

Car culture and global environmental politics

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Abstract. This article develops emerging critical approaches to global environmental politics by starting with the question, posed by Julian Saurin: ‘If degrading practices occur as a matter of routine, how do we account for this?’. Through an analysis of the global political economy of the car, it shows that widespread social practices which systemically produce global environmental change are simultaneously deeply embedded in the reproduction of global power structures. It focuses on three interconnected aspects of this global political economy—the role of the car industry in processes of globalization, its role in reproducing capital accumulation in the twentieth century, and the promotion of the car over its alternatives by states.

*A man with a good car, needs no justification
Fate is in my hands, and in the transmission*

(Gang of Four, ‘A man with a good car’, *Hard*, EMI, 1983)

There is now an emerging critical literature on global environmental politics (GEP) within International Relations.² This literature, in differing ways, is critical of what remain the conventional approach(es) to the study of environmental change within International Relations. The main intention of most of this literature is to disrupt the notion that international power structures are neutral with respect to environ-

¹ I am grateful in particular for insightful comments on an earlier draft of this article from Richard Devetak, Peter Newell, David Scrivener and Ben Seel, and to an anonymous reviewer. I am also grateful to those present at seminars in the Department of Politics and International Studies at Warwick University, at the British International Studies Association Conference in December 1998 at Sussex University, and at Carleton University, Ottawa, where earlier versions of this article were presented, for lively and positive feedback, as well to students on my third year course on the politics of the car for stimulating debates and some excellent research papers.

² For example Ronnie D. Lipschutz and Ken Conca (eds.), *The State and Social Power in Global Environmental Politics* (New York: Columbia University Press, 1993), pp. 306–26; Simon Dalby, ‘Security, Modernity, Ecology: the dilemmas of post-Cold War security discourse’, *Alternatives*, 17:1 (1992); Peter Doran, ‘Earth, Power, Knowledge: Towards a Critical Global Environmental Politics’, in John MacMillan and Andrew Linklater (eds.), *Boundaries in Question: New Directions in International Relations* (London: Pinter, 1995), pp. 193–211; Lorraine Elliott, *The Global Politics of the Environment* (London: Macmillan, 1998); Thom Kuehls, *Beyond Sovereign Territory: The Space of Ecopolitics* (Minneapolis: University of Minnesota Press, 1996); Karen Litfin, *Ozone Discourses: Science and Politics in Global Environmental Cooperation* (New York: Columbia University Press, 1994); Matthew Paterson, ‘Radicalizing regimes? Ecology and the Critique of IR Theory’, in John MacMillan and Andrew Linklater, *Boundaries in Question*, pp. 212–27; Anne Sisson Runyan, ‘The “State” of Nature: A Garden Unfit for Women and Other Living Things’, in V. Spike Peterson (ed.), *Gendered States* (Boulder, CO: Lynne Rienner, 1992); Julian Saurin, ‘Global Environmental Degradation, Modernity and Environmental Knowledge’, *Environmental Politics*, 2:4 (1993), pp. 46–64; Julian Saurin, ‘International Relations, Social Ecology and the Globalization of Environmental Change’, in Mark Imber and John Vogler (eds.), *Environment and International Relations: Theories and Processes* (London: Routledge, 1996), pp. 77–98.

mental change. The liberal institutionalists who dominate the study of environmental change within IR assume such neutrality as they simply analyse the responses of states collectively to such change. Implicit (and occasionally explicit) is an assumption that the interstate system can *in principle* respond effectively to environmental change. Critical writers aim to challenge this assumption. Many of them (although not all) also wish to challenge the assumption that the states system is the only power structure on which it is relevant for students of IR to focus their attention.

Nevertheless, there are differences of approach within this critical literature. One strategy is to develop ideas taken from Green political and social theory and develop them within an international or global context. Some writers have started to go beyond a critique of conventional approaches, and generate more constructive arguments about what a distinctly Green perspective on IR/global politics might involve.³ This literature focuses on Green critiques of anthropocentric ethics, hierarchic power structures, instrumental reason, and so on. The intention is to outline how a Green perspective is distinct from other perspectives in IR (while having some clear common interests and also clear contrasts with other perspectives, particularly feminist, critical-theoretic, post-structural and Marxist). This approach remains heavily normative in its theoretical orientation, containing various embedded assumptions about the ecologically unsustainable nature of contemporary societies. It is weaker in establishing the viability of these assumptions.

A second strategy is to argue that global power structures are inconsistent with principles of sustainability required by the ecological crisis. Lorraine Elliott's *Global Politics of the Environment* is a good example of this line of argument.⁴ She sets up the debate in the familiar terms of Cox's problem-solving/critical theory distinction.⁵ For her, to adopt a critical approach is to suggest that:

the contemporary political and economic order is quite likely to be part of the problem ... This introduces a different set of questions. What prospect, for example is there for effective environmental governance in a decentralised system of sovereign states? Does the liberal international economic order, with its emphasis on freer international trade, modernisation and export-led growth, provide a firm basis for the elaboration of principles and strategies which will overcome global environmental decline, or is the liberal international economic order part of the problem in the first place? Can we achieve environmental security in a militarised world?⁶

The reason why existing political, social and economic structures are 'part of the problem' is because their underlying principles mean that they are not conducive to *responding* effectively to global environmental change. A consequence of the sovereign states-system is that there is insufficient coordinating capacity to resolve

³ Eric Helleiner, 'International Political Economy and the Greens', *New Political Economy*, 1:1 (1996), pp. 59–78; Eric Laferriere, 'Emancipating International Relations Theory: An Ecological Perspective', *Millennium*, 25:1 (1996), pp. 53–76; Eric Laferriere and Peter Stoett, *Ecological Thought and International Relations Theory* (London: Routledge, 1999); Matthew Paterson, 'Green Politics', in Scott Burchill (ed.), *Theories of International Relations* (London: Macmillan, 1996).

⁴ Elliott, *Global Politics of the Environment*.

⁵ Robert W. Cox, 'Social Forces, States and World Orders: Beyond International Relations Theory', in Robert O. Keohane (ed.), *Neorealism and Its Critics*, (New York: Columbia University Press 1996), pp. 204–54.

⁶ Elliott, *Global Politics of the Environment*, p. 4.

global problems which require extensive changes in the practices of all of the world's states. The liberal international economic order constrains states from making the required economic interventions to reduce particular types of pollution or intensive resource use, and creates incentives for states to overuse particular resources.

The logic of such an argument predominantly takes the familiar form of the logic of collective action, and this it shares with regime analysts. The difference is simply over whether or not sufficient coordination is possible in a decentralized anarchic system. The argument here of Elliott and others is similar to a predominant argument of the 1970s such as that of Ophuls who argued for forms of world government as a response.⁷ The difference in Elliott's case is that she extends the analysis to discuss structures other than those of the interstate system.

A weakness of this approach is that it only manages to demonstrate that global power systems are logically contradictory to achieving sustainability. This is the meaning for Elliott of the states-system being 'part of the problem'.⁸ The states-system is spatially at odds with the logic of global problems, the principle of sovereignty prevents sufficient coordination to deal effectively with such problems, capitalism's growth dynamic is at odds with the steady-state requirements of a finite planet, and so on. The argument is abstract/deductive in form and is thus difficult to develop in specific contexts. What is missing is an explanation of why global environmental change occurs in the first place (like regime analysis, the explanation is implicitly that it is a 'tragedy of the commons' [sic] problem). This is evident in her misreading, or at least narrow reading, of Hildyard's 'foxes in charge of the chickens' metaphor.⁹ She correctly interprets this to mean that processes like UNCED have been designed to shore up the power bases of global elites and prevent radical social change, but misses the inference that it is those global elites and the social structures within which they are hegemonically powerful that drive global environmental change; who are the 'foxes'.¹⁰

A stronger critical approach would be based on an argument that these power structures systemically *produce* environmental change in the first place, rather than simply preventing successful responses to that change. This would establish a stronger case for critical approaches than simply to argue that (for example) states cannot effectively respond to the environmental crisis because of the problem of the 'spatial mismatch'. It also allows us to engage in interpretive analysis grounded in concrete processes and experiences, and suggests lines of enquiry which would enable us to develop more nuanced arguments about precisely what it is about capitalism (for example) that is unsustainable, and therefore what would be the necessary features of a sustainable political economy.

Julian Saurin is one writer who has tried to develop such an argument.¹¹ Saurin suggests that rather than analyse how states 'have responded to the impact of

⁷ William Ophuls, *Ecology and the Politics of Scarcity* (San Francisco: W.H. Freeman, 1977).

⁸ Elliott, *Global Politics of the Environment*, p. 4.

⁹ Nicholas Hildyard, 'Foxes in Charge of the Chickens', in Wolfgang Sachs (ed.), *Global Ecology* (London: Zed, 1993), pp. 22–35; Elliott, *Global Politics of the Environment*, pp. 117–8.

¹⁰ I am perhaps being slightly unfair to her here She does imply that such a process 'leave[s] the main causes of the trouble untouched' (*Global Politics of the Environment*, p. 118). But there is still no sense that such causes are bound up systemically with the logics of the world's major power structures; they remain a disparate set of dynamics underlying environmental change.

¹¹ Saurin, 'Global Environmental Degradation'; Saurin, 'International Relations, Social Ecology'.

environmental change—where the change is taken as given and relatively unproblematic—a thorough analysis of *causes* and of the *diffused* processes which engender environmental change’ should be developed.¹²

Saurin’s argument here has two consequences. Firstly, it suggests that investigating such causes and diffused processes leads us to challenge the implicit assumption underlying the arguments of regime analysts, and also of writers such as Elliott or Hurrell & Kingsbury, that environmental change is a ‘consequence of accidents, errors or misunderstandings’. Rather, we should talk of the ‘*production* of environmental degradation’.¹³ This leads us to discuss the material practices which produce such change. ‘Attention paid to globalized reiterated practices reveals incomparably more about the organization and administration of degradation than does a focus on the *ad hoc* and tangential witnessed in interstate environmental negotiations’.¹⁴

Secondly, his argument leads us away from discussing environmental ‘issues’. As Saurin suggests in his critique of Steve Smith’s provocative article about why the environment is ‘on the periphery’ of International Relations, this marginalization stems at least in part from its conceptualization as a set of discrete ‘issues’—climate change, toxic waste, species extinction, etc—which serve to marginalize the study within the discipline.¹⁵ But reducing ‘global environmental change’ to ‘environmental issues’ also serves to make each ‘issue’ appear discrete and by inference manageable, more amenable to technological fixes. This therefore abstracts from the systemic production of such change.

The ‘globalized reiterated practices’ I examine are those surrounding the car. Cars clearly generate environmental change across a range of ‘issues’. They are important in the way that human societies cause acid rain, climate change, a wide range of types of urban air pollution, as well as consuming large proportions of the resources used by humans, both directly and through associated activities such as road building. Simultaneously, the car has increasingly, albeit in some countries more than others, come under attack. There therefore exist practices of resistance to car culture and road building, as well as other responses at the levels of public policy and in terms of shifts in the general political climate.¹⁶ There will of course be much in the analysis which is specific to the practices surrounding the car, and I recognize also limitations due to the narrow range of countries from which examples are drawn, but there is also much which I would argue is generalizable.

¹² Saurin, ‘International Relations, Social Ecology’, p. 79.

¹³ *Ibid.*, p. 81.

¹⁴ *Ibid.*, p. 85.

¹⁵ Steve Smith, ‘Environment on the Periphery of International Relations: An Explanation’, *Environmental Politics*, 2:4 (1993), pp. 28–45; Saurin, ‘International Relations, Social Ecology’, p. 78.

¹⁶ There is not space here to examine the dynamics of such resistance. I give a brief account in Matthew Paterson, ‘Car Trouble’, in *Understanding Global Environmental Politics* (London: Macmillan, forthcoming 2000). For fuller accounts, see for example Derek Wall, *Earth First! and the Anti-Roads Movement* (London: Routledge, 1999); Ben Seel, Brian Doherty and Matthew Paterson (eds.) *Direct Action in British Environmentalism* (London: University College London Press, forthcoming 2000); George McKay, ‘Direct Action of the New Protest: Eco-rads on the Road’, in *Senseless Acts of Beauty: Cultures of Resistance Since the Sixties* (London: Verso, 1996); Brian Doherty, ‘Paving the Way: the Rise of Direct Action against Road-building and the Changing Character of British Environmentalism’, *Political Studies*, 47:2 (1999), pp. 275–91; Ben Seel, ‘Strategies of Resistance at the Pollok Free State Road Protest Camp’, *Environmental Politics*, 6:4 (1997), pp. 108–39.

This article tries therefore to go beyond a critique of regime theory, and to provide an empirical analysis consistent with the basic principles of a Green position in IR. I take as my point of departure Saurin's core question, 'If degrading practices occur as a matter of routine, how do we account for this?'.¹⁷ I therefore ask the question: How are the power structures of global politics implicated in the way that environmental change is generated? To answer this, I examine a set of social practices which systemically generate environmental change, and the way these practices are structured politically.

What I want to show is that use of cars is deeply embedded in the reproduction of global power structures. These daily consumptive practices and experiences simultaneously both systemically produce environmental degradation on global and local scales and also help to reproduce capitalist, statist, patriarchal identities and structures. Thus I argue that in this way such structures are deeply implicated in the production of environmental degradation. I advance such an argument here by analysing the rise of the car in terms of Global Political Economy. This involves three aspects: that the car industry has been instrumental in creating the transnational flows associated with globalization; that the reproduction of a globalizing capitalism has involved the expansion of the car industry as that industry made crucial contributions to securing accumulation; and that the state has been highly involved in promoting the car over its competitors, both because of the state's structural role in promoting accumulation, and because of the consequences of interstate competition, the importance of a car industry for development, and in some instances the car industry's connection to a state's warmaking capacities.

Such an argument is necessarily partial. A Global Political Economy which ignores the ways in which cars have become deeply embedded in twentieth century modern identities fails to explain the dynamics which have secured the car's rise. While outside IPE, political economy has started to come to terms with the importance of consumer culture in sustaining twentieth century capitalism, for example in debates surrounding post-Fordism,¹⁸ IPE has yet to follow suit. Indeed, Gramscian IPE, on which much of my argument below is premised, remains resolutely productivist in its orientation.¹⁹ Thus we should consider questions of consumer culture and identity in general terms through a focus on the symbolic power which the car has gained, where the car is valorized as a supremely modern (and rhetorically at least, therefore irresistible) technology and commodity. Furthermore, such forms of identification around the car have helped to reproduce the social inequalities endemic to modern societies and the symbolic politics of identity. However, for reasons of space I do not explore such questions here, and the

¹⁷ Saurin, 'International Relations, Social Ecology', p. 90.

¹⁸ For example, Ash Amin, 'Post-Fordism: Models, Fantasies and Phantoms of Transition', in Ash Amin (ed.), *Post-Fordism: a Reader* (Oxford: Blackwell, 1994).

¹⁹ See for example Mark Rupert, *Producing Hegemony: The Politics of Mass Production and American Global Power* (Cambridge: Cambridge University Press, 1995), who develops the Gramscian framework specifically in relation to the politics of production at Ford Motor Company.

analysis is limited to questions of political economy conventionally understood. I explore the cultural-symbolic aspects of cars in more detail elsewhere.²⁰

Cars and global environmental change

This argument of course implies that responding to environmental change and moving towards a more sustainable society necessarily involves a shift away from a car-based economy. It is perhaps worthwhile at this point spending a bit of space discussing the environmental impact of the car, in order to argue this. Cars are widely acknowledged as a main cause of many aspects of environmental degradation.²¹

Cars are a major origin of the pollutants causing a number of the major air pollution problems which societies currently face. Regarding global warming, road transport (of which cars account for a substantial majority²²) produces 23 per cent of the CO₂ emitted into the atmosphere in the OECD (CO₂ is responsible for approximately 55 per cent of global warming, and the IPCC suggests that emissions should decline by over 60 per cent to stabilize the climate)²³. This of course is only emissions directly from fuel use. The IEA estimate that this is only 60–65 per cent of total greenhouse gas emission throughout the life of a car, the rest coming from fuel

²⁰ See Paterson, 'Car Trouble'. For a selection of works focusing on such aspects of the car (from diverse perspectives), see for example Wolfgang Sachs, *For the Love of the Automobile* (Berkeley: University of California Press, 1992); Winfried Wolf, *Car Mania* (London: Pluto, 1996); Kristin Ross, *Fast Cars, Clean Bodies: Decolonization and the Reordering of French Culture* (Cambridge MA: MIT Press, 1995); Peter Freund and George Martin, *The Ecology of the Automobile* (Montreal: Black Rose, 1993); Andre Gorz, 'The Social Ideology of the Motor Car', in *Ecology as Politics* (London: Pluto, 1980), pp. 69–77; James Flink, *The Car Culture* (Cambridge MA: MIT Press, 1975); James Flink, *The Automobile Age* (Cambridge MA: MIT Press, 1988); Clay McShane, *Down the Asphalt Path: The Automobile and the American City* (New York: Columbia University Press, 1994); Judy Wajcman, *Feminism Confronts Technology* (Cambridge: Polity, 1991); Andrew Wernick, '(Re-)Imaging Technology: The Case of Cars', in *Promotional Culture: Advertising, Ideology and Symbolic Expression* (London: Sage, 1991); Marshall Berman, 'Robert Moses: the Expressway World', in *All That is Solid Melts into Air: The Experience of Modernity* (London: Verso, 1982).

²¹ Although this is always problematic, I shall stick to a narrow definition of 'environmental' here. The reorganization of urban space that a car-based system effects is of course a crucial form of environmental change in terms of people's direct experience of the space around them. The substantial number of deaths and serious injuries caused by cars, should also in many ways be considered an environmental problem. In the UK, for example, more people have been killed on the roads since 1945 than were killed in the Second World War on active service (See Mick Hamer, *Wheels within Wheels: A Study of the Road Lobby* (London: Routledge & Kegan Paul, 1987), p. 2; for general figures on this see Wolf, *Car Mania*, pp. 201–4). Here, however, I deal only with aspects of the 'environment' involving pollution and resource consumption.

²² For Australia, the only country where the International Energy Agency gives a figure, cars contribute 65 per cent of total road transport emissions (International Energy Agency, *Cars and Climate Change* (Paris: OECD, 1993), p. 222). Australia has higher than average emissions from freight, due to its size. Concerning all OECD countries, Gordon suggests that cars account for 85 per cent of all the energy used in transport (and therefore 85 per cent of the CO₂ emissions, since practically all the transport emissions come from oil). See Deborah Gordon, *Steering a New Course: Transportation, Energy and the Environment* (Washington, DC: Union of Concerned Scientists/Island Press, 1991), p. 7.

²³ Figures producing the 23 per cent figure are calculated from International Energy Agency, *Cars and Climate Change*, pp. 30–2. The global figure is lower, at about 14 per cent (Michael P. Walsh, 'Highway Vehicle Activity Trends and Their Implications for Global Warming: The United States in an International Context', in David Greene and Danilo Santini (eds.), *Transportation and Global Climate Change* (Washington, DC: American Council for an Energy Efficient Economy, 1993), p. 5. The IPCC figures are from J. T. Houghton, G. J. Jenkins, and J. J. Ephraums, *Climate Change: The*

extraction, processing and transport (15–20 per cent), manufacturing (10 per cent) and tailpipe emissions other than CO₂.²⁴ Even this discounts the emissions involved in road construction (to say nothing of the deforestation road construction often either directly involves or indirectly promotes). They are also the major contributor to many of the gases known collectively as Volatile Organic Compounds (VOCs) and to about 90 per cent of total carbon monoxide (CO) emissions. Chemical reactions involving these compounds produce tropospheric ozone, another greenhouse gas. However, cars assume greater importance in the politics of global warming than this suggests, since along with aviation, they are the only sector whose underlying emissions trend in industrialized countries is one of growth. Emissions from domestic and industrial sources, the other major sectors, have been roughly stable since the mid-1970s. So dealing with cars becomes particularly important, as it is widely recognized that technical advances can easily be outstripped by growing car use.

Cars also are a predominant cause of acid rain. Road transport accounts for between 33 and 50 per cent of NO_x emissions in industrialized countries (varying by country),²⁵ averaging 48 per cent across the OECD as a whole.²⁶ About 60 per cent of road transport NO_x emissions come from cars.²⁷ These gases (NO_x comprises both nitrous oxide and nitrogen dioxide) cause acid rain, which has already caused substantial damage to lakes and fisheries, crops, buildings, and human health, throughout the industrialized world, and is starting to do so in other countries.

Local air pollution problems are also to a great extent caused by car emissions. VOCs, benzene, lead, CO, particulates, and other exhaust emissions have been associated with a wide range of health problems. These include brain damage, respiratory problems and infections, lung cancer, emphysema, headaches, aggravation in those with heart disease, low birth weights, leukemia and stress (from noise levels).²⁸

Therefore, in relation to all of these environmental problems, car use helps to create a dynamic leading to the emergence of international environmental regimes conventionally understood in IR (especially concerning acid rain and global warming). Companies involved in car production and related activities, in particular oil companies, have been highly involved in lobbying on those issues to defend their interests, and some would suggest have been structurally powerful, enabling them to defend those interests successfully.²⁹

IPCC Scientific Assessment (Cambridge: Cambridge University Press, 1990), p. xx. This is an underestimate of the importance of CO₂, since Chlorofluorocarbons, responsible for about 20 per cent of global warming to date, have been phased out under the regime to deal with ozone depletion. CO₂ correspondingly becomes more important. See Matthew Paterson, *Global Warming and Global Politics* (London: Routledge, 1996), pp. 11–14, for a fuller discussion of this.

²⁴ International Energy Agency, *Cars and Climate Change*, p. 37.

²⁵ John McCormick, *Acid Earth* (London: Earthscan, 1989), p. 62.

²⁶ International Energy Agency, *Energy and the Environment: An Overview* (Paris: OECD, 1989), p. 34.

²⁷ For slightly differing figures, of which 60 per cent is a half-way figure, see Sonja Boehmer-Christiansen and Helmut Weidner, *The Politics of Reducing Vehicle Emissions in Britain and Germany* (London: Pinter, 1995), p. 93, or Transnet, *Energy, Transport and the Environment* (London: Transnet, 1990), p. 36.

²⁸ For a longer discussion of these, see Freund and Martin, *Ecology of the Automobile*, pp. 29–33.

²⁹ In relation to global warming politics, see Peter Newell and Matthew Paterson, 'A Climate for Business: Global Warming: The State and Capital', *Review of International Political Economy*, 5:4 (1998), pp. 679–703. For acid rain, see for example Sonja Boehmer-Christiansen and Jim Skea, *Acid Politics* (London: Belhaven, 1991) or Sonja Boehmer-Christiansen and Helmut Weidner, *The Politics of Reducing Vehicle Emissions in Britain and Germany* (Pinter: London, 1995). On the role of cars in producing such problems, see for example International Energy Agency, *Cars and Climate Change*.

The second major class of environmental problems which a car economy is heavily involved in producing is resource depletion. Cars consume between 35 per cent of the oil in Japan up to 63 per cent of the oil used in the US, simply in their use. Oil is also a major resource in asphalt and therefore road production. In the US, car production consumes 13 per cent of all the steel, 16 per cent of the aluminium, 69 per cent of the lead, 36 per cent of the iron, 36 per cent of the platinum, and 58 per cent of the rubber (both natural and synthetic).³⁰

Finally, a car-based society has radically altered space. Urban space in particular has been systematically reconstructed to make allowance for the space required to move people about in cars. Cars take up huge amounts of space which could be used for other purposes. The highest figure is for Los Angeles, where two thirds of all land space is devoted to car use—driving, parking (at shops, work, home, restaurants, etc.). For the US as a whole, about half of urban space is devoted to car use, while 10 per cent of available arable land is taken up by roads and parking places.³¹ Many suggest that this has become a self-reproducing trend, as the reorganization of towns and cities to make car-based mobility more possible has meant that increasingly a car has moved from being a luxury to a necessity.³²

A global political economy of the car

If we want to answer Saurin's question, a reasonable starting point is in international/global political economy, more precisely in IPE which has its origins in Marxism. This allows us to emphasize the way in which capital accumulation requires the success of particular industries (the specific industries concerned may change over time), and the way in which the state is structurally required to intervene to ensure continued accumulation and thus to promote key industries. I use this below to show how the specific material practices involved in the car are organized as part of the ongoing reproduction of capitalist societies, and are increasingly organized transnationally rather than simply within national borders. But at the same time, the car industry is not simply something which has been organized through capitalist enterprises; it is an industry which has been seen ubiquitously as a key industry in ensuring continued accumulation.

Discussions of the car industry within IPE tend to focus on two questions.³³ Firstly, there is a concern to explain the changing spatial organization of the car

³⁰ Freund and Martin, *Ecology of the Automobile*, pp. 17–19.

³¹ All figures in this passage are taken from Freund and Martin, *Ecology of the Automobile*, pp. 17–19.

³² See for example, Gorz, 'Social Ideology of the Motor Car', Ivan Illich, *Energy and Equity* (London: Calder & Boyars, 1974); Wolf, *Car Mania*.

³³ I exclude here a substantial body of work within industrial relations which is connected to such themes. This literature asks questions concerning the changing forms of work organization. The car industry is often taken as an exemplar of such changes—the shifts from Fordism to post-Fordism exemplifying the car industry's importance in this respect. See for example Steven Tolliday and Jonathan Zeitlin, 'Introduction: Between Fordism and Flexibility', in Steven Tolliday and Jonathan Zeitlin (eds.), *The Automobile Industry and its Workers* (Cambridge: Polity, 1986), pp. 1–25. For a selection of other works on industrial relations and the global car industry, see for example C. M. Law (ed.), *Restructuring the Global Automobile Industry* (London: Routledge, 1991); F. C. Deyo, *Social Reconstruction of the World's Automobile Industry* (London: Macmillan, 1996); or Ulrich Jurgens, Thomas Malsch and Knuth Dohse, *Breaking from Taylorism: Changing Forms of Work in the Automobile Industry* (Cambridge: Cambridge University Press, 1993).

industry, reflecting a broader concern with a shift from an ‘international’ to a ‘global’ economy. The car industry is often taken as a paradigm case of a globalized industry.³⁴ Dicken emphasizes how the car industry is organizationally one of the most globalized of all manufacturing industries, and had transnationalized early. Ford and General Motors had set up plants abroad during the 1920s, and by 1994, for example 57 per cent of Ford’s production took place outside the US. Most of the largest car manufacturers have over 40 per cent of their production outside their ‘home’ country.³⁵ Although a substantial majority of final car assembly is still carried out in ‘triad’ countries in North America, Japan, and Western Europe, 20 per cent is now outside that area, and component manufacture is more widely spread.³⁶ Dickens also argues that car companies have been innovative in relation to emerging forms of interfirm alliances (such as sharing R&D costs) as one of the responses by firms to increased competitiveness pressures associated with globalization.³⁷ Others illustrate the transnational nature of the car industry through the notion of global commodity chains.³⁸

Secondly, there is a concern to explain this spatial distribution of production facilities in terms of government policies. A successful car industry has been widely taken to be a necessary condition for a successful economic development strategy by national states in the twentieth century.³⁹ Many states established various forms of protection to ensure dominance of the domestic car market by domestic firms, and several nationalized car companies as national ‘flagship’ industries. Mark Rupert also shows how the changes in production techniques and labour relations—collectively known as Fordism—laid the foundation for the projection of US global power in the mid-twentieth century.⁴⁰ Within a globalizing economy, the imperatives for governments to compete to attract investment is taken as the background for this concern. There is often a clear connection to normative policymaking concerns with how ‘we’ (nationally understood) promote ‘our’ car industry, as well as a concern to evaluate (and often emphasize) the role of the state under conditions of globalization. Reich, for example, shows that the success of ‘national’ car industries is dependent primarily on the degree of access to the domestic market which overseas producers have, and varied types of support given to domestic firms by the state.⁴¹ Gradually, as the economy has globalized, most countries have disbanded nationally owned car companies as the means of pursuing such goals, in favour of opening up

³⁴ See for example Peter Dicken, *Global Shift* (London: Paul Chapman Publishing, 1998, 3rd edn.), pp. 316–52, or David Held, Anthony McGrew, David Goldblatt and Jonathan Perraton, *Global Transformations: Politics, Economics, Culture* (Cambridge: Polity, 1999), pp. 262–3.

³⁵ Dicken, *Global Shift*, pp. 316–8 and 335–6.

³⁶ *Ibid.*, p. 319.

³⁷ *Ibid.*, pp. 337–8.

³⁸ See for example, Naeyong Lee and Jeffrey Cason, ‘Automobile Commodity Chains in the NICs: A Comparison of South Korea, Mexico, and Brazil’, in Gary Gereffi and Michael Korzeniewicz (eds.), *Commodity Chains and Global Capitalism* (Westport CN: Praeger, 1994), pp. 223–44, and Hyung Kook Kim and Su-Hoon Lee, ‘Commodity Chains and the Korean Automobile Industry’, in Gereffi and Korzeniewicz, *Commodity Chains and Global Capitalism*, pp. 281–96.

³⁹ Dicken, *Global Shift*, p. 316.

⁴⁰ Rupert, *Producing Hegemony*.

⁴¹ S. Reich, ‘Roads to Follow: Regulating Direct Foreign Investment’, *International Organization*, 43, pp. 543–84; Dicken, *Global Shift*, pp. 330–2. See also more generally, A. Kawahara, *The Origin of Competitive Strength: Fifty Years of the Auto Industry in Japan and the US* (Kyoto: Kyoto University Press, 1997).

markets, but simultaneously providing inventive packages to attract investment from now global firms. Such incentives include various forms of tax breaks as well as state investment in infrastructure for the factory concerned.⁴² One final concern often raised in these debates is that of the position of developing countries—whether or not it is possible for developing countries to emulate industrialized countries in developing a car industry, or how they might develop other policy tools to promote such an industry.⁴³

Literature on the car industry within IPE thus asks fairly specific questions regarding the car industry. It asks what role the car industry plays in contemporary shifts, to post-Fordism, to a ‘global’ economy, in particular, and what the consequences of such shifts are for national development strategies, and how states can attract investment from the car industry. More importantly for the present purposes, it allows us to show how the production of global environmental change is organized on a global scale, and transnationally.

But such questions also take for granted precisely what from an ecological viewpoint needs to be explained. They take for granted the expansion of the car industry, and ask questions only of how such expansion is organized. This is the case both for economic geographers or realists in IPE, concerned with the distribution of the benefits of the car industry between states, or for Gramscians like Rupert, concerned with the way accumulation is organized and contested. While a Gramscian IPE is a useful starting point to this sort of question, it is necessary to ask other questions to develop an ecologically oriented IPE. From this point of view, the taken-for-granted nature of the expansion of the car industry needs to be questioned. We need to explain why it is that the car industry came to be so dominant. This is a question of its growth relative to other transport modes. But it also a question of why transport as a whole has grown *per se*. Part of the answer to these questions lie in an explanation of the role of the car (and of transport more generally) in promoting economic growth.

Cars and growth

Cars have been seen to play a fundamental role in the promotion of economic growth in the twentieth century, and thus in the reproduction of capitalism as a system. Both proponents and social critics argue that both in terms of its direct stimulating effects on the economy and the broader political-economic shifts effected because of the motor industry’s role in reorganizing industrial production (‘Fordism’), the car has been central to promoting growth. This role has therefore

⁴² See Dicken, *Global Shift*, pp. 271–2, for elaboration of the types of support provided, and some of the biggest examples in terms of financial support provided by states.

⁴³ See for example Robert Gwynne, ‘New Horizons? The Third World Motor Vehicle Industry in an International Framework’, in Law, *Restructuring the Global Automobile Industry*, pp. 61–87; Graeme Maxton and John Wormald, *Driving Over a Cliff? Business Lessons from the World’s Car Industry* (Reading, MA: Addison-Wesley, 1995), pp. 132–41.

been central in legitimizing the car's expansion, enabling the car to become perhaps *the* symbol of progress for most of the twentieth century.

For much of the century, the motor industry, and associated industries (oil, steel, construction, in particular) have had growth rates noticeably above those for the economy as a whole. A fairly common assessment would be along the lines given by Overy:

the motor and aviation industries have both contributed to sustaining high levels of economic growth and technical change at a vital period in economic development, when the technical and market possibilities of the first industrial revolution were reaching a climactic point.⁴⁴

This was particularly the case in the US, where the particular strength of the car industry was crucial in the increasing dominance of the US economy over the rest of the world.⁴⁵

Debates concerning transport and developing countries also reflect this. Car ownership is expanding much faster in developing countries than in industrialized countries, partly reflecting saturation in the latter group,⁴⁶ but also reflecting cultural assumptions concerning connections between transport and development. Modernization theory, the dominant approach to development practice in the post-colonial period, has routinely assumed a linear relationship between transport growth and development. Although there has been a shift from assuming that transport growth leads directly to economic development (understood to mean GNP *per capita* growth), towards assuming only that transport creates permissive conditions for growth,⁴⁷ a strong connection is still assumed both in academic studies of transport in economics, geography and sociology, and by transport planners.⁴⁸ And the pervasive assumption in both such circles is that as countries move up the

⁴⁴ Richard Overy, 'Heralds of Modernity: Cars and Planes from Invention to Necessity', in Mikulas Teich and Roy Porter (eds.), *Fin de Siecle and its Legacy* (Cambridge: Cambridge University Press, 1990), pp. 54–79, at p. 71. The role the car played in stimulating economic growth is central to some of the classic histories of the car, such as John Rae, *The Road and the Car in American Life* (Cambridge MA: MIT Press, 1971), and Flink, *Car Culture; Automobile Age*. Flink, *Car Culture*, p. 167, suggests that the saturation of the market for cars in the late 1920s in the US was one factor in producing the Depression. For other expressions of the central role played by the car industry in stimulating economic growth, see for example Ross, *Fast Cars, Clean Bodies*, p. 19; IEA (1993) *Cars and Climate Change*, International Energy Agency, Paris; Wolf, *Car Mania*, p. 124; and Dicken, who quotes business management analyst Peter Drucker in the middle of the century thus: 'the automobile industry stands for modern industry all over the globe. It is to the twentieth century what the Lancashire cotton mills were to the early nineteenth century: the industry of industries'. See Dicken, *Global Shift*, p. 316; Peter Drucker, *The Concept of the Corporation* (New York: John Day, 1946).

⁴⁵ Wolf, *Car Mania*, p. 73; also Rupert, *Producing Hegemony*.

⁴⁶ See Marcia Lowe, *Alternatives to the Automobile: Transport for Livable Cities*, Worldwatch Paper 98 (Washington, DC: Worldwatch Institute, 1990), pp. 7–8, or Harry Dimitriou, 'Transport Problems of Third World Cities', in Harry Dimitriou (ed., assisted by George Banjo), *Transport Planning for Third World Cities* (London: Routledge, 1990), pp. 50–84. Dimitriou also suggests (at pp. 52–3) that the increase in car ownership in developing countries has been stimulated by aggressive marketing techniques by car manufacturers in the early 1980s because of reduced demand in industrialized countries because of the recession and general saturation of markets.

⁴⁷ Brian Hoyle and Jose Smith, 'Transport and Development', in B. S. Hoyle and R. D. Knowles (eds.), *Modern Transport Geography* (Chichester: John Wiley, 1992), pp. 11–32; Rodney Tolley and Brian Turton, *Transport Systems, Policy and Planning: A Geographical Approach* (Harlow: Longman, 1995), p. 76.

⁴⁸ David Simon, *Transport and Development in the Third World* (London: Routledge, 1996).

development ladder, the car becomes the favoured transport mode because of its flexibility and because of its associations with personal freedom.⁴⁹

The centrality of cars in promoting growth from the early twentieth century onwards lay partly in the way that investment in this industry stimulated many other industries, including road building, oil and petrochemicals, steel, and others. It was secondly to do with the way that cars both accelerated and made more flexible the movement of people around and between towns, cities and rural areas, compared with previous transport modes such as horses, trains, and canals. But it was also in the way that industrial production was reorganized in the first few decades of the century. This reorganization facilitated a massive increase in industrial productivity and thus stimulated the economy, at a time when previous growth patterns appeared to be coming to a stop. That the car industry was central in such reorganization is clear from its most commonly designated name—Fordism. It is this that leads Ross to claim that ‘the car *is* the commodity form as such in the twentieth century—“Taylorization” [the methods of rationalizing work in factories central to Fordism] ... was developed *in the process of* producing the “car for the masses” and not the inverse’.⁵⁰

Taylorization involved the breaking down of production tasks to their simplest elements, to change production from each worker doing multiple tasks, such that a worker could be said to have built a car. Instead, each worker would do only one task, repetitively, throughout the day, and the car would be built by the work team as a whole. In its form as introduced by Ford, this involved the use of the assembly line where the car in production would be moved mechanically around the factory, each worker adding their part as it passed them. This method of production greatly increased worker productivity, and thus reduced prices for finished products, in this case the car.

However, this reorganization of production was simultaneously a reorganization of the ways businesses worked, producing the twentieth century corporation, as opposed to earlier forms of corporate organization. As already discussed, it helped produce multinational corporations, as car companies were among the first to set up factories outside their home countries, and thus helped stimulate processes of economic transnationalization. Fordism also involved a substantial shift in relations between companies and the state, in the ‘regime of accumulation’.⁵¹ The reorganization of capitalism along these lines is usually credited with creating a new round of economic growth which lasted until the late 1960s. The car industry was central to this, both in terms of creating the initial impetus for growth, and pioneering the new production techniques which were able to enable growth to be sustained. Aglietta

⁴⁹ The studies just cited all note how car ownership in developing countries is concentrated in the relatively high income NICs, and make the connections to a relatively high income in such terms. Sometimes, countries also promote the car over its alternatives in order to promote an emerging indigenous car industry, as for example in China’s attempts to restrict bicycle use in Beijing to enable faster movement by car. On this see Henry Chu, ‘Four Wheels Good, Two Wheels Bad in busy Beijing’, *The Guardian* (London), 31 October 1998, emphasizing the connection to China’s emerging car industry.

⁵⁰ Ross, *Fast Cars, Clean Bodies*, p. 19.

⁵¹ Michel Aglietta, *A Theory of Capitalist Regulation* (London: New Left Books, 1979). For reviews of what is meant by Fordism, see for example David Harvey, *The Condition of Postmodernity* (Oxford: Blackwell, 1990), and on the centrality of the car industry to Fordism, see David Gartman, *Auto Opium: A Social History of American Automobile Design* (London: Routledge, 1994), or Rupert, *Producing Hegemony*.

suggests that cars were central features of Fordism also in terms of mass consumption: Fordist consumption 'is governed by two commodities; standardized housing that is the privileged site of individual consumption; and the automobile as the means of transport compatible with the separation of home and workplace'.⁵²

The state promotes the car

Given the structural role of the state in promoting accumulation, it is no surprise that once the car's potential in accelerating accumulation was realized, states began to promote the car vigorously. The car industry offered significant improvements in the capability to commodify means of mobility, and at the same time accelerate the movement of goods and people in the economy. Promoting the car through hidden and not-so hidden means has helped it to become the dominant force it is. Such state promotion of cars is perhaps best understood in terms of the state's structural role in capitalist societies, its general imperative to support the conditions for capital accumulation.⁵³ Support for the car thus helped to reproduce state power itself.

Early on, many restrictions were in place which acted to restrict the use of cars. The classic restriction was the Red Flag Act in Britain, which restricted the speed of motor vehicles to 2 mph, and insisted that three people accompany such vehicles with red flags of warning. This was only repealed in 1896, when the red flag provisions were abolished, and the speed limit raised to 14 mph.⁵⁴ The UK had the most restrictive laws, but restrictions existed elsewhere. France instituted 6 mph speed limits in some cities, and in 1912 the Parisian government 'ordered gendarmes to shoot out the tyres of speeding motorists'.⁵⁵ In the US, steam engine cars had been banned when they had developed earlier in the century, but the internal combustion engine was not placed under such restrictions. Such restrictions reflected opposition to cars on grounds of noise, smell, and danger.⁵⁶ More quickly than elsewhere, restrictions on cars were dismantled in the US, largely due to judges ruling against cities having the right to impose such restrictions. Ironically, this initially involved dismantling restrictions on the bicycle. By 1900, 'activist judges had ruled against urban regulations that might impede automobility'.⁵⁷ The other major restriction was imposed by the quality of roads. This was something that both car manufacturers and municipal engineers were often aware of, and car manufacturers acted to promote the quality of roads.⁵⁸

After car manufacturers had managed to overcome these political obstacles to the car's expansion, in most Western European countries and the US by about 1910, the

⁵² Aglietta, *Theory of Capitalist Regulation*, p. 159, quoted in Peter Freund and George Martin, 'The Commodity that is Eating the World: The Automobile, the Environment, and Capitalism', *Capitalism, Nature, Socialism*, 7:4 (1996), p. 8.

⁵³ For example, Bob Jessop, *State Theory: Putting Capitalist States in their Place* (Cambridge: Polity Press, 1990).

⁵⁴ Overy, 'Heralds of Modernity', p. 61.

⁵⁵ McShane, *Down the Asphalt Path*, p. 113.

⁵⁶ For more on early opposition to cars, see for example Wall, *Earth First! and the Anti-Roads Movement*, pp. 17–39; Paterson, 'Car Trouble'; Hamer, *Wheels within Wheels*.

⁵⁷ McShane, *Down the Asphalt Path*, p. 115.

⁵⁸ *Ibid.*, pp. 109–110.

state by and large became a dedicated ally of the car companies. In some cases the car's expansion became a specific election pledge by politicians—Hoover's slogan in the 1924 election was 'a chicken in every pot; two cars in every garage'.⁵⁹

The promotion of the car economy by the state has had perhaps four main facets. The first of these has been road building (both within and between urban areas). The second is the progressive neglect and downgrading of public transport and non-motorized forms of transport. Thirdly, there are various fiscal measures which effectively subsidize car use relative to other forms of transport. Finally, there are occasional instances of collusion between states and car companies designed to remove competitor modes of transport to the car.

As Wolf points out, roads are different to rail in that the ownership and control of the transport infrastructure (roads) and of the means of transport (cars, lorries) can be separated easily. This separation has enabled states to promote the car, resulting in a system operating by the principle of:

private appropriation of profit, socialization of costs and losses. Private profits are appropriated by the vehicle manufacturers, the insurance companies and the motorway construction firms; costs are socialized by means of public financing of motorway construction, policing, hospitalization of the injured and repairs to the environment.⁶⁰

The principal element of this has been road building. The emergence of the car demanded improvements to the quality of road surfaces, and the emergence of mass motorized societies demanded substantial increases in the quantity of roads. The provision, out of general public expenditure, of such investment, has been something which all states have accepted as one of their basic roles. Highways became, in Wood's term, 'a natural function of the state'.⁶¹

With the exception of a small number of toll roads financed privately, states have historically always paid the cost of road construction. The difference in the era of the car, however, has been that the costs of road construction (up to the standards required by the car, and in urban areas, to avoid dust) have been substantially higher than previously was the case. Also, increasingly, the direct benefits of road construction have been received purely by car users, whereas previously road users of various types, employing a variety of transport modes (horses, carriages, carts, bicycles, trams, pedestrians) and for non-transport uses, such as leisure and commerce, benefited from road building and maintenance. This development was intensified by urban freeway and parkway construction (with some deliberately designed to exclude public transport, as in some of Robert Moses' parkways in New York which had nine foot high bridges, too low for buses to pass⁶²) and reached its peak with the construction of motorways. What is distinctive about these constructions is that they have been designed and regulated to be used solely by motorized transport—bicycles and pedestrians are explicitly excluded from them. They are also designed specifically to compete with/replace trains, which had previously been the primary means of inter-urban transport. They do this by avoiding or going straight through city centres.

⁵⁹ Quoted in Wernick, '(Re-)Imaging Technology', p. 71.

⁶⁰ Wolf, *Car Mania*, p. 89.

⁶¹ Dennis Wood, *The Power of Maps* (New York: Guilford Press, 1992), p. 107, cited in Freund and Martin, *Ecology of the Automobile*, p. 82.

⁶² Langdon Winner, 'Do Artifacts have Politics?', *Daedalus*, 109 (1980), pp. 121–36; Wajcman, *Feminism Confronts Technology*, pp. 131–3.

Motorway construction was initiated by Mussolini and then Hitler, primarily for military reasons. But other countries soon followed. Two classic accounts of the process in the UK and the US are in Hamer and Davies respectively.⁶³ In both cases, the ‘road lobby’ (Hamer’s phrase) or ‘highway lobby’ (Davies’ term) increasingly knocked on open doors in persuading governments to spend large amounts of public money on the schemes. In both cases, this lobby, a coalition of car, oil, and construction companies, allied with highway and municipal engineers, is regarded as forming *the* single most powerful political lobby. In the UK, the lobby’s initial plan for a 1,000 mile motorway network, originally thought up in the early 1930s, was taken up almost *verbatim* by the Labour government in 1946, and completed ahead of schedule by 1972. The plans were then rapidly expanded to 3,500 miles, again the government adopting the plans of the British Roads Federation (the organization providing the forum for the road lobby to operate) very closely.⁶⁴ In the US, the Highway Aid Act of 1956 created a system whereby the bulk of car-related taxes went into a Highway Trust Fund which could only be used for highway construction. The state added money into the fund from other sources, to fulfil the lobby’s ambitions.⁶⁵

The second aspect of the state’s promotion of the car has been neglect of alternative means of transport. Wolf shows how in a number of Western countries, state spending on transport since World War II has systematically favoured roads. Rail transport networks have declined throughout this period, with many countries dismantling large proportions of their network.⁶⁶ A recurrent complaint is that there is not a ‘level playing field’ between road and rail (and as Wolf shows, canals)—for example in the UK, with rail investments having to show profits, while the costs of road construction are simply written off by the state.

The third aspect of this favouring of cars has been hidden subsidies to the car, relative to its competitors. Despite high petrol taxation in many countries, the net effect of relevant fiscal policies is usually regarded to be favourable to the car. The differential treatment of infrastructure investment between road and rail is clearly an important component of this. But other aspects are also significant, for example involving tax relief on provision of company cars. Athanasiou estimates that the value of total subsidies to the car in the US is approximately \$400bn.⁶⁷

A fourth concerns direct collusion between states and the car industry to remove its competitors. In many cities in the US, the companies were direct in their approach. In a justly infamous case, National City Lines, a bus company formed in the early 1930s by General Motors, Standard Oil of California and Firestone Tire Company, systematically bought up and dismantled tram lines, ostensibly with the purpose of replacing them with buses, but ultimately to reduce competition for the cars which provided them with far higher profits. The companies were convicted in 1949 under anti-trust legislation of conspiracy.⁶⁸ In all, by 1949 they replaced ‘100

⁶³ Richard O. Davies, *The Age of Asphalt: The Automobile, the Freeway, and the Condition of Metropolitan America* (Philadelphia: J. B. Lippincott, 1975); Hamer, *Wheels within Wheels*.

⁶⁴ Hamer, *Wheels within Wheels*.

⁶⁵ Davies, *Age of Asphalt*; see also Gordon, *Steering a New Course*, pp. 12–13.

⁶⁶ Wolf, *Car Mania*, pp 75–81, 117–123.

⁶⁷ Tom Athanasiou, *Divided Planet: The Ecology of Rich and Poor* (Boston: Little, Brown, 1996), p. 264.

⁶⁸ Hamer, *Wheels within Wheels*, p. 22.

electric transit systems with GM buses in forty-five cities'.⁶⁹ By the late 1950s, over 90 per cent of the US's tram network had been dismantled.⁷⁰

In addition to the structural role which states have in promoting accumulation, the promotion of cars has been driven by the competitive interstate environment in which states operate, as emphasized by economic geographers such as Dicken. Wolfgang Sachs expresses the dynamic well in his account of debates about the car in early twentieth century Germany.

What critics of the automobile saw themselves confronted with in the debates of the time could be called the executive syllogism of competition-driven progress: (a) technological development cannot be stopped; (b) escape is not an option, so Germany [or Britain, France, the US, etc.] must take the lead; (c) therefore, we are called upon to support the automobile and its industry with all the means at the State's disposal ... The world market cast its long shadow over debates about the meaning of motorization on native streets.⁷¹

But it was not only interstate economic competition which created strong incentives for governments to promote the car industry. After World War I, the increasing military utility of motorized transport meant that a strong car industry was connected in governments minds to preparedness for war. In addition, motorways were first conceived by Mussolini and Hitler to accelerate the movement of troops, as already mentioned.

As governments have systematically promoted cars over their alternatives, they have thus helped also to sustain their own rule. Economic growth has become one of the central indicators of government legitimacy in the twentieth century. Promoting the car has therefore enabled state elites to ensure their own rule, because they have been able to promote the interests of structurally dominant capital, but also because it has helped to promote consumerist understandings of individual identity, helped to focus nationalist projects around particular technologies, and in specific contexts to promote employment.

⁶⁹ Hamer, *Wheels within Wheels*; Wolf, *Car Mania*, p. 84; Wajcman, *Feminism Confronts Technology*, p. 128; Freund and Martin, *Ecology of the Automobile*, p. 135; UNCTC, *Climate Change and Transnational Corporations: Analysis and Trends* (New York: United Nations Center on Transnational Corporations, New York, 1992), pp. 55–6.

⁷⁰ Wajcman, *Feminism Confronts Technology*, p. 128. McShane, *Down the Asphalt Path*, p. 115, and Freund and Martin, *Ecology of the Automobile*, pp. 135–6, both allude however to how this collusion was also made possible both by the monopolies which the tram companies inevitably formed and which were resented by their users, and by corruption on the part of the tram companies. More generally, Wolf, *Car Mania*, pp. 81–4 suggests that in the US, competition between road and rail early in the twentieth century reflected competition between the two leading groups of industrialists Vanderbilt/Morgan, and Rockefeller. A number of factors, including the recession of the 1920s, favoured the latter group, and thus the car industry (Rockefeller having large stakes both in Ford and in Standard Oil, with Morgan involved not only in railroads, but also particularly in banking which was obviously hit hard by the recessions). For an account which suggests that the collusion was unimportant, see Gordon, *Steering a New Course*, p. 20, citing James A. Dunn, *Miles to Go: European and American Transportation Policies* (Cambridge, MA: MIT Press, 1981). David J. St Clair, *The Motorization of American Cities* (New York: Praeger, 1988), argues, between these positions, that the role of GM and others was crucial but cannot properly be called a 'conspiracy'. However, he is at pains to show that the motorization of US cities was not the 'natural' result of people's innate desire for cars.

⁷¹ Sachs, *For the Love of the Automobile*, p. 27.

Conclusions

This article has tried to develop critical approaches to GEP by showing how global power structures systematically produce environmental change. The practices surrounding the car are deeply embedded both in the production of environmental change and in the reproduction of capital accumulation, state domination, patriarchal identities and power, in short, of modernity itself. Much more could be said concerning questions of consumption, which would broaden the argument from the relatively narrow focus on global political economy presented here. I have limited myself to arguing that the dynamics of globalization and accumulation inherent in capitalist society, and the competitive nature of the interstate system, combine to produce a form of development centered around the car which has been highly ecologically problematic.

At the same time, the development of a car industry has helped to reproduce such power structures because of the ways it has facilitated accumulation. The acceleration of the movement of goods, the transformation of production by car manufacturers in what became known as Fordism, and the direct stimulation of the economy by the car industry, all meant that the car has played a key role in promoting accumulation in the twentieth century, and thus in reproducing capitalist society on a global scale. It has also played an important role in integrating the economy globally as car manufacturers have led the way in organizing production transnationally. As a consequence of its role in reproducing capitalism, it also became a part of state managers' strategies for reproducing their own state power, legitimizing their rule through promoting the car and thus economic growth.

Such an analysis starts with questions which could be posed within a neo-Gramscian framework in IPE. But it also exceeds the limits of that framework by asking not only how accumulation is organized, distributed and contested, but what role specific material practices (which therefore have specific ecological consequences) and the technologies through which such practices operate, play in the organization, distribution and contestation of accumulation. Thus an ecological approach to IR or IPE asks not only how has the car been an example of the dynamics of twentieth century capitalism, but in what ways have the features specific to the car and its associated social practices made such dynamics possible? This article has offered some preliminary answers to such a question.

This is a stronger argument than simply saying that such power structures are incompatible with successful responses to environmental change, which has been the focus of most critical writers on GEP to date. If global power structures are complicit in producing environmental change in the first place, then this is another perhaps stronger reason to reject liberal institutionalist analyses which presume the neutrality of such structures. However this argument goes substantially beyond a simple critique of regime-theoretic approaches, outlining a form of analysis which focuses on the social forces which underpin practices which produce global environmental change.

It also helps to show us, although I have not been able to develop this point here, how we might think about global social change towards sustainability. It suggests both that the principles on which existing systems are based (accumulation, globalization, interstate competition) are unsustainable, but also that practices of resistance

could begin to change consumption practices and social structures over time. Increasingly, the 'man' with the good [sic] car, does need justification, and while fate is in our hands, it is increasingly being seen as involving abandoning the transmission. However, what is perhaps not yet recognized is the depth of global social change implied by such an abandonment.