the learned behaviour (a drawing, gesture, language, song) transforms as it moves through the chain can help answer questions about how structure emerges in linguistic and cultural evolution, or about how constraints (such as learner's biases) shape transmission (109).

For EXPF, we adapted the structure of the "transmission chain" from iterated learning. Instead of transmitting a learned behaviour, our subjects encountered and revised the experimental design itself. After the first subject, each subsequent subject would experience an experiment that had been revised by the impressions of the subject who had come before. In this design, the experimental activity itself was rendered response-able to subjects' reported interpretations and suggested revisions. In rendering the experiment response-able in this way, the transformations to the experiment became our primary source of data, not about a cognitive process happening inside a person, but about performative entanglement within the experimental system.



EXPF Experimental Design. Klein and Marghetis (2015a).

Methods/Score

We recruited participants using the university's online system for recruiting and managing volunteers for psychology experiments, who can participate in exchange for academic credit. Our subject pool thus consisted of students who were taking lower division courses in psychology or cognitive science. We recruited a total of twelve subjects. The first six subjects participated in a first transmission chain. We then "re-set" the experiment to its "original" or base settings before recruiting and running another six subjects in a second transmission chain. For an ordinary psychology experiment, one relying on averaged electrophysiological or behavioural data, this would not be a sufficiently large sample. But as an experiment in response-ability, with the goal of enabling iterative transformation, we suspected this small sample would suffice to observe iterative change—and perhaps even the emergence of stable interpretations. By running more than one chain,

moreover, we hoped to illustrate the ways that seemingly inconsequential decisions can have surprisingly large implications for the eventual emergence of response-able entanglements.

When participants arrived at the lab, they completed a consent form.[8] We then brought them into the testing room, where they first filled out a short demographic questionnaire. Next, we had participants complete what appeared to be a standard computer-based cognitive psychology experiment which instructed them to respond to a set of stimulus images[9] by pressing keys and typing words. In the original setting of the experimental task, we followed the convention of having two "blocks" with a break in between, and in the second block had subjects inverse which keys signified like/dislike. We used ePrime, a software program for running experiments in cognitive psychology, to run the computerized experimental task, which included on-screen instructions.

Once this experiment-like experience ended, we had a debriefing/feedback session where we asked a subject for their thoughts on the experiment's purpose and design and entered their responses in a Google form. Whenever possible, this debrief was videotaped. In our debrief/feedback interview, we first asked subjects a set of general questions about their interpretation of the experiment's purpose and their performance:

1. What do you think was the purpose of this experiment? In other words, what question was it asking?
2. Do you think your behaviour helped you answer this question? (Y/N)
3. How do you think you behaved, relative to the question you think the experiment was designed to answer?

We then asked the subject for general suggestions on how to improve the experiment given their interpretation, followed by a set of questions about how to improve specific areas of the experiment. We asked them for feedback on how they might improve the demographic questionnaire, the instructions, the task, the stimuli, the layout of the space, and the experimenters. After this, we did a final, "genuine" debrief, revealing that we were interested in the expectations and experiences of experiment and explaining their place in the iterative structure. Ironically, because we followed the deceptive convention of keeping our true purpose hidden until the end, subjects were not aware of their structural power until they no longer had it.

After a subject left, we had to respond to and resolve their feedback before the next subject arrived. Our score required that we attempt to respond to all their suggestions, although this was balanced with the goal of generating an experience for the next subject that was not completely incoherent, unethical, dangerous, or otherwise unviable as a convincing performance of a "psychology experiment." We had around an hour to decide on the response and make the revisions to the experiment before the next subject arrived. Whenever possible, we took the subjects' suggestions literally (for instance, add more images of emotions; remove or modify a question in the questionnaire). Sometimes, though, because of ambiguity in the subject's responses, or because of limitations of the programming software, ethics protocol, or the short time we had to implement revisions, deciding how to respond involved compromise and consensus. Coming to a quick consensus on the revisions to be done became an important part of performing our score. These revision sessions were videotaped whenever possible[10] and their decisions logged in a document in each subject's folder.

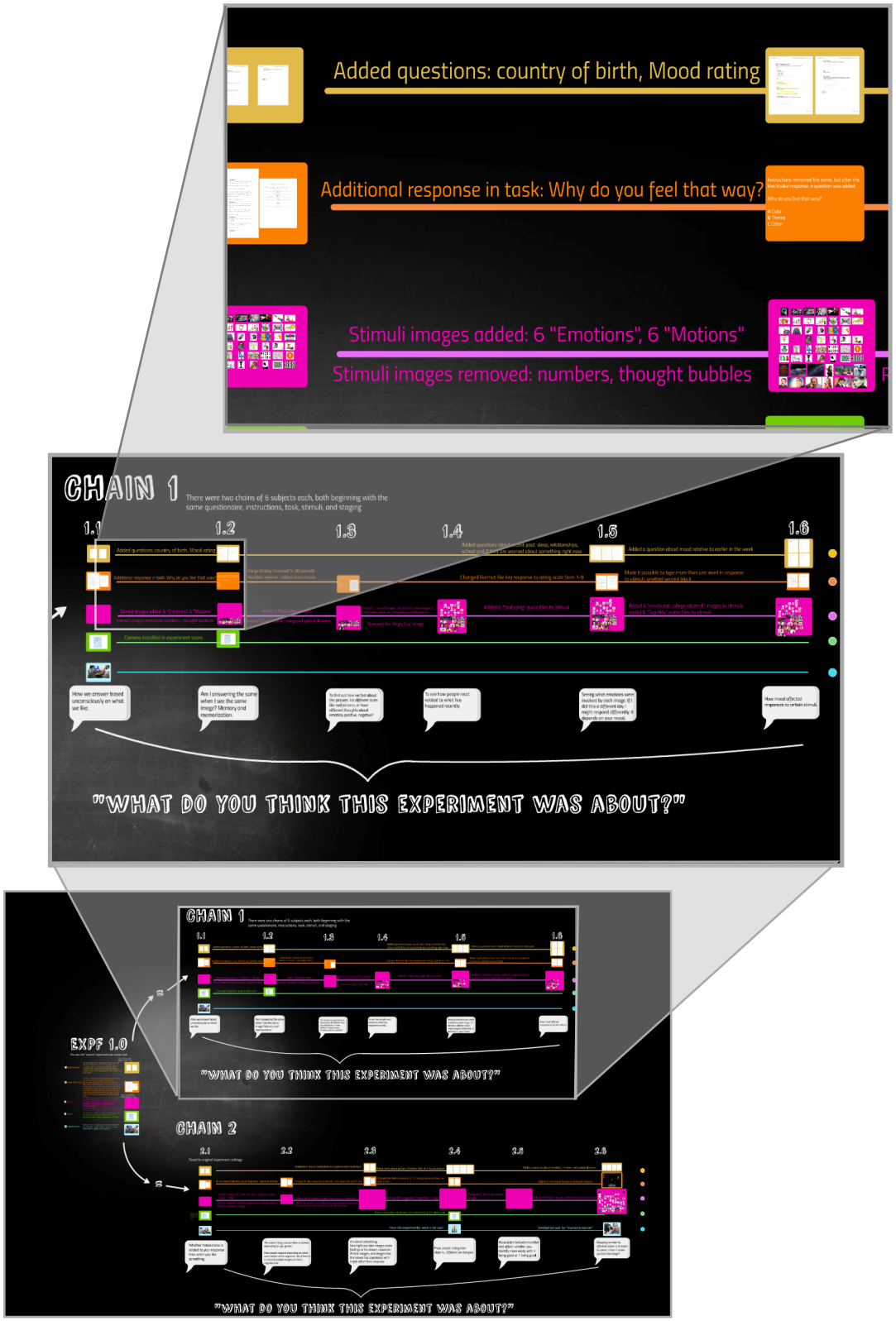
In order to keep track of revisions, we maintained a digital folder for each subject in the chain, containing sub-folders of materials for each revisable channel of the experiment (questionnaire, instructions, task, stimuli, space/layout, experimenters). Between participants, before beginning the process of revising the materials, we would duplicate the preceding participant's suite of folders. In each iteration's folder, we included a document outlining the specific changes that would be reflected in the next iteration (so that we would not have to search for the changes in order to find them).

In the following analysis, we offer two accounts of our performance which reflect the two configurations of breaching as a method introduced earlier. The first, following Garfinkel, locates the effects of the breach in the activity into which we intervened, and captures it by logging the responses of participants and the corresponding changes to the experimental materials. By foregrounding the revisions to the design, this account renders invisible the work of eliciting, negotiating, or implementing the revisions by which the experiment transformed. The second, informed by Piper, misses broad patterns and sequences of transformation, instead foregrounding moments in our encounters with subjects, with one another, and with the experimental apparatus, reflecting on how the breach operated on us as part of the experimental system.

What Happened? [I] Visualizing the Shape of EXPF

One of the ways we sought to capture and understand what happened in EXPF was by making a visualization that depicted EXPF's iterative structure and logged the changing shape of the experimental design. Using online Prezi software, we organized the interpretations and revisions into an interactive timeline for each chain. This visualization, pictured below (and available in its interactive format at http://prezi.com/9mvzknsutm2u/) registers the transformation to the experimental materials across each horizontal "channel," including zoomable versions of the revised materials (questionnaire, stimuli, etc.), for each iteration in the chain, grouped vertically. Between each set of materials runs text descriptions of the revisions made between each iteration, and a distilled version of each subject's reported interpretation of the experiment appears in a speech bubble below the corresponding iteration.

The visualization represents how the experiment changed as subjects experienced and revised it. As a catalogue of responses and revisions made through the entire performance, it can ground some broad observations about how experimental performances are maintained. It also allows us to speculate materially about the relationship between expectancy and performance, and between subjects and objects of cognition, in other words, the agential and empirical features of experiment.



Stills from visualization of EXPF, with magnified details. This visualization can be explored at http://prezi.com/9mvzknsutm2u and includes logs of revisions and zoomable versions of iterated experimental materials (Klein & Marghetis 2015b).

The first thing to note is that the two chains were very different despite beginning with the same settings. The first chain "became about" emotion and mood halfway through, winding its way through imagined research questions (and corresponding feedback and revision) about unconscious preferences, memory, race and response to images, and the effect of participants' recent life events on their affective response to images. The second chain began with an interpretation that the experiment was testing the relationship between handedness and speed of response, circled marketing and prototypes, and ended up cohering with two back-to-back interpretations about the mapping of affective value onto number ratings.

Chain 1, which "became about" mood, saw corresponding revisions made to three channels: the questionnaire, the stimuli, and the experimental task. The questionnaire in chain 1 grew from two to four pages, incorporating, at subjects' suggestion, items about country of birth and various questions about mood, and then questions about recent problems with sleep, relationships, and school. Subjects had us revise task parameters, adding a third response to the task: following the like/dislike and typing a word in response to an image was added the oddly reflexive question, "Why do you feel that way?" This question had its reflexiveness quashed (or rather, scientized) by the same subject's suggestion to add a multiple choice selection that accompanied it: "a) color, b) theme, c) other." The stimulus set ballooned, adding more items than were deleted, including incorporating images of "motions," "emotions," "disgusting" and "sexual" images, and even adding music into the stimuli, first "sad songs," then, presumably in response to the "sad songs" Google found for us being too unpopular, a selection of happier "top hits." It is possible to speculate that, for instance, the questionnaire had an important role in shaping the emergent coherence of the interpretation of mood. However, it's equally possible that a less obvious change, such as more time to look at the image before responding, could have informed the revision-interpretation arc. Instead of speculating about specific chains of influence, we suggest that the overall shape of the experiment, as a kind of behavioural sculpture, unleashes and thus demonstrates the range and power of the invisible traffic of expectancy.

The fact that the two chains transformed in completely different ways, along with subjects inferring different research questions, demonstrates that a diversity of interpretations are plausible in subjects' responses to any experiment, in spite of efforts to mask or obscure its research question. Materializing these interpretations by implementing subjects' suggestions led to new interpretations, and in each chain, a kind of interpretive coherence emerged, with previous interpretations beginning to re-occur, in whole or in part, in subsequent subjects' feedback. By asking subjects to respond to the experiment by making revisions, and in passing these modifications on, EXPF not only registered what participants thought the experiment was about, but also exposed and amplified how they imagined experimental design to work. The subjects became, indirectly, the designers of the experiment, and emergent coherences illuminated loops or eddies in the activity where some feature of the experiment caught the interest of the subjects.

What EXPF materialized was precisely the invisible indexical traffic that threatens the integrity of the typical experiment through dreaded "expectancy effects." Treating this traffic not as a threat, but as a constitutive agential feature of experiment, EXPF showed that hiding the purpose of an experiment doesn't stop interpretations from arising and may not stop these interpretations from mattering. EXPF's distinct chains and emergent coherence suggests that, rather than working to keep them separate, centring subjects' experiences of/in research design might have value for improving research design. While EXPF bracketed having a cognitive hypothesis, it made use of the routines and materials of experiments that ordinarily investigate basic cognitive processes in healthy

adults. EXPF's iterative feedback mechanism could, for instance, be adapted to help ground experimental design in the experiences of neurodivergent people, rather than being anchored to the premises of the scientists about the condition under study.

Garfinkel's breaching experiments were pedagogical exercises that functioned mostly to demonstrate the indexicality on which everyday action rests. The demonstration comes from observing and logging what happens, how a situation falls apart or transforms in response to a breach. Because EXPF was iterative, unlike Garfinkel's episodic breaching experiments, we were able to track transformation across the iterative chains. This iterativity renders EXPF as not only demonstrative but also speculative. Based on the observation of two distinct chains, we could ask what would it look like if we carried out ten or even one hundred chains. How many different interpretations of the original settings would that generate? Within each chain, subsequent subjects began to converge on a recurring interpretation near the third or fourth iteration—though different chains led to different interpretations—even though the score dictated that we respond only to the suggestions of the current subject. Could we then speculate about whether the emergence of interpretive coherence had a predictable shape, and if so, what would happen if the chains continued for twelve, twenty-four, fifty iterations? Based on observations of particular sequences of revision and interpretation, we could ask whether certain changes were more suggestive than others, even suggestive of a given interpretation, or whether a more powerful factor shaping interpretation came from the psychology or cognitive science courses the participant happened to be taking. These questions were primarily speculative and channelled the richness captured in the performance and organized by the visualization as a jumping off point to imagine how we might generalize beyond what our initial data could support.

Our visualization registers transformation by foregrounding the marks made on the materials proscribed by our revision "channels." By illustrating, through material traces, how our design unfolded iteratively, one effect of this visualization is to objectify experimental performativity. The visualization is a log, similar to the logs Garfinkel instructed his students to keep of their breaching experiments. The transformations logged in the visualization demonstrate how much "expectancy" may be holding up an experiment—how interactional resources or semiotic cues are drawn upon in constructing a legible experience of experiment. The transformations, in their variation and iterative emergent coherence, ground speculations about how that coherence emerges and about what it means. They also suggest that the relations between empiricism, subjectivity and experimentation can be reconfigured, such that other experiments and empirical configurations are possible.

What Happened? [II] Becoming Instruments

While the visualization simplifies the relationship between the participants' experience and the transformations to the experimental design, these transformations were never a direct imprint of participants' impressions and expectancies. To transform the experiment was *work*: We were responsible for carrying out EXPF, including eliciting feedback, deciding how to respond, and implementing the revisions, usually within the hour or so between participants. This work was located in interactions: between the experimenters and subjects, between one another, between ourselves and the material and performative infrastructure of the experiment we were working on. Many of these interactions were recorded on video; others are recalled with the help of the visualization, or from fieldnotes. The following account reports and reflects on the experience of enacting our breaching experiment. Informed by Adrian Piper's breaching method, we position

ourselves as catalytic agents but also as part of the system being breached and thus as instruments to register its effects. Here we describe the work of enabling response and becoming response-able, anchored in fieldnotes and recollections.

Deciding how to implement the subject's interpretations and suggestions was itself an act of interpretation and negotiation. Sometimes this was because the suggestions they made were ambiguous, and sometimes it was because they were impossible (time constraints, constraints of the program architecture, constraints of the IRB ethics agreement under which we operated, and so on). Becoming responsive forced us to continually and improvisationally negotiate material and temporal constraints in the experimental design under revision. This negotiation often involved confronting our own institutional and disciplinary roles; while the ethnographer of science and the cognitive scientist were, according to the score, equal co-conspirators in this performance, the reality of our disciplinary training and differential expertise meant that some negotiations (e.g., how to design new stimuli) were decided by appeals to authority or practicality. Becoming responsive thus forced us to continually confront the boundaries of our own score, by balancing between what was logistically possible, what was true to participants' feedback, and what was going to allow our performance to continue to "work."

Over the course of EXPF, some subjects suggested revisions that required compromise to implement given our time and technical constraints and our commitment to responding. In negotiating how to respond, we encountered how and where the experimental design was malleable, and how and where it was more inflexible. For instance, subject 1.4 suggested that we incorporate sad music videos into the stimuli set, but the E-Run software could not play video files. In order respond to their suggestion within the constraints of what we could accomplish with the program in around forty-five minutes, we compromised and used audio clips of "sad songs" rather than multimedia videos. At times, the workarounds we compromised on would introduce unsuggested changes, like when subject 2.5 suggested we add a "Tetris[11] break" between blocks of the experimental task. When we discovered the computer on which we were running the experiment couldn't download new software, we decided to instal the game on the computer in the adjacent testing room, which introduced a room change and additional experimenter-participant interactions that had not been part of the feedback. The work of responding to subjects' feedback revealed emergent hard and soft components of the experimental design. Sometimes, this process revealed a kind of stiffness or procedural inertia, while at other times the process revealed unanticipated porousness between parts of the design, inviting unplanned ripples into the performance. While encounters with the affordances and constraints of infrastructures of experimental design are already part of the everyday work of experimentation, EXPF reconfigured the conditions under which we had those encounters. The iterative aspect of EXPF meant that we encountered the design again and again in rapid succession, and the agential inversion of EXPF opened the horizon of possible changes beyond one constrained by the scientists' viewpoint.

In addition to putting us into an unpredictable creative interaction with the material infrastructure of the experiment, EXPF also necessitated revising our understanding of our score. In the following fieldnote excerpt, some of these contact points emerge. It begins by invoking our expectations and desires for EXPF in characterizing what "went well" about the first day of data collection, which included running two subjects, and goes on to discuss a conundrum that emerged regarding limits on our role as performers and experimenters.

> Things that went well—the first sub was very willing to talk and give her interpretations. We made changes as best we could. The second subject was less talkative but still made suggestions and changes—a procedure for how to debrief amongst ourselves and make the revisions before the next person is becoming clear.
>
> Interesting:
>
> The interpretations of the subs are not necessarily coherent, nor are the changes that they suggest. For instance, the first subject suggested that we add a multiple choice question into the task, to ask why the person liked or disliked the image; but did not explicitly suggest that we change the instructions (probably because the instructions prompt came before the task prompt). Not sure if we should go back and prompt her to standardize this. The 2nd sub's experiment was missing an instruction about this—I tried to smooth it over, but T says not to editorialize and just to let it be confusing if that's what it is. He says "it's their responsibility." At the same time, we are the ones mediating how to implement the changes. (SK, EXPF Fieldnotes, May 6, 2015)

Amid early uncertainty about how EXPF would work, a key concern was whether the participants would give us enough feedback to make iterative transformation possible. Their willingness to talk was key for our aim—having collected that talk, we were then able to try out how we would respond to that feedback in deciding what revisions to implement. It seemed, after the first day, that our debrief interview was working to elicit enough feedback, that is, enough feedback that we had changes to implement. The "procedure" that was becoming clear was that we would discuss how the subject debrief had gone, come to a consensus on what changes to make, summarize them in a word processing document, and then divide up the work of making the revisions.

The second part of the fieldnote goes on to describe a decision we faced about what to do if revisions introduce incoherence. The "incoherence" we are concerned with in the excerpt is not that we don't understand their interpretation, or that a given interpretation does not seem to follow from the previous one, but that following the participants' suggestions as given could mean the revisions could make the experiment incoherent for subsequent participants. Since a central goal of our performance was to invert the standard power relations *within a psychological experiment,* we were compelled to filter subjects' suggestions through our own perceptions of what changes were possible without destroying the performance's legibility *as an experiment*. Maintaining that legibility, however, did not mean that each iterated version of the experiment would have the internal coherence that is often a goal of "real" experimental design. The performance's debrief procedure, for instance, despite its exhaustive questions, couldn't ensure that the participant's interpretation would be reflected evenly in their suggested revisions, or that their revisions would never contradict one another. This fieldnote, therefore, expresses concern about the "incoherence" that would occur for the following participant if we followed their suggestion to change the parameters of the response to the images, without making an accompanying revision to the instructions. We faced a dilemma when introducing the next participant to a revised component of the experiment—if it is too confusing they might not know how to proceed. The fieldnote reports an attempt to smooth the explanation over when explaining the instructions to the next participant, but when one of us (SK) mentioned this to the other (TM), he responded that we should try "not to editorialize," that it was "their responsibility." This response invokes our role with respect to our score, to temper an impulse to manage the experience of the participants. It thus asserts that the responsibility of maintaining the

coherence of the experiment belongs to the participants, both as suggesters of revisions and as recipients of (potentially disjointed) iterated experimental materials. Allowing the participants to be "responsible" for the experiment's design, as suggested in this interaction, meant we should leave any emergent procedural contradictions to fester—if the experiment becomes incoherent to participants as a result, so be it. This dilemma exemplified the tensions we faced in performing and thus encountering our score. What was more important, adhering strictly to the score we had imagined for ourselves (by not filling in gaps in participants' feedback, not making any change that wasn't explicitly suggested), or responding in such a way that would enable EXPF to go on?

It turned out that neither holding subjects "responsible" (in TM's words), nor the complement of that goal, rendering the experiment response-able, were as straightforward as we had imagined. Ultimately, the iterations of the experiment didn't render it so incoherent that it stalled or stopped, but neither were we able to maintain the perfectly detached role invoked in the excerpt. This was because in giving participants agency over the experiment's design, we had to deal with their categories for experiencing the experiment, which did not always neatly line up with our conceptualization, with the categories embedded in our technologies, or with the boundaries imposed by our institution.

In the process of implementing revisions, we found that the infrastructure of the software did not abide by the same distinctions that we had devised for ourselves and presented to participants. We had divided the "task" and "instructions" into two separate channels/folders, with two distinct corresponding questions in our debrief interview. However, in responding to suggestions, we encountered mundane interdependencies in the infrastructure of E-Run that muddied this distinction.

E-Run administered the on-screen instructions, the stimuli, and the instruments for capturing different kinds of responses, and the interdependence or independence of these different components was not transparent to the participants. In order to revise a like/dislike key-press response into a 1-5 rating scale, for example, the new response keys would automatically be displayed in the on-screen instructions. For other parts of the experiment, the on-screen instructions were the only visible indicator of that task for the participant. For example, when participant 2.1 suggested we revise the task to make it possible to type more than one word in the text box, the only way to communicate that revision to the next participant was to change the on-screen instructions regarding how many words they could type ("a word" became "word or phrase"). The part of the program that defined how many words or characters could be typed into a field was invisible to participants. It was not until we were faced with the concrete task of making specific revisions that we encountered the gap between how we had conceptualized the experiment's channels, the way they were integrated by the software program, and by extension, how they were distinguished (or not) for participants. We had conceived of our role as one of mediation between the iterated materials of the experiment and the elicited feedback of participants, but becoming response-able put us into unexpected positions and encounters. In this example, we encountered the software infrastructure as a mediating instrument between our idealized performance score and the emergent, local categories of the participants in their given iteration.

"Making the Call"

These examples of becoming response-able in EXPF focused on our encounters with components internal to the experimental activity—between a participant's interpretation and the constraints of the materials we were working with, or between our conceptualization of the "channels" of the experiment and the categories and coherences that emerged for participants. In addition to those encounters, some suggestions and contingencies also forced us to contend with ethical and institutional boundaries of our experiment-performance. In the following fieldnote, one of us (SK) describes a decision to ignore part of a participant's suggestion because of the risk of introducing certain "dangerous" images into our stimuli.

> The 2nd sub didn't like the optical illusion images, and since she thought we were investigating something to do with memory, she told us to remove them. She suggested we replace them with images of disgusting bugs—we actually decided not to use bug images but instead the images that came up in Google when we search "disgusting" that don't include bugs, in case people have phobias of bugs. Making the call of what is ok/isn't ok is an interesting limit. (SK, EXPF Fieldnotes, May 6, 2015)

We decided against using images of "disgusting bugs" because we did not want to introduce potentially upsetting or traumatizing images into the stimulus set. We had made a similar decision in the first chain when a subject suggested we add "more sexual images." Our compromise was to omit any graphic sexual images from our image search and select only G-rated images. Images of "disgusting bugs" or "sexual images" risked falling outside the bounds of what our ethics approval allowed. These decisions differed from the compromises described in the previous section because the constraint was not technical or originating from our vision of how our score would work. These suggestions, which were technically simple to implement, forced us to bump up against institutionally imposed ethical constraints about what should and shouldn't happen in a cognition experiment, or more accurately, what can happen in a cognition experiment without submitting a new application to our university's Institutional Review Board. What materialized in response to these suggestions was our own cautious and conservative interpretation of our institution's definition of potential harm, or "making the call of what is ok/isn't ok." In other words, our performance's transformation was also shaped by institutional limits, insofar as our decisions reproduced them. EXPF could not, in fact, become just anything. The sudden appearance of the institution's vision of experiment in our response to any slight suggestion of "riskiness" illuminates the broader institutional context in which research regularly operates, with its own set and scale of norms and rules. As anyone who has had to revise their research protocol knows, procedural inertia functions from the institutional scale too, making particular research configurations and interventions more and less possible.

At the same time as we were carrying out a performance aiming to open experiment to iterative transformation, we wound up enforcing our institution's vision of what constituted a low-risk research encounter. Our ability to suddenly switch gears from responsive implementers to institutional enforcers is somehow poignant, revealing how rooted our own responses were in the broader system we were working to breach.

Breaching the agential structure of the experiment, of which we were a part, meant breaching both ways: we breached the experiment, and the experiment breached us. This account, anchored in reflection and fieldnotes, is informed by Piper's "catalytic" approach to breaching, which positions the performer inside the system of perception that she breaches, assigning her the roles of catalyst and observer, and enabling her to observe not only the ripples in the situation but "the boundaries of [her] own personality" (Lippard and Piper 1972, 77). With EXPF, we breached the conventional structure of the experiment, and we were also inside of the system that we breached, enabling us to meet the boundaries of our materials, of our performance score, and of our respective, situated socialization as researchers. Making EXPF response-able entailed opening the experimental apparatus to reorganization by those experiencing it from the inside. Becoming the instruments of that transformation forced us to encounter the indexical infrastructures internal and external to the experiment, including interactional routines, software, hardware, and ethical and institutional norms, which are co-authors of research design.

Conclusion: Indexicality and Response-ability for Interdisciplinary Collaboration

EXPF breached the performative structure of "experiment" by rearranging its agential configuration in order to register and amplify its invisible constitutive contextual traffic—or as Piper and Garfinkel might have termed it, its indexicality. Our intervention was not episodic, like Garfinkel's breaching experiments and Piper's Catalysis, but iterative. This allowed us to create iterative chains of heres-and-nows that were mutually and sequentially implicated. We have tried here to account for what happened in these iterative chains in two different ways. Each provides a way to slice through the indexicality that EXPF made available. Looking at EXPF as a kind of material-semiotic sculpture, as conveyed by our digital visualization, presents a clean, ideal version of EXPF as we imagined it: a catalogue of iterated impressions and transformations to the performative structure of the experiment, leaving its marks on the shape of the activity and its accompanying material remains. This sculptural representation highlights the richness of the indexical resources that hold up an experiment, invites questions about the origins and implications of the coherence that emerges in iterative research design, and even suggests that iterative, subject-centred design may have empirical potential as a research practice.

What the visualization masks, however, is the complex work of becoming response-able. This was where we engaged with—sometimes resisting, sometimes reinforcing—the tangle of relations and infrastructures and norms that enable and constrain the performance of a scientific experiment. As response-able implementers, we occupied a new relationship to the experimental apparatus, one that mediated between subjects and researchers. This forced us to repeatedly and improvisationally wrestle with the experiment's material, conceptual, and institutional constraints as well as with our own expectations as researchers with differing histories of engagement with experiment. Each decision, each struggle, and each compromise was for us a different "here-and-now" of experimental performativity, rendering sensible unexpected affordances, obstacles, and interdependencies in what might otherwise be an opaque and unquestioned procedure. In the encounter between responsive experiment and response-able subject, we became instruments of creative response.

Like good experimentalists and performers, we hoped that our design would "work," meaning both that each iteration would serve as a convincing instance of a psychological experiment and that repeated iterations would gradually reveal the background expectancies that undergird the very

possibility of psychological experimentation. Focusing on these transformations materialized the invisible subjective traffic of experience and expectancy and allowed us to speculate about what transformations and experiments are even possible. But it was also in encountering the experiment's stiffness, inertia, and resistance—the limits in its indexical traffic—that we could "remember and feel what [was] going on." We were forced to confront—in our materials, routines, and selves—the boundaries of the system we were aiming to breach. With each iteration there was the danger that the subject's suggestions would cause a chain to "collapse"—that is, to produce a new experiment that was impossible, ridiculous, unethical, or otherwise impossible to implement.

But this danger of "failing" was also the source of EXPF's power. Response-ability, as an ethic located in posthumanist frameworks, is a revision of "responsibility," which is bound up with, and assumes, a rational, liberal "willful human subject" and a separate entity for which they are responsible (Barad 2008, 172). Response-ability, in contrast, does not presume the existence of subjects and objects but treats them as emergent properties of what Barad calls an "intra-action" or what Haraway calls "becoming-with" (Haraway 2007, 2016). EXPF explored what it might mean to implement response-ability within a responsible research apparatus. We aimed to "remember and feel what is going on" and "work to respond practically" (Haraway 2007, 75) in an apparatus that, by design, both enacts rational human subjects and extracts cognitive objects from them. In the instances where responding faithfully to a subject's suggestion would not have been disciplinarily or institutionally acceptable—for instance, for ethical reasons—we were suspended between a local response-ability on the one hand and an institutional responsibility on the other. Rather than seeing these moments as failures because we faced obstacles to implementing our score, we understand these moments as places where, by bumping up against its limits, the performance illuminated the infrastructural and institutional power structures that both enable and constrain the production of psychological and cognitive knowledge objects.

EXPF was an experiment in cultivating response-ability for research subjects and in experimental design, but it was also an experiment in enacting responsive relationships between ethnographers of science and the scientists they study. When an ethnographer of cognitive science—the first author—began to collaborate with a cognitive scientist—the second author—that meant entwining our divergent motivations, concerns, and particular disciplinary subjects and objects. As a structured activity that is already built to be taken apart and reassembled, experiment lent itself well as a medium, object, and frame for our collaboration. For the ethnographer, this collaboration was and continues to be an opportunity to explore what enables experimental methods to travel in time and space, to consider the conceptual and practical limits of experiment, and to develop modes of engaging research practice that open its participants to co-transformation. For the cognitive scientist, the performance dovetailed with his interest in the emergence of stable knowledge from messy social interactions, and thus gave him an opportunity to think about his own epistemic practices—experiment design, data collection, statistical analysis—as yet another site in which stable facts emerge from material and social entanglements.

Our collaboration was a way to "stay with the trouble," to use Haraway's well-known expression. We began by working on a bit of localized "trouble" for experimental psychologists: the problem of expectancy effects. We inverted the experiment so that expectancy, instead of being managed, minimized, or bracketed, became something to which we were compelled to respond. Turning experiment "inside out" both meant returning agency to its subjects, and *at the same time* becoming part of a different kind of instrument—one that is no longer singularly and inwardly focused on its objects, but instead telescopes outward from the proximate experimental performance to the

material and social entanglements that ground it. This allowed us to reimagine experiment from a control-centred practice, into a flexible, response-centred practice, capable of registering and holding on to multiple scales at once.

This approach has implications for several ongoing conversations about reflexivity in research methods and interdisciplinarity. First, EXPF responds to calls for reflexivity in STS methods; second, it offers an alternative interdisciplinary relation between performance studies and cognitive science; and third, it intervenes, empirically and methodologically, in conversations about methodological entanglement and context-sensitivity within experimental psychology and cognitive science research. Each of these is premised on response-ability: between ethnographer and cognitive scientist, between scientific and artistic performance traditions, and between experimenters and research subjects.

EXPF responds to calls for reflexivity in STS methods by starting from the premise of methodological entanglement—making performances with scientists rather than bracketing those entanglements out. Our collaboration thrust us both into a new and precarious version of "unique adequacy" that did not take the stability of experimental methods as a given. The destabilization of the expert practice through breaching made the possibility of failure imminent but at the same time made it possible to inhabit and orient to experimental design in new ways. Empirically, this helped to illuminate the indexical structure of experiment, but it also opens up methodological possibilities by radically opening disciplinary practices to one another.

Similarly, EXPF offers an alternative model for performers and performance scholars to collaborate with cognitive scientists. Much work at the intersection of performance studies and the cognitive sciences aims to enact "a friendly symbiosis with cognitive science" (McConachie 2006, xiv; see also Blair, 2008; Cook 2007). In spite of criticisms of reductionism and hierarchical scientism, the imperative to pursue this symbiosis remains strong (Shaughnessy 2013). This symbiosis is enacted largely as an exchange, whereby science provides frameworks, paradigms, and authoritative weight, and performance provides vivid and visceral materiality. This has two related implications: the bodies and practices of *science* disappear, while the embodied knowledges of performance continue to be institutionally undervalued. Ironically, this exchange arrangement risks re-inscribing the mind-body dualism that much of the work on embodiment in both performance studies and cognitive science aims to undo. Our intervention attempted to resist this re-inscription by holding on to the embodied performances of science and scientists. Making performances together, and working with and on our own situated activity, can disrupt the dualistic exchange model of interdisciplinarity that often characterizes collaborations between cognitive science and performance. Remembering the bodies and performances of scientists is a levelling mechanism that makes it possible to share the onto-epistemic stage. Our approach thus explores an alternative model of interdisciplinarity that does not begin and end with an exchange of findings, frameworks, or fieldsites, but which is premised on making and inhabiting a performance together, thus becoming response-able to one another and entangling the methods by which we perform research.

Finally, the kind of response-ability that we cultivate in EXPF has implications for research practice in the psychological and cognitive sciences. Researchers in these fields are increasingly aware that the situated materials and practices of doing research with and on other humans matter, including in ways that are not yet understood. Considering cognitive scientific practices as central and integrally intertwined in the production of scientific findings has the potential to help these fields collect better data by shedding light on unconsidered variables and sources of bias. More ambitiously, we hope

that it could shape the direction of research questions or complicate underlying assumptions about the phenomena under investigation. The response-able design of EXPF could be adapted to help illuminate and remediate Eurocentric cognitive constructs, or neurotypical researchers' embedded assumptions about the cognition of neurodivergent people. Adapting this iterative approach could help anchor the research design in the experiences of those being studied, while simultaneously revealing the researchers' varied resources: implicit assumptions, procedural inertias, and institutional and technological infrastructures.

Ultimately we are not suggesting that performance-collaboration should displace classical experimental or ethnographic methods, or that it is the best or only way to bring performance and cognitive science together. Rather, we are arguing that, by adding it to our toolboxes, performance-collaboration has the potential to reshape the methods we use alongside it. Disciplinary frameworks, habits, and instruments can be re-assembled to be more dynamically responsive to the complex worlds they investigate. In taking performativity seriously by making performances together, we can develop research designs that "remember and feel" the ways that we are already acting together.

Notes

1. For laboratory studies of scientific practice see especially Latour and Woolgar (1979), Lynch (1979), Knorr Cetina (1981), Collins (1985), and Alac (2011). For scientific performativity, see especially Pickering (1995), Mol (2002), Barad (2008), and Law (2008).

2. Karen Barad's use of apparatus (2007) has been helpful for coming to grips with the cognitive psychology experiment as a material-semiotic arrangement through which a cognitive phenomenon is produced and the observer/observed, subject/object relational entities emerge. The layering of cognitive and social science apparatuses in this project takes advantage of the shared material-semiotic resources of human "subjects" and "researchers" to intervene in the spaces and practices between observers and observed.

3. These moves are characterized by a recognition among STS scholars that engagement with scientists need not be a choice between being distanced or oppositional (Klein and Gluzman 2015; Downey and Zuiderent-Jerak 2016). In locating EXPF in the midst of this collaborative turn, it joins an emerging cluster of projects between the arts, social sciences, and the cognitive/psychological/neuro-sciences aimed at exploring the boundaries and possibilities for interdisciplinarity. See, for example, Callard (2014) and Callard and Fitzgerald (2015) on collaboration across the social and neurosciences; and Zuiderent-Jerak (2015) on situated intervention in health care and the collaborative research projects between artists, scientists, and anthropologists of the Aarhus University Research on the Anthropocene (AURA) group led by Anna Tsing.

4. Ethnomethodology offers an orientation to situated action that can help us "remember and feel what is going on" in the context of the cognition experiment by treating rationality and objectivity as local and practical accomplishments rather than inherent human capacities.

5. There is a presumption here that good social research necessitates transforming the analyst, but that it leaves the research site for all intents and purposes intact. This presumption partially reproduces some of the boundaries between observer and observed/authentic and inauthentic phenomena that underlie most empirical claims, even as ethnomethodology challenges the distinction between subject and object.

6. A predecessor and contemporary of Garfinkel who was concerned with the empirical function of breakdown for revealing the structure of social life was Erving Goffman. In particular, Goffman's early studies of mental institutions and other stigmatized groups provided examples of interactional breakdown and stigma around which he built his dramaturgical theory of the self, which seeks to maintain "face" and avoid breakdown along with its damaging social repercussions.

7. For foundational work on performance as an intervention in the academy, see Conquergood (2002) and Taylor (2003), and moves to "Performance as Research" and "Practice and Research" in performance studies and theatre studies programs.

8. The consent form was a static part of EXPF, because the procedures of EXPF fit within the description of a computer-based cognition experiment in the "blanket" consent form that the lab used to cover a number of experiments implemented by its members.

9. We began both chains with the same starting set of image stimuli, which are available as part of the visualization here: http://prezi.com/9mvzknsutm2u/. We wanted the "base" stimuli to have the potential to evoke different interpretations, but not to overdetermine these interpretations by having them share obvious conceptual or physical characteristics or be otherwise categorized in terms of a single recognizable cognitive construct. Our solution to this problem was to create a script for ourselves on how to use Google image search to select images. In a move that served dual purposes of obscuring any single cognitive hypothesis in being cheekily self-referential, we selected six search terms from the psychology department's web page listing faculty research interests. These search terms were "addiction," "control," "child development," "language," "learning," "number," and "perception." Upon entering each of these into Google image search, we chose the first distinct six images for each term (no duplicates or near duplicates) that had no written text and were not graphic or predictably disturbing. This script also provided a procedure to follow later on when revising the stimuli in response to feedback, only extracting search terms from subjects' language.

10. We had planned to videotape each debrief and each revision session (though our camera arrangement and taping protocol was subject to revision). In many instances, we videotaped the debrief with the subject and some or all of the revision process. Exceptions included when a subject did not consent be videotaping, when a subject revised the placement and use of the camera, and when the battery ran out of power.

11. A popular, classic block stacking computer game.

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