Thesis corrections: summary of changes

Robin Lovelace

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1 Introduction

Many changes have been made to the thesis following the viva, all of them minor typos and formatting issues. These can be split into 3 main parts: corrections suggested by Charles Pattie, corrections from Michael Batty and additional changes.

Additions are highlighted in blue text. Deletions are ~~crossed-out in red~~.

A number of issues applied throughout the entire document, so not every instance of a change is mentioned here. These systematic changes include:

- "fig." replaced by "figure" throughout

- "individual-level" replaced by "individual level" throughout and other hyphenation mistakes corrected

- data are now treated as plural, although there is an ongoing debate on the subject e.g. http://www.theguardian.com/news/datablog/2010/jul/16/data-plural-singular

- "1990's" replace by "1990s" throughout and for all decades

More changes than those described here have been made: this document is a summary of changes. To see all changes see the file "dif.pdf" in the "thesis-reproducible" GitHub repository (https://github.com/Robinlovelace/thesis-reproducible).

2 Corrections from Charles Pattie

~~temping~~ tempting, page 2.

~~On~~ In addition ... Page 9.

£900 bicycle through ~~them~~it... Page 15.

~~bound-up~~ bound up ... Page 24.

The energy costs of commuting ~~is~~ are ... Page 25.

~~social-theory~~ social theory ... Page 25.

Clearly, it is not money per se that affects commuting energy costs, but its indirect influence on behaviour~~, which is rarely direct~~... Page 32.

A wide range of individual and geographical factors. Page 35.

Building on these findings, ~~(Levinson, 2012)~~ Levinson (2012) returned to the question ... Page 36.

Simonsen and Walnum (2011) ~~harnesses~~ harness the knowledge that energy use and greenhouse gas emissions are two sides of the same coin ... Page 37.

on transport ~~an~~ and energy... Page 38.

since the ~~1800's~~ 1800s ... Page 39.

Von Karman and Gabrielli (1950) and ~~its~~ their successors... Page 39.

[The impacts] ~~was~~ were determined ... Page 42.

Sexton et al. (2012) ~~paper~~ set out to ... Page 43.

the need to ~~asses~~ assess potential future impacts... Page 43.

The authors tested their results against the ~~another~~ radiation model and found that ~~their model~~ theirs "yields significantly better results" (Lenormand et al., 2012, p. 6)~~than than the 'radiation model'~~. It is to this radiation model, another scientific approach to commuting, that attention is directed below... Page 45.

~~read-through~~ read through Page 46.

In the sustainability literature, the term is rarely quantified ... Page 50.

In the context of transport ~~system~~systems... Page 50.

is ~~is~~ central to the thesis. ... Page 53.

frequently used ~~in~~ throughout the thesis... Page 53.

~~short-term~~short term... Page 56.

~~make-do~~ make do ... Page 58.

empirical data seldom ~~fits~~ fit into any neat model and therefore ~~distracts~~ distract from explanation. This point was made as early as the ~~1970's~~1970s... Page 59.

the ~~the~~ car ... Page 62.

the field of statistical mechanics ... Page 63.

to ~~the~~ tackle the research challenge ... Page 66.

~~eduction~~level of education... Page 69.

~~ground-up~~ ground up ... Page 74.

used for a range of applications ... Page 75.

During the 3rd quarter of 2012, there were 29.86 million employed people in the UK ... Page 79.

~~be harder more difficult~~ harder to analyse and visualise ... Page 86.

~~split-up~~ split up ... Page 88.

The NTS dataset has an impressive response rate to key question which tend to have a lot of NA values, and are very patchy~~)~~... Page 95.

~~an~~ a geo-referenced ... Page 97.

~~could-well~~ could well ... Page 97.

The ~~data~~ datasets presented so far, on energy use of personal travel and commuting behaviour, ~~is~~ are sufficient ... . *And changed throughout.* Page 97.

'~~drop-off~~ drop off the kids' ... Page 97.

as buses and railed vehicles can only follow pre-defined ~~path~~paths... Page 98.

~~...~~ (Johnston and Pattie, 1993; Blien and Graef, 1998) ... Page 110.

~~download~~ downloaded from census dissemination portal Casweb ... Page 110.

perfect (fig. 4.14)... Page 118.

(see 4.25 ~~, above~~)... Page 122.

household incomes ~~and~~ at the MSOA level ... Page 124.

to ~~to~~ a fixed randomising factor ... Page 126.

Because simulation, almost by definition, estimates something that is not otherwise ~~know~~known... Page 128.

~~Intergerisation~~ Integerisation ... Page 130.

~~tops-up~~ tops up ... Page 132.

does one only include the chemical energy stored in the petrol burned in the pistons? ~~or~~ Or do we also include the primary energy consumed ... Page 151.

Brackets added around figure. Page 152.

Inserted brackets around table ... Page 155.

Although the Defra dataset ... Page 155.

The closeness of the average energy costs of driving reported by ~~(Mackay, 2009)~~ Mackay (2009) ... Page 157.

he first paper that formalised this problem in the context of ~~system-level~~ system level energy costs of transport was ~~(Fels, 1975)~~ by Fels (1975) ... Page 160.

exceptions include ~~...~~ Treloar et al., 2004; Lenzen, 1999; Mackay, 2009; Lovelace et al., 2011)Page 160.

It is all ~~to~~ too easy ... Page 161.

Inserted brackets around figure Page 175.

model was ~~ran~~ run ... Page 175.

hotels ~~,~~ and restaurants ... Page 176.

students trace roadways on paper maps" (Boscoe et al., 2012, 189). The original is not cited in the quote because a hard copy of the book could not be found. Therefore the quotation, from is used. ... Page 183.

Building on these findings, ~~(Levinson, 2012)~~ Levinson (2012) returned to the question of the factors affecting commute time ... Page 183.

~~The~~ An indirect (yet somehow more tangible) impact of poor road quality on transport energy use is that it can discourage ~~from low energy vehicles~~people from buying a low powered and energy efficient car... Page 190.

altering the values for one ~~modes~~ mode whilst leaving the others unchanged ... Page 191.

~~between~~ in the decade following 1973... Page 192.

more than 10% below the 3 MJ/km figure calculated from ~~(Defra, 2012)~~ Defra (2012) ... Page 192.

Bracket inserted. Page 195.

Additional strain on ~~a~~ an ailing electricity grid ... Page 199.

This is the argument made powerfully by ~~(Plowden and Lister, 2008)~~ Plowden and Lister (2008) ... Page 199.

Which of these approaches to projecting fleet efficiencies is most is context specific and depends on the aims of the research ... Page 200.

~~YatH~~ Yorkshire and the Humber was taken ... Page 205.

Brackets added. Page 207.

come ~~for~~ from official data sources ... Page 208.

"Having considered the limitations of the data, and weighed up the pros additional of complexity with the advantages of simplicity" replaced by "Having considered the limitations of the data, and weighed up the costs and benefits of complexity" ... Page 212.

"'card', 'carp', and 'moto' refer to car driver, car passenger and motorbike respectively." Added to explain the acronyms. Page 214.

It is interesting to ~~not~~ note ... Page 219.

The highest and lowest (outside London) values are found in Rutland (the geographic centroid of which is located 109 km from central London, and which was the last county in England to have a direct trainline to London) and the City of Kingston upon Hull, respectively... Page 219.

there is a tendency for areas located close to railways to be associated with a high proportion of per trip energy use to be composed of rail travel ... Page 221.

~~course~~ coarse levels of aggregation ... Page 223.

something ~~for~~ which ... Page 223.

Local ~~authorities~~ Authorities ... Page 224.

When distance band and mode of travel are ~~know~~ known ... Page 227.

the lowest classes ~~live~~ tend to work closer to home ... Page 231.

Another issue was finding ~~Geographical~~ geographical ... Page 233.

~~the~~ also ... Page 236.

That energy use per commute is greater in the Netherlands ~~is higher~~ than in England is an interesting result in itself ... Page 237.

Brackets inserted. Page 243.

as aggregate data ~~tells~~ tell us little. Page 244.

~~the~~ Sheffield028 (an MSOA zone) is more unequal ... Page 255.

Figure 7.14 size increased. Page 261.

the proportion of car trips ~~that shift to car~~ replaced by bicycle trips ... Page 267.

cycling uptake is driven largely ~~be~~ by the young ... Page 269.

Suburbia in its current form gradually vanishes, and communities will become "'villagised' so people could meet more of their needs from their neighbourhood without commuting" (North, 2010, p. 591). ~~around urban areas, while avoidable long distance travel would be~~ ... Page 276.

~~R^2 values~~ Pearson's coefficient of correlation (r) ranged from -0.59 to -0.22 ... Page 283.

3   Corrections from by Michael Batty

due to lack of jobs ... Page iv.

roughly equivalent to ~~country~~ county level in the UK ... Page 35.

"than those" added to the following sentence: It was found that people living in more sparsely populated areas were more likely to travel far to work than those living in dense areas. Page 35.

Moreover, it is assumed that the former is a ~~a~~ close enough proxy of the latter ... Page 37.

This is a recurring ~~them~~ theme ... Page 39.

In the sustainability literature, the term is rarely quantified ... Page 50.

changes ~~on~~ in the real spatial microdata ... Page 56.

Whole cases are ~~are~~ generated using integerisation. Page 58.

~~microsimualtion~~ microsimulation ... Page 75.

translating the total ~~in~~ into commuter energy use ... Page 84.

ggplot2 has been used throughout this thesis for plotting with help from key ~~reference~~ references ... Page 109.

Because simulation, almost by definition, estimates something that is not otherwise ~~know~~known... Page 128.

the true value is only really ~~know the value~~ known to one significant figure. Page 168.

Another pattern that emerges is the relationship between the very low energy costs of commuting in London, and the relatively high costs of areas within a ~100 km radius ~~surround~~ surrounding the centre ... Page 219.

When distance band and mode of travel are ~~know~~ known ... Page 227.

Despite these possibilities, it is important to remember that the results are *simulated* ... Page 261.

4   Additional changes

Many small additional changes were made to the thesis, reflecting typos, style issues and grammatical mistakes and inconsistencies found in the text. A selection of these are highlighted below. Page numbers are not shown; a full list of changes can be found in the file "dif.pdf" in the "thesis-reproducible" GitHub repository (https://github.com/Robinlovelace/thesis-reproducible).

, except the Cretaceous-Tertiary boundary event generally attributed to impact of an asteroid with the Earth" (Hay, 2011).

This is because transport systems are inherently mobile, therefore requiring a high energy density ~~energy storage~~power source.

Energy is the 'master resource' from which all others (including more energy) can be obtained; emissions are the end result ~~result~~ of energy use.

Most greenhouse gas emissions stem from ~~burning~~ fossil fuel use, and once extracted, these fuels are invariably burned. This has led to the conclusion

Overall commuting is the ~~the~~most time-consuming reason for personal travel in the UK

results to be replicated by anyone provided with the same input data as used in the ~~this~~thesis. To this end numerous script files are provided which allow many of the analyses performed to be re-run on any computer using free – This recognition of the potential applications of the research is reflected in

the ~~the~~ aims and objectives.

The energy costs of commuting ~~is~~ are therefore of critical importance to the ability of modern economies to sustain themselves.

characterising and modelling active travel patterns ~~also~~as well

e.g. Chris Fisher's decision not to move to Hereford because commuting to the ~~Tyrrel~~Tyrrell's crisp factory would then become too expensive

The energy ~~costs~~ cost of commuting

Theories are hypotheses about how the world *should be*, based on ~~past~~ experience

The ~~the~~ law is falsifiable (and has been falsified on numerous occasions!)

efficiency — and related concepts of fuel economy and energy ~~economy~~ intensity — is well established in research on the energy requirements of ~~of~~ freight transport (Kamakaté and Schipper, 2009).

At present however, this quantitative branch of the resilience concept lacks empirical application. The term ~~will~~ is harnessed to discuss the ~~the long-sustainability~~ long term sustainability of commuter systems and their capacity to function in the event of oil shortages.

~~Energy use in~~ The energy costs of transport, and ~~its~~ their underlying causes, have been explored at a range of different scales.

for energy and transport studies focussed more locally. Moreover, because the factors affecting commuting behaviour operate at many ~~different~~ levels

In this chapter they are ~~are~~ grouped together under the broad term 'urban modelling'

the impacts of policy or other changes ~~on~~ in the real spatial microdata methods of analysis and ~~and~~ conventions of mathematical notation

one advantage they seem to have had ~~was~~ a clear theoretical focus

strategic ~~planing~~ planning

hierarchy of entities for inclusion was established, in descending order ~~order~~ of priority:

Thus ILUTE can ~~can~~ be used

for spatial microsimulation, at various levels of geographic aggregation. The ~~disadvantage of census data~~ main disadvantage of the census dataset is that it only provides information about a small number of variables compared

with more specific surveys that have lower samples sizes.

in addition to enabling statistical operations, ~~it~~it's a general programming language, so that you can

The mathematical properties of IPF have ~~have~~ been described in several papers

Neighbourhood Statistics data using ~~a~~ an ordinary least squares (OLS) regression model.

In second and third place respectively were the proportional probabilities and TRS approaches, which took a ~~a~~ couple of seconds longer for a single integerisation run for all areas.

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