LONDON'S THIRD AIRPORT

FROM TLA TO AIRSTRIP ONE

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The paper reviews the debate surrounding 'the airport decision'. A set of assumptions that has been of fundamental importance to the deliberations of the Roskill Commission is identified and some of the major combatant groups are categorized according to their responses to these assumptions. Forecasts of very rapid growth in air traffic are examined alongside forecasts of increasing mobility by other modes of transport and communication. Some implications of these developments are considered and doubts about their desirability expressed.

IN DECIDING TO BUILD an airport at Foulness the government has resolved none of the major issues in the Third London Airport controversy. There are a number of sides to the debate; although the contending parties have occasionally united into pro-Roskill and anti-Roskill camps, such a dichotomy is inadequate for a proper appreciation of the issues at stake. In joining this debate, I find myself in disagreement not only with the Roskill Commission but also with many of its critics.

A study such as Roskill's cannot avoid assumptions, assumptions about the nature of the problem under study, about the methods to employ in solving it, and about the proper application of the methods. To understand the many and diverse points of view on the subject of London's airports requires, not so much a mastery of the often sophisticated arguments by which these points of view are defended, as an appreciation of the initial assumptions upon which the arguments are based. I will, therefore, begin by describing five assumptions of fundamental importance to the work of the Roskill Commission with which I disagree. The first concerns the nature of the problem; the second and third concern the method employed; and the fourth and fifth its application.

Roskill's assumptions

    1. *The need for a third London Airport.—*

        'We believe . . . a third London airport is essential in the nation's interest.'

                                                  (Report, p. 7)

        'No attempt is made, or could be made, to qualify the total benefits accruing to the travelling public and the country as a whole from the operation of each individual site. To set against the net costs for each site (assessed in the cost-benefit analysis) there is what might be termed a "base load" of benefits, not measured, but for the existence of which it would be wrong to proceed with a third London airport at all.'   *(Volume VII,* p. 103)

    Thus is the need for an airport presented as the Commission's major initial premise. Although it is a proposition that they are not called upon by their terms of reference to prove, they make it clear that it is a view that they hold not only with conviction but with a tinge of national pride:

        'The hostile jibe during the Second World War that this country was no more than an aircraft carrier should in the last thirty years of the present century be a source not only of pride but of economic and political strength.'   *(Report,* p. 5)

and

        'If the nation has to lose something of its past to obtain a third London airport,

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there is no reason why it should not gain much of value for its future, for we regard it as essential that the planning and design of the new airport shall provide the tens of millions who will use it well into the next century with a gateway of which the nation can be proud.'   (*Report*, p. 146)

But they recognize the dangers of allowing their own personal convictions to shape a public policy recommendation. They reason that the sanction for such an assumption, which they concede is unprovable in cost-benefit terms, could only derive from a public consensus that it is valid, and such a consensus they are convinced does exist:

'It is significant that not even the most ardent opponent of aircraft noise argued at the final series of public hearings that there should be no third London airport at all. . . . Generally it has been accepted that there should be a third London airport and that this country should not purchase peace and quiet at the price of cutting itself off from the world's air routes. . . . It is significant that the chapter ("the Value to the Nation of the Third London Airport") was the subject of no criticism whatever at any stage of the final series of public hearings.'   (*Report*, p. 8)

2. *Quantification in cash terms.*—

'The programme for the cost-benefit analysis comprises three main stages: identification of the relevant factors; quantitative measurement of their significance; and the expression in value terms of these quantities in order to permit aggregation of the costs and benefits due to the different factors. Valuation means measurement in money terms since the medium of money is clearly the most convenient and the most easily understood general standard of comparison.'   (*Volume VII*, p. 5)

Although never quite committing themselves explicitly to the assumption that their decision could be completely quantified, this, in *Volume VII*, was clearly the commissioners' ambition:

'The existence of unquantifiable factors presents difficulties. An obvious procedure (in the face of these difficulties) would be to evaluate in money terms those costs and benefits which presented no problems, and derive money costs for each site. The four sites would then be ranked in terms of the other unquantified factors, and a subjective assessment made whether the second class of factors was sufficiently important to disturb the ranking of the sites in money terms.' (*Volume VII*, p. 5)

But this procedure they argue has one 'fundamental' and two 'major' defects. It cannot cope satisfactorily with more than one or two unquantifiable factors; it would be unconvincing in terms of its objectivity; and, most important, it would merely substitute implicit for explicit evaluation. The only alternative that they can see, in *Volume VII*, is to evaluate *all* the relevant factors in money terms. The attempt to do this leads the Commissioners to assume that 'every man has his price', and that human lives are worth £9300.

In the final *Report* they retreat from their ambition of comprehensive cash quantification, protesting that they have been 'widely misunderstood'. They declare 'it was clear from the outset that the cost-benefit analysis would never include everything relevant to (their) decision'. But they do not retreat very far. They do withdraw their use of fire insurance values for the costing of churches, and they reduce the value of children's time from 5½p to 2½p per hour. But they do not retract the ideas that every man has his price and that a life is worth £9300. They simply 'emphatically reject the implication that material considerations have been unduly prominent in (their) thinking'.

3. *Additivity.*—Table I and Table II illustrate another assumption which could perhaps be considered an aspect of assumption 2 but which is important enough to be treated separately, namely, additivity. All the factors listed in these tables have been treated as though they were mutually exclusive. If they were not it would make no sense to add them.

TABLE I

NOISE SENSITIVE ITEMS AFFECTED BY AIRCRAFT NOISE

Discounted costs (£m)

Site	Historic buildings open to the public	Freshwater fishing	Hunting	Golf	Total by site
Cublington	2·0	1·4	0·02	0·01	3·43
	Ascott House (Wing)				
	Claydon House				
	Waddesdon Manor				
	Woburn Abbey				
Foulness	nil	nil	0·012	nil	0·012
Nuthampstead	0·3	0·06	0·03	nil	0·39
	Audley End				
Thurleigh	nil	0·5	0·02	nil	0·52
Total for each item	2·3	2·0	0·09	0·01	4·4

(a) In the *Report* two additional country houses, Hartwell and Nether Winchendon, were included in the estimate of the effect of noise from Cublington.

(b) These costs were gathered together with the costs for other 'items' such as displaced gliding clubs, bird sanctuaries and the double glazing of churches and all were *added to produce a sum* listed in summary cost-benefit table as item 20, 'Recreation (including noise)'.

(*Volume VII, Table* 24.3)

TABLE II

SUMMARY COST-BENEFIT ANALYSIS

Differences from lowest cost site (£ million discounted to 1982, *Report*, Table 12.1)

		Cublington		Foulness		Nuthampstead		Thurleigh	
		High time values	Low time values	High time values	Low time values	High time values	Low time values	High time values	Low time values
otv	1 Airport construction	18		32		14		0	
	2 Extension of Luton	0		18		0		0	
	3 Airport services	23	22	0	0	17	17	7	7
	4 Meteorology	5		0		2		1	
	5 Airspace movement	0	0	7	5	35	31	30	26
	6 Passenger user costs	0	0	207	167	41	35	39	22
	7 Freight user costs	0		14		5		1	
	8 Road capital	0		4		4		5	
	9 Rail capital	3		20		12		0	
	10 Air safety	0		2		0		0	
	11 Defence	29		0		5		61	
	12 Public scientific establishments	1		0		21		27	
	13 Private airfields	7		0		13		15	
	14 Residential conditions (noise, off-site)	13		0		62		5	
	15 Residential conditions (on-site)	11		0		8		6	
	16 Luton noise costs	0		11		0		0	
	17 Schools, hospitals and Public authority buildings (including noise)	7		0		11		9	
	18 Agriculture	0		4		9		3	
	19 Commerce and industry (including noise)	0		2		1		2	
	20 Recreation (including noise)	13		0		7		7	
Aggregate of inter-site differences (costed items only) high and low time values		0	0	197	156	137	128	88	68

The Commissioners' belief that their problem is, *in principle*, amenable to disaggregation into exclusive 'factors' is made most apparent in their discussion of the 'factor' that they found most difficult to deal with, namely, 'planning'. 'Planning' is seen as a 'factor' deserving of a place in the summary cost-benefit table in the same way as other 'factors' such as noise, accessibility, recreation and firing ranges. 'No single factor', they say, 'can dictate our answer'. They are apologetic about their failure, in this study, to bring planning within the cost-benefit framework. Although they concede that planning issues could present 'major difficulties' they

do not seem to think that it would be unreasonable for future studies to attempt its cash quantification; they can see 'no practical alternatives to cost-benefit analysis as a framework for studying the problem' (*Report*).[1]

4. *Equity.*—

'As would be expected, high priced property depreciates much further than low priced (when subjected to a given amount of noise), and for any given level of noise and class of property the depreciation is much greater around Gatwick than around Heathrow.'   (*Volume VII*, p. 375)

'In fact, as might be expected, these values (that people place on time) are closely related to income levels. In other words, the members of the travelling public with high incomes are more willing to buy additional leisure time. It follows that, instead of expressing the implied value of leisure time as an average for the travelling public, it is more *accurate* to express it as a percentage of the incomes of the persons involved.'   (*Volume VII*, p. 11, my italics)

The Commission recognized that the third London airport project would cause a 'material' redistribution of income in favour of the rich. In *Volume VII*, however, they do no more than indicate their awareness of the problem. Returning to the problem in the *Report* they handle it very gingerly. They accept in principle that all the points put to them during the public hearings concerning equity are relevant to their final decision 'and should be taken into account in the same way as other evidence submitted to (them)'. Just what this 'way' is, is not very clear but the statement would appear to be an admission that they are prepared to be *subjectively* or *qualitatively* swayed by such evidence because their final comment on the problem indicates that they want nothing to do with any quantitative remedy:

'We do not know enough about the value which people with different incomes attach to the marginal pound to be able to devise a valid formula for general application and even if we had such knowledge we would be reluctant to recommend that government should use such a formula in public decisions.'   (*Report*)

Thus in choosing to ignore the redistributive effects of a third airport the Commission has deliberately chosen (a) to give greater weight to the convenience of rich people, and (b) to incorporate the assumption that it is cheaper to fly over poor people.

5. *Significance.*—

'. . . we have covered *all* the issues which our terms of reference enjoined us to take into account before making our recommendations of a site for the third London airport.'

'Essentially we see our task in framing a recommendation as requiring us to balance the advantages and disadvantages—from *all* points of view including particularly investment and planning—of the four sites in the light of our judgement upon *all* the evidence.'   (*Report*, p. 130, my italics)

The final assumption that I wish to consider I have called the significance assumption. The Commission believes that the factors it has included in its cost-benefit analysis are the significant ones, and that the cash value attached to any factor represents—at least at the right order of magnitude—that factor's proper weight relative to all other factors. Although in the *Report* the Commissioners attempt to back away from the cost-benefit table for which they express so much

1. Precisely what the Commission intends by the term 'planning factor' is not clear to me. I suspect that they disagree with Prof. Buchanan, the dissenting Commissioner, not about the importance of planning, but about the sense of the term. They see it as representing only one item among many, indeed an item that will 'have to adapt itself to the airport' (*Volume VII*), while Prof. Buchanan, in his note of dissent, considers that the term embraces the whole of the decision that he has been asked to make.

enthusiasm in *Volume VII*, this table remains the foundation of their recommendation. They protest that they have not been unduly materialistic or insensitive, that they have been misunderstood by people 'who should have known better', and that they have not based their decision solely on the cost-benefit analysis. Yet still, in the *Report* they argue that 'cost-benefit analysis provides a logical framework within which to assess *all* the effects flowing from a particular investment or planning decision' (*Report*, p. 12, my italics). The chapter in the *Report* presenting their recommendation of an airport at Cublington represents little more than a justification, in words, of the numbers that they have entered in their cost-benefit balance sheet. They resort in fact to precisely the method that they criticize in *Volume VII*, of considering whether or not unquantifiable 'judgement factors' are weighty enough to disturb their cost-benefit rankings. They decide that they are not.

Responses to Roskill

All the above assumptions have been challenged, and in my view thoroughly discredited, by various critics of the Roskill Commission. However, within the ranks of these critics there is considerable dissension. Table III and the discussion which follows represent an attempt to summarize the major features of the debate that surrounds the Commission's work.

A great many points of view have been forced into a few simple categories

TABLE III

Assumptions	1 Pro-Roskill	2 Anti-Roskill (A)	3 Anti-Roskill (B)	4 Anti-Roskill (C)	5 Anti-Roskill (D)
1. Need 2. Quantification 3. Additivity 4. Equity 5. Significance	1. Yes 2. Yes 3. Yes 4. Yes 5. Yes	1. Yes 2. Yes 3. Yes 4. ? 5. ?	1. No 2. Yes 3. Yes 4. No 5. No	1. Yes 2. No 3. No 4. No 5. No	1. No 2. No 3. No 4. No 5. No
Airport at *Method (CBA)* *Application* *Advocate*	Cublington Approval Approval Foster	Foulness Approval Doubt Hall	Nowhere Approval Disapproval Mishan	Foulness Disapproval Disapproval P. Self	Nowhere Disapproval Disapproval Ludd

which have been defined in terms of the five assumptions described in Table III. Although such a table cannot do full justice to the complexity and subtlety of the views of many of Roskill's critics, it does represent, in my judgement, the bare bones of the controversy. The selection of representative advocates for each category is somewhat arbitrary but is based on published articles in which they have set out their views of the Commission's assumptions. The fifth column summarizes my own position with respect to these assumptions.

The Commissioners consider their work to be in the vanguard of scientific planning-decision-making and declare in the *Report* that they 'are proud to be associated with it and to have initiated it'. Although their study is unprecedented in its scale, the nature of the difficulties it confronted is common to a great many other planning problems. A number of people involved in the airport study now advocate applying the skills and techniques developed in the study to these problems (e.g. Flowerdew, *The Times*, 29 April 1971). The debate about the appropriateness and validity of these skills and techniques is, therefore, one of considerable importance.

1. *Pro-Roskill.*—
    'The report should have been hailed as a triumph of reason and humanity.'
                        (Christopher Foster, *The Times*, 4 March 1971)
Although a self-declared minority, the adherents to this position are prepared to defend explicitly all the assumptions described above, often with less reserve than the Commission itself. For example, Foster, far from dismayed by the difficulties of cash quantification, refers to the differences in Table II between Cublington and Foulness as differences in 'hard cash'. He describes the report as 'far in advance of anything anyone else has done' and affirms the assumption of need—'As long as there is a possibility—as there must be—that a third airport is needed by 1980, it is inhuman not to designate it now'.

Also found in this group as often uncritical allies of the cost-benefit analysts are the members of the anti-Foulness lobby. Their enthusiasm is for the decision rather than the method by which it was arrived at. Their arguments eschew analytical niceties and are framed more in terms of the 'extreme intelligence' (B. Harrison MP, quoted in *The Times*) of the Commissioners and the amount of time and money they have spent in arriving at their decision.

2. *Anti-Roskill (A).*—
    'Even if you disagree fundamentally—I do—with Roskill's final conclusion . . . the critical thing is to take the final report in its own terms.'
                        (Peter Hall, *New Society*, 28 January 1971)
    '(The recommendation) is based on the most rational, dispassionate procedure that good minds could devise.'   (Peter Hall, *ibid.*)
    'Stick it on Foulness.' (*A sign displayed in Cublington*)
As was the case with the previous category, this category contains both those who feel strongly about the decision itself and those who are concerned about the manner of its making. Peter Hall, although not unconcerned about ends, is primarily concerned in his review to argue that the best way of achieving them is through 'dispassionate' and 'scientific' means. He faults the Commission not on its basic procedure or its fundamental assumptions but on matters of a more technical nature such as the costing of the accessibility factor, the quantification of noise and the treatment of construction costs.

The single most convincing piece of evidence submitted by critics in this category is Parry Lewis's (1971) critique of the passenger user costs (Table II, item 6). His argument is, in parts, an extremely complex and technical one but its essence is fairly simple: the elasticities of demand implied by the Commission's traffic forecasts are wholly implausible. There are, he suggests, two main reasons for this; (a) the Commission's accessibility model was logically misconceived and produced nonsensical results, and (b) the Commission, in using a gravity model to forecast future traffic flows, treated airports as final destinations, thereby grossly exaggerating the consequences of accessibility differences between alternative airport systems.

Parry Lewis's criticisms completely undermine the credibility of the values assigned to passenger user costs and hence the credibility of the Commission's recommendation. The importance of item 6 can be demonstrated by removing it from the cost-benefit table. Doing this moves Foulness from last place to first in the cost-benefit rankings.

However, while critics such as Parry Lewis were challenging certain technical aspects of the Commission's recommendation, the activities of would-be allies, such as the Wing Airport Resistance Association, were undermining the credibility of the cost-benefit methodology itself. The Wing Airport Resistance Association

is very proud of having met the Commission's research team on its own ground by arguing a technical, cost-benefit case before the Commission; but its partisan use of the research team's techniques simply confirmed the cynic's suspicions that the techniques can be used to prove just about anything one wants to prove. The self-interestedness of some in the anti-Cublington lobby was so transparent that they were rebuked in Parliament by Anthony Crosland 'for giving the impression that they did not care twopence for anyone else's noise or environment'.

So far I have considered only what might be termed the technical arguments for and against the Roskill decision. I turn now to a consideration of more fundamental objections to the work of the Commission.

3. *Anti-Roskill (B).*—
'. . . much of the assumed benefit of air travel is illusory.'
(E. J. Mishan, *What is Wrong with Roskill?*, 1970)

Mishan's criticisms of Roskill relate to assumptions 1, 4 and 5. He does not appear to have any quarrel with the quantification and additivity assumptions, the assumptions that form the methodological base of the Commission's cost-benefit analysis. The conceptual underpinning of the report, he declares, is 'sound enough' (1970).

His most important criticism is aimed not at the Commission's work but at its terms of reference. He argues that Roskill was asked to answer the wrong question; the right question, in his view, is not where and when an airport should be built but whether it should be built at all. He strongly suspects that a 'respectable' cost-benefit analysis would not justify a new airport. This suspicion derives from his conviction that there are large concealed external dis-economies connected with air travel, and that the benefits are largely illusory. His argument is set out in considerable detail elsewhere (1967); its essence is as follows. Although aircraft produce pollution, mainly in the form of noise, those who are disturbed receive no compensation. Because those flying do not have to pay for the privilege of disturbing those on the ground, the fares they pay do not cover the true cost of their journeys. Thus those on the ground are subsidizing, against their will, those doing the flying, thereby encouraging increased volumes of traffic. Moreover, an individual can do nothing to reduce the volume of noise to which he is subjected by not flying himself. In effect, therefore, people living under an airport flight path can choose to fly and endure noise or they can choose not to fly and endure noise. They cannot unilaterally, except by moving, opt for peace and quiet. The Commission acknowledges this argument but replies that the effect of these subsidies 'can hardly be considered significant' (*Volume VII*).

In rejecting the Commission's first and most fundamental assumption that an airport is needed, Mishan is rejecting the *raison d'être* of the whole study. Consequently his criticisms of the equity and significance assumptions are of a somewhat hypothetical nature. He is mainly concerned to demonstrate what the inadequacies of the Commission's work would have been if they had attempted to answer the right question.

He finds two major faults with the Commission's treatment of equity. First the values that it attaches to dis-amenities are too low and biased in favour of the rich. Second, there is almost no likelihood of compensation actually being paid to the great majority of the 'losers' that are identified by the Commission. This is, of course, the fault of existing compensation laws and not the Commission, but in choosing to ignore the problem, the Commission, he argues, is condoning a great injustice.

Had the Commission been asked to decide whether or not an airport should be

built, Mishan's quarrel with them would have been, we can surmise, not about
procedural principles but about the relative significance of the items included in,
and excluded from, the cost-benefit balance sheet. His answer to the hypothetical
inadequacies of Roskill would appear to be a still bigger, more detailed and more
comprehensive cost-benefit analysis.

His position, however, is somewhat ambivalent. Although in the latter part of
his book (1967) he discusses at considerable length 'the unmeasurable consequences
of economic growth', he calls this part of the book a 'digression' and concedes
that he cannot integrate it with the formal economic analysis that precedes it. Yet
his discussion of the shortcomings of Roskill (1970) and his more general discussion
of similar problems (1967) reveal an ambition to quantify comprehensively the
consequences of economic growth;

    'If the problem (of external dis-economies) is to be tackled by society, the
economist must persist in revealing the nature of the beast, and must suggest the
circumstances under which meaningful magnitudes may be attributed to external
effects. Nor should he shirk the detailed description of cases wherever the social
consequences that escape the pricing system appear to be so involved that a com-
prehensive criterion for evaluating them cannot, as yet, be satisfactorily evolved.'
                                                                 (1967)

In this passage social consequences are not unmeasurable but 'escape the pricing
system' and the solution to the problem 'cannot, as yet, be satisfactorily evolved'.

A similar ambition is found in the work of the Roskill Commission and it is at
this that the arguments of the next category of critics are directed.

    4. *Anti-Roskill (C)*.—
        'Nonsense on stilts'
        'Lunatic logic'
        'A porridge of bogus accountancy.'
                  (Peter Self, *New Society*, 2 July 1970 and 4 February 1971)

Although the occupants of this category accept the assumption of need, they
dispute all the rest of the Commission's major assumptions. They would agree with
Mishan that the Commission's treatment of equity and significance is completely
inadequate but most of their critical attention is focused on the rationale of
cost-benefit analysis. A number of discussions of this topic have been published;
Self's and Needham's (1971) are recommended along with a great many other
articles and letters of a similar tenor that have appeared in the daily and weekly
press. To them I would like to add my own comments, looking first at the assump-
tion of additivity.

The Commission has attempted to place a cash value on a mosaic, not an ordinary
mosaic made up of bits of stone and glass, but a *human mosaic* (see Plate II). It has
done this by peering very closely at the individual bits and pieces, deciding what
each is worth alone and adding them all up to produce an answer. This procedure
applied to the valuation of an ordinary mosaic would strike Christie's or Sotheby's
as ludicrous. That it can, in any sense, capture the value of something as complex
as a few square miles of English countryside strikes me as improbable. The Com-
mission is prepared to argue that it can, at least in so far as its value to the residents
of the particular piece of countryside is concerned. The effects of relations, juxta-
positions and context it considers to be either not important or 'fully reflected' in
the market value of individual pieces of property. Their argument simply exposes
a naïve belief that the value of the whole *must* equal the sum of its parts.

A related point concerns the problem of defining just what may be added mean-
ingfully to what. For example, 1 000 000 000 minutes represents the total number
of minutes involved in saving 200 000 000 people 5 minutes each. This is an inter-

esting, but to me perfectly meaningless, figure. By applying a cash conversion factor to numbers such as this the Commission transforms them into 'hard cash' and compares them with, and adds them to, all the other items in Table II. If the individual time savings associated with the most accessible airport system (Cublington) are not considered by the individuals concerned to be significant—and Parry Lewis provides convincing reasons for doubting that they are—then adding a large number of these insignificant time savings together cannot produce a meaningful total.

Cost-benefit analysis as it is employed by the Roskill Commission is a micro-analytical technique. The analyst who uses it must proceed by identifying, measuring and then aggregating a large number of small scale consequences of the project under consideration. The technique is completely inadequate as a method for assessing the macro-scale consequences of a project as large as the third London airport. Where the technique is stretched in an effort to make it cope with such consequences it loses all credibility. The inadequacies of large scale comprehensive cost-benefit analyses and the disparities in their treatment of micro- and macro-scale phenomena have been very nicely summarized by the metaphor of a horse and rabbit stew:

'The tiny rabbit is minutely examined and exhaustively analysed with sophisticated techniques before it is placed in the stew—but then we go out and get any old selected-at-random horse and throw him in. The quality of such a stew is bound to be rather indeterminate.'   (*Downs, 1965*)

I should like now to consider the Commission's ambition to quantify in money terms, matters which are not customarily considered in such terms. The commission recognized that the market price of a house did not always indicate its true value to the people living in it:

'Over the years (they) may have invested much time and effort in adapting the house to their particular requirements. They may also have built up a circle of friends and local activities, which they might find it difficult or impossible to build up again in some other locality.'   (*Volume VII*)

The 'subjective' value that someone places on his house over and above its market value is termed 'consumer surplus'. It was estimated by asking people the following hypothetical question:

'Suppose that your house was wanted to form part of a large development scheme and the developer offered to buy it from you, what price would be just high enough to compensate you for leaving this house and moving to another area?'   (*Volume VII*)

A difficulty arose in that 8 per cent of the people questioned in the Commission's survey, and 38 per cent of a similar British Airports Authority survey replied that no amount of money would induce them to move. This caused some puzzlement; it was thought that perhaps people had not understood the question, or perhaps that they did not believe that the question was hypothetical and so were preparing a bargaining stance. The Commission declined to abandon its view that 'every man has his price' and so, where someone would not tell them what it was, they answered for him, and entered a value of market price plus 200 per cent in the appropriate column. Thus the absolute upper limit of the value that the Commission permits anyone to place on his 'circle of friends' is twice the value of his property. This is considered 'generous' compensation for his loss. Of course, so long as they remained determined to conduct a cost-benefit analysis, they were compelled to set an arbitrary limit. The inclusion of only one infinite price would completely wreck the analysis.

I come now to the most extreme example of the Commission's commitment to

cash quantification, the previously quoted figure of £9300 that the Commission used in order to take 'full account . . . of a coastal site in mitigating the danger from aircraft accidents to people on the ground' (*Volume VII*). This figure is attributed to the Ministry of Transport and would appear to come from a Road Research Laboratory report which values a fatal road accident at this figure (Dawson, 1967). Because, on average, slightly more than one person is killed in every fatal road accident the *per capita* cost used should have been slightly lower. However, let us look at how this figure is derived. £5000 of it represents the 'subjective' loss involved; it is not entirely clear whether this is the value of a person to himself or to those he leaves behind. But there is a second component that represents the economic loss to the community; this is calculated by subtracting a person's annual consumption from his production, adding this up over his life expectancy, and discounting back to the date of death to produce a person's net present value at the time of death. Following through this calculation we find that if an airplane crashes on a man and kills him the net economic loss to the community will be £4360. But if the same thing happens to a *woman* the community will enjoy a net *gain* of £1120. This is because women, on average, are calculated to consume more than they produce. Looking further we find that this average figure of £9300 also conceals the fact that old men are also a net drain on the economy and consequently even with their £5000 'subjective' allowance are no great loss if killed.

It has been seriously argued elsewhere by Alan Williams ('What is life worth?' *Nouse*, 12 March 1970) that figures such as these are a prerequisite to the making of 'sensible, systematic and rational decisions'—and perhaps he is right. Imagine the captain of the *Titanic,* with his ship sinking beneath his feet, how grateful he would have been for the assistance of the Commissioners. And imagine how appalled they would have been by the irrationality of the anachronistic cry 'women and children first', and by the inefficiency of the subsequent allocation of scarce resources (lifeboats).

This fantasy may seem rather hard on the Commissioners; perhaps they simply used the statistic without inquiring into the nature of its origins—although even this gives pause for thought. I do not believe that it is unfair to those who concoct such formulae. There exists a substantial literature on this topic in which people argue with great conviction that a refusal to place a cash value on human life is both illogical and irresponsible. Some of the more interesting titles from this literature are the following: 'The money value of a man', 'The economics of cancer', 'The economics of mental illness', 'The replacement cost of a housewife' and 'The costs of the World War' (all these are used or referred to in an article which attempts to apply cost-benefit analysis to the evaluation of syphilis control programmes, Klarman, 1965).

In refusing to place a cash value on human life, the charge reads, we are simply sticking our heads in the sand and avoiding the harsh realities of life. I would argue that the contrary is true. A handy formula for converting life into money is a help to someone making a decision only in so far as it permits him to avoid facing a real and distressing problem. But more than this, I would argue that encouraging people to think in this way is positively harmful, that it can only induce a callous and calculating frame of mind and encourage the sort of mentality that can contemplate 'mega-deaths' with equanimity.

Lessons for the future?

It has frequently been said that everyone involved in the Roskill enquiry has learned much of value from the experience. But if my interpretation of the differ-

ences between the positions summarized in Table III is valid, then it is not clear what practical lessons can be drawn for the future. Each position, with the exception of the last, has its authoritative advocates and a significant following. They are separated by differences in fundamental assumptions, and unless and until these differences are resolved, the most that can be expected at similar enquiries in the future is a repetition of the same arguments. I can see no way of reconciling these differences and will not try. Rather I will attempt to extend the scope of the debate by a closer consideration of the Roskill Commission's assumption that a new airport is needed.

The assumption of need

Figure 1 forms the basis of the assumption that a third London airport is needed. The Commission has argued that such growth is good and that facilities should be built to accommodate it. An indication of the high value that they attach to this growth can be gained by a comparison of curves (b) and (c). The difference between them in the year 2000 represents the Commission's estimate of the number of passengers that would be deterred from flying if the airport were built at Foulness rathe

a) Forecast terminal passenger demand at Heathrow, Gatwick, Manchester, Luton and T.L.A. (T.L.A site not specified, Report p 191)

b) Forecast annual surface access air passengers through Cublington system (Report p 250)

c) Forecast annual surface access air passengers through Foulness system (Report p 250)

Fig. 1   Forecast of passenger demand for third London airport systems

than Cublington. Relative to the total numbers flying the difference is very small. But it is the value that the Commission attaches to this difference that forms the largest component of the passenger user cost item (the largest item in the summary cost-benefit table). This difference therefore serves as the Commission's most compelling argument in favour of Cublington.[2]

The Commission has argued that the value that they attach to this growth was not seriously disputed at the public hearings. Where it has been argued that a
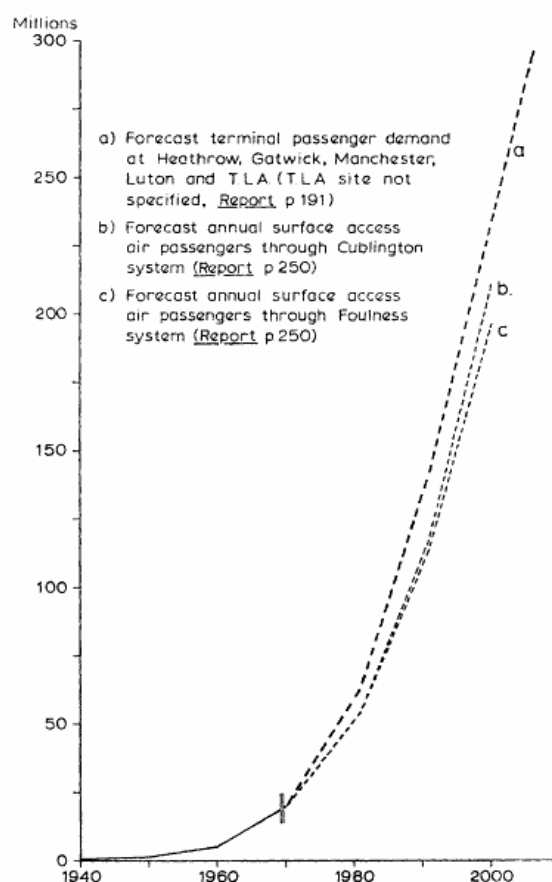
2. It is Parry Lewis's contention that this difference, relatively small though it may be, is grossly exaggerated. But even without this criticism there would remain the obvious objection that the difference would be well within any reasonable confidence bands that might be drawn about these curves.

third London airport is not necessary it has usually been contended that VTOL or
STOL or some other development of a technical nature will make it unnecessary.
It apparently was argued by no one that the growth of this traffic should be
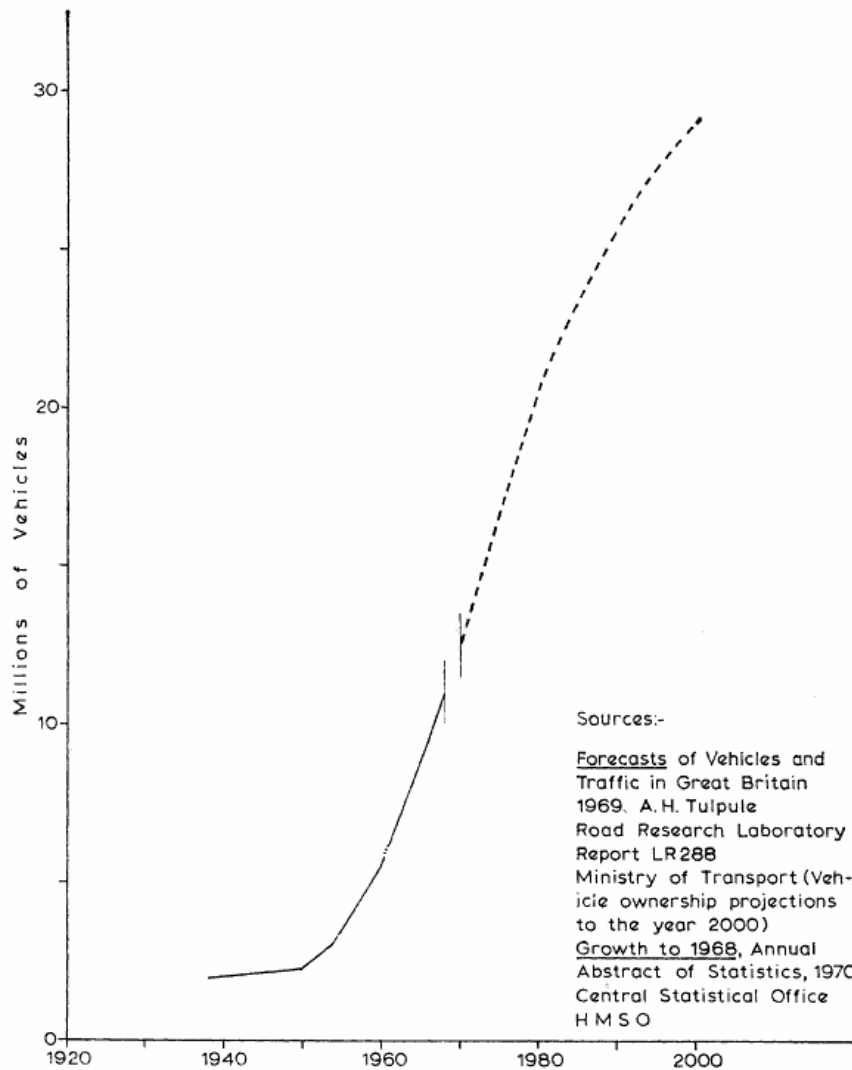

Fig. 2   Car ownership in Great Britain. Growth and forecast growth to the year 2000

restricted. Figure 2 and Table IV place this growth in a larger context. The table
shows that in the fifteen years between 1953 and 1968 the average number
of miles travelled *per capita* in this country by all modes of transport approxi-
mately doubled, increasing from just over 6 miles per day to just under 12.
Forecasts of air and surface traffic suggest that this trend is continuing and

TABLE IV

ESTIMATED PASSENGER MILEAGE IN GREAT BRITAIN BY RAIL, ROAD AND AIR

Year	Total (thousand million miles)	Per capita (miles)	Per capita per day (miles)	Average trip length (miles) assuming an average of 2·5 round trips per day per capita[a]
1953	117·1	2314	6·34	1·26
1968	241·5	4359	11·94	2·38
2000	622·0	9283	25·43	5·08

Source for 1953 and 1968 *Annual Abstract of Statistics*, HMSO

The estimate for the year 2000 is composed as follows:

	Passenger miles (thousand million miles, 1968)		Projected change by year 2000	Total 2000 (thousand million miles)	
Road					
—private	177·7	×	2·68	476	
—public	36·7	×	1·50	55	
less allowance for fewer passengers per vehicle				−31	
Total road					500[b]
Rail	20·8	×	·90		18[c]
Air					104[d]
Total by all modes					622

(a) The assumption of 2·5 trips per day is not important, it simply produces convenient numbers for the illustrations that follow. The assumption that the number, whatever it might be, of trips per day (by all modes including walking) remains fairly constant over time, is important.
Estimates of the total number of miles walked in a year are not available. It is assumed that the number, relative to the air, road and rail figures, is very small and shrinking.

(b) The road change factors were calculated from forecasts of vehicle mileages to the year 2000 (Tulpule, 1969, *Forecasts of Vehicles and Traffic in Great Britain*, RRL Report, LR 288). The allowance for fewer passengers is a conservative guess that produces a nice round number.

(c) The rail change factor is a conservative guess based on an examination of recent trends showing rail mileages to be fairly static.

(d) The air total is based on estimates from the *Report* of 130 million British air journeys per year in 2000 (*Report*, Table 7) and an average trip length of 800 miles (a conservative estimate viewed in the context of recent trends).

that a further doubling at least will take place by the end of the century.

Although there is growing concern about the pollution produced by all this activity, the pollution problem is still discussed primarily in terms of technical solutions. It is argued that if sufficient time, money and technical expertise were devoted to the problem it could be brought safely under control. It is fair to say that 'conventional wisdom' still views the above evidence of rapidly increasing mobility as, in itself, a sign of 'progress'.

Mishan takes quite a different view. Increasing mobility is an aspect of economic growth that he views with deep despair. One consequence of increasing mobility he refers to as 'tourist blight'. The tourist industry is growing even more rapidly than total air traffic. The very fact that it is unblushingly called an 'industry' is perhaps sufficient to indicate its increasingly depersonalized nature. Certainly, if the forecast of a more than sixfold increase in the numbers of tourists coming to London by the year 2006 is fulfilled, the provision of accommodation for them will

radically transform the place they have come to visit. Whether this transformation represents 'blight' or 'progress' is something for the people who live in London to decide. I strongly incline to Dr. Mishan's view that it is blight. It is difficult to imagine that the press of such numbers could be anything else. However, the transformation, if it comes about, can very rightly be described as a direct consequence of a new airport; if the facilities are not provided to bring these numbers to London they will not be able to come. The tourist transformation will affect far more people than those directly affected by aircraft noise, yet nowhere in the Commission's cost-benefit analysis does it, or could it in any meaningful sense, appear as either a cost or a benefit.

The doubling and then doubling again within a few decades of the number of miles travelled per day by the 'average person' must have a whole host of other consequences for the society in which this 'average person' lives. Not all these consequences, I suggest, are necessarily good ones. In the following section an attempt will be made to describe an aspect of this increasing mobility which is, in principle, quantifiable—although not in cash terms. The description is not inconsistent with Mishan's pessimistic view and indeed, I feel, lends support to it.

Mobility patterns

The argument is, in places, somewhat technical so I will begin by stating its essence which is really quite simple. Firstly, the trends in rapidly increasing mobility are not inevitable growth processes but the consequences of economic and technical changes which reduce the cost of distance. These processes are, therefore, within the power of society to control. Secondly, because time is limited, any change that results in people spending more of their time at an increased distance from home means that they will have less of it to spend close to home.

Interaction as a function of distance.—Figure 3 describes a hypothetical 'centred interaction field' in which a number of trips taken by a number of individuals are shown as though they had a common origin. Each dot represents a trip end, and its position indicates the length and compass direction of the trip. This method of description has been employed by Hägerstrand (1967) in his analysis of 'centred migration fields' and 'mean information fields'. The density of the dots decreases
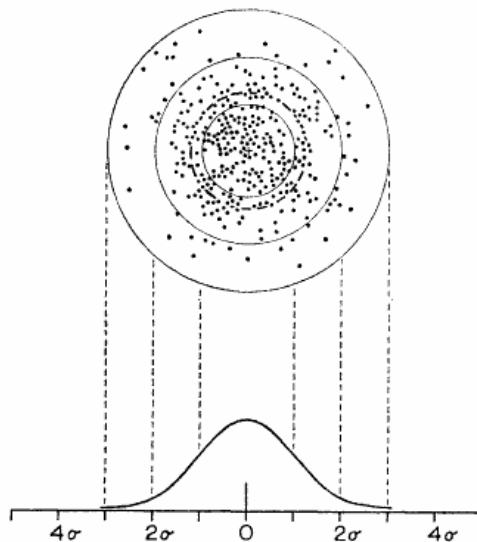
Broken ring shows mean radius of interaction

Fig. 3   A centred interaction field (top half of diagram from Calhoun, 1966)

with distance from the centre, permitting the generalization of the pattern as a contoured density surface. Figure 3 represents the rather special case of a sample of a bivariate normal distribution. The radius of the broken circle represents the average trip length, or mean radius of interaction. The contoured surface is bell shaped and has a normal cross-section. (See Eric Moore, 1970, for a similar application of the bivariate normal probability density surface.) Although they would be unlikely to be all bivariate normal, similar diagrams could be drawn to describe the daily, monthly or annual interaction patterns for every individual in the country. We could describe the interaction pattern of the 'average person' by producing a national centred interaction diagram which represented the interaction pattern of the whole country. Such a graph would, of course, contain millions of dots, i.e. the s um of all the dots on the individual graphs.

If we were to produce such a diagram for the whole country, and if we assumed that the resultant pattern was bivariate normal[3], then the pattern could be interpreted as a normal probability density surface having the following circular form:

$$f(d) = \frac{1}{2\pi\sigma^2} \cdot e^{-(d^2/2\sigma^2)}$$

where $d^2 = (X-\overline{X})^2 + (Y-\overline{Y})^2$: and $\sigma_x = \sigma_y = \sigma$; and X and Y are statistically independent; and where $f(d)$ is the density at a point located at a distance d from the centre.

We could now employ standard statistical tables of the normal circular probability integral to estimate the proportion of total dots (trips) falling within any given area on the diagram. If we further assume that the amount of time spent at the end of each trip is constant, i.e. the same regardless of trip length or direction, then this proportion can also be interpreted as the fraction of total interaction time spent within this given area[4].

We can now describe what would happen to our national centred interaction field if the total number of trips (by all modes, including walking) remains constant, the form of the distance decay function remains constant and the average trip length is doubled. A doubling of the mean radius of interaction corresponds to a doubling of σ. This would produce a flattening and spreading of the probability density surface and reduce the centre height to one-quarter of its previous height. In Figure 4 the high peaked curve represents the interaction pattern of an individual or a group with an average radius of interaction of 1·26 miles, and a standard deviation of approximately 1·0. The other curves represent the effect of doubling and then doubling again the average radius of interaction.[5] If we assume that the total amount of time that all individuals have available for 'interaction' remains relatively constant (e.g. the sum of their waking hours), then if in spending this time they distribute themselves more widely over space, the amount of time they can spend close to home is very substantially reduced.

3. The actual shape of the distribution is not important to any of the conclusions drawn, the assumption is made simply for the sake of expository and mathematical convenience.

4. Because time spent at a destination probably increases with trip length, the above assumption will be seen to be conservative with respect to the conclusions which follow.

5. These curves represent cross-sections through a density surface. Although the area under the cross-section appears to shrink as the curve flattens, the volumes under these surfaces are all the same.
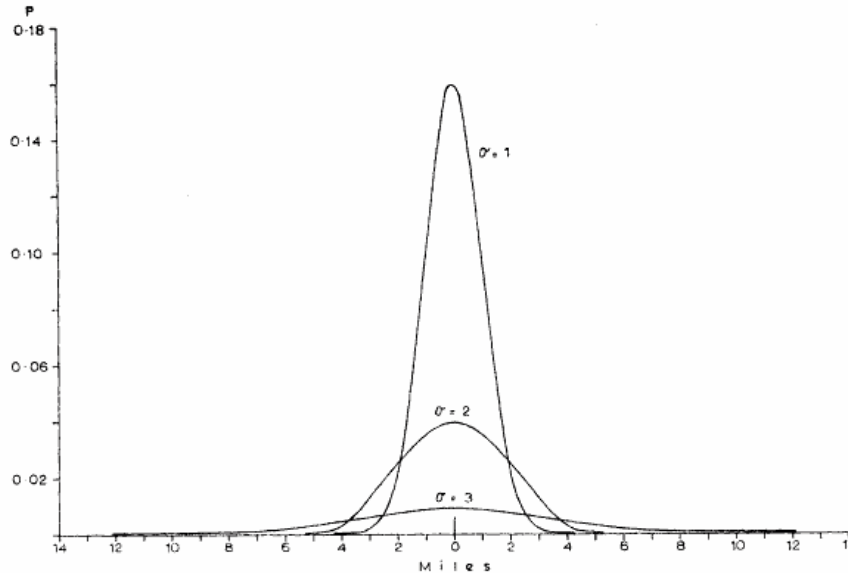
Fig. 4 Variations in intensity of interaction with changes in mean radius

In Figures 5 and 6 a further statistical feature of such change is described. These diagrams illustrate the changes that take place in the statistical probability that any two 'average individuals' will know each other and have contacts in common. From the above mentioned statistical tables (Burlington, 1970) we can estimate the proportion of their time that A and B will spend in an area represented by the shaded circle (radius = 0·8 mile) midway between them. The larger, unshaded circles have radii of one standard deviation and represent the circumferences of the areas within which the individuals spend 40 per cent of their time. Alongside each pair of curves are given (a) the proportion of time an 'average individual' will spend within the shaded circle and (b) the proportion of time spent jointly in the shaded circle (joint probability). We see, not unexpectedly, that for people living close together, the probability that their interaction patterns will overlap declines quite dramatically as mobility increases. Again not surprisingly, in the case of individuals living somewhat farther apart the probability of overlap first increases and then decreases as mobility increases. In the first case then, the probability of knowing one's neighbours declines with increasing mobility, while in the second case all probabilities are extremely small.

Regularities over time.—The diagrams referred to above have illustrated the effects of change in mobility levels. They have assumed that the form of the distance decay function remained constant (bivariate normal) while one of its parameters, σ, changed. The first part of this assumption, the constancy of the form of the distance decay function over time, is common to almost all transport studies concerned with predicting future traffic patterns. It is an assumption underlying Roskill's use of the gravity model, and is found in *Calibrating and testing a gravity model for any size urban area* (Bureau of Public Roads, 1965), the manual upon which a large number of traffic planning studies have been based both in this country and elsewhere. Although empirical support for the assumption is not
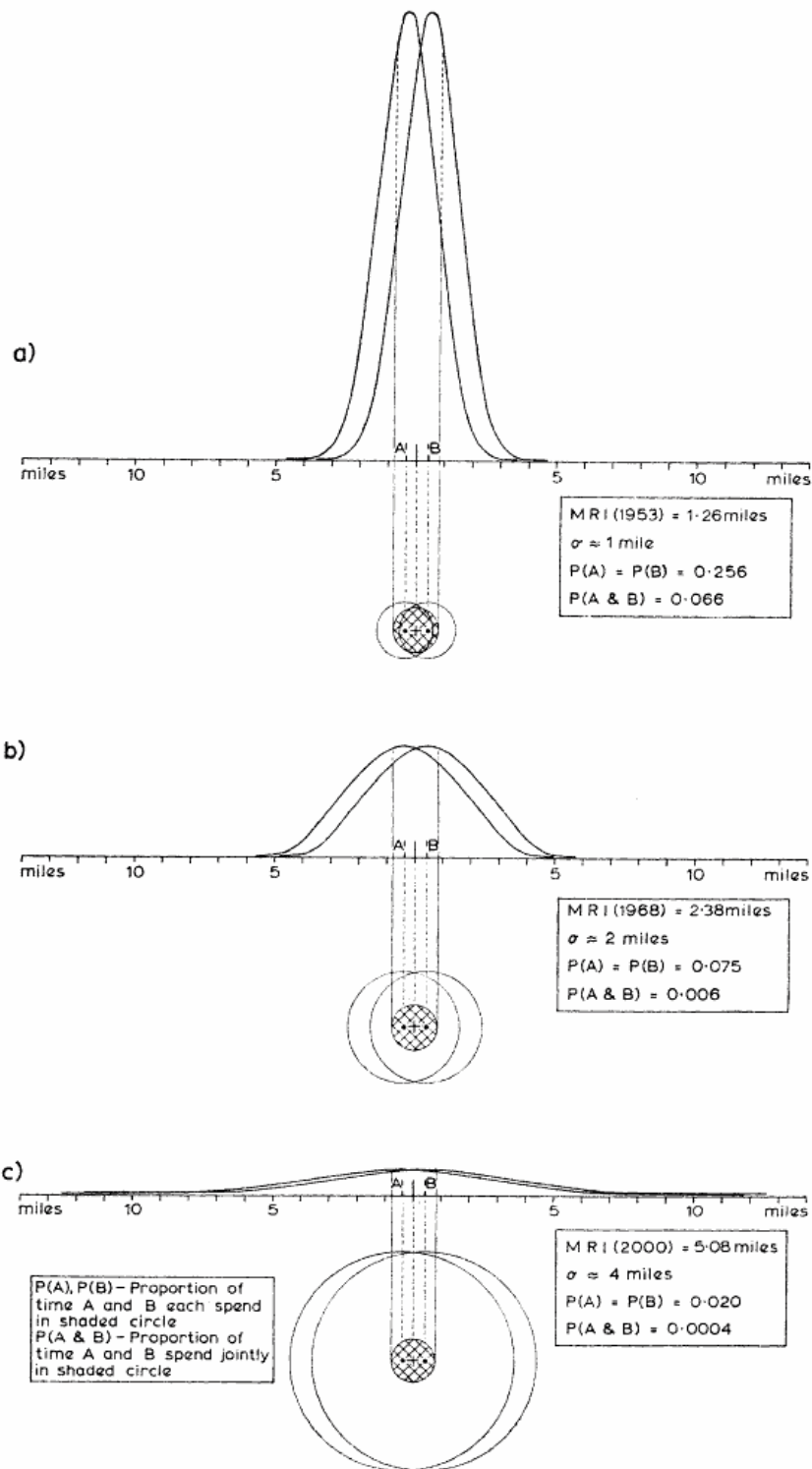
a)

MRI (1953) = 1·26 miles
$\sigma \simeq 1$ mile
P(A) = P(B) = 0·256
P(A & B) = 0·066

b)

MRI (1968) = 2·38 miles
$\sigma \simeq 2$ miles
P(A) = P(B) = 0·075
P(A & B) = 0·006

c)

P(A), P(B) – Proportion of
time A and B each spend
in shaded circle
P(A & B) – Proportion of
time A and B spend jointly
in shaded circle

MRI (2000) = 5·08 miles
$\sigma \simeq 4$ miles
P(A) = P(B) = 0·020
P(A & B) = 0·0004

*Fig. 5   Probabilities of contact between 'average individuals' A and B when distance
A to B = o·8 mile*

a

miles 10   5   A   'B   5   10   miles

M R I (1953) = 1·26 miles
σ ≈ 1 mile
P(A) = P(B) = 0·0057
P(A & B) = 0·000032

b)

miles 10   5   A   'B   5   10   miles

M R I (1968) = 2·38 miles
σ ≈ 2 miles
P(A) = P(B) = 0·026
P(A & B) = 0·00067

c)

miles 10   5   A   'B   5   10   miles

P(A), P(B) – Proportion
of time A and B each
spend in shaded
circle
P(A & B) – Proportion
of time A and B
spend jointly in
shaded circle

M R I (2000) = 5·08 miles
σ ≈ 4 miles
P(A) = P(B) = 0·015
P(A & B) = 0·00023

Fig. 6 *Probabilities of contact between 'average individuals'* A *and* B *when distance*
A *to* B = 6 *miles*

absolutely conclusive, there is considerable evidence that, other things being equal, travel behaviour is fairly constant with respect to time and cost. That is, that people, on average, spend a fairly constant proportion of their limited time and money on travel, and that the proportion of long to short journeys (measured in time or money) also remains fairly constant.

In the illustrations given above it is assumed that the change taking place in the relationship between cost and distance is a simple proportional one, and that the distance decay function is circular bivariate normal. Neither of these assumptions is realistic but the probable departure of reality from them is not likely to be such as to substantially affect the conclusions drawn. Change in the cost of distance is related to mode of transport and there have been great cost reductions for some modes such as air, car and rail while other modes such as walking and cycling have been unaffected, or become relatively more expensive. However, one of the consequences of these changes has been a shift away from walking and cycling to the modes that have become relatively cheaper. Also, although the consequences of transforming the distance scale have been illustrated for a bivariate normal distribution of interaction time, as long as (a) the distribution is circular and constant in form, and (b) the volume under the surface is constant, then no matter what the precise form of the distance decay function, a transformation which doubles the physical radius of interaction will quadruple the area contained within it and consequently reduce the mean height of the density surface by a factor of four. Also, the assumption of circularity underlies all gravity model distance decay functions. The A_i and D_j of gravity models, if expressed as proportions of the total origin and destination interaction, could be used in place of the assumption of a uniformly distributed population.

What then is it that produces changes in the average radius of interaction and the standard deviation? If the above assumptions are valid, it can only be that the relationship between time and cost and distance is changing. If people perceive distance in terms of time or money rather than miles, and govern their travelling accordingly, then any change that reduces the relative cost of physical distance will result in their travelling more miles. Two changes in particular have affected this relationship. First, improvements in transport technology have reduced the absolute time and money costs of travel. Secondly, rising real incomes have reduced the relative cost of travel, The net effect of these changes, although influenced and somewhat obscured by many other changes (such as the developments in telecommunications discussed below), has been, and will be, a greatly increased spatial spreading of all human activities.

A further illustration will describe another aspect of these changes. If we measure distance in minutes or pounds rather than miles, and if travel behaviour is constant
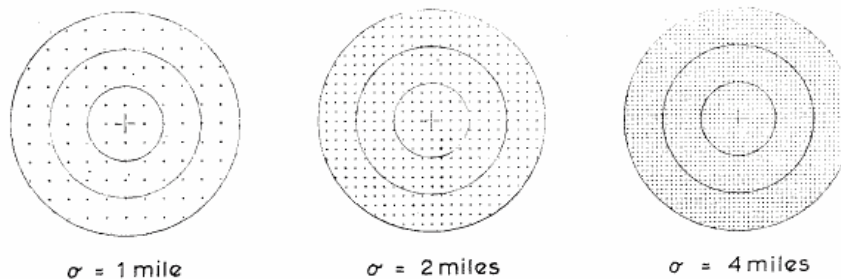

$\sigma = 1$ mile $\sigma = 2$ miles $\sigma = 4$ miles

Fig. 7   Changes in population density

with respect to the first two scales but not the third, then the mean radius of interaction measured in minutes or pounds can remain constant while, measured in miles, it increases or decreases. Figure 7 shows the effect that a reduction in the cost of distance would have on the population contained within an 'average individual's' time-cost radius of interaction. If the population is uniformly distributed, as in the illustration, every doubling of the physical radius will quadruple the population contained within it.
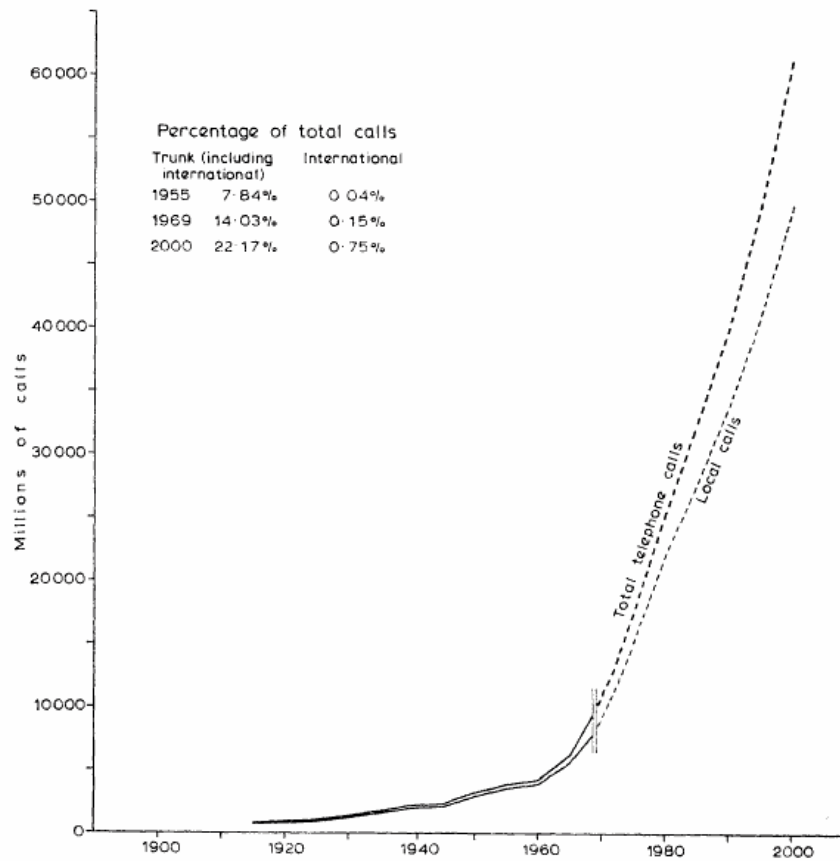

Fig. 8   Growth and forecast growth in telephone traffic to the year 2000

Change at the centre.—A number of consequences of changes in the cost of distance have been discussed above. Another major point to consider is the nature of change at the very centre. If the above 'centred interaction fields' and their associated graphs represent the spatial distribution of waking hours, then the height of the graph at the centre should be proportional to the amount of time spent at home. Evidence relating to change in the amount of time spent at the centre is rather sparse. Hägerstrand and Chombert de Lauwe have found that people in large towns and cities spend less time at home than those living in smaller centres (Anderson, 1970). This is consistent with the expectation that urban interaction fields, being more densely populated, contain more, and more varied, things to do outside the home. Therefore we would expect that as increasing mobility enlarges

interaction fields, or increases their perceived density, people will spend less of their time at home. However, Wilmot (1970) suggests that people are spending *more* time at home. This apparently contradictory evidence can perhaps be partly explained by Figures 8 and 9 which show that people are doing increasingly more of their interacting electronically.

The graphs showing the increase in telephone traffic and increasing time spent watching television suggest that even if people are spending more time at home the intensity of interaction at the centre is being sapped electronically.

Although interaction by telephone is a weaker form of communication than that afforded by face-to-face contact, the pattern of growth is similar to that presented by the physical interaction indices. Growth is very rapid and fastest of all at the greatest distances. It is at these longer distances where the greatest scope lies for reducing the cost of distance and thereby generating more traffic. The forecasts shown in Figure 8 of growth in international traffic were made three years ago and foretell a 40-fold increase in traffic by the year 2000. Although more recent estimates have not been published those working with these statistics now consider them to be a gross underestimate and suggest that an 80-fold increase is not unlikely.

Source of graph
Masson in The Effects of Television

It is estimated that an average set is on $3\frac{1}{2}$ hours per day during summer and 5 hours per day during winter
(JICTAR/AGB)

Fig. 9   Growth in the number of television sets in homes

The impact of television is the subject of endless debate. But it cannot be seriously doubted that one of the consequences of having a television set on four hours a day is to attract the attention of those in the household away from each other and toward the material presented. Television coverage of current events now extends, intermittently, depending on the 'newsworthiness' of events, to almost all parts of the world. If graphs were to be drawn to describe changes in an 'average individual's centred information field', Figures 8 and 9 suggest that these graphs would show a spreading and flattening even more pronounced than that depicted by the physical interaction graphs. If the growing amount of time spent interacting electronically
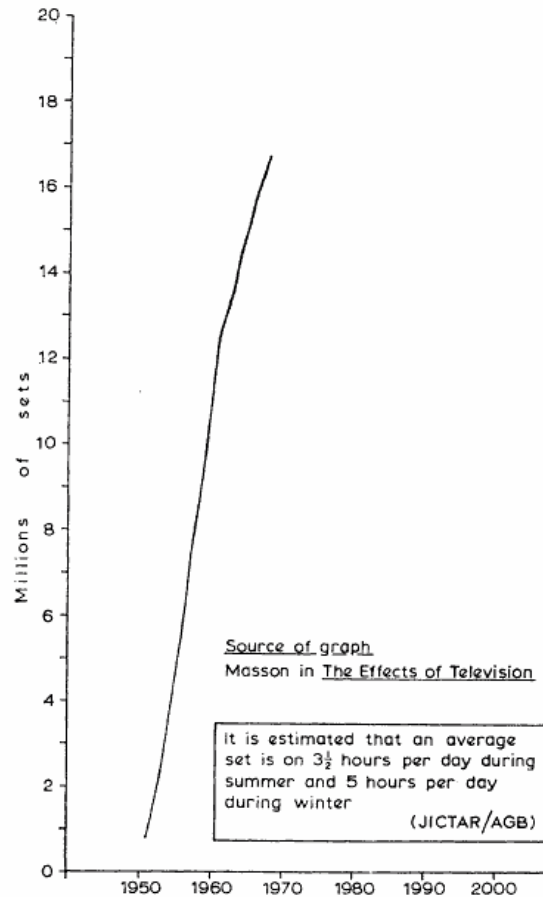
is charged against time spent at the centre (i.e. those so interacting are counted present in the flesh but absent in spirit) then Figures 4, 5 and 6 can be considered a valid representation of the nature of change at the centre as well as at a distance.

Polarization.—An aspect of the national average mobility indices that has been ignored to this point is the variation concealed within them. While, on average, the nation is becoming very much more mobile, the disparity between sectors of the population is very large and growing. Public transport services are declining and those dependent on them are becoming less mobile. Among those most affected are the young, the old and the poor. Although they are probably a minority, the numbers affected are substantial (Munton and Clout, 1971; Bendixson, 1971; and GLC, 1970).

Figure 10 represents an attempt to illustrate the diversity and growing disparity contained within the national mobility trends. It is a highly impressionistic view of a cross-section through a 'mobility landscape'. No scale is provided because the interaction fields shown can represent a number of different levels of aggregation from the individual to the regional scale.

It is a landscape that in its major features correlates highly with a number of other landscapes. One could, for example, draw maps showing spatial variations in a number of socio-economic variables such as income, property values, sensitivity to noise, the value placed on time or even the cash value of a human life. If one did, one would expect to find, on the
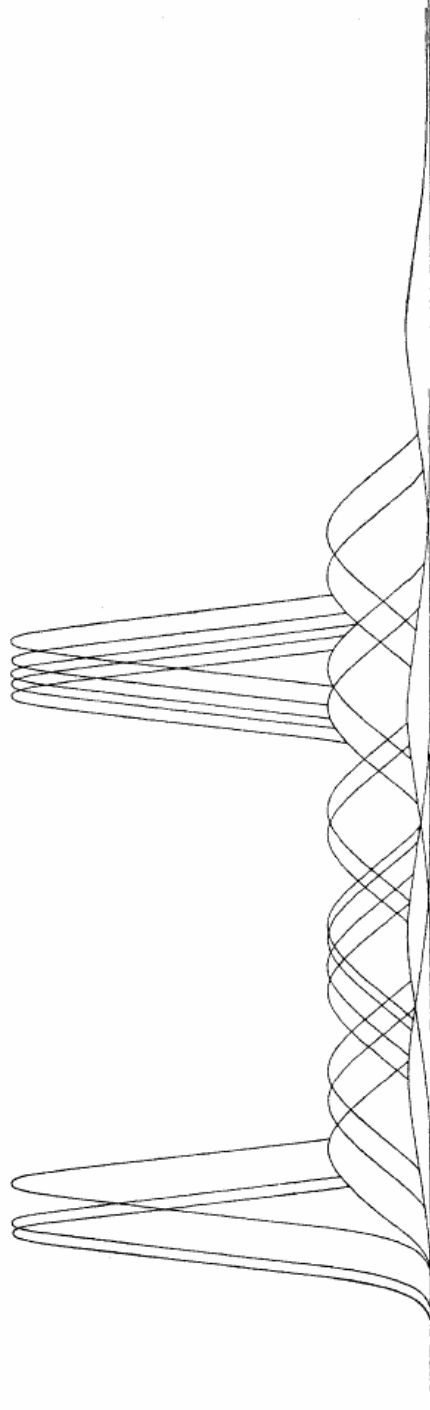

Fig. 10 Cross-section through a mobility landscape

basis of correlations established or used in the Roskill study, that the patterns on all these maps looked very much alike.

The implications for an optimizing transport planner are very interesting. Other things being equal, the projects that flatten the flattest curves will yield the greatest returns if these returns are calculated on the basis of maximizing the value of time saved. And, other things being equal, building motorways through, or flying airplanes over, the zones of lowest mobility will minimize the cost of these projects. In brief, a consistent application of the optimizing principles found in the Roskill reports would accentuate already existing disparities.

The immobile poor and the mobile rich have, I suspect, quite different views of the world; certainly a charge heard not infrequently following the publication of the *Report* was that the Cublington protesters were defending narrow, middle-class interests. Any developments that help to increase social and economic disparities can only cause a growing divergence in the values and attitudes that a planner must reconcile within the scope of his decision. It is reasonable to ask, as the Roskill Commission does not, just how wide these divergences can grow before they become completely irreconcilable.

Moreover, as mobility increases and interaction fields spread and overlap, political and administrative boundaries, if they are to continue to encompass most of the activities of most of the citizens contained within them, must also spread. Planning regions must become larger and less personal to keep pace with change. If they do not, planners, politicians and administrators become impotent. Greater uniformity and harmonization of systems is also demanded in the interests of greater efficiency. Recent proposals for the re-drawing of political boundaries, decimalization, and metrication are topical examples. Change of this sort, imposed by authorities that seem increasingly remote and impersonal, is viewed by some, not implausibly to my mind, as an encroachment on fundamental liberties. The implications for future Roskill Commissions seem fairly clear. More than anything else, it was the scale of the decision that the Commission was asked to make that made it impossible for its recommendation to please everyone. The geographical scale of transport planning decisions is a direct function of levels of mobility. Although the Roskill investigation represents the largest exercise of its kind to date, there is no reason to suppose that the scale of such exercises will stop increasing so long as mobility continues to increase. Again it is reasonable to ask, as the Roskill Commission does not, how far such increases in the scale of society's problems can go, before the problems become insoluble in human terms. The Commission does not appear to concede even the possibility that problems might be created that would be simply insoluble. Such problems that might arise would be seen simply as large, complex and challenging, and capable of 'solution' by the use of simplifying devices such as the cash valuation of human life.

Further doubts

The 'quality of life' is a metaphysical idea. That the material circumstances of men's lives do affect the quality of their lives is doubted by very few. But one cannot hope to demonstrate in any rigorous or scientific way what the consequences of the changes described above might be for the richness or happiness of the lives of the people affected. One can only wonder, surmise, speculate and doubt. There is, I believe, room for considerable doubt that the trends described above will improve the quality of life.

As the average level of mobility of a society rises, the probability that any individual will know his neighbours declines very rapidly. The declining probability of

Although increasing disparities in levels of mobility are, where they are recognized, generally acknowledged to be undesirable, the growth of average levels of mobility is, in the conventional view, equated with 'progress'. Certainly I would not dispute that, historically, increased mobility has brought many benefits. It has liberated people from the monotony and claustrophobia of village life and helped to break down narrow and insular attitudes. It has brought different cultures into contact and exposed people to new ideas and ways of thinking. It has brought economic benefits as well. It is agreed on all sides to be a concomitant of economic growth; it was a lubricant to trade and permitted functional specialization and larger, more efficient scales of production. In the conventional view it has been, *and therefore is,* an aspect of economic and social progress.

There is, however, room for doubt that these trends, extrapolated toward infinity, will always continue to make for 'progress'. There is a fairly recent, but rapidly growing concern voiced by those such as Dr. Mishan about runaway growth rates of a great range of things from population, through pollution, crime and drug addiction, to mobility and GNP. It seems not wholly implausible to a growing number of people that such trends, which appear so similar, might in some very complex way be causally related. Certainly Dr. Mishan is not alone in voicing such suspicions. There is also a growing disinclination to believe in the existence of natural regulators and invisible hands that will ensure that these trends will level off at some future, optimal level. Level off they must in a finite world, but it appears unlikely that the levels at which they do will be, in any sense, optimal.

Although I share Dr. Mishan's pessimism about these trends, I do not share his view that the undesirable consequences of abetting them by building new airports could be demonstrated by a 'respectable cost-benefit analysis'. Although Professor Self's alternative of 'imaginative foresight in decision taking' strikes the hard-headed economist as infuriatingly vague, it would appear to be the only 'method' of sufficient scope for the task in hand. I will end, therefore, with an appeal to the imagination in the form of a vision of a future England.

It is a vision of a completely polarized society. The rich and powerful are highly mobile, flitting overhead in helicopters and in instant electronic touch with anywhere and everywhere. The poor inhabit a dismal, dirty, pedestrian world. They lead alienated, depersonalized and apathetic lives, quite overwhelmed by the power and scale of the State which governs them. They feel, and are, incapable of taking any action that can improve the circumstances of their existence. It is an extreme and profoundly pessimistic vision. It is George Orwell's view of England in 1984. Certainly in many of its details it can be argued that it is improbable. But one does not need to accept the whole of it in order to appreciate the appropriateness of the name he chose for it. He called it 'Airstrip One'.

References
Adams, J. G. U. 1970 Westminster: The fourth London airport? *Area,* IBG No. 2.
Anderson, J. 1970 *Space-time budgets.* Discussion Paper No. 40, London School of Economics
    Graduate School of Geography.

Bendixson, T. 1971 Keeping on the country buses. *New Society*, 18 February.

Bureau of Public Roads 1965 *Calibrating and testing a gravity model for any size urban area.* Springfield Va. US Department of Commerce.

Burington, R. S., and May, D. C. 1970 *Handbook of probability and statistics with tables.* Second edition, McGraw-Hill.

Calhoun, J. B. 1966 The role of space in animal sociology. *Journal of Social Issues,* **XXII**: No. 4, 46-58.

Commission on the Third London Airport 1970 *Papers and Proceedings Volume VII.* HMSO.

Commission on the Third London Airport 1971 *Report.* HMSO.

Dawson, R. F. F. 1967 Costs of road accidents, *Road Research Laboratory Report.* LR 79.

Downs, A. 1965 contribution to discussion in *Measuring benefits of Government investment,* ed. R. Dorfman. Washington DC: Brookings Institute.

Flowerdew, A. D. J. 1971 letter to *The Times,* 29 April.

Foster, C. 1971 *Roskill's arguments answer the critics. The Times,* 4 March.

Greater London Council 1970 *The future of London transport.* County Hall.

Hägerstrand, T. 1967 *Innovation diffusion as a spatial process,* trans. A. Pred, University of Chicago Press.

Hall, P. 1971 Roskill's argument analysed. *New Society,* 28 January.

Halloran, J. (ed.) 1970 *The effects of television.* Panther.

Klarman, H. E. 1965 Syphilis control programs. In *Measuring benefits of Government investment,* ed. R. Dorfman. Washington DC.: Brookings Institute.

Mishan, E. J. 1967 *The costs of economic growth.* Penguin.

—— 1970 What is wrong with Roskill? *J. Transp. Econ. Policy,* **IV**: 221-34.

Moore, E. 1970 Some spatial properties of urban contact fields. *Geographical Analysis,* **11,** No. 4, October.

Munton, R. and Clout, H. 1971 The problem bus. *Tn. Ctry Plann.,* **39**: 112-16.

Needham, B. 1971 The cost-benefit fallacy. *Official Architecture and Planning,* **34**: 47-49.

Parry Lewis, J. 1971 *The forecasts of Roskill.* Occasional Paper No. 11, Centre for Urban and Regional Research, University of Manchester.

Self, P. 1970 Nonsense on stilts. *New Society,* 2 July.

—— 1971 The Roskill argument. *New Society,* 4 February.

Williams, A 1970 What is life worth? *Nouse, York University.* 12 March.

Wilmot, P. 1970 Some social trends, in *Developing patterns of urbanization,* ed. P. Cowan. Edinburgh: Oliver and Boyd.

Sources for graph of telephone traffic

1915-1969 *Post Office Telecommunications Statistics 1969.* Management Services Department (MSD/MS3) Post Office Headquarters, London.

1969-2000 Domestic traffic—unpublished GPO memo. International traffic—*Routing and Switching of International Telephone Traffic in the UK.* Task Force Report, January 1967, GPO.

DISCUSSION

Afternoon meeting 3 *May* 1971

The CHAIRMAN (Prof. M. J. WISE): Few decisions in land use planning have aroused so much controversy as that over the third London airport. I recall that some four years ago, in this Hall, when the controversy was in its infancy, I think still in the Stansted days, Dr. Kenneth Sealy opened a remarkably stimulating discussion on the problems inherent in the siting and development of airports in Britain and, since that time, the Society has continued discussion of the problem in the *Journal* with a paper by Mr. Blake on the landscape problems arising from airport development.

We can now resume the discussion in the light of the recently announced Government decision in favour of the Foulness site. Controversy has raged, not only over the site decision, but also over the methods used by the Roskill Commission to evaluate evidence and to arrive at its recommendations and particularly over the ways in which cost-benefit techniques have been employed.

I think we can expect Dr. John Adams, who will open the discussion, to comment on