Anticipating Harm
Regulation and Irregularity on a Road Construction Project in the Peruvian Andes

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Abstract
This article draws on an ethnography of road construction in the Peruvian Andes to explore how engineering projects operate as sites of contemporary governance. Focusing on the way in which engineering projects entail a confrontation with dangers of various kinds, we explore how people caught up in road construction processes become preoccupied with the problem of anticipated harm. Drawing on the notion of ‘codes of conduct’, we suggest that the governmental effects of practices which attempt to deal with the uncertainty of the future might be analysed as a tension between the enactment of two different kinds of codification. Building on the notion of coding as a situated material practice, we investigate the appearance of two different ways of encoding a relationship with an uncertain future which we term ‘machinic’ and ‘emergent’. The article builds on a description of these two ways of encoding uncertainty to explore how formal mechanisms of dealing with anticipated harm, such as the regulations of health and safety, are both unsettled and reinvigorated by more affective and relational dimensions of practice.

Key words
anthropology ■ control ■ difference ■ knowledge ■ risk ■ safety

Introduction
IT WAS not long into our research that we heard about the first death. We were three months into ethnographic fieldwork with a consortium of engineers who were constructing a 700 km ‘interoceanic’ highway...
between the southern Andean highlands of Peru and the border with Brazil in the Amazonian rainforest when news came that one of the construction workers on the project had been killed. News travelled fast along the road and by the evening of the day of the accident, the small Andean town where we were staying (several hours drive away from the accident site) was buzzing with news of the fatality. No one knew quite what had happened, but everyone wanted to talk about it. A few days later when we were travelling with two engineers from the consortium, we drove past the spot where it had occurred. Two wooden crosses were hammered into the ground — one provided by the construction company and one by the relatives of the deceased man. When the engineers got out of the car, their driver told us what he knew of the incident. A man had been working behind a bulldozer and it seemed he had tripped or somehow been distracted and the machine had driven right over him and crushed him.

Road construction, like all construction projects, is a process which has to grapple with the problem of anticipated harm. Whilst construction deaths are an obvious danger, we might argue that the problem of harm has an even more fundamental relationship to road building, forming an inherent part of the impetus which drives road construction in the first place. Building on a generalized politics of fear (Gourevich, 2010) of the social and economic effects of exclusion from international flows of capital and resources, road building offers a tangible form of political action, protecting the population by facilitating their connection to global processes. In Peru, as in many developing nations, road building has long been seen as a way of mitigating some of the dangers of underdevelopment, economic isolation and political volatility. Road building projects are promoted by external, multilateral agencies looking to create new markets and to stimulate commodity flows whilst simultaneously providing the necessary degree of infrastructural support in fields of health, education, and institutional process to ensure the political stability necessary for economic development. Supported by the World Bank, the Peruvian government is actively engaged in several large-scale road construction programmes in what could be seen as investments in ‘safe living’ for the nation and its citizens who would otherwise be at risk of suffering from the dangers of isolation, disconnection and economic and political disenfranchisement.

As well as responding to a generalized politics of fear, new roads also offer a solution to more mundane and day-to-day dangers. Good roads promote a sense of enhanced security and appear to materialize a kind of liberal social ordering. In the challenging terrain of the Peruvian Andes, modern road construction promises to straighten out the sharp bends around which drivers of large buses have learnt to skilfully manoeuvre; to place safety barriers between cars and the deep precipices over which they frequently fell; to shore up rocky cliffs and blast away precarious outcrops.
which used to turn into rock falls and landslides in bad weather or when earth tremors struck; and most importantly perhaps, to flatten bumpy, dusty, steep, narrow roadways into smooth, level, two-way tarmac strips that can increase the speed of travel, cutting journey times between towns from days or weeks down to a matter of hours. Through material interventions roads are claimed to produce positive social effects, increasing mobility whilst also improving safety. Road building might in this respect be seen as an ideal example of the exercise of governmentality through the implementation of measures which are oriented towards the freedom of the population (Foucault, 2008; Joyce, 2003).

In lectures transcribed in The Birth of Biopolitics (2008), Foucault argues that the emergence of a governmental concern with the problem of danger and security came during the 19th century out of liberal principles which were concerned with how to manufacture the freedom of both the individual and the collective. The greatest risk to freedom came from the encroachment of alternative interests. For the collective, it became imperative to protect against the danger of the encroachment of individual interests, whilst the individual simultaneously needed to be protected from threats produced by the collective. Foucault argued:

If on the one hand...liberalism is the art of government that fundamentally deals with interests, it cannot do this...without at the same time managing the dangers and mechanisms of security/freedom, the interplay of security/freedom which must ensure that individuals or the community have the least exposure to danger. (Foucault, 2008: 66)

The management of danger and the fear of disconnection through technologies like roads can thus be linked to a historically specific form of governmentality which simultaneously promoted the freedom of the individual whilst putting in place the means through which the interests of the collective could also be protected. In the case of road building, we might argue that a generalized fear of the effects of disconnection leads to interventions which govern by reinforcing a principle of freedom through the implementation of a logic of security.

How this occurs is the central interest of this paper. Drawing on our ethnographic work on road building in Peru, we suggest that attention to the situated practices of construction engineers provides a powerful means of engaging with the contemporary manner in which governance is enacted through an engagement with the problem of security. Engineering is a discipline which is oriented towards navigating and responding to danger, and producing solutions to the immanent threat of harm. Whilst engineering is rarely acknowledged in social theory as a central player in forms of governmentality, we suggest that engineers play a key role in formulating and enacting the contemporary means through which the state comes to organize and manage populations. On the one
hand, the construction process itself is regulated by norms of engineering, by state law, and by the corporate enactment of a responsibility to protect against the potential harm that might be caused to the social and material environments by their material interventions. On the other, engineering consortia have to translate these normative devices through ongoing engagements with people and materials in order to produce a code of corporate care which works across all dimensions of their projects. In this respect the project of building a road is itself a process that aims to produce a systematic stabilization from an unstable social and material world. The code of corporate care in road construction is a regime of transformation and of protection that responds to the anticipation of harm of many different kinds.

Deleuze (1992) has extended Foucault’s characterization of liberal governmentality into the contemporary era by suggesting that the disciplinary techniques of modern institutions are being superseded by coding capacities most obviously embedded in computing technologies. For Deleuze, codification is supplementing and replacing older forms of administration and enumeration. As it does so it reveals new forms of subjectivity based less on the establishment of an opposition between the individual and the collective and instead on the temporary appearance of unstable subjects out of iterative combinations of ‘dividual’ matter (Deleuze, 1992). Whilst Deleuze’s thesis on societies of control offers a helpful extension to Foucault’s reading of 19th-century forms of governmentality, our aim in this paper is less to evaluate the relative merit of these theories than to use them as a starting point for exploring ethno- graphically the interplay between different kinds of enumeration and classification that engineers employ in the anticipation and management of danger. In this respect our approach is more akin to that of Douglas (1992), who sees the variety of responses to the anticipation of harm as the outcome of morally charged fields of social relations oriented towards the production of particular kinds of community. Rather than characterizing a contemporary approach to risk as entailing a particular kind of coding, we are interested in the way in which the anticipation of harm in engineering practice entails different and contradictory ways of managing uncertain relations. Drawing on the concerns of the special issue regarding the ways in which regulatory practices might be understood as ‘codes of conduct’, we use our ethnographic material to consider the usefulness of a theory of codes for understanding the governmental practices of engineering. Introducing the terminology of machinic and emergent codes, we explore to what extent the governmental dimensions of engineering, often characterized as a modernist science par excellence, emerge out of a tension between different kinds of codification. In this respect we aim to contribute to understanding the ways in which practices of coding work to produce the conditions through which danger is made manifest in specific times and places.
Accident Prevention and the Machinic Code

A few days after the accident, we were invited to attend a health and safety briefing given by the road construction company to new workers at one of the engineering camps. When the room was full, the health and safety officer, Engineer Revaleta, came in and flicked off the lights. The space was lit by the glow of the power point presentation projected onto the screen at the front. Two minders patrolled the room, hushing the new recruits and clapping their hands over the heads of anyone who appeared to be losing attention or drifting off to sleep in the soporific quiet of the darkened classroom. The talk was all about how to ensure the avoidance of accidents in the process of road construction. Half way through the talk a picture flashed up on the screen of a man lying dead on the ground with blood coming out of his head. Somewhat shockingly, it turned out this was the man who had died in the accident earlier in the week. The purpose of the talk was to explain in great detail to new recruits how they could prevent this kind of thing happening to them or their fellow workers.

According to Revaleta, accidents need never happen. The construction company operated with a goal of ‘zero accidents’ which in spite of the death earlier in the week was still being voiced as a key objective which drove Revaleta in his safety mission. It was, indeed, Revaleta’s job to make sure that people were signed up to this common goal. Not only was safety important, but for Revaleta and the company alike it was an absolute priority. As Revaleta himself put it, to become a member of the ‘family’ of the construction company, all workers were expected to have security as their principle objective and to see the following of rules and norms as a key responsibility.

Revaleta’s description of the causes of an accident disaggregated it into a series of discrete parts. First of all there are dangers (peligros). These are things that could potentially cause accidents. Second there are risks (riesgos). Risk is the latent state of an accident, which occurs when a person is exposed to a potential danger. Revaleta showed the following equation to explain this further: $R = P + C$, where $R =$ Risk, $P =$ Probability and $C =$ Consequence. An accident (accidente) is any form of personal injury, material harm or interruption in the process of construction when a risk materializes into an event of this kind. An incident (incidente), on the other hand, is when risk materializes into any other kind of event which does not involve personal injury, material harm or the interruption of the construction process. He gave the example of dropping a tool from a height and just missing a fellow worker as the case of an incident.

With the seemingly unpredictable now disaggregated into these different components, Revaleta was then able to show that it was possible to produce an adequate response to each of these different parts, thus ensuring that harm could be mitigated. Dangers were dealt with by introducing a series of norms, such as bans on drinking, requirements to use safety equipment in particular spaces, procedures for clear communication between foremen and workers, and stipulations about hours of work which
would prevent exposure to potential dangers and thus reduce risk. The purpose of these norms was precisely to ensure that potential dangers would not be transformed, in the terms of his formula, into risk (cf. Beck, 1992).

In the health and safety briefing the problem of harm appeared to be explicitly confronted through a process of codification. Literatures on varieties of coding practices tend to stress the ways in which codification entails a process of formal abstraction. In the field of descriptive linguistics, for example, scholars have long recognized that the identification of core elements and their possible patternings is a descriptive practice oriented to the production of generic relations through which particular, but arbitrary, symbolic forms are organized into sequences that convey and generate meaning. Computer languages operate in the same way, as do the informational codes of DNA, or the equations of mathematical thought. Here the value of the code lies precisely in its reductive formalism. The purpose of this reductive formalism is to describe a system of relations with generative capacity. This move from description to generative action alerts us to the ways in which formal coding is oriented towards a process of mechanization, whereby actions occur autopoetically without the need for ongoing management or persuasion. In the health and safety briefing, the disaggregation of an event into dangers, risks and accidents was intended to set in play a series of commonsensical responses in what we might term a ‘machinic’ manner. Just as experiments in artificial life use machinic codings to run sequences in order to produce virtual context-free worlds in which pure principles of generativity and sociality can be observed in action (Hayles, 1999), health and safety procedures were expected to stimulate common-sense into action, thus producing normative transformations in behaviour that would alter the conditions which had produced the need for a code in the first place. As a form of what we might call ‘machinic’ codification, the health and safety briefing revolved around the production of a description of a very specific kind, which was designed to eliminate extraneous information in order to capture the fundamentals of generative processes (in this case, a rational response to objective conditions) for productive effect (zero accidents).

The Role of the Assistant

Whilst the health and safety briefing laid out the logic of the machinic code, it was in the day-to-day practices of road construction that the process of enacting the code took place. Here we found that the discursive logic of the machinic code was materialized through engagement with all manner of human and non-human ‘assistants’ (Beckmann, 2004). Road signs and hard hats provided a major assistive role, as did a manual of health and safety rules, sections of which were read out to work teams on a daily basis. Driving too fast was dealt with by speed limits or traffic humps; people were protected against falling objects by their hard hats and steel toe-capped boots; unpredictable vehicle movements on the road were to be
avoided by proper training in adequate signalling and appropriate norms of
manoeuvre. The improper use of unpaved bits of mountainside as short-
cuts was prevented by the presence of Revaleta himself. He was constantly
on the move up and down the stretch of road that he was responsible for,
looking out for bad behaviour, warning his fellow workers to beware of his
eagle eye; ‘remember, even the rocks are watching you!’ he warned.

Beckmann (2004) uses the idea of the ‘assistant’ to describe those enti-
ties that enable the anticipation of harm to be displaced in order for action
to occur. In his work, he uses the notion of the assistant specifically to
describe car safety mechanisms as a way of rethinking the relationship
between the driver, the car, the safety mechanisms, the webs of expertise,
and the affective relations that produce the relationship of trust between
the car driver and the car.

Our interest in these ‘assistants’ is in the ways in which they are
deployed to manage the affective dimensions of regulatory procedures.
Building on the work of those like Latour (1992), who have stressed a need
to pay greater attention to the place of objects in our description of social
worlds, we suggest that the capacities attributed to the assistant such as
trustworthiness, reliability and utility are traits which rely not on the intrin-
sic properties of the person or object through which it is hoped that harm
will be mitigated but on the practices of codification that allow entities to
appear as assistants in the first place.

Rules such as speed limits, clothing regulations and directives as to
appropriate behaviour establish material arrangements like road signs, hard
hats, florescent vests and the health and safety manual as objects which
have the capacity to provide protection against a particular kind of uncertain
future. Whilst on the one hand the assistants work to reproduce the machi-
nic effect of the code of corporate care, on the other the set of relations
through which these assistants come to generate their normative effects
introduces a domain of ambiguity into the smooth operation of the machinic
code. The different practices which health and safety officers are engaged
in involve a constant negotiation over who or what can legitimately function
as such an ‘assistant’ in any particular situation. When assistants are taken
out of the situations through which they have gained their assistant status
and expected to operate as assistants in other settings, or, alternatively,
when the conditions within which the assistants originally received their
assistant status are removed, the consequences are frustrating and often
dire. Unsurprisingly, as we will see in the following section, it is often the
assistants themselves who bear the brunt of the frustration, as people
direct anger, humour or irreverence at the incapacity of these objects or per-
sons to secure against uncertainties of different kinds, including those for
which they were never intended.

Whilst the practice of establishing and operationalizing a machinic
code produces the various assistants which we describe above, the process
of road construction is, as we have already mentioned, characterized by a
multiplicity of dangers and thus by a proliferating array of other kinds of
assistants whose presence in the social relations of road construction works to disrupt the smooth operation of the machinic code. For example, the protection against harm in relation to road building in the Andes involves assistants as diverse as a hard hat, a manager, a spirit, a kin relation and a coca leaf. By using the terminology of assistance, we are alerted to the diverse specific things and persons that are drawn into practices of safe living, in a way that echoes Isabelle Stengers’ call for an attention to practice as a way of refraining ‘from using general judgemental criteria to legitimate their elimination, and to refrain from dreaming about a clean world with no cause to wonder and alarm’ (Stengers, 2007: 15).

Here, Stengers is arguing against approaches which ‘eliminate’ some practices or things as irrelevant because they appear to be concerned with different matters to those which are ‘normally’ or ‘habitually’ posed (or coded) as relevant. We use the notion of the assistant to go beyond the realm of health and safety and the strictures it imposes through the machinic code in order to draw attention to other ways in which people deal with the dangers produced by construction projects like road building. By following the way in which entities of apparently different orders become folded into the notion of the assistant, our attention is drawn to the ways in which the machinic code operates alongside other ways of coding. In the following section we turn our attention to the extended effects of the machinic code as it becomes operationalized in practice. We then move on to discuss the appearance of all manner of other assistants which fall outside the remit of the machinic code but which nonetheless play an important role in dealing with the anticipation of harm. It is here we find a range of practices which unsettle the theoretical leverage of the machinic code as a metaphor for contemporary forms of governance.

Responsibility, Control and the Machinic Code

The main circumstance within which danger reappeared in the logic of the machinic code came from the circumvention of these rules which Revaleta set out through an avoidance or ignoring of the assistants which had been put in place to protect against possible dangers. The reasons for the flouting of these rules were also formally systematized in the induction talk. They included lack of knowledge, inadequate psychology, problematic attitudes, inadequate leadership, and a deficiency in the training of engineers. Ultimately, the potential of infinite regress in the codification of life was stalled by the assertion that for these codes of protection to work, it required individual workers to take personal responsibility both for their own safety and for the safety of others. Asked to participate as the kind of archetypal modern subjects which Foucault shows to be produced by forms of governmentality based on the management of security, the workers found themselves not simply subject to protection but also constituted in the same moment as autonomous actors with direct responsibility for their own actions.
Within the system of codification that we see outlined here, the constant identification of a direct and code-able relationship between cause and effect meant that in order to become responsible, workers were required to submit themselves to the systemic or machinic coding of the company for which they were working. Each worker was given a uniform and a hard hat with a colour that corresponded to their particular role and the environments where they were allowed to pass. The hard hat itself took on a symbolic importance as an indicator of incorporation/exclusion from the construction process as those allowed inside the construction camp were issued with hard hats, whilst hopeful potential workers who hung around outside the gates were conspicuous for their lack of uniform, safety vests, or hat.

Once allowed into the company and issued with the requisite safety equipment, being a responsible worker became a matter of being a worker who also acknowledged the causal relations that the machinic coding sets up. As we suggested earlier, what distinguishes the machinic code is not only its capacity to describe but also the potential for it to produce predictable generative effects. To refuse to participate in the machinic code was literally to put a spanner in the works, that is, to stop the generative effect of the system. This had dire and serious effects both for the system and for people's personal employment prospects. Aware of the risk to the functioning of the machinic code, Revaleta stressed throughout the induction talk how infringement of the rules would lead to immediate and absolute dismissal. Revaleta was widely feared within the company by many employees precisely because of his reputation for carrying out this threat, sending people home without pay for as minor an offence as having forgotten to eat breakfast—a failure, in terms of the code, of an understanding of the need for proper sustenance to ensure vigilance, strength and a capacity to react appropriately in the course of their work.

In spite of the attempts at codification according to the production of a code that will be able to have generative effects when put in place, we found that in practice the unruly constantly reared its head to threaten the capacity of the machinic code to achieve its generative potential—that is, to prevent harm through the clarification of generic causal relations. Implicit in Revaleta's evangelical selling of the health and safety code, and in spite of the list of means of ensuring it was followed, was the recognition that ultimately these codes were going to be circumvented. Revaleta knew that his drivers would take short-cuts down the mountainside, cutting off the curves in the tortuous bends by veering down crumbling gullies. He expected that people would turn up to work drunk, that they would ignore the rules about wearing their hard hat in their vehicles, break the speed limits that he had imposed in the name of health and safety, steal the road markers with their reflective strips, and forget to wear their face masks or florescent vests.

Whilst this was a frustration for Revaleta, it was perhaps more interestingly a cause for the production of all kinds of other uncertainties and
responses to those uncertainties, as we will explore in the next section. As the assistants that are put in place as a key feature of the machinic code are displaced by choice or by circumstance, we not only see the limits of the code but also the reappearance of an unpredictable and unsystematized relation to the anticipation of harm. When the engineering camp, normally a space of danger, became transformed into a space of celebration — the site of a party celebrating Peruvian independence day — the safety rules which people were used to being told to abide by momentarily disappeared. Workers were told that they could wear civilian clothing that day, drink beer, and leave their hard hats at home. Without the coding to hold them in place, we found that the assistants mobilized to produce a machinic coding to militate against the anticipation of harm suddenly lost their power to prevent accidents according to the strictures of the coding which produced them, producing the effect of confusion and bafflement. It is here that we can begin to attend to the hidden dimensions of the apparently ‘transparent’ code as we are forced to recognize that the relationship of assistant to code is highly ambiguous — evidenced in this case by the fact that many still turned up at the party in their full safety attire.

The seemingly arbitrary way in which rules can be applied and removed, and the ways in which this creates spaces in which people make mistakes about how to relate to assistants at different moments in time, often makes it even more difficult to enforce these rules when people decide for themselves that the circumstances they are in do not warrant the use of assistants, or at least not in the ways intended. Signallers on the road remove rubber face masks intended to protect them from the dust because the masks are hot and sticky and these same people have spent all their lives travelling along dusty roads without face masks and seem to have survived. However, even when they are removed from their causal link with the machinic code, assistants like these face masks do not necessarily lose the residue of their effectiveness towards a relationship with an unpredictable future. For example, it may not be their capacity to protect against dust, but rather the capacity that they hold when worn to protect against dismissal or accusation of lack of complicity that allows them to operate as assistants in the mitigation of harm. Here we are suggesting that the ambiguity of the relationship between the machinic code and its assistants produces the space in which people then take responsibility for themselves in ways that exceed the terms of the code which, in signing their contract with the company, they have agreed to abide by.

Whilst the practice of instituting a machinic code is ostensibly all about making causal relations explicit, the social practice of codification harbours a certain ambiguity. The attempt to make explicit the orderings which produce generative relations requires the coder to move away from the empirically observable or the intuitive enactment and to render transparent the motivations, structures and forces which produce particular kinds of actions. Through this process of explication, the resulting codes themselves become socially restricted to those who are versed in the techniques
of observation, detection and inscription that make explication possible. Machinic codes thus often become associated with expert practice. Ironically, however, the very techniques through which codes explicate relations and render them transparent simultaneously produce descriptions whose formalization renders them inaccessible to others. The code becomes detached from the business of everyday living and is rendered opaque, or even secret.

The explanatory force of the ‘secret code’ lies not in its internal logic but in its promise to unlock meaning and explicate causality by proving relevance at a different scale from that where it was produced. This scale shifting alerts us to the leap required to bridge the gap between the processes of abstraction from which the machinic code is derived and the entangled web of shifting relations which the code is subsequently expected to describe and control. The process requires a reversal whereby the abstraction is produced as prior to that from which it was derived. The pursuit of DNA as the ultimate information system driving human beings engages this doubled explication, as public interest drives subsequent investment to decipher it in a way that seems to gloss over the gaping chasm between the explication of a genetic relation and the explication of human social behaviour. Likewise, the production of a machinic code in the area of health and safety aims to produce relevance by altering the specificities of behaviour according to a universal logic of rational action.

The machinic codes that the company devised and attempted to impose on its own workforce exemplifies the ways in which the management of risk involves both the direct control of workers’ bodies and sensibilities and the privatization of risk as workers become individually responsible for safety on the construction site. Yet the management understand that the code is not, in practice, generative of the norms of individual and collective responsibility upon which its efficacy relies. This insistence that risk can be managed through the imposition of regulations and codes of safe practice, while self-evidently foundational to company procedures, finds itself in constant confrontation with other notions of environmental and social hazard which it cannot contain. It is to the ways in which these other forms of anticipated harm make an appearance, and the assistants mobilized in dealing with them, that we now turn.

The Deflection of Harm in the Emergent Code

In this section we introduce into our analysis a discussion of the ways in which the uncertainty surrounding incidences of harm might be coded in ways that exceed their description as either located inside the machinic code and thus systematic and logical, or outside and therefore chaotic, uncoded and incomprehensible. We introduce into our analysis of uncertainty an alternative in the form of what we call the ‘emergent code’. By opening up the notion of coding from merely being a process of formal abstraction, we attempt to understand in greater detail the complex ways in
which lines of authority and control are established and negotiated around questions of security.

Awareness of the scale shifting that codification practices entail with respect to human behaviour has led the social sciences to articulate a rather different notion of coding to that outlined above, captured in the less formal notions of habit or norm. These codes of conduct are produced iteratively with a view to disambiguation rather than causal determination. Case law which produces precedents out of which legal doctrines are derived are a good example of these kinds of codes which orient action but do not determine generative relations in the same way as machinic code. Indeed, such codes are brought into being through the processes of their enactment and it is in this sense that we use the term ‘emergent code’. The emergent code still has a powerful and restrictive hold on the shaping of the relational possibilities available to those who come under its rubric. Far from being free to change at will, these emergent codes, like machinic codes, also appear to entail a process of encoding, but this process operates with different techniques and produces different kinds of expertise and alternative dynamics as far as transparency and secrecy are concerned. In particular we are interested in how different forms of anticipatory coding co-exist and work on each other, looking more explicitly at how emergent codes embrace the relations and orientations which machinic codes, by contrast, seek to transcend.

When people heard that a worker had died many spoke of the inevitability of the accident. This was, they said, the first in what was bound to be a series of fatalities. The accident happened in a landscape imbued with the presence of powerful spiritual forces, and the death was seen by many as retribution for the harm being done to the land as it was gouged out, displaced and removed in the process of road construction. There was little surprise that the man was run over – no doubt, some said, the earth grabbed hold of his legs and held him fixed in place as the machine rolled over him and crushed him. There was a recognition that these kinds of occurrences happen all the time. Since the accident there had been reports of other events. There were rumours that some of the dead man’s co-workers had begun to be haunted by his spirit, whilst others had fallen sick inexplicably. Another person told how a bulldozer had mysteriously crossed in front of one of the other night drivers, almost causing another accident. We were told that this was just the first in what was to be a long run of deaths resulting from the construction project.

What were the means then of dealing with these kinds of occurrences? How did people approach the inevitability and yet unpredictability of harm that would occur through this project that was meant to be producing a more secure future for them? One means of mitigating the potential anger of the earth forces that were considered to be at play in this incident was to ensure that proper ritual payments were made to these spiritual forces, before the earth was tampered with. The people who described the accident as the outcome of unpredictable forces of retribution were used to making
such payments at the beginning of the agricultural cycle in the hope of an abundant harvest, at the start of any construction project or business venture, even when setting out on a journey (Harvey, 2001), and there was a recognition that a similar ritual would be appropriate in relation to the process of road building.

Aware of this ritual practice in the region the road was to pass through, the community relations team at the engineering company had in fact performed a ceremony before the construction began where they made some ritual offerings to the earth in the form of the Andean ‘despacho’. In the Andes people make such offerings to mountain and earth forces in an attempt to draw these beings into relationships of exchange for mutual benefit. Huge care is put into the details of such offerings, which have to be performed accurately in order to avoid antagonizing the powers which animate the Andean landscape. These powers have the capacity to ruin harvests, kill livestock, and send illness and death. They also have a capacity for benevolence and can bring good fortune to a lucky few. Forging a relationship with earth and mountain forces in this way is, however, explicitly without guarantee. Humans can appeal but they do not control.5

In this respect, ritual payments involve a rather different sense of anticipation to that mobilized by the machinic code. As Amoore and de Goede (2008) and Anderson (2010) have shown, contemporary forms of governance involve a range of different responses to the anticipation of an uncertain future, variously described as practices of pre-emption, prediction and preparedness (also see Massumi, 2005). Revaleta’s health and safety code can be understood in these terms. It is a form of preventing harm which incorporates, in particular, aspects of pre-emption (accidents will happen and we must act to stop them before they do) and preparedness (health insurance for all workers and indemnification insurance on the part of the company). In contrast, the Andean despacho does not fit easily within these characterizations of contemporary governance, and as an anticipatory practice might better be characterized through the idea of ‘petitioning’ for a safer future.

Given the different basis of anticipation in the health and safety procedures as opposed to the ritual payment to the earth, the performance of an Andean despacho by the engineering company was therefore highly ambiguous. The authenticity of the practice was dismissed by some observers as impossibly naïve or deeply cynical, carried out as it was by a firm whose managers had no personal investment in the land and no belief in the importance of maintaining good relations with the land as a powerful and sentient life force. However, they did have an interest in calming the workforce. Thus we also found that the engineering consortium decided to hold a Catholic mass for the worker who had been killed. The death had led to a proliferation of hauntings and ghostly threats and workers were refusing to come to the site where the man had died. Themselves anxious to put an end to the contagious effects of the first death, the company recognized that there was a need to engage with the apprehensions of their
workers, even if their primary motivation was to calm the work force rather than the earth itself. Whilst, in the mode of the machinic code, the company had to find ways of exercising a duty of care that produced generative effects as transparent and reproducible, here they were drawn into engagements which required a sensitivity and attention to the emergent code. The duty of care was produced here not as a systematizing logic but rather as a relational capacity. This nonetheless operated within powerful, if not fixed, parameters of its own. The company policy was certainly to be respectful of local beliefs but, as in so many other post-colonial and development ‘encounters’, such culturalist accounts of difference which suggest that different people simply ‘believe’ different things mask other potentially more volatile differentiating practices such as the potential to attribute value, claim ownership, and express concern in a way that is recognized as valid (Cruikshank, 2005; Povinelli, 1995).

One of the striking things when listening to Revaleta’s description of the machinic qualities of the health and safety code as a means of protecting against harm was just how different it seemed from the codes which worked to organize the anticipation of harm in manual construction projects that lay outside of the remit of the company. Most of the workers in the induction class came from the local area, due to a legal stipulation which had been imposed on the engineering company that they must employ labour from the locality through which the road was passing, whenever possible. As such, these workers were accustomed to an Andean mode of collaborative labour through which construction projects in the communities from which they hailed were usually organized. Just that week we had been in a community near the engineering camp, watching a group of people take down and re-assemble two adobe houses that were in the way of a small track that they had wanted to straighten and widen. The community work party was organized precisely around a kind of intense sociality that Revaleta had explicitly outlawed as amounting almost to conspiracy to murder under the rubric of a machinic code where personal responsibility remained the lubricant which enabled the production of a safe future to be realized. Revaleta had explicitly outlawed drinking, joking, smoking, and even laughing as potential distractions which could transform danger into risk and ultimately accident, yet these were utterly obligatory activities in Andean work parties like those that we observed. In these parties, the source of potential harm lay not in the equation that Revaleta outlined between danger, risk and accident, but rather in the danger of inhabiting a world without sufficient or proper relations. The code which militated against this occurrence was an emergent code, a code through which relations must be built and rebuilt according to circumstances which thrust themselves forward with meaning and force as misfortunes of different kinds. For the work party, ensuring safety meant ensuring adequate sociality. This required activities like drinking and smoking, activities which generated energy and the comradeship needed to prevent the collaboration from falling apart. Far from being an attempt at control as the primary
means of mitigating harm, the emergent code which these work parties produced was one oriented towards the production of energy as a way of engaging an uncertain future. In some contexts, passing out from excess alcohol is taken as a sign of trust and a job properly celebrated (Harvey, 1994).

Here, the practices oriented to ensuring the ongoing efficacy of the emergent code required their own assistants – alcohol, coca leaves, ritual payments to telluric forces, ties of compadrazgo (godparenthood) and of kinship, and the acknowledgement of particular skills and capacities that marked particular men as ‘specialists’ (maestros) who would direct proceedings through direct involvement, taking the lead, performing the most difficult tasks, and showing others by example. Emergent codes are thus distinguished from machinic codes not by the existence of hierarchy or by the deployment of assistants, but rather in the assumption that all orderings are experiments or possibilities concerned with social relations that in the final analysis are not determinable by reason.

**Emergence in the Machinic Code**

For many people the risks and dangers produced by large-scale road construction projects are multiple. However strongly invested people are in the roads, the process is fraught with anxiety and preoccupation. These anxieties point to the fundamental uncertainty as to whether or not the road will become a public good. This raises the question of exactly who it is ‘good’ for: local towns and villages, regional or national economies, foreign investors, or those with the wit or the luck to take advantage of opportunities? The question of how benefit will accrue and to whom are questions that swirl around these projects, as rumours of corruption, hidden deals, and personal gain cling to the infrastructures of future possibility – their materials, their jobs, their promise of transformation. Construction companies do little to engage these anxieties. Drawing on the machinic codes of national and international statute, they limit their responsibility to the legal obligation to ensure that the construction process itself does not endanger life, or engender negative environmental impacts that could have been avoided. Indeed, as far as they possibly can they seek to produce explicit ‘procedures’ to frame all their activities as machinic codes, precisely as a mode of self-protection from the vortex of potential disappointment. Responsibility for the generation of benefit rests elsewhere, not least with the people who are constantly reminded that they are being provided with this road and it is up to them to make something of it.

In this respect machinic codes appear as devices that offer protection in and of themselves. Machinic codes appear here as assistants that enable the construction companies to detach the technical from the social, and to proceed on that basis. Within this framing, the degree to which the companies attend to social issues becomes an added benefit, a gesture of goodwill, an agreement that enhances a bid and adds value to the core expertise of a company. And yet as we suggested above, machinic codes are
notoriously unstable with respect to projects of social ordering precisely because those relations and affective forces that are carefully put to one side do not go away.

We were fascinated to observe how those responsible for health and safety in the construction process tackled this dilemma of the destabilizing gap between machinic and emergent codes. Their response was to embed the machinic codes in fields of passionate relations. Of all the many people we spent time with on the road construction project, none were as obsessive or as overtly passionate about their work as the health and safety officers. This attitude was one which they openly talked about and took pride in. The loved their work and they were fascinated by their potential to draw others into practices of safe living. Education was central, but education worked through allure, passion and affect. We saw in the previous example of the health and safety induction how the engineer in charge worked on his audience with a deep sense of theatricality—evoking the insecurities that seem to require machinic codes for safe living. Others worked via different relational possibilities. We were particularly captivated by a health and safety engineer who taught inductees by drawing his students into dramatic scenarios where they had to learn to help each other to survive. He was fascinated by his job and wanted to teach by contagious enthusiasm. The challenge was to conjure scenarios that his students could invest in emotionally, so that they would be motivated to learn the skills they needed to be able to work safely. The skills were not machinic codes but principles of interdependence and a capacity to improvise. For example, he taught them how to make a stretcher from poles and a shirt and stressed the importance of being able to respond to accidents in remote sites. We were particularly impressed by his passion for road signage. He wanted his road to have the best signage of any in Peru. Such signs are, of necessity, standard forms—themselves codes designed to disambiguate potential hazards such as bends, steep inclines, or to offer clear instructions as to speed limits. Nevertheless, his versions of these signs were hand-drawn, lovingly painted, and carefully placed. He was particularly happy about the reflectors that he had fixed to bridges and curves to alert drivers to dangerous drops. These small devices had succeeded in capturing local interest to the extent that people were said to be taking special trips to see ‘the lights’, sometimes travelling up to 13 km for the pleasure. Their popularity was such that they were also being stolen, which, while disappointing in some respects, was also clear evidence that they ‘worked’, they were noticed, and that they were mobilizing people.

In their enactment through material relations of assistance, all the machinic codes we have referred to in this paper also participate in the affective fields of the emergent codes that they are designed to side-step. For in the social world all abstractions are unstable as they continually re-enter material dynamics of exchange and circulation that render them unpredictable. In these circumstances the assistants in play multiply. At the same time, and by extension, the assistants themselves provoke a
flouting of machinic code. Thus while Revaleta positions himself as an assistant to the project of health and safety by extending his panoptic gaze in order to engender a principle of self-discipline in his workers, he also invites a response. Driving down ‘illegal’ short-cuts (cortes), the drivers of the consortium’s 4x4s are sceptical of Revaleta’s capacity to see them and are simultaneously able to transfer their trust in Revaleta’s rules and regulations into a trust in the capacities of the vehicle to perform the health and safety measures built into off-road vehicles. At the same time, there is a frisson of excitement about breaking Revaleta’s rules and possibly even wonder at the ability of the vehicle to take them to the limits of acceptable practice. Bored, away from home for long periods of time, in environments that offer them little by way of habitual past-times beyond the television and a football pitch, the construction site and its surroundings are environments made for practical jokes, seductions and the dangerous hide and seek with Revaleta and those who became his eyes and ears.

These brief examples are intended to demonstrate the importance of looking at the specificity of the relationships in which machinic codes come into being, the risks they make visible, and the limitations or slippages that are produced when these codes are imposed, however strictly they are applied. Such codes can only become relevant to the extent that they engage with existing modes of safe living and the established expectations of others. Their abstract causal logics are destabilized by the lived experience and self-evidence of other options. While all the security personnel that we came across in the company had a sense that they knew better, and saw local people as in need of education, the means by which they enacted and produced the machinic code necessarily required an openness to other possibilities or codes of relationality which we have demarcated here as emergent. It is interesting, for example, that the skilled urban workforce were more likely to follow health and safety regulations with regard to eating in ‘approved’ cafes than they were to obey the rules on speed or having fun in the workplace. By paying attention to the practices of codification of different kinds, we find that experts do not rule through the authoritarian imposition of the health and safety code. Rather, we find that the coding practices are imbued with affect such that they operate to ensure that workers engage specific principles and mechanisms of safe-living. The manager or expert can remain utterly committed to ensuring safe-living in the fields of relations for which they have responsibility and at the same time deflect responsibility for anything that happens onto individual workers – instantiating the specific ways in which notions of security and control are combined. Our approach has thus shown the ways in which the power of governmentality through security emerges as a precarious and relational effect. Much as Ahmed (2010) has argued in relation to ‘happiness’, ‘security’ does not reside in objects but emerges relationally, and circulates in what are often subtle subversions of any particular purpose or orientation. The intentions that generate specific regulations and bring particular assistants into play are not necessarily the means by which a sense of security
is engendered. Revaleta knew as well as anybody that security was not ensured merely by the existence of regulation or by the presence of the assistants deployed by him and his colleagues. The thrill or even the mundane instrumentality of alternative practices imbues the landscape of security and control every bit as much as the following of machinic codes.

Conclusion

In this article we have explored the way in which people confront the anticipation of harm in relation to road construction in terms of a tension between different kinds of coding practices. Building on the notion of coding as a social practice which entails the participation of assistants, we have investigated the appearance of two different tendencies which we suggest emerge as responses to conditions of uncertainty. The first is the more familiar version of coding, involving practices oriented to the production of what we call ‘machinic’ codes which attempt to render the world predictable, and which set up the conditions through which causality can be specified. The second involves certain practices which conventionally fall out of the language of coding but which, we suggest, offer an important additional dimension to understanding the ways in which the practice of coding is more complex and less determined than the machinic code allows for. This involves practices which encode a relational response to potential future occurrences, producing what we call ‘emergent’ codes oriented to a future that is inherently unpredictable in terms of the detail of its actualization. In some respects the differentiation between machinic and emergent codes echoes the distinctions that Massumi identifies between codification and coding, regulation and regularity, rule and habit (Massumi, 2002: 81–8). However, our focus in this article has been on how a focus on coding as a socially situated and morally charged social practice reveals the many ways in which machinic and emergent codes are never fully differentiated. We have been particularly interested in the role that the emergent code plays in enabling machinic codes to assume that semblance of autonomy on which their social force depends.

By focusing on the way in which assistants are an integral part of coding practices, we have drawn attention to the centrality of forces of affect, emotion and desire as integral to the dynamics of coding. Attention to the divergent ways in which machinic and emergent codes respond to the uncertainties of an unfolding future holds the potential to reveal how different forms of anticipatory coding effectively entrench and destabilize lines of social and cultural difference. Approaching the material interventions of engineers as forms of governance, we have suggested that the practices through which engineers participate in the reproduction of contemporary forms of governmentality is not through the imposition or enactment of a singular logic but through the negotiation of a tension between abstractions which code the world according to machinic principles, and normative social codes which are concerned with the emergence of
social relations. We suggest that machinic and emergent codes are not just interdependent, but that the relationship between the two is what sustains the ways in which the desire for greater security simultaneously produces anxieties about unwelcome control.

We have used ethnographic material to explore the social practices of coding which we found people to be mobilizing as ways of dealing with the anticipation of harm under conditions of transformation. We do not suggest that the codes we have identified are the only ones that matter; there are many kinds of habitual practice that could be drawn on to exemplify the distinctions we are discussing here. Indeed, it is arguable that what we are calling emergent codes are not really codes at all. Alternatively, we could see them as relational potentialities, or forms of association which are produced as the affective culmination of history, biography and interactions with material environments. Nonetheless, our primary aim has been to question the hegemony and exclusivity of the machinic code as the only form of coding by introducing the notion of emergent codes into the discussion. Our purpose in making this analytical distinction has been to help us identify with more precision how these different means of containing and relating to people and things orient practice in environments which seem to become increasingly uncertain in the face of state-led infrastructural development projects. We have also been concerned to find new ways of analysing the contemporary politics of difference as articulated and experienced under conditions of development and state intervention. In this respect we hope to have shown that an extension of our characterization of codes through attention to their relational imbrications provides a fruitful analytical approach. It is clear that coding practices are far from neutral interventions in social situations and themselves work as ‘assistants’ in the configuration and mitigation of anticipated harm. The variety of codes which course through a multiplicity of relational practices produce actions of different kinds. Some of these could be seen as simply cynical responses to cultural incommensurability, such as the enactment of the offerings to the land by the engineering company. Instead, however, we have suggested that by attuning ourselves to the co-presence of the machinic and the emergent code, we have been able to describe these events not as a clash between closed worlds that imitate or impinge on one another but rather as contingent and constraining codings and patternings which can operate as explanations for dynamics of contradiction and confusion as well as conduct and control.

In this respect we have extended the work of Douglas (1992), who likewise was interested in how to produce an account of risk and blame which bridged the apparent gulf between anthropological accounts of divination, witchcraft and sorcery as responses to uncertainty on the one hand, and the scientific enumeration of risk on the other. In invoking the language of machinic and emergent codes to confront the practices out of which these separations occur, we suggest we have come a little closer to evoking the politics through which ‘cultural’ difference can be understood to be constituted. Here we have focused on how difference is made through engagements with
danger as produced by projects of state control. In this sense we have tried to move away from the evocation of a contemporary neo-liberal system producing overarching dangers of one particular kind, with the implication that alternative systems produce alternative dangers that are radically disconnected from the neo-liberal project. Instead we have shifted our attention to the co-presence of diverse practices as they emerge in relation to shifting matters of concern that are provoked by contemporary forms of environmental intervention and development. This has begun to allow us to incorporate various dimensions of the problem of safe living — from Revaleta’s calls for personal responsibility, to the ritual payments to the earth, from the evocation of wonder in road signs, to the trust placed in mechanical vehicles — into a single description, without collapsing the differences that continue to provoke and engender both suspicion and wonder about the dynamics of change and the possibilities of the future brought about by dangerous but desired technologies like roads.

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**Notes**

1. See for example Merriman (2004) and Moran (2009) for a description of some of the risks and unforeseen effects of road construction projects in the UK and Schivelbush (1986), who writes about the fears associated with the introduction of the railroads in the 19th century.

2. In this respect, roads might be seen as an instance of what Beck (1992) terms the ‘risk society’ in that they produce both the material and epistemological conditions in which society comes to be organized around the problem of risk.

3. See for example Mann’s (1993) discussion of infrastructural power and some of the more specific consequences for Latin American states in Salvatore (2006).

4. We take the term from Peter Sloterdijk, who writes about the acceleration in ‘explication’ over the 20th century, referring to ‘the revealing-inclusion of the background givens underlying manifest operations’ (Sloterdijk, 2009: 9).

5. See Allen (1988); Gose (1986, 1994); Harris (1982); Sallnow (1987). Such orientation to powerful forces includes the ways in which people imagine and engage the state (Poole, 2004).

6. There are interesting overlaps between the notion of ‘machinic codes’ and the ‘engine sciences’ described by Carroll as the ‘cultural integration — in practice — of natural philosophy, mathematics, and engineering in the second half of the seventeenth century’ (Carroll, 2006: 7). Carroll’s interest in looking at the processes involved in rendering diverse practices and material entities amenable to both statecraft and experimental science are clearly still at work in the codifications that fascinate 21st-century science and statecraft.
References


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