

**RECONCEPTUALIZING FARMERS AS PESTICIDE USERS:
FROM *HOMO ECONOMICUS* TO COMPLEX SUBJECTIVITIES**

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ABSTRACT

Through empirical analysis and theory, this paper critiques technocratic regimes of protection vis-à-vis pesticide use, which are efforts limited to technical rationality and didactic communication of pesticide risks that model pesticide users as self-responsible individuals (ie, *Homo economicus*). Data reveal that knowledge of risk does not translate into greater protective gear use, within the Costa Rican case presented and more broadly. This circumstance, across first and third world contexts, leads me to develop a more holistic conceptualization of farmers' subjectivities that highlights numerous constraints — informational, political economic, cultural, individual, and environmental — to which farmers are subject. This conceptualization reveals the inadequacy of most efforts to address farmers' protective gear use, and leads me to propose a multi-tiered solution to pesticide problems, including an industrial hygiene approach and fostering subjectivities through participatory research involving pesticide users.

KEYWORDS

farmers; personal protective equipment; pesticide use; risk perception; neoliberal subjects; subjectivities

PESTICIDES & TECHNOCRATIC REGIMES OF PROTECTION

Worldwide each year, pesticides poison three to 25 million people, and directly kill at least 220,000 (Jeyaratnam 1990:141, WHO 1990:89). Workers and farmers, exposed directly to pesticides in high concentrations, face the highest risk of occupational poisoning (Paarlberg 1993). Exposure to various pesticides has also been connected to cancer, birth defects, miscarriages, disruption of the endocrine system that governs sexual and mental development, and suppression of the immune system (Colborn et al 1993, Dich et al 1997, International Program on Chemical Safety 2002, Repetto and Baliga 1996, Steingraber 1998). Environmental problems from pesticides abound (Pimentel et al 1992). Although activists have pushed for an expansion of society's control over pesticides in a Polanyian double movement (Galt 2008a) and organic agriculture has grown rapidly around the world (Scialabba and Hattam 2002), pesticide sales worldwide continue to grow, from \$13 billion in 1983 (Weir 1987:21) to \$38 billion in 2009 (CropLife International 2010:13).

Governments and the agrochemical industry have made slight accommodations in the face of these problems. These responses mostly constitute *technocratic regimes of protection*, which I define as efforts to protect lives that are limited to (1) technical rationality that focuses exclusively on issues of instrumental action that attempts to predict and control events, objects, and people (Habermas 1987), and (2) didactic communication of pesticide hazards to people seen to be at risk *because of their individual decision-making*. In this framing, “[p]oisonings are considered the consequence of misuse or abuse of pesticides, and ‘safe use’ is the responsibility of the farmer” (Wesseling et al 2005:S703). As a Honduran official recently noted, “[w]e have no proof that adverse health effects occur if workers would take all precautions; therefore, we have no scientific base to restrict or ban these pesticides” (Wesseling et al 2005:S702). By blaming negative health effects on workers and farmers refusing to protect themselves, officials often delay regulating pesticides (cf. Irwin 1989).

A great deal is at stake in the way that we conceptualize the pesticide problem. Technocratic regimes of protection discursively shift the cause of the pesticide problem to the deficiencies of local cultures and individuals, labeled “underdeveloped” and “ignorant”, respectively. As Frederick Rarig, a pesticide company executive, noted, “We have not been completely successful in harmonizing pesticide technology with the cultural forces and values of our own society. It is proving infinitely more difficult to achieve a successful accommodation of pesticide technology with the cultures and economies of the lesser developed countries” (1979, cited in Bull 1982:87). Technocratic regimes of protection have for decades been established through “safe use” campaigns focusing primarily on educating individual pesticide users and promoting use of personal protective equipment (PPE) based on the assumptions that trainees will better protect themselves (Murray 1994, Murray and Taylor 2000) and that protective clothing is indeed protective. CropLife International (2010:12), the promotional association of the global agrochemical-seed industry, reports their efforts reaching “over 40 countries and train[ed] more than 300,000 individuals each year” and that “training farmers in Integrated Pest Management and responsible use of crop protection products is a key focus.” Framing farmers’ lack of protective gear use as resulting from underdevelopment and ignorance means, quite conveniently for capital, that the problem can be overcome with simple trainings and further capitalist development.

I argue that a very important missing piece for addressing the pesticide problem is a robust conceptualization of farmers’ subjectivities. Farmers as pesticide users grapple with knowing that their livelihoods as petty commodity producers depend on externalizing costs in the form of undermining their own bodies through pesticide exposures. A triad of related subject positions — subjective immunity, fatalism, and heroic sacrifice — arise from this embodiment of the second contradiction of capitalism (i.e., the undercutting of the conditions of production by individual capitals, cf. O'Connor 1994). A range of other contexts — cultural, informational, individual, and

environmental — modify and often reinforce these subject positions’ intensities, and these contexts, as well as the political economic context, are quite resistant to change. This more holistic conceptualization moves beyond the deeply problematic conceptualization of self-responsible individuals making choices, ie, *Homo economicus*, to understanding how farmers are constrained within an agrarian political economy that threatens lives and livelihoods, and how these constraints might be challenged.

CONCEPTUALIZING FARMERS’ COMPLEX SUBJECTIVITIES IN THREE STEPS

The early social science concept of a unitary “subject” created by nation states — ie, political subjects brought under the control of a unifying ideological state apparatus — has given way in recent decades to more diversified theorizations of subjects. These have ranged from understanding subjects as “human bodies in intersubjective interaction” as in microsociology to subjects as “obeying the dictates of the vast underground territory of the unconscious” as in (Lacanian) psychoanalysis (Thrift 2008:84). In the last decade, by drawing on and weaving together diverse theorizations of subjectivities from Althusser, Foucault, feminism, and political ecology, geographers have conceptualized people as broadly-construed social subjects, and more-than-social subjects (Allen and Guthman 2006, Bondi 2005, Gibson-Graham 2006, Guthman 2007, Guthman and DuPuis 2006, Larner 2007, McCarthy and Prudham 2004, Mitchell et al 2003, Robbins 2007, Watts 2003). Through these examinations of subjectivities — environmental, neoliberal, embodied, economic, and otherwise — critical geographers have illuminated the complex ways that subjects are interpellated by powerful processes, discourses, social actors, and non-human actants.

In his oft-cited explanation of the reproduction of the conditions, means, and relations of production, Althusser (2006:98) theorizes that subjects are “interpellated” or “hailed” by ideology, “the system of the ideas and representations which dominate the mind of a man [*sic*] or a social group.” For Althusser (2006:106, 108), “*individuals are always-already subjects*” through a quadruple

system of interpellation that ultimately means that individuals as subjects “work all right ‘all by themselves.’” Althusser notes that the very ambiguity of the word subject — a free subjectivity as author of actions, and a subjected being submitting to a higher authority — is a function of how it works: “the individual *is interpellated as a (free) subject ... in order that he shall (freely) accept his subjection*” (Althusser 2006:108, original emphasis). Robbins (2007) extends Althusserian interpellation into the non-human realm: turf grasses interpellate lawn people — those willing to spend money on agrochemicals and other inputs to maintain a lawn — within the context of an ideology of maintaining property values and being a good neighbor that has been created and cultivated by lawn chemical companies, the major political economic actor in lawn ecologies. Implicit in Robbins’ extension is that Althusser’s Ideological State Apparatus is but a single force interpellating our subjectivities; capitals (writ small in terms of economic sectors) create their own ideological apparatuses as required for further accumulation, which are propagated and perpetuated culturally, and non-human actors act on our subjectivities somewhat independently.

Focusing on the possibilities of contesting and changing hegemonic ideologies and their subjectivities, Gibson-Graham (2006:127) describe “a politics of the subject” in their community economies work as moving beyond only “discursively enabled shifts in identity” to “something that takes into account the sensational and gravitational experience of embodiment, something that recognizes the motor and neural interface between self and world as the site of becoming of both.” Bringing in embodiment, especially in relation to the contradictions of capitalism (see also Guthman and DuPuis 2006), requires focusing not only on people’s ability to change but also upon “whatever enables us to act prior to reflection, the habitual, the embodied knowledge, the ways of being in the world that we almost never think about” (Gibson-Graham 2006:128). They argue that how this *habitus* (cf. Bourdieu 1984) changes needs to be a new focus for critical geography since “the mechanics of subject movement remain a matter for theoretical speculation” (Gibson-Graham

2006:129). Thrift (2008:84) similarly advocates for switching away from subjects to focus on “the sites at which behavior is modified, that is with the moment, the location, and the mechanism through which difference or invention was produced.”

What do these critical geographies, cursorily reviewed here, say about what interpellates, and about what stands in the way of producing new subjectivities? In short, the state, capital, cultural norms, and non-human actors, often acting together interpellate. Already-existing subjectivities, captured well in Bourdieu’s concept of habitus, and the various ideological apparatuses that produce them stand in the way of change. In contrast to Althusser’s thinking, in which subjectivities are locked down (cf. Dolar 1993), for Gibson-Graham, Thrift, and others (Mitchell et al 2003) there is considerable room for reshaping and reconfiguration. In line with this recent work, I use “complex subjectivities” as shorthand in this paper to refer to subjectivities as interpellated by multiple and complex causes *and* with the potential for change.

Operationalizing this view of complex subjectivities, this paper uses a case study of Costa Rican vegetable farmers and a broader engagement with the literature to consider farmer subjectivities vis-à-vis pesticides in three ways. First, I consider and critique farmer subjectivities as they are implicitly modeled by “safe use” trainings. Pesticide users are implicitly modeled as *Homo economicus*; as such, technocratic regimes of protection attempt to hail neoliberal subjects. Following Larner (2000), Bondi (2005:499) notes that, “As a form of governmentality, neoliberalism works by installing a concept of the human subject as an autonomous, individualised, self-directing, decision-making agent at the heart of policy-making.” I show empirically that the model of the pesticide user as *Homo economicus* is grossly inadequate. A core assumption of technocratic regimes of protection — that farmers will use more protective gear when they become aware of pesticide hazards — fails with great regularity.

Second, I develop a more holistic theorization of farmer subjectivities from the literatures on farmers' protective gear use and risk perception. Recognizing complex subjectivities requires careful consideration of the processes influencing farmers' pesticide use and protective gear use by looking across a variety of realms that are often disregarded, or considered separately by different disciplines. Jointly theorizing informational, political economic, cultural, individual, and environmental contexts vis-à-vis farmers' subjectivities shows the broad array of conditions and processes affecting and interpellating farmers' pesticide use, and shows why the subject implicit in technocratic regimes of protection is so grossly inadequate. Considering farmer subjectivities holistically has thus far been a persistent gap in the literature on pesticide use. As Douglas (1985:2-3, emphasis added) notes about the risk perception literature:

We may expect some random patches of inattention because of the impossibility of attending to everything at once. But *regularly scheduled obliviousness* is more intriguing. Persistent shortsightedness, selectivity, and tolerated contradiction are usually not so much signs of perceptual weakness as signs of strong intention to protect certain values and their accompanying institutional forms.

Douglas' insight describes research on protective gear very well. This persistent focus on a simple fix to protective gear use creates a "regularly scheduled obliviousness" that effectively hides more fundamental questions. Thus, while failing miserably as applied social science, technocratic regimes of protection work exceedingly well *discursively* to maintain the status quo.

Third, drawing on Gibson-Graham (2006) and Freire (1970), I consider farmer subjectivities as a site of political possibilities for new subjectivity formation based upon participatory research that examines pesticide users' subjugated positions. These efforts, aimed at reworking subjectivities around pesticide use and grounded in theories relating structure and agency, would facilitate pesticide users' and rural residents' overcoming the limiting frame of technocratic regimes of

protection through structural analysis of their position vis-à-vis the agro-input and food industries, and their posing of questions about industrial agriculture, the political economy in which it exists, and their roles in these systems.

THE COSTA RICAN CONTEXT

This work draws upon my research in Costa Rica from 2003 to 2004. Costa Rica has a peaceful history, a diminutive military, a social medical system with health outcomes comparable to industrialized nations, and high living standards (Zimbalist 1988). As the “green republic”, protected areas cover more than 25% of its territory (Zimmerer et al 2004) and its economy depends on international tourism. Environmental education has been a strong feature of public schools since the late 1980s (Vaughan et al 2003).

Costa Rica also features an agrochemically dependent agriculture with the highest pesticide use per cultivated area on the planet (Food and Agriculture Organization 2004). The pesticide problem is writ large in the country. For example, DBCP, a nematocide banned in the US in the 1970s but exported to Costa Rica for years, sterilized thousands of male banana workers (Thrupp 1991, Weir and Schapiro 1981). About 1,000 pesticide poisonings are reported annually (Leveridge 1998), although the actual number is likely much higher (von Düselen 1991). The rural population has significantly higher cancer rates (Wesseling et al 1999), banana workers have higher rates of certain cancers (Wesseling et al 1996), and the region with the highest documented pesticide use has extremely high stomach cancer rates which many suspect is caused by agrochemicals (Ortíz Gutiérrez 1996). During my 2003-04 fieldwork, pesticide poisonings of elementary school students from nearby spraying hit the news twice (Gutiérrez C. 2003, Rojas 2004). Farmers and the general rural population continue to bring up these issues — sterilization, poisonings, and cancer — in conversations about pesticides.

In my fieldwork in Northern Cartago and the Ujarrás Valley I was disturbed by farmers and farmworkers commonly spraying pesticides without gloves or other protective gear (Figure 1) and wondered why this occurred. Many characteristics of the study area should, theoretically, encourage higher levels of protective gear use. In the area, (1) farmers are relatively highly educated vis-à-vis developing countries (almost all have a sixth grade education, with many having completed high school and some college), (2) the farming population is relatively wealthy because of the high-value vegetables they produce (as an indicator, 75% of farmers surveyed own a truck), (3) agrochemical retailers sell protective gear, (4) export production demands farmers to be cautious with their pesticide use vis-à-vis residues, which exporters convey as harming consumers and causing regulatory violations, and (5) the climate is cool to cold in the temperate vegetable zone, meaning that protective gear is more likely to be used than in hotter climates because it is less uncomfortable. Due to these characteristics, the case I present here is a *critical case* in examining farmers' use of protective gear in the global South. Critical cases are those that exemplify the statement "if it doesn't happen here, it won't happen elsewhere" because the conditions of the critical case tilt strongly in favor of certain phenomena occurring (Patton 2002:236).

METHODS

From April 2003 to January 2004 I conducted in-depth, face-to-face surveys of 148 vegetable farmers in the study site. Farmers produce similar crops for both the export and national market, and these different market orientations face different regulatory regimes. These differences result in export farmers using less residual and less toxic pesticides, being more cautious in respecting the required interval between spraying and harvest, and spraying less intensively than national market farmers (Galt 2007, 2008b, 2009). Other data collection included in-depth farmer interviews about regulations, interviews with agrochemical salespeople and produce buyers, inventories of pesticides at agrochemical sales places, observation of farming practices (including spraying), informal conversations with farmers, library research, and planting my own vegetable plot.

The survey data used below concerns farmers' use of protective gear and knowledge of health hazards, and is restricted to those farmers personally involved in spraying (hence the sample size less than 148). The data allow for examining correlations between knowledge of different hazards and protective gear use. Additionally, they allow for comparing export-oriented farmers and national market-oriented farmers, an interest that emerges from recent work in international agro-food studies showing that export farmers exercise more caution about pesticide residues than national market farmers (Galt 2007, 2009).

THE WIDE GAP BETWEEN KNOWLEDGE AND PROTECTIVE GEAR USE

Table 1 summarizes protective gear used by farmers when they are personally spraying the pesticide they identify as the most hazardous one they use. Two major patterns emerge. First, most farmers wear very little protective gear. Counting formal and informal protective gear, farmers wear 1.7 pieces on average. Second, differences between farmers producing for different markets are remarkably small at the aggregate level, although there are some minor differences by type of protective gear worn. National market farmers, who as a whole are less cautious about residues, are more likely to use formal protective gear, except for gloves, with significant differences in goggles and rubberized pants (although the differences are still relatively small, and use does not exceed 30% for the pants). Export farmers are more likely to use informal protective gear. Even though these differences appear in the disaggregated data by item, there is no clear difference in overall use of protective gear.

As for data concerning knowledge, farmers in the area know a great deal about pesticides. For example, they know which pesticides are compatible for mixing with others, the need to rotate different classes of pesticides to slow the development of pest resistance, and the existence of regulations around residues for the export market. Farmers were also almost universally concerned with the impacts of pesticides on themselves, their families, consumers, and the broader

environment. In conducting the survey I asked whether farmers knew that pesticides could cause a specific list of bodily harms (first column of Table 2). I read the list and asked farmers to respond either “yes” or “no.” This rather crude way of asking questions in the survey sometimes elicited heart-wrenching stories. A large number of farmers in the area made the connection between their agrochemical use and the area’s high rate of stomach cancer. During one interview, when I came to “cancer” on my list, Ignacio (a pseudonym to maintain confidentiality) told me the story of how his wife of more than 30 years was diagnosed with stomach cancer and died soon afterward. From his tears and his story, it was clear that Ignacio felt at least partially responsible for his wife’s death because of the agrochemicals he regularly uses. Many farmers also told stories about friends, family members, and workers poisoned while spraying or mixing. More than a quarter of surveyed farmers reported that they had been poisoned by pesticides at some point (Table 2), and some noted that it had happened repeatedly. These farmers, then, are far from ignorant about pesticides’ ill effects.

How does farmers’ knowledge of these various dangers relate to their use of protective gear? There is a complete lack of correlation between the two variables, sum of protective gear used and sum of dangers known ($r = -0.01$, where $r = 1$ is a perfect association, and $r = 0$ is a complete lack of relationship). Cumulative knowledge of dangers and protective gear use are *completely* unrelated. This disconnect is confirmed with qualitative data as well — for example, one farmer that I got to know well and who would go on at lengths about the problems created by pesticides wore almost no protective gear when spraying.

EXPLAINING THE DISCONNECT THROUGH COMPLEX SUBJECTIVITIES

This sharp disconnect between knowledge of hazard and protective gear use has been shown by many other researchers, appearing across an array of disciplines where methods would permit it to be found (Ajayi and Akinnifesi 2007:209, Avory and Coggon 1994:238, Crissman et al 1994:594-5, Feola and Binder 2010:21, Hunt et al 1999, Matthews 2008:839, Recena et al 2006:230,

Stewart 1996:426, van der Hoek et al 1998:495). Surveys also show relatively low protective gear use in the most “developed” circumstances (e.g., Mandel et al 1996, Perry and Layde 1998). For example, only half of surveyed California farmers use rubber or vinyl gloves when spraying, compared to 37% in other states (Schenker et al 2002:462). Since the strong disconnect persists in the global North — the supposed “endpoint” of development — these low rates of protective gear use should not be seen as the paragon to be achieved through development and educational interventions that technocratic regimes of protection pose. Across many cases, no matter the level of training or development, a substantial percentage of farmers do not wear recommended protective gear, *despite knowing the dangers*. This is an extremely robust finding about real-world situations from behavioral and social scientists. In many cases, however, researchers treat the finding as a paradox or “anomalous situation” (e.g., Hunt et al 1999:236), which prevents a deeper consideration of why.

The model of humans and behavior implicit in technocratic regimes of protection is grossly inadequate. As Wynne (1996:57, original emphasis) notes about risk management, “Through their rationalist discourses, modern expert institutions ... *tacitly and furtively impose prescriptive models of the human and the social upon lay people, and these are implicitly found wanting in human terms.*”²¹ Because of the dominance of *Homo economicus*, there has been very little, if any, holistic theorization across pesticide use case studies about how structures and discourses intersect to shape specific circumstances. Instead, studies of particular cases are usually treated in isolation. Most behavior-oriented studies assume that peoples’ attitudes toward safety are easily modified in desired ways by other people (experts), or at the least by those who possess them. For social scientists, the explanatory power of social-level factors generally trump those of the individual level.

There is a need, then, for a more robust conceptualization of pesticide users’ subjectivities. Bringing together critical geographers’ recent conceptualization of subjectivities — the

intermingling of discourse, meanings, political economy, bodies, and actants in the shaping of the interface of ourselves and our worlds (Gibson-Graham 2006, Guthman and DuPuis 2006, Robbins 2007) — suggests prioritizing factors shaping subjectivities in five interrelated contexts: informational, political economic, cultural, individual, and environmental. With this frame in place, I examine the literature on protective gear use and the risk perception literature, including qualitative work done in industrial factory settings, as these offer the important parallel of dangerous work and bodily exposures. From these literatures I inductively develop a framework of farmers' subjectivities vis-à-vis pesticide use that highlights multiple contexts shaping the lack of protective gear use (Figure 2).

A commonly proposed reason for lack of protective gear use is lack of information, including ignorance and one-sided promotional efforts. Many researchers identify farmers' lack knowledge about the hazards of pesticides (Leveridge 1998, Pimentel et al 1992, Rucker et al 1988), including long-term dangers (Cropper 1994), as the reason for not using protective gear. Political economic approaches highlight structural reasons for this ignorance, especially unaccountable and unscrupulous pesticide manufacturers that promote pesticide use without adequately disclosing its dangers (Bull 1982, Murray 1994, Paarlberg 1993, Thrupp 1990, van der Hoek et al 1998) and illiteracy and inadequate education arising from the highly unequal world system (Weir and Schapiro 1981).

Further elucidating the political economic underpinnings of protective gear use is necessary since “[p]esticide practices are shaped by larger structural influences above and beyond the presence or absence of accurate knowledge of the product” (Murray and Taylor 2000:1740). The most commonly identified social-level constraint is poverty and the resulting inability to afford protective gear (Ajayi and Akinnifesi 2007, Antle and Capalbo 1994, Bull 1982, Pimentel et al 1992). Keeping in the political economic vein, governments' lack of prioritization of pesticide problems and lack of

capacity in confronting them has also been emphasized (Bull 1982, Jeyaratnam 1985). States can and do mandate protective gear use for pesticide handlers, but the numerous and dispersed workplaces of agricultural production make enforcement difficult and costly.

The political economy of agriculture literature shows that the circuits of capital — the most powerful driving force of change in the agrifood system — reconfigure the farming system in the quest for profits and are indifferent to human, social, and environmental costs. Appropriationism, the process through which petty commodity producers increasingly purchase off-farm inputs to substitute for inputs or services once produced on-farm, creates sites of capital accumulation by reducing “the importance of nature in rural production, and specifically as a force beyond [capital’s] direction and control” (Goodman et al 1987:3). As capital and governments create market conditions that place farmers in strong competition with one another, the “treadmill of production” results and appropriationism increases. On the treadmill, farmers’ adoption of the latest technologies, including pesticides, become necessary for them to continue farming, yet, since farmers accumulate capital at different rates, those on the low end falling prey to “cannibalism” where one farming operation devours another (Buttel 2004, Cochrane 1979).

The pesticide treadmill is an important aspect of the treadmill of production. While pesticide use becomes basically mandatory on the treadmill of production, pesticide use does not guarantee that farmers’ livelihoods will continue since some farmers will accumulate capital faster than others, and crop failure can have a devastating effect on indebted farmers (van der Hoek et al 1998:501). Pesticide inputs also directly compromise farmers’ and farm families’ health (Antle et al 1998). Thus, livelihoods *and* lives are on the line within an agricultural system where farms are placed into strong competition with one another and expensive and dangerous inputs become necessary to socially reproduce the farm. This context of farmers’ constantly needing to adopt new

inputs to maintain their livelihoods creates a feeling of inevitability toward even the most hazardous inputs.

Political economic circumstances also matter in the more intimate shaping of the workplace, and this situation fundamentally structures the subjectivities that arise. Capitalist work situations, including petty commodity production with labor constraints, make protective gear unattractive because it impedes competitiveness. Johnston and McIvor (2004) point to the need for workers to maximize their productivity and forsake protective gear because it can encumber them, making them less efficient. For example, miners do not wear masks because they reduce their productivity by constricting their breathing (Johnston and McIvor 2004). This concern is mirrored with pesticide use; some Costa Rican farmers note that using protective gear increases the amount of time it takes to spray. Similarly, use of a motorized backpack sprayer increases atomization — and thereby respiratory exposure — but allows for the job to be done more quickly, allowing for more efficient use of their own labor or that of their workers. In this way, farmers and workers, as what Marx called “personal conditions of production”, become subjected to the second contradiction of capitalism; “when individual capitals attempt to defend or restore profits by cutting or externalizing costs, the unintended effect is to reduce the ‘productivity’ of the conditions of production, and hence to raise average costs” (O'Connor 1994:165). Farmers recognize that they literally embody this contradiction; how they reconcile it is strongly shaped by cultural understandings.

Researchers commonly highlight local cultural understandings of risk, which often assign causation to individuals’ physical weakness or error, rather than to the activity itself (Hunt et al 1999). For example, in telling stories about poisonings, campesinos in Chiapas, Mexico, while acknowledging the hazards of pesticides, emphasized that poisonings “were due to some physical weakness (such as aging or infirmity) or error on the part of the person affected” (Hunt et al 1999:240-1).

Recent work has emphasized that cultural norms concerning protective gear strongly influence farmers (Feola and Binder 2010, Hunt et al 1999, Mera-Orcés 2000). Feola and Binder (2010:20) note, “the social mechanism of conformity to the descriptive norm defined by the behavior of the majority of farmers may drive [farmers] to a rigidity trap” of not wearing protective gear. This can be exacerbated by machismo identities emphasizing performance of masculinity through exposing oneself to harm and health hazards when spraying (Hunt et al 1999, Mera-Orcés 2000, Orozco et al 2009), which has also been shown in industrial factory settings (Connell 2000, Johnston and McIvor 2004). The discourse of masculinity is at play in Costa Rica, but was not a primary research focus. Pesticides are bound up with farmers’ identities, as one bumper sticker from the area makes clear; it reads, “I am a potato farmer” with a fungicide advertised immediately below. Male farmers, who comprise the vast majority of farmers in the area, suggested that women should not spray because they are weaker, and responsible for child bearing. I never observed a woman spraying. There is also a norm against having young children help in the pesticide application, though it is fairly common for teenage boys to be involved. With particularly strong norms, farmers may lack “corporal freedom” (cf. Valentine 1999) in spraying situations as strong machismo discourses can make pesticide users act against their own interest of protecting their bodies.

Behavioral researchers also identify individual-level characteristics or constraints. Individuals’ general approach to safety in other situations is strongly related to protective gear use (Avory and Coggon 1994, Feola and Binder 2010). Murray (1994) notes while some people are more careful than others, this explanation cannot be advanced on its own since it is popular among farm managers concerning their workers, and mimics “blaming the victim” in important ways. In recognizing this individual-level factor, Avory and Coggon (1994:238) note, “we should be attempting to influence farmers’ attitudes to health and safety more generally”, yet there is little to no evidence that people’s general approaches to safety are modifiable through outside interventions.

Embodied experiences with pesticides also influence protective gear use, with poisoning episodes often making farmers more cautious (Feola and Binder 2010, Galt 2008c, Hunt et al 1999). This can create what epidemiologists call the “healthy worker effect” (Li and Sung 1999) at the population level where those who are most sensitive or averse to exposure are less likely to stay in the profession. Risks are generally perceived as less important if negative effects are not immediate or seem fairly minor (Vaughan 1993), but these perceptions may shift dramatically upon experiencing poisoning since it forces pesticide users to reconceptualize risks as immediate and severe. Experience also contributes to a lack of protective gear use, as every day without protective gear *and* without poisoning incident can be implicitly or unconsciously interpreted as evidence that one does not need to wear it.

The environmental context also acts as an important constraint. Hot and humid climates that dominate developing countries make working outside in full protective gear impractical or downright unbearable (Thrupp 1990, van der Hoek et al 1998, Wesseling 1991). This must be seen, however, in relation to the structure of capitalist agriculture because it is not that protective gear cannot be worn *per se*, but just not for sufficient lengths of time needed to complete work efficiently enough to compete with other units of production.

These contexts — informational, political economic, cultural, individual, and environmental — shape and greatly constrain the subject positions available to people engaging in dangerous work. The center of Figure 2 shows three phenomena identified in the risk literature — subjective immunity, stoic fatalism, and heroic sacrifice — heretofore not theorized together. I conceptualize these as related subject positions resulting from joint but paradoxical interpellations by political economy, culture, and environment, ie, these subject positions arise through farmers’ attempts to reconcile the unreconcilable realizations that (1) they and their families are dependent upon an economic activity — usually justified culturally as the occupation that one goes into because of

tradition — that compromises health and will likely shorten their lives, and (2) the commonly advanced way of protecting themselves — protective gear use — is fundamentally unrealistic in their work environments for many reasons, including climate, competition, and/or cultural norms. These subject positions are ideologies, not in the Althusserian sense, but rather following Dolar (1993:92): “every ideology, in its reduced form, can be defined as an attempt to form the impossible junction of two minimal elements that by their very nature do not fit.”

One subject position is “optimistic bias” or “subjective immunity” wherein people believe they are personally not as susceptible to health risks (Douglas 1985, Hunt et al 1999, Rucker et al 1988). That individuals “have a strong but unjustified sense of subjective immunity” is one of the “best established results of risk research” (Douglas 1985:29). Familiarity with a risk causes people to underestimate the importance of that risk (Douglas 1985, Vaughan 1993), and discounting risk becomes pronounced when the economic benefits of the activity are high (Rucker et al 1988). In Northern Cartago and the Ujarrás Valley, farmers commonly spray one to two times per week in each field. Since farmers plant three fields on average, most farmers are involved in spraying two to three days per week, and many spray almost every work day. Trucks deliver agrochemical to small agrochemical stores daily in almost every town. Billboards on the main road advertise pesticides for vegetable crops. Farmers wear baseball caps from major pesticide companies. Raffle prizes include pesticide “trial packs.” Here, as in many agrochemically dependent farming regions, pesticide use is an absolutely normal part of life. This *habitus* allows subjective immunity to arise and survive.

Fatalism — a submissive attitude toward dependence on a activity seen simultaneously as dangerous and unavoidable — is the opposite side of the coin as “optimistic bias.” Farmers in Northern Cartago would speak often of the absolute economic need to spray their crops for fear of losing all. They know pesticides harm the land and many suspect their pesticide use to the high rates of stomach cancer in the area, but they are resigned to their use and their bodily exposures (see also

Hunt et al 1999:244, van der Hoek et al 1998:501). This mirrors “stoic fatalism” among mining workers (Johnston and McIvor 2004) and “a feeling of fatalism about working conditions” in hazardous US industries (Gottlieb 1993:285) and is likely heightened by a sneaking suspicion that protective gear is probably not very effective.²

Heroic sacrifice for the good of others, eg, one’s family, the nation, etc., is another subject position created by dependence upon dangerous occupations. Among Scottish mining workers, family men often feel that they are working for others, to both maximize household earnings and to give their children a better chance (Johnston and McIvor 2004). Walter et al. (2004) identify discourses of onerous labor as honorable masculine sacrifice among undocumented Mexican day laborers in San Francisco. Thus, men in hazardous professions can see their bodily destruction through hard work and exposures as sacrifices they make for others, a subject position dialectically related to masculinity discourses.

Considering these subject positions and the broader contexts that interpellate subjectivities as a whole, what kinds of subjects are farmers as pesticide users? Far from the assumed *Homo economicus* subjects who compliantly change their behaviors based on “safe use” training, this holistic view shows that farmer subjectivities are complex and shaped by numerous contexts and processes. Farmers are strongly constrained by informational, political economic, cultural, individual, and environmental contexts that make protective gear use prohibitive for many reasons. The resulting subjectivities available are therefore quite resilient since the forces interpellating them are powerful, resistant to change and contradictory when they come together.

WHAT IS TO BE DONE?

The study area in Costa Rica is a best-case scenario for farmers’ protective gear use in the global South, yet there is very little use of protective gear in this case, and increased knowledge of pesticide danger does not translate into increased protective gear use. This disconnect, shown across

many different social contexts, results from constraints in political economic, cultural, individual, informational, and environmental domains that together set up a contradiction to which three interrelated subject positions — subjective immunity, fatalism, and heroic sacrifice — are a response.

Technocratic regimes of protection rest on an overly simplistic model of behavior focusing on a single constraint — lack of information — and ignores the subject positions of farmers and the other forces interpellating them in the framework developed above. Rather than question its faulty foundation, “safe use” proponents continue with training efforts, attributing their failings to the shortcomings of non-compliant subjects, rather than a failing of their model of humans. In this way, these trainings continue to “fail forward” as do many aspects of the neoliberal project (Peck 2011). Murray (1994:132) argues “safe use” projects can be wasteful of scarce resources, undermine efforts at important structural change, create a placating effect since it seems that pesticide problems are being addressed, and allow pesticide problems to persist “by dominating the discourse on pesticide issues.” Similarly, strong critiques of pesticide use in developing countries argue that farmers and farmworkers *cannot* use pesticides according to the label instructions because of the severity of constraints (García 1999). Following upon these, the constraints in Figure 2 cannot be addressed by didactically training individuals.

The multiple mechanisms structuring the lack of protective gear use, and their resistance to change, must be taken into account in constructing more protective pesticide regulatory regimes. This means a very different approach to safety is needed, with state health and environmental departments playing a strong role (Murray et al 2002, Wesseling et al 2005). In place of “safe use” campaigns, Murray and Taylor (2000) advocate an “industrial hygiene” approach which addresses the problem in a hierarchical fashion with largest-impact interventions prioritized. First is eliminating the most hazardous pesticides in local use, generally acutely toxic Category 1 pesticides, by revoking their registrations and promoting integrated pest management (IPM) and agroecological methods. It

is important to note that when the state intervenes by restricting pesticide use, the pesticide industry often pushes back (Murray et al 2002). Pressure, then, needs to be maintained on state apparatuses. The second priority in the industrial hygiene approach are administrative controls focused on the organizational context of agriculture, such as limiting the amount of time that someone can spray. Third, as a last resort, is promoting protective gear only after the first two interventions.

To create a broader politics of possibility, strategies complementary to the industrial hygiene approach should be developed. One such strategy involves engaging pesticide users in knowledge production in order to reshape subjectivities toward emancipatory ends, a very difficult proposition but one worth trying. The tradition of “consciously challeng[ing] the antidemocratic patterns of techno-bureaucratic expertise” has a long history in geographic thought, including the scholarship of Jim Blaut and the Detroit Geographical Expedition and Institute (Heyman 2010:310), from which this effort can learn a great deal.

Critical geographers have argued that oppositional subjectivities can be nurtured in social movements or diverse economies (Gibson-Graham 2006, Harris 2009, Watts 2003), yet, outside of critical pedagogical theory (e.g., Mezirow 1995), we know little about how to facilitate the transformation of subjectivities more broadly. For example, Foucault was clear on need for “ethical practices of self-cultivation” but little guidance on “the elusive project of changing the self” (Gibson-Graham 2006:129). What is needed is a participatory research program that confronts the reality that small farmers’ livelihoods and their families are subjugated to agro-input industries and food industries. In the place of didactic training strategies should be a critical pedagogical approach focused on analysis of current social situations in which the subjugated become researchers of their own social positions (cf. Freire 1970). This would involve farmers’ and farm families’ critical reflection upon their position and pose questions typically hidden by “safe use” discourse, such as: How safe is protective gear? Are any effects of pesticides other than acute

poisoning stopped or greatly reduced by protective gear? Who wins and who loses when farmers widely adopt pesticides? How might farmers get off of the pesticide treadmill? Do we really need pesticides, and in what contexts? These and similar questions can act as “opening-up themes” (cf. Taylor 2005) to drive future inquiry of researchers and pesticide users into the problem.

This effort requires resolving the false dichotomy between society and individual, which can be done through Bhaskar’s (1979:45-6) transformative model of social activity (TMSA). TMSA holds that a simple dialectic between individuals and society is insufficient: “People do not create society. For it always pre-exists them and is a necessary condition for their activity. Rather, society must be regarded as an ensemble of structures, practices and conventions which individuals reproduce or transform, but which would not exist unless they did so.” Both society and human praxis “possess a *dual character*. Society is both the ever present *condition* (material cause) and the continually reproduced *outcome* of human agency. And praxis is both work, that is conscious *production*, and (normally unconscious) *reproduction* of the conditions of production, that is society” (Bhaskar 1979:43-4, original emphasis). For example, workers do their jobs and receive their pay intentionally, but unintentionally reproduce capitalism. Similarly, farmers using pesticides keep pests at bay temporarily and may save their investments in their crops, but reproduce an agriculture subjugated to agro-input industries, food industries, and markets through which surplus is extracted (Banaji 1980, Blaikie and Brookfield 1987, Goodman and Redclift 1981) and that undermines the ecological systems and farmers’ and workers’ health (O’Connor 1994). The TMSA framework, and theories structure and agency generally, can serve as a basis for this participatory research praxis.

This participatory research program that highlights critical reflection on subjectivities, subjugation, and structure-agency relationships is not an abandonment of political economic analysis, as we clearly must pay particular attention to “the forms of power and the forms of

economy — the contours of hegemony — that they express” (Watts 2003:25). But it means that it cannot be a remote academic exercise. It is an intellectual project that could become more powerful if it involved as its architects the very people who depend upon pesticides for their livelihoods. This engaged praxis will ideally draw upon and further develop a political economic critique of pesticide-dependent agriculture, and build an alternative vision and practice of the way agricultural and market-society relationships ought to be.

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FIGURE CAPTIONS

Figure 1: A farmworker mixes a carcinogenic fungicide without gloves. The workers had asked the manager for gloves before beginning their work, and the manager responded that he had forgotten them but they had to proceed anyway. Source: author.

Figure 2: Farmers’ subjectivities vis-à-vis protective gear use

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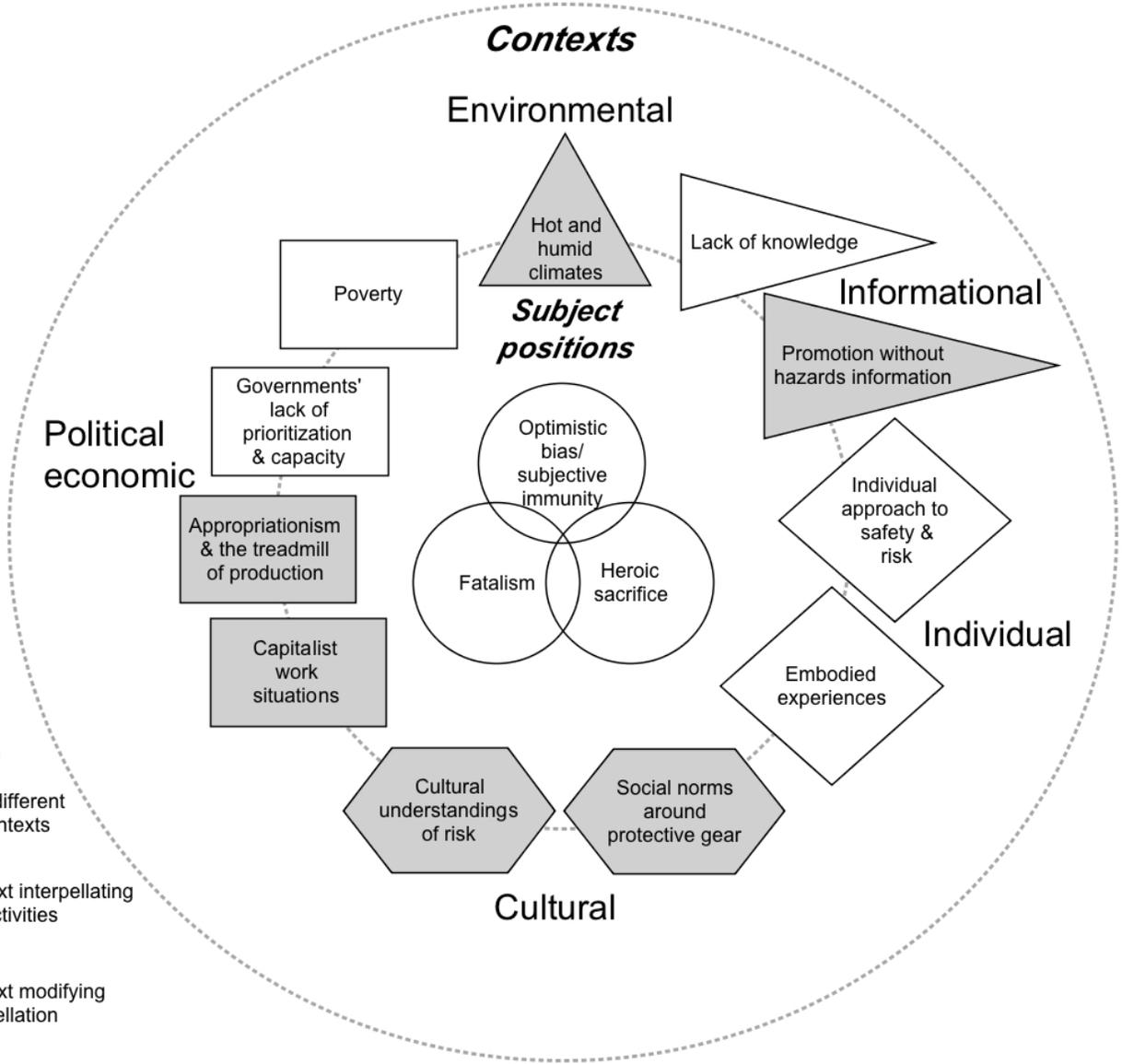
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¹ Conceptualizing people as simple cogs in a linear process has a long history. Tracing the links between Taylorism, behavioralism, and *Homo economicus* (as both model and as subjects that dominant discourses attempt to hail) is beyond the scope of this paper, but would prove useful and interesting.

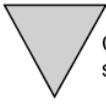
² Studies have shown a considerable amount of pesticide spray still reaches those wearing protective gear (Fenske, 1993, cited in Murray and Taylor 2000).





LEGEND

Shapes signify different (interrelated) contexts

 Context interpellating subjectivities

 Context modifying interpellation

Table 1: Farmers' protective gear use by different market orientation

	All (n=108)		National market		Export (n=21)		Exp>Nat Market	t-tests		
	%	sd	%	sd	%	sd		t	p	sig ¹
<u>Formal protective gear</u>										
Respirator	0.0%	0.00	0.0%	0.00	0.0%	0.00	—	—	—	—
Goggles	4.6%	0.21	5.7%	0.23	0.0%	0.00	n	2.29	0.01	°°°
Rubber gloves	18.5%	0.39	17.2%	0.38	23.8%	0.44	y	-0.63	0.27	—
Rubber jacket	10.2%	0.30	11.5%	0.32	4.8%	0.22	n	1.15	0.13	—
Rubber pants	26.9%	0.45	29.9%	0.46	14.3%	0.36	n	1.69	0.05	°°
Rubber apron	8.3%	0.28	9.2%	0.29	4.8%	0.22	n	0.78	0.22	—
Overalls	0.9%	0.10	1.1%	0.11	0.0%	0.00	n	1.00	0.16	—
<u>Informal protective gear</u>										
Mask	39.8%	0.49	39.1%	0.49	42.9%	0.51	y	-0.31	0.38	—
Long sleeve shirt	46.3%	0.50	42.5%	0.50	61.9%	0.50	y	-1.60	0.06	*
Hat/hood	13.0%	0.34	9.2%	0.29	28.6%	0.46	y	-1.83	0.04	**
<u>Sum of protective gear</u> ²	1.7	1.5	1.7	1.5	1.8	1.3	y	-0.48	0.32	—

¹ significance denoted as ° = national market farmers are higher; * = export farmers are higher;

***=1%, **=5%, *=10%

² Index is a count of each piece of equipment listed above. Excludes standard farmer wardrobe of pants, short-sleeve shirt, & rubber boots.

Table 2: Knowledge of and experiences with pesticides, by market orientation

	National market (n=108)		Export (n=21)		t-tests		
	%	sd	%	sd	t	p	sig ¹
<u>Knowledge of dangers</u>							
Poisoning	99.1%	0.10	100.0%	0.00	-1.00	0.16	—
Death	99.1%	0.10	100.0%	0.00	-1.00	0.16	—
Cancer	88.9%	0.32	94.9%	0.22	-1.27	0.10	*
Birth defects	76.9%	0.42	79.5%	0.41	-0.34	0.37	—
Brain damage	78.7%	0.41	87.2%	0.34	-1.26	0.11	—
Altered hormones	58.3%	0.50	59.0%	0.50	-0.07	0.47	—
Immune system	63.9%	0.48	76.9%	0.43	-1.58	0.06	*
Spontaneous abortion	48.1%	0.50	43.6%	0.50	0.49	0.31	—
	Ave	sd	Ave	sd			
<i>Sum of dangers known²</i>	6.1	1.97	6.3	1.81	-0.57	0.28	—
<u>Experiences with pesticides</u>	%	sd	%	sd			
Poisoned before	28.7%	0.45	25.6%	0.44	0.37	0.36	—
Produce tested for residues	33.6%	0.47	79.5%	0.41	-5.73	0.00	***

¹ significance denoted as ° = national market farmers are higher; * = export farmers are higher; ***=1%, **=5%, *=10%

² Index is a count of knowledge of each type of hazard listed above.