

As Needs Must

**A Qualitative Study of Motorists' Habitual Traffic
Behaviour in a Situation of Reduced Road Capacity**

Rosemary Sharples

A thesis submitted in fulfilment of the requirements for the degree
of Doctor of Philosophy

Faculty of Engineering and Information Technology
University of Technology, Sydney

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements of a degree except as fully acknowledged in the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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Abstract

This study is concerned with the manner in which motorists react when part of the road network is reduced in capacity. It is concerned with the habits associated with finding a route and choosing a mode.

Knowledge of motorists' responses is important in light of the increasing incidence of reductions in road capacity, due to road capacity being reallocated to other modes. Examples include pedestrianization, and the installation of bus lanes or street running light rail. Capacity is also reduced when infrastructure fails because of natural or man-made actions or lack of action. Authorities must ensure that traffic can cope with the disruption that reducing capacity brings, whether caused intentionally or unexpectedly. It has been noticed that traffic reduces after an incident of reduced road capacity, but only to the extent it needs to do so. The results of this study suggest a hypothesis to explain this observation.

The field study described in this thesis consisted of a qualitative survey of motorists who drove along Epping Road in Lane Cove, Sydney, Australia, both before and after the reduction in capacity which occurred after the opening of the Lane Cove Tunnel in 2007. The motorists described their travel behaviour in relation to Epping Road. From their descriptions of their propensity to switch routes during the course of their trip, two hypotheses were developed, which offer a potential explanation for the disappearing traffic.

The route switching hypothesis posits that a minority of motorists have a habit of changing routes to avoid the delays they encounter. They may change their route before the journey starts or while the journey is underway. The minimal chaos hypothesis states that:

Route switching by a percentage of motorists, in combination with other motorists leaving the route or changing their time of travel, results in changes which tend towards the minimum necessary required to avoid on-going disruption.

The variations in the motorists' mode use habits can be explained by their level of travel competence, which is defined by this study as the ability to make informed choices between the available modes. This is achieved by acquiring both trip planning competencies and trip execution competencies. The thesis gives examples of the range of competencies required for the modes in widespread use in Sydney. It also gives an example of how enhanced travel competence affected travellers in a incident of reduced road capacity in Brisbane.

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Illustrations

Photographs

- **State Library of New South Wales**: George Street West;
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Maps

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ALICE was beginning to get very tired of sitting by her sister on the bank and of having nothing to do: once or twice she had peeped into the book her sister was reading, but it had no pictures or conversations in it, “and what is the use of a book,” thought Alice, “without pictures or conversations?”

Lewis Carroll, *Alice's Adventures in Wonderland*

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Definitions

AADT (average annual daily total) – the total annual flow of traffic divided by the number of days in the year to give the average flow per day.

affective – relating to feelings or emotions

bus only lanes – for the exclusive use of buses

bus lanes – lanes open to taxis, hire cars, motorcycles, cycles, emergency vehicles and special purpose vehicles operated by or under the direction of Roads and Maritime Services.

CBD – central business district

Cityrail – operator of passenger rail services in Greater Sydney at the time of the study

Connector Motorways Pty Ltd (formerly Lane Cove Tunnel Company) – consortium of companies which won the right to build, maintain and operate the Lane Cove Tunnel for 30 years.

Cross-City Tunnel (CCT) – road tunnel passing under the central business district of the City of Sydney, linking the western edge of the CBD and the eastern suburbs.

cycle lane – on-road lane for the use of cyclists

EIS (Environment Impact Statement) – *Lane Cove Tunnel and Associated Road Improvements: Environmental Impact Statement*; published by Sinclair Knight Mertz in October 2001; contained a proposal for a scheme, which was accepted with slight amendments; and an explanation of the history of the concept.

EM1-EM18 – codes assigned to people who responded by e-mail to publicity in the press local to Epping Road about the field study.

Epping Road corridor – the combination of the Lane Cove Tunnel and the stretch of Epping Road in Lane Cove between the Gore Hill Freeway and the Lane Cove River.

expressway – divided roadway with full or partial access control, and traffic signals or grade separated interchanges. Designed for a running speed of 40-50 m.p.h. with interruptions to free-flow kept to a minimum. Does not carry as much traffic as a freeway, nor have as wide a right of way. Pedestrian traffic and access from abutting property prohibited. Primary purpose is to carry long distance traffic (SATS, vol. 1, p. III-2).

FEIT – Faculty of Engineering and Information Technology (at the University of Technology, Sydney)

freeway – divided roadway with complete access control, and grade separated interchanges. Designed for large volumes of free-flowing traffic at speeds of 40-60 m.p.h. Pedestrian traffic and direct access from abutting property prohibited. Primary purpose is to carry long distance traffic (SATS, vol. 1, p. III-2).

HCR report – *Traffic Impact of Highway Capacity Reductions: Assessment of the Evidence*. This is the report produced by the Transport Studies Unit of the Economic and Social Research Council of the United Kingdom government for the Department for Transport and London Buses. It is the seminal report in this field.

Hillsbus – bus operator which services the Hills district in north-west Sydney.

IN1-IN10 – codes assigned to motorists who were interviewed for the field study.

Joint Select Committee on the Cross-City Tunnel (JSCCCT) – parliamentary committee made up of members of both the upper and lower houses of the parliament of NSW, drawn from Labor, Liberal and independent groupings, whose job it was to look into the problem with the Cross-City Tunnel. The committee also looked into the Lane Cove Tunnel (*q.v.*).

Lane Cove Tunnel (LCT) – final link in the Sydney Orbital Network (*q.v.*). It was built by Connector Motorways Pty Ltd (*q.v.*) but did not achieve the predicted flow of traffic and was sold to Transurban Ltd (*q.v.*).

Lane Cove Tunnel Action Group (LCTAG) – coalition of 15 groups drawn from the residential, commercial and industrial sectors of Lane Cove lobbying in regard to the Lane Cove Tunnel.

Lane Cove Tunnel Transition Working Group (LCTTWG) – working group announced by the Minister for Roads in June 2006, which became the Lane Cove Tunnel Integration Group (LCTIG). It consisted of representatives of the Premier’s Department Infrastructure Implementation Group, the RTA, Connector Motorways and, as required, NSW Treasury, the Ministry of Transport and the State Transit Authority.

motorway - a divided road with two or more lanes for traffic travelling in each direction, with no at-grade intersections and with full control of access from abutting property.

NRMA (National Roads and Motorists’ Association) – body representing motorists in NSW.

NSW – New South Wales

peak hours - for the purposes of this study, the peak hours are defined as

- a.m.: 7.00 - 9.00;
- p.m.: 16.30 -19.00.

PMV – private motor vehicle (car, light goods vehicle or motorcycle)

RMS (Roads and Maritime Services) name adopted when the RTA (*q.v.*) was reorganized in 2011.

RRC – reduction in road capacity

RTA (Roads and Transport Authority of New South Wales) – NSW government authority whose responsibilities included non-local roads and bridges in NSW, driving and motor vehicle licences, and road safety. Now known as Roads and Maritime Services (*q.v.*).

SKM (Sinclair Knight Merz) – consultants who prepared the environmental impact statement for the Lane Cove Tunnel scheme.

SUP (shared use path) – off road path for shared use by pedestrians and cyclists.

Sydney – Sydney, New South Wales, Australia

Sydney Buses – state owned bus operator, which runs services along Epping Road.

Sydney Orbital Network (SON) – motorway ring road in Greater Sydney. It consists of the following stretches of motorway:

- M1 (Eastern Distributor);
- M2 (Hills Motorway);

- M5 (South Western Motorway);
- M5 East;
- M7 (Westlink);
- Gore Hill Freeway;
- Warringah Freeway;
- Sydney Harbour Tunnel; and
- Lane Cove Tunnel.

Extensions to the motorway network in Greater Sydney have been proposed.

TP1-TP2 – codes assigned to people who responded by telephone to publicity in the press local to Epping Road about the field study.

traffic – people and vehicles passing to and fro along a way. This may be one or more of pedestrians, cyclists, motorists, buses, trams/light rail and heavy goods vehicles.

transit lane – a lane reserved for high occupancy vehicles, including cars and buses.

- a T2 transit lane is for vehicles carrying at least two (2) people;
- a T3 transit lane is for vehicles carrying at least three (3) people.

transport – unless specified otherwise, this means urban passenger transport, public or private

Transurban Ltd – private owner and operator of the Lane Cove Tunnel, with an interest in four other elements (M1, M2, M5 and M7) of the Sydney Orbital Network.

UTS – University of Technology, Sydney

