Dirty work: fixing cars for us

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Abstract

Late modernity has seen a shift of work away from physical labour with material objects to what Hardt and Negri (2000) call 'immaterial labour'. The servicing and repair of cars remains a form of work that involves manual and mental skills in manipulating objects that cannot easily be substituted by robots or computers. Such work goes on in a multitude of small service centres to sustain the mobility of modern societies as most users choose to pay someone else to maintain this piece of equipment that is an intrinsic part of much contemporary social life.

Fixing cars requires human workers to confront a series of objects (the car, its various components, hand and power tools, lifts, diagnostic machines, fluids, dirt and so on) that the user of the car routinely avoids. This is not bricolage but work organised in relation to a series of social systems; such as the MOT, manufacturers' service guidelines, training of personnel and the business relationship between service centre and customers. This paper explores the theme of ‘dirt’ and its management within the practices of the garages studied.

Introduction

When a car is involved in a crash at a speed sufficient to bend metal and bring it to an abrupt halt, it usually leaves on the surface of the road, along with bits of broken plastic from light fittings and paint flecks, a pile of dirt. This is a moment when what is taken to be a perfectly clean vehicle by the passer-by, displays that it is actually harbouring a quantity of dirt about which its owner and keeper almost certainly did not know. Those involved in such a crash are too shocked and preoccupied with how the people are and what the damage is, to the vehicle to be worried about this unseemly exposure of hidden dirt. It is left to the policeman or roadsweeper to remove this unsightly stuff. But it comes from the recesses of your car where the car technician at the garage has to work when you want the vehicle serviced or repaired. It is about the dirty work that we ask such technicians to do that this paper will look at.

Modern cars are designed so that the 'bodywork' is made up of hard, smooth, metallic and glass surfaces on the outside that are exposed to view. It is these surfaces that get washed when the weekend job of car cleaning is done at home or the local drive-thru car wash. A clean car is one that has no dirt or streaks on the painted metal, the chrome and glass – these surfaces reward the proud owner by reflecting his image and sparkling in the sun's rays. But about a fifth of the car's outer surface is 'underneath', not usually visible to the eye of anyone looking at the vehicle as it stands on the road. This underneath is not a smooth, rounded, continuous surface but a flat surface with a series of indentations and folds, with pieces of equipment attached. Four large recesses house the wheels with their brakes, suspension and steering mechanism and there is some sort of recess at the base of the engine, though nowadays often partially covered-in by a removable plastic panel. The underneath of modern cars is largely covered with a grey or black plasticised, under-seal to protect the metal structure and components – it has a surface that is bumpy and textured and usually covered in the grime that is splattered up from the road. It is the dried on, accumulated debris, particularly from the wheel arches, that the car deposits in the shock of a prang.

This paper is drawn from a research study into the professional maintenance of the private car. Maintenance work was filmed at a number of premises of varying sizes and organisational complexity. The paper is mainly exploratory, as this is work still in progress. For most of us the car is a functional and unproblematic asset but when it does break down, develops a problem or needs routine attention, we usually turn to professional help. During our research we were struck by the extent that dirt constitutes the working environment of the car maintenance professional. The world of the garage technician is a very different one to the smooth metallic and glass surfaces, and upholstered comfort that form our usual experience of the car. For many this omnipresent dirt would be reason enough not to venture into this twilight region of our own cars. For those not so squeamish, the increasing technical complexity and specialist tools and equipment required, means that car maintenance is normally left to professional care.

It is the dirty nature of almost all this professional care that we are concerned with. This will involve a journey into this nether world, deep and dirty, down under the ordinary domestic car, into the recesses behind the wheels, beneath the bonnet and to those under-parts of the car that the driver seldom has anything to do with. This is the dirty work that we routinely delegate to the technicians to do in these spaces with the cold, hard, unpainted metal surfaces of the mechanical components and the functional greys of the rubber and plastic tubes and protective coverings. Unless the car is very new, these surfaces are almost always dirty, covered in a mixture of unspecific dirt from the road (usually carried as a muddy liquid to where it lodges before it dries in place), oil and grease, (blackened and impregnated), rust in its various stages and metal dust shed as parts work against each other. These areas make up the 'dirty spaces' of the car, and we begin our journey by standing in a maintenance pit under a car undergoing an MOT check.

Figure 1: Dirty spaces under the car

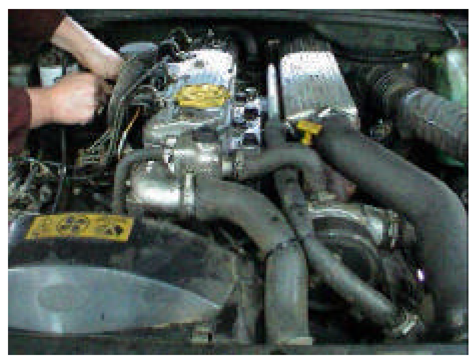

Figure 2: The engine

Figure 3: The wheel arch

The single object of 'the car' is of course a multitude of component objects, welded, bolted, riveted, glued and pushed together. What we users of the car see as a continuous, discrete entity that moves as we drive it and stays put when we get out and leave it, is, for the car mechanic, a series of things that can be taken apart, adjusted, replaced and cleaned. The components underneath are designed and made for function – no one cares what they look like, close up or from a distance. What is important is that they contribute to the operation of the vehicle, translating the wishes of its occupants to move, stop, turn and provide a comfortable ride. The smooth working of the vehicle depends not only on the presence and functionality of the solid components but also the cleanliness of a series of interfaces between moving components – greases, oils, silicons, rubbers, plastics. The more fluid components take a form that the person inside the car would already think of as 'dirt' – grease and oil once out of its container sullies the lived-with surfaces of skin, cloth, vinyl, hard plastic and painted metal. The rubbers and plastics of bushes and fixings contribute their own form of dirt to that of metal components that pollute surfaces under the car. All solid materials give up fragments that transform the colour and texture of the fluid materials, which in turn attach to any surface they touch and then hold any airborne particles of dry and hard materials. The result is a range of different types of dirt from slime to grime, from more or less viscous to more or less solid.

In addition to the fluid lubricants, the car holds other fluids – screenwash, engine coolant, brake fluid, battery acid – that drip and seep from their discrete containers, especially during a top up. These fluids may do little damage within the already dirty surfaces underneath and inside the car's engine compartment. But they would pollute the inside of the body – either the body of the car or the body of a human – and prove to be a particularly vitriolic form of dirt.

Oil

We have all seen the golden or colour-tinted translucent, almost transparent, beauteous viscous substance that is sold as engine oil – at least in advertisements. But whatever engine and whatever state it is in, as soon as the oil enters it is transformed into a black, opaque liquid that becomes more viscous in the last dregs of the sump. Removal of the old engine oil is a routine part of any service; difficult to do while the vehicle sits on the ground. The drain plug is at the lowest point of the engine, underneath and in the centre of the vehicle. The modern lift or ramp raises the car above the technician so he can see and touch the nethermost parts of the car that are virtually inaccessible to the driver. Early in the service a special removal tank with an adjustable draining funnel is brought underneath to catch the soiled fluid from the sump while other inspection work proceeds. The technician has to take care when removing the drain plug, since the second it's released the oil will flow with the pressure of gravity – and onto his hands and up his sleeve if he isn't careful.

The oil draining from this Land Rover begins as a smooth and continuous arc but as the pressure decreases it's trajectory hits a steering rod and the draining fluid, begins to break up and fall messily into the funnel.

Figure 4: Oil draining

Particles

Air carries particles of material into the upward facing cups in the engine block through which the spark plugs are bolted. There the particles coagulate with oil that runs off the rocker cover. When the plugs are removed any dirt gathered in the cups may fall into the cylinder and interfere with the fine engineering of the piston head and cylinder cavity. To avoid this, high-pressure air through a long nozzle can be used to remove the particles breaks into small grimy lumps and fly around the engine compartment.

Figure 5: Blowing away dust particles

Rust and dust

The brakes are a mixture of finely engineered and lubricated pistons that expand to translate pressure to the brake shoes or pads, and dry, abrasive pads that provide the friction on metal surfaces to slow and stop the roadwheels. The pistons of slave cylinders, and the inside of pipes carrying brake fluid must be clean and shiny to move smoothly and ensure a steady translation of pressure. But the abrasion of pads on exposed metal produces dust and dirt from the compound on the pads which mixes with the rust from the unpainted, unlubricated metal. Inside rear brake drums the detritus accumulates and the springs and clips rust and their movement becomes restricted with dust. Extracting the debris requires the removal of components and provides an opportunity to check the integrity of the pipes, cylinders and rubber dust covers.

Here a wire brush is used to first break up the encrusted dust and rust inside a rear brake drum. The dust is blown off with expelled breath and subsequently degreaser is used to drag the dust off in a light liquid that drips to the floor. The technician has a paper ‘rag’ in his hand while doing this work but does not use it on the surface of the components.

Figure 6: Cleaning brakes with brush

Grease

Just as engine oil becomes black and opaque as soon as it is used so does grease. But the grease is no better than translucent to begin with and some graphite-based greases are black and sticky to start with. The road wheels of the car are fundamental to the vehicle's movement and the interface between the wheel and the car moves all the while the vehicle is moving at speeds many times that of the car over the road. The multiple roller bearings that form this interface are subject to pressures in all directions as the weight of the car pulls and pushes in all planes. A feature of modern front wheel drive cars is the 'constant velocity' or CV joint that translates the torque from the engine to the road wheels at the same time as accommodating movement in a horizontal plane from the steering and a vertical plane from the suspension. The joint has to turn at the speed of the drive axle but be able to move through something like ninety degrees in the horizontal plane and twenty in the vertical plane to cope with changes in the angle of the wheel in relation to the vehicle. This is a complex joint in which the bearing moves with the speed of the axle and has many moving parts in continuous use while the car is rolling. Because of its complex range of movement, and unlike the hub bearings, the CV joint is not enclosed within metal parts so that its lubricating grease is vulnerable to dirt. A synthetic rubber 'boot' that has a bellows design to allow the flexible material to move in two planes protects the joint. The boot keeps granular dirt from contaminating the metal bearings that would lead to them wearing out very rapidly. The rubber of the boot separates the dirty world outside from the slimy world inside the joint and greasing the joint requires careful management of these ambiguous materials.

Figure 7: Greasing a CV boot

Ensuring that the boot is in good condition and replaced promptly when split or showing signs of deterioration is a standard part of servicing and MOT checks. When damaged, the old boot is likely to be contaminated with road dirt but also with grease from inside the bearing. Removing the boot exposes the bearing and its grease; it is virtually impossible for the mechanic not to get dirty during this operation. Replacing the boot involves a procedure of expanding it over a 'shoe' to help it go beyond the metal components of the joint. This process of stretching and sliding the boot into place is done with a special lubricant that is slimy yet sticky – a more slimy form than ordinary bearing grease, it contaminates everything and is unpleasant to the touch. Technicians usually wear plastic or rubber disposable gloves for this task. Once in place, the excess lubricant is removed using cloths or paper towel: lubricant should be inside the boot to help the smooth running of the CV joint, outside should be clean and not so sticky as to attract and hold road dirt once the vehicle is back in use.

Figure 8: Cleaning off excess grease

The significance of dirt

In Western societies the processes of industrialisation and urbanisation led to changes in the way that dirt was perceived. In pre-industrial rural communities dirt was commonplace and seen as positive and fertile. Dirt gave life and was also a sign of ‘plain living’ and ‘honest toil’ (Hoy: p22). However, this perception of dirt could not be maintained with the arrival of the industrial revolution. The rapid industrialisation and urbanisation associated with this period resulted in an unprecedented concentration of the population. The scale of this massive expansion can be shown by the population census of the industrialising towns of the North of England in the 19th century. Between 1801 and 1851 Bradford's population grew from 13,000 to 104,000, Sheffield from 46,000 to 135,000, Leeds from 53,000 to 172,000, Birmingham from 71,000 to 233,000, Manchester from 75,000 to 303,000, while Liverpool rose from 82,000 to 376,000 (Daunton, 1983: pp 212-33, cited in Belcham 1990: p37). The concentration of such large numbers of people in small areas meant that outbreaks of ‘filth diseases’ were much more common, and their consequences far more severe. These consequences also began to be seen in a different light: economic concerns replaced humanitarian ones. Porter (1994) argues that in the first part of the 19th century Enlightenment humanitarian concerns for relieving the individual's suffering were transformed by utilitarian political economy into economic considerations: '*It was the economic value of preventing premature mortality to the expanding industrial state which was primarily responsible for public health reform in early 19th century Europe*' (Porter, 1994: p8). In Britain the sanitation movement of the first half of the 19th century was led by '*Jeremy Bentham’s secretary and most ardent disciple, Edwin Chadwick, public health reform in Britain was a crusade to reduce the financial burdens of destitution through a campaign against infectious infections caused by "filth"*' (ibid.: p9). Humanitarian concerns continued to be expressed through philanthropy. People like Sir James Phillips Kay-Shuttleworth aimed to '*reform the "ragged"* *classes by educating them into the role of civically hygienic citizens*'. Philanthropy's duel agenda was an attempt to '*eliminate environmental filth and moral depravity with one stroke*' (ibid).

By the 1840s the first generation of sanitarians were attempting to tackle the problem of the '*filth diseases*' by advocating the building of sound sewers and the provision of clean water (ibid: p124). Chadwick's ideas of public health were selective, some parts of the environment, such as sewers, became a part of medicine, while others, such as diet and the workplace disappeared: '*Chadwick and company rejected work, wages, and food to focus on water and filth, arguably the greatest "technical fix" in history*' (Hamlin, 1998: p13). Chadwick narrowed the concept of public health to two '*politically innocuous*' factors: clean water and sewers. The *Sanitary Report* of 1842 makes the case that insanitary conditions are the cause of disease. Using William Farr's data, Chadwick insisted that the evidence shown by the death rates of preventable disease by county pointed to one cause: '*atmospheric impurity, occasioned by means within the control of legislation, as the main cause of the ravages of epidemic, endemic, and contagious diseases among the community, and as aggravating most other diseases*' (cited in Hamlin, 1998: p160). Hamlin argues that a moral agenda underlies Chadwick's veneer of scientific empiricism: the use of selective cases; vague generalisations, examples of folklore and assumptions of proven induction without the backup of a systematic appraisal of relevant evidence. Chadwick uses his examples as evidence that 'speaks for itself', and leads the reader to the conclusions he has set out to prove (ibid: pp160-2). In the report, Hamlin notes, Chadwick often equates dirt and squalor with moral depravity: '*Thus, at some point the poor were no longer innocent victims, but truly depraved beasts*' How these people came to be in such squalor is not explored by Chadwick: '*readers were simply given a correlation - revolting conditions and despicable people*' (ibid: pp167-8). Hamlin argues that the *Sanitary Report*, written over a period of increasing poverty, economic distress, and political agitation, was '*an ideological manifesto, not an empirical survey of conditions affecting health*' (Ibid: p187). It was a manifesto which espoused a science of public health through the construction of an environment which would lead to social stability; a document which would assist in the imposition of order. Later scientific advances led to the linking of disease to specific micro-organisms rather than dirt itself, resulting in the combination of the sanitarian's Public Health and the scientist's Germ Theory to 'rationally' combat disease. Although, discoveries of disease causing spores in dirt helped maintain the strong connection between dirt and disease, and germ theory reinforced the cult of cleanliness (Tomes, 1998, pp 38-47). Almost a century after the advent of germ theory gave the control of dirt a fully scientific rationale Mary Douglas restated the underlying moral objection to dirt implicit in much of Chadwick's work.

In *Purity and Danger* (1966) Mary Douglas argues that ambiguity proves difficult for human beings to deal with in their collective activities; culture involves classification, the demarcation of different items and activities in the world in relation to each other. For Douglas dirt is essentially disorder, the breakdown of classification, in which the boundaries between classes are ambiguous or confused. There is then no absolute form of dirt, merely a series of relationships between things in the world that may appear to us as natural but which are established through cultural responses to living with and distinguishing between those things. The elimination of dirt is 'a positive effort to organise the environment' a 'reordering of our environment, making it conform to an idea' (Douglas 1966: 2). Rituals of purity unify a culture so that 'Disparate elements are related and disparate experience is given meaning'. In the modern world of scientific and technological rationality such rituals are not determined by religious principles but by a system of knowledge and action based on evidence of the workings of the material world. But as Douglas argues in relation to primitive cultures: 'The whole universe is harnessed to men's attempts to force one another into good citizenship' (1966: 3). Even in modern societies, where knowledge and action are no longer dominated by religion, practices in relation to classification, not least those concerning dirt, continue to carry moral connotations. These become ritualistic in that dirt is routinely identified as 'matter out of place' that must be dealt with by a systematic response: 'Dirt is the by-product of a systematic ordering and classification of matter, in so far as ordering involves rejecting inappropriate elements' (Douglas 1966: 36).

How, then, can Douglas' view of dirt be applicable to the technological rationality that the car and its maintenance are built upon? The engineer's concern with dirt is related to the working capacities of functional items – the build up of dirt will increase wear on moving parts and may eventually lead to their inability to function. Dirt will damage smooth surfaces designed to move against each other with as little friction as possible. Oil, grease and other lubricants provide a continuously flexible interface between moving parts. But oil and grease contaminated with dirt will increase the wear on hard surfaces, grinding away the hard material to change the orientation of opposing surfaces. Joints between moving parts become worn which reduces the smooth juxtaposition of moving parts increasing play and so decreasing mechanical efficiency. Movement in the joint in directions unintended by the engineer increases the space in which dirt can become introduced and so hasten the damage to the surfaces and. Energy is absorbed by the moving parts rather than being translated from one to another and when such parts heat with absorbed energy they will eventually melt and fuse. Moving parts not subject to high velocities can become simply blocked up with dirt and contaminants that prevent their free movement. The degradation of metal, grease and rubber components can also lead to their collapse – the part degrades to such an extent that it is no longer able to support the pressures to which they are subject.

There is then a mechanical rationality that underlies the management of dirt on the moving parts of a car. While the owner's concern with dirt is usually limited to the control of dirt on the lived with surfaces of the vehicle (dirt on the body and glass work, dirt inside the seating compartment), the technician or mechanic takes responsibility for the management of dirt in the working parts of the vehicle. Since the working parts are subject to continuous assault by dirt they are always more or less dirty but at intervals the dirt must be removed if it is not to cause mechanical defects in the future or if mechanical defects that are detected are to be properly corrected. The detail of the management of dirt underneath the car is of little direct concern or interest to the owner or driver. Instead, their concern is with the smooth and efficient working of the mechanical parts of the car – that is, that it should continue to work as it has been doing. The owner of the modern car accepts that regular or routine servicing will reduce the chances of 'breakdown', of the failure of the vehicle to work as expected. They also accept the legal requirements for MOT checks that are directed to the continued safe operation of the vehicle, checks that are focussed on those components such as brakes, steering, bearings and tyres whose failure in use could lead to the vehicle becoming uncontrollable and dangerous to all road users.

At first glance then, the management of dirt within the working components of the car is beyond aesthetics and culture and driven by the technological rationality governing the mechanical components of the vehicle. But the technological determination of the maintenance of cars is a cultural subsystem that is affected by broader criteria than incontrovertible mechanical principles. For example, the precise degree of dirt that can be tolerated underneath cars is partly a function of the specific design of a particular arrangement of components and partly a function of the specific procedures developed to deal with dirt within a particular social setting. In other words, the precise response to how to deal with dirt underneath cars is not systematic and is the result of conventions of practice. The result is that different technicians and different workshop organisations will respond to dirt in different ways. Just when dirt will be removed, how much attention will be given to dirt and how its removal will be managed will vary according to criteria that are partially mechanical and partially the result of cultural and organisational arrangements. Approaches to the removal and management of dirt vary according to different settings and between different technicians.

Research in different settings found that the practices used on exactly the same type of maintenance activity differed somewhat. For example, when servicing brakes sometimes degreaser is squirted from an aerosol onto components on the car and allowed to drip on the floor – later it is cleaned away. In one workshop the routine cleaning of brake components while still on the car was done with aerosol degreaser that dripped to the floor where it was absorbed by sawdust and then swept away. Dry dirt from brake shoes and rust on exposed metal was first abraded to loosen it into fine particles, then sluiced with liquid degreaser to move it to the floor, then absorbed into dry sawdust to enable it to be swept up into a dustpan before being put into the place where all dirt should go – the bin. Plastic dustbins are used as a repository for a wide range of dirt from work on cars. We also watched the bin being put directly under the wheel being cleaned so that the degreaser carried debris straight into the bin, skipping out the sawdust and sweeping process. In another workshop, a water-based degreaser was used from a portable bath and pump system so that the chemical liquid can be cleaned and reused rather than simply thrown away. The degreaser is again being used to transform both dust particles and grease or oil residues into a liquid that will flow away to remove all ambiguous materials. Air pressure is used to finally dry the components; a wash and blow dry.

Figure 9: Cleaning brakes 1

Figure 10: Cleaning brakes 2

Those who become technicians accept their involvement in dealing with dirt (as do all humans to a greater or lesser extent) and bring to their practices a general sense derived from the culture about the control of contamination and dirt. Through training, guidance and experience this general sense is expanded to take in the special practices that they will engage in – working with mechanical objects that are continually exposed to dirt. Work practices are further undertaken within organisational contexts that impose practices and procedures including those to do with the management of dirt. The maintenance of cars, therefore, is not based solely on mechanical rationality as a cursory glance might imply. The link to culture is especially strong in the context of dirt.

Douglas' Schema

Douglas describes the modern world as one in which stability is achieved through a system of classification in which objects have recognisable shapes and have permanence that produces a 'schema' of the material world. The modern car fits into such a schema and at a focus on fine detail, the mechanical components underneath the car extend the schema. Components that malfunction or show signs of malfunction become ambiguous and dirt is a sign that components are failing to take up their place within the schema. The dirt on components may simply hide their distinctness or connection with other components; it may intrude on the environment of the components making dealing with them difficult and messy. Dirt produces ambiguity in the material world under the car and creates ambiguity for those attempting to apply a stable 'structure of assumptions' about the working relationship between components (Douglas 1966: 37). However rational the reasons behind cleaning practices in the modern garage they become routinised and so become rituals of the practices of service and repair. Draining the oil and cleaning drum brakes are activities based not on the actual failure of mechanical parts but on procedures established to minimise future wear caused by dirt. The rituals of cleaning begin to return the components to the form they had before dirt had accumulated. It returns components towards the relative lack of ambiguity of their 'new' state when dirt and its effects were absent.

Douglas notes Sartre's example of things that are 'slimy' as being anomalous and ambiguous in terms of a classification system. Things that are 'slimy' are neither liquids nor solids, and as such 'do not fit in' with our main classifications. The ambiguity of slimy materials is to do with the way they flow slowly, or melt into themselves, their softness and their stickiness to other objects including the skin. Slime is yielding, it adheres to us; it appears that we can possess it, yet, when we hold it, it reverses the situation and possesses us. For Sartre, the classificatory system that distinguishes between different material objects carries a moral connotation so that 'the slimy is a response to a demand, already the bestowal of self, the slimy appears as already the outline of a fusion with the world and myself' (1957: 605). Slime 'offers a horrible image; it is horrible in itself for a consciousness to become slimy' because such a consciousness would be perpetually held back from projecting into the future (Sartre 1957: 610). Sartre describes slime as the symbol of an 'anti-value', a form of being not yet realised, but always threatening to be realised. This moral ambiguity is reflected in the distaste demonstrated by technicians when dealing with slime – but it is also a fascination of their work, to deal with ambiguous materials and control them to create an assemblage in which dirt is minimised, slime is enclosed in the appropriate areas and the interfaces between mechanical parts is properly managed.

If dirt and slime are ambiguous materials, neither hard nor soft, of indeterminate colour, facilitating a moving connection or threatening to damage it, there are cultural strategies designed to respond to ambiguity. Anomalies must be confronted at the cultural level if confidence in the entire system is to be maintained and Mary Douglas highlights five different strategies for dealing with them: 1) resolving an anomaly by reinterpreting the event; 2) physical control; 3) avoidance; 4) labelling the anomaly dangerous; 5) ambiguous symbols used in rituals (1966: 40). The design of cars and their components will attempt to avoid the merging of slimy materials and dirt and just as in other areas of cultural life (such as domestic hygiene and public health) anomalies are labelled 'dangerous'. Car users routinely avoid the dirt under their cars, leaving it to the garage technicians to manage it. Technicians will usually avoid personal contamination by using overalls, workboots and disposable gloves. Ambiguity is managed by technicians through ritual practices such as the squirting on of degreaser agents that turn both particle dirt and greasy dirt into a liquid that through gravitational flow and evaporation leave a clean component. The use of paper towels and wire brushes are physical means that directly control the build up of dirt or other ambiguous materials. As Douglas explains, in the modern world '[w]e do not bring forward from one context to the next the same set of ever-powerful symbols: our experience is fragmented. Our rituals create a lot of little sub-worlds, unrelated' (1966: 70). The world of technological reason has consistencies and continuities but is not a homogenous culture as was the world of religious forms. The sub-world of professional car maintenance has established a series of rituals and practices that have proved effective in managing the ambiguity of dirt.

<u>Strategies for dealing with anomalies in the sub-world of professional car maintenance</u>

1) **Reinterpretation:** The car's design is contrived to hide its dirty underbelly leaving it to be confronted by the sub-world of professional car maintenance. The sleek white car departs, but the deception is exposed by the dirty signature it has left on the white tiled floor.

Figure 11: The clean car

Figure 12:The dirty ‘footprint’ left by the clean car

2) Physical control: Much of the dirt from underneath the car that is detached while it is being worked on falls to the floor, making the work place dirty. The control of this build-up of dirt on the floor is a continuous process, linked to safe working practices, but also linked to an aesthetics of organisational space. The clean work space is ready for more work to take place, for a new vehicle – often the work bay is cleaned after the work on one vehicle is finished and before the arrival of the next, as if cross contamination were a risk. The build up of dirt on the floor reflects both the parts of the car that have been worked on and the underneath spaces that accumulate dirt. The management of dirty work is often divided organisationally so that technicians remove dirt from cars and their components but create dirt on the workshop floor that someone else (cleaner or trainee) then has to remove. The physical control of dirt varies according to organisational setting.

Figure 13: Technician sweeps up in small independent

3) Avoidance: The user avoids the anomaly of dirt under the car routinely and the technician avoids direct contact wherever possible – this again can vary greatly. In all the settings visited the technicians wore ‘overalls’ that protected their ‘ordinary’ clothes from dirt, oil and grease. The larger garages arranged for overalls to be cleaned so that staff members were always able to look clean and present the brand name and colours of the master organisation (sometimes the car manufacturer, sometimes the brand of garage or chain). Workshop foremen who managed the work rather than undertaking it themselves, usually wore coats made that carried similar colours and labels. This lesser degree of protection symbolically represented their greater distance from the dirty work and greater proximity to the relatively clean work of desks. The workcoat is of course much easier to remove and its revered lapels went with a white shirt and tie. Managers and owners were more likely to wear ordinary business clothes. One owner was also the only mechanic and was never seen at work in anything but overalls. Another owner/manager, who was never seen in overalls, was occasionally seen working on vehicles.

A noticeable feature of the way that technicians managed their own relation to dirt was through the use of plastic disposable gloves rather like those used by health professionals. The oils and other materials that the technicians work with are potentially harmful to the skin and will inhibit the healing of the cuts and calluses that seem to be entailed in the work. Sometimes a barrier cream would be applied first, and then the gloves providing a very high degree of protection that would make cleaning easier on completion of the task or shift. Of course both barrier creams and rubber or plastic gloves constitute ambiguous materials of more or less slimy consistency that were not necessarily any more attractive than direct contact with the dirt.

Figure 14: Using protective gloves

4) Labelling the anomaly dangerous: Dirt is labelled a health risk and as such must be controlled. In practice, while some dirt is undeniably dangerous to health, some forms of dirt, clutter and rubbish are not such a direct threat. This is reflected in the differing way such anomalies are confronted within different organisations. While particle dirt, dust, slime and grease are all ambiguous materials that require to be ordered through the organisational culture of the workshop, the failed components and worn parts that are removed also take on an ambiguous status as rubbish. In smaller organisations where time spent clearing up was time not spent working on vehicles, there was a difficult compromise between managing dirt of all sorts and getting the work done. The consequence was that there were more likely to be areas of the workshop that attracted used and discarded components and pieces of equipment. It is difficult to distinguish just what is still of use and what is simply ‘matter out of place’ in some workshops. Where the classification system has to be shared throughout a hierarchical organisation with many employees, such ambiguity cannot be tolerated. It is the larger organisations that have applied principles of rationality not simply to the work on mechanical objects but to the organisation of the work and the workspace. In these large workshops cars are worked on in bays side by side. There is a uniformity in the way each space is controlled and kept clean. The technicians tools are kept ordered and organised in the large red toolchests that distinguishes their equipment from that owned by the garage. Each bay will have its own bin and it is the responsibility of someone low in the organisation to keep the bins empty.

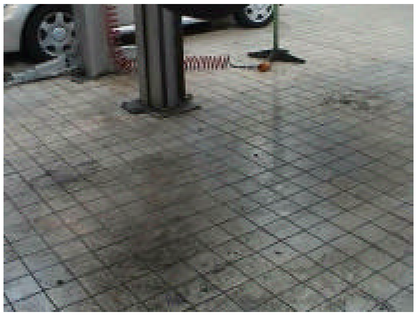

Figure 15: Build up of dirt in a highly controlled environment

5) Dirt as symbol: All dirt, whether harmful or not, is considered potentially dangerous. The danger imputed to dirt is used as a justification for the reordering of the environment. Behind the expressed danger of dirt lies the moral danger of breaching and blurring cherished classifications. Although we have concentrated on the dirty aspects of car maintenance, the increasing technical complexity of modern cars requires the technician to posses a wide range of skills running from basic engineering to computer diagnostics. Our concentration on dirt is partly due to the pervasive presence of dirt under cars, and partly a cultural response to the anomaly of dirt itself. This focus on dirt in no way seeks to denigrate the profession of car maintenance, which is unfairly tarnished by the wider cultural response to dirt and ambiguity.

Figure 16: Some work is not so dirty

Conclusions

The inside of the private car is generally clean. Newer cars are cleaner and cleaner to work on than older vehicles. Newer cars are more likely to be found in the large dealerships who have linked service agreements to sales. These are the organisations that will have more modern workshops with specialist equipment to keep them clean. The technicians will have a high degree of support and encouragement to keep themselves and their workshops clean – this is not to suggest that smaller organisations dealing with a different segment of the market are any less likely to meet all the safety at work requirements, many of which are concerned with aspects of cleanliness. But whatever the organisational setting and whatever the routines for dirty management, the business of working on the underneath of cars is dirty.

There is a perception of the motor mechanic or technician as no better than a 'grease monkey' whose work is defined by the ambiguous materials that they have to work with. In this paper we have tended to reinforce this stereotyped view but in later papers we will focus on the technical skill and embodied knowledge that really define the work that they do. The stereotype of repair and maintenance work on cars as being 'dirty work' is why such work is regarded as menial and, like the dirty work of cleaning institutional and domestic buildings, is poorly paid and with low social status. In explicating this particular form of dirty work to show that it is both a material aspect of modern cars and a practical and organisational feature of working on them, we hope to have shown how the car users response to dirt interferes with recognising the complex nature of the work that is actually undertaken beneath cars. The work may be dirty but is not mechanical; it requires a form of knowledge of the interaction of the parts of cars and tools that depends on a particular relation between mind and body that must be learnt and which cannot be built into machines or robots.

Following Douglas, we have argued that lying behind the practical reasoning of keeping cars running and operating safely is the moral objection of dirt as disorder. From the viewpoint of technical rationality, dirt cannot be allowed to interfere in the precision-engineered machinery, which keeps our cars operating efficiently and safely. However, as Douglas argues, our responses to dirt go beyond scientific rationality. We share with primitive cultures a moral objection to dirt; whilst theirs is a total worldview, ours are fragmented sub-worlds. This moral objection to dirt sits uneasily with the technological rational objection to dirt as a medium responsible for damaging precision-engineered systems and components. This tension is highlighted by the differing approaches and cultural practices to dealing with dirt that are superficially thought to be governed by the unifying discourse of mechanical rationality. Whatever they know about the mechanical principles of how cars work, most car users will avoid the risky work involved in dealing with the underneath of their cars in which dirt, slime and ambiguity await them. Most of us are pleased to ask someone else to do the dirty work of fixing the car.

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