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Bio-Ethnography: A Collaborative, Methodological Experiment in Mexico City (<http://somatosphere.net/2015/bio-ethnography.html/>)

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In 1993, a team of U.S.-based environmental health researchers partnered with public health officials in Mexico to form ELEMENT (Early Life Exposure in Mexico to Environmental Toxicants). The project aimed to study the effects of chemical exposures, particularly lead, on fetal and childhood growth and neurological development in what the United Nation then designated as the most polluted city on earth. Since then, ELEMENT project staff have collected samples of blood, urine, hair, toenails, breast milk, and teeth for ongoing molecular analysis from nearly 2000 participants, mostly working-class mother and child pairs recruited through *Instituto Mexicano del Seguro Social* (Seguro Social) clinics in Mexico City.

While pollution in Mexico City has lessened in recent decades through banning lead in gasoline and certain kinds of catalytic converters in cars, obesity rates have risen dramatically, resulting in Mexico being named the fattest industrial nation in 2013. The rise in obesity and diabetes has put increased pressure on Seguro Social. The system is notorious for its long waits, impersonal care, and lack of services. This complex set of circumstances creates relevant project conditions and a willing and compliant subject population for ELEMENT, as participants, through the project, receive kinds of personal attention unavailable through Seguro Social. Recently the project has expanded to collect data on additional toxins (e.g., bisphenol A, mercury, and fluoride) and new health concerns (e.g., premature sexual maturation and obesity) (Afeiche, et al. 2011).

Since the fall of 2012, I have been observing ELEMENT researchers at the University of Michigan in their laboratories and staff meetings, and in March 2013, I began conducting observations of interaction between project staff and project participants in Mexico City. Currently, I am engaged in a year-long ethnographic study of six ELEMENT participant families living in two geographically distinct, working-class neighborhoods, focusing on household and neighborhood environments and histories relevant to the production of bodily states. Following this study, I will collaborate with ELEMENT researchers to combine biological and ethnographic data to produce more complex accounts of the links between ill health and life circumstances. In both these project phases, I am also investigating the scientific process itself:

how participants' lives are shaped by their involvement in ELEMENT research and how researchers make "universal" knowledge gleaned from monitoring specific participants' bodies located in particular sites.

ELEMENT researchers have made several key "universalizable" findings about chemical exposures. One of ELEMENT's early findings—that lead exposure has the greatest effect on the developing fetus in the first trimester of pregnancy—has influenced environmental and public health policy around the world. Like most molecular epidemiology studies, ELEMENT's approach tends to situate key mechanisms for health and disease inside individual bodies rather than within specific historical and economic processes. Thus, lead levels measured in the blood of people in Mexico City in a particular neighborhood are assumed to mean the same as numerically identical levels measured in rural China. My project seeks to complicate this framework, drawing on work in both the biological and the social sciences that investigates the complex looping effects that organisms and environments have on each other (Hacking 1995). This scholarship, especially Margaret Lock's framework of "local biologies," challenges the assumption that biological processes are universal, that is, unaffected by circumstance or history (Lock and Nguyen 2010).

Research directions at the ELEMENT project support this looping approach. ELEMENT scientists have begun to employ epigenetic analysis in their examination of the health effects of chemical interactions in specific environments in Mexico City. Anthropology and STS have much to offer epigenetic researchers however, who tend to narrowly define what they call "social determinants" and continue to situate key disease-transmission mechanisms exclusively inside individual bodies rather than within larger histories (Lock 2013). Already, in the United States, epigenetics seems poised to create new means to blame mothers, especially poor mothers, for the development of their children.

A Bio-Ethnographic Approach

Through my collaboration with ELEMENT scientists, I am attempting to develop something I call a bio-ethnographic approach, which integrates biological and ethnographic data about the larger histories and life circumstances that shape health. A bio-ethnographic approach might sound similar to what American biological anthropologists have formulated in recent decades as a "bio-cultural synthesis," which explores the role of culture in shaping human biology and behavior, but there are important differences (Beall 2006; Hadley, et al. 2010). By maintaining culture as distinct from biology, bio-cultural synthesis remains asymmetrical. It leaves unexamined the historical and economic conditions that continuously shape biological processes and scientific study itself. By proposing a bio-ethnographic account, I am not simply adding culture to biology in order to arrive at a better understanding of human biological adaptation, but instead combining two different kinds of methodologies—ethnographic observation and biological sampling—in a synthetic, symmetrical analysis that understands environment-body interactions as always relational and constructed phenomena.

Developing a bio-ethnographic approach in a Latin American site also demonstrates how current North American biological models of the entanglement of environment and organism have some similarities to the long-standing Latin American emphasis on the reciprocal malleability of bodies and environments, often characterized by North American scholars as Lamarckian (Cadena 2000; Stepan 1991). Bringing this Latin American

emphasis on malleability into critical conversation with STS literatures dislodges prevalent assumptions about the originality of current constructionist STS models of bodily plasticity and enables a close examination of the ways ELEMENT participants themselves model entanglements of ill health and life conditions.

I am also positioning bio-ethnography as a means to counter the resurgence of the “culture of poverty”. The concept arose in 1960s anthropology as a means to avoid deterministic racialized, biological explanations for ongoing poverty. Ultimately, though, it produced another form of determinism, attributing lack of economic advancement to the “cultural mentalities” of the poor. A key early text used, or misused, in the popularization of this concept was Oscar Lewis’s *Five Families: Mexican Case Studies in the Culture of Poverty* (Lewis 1975), which described one day in the life of five Mexican families in the 1950s, four of them in Mexico City. The uptake of this ethnographic account of poverty is instructive today, as some researchers in public policy, sociology, and epigenetics are newly attracted to the “culture of poverty” concept, remaining mostly uncritical of how the culture concept is once again separated from the material conditions and forms of dominance that produce inequality (Bourgois 2001; Small, et al. 2010).

In recent decades, anthropologists and sociologists have produced nuanced structural accounts of the conditions that perpetuate inequality, without rooting inequality in either the bodies or the mentalities of “the poor” (Bourgois 1995; Edin and Lein 1997; Katz 2013; Mullings and Wali 2001). Nonetheless, in their parsing of inequality, these studies leave physiological processes unexamined. This lacuna points to the need for the combination of biological and ethnographic findings—or bio-ethnographic research—to provide symmetrical accounts of life circumstances like poverty without deploying biology or culture as their locus.

Complex Conditioning Entanglements

When I first began to develop this project I imagined *exposure* as a crucial conceptual term for bio-ethnography. In the biological sciences, the term *exposure* tends to have a specific, and negative meaning, referring to contact with harmful phenomena, such as exposure to lead. Some social science research on environmental health science has adopted the concept of exposure as a means to bring together the study of health and of the environment, two realms that have long been examined separately (Brown, et al. 2011; Mitman, et al. 2004; Shostak 2013). However, in this context, *exposure* is somewhat taken for granted as an agreed-upon technical term transparently describing events that happen to bodies in environments, without an adequate history of the term. As I am engaged in documenting how ELEMENT scientists, study participants, and, indeed, I myself deploy exposure, I have started to rethink its usefulness for this project. My idea had been to critically expand the concept, by examining exposure as a set of processes that include historical and political-economic dimensions. Making diverse processes equivalent however runs the danger of an “ontological flattening” (Landecker and Panofsky 2013, 341), which accepts and expands the standard model of exposure science where discrete bodies are exposed to foreign external substances. And in fact, this assumption is now undergoing profound change in many of the life sciences themselves, which posit complex conditioning entanglements that co-construct organisms and environment (Barker 1990; Bateson, et al. 2004; Jirtle and Skinner 2007; Suter, et al. 2010). I wonder then, if exposure might be replaced by a term that signifies ongoing, complex, conditioning entanglements.

Three examples from my research in Mexico City demonstrate how a bio-ethnographic approach, including dynamics like kinship, history, gender, land politics, material culture, and class, might combine with biological data collected by ELEMENT to create a fuller account of the complex, conditioning entanglements that produce bodily states.

1) ELEMENT mothers have described to me how ELEMENT staff diagnosed their children with conditions, like ADHD, that would never have been diagnosed or treated through the Seguro Social system. For participants, who are mostly poor and working-class, being involved in ELEMENT provides forms of attention they do not receive through Seguro Social, such as being referred for specialized diagnostic tests and being chauffeured to and from ELEMENT appointments in a private car. Thus, this study population has a specific biology created in part by their participation in the study itself. Emergent models of organism-environment interaction suggest that these factors might in turn shape the data collected by ELEMENT.

2) While ELEMENT have focused on the detrimental effects of lead on fetuses and young children, some families continue to use lead-glazed ceramic dishes (*trastos de barro*) that were handed down and sometimes made by their grandmothers before they migrated from the countryside. Family members describe how these dishes are essential, at least on religious holidays, for honoring their grandmothers and as reminders of a different kind of life from their own in urban neighborhoods. Furthermore, they assert, along with many others in Mexico, that food cooked in leaded dishes tastes different, literally sweeter. The use of these dishes could be seen as part of a larger rejection of the North American imperialism perceived in recent public health campaigns to discourage the use of leaded dishes. An example of this wider response is the rise of restaurants that specialize in cooking and serving food on leaded ceramic dishes. Their advertisements claim that leaded dishes make the food taste better and connect customers to a healthier, rural past.

3) Since this last fall I have been living and working in an extremely dense, hilly and geographically distinct working class neighborhood, I am calling “Moctezuma”, with one of the worst reputations in Mexico City. Along with spending time with three ELEMENT participant families, my co-researcher, Vanessa Cravioto, and I are also investigating Moctezuma’s specific history and environment. One of the most striking aspects of our work so far has been the contrast between the external designation of Moctezuma as dangerous and our lived experience there. Moctezuma is often perceived as dysfunctional, unpoliced, over-crowded, filled with violence and drug use. We however, have experienced it as a safe and unified neighborhood where people marginalized elsewhere, like drug users and people with disabilities, are integrated into daily life through their imbrication in families who have all known each other for sixty years.

It may be that the particular history and geography of Moctezuma has produced a kind of dense social safety net that needs to be accounted for in “health” analysis. Moctezuma is primarily made up of large, extended, stable households made possible through 1970’s land-titling programs. Additionally, Moctezuma is geographically bound, by a sewage-filled dam, recycling centers, cement factories, and a freeway. Although these boundaries could be understood as “exposures” that negatively affect health (which they undoubtedly do), they also contribute to a sense of neighborhood distinction making for an intensely relational environment where “knowing” each other provides intensive solidarity. Residential stability and geographical distinctiveness might be key to the complex conditioning entanglements that shape everyday life and health in Moctezuma.

While our ethnographic methods during this phase of data collection are standard (daily observation, life history interviews, participation in neighborhood events, and archival research), it is unknown what exactly our bio-ethnographic collaboration with ELEMENT researchers in the next phase of the project will look like. What methods and frameworks will allow us to combine biological data with ethnographic materials without privileging the biological data as more “real” than the ethnographic data? What might replacing an exposure model with a complex conditioning entanglement model, which takes into account factors such as household gendered economies, geography and kinship, contribute to understanding how, for instance, how diabetes is triggered in ELEMENT participants or how lead might affect various family members differently? And, by putting biological samples in conversation with participant’s life trajectories and environments, what might we learn that would not be possible through either ethnographic or environmental health methods alone? Your thoughts are welcome.

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