K.J. LARKINS

DEPARTMENT OF TRANSPORT

RULES OF PRECEDENCE AT INTERSECTIONS: An examination of alternatives for Australia

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15 May 1980

Australian Government Publishing Service
Canberra 1979

ISBN 0 642 01601 1

Document Retrieval Information

Date: January 1979

Keywords

State of the art study, right of way, three-way crossings, stop signs, yield signs, gap acceptance (traffic flow), merging (traffic flow), limited access highways, freeways.

Abstract

The paper examines the principles underlying the approaches adopted to the regulation of traffic at intersections in the United Kingdom, the United States of America, Australia and New Zealand and comments upon their relevance to local conditions.

It is argued that adoption of offside priority (giving way to the right whilst driving on the left) rather than either of the alternatives (giving way to the left or major/minor roads) has proved increasingly inappropriate to modern traffic conditions as well as detrimental to urban amenity. Further it is argued that the requirement in the United States 'to yield the right of way', right of way itself being defined as a privilege, is conducive to safer driver behaviour than the creation of the obligation 'to give way' which applies in Australia.

The Australian experience is specifically documented in the hope of laying to rest any notions that offside priority is a viable proposition. A major/minor system of right of way based on a 'T' junction rule, 'Give Way' signs and 'Stop' signs is proposed instead.

Note

This report is disseminated in the interest of information exchange.

The views expressed are those of the author and do not necessarily represent those of the Commonwealth Government.

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Printed by C J THOMPSON, Commonwealth Government Printer, Canberra

Acknowledgments

The author wishes to acknowledge the encouragement given him by Mr J. A. Pitt and the late Mr J. Illa, former chairmen of the Australian Road Traffic Code Committee; Mr R. J. Hancock, former Executive Officer of the Committee; Mr B. C. S. Harper; the author's colleagues in the Office of Road Safety; and the many others who have provided a sounding board for his ideas over the years.

Contents

RULES OF PRECEDENCE AT INTERSECTIONS: AN EXAMINATION OF ALTERNATIVES FOR AUSTRALIA

1. Introduction

In the past few years there has been greater use of signs and signals to allocate priority at intersections in Australia, but no consensus has emerged for the adoption of a system-wide alternative to the give-way-to-the-right rule.

This paper examines the principles underlying the approaches adopted to the regulation of traffic at intersections in the United Kingdom, the United States of America, Australia and New Zealand and comments upon their relevance to Australian conditions.

The Australian choice of offside priority (giving way to the right whilst driving on the left) rather than either of the alternatives has had important implications for the development of the traffic system as a whole as well as for the philosophy of driving. The alternatives were near-side priority (giving way to the left) which would be the equivalent of the American rule of giving way to the right whilst driving on the right; or major/minor roads, as adopted in the United Kingdom.

Under all three systems of right of way, drivers proceeding straight ahead have precedence over drivers turning across their path and this aspect of right of way is therefore considered only incidentally in this paper.

Diagrams in this paper, including those depicting practices in the United States, show situations as they exist, or would exist, when driving on the left-hand side of the road (with exception of Figure 5). The inverted triangle symbolises a 'Give Way' sign or a 'Stop' sign with the meaning of stop and give way.

2. The major/minor system in the United Kingdom

To anyone accustomed to the Australian emphasis on giving way at intersections, a noticeable feature of the U.K. Highway Code is the absence of any general rule relating to priority at intersections. This has been the case since the earliest days of motoring. Indeed there was no explicit body of rules governing conduct on the roads in the U.K. until the passage of the *Road Traffic Act* 1930, the principles of which were embodied in the Highway Code.

The principle adopted from the beginning in regard to intersection operations was that:

> . . it was thought best to deal with the matter from the point of view of road importance rather than vehicle position because we had so many irregular layouts.[24]

The provision contained in the original Highway Code read:

> No vehicle has right of way at crossroads, but it is the duty of the driver in the minor road when approaching a major road to go dead slow and to give way to traffic on it. Nevertheless when you are driving on a major road always keep a sharp lookout and drive cautiously at crossroads and road junctions.[24]

2.1 The Royal Commission on Transport, 1929

Adoption of the major/minor principle came after a degree of controversy. This was not surprising since the exponents of a directional rule—in this case giving way to the right—included the influential Automobile Association which no doubt received support from those of like mind in the United States. That country had chosen the opposite directional rule in their first Uniform Vehicle Code of 1926, i.e. giving way to the right but for driving on the right-hand side of the road.

The major/minor concept, however, had the support of the equally influential Royal Automobile Club. Both views were presented to the Royal Commission on Transport which in 1929 reported on the Control of Traffic on Roads.[82]

Dismissing as irrelevant any comparison with the rule of the road at sea, the Royal Commission in fact disposed of the entire issue of 'Priority of Traffic at Cross Roads' in less than two pages of its report.

As well as commenting upon the intransitive situation which would arise if four vehicles arrived at a cross intersection simultaneously, the Royal Commission observed that frequently the vehicle on the right would not be visible to the driver on the left until such time as collision was almost inevitable.

2.2 Classification of Roads

The Commissioners opted unequivocally for the principle that:

> . . all the roads of the country should be graded in accordance with their degree of importance; and that traffic on the less important road should give way to traffic on the more important. The drivers on the more important roads would not be absolved from all responsibility; it would be their duty to keep a sharp lookout and to drive with special caution at all road junctions, the existence of which should be communicated to them by means of suitable road signs placed short of the actual junction. They should, however have precedence over drivers entering from less important roads.

On the matter of the determination of a hierarchy of roads the Commissioners noted that all the more important roads had been classified as Class I or Class II roads and that:

> When two roads of the same category intersect, it will be the duty of the highway authority to decide which is the major road, regard being had to the amount of traffic. We recognise that it will take time to deal in this way with all the road junctions in the country, but steps should be taken at once to give this precedence to Class I roads.

The Commissioners concluded their remarks on the issue by noting with satisfaction that the Minister for Transport in the meantime had decided to adopt a similar recommendation emanating from a conference specially summoned to consider the matter.

Thus there came into being the system which was to provide a model for other countries, even as far away in time and space as Australia, or at least parts of it, almost half-a-century later.

Although relying initially for its effect on such cues as the width of roads, presence of bus routes, white lines, density of traffic and type of street lighting, the major/minor principle was 'found to work quite well' by the Metropolitan Police Traffic Chief in 1933.[24] It was subsequently reaffirmed by Government Committees in 1944 and 1963.[3]

2.3 Intersection provisions in the Highway Code

By 1954 the wording of the Highway Code[8][1] had been changed but not the meaning:

> 34. When approaching a road junction where there is a 'Slow' sign, slow down and be ready to stop when you get there.
>
> 35. Where there is a 'Halt' sign, you must stop at the major road ahead even if there is no traffic on it.
>
> 36. At a road junction, look right, look left, then right again. Do not go on until you are sure that it is safe to do so.
>
> 37. At a road junction, give way to traffic on the main road. If in doubt, give way.
>
> (The word 'junction' is used synonymously with 'intersection')

In 1963, the Traffic Signs Committee recommended the erection of 'Give Way' signs to reduce ambiguities at intersections where traffic was considered to be of equal importance. It envisaged that if a sign were required on the minor road, a 'Give Way' sign should be used[2] and the latest version of the Highway Code, published in 1968, and reprinted in 1976,[73] contains no mention of intersections not marked by 'Give Way' and 'Stop' signs.

2.4 Priority at roundabouts

Advocates of offside priority in other countries have recently made much of the introduction into the U.K. Highway Code of a provision that traffic about to enter a roundabout should give way to traffic already traversing it so that the roundabout does not lock up.[9] In reality the traffic being given precedence is only incidentally on the right or offside. The principle of the rule is in fact similar to the so-called 'box junction' rule introduced around the same time which prohibits entry into an intersection where this would cause it to become choked

2.5 Summary

The major/minor concept has therefore remained the same and is clearly considered by the U.K. authorities to be superior to the directional right-of-way rules which were rejected in 1929. This is not to say that it comes cheaply in terms of traffic control devices, but it does give legal recognition to what will later be shown to be the driver's natural sense of traffic priorities. Although conclusive data cannot be cited, it is perhaps significant that the U.K. has, relative to its vehicle/population ratio, one of the lowest road traffic accident fatality rates in the world[78] and the aligning of law and expectancy on the the vital matter of intersection operations may be an important factor in this.

3. Modified near-side priority in the United States of America

The American approach, stemming as it did from the regular gridiron plans of the majority of U.S. cities, could hardly be more different from the British one.

Very soon after the motor car appeared, the inadequacy of the common law 'first-in-the-intersection-proceeds' rule to control other than horse-drawn traffic became apparent.[29] The need to prevent drivers from racing for the first-in position led to the adoption of the following rule in New York City in 1903, the first right-of-way rule:

> On all public streets or highways in the city all vehicles going in a northerly or southerly direction shall have right of way over all vehicles going in an easterly or westerly direction.[24]

An element of priority is evident in this arrangement for the north-south direction represented the main axis of Manhattan Island. This was not necessarily the case elsewhere and the practice of giving way to the right was generally adopted throughout the country. The rationale is simple: when two vehicles reach an intersection at approximately the same time, the one on the near-side is the first to clear their line of conflict (Figures 1 and 2).[52]

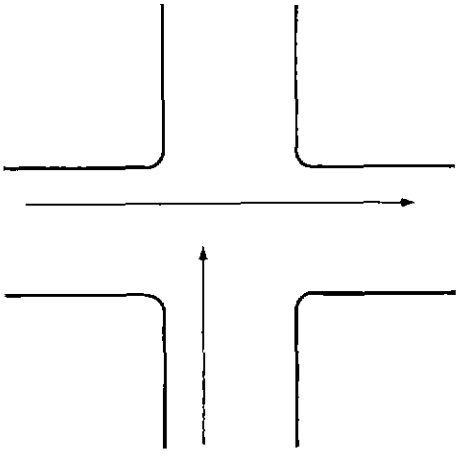

Fig. 1 Under near-side priority the vehicle accorded the right of way does not even have to clear the intersection before the yielding vehicle can proceed.

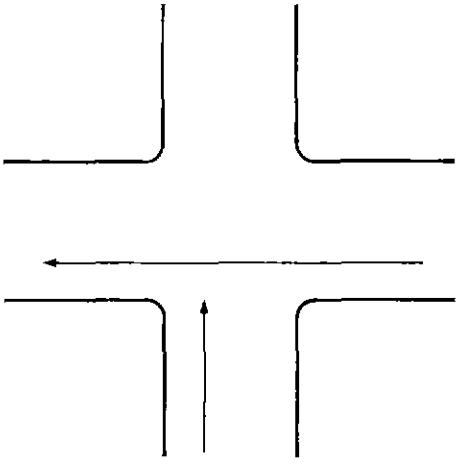

Fig. 2 Under offside priority the vehicle accorded the right of way has to pass beyond the intersection before the yielding vehicle can proceed.

3.1 Eno, the Council of National Defence Code and the Uniform Vehicle Code

William Phelps Eno, an architect by training, has been called 'the father of highway traffic regulation'. He was responsible for the New York Code of 1903, and was for many years influential in traffic matters throughout the world, his achievements including the introduction of 'rotary traffic' (i.e. roundabouts). In his later years Eno advocated either no right-of-way rule at all or giving way to the left, the equivalent of the present Australian Rule (i.e. offside priority).

During the First World War Eno drafted the 'Council of National Defence Code of General Highway Traffic Police Regulations' (The CND Code).[23] In promulgating it for general adoption during the 1920s Eno found himself at variance with the formulators of the Uniform Vehicle Code (UVC) first endorsed by a national committee in 1926 as a model for adoption by the States.[86]

Eno's main grounds for the advocacy of offside priority concerned traffic operations as he saw them, and not safety as such. His contention was that for vehicles driven on the right, giving the right of way to vehicles approaching from the left would block traffic less as they would tend to yield from a position outside the intersection.[23] Although this could hold for sequential approaches of pairs of vehicles it cannot resolve conflicts in the event of the simultaneous arrival of four vehicles at a crossroad; after a momentary delay they could equally well start again and meet in the middle as the U.K. Royal Commission tartly observed.[83]

In fact, in the more common situation of three, rather than four, vehicles approaching an intersection simultaneously from different directions, Generowicz[36] points out that the American near-side priority rule in fact enables all three to proceed without an intransitive situation developing, even where turning vehicles are involved (Figures 3 and 4). In the case of arrival at the same time, the UVC solved the problem very simply by adopting the old horse-and-carriage rule of first entry: a driver having entered the intersection was legally protected from having to yield the right of way to another driver then approaching the intersection. (It will later be argued that the so-called 'First-in Rule', either implicit or explicit, is a necessary adjunct to a directional priority rule.)

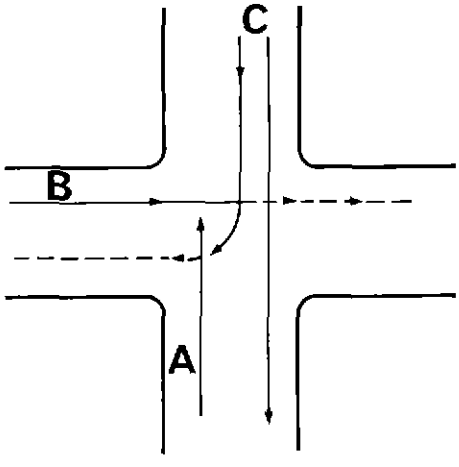

Fig. 3 Under near-side priority only two of the three approaching vehicles are involved

'A' must give way to 'B' irrespective of 'B's' obligation to 'C', and having yielded can pass behind 'B'. 'C' if turning right can pass behind 'A'.

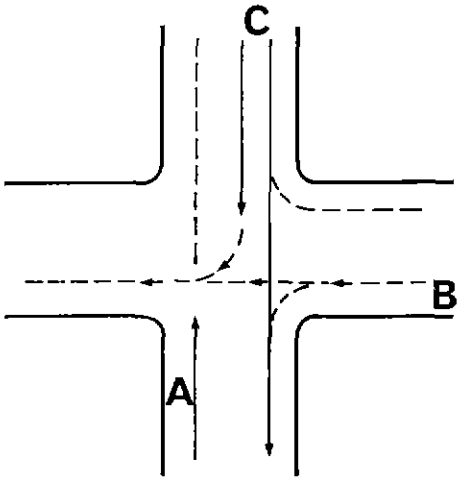

Fig. 4 Under offside priority all three approaching vehicles are involved

'B' is totally dependent on 'C' but 'A' must correctly judge 'B's' response over which he *has no control*.

If 'C' is turning right an intransitive situation exists as 'A' is obliged to give way to 'B' who is required to give way to 'C' who is required to give way to 'A' who is . . .

Interestingly enough, on the alleged safety grounds of visibility to the left and to the right for drivers operating on the right-hand side of the road, Eno's remarks as to

a superior view to the left (offside) contain a quaint reference to the fact that 'the driver's view is not obscured by the windshield of his car' (emphasis added).[23] Presumably the driver approaching the intersection looked out over his door, there then being no window glass, the windscreen pillar being vertical and at some distance from him. This is, of course, quite contrary to the position today where the sloping A-pillar tends to obscure the view to the offside since the windscreen comes around further and is slanted backwards. In fact, the one piece curved windscreen affords excellent vision to the near-side, which also happens to be that upon which most information is presented in the form of direction and regulatory signs.

More importantly, near-side priority offers a wider angle of view of vehicles to which a driver is required to give way (Figure 5).

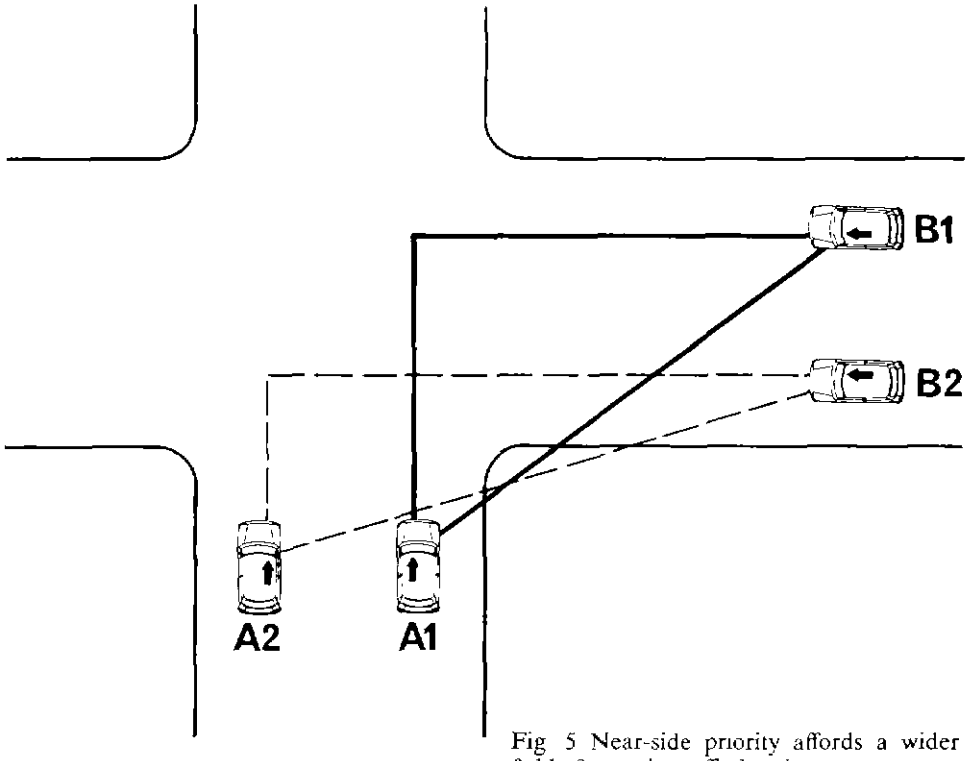

Fig 5 Near-side priority affords a wider field of view than offside priority.

A1 driving on the right and required to give way to the right (near-side priority) has a better view of B1 than A2 driving on the left and required to give way to the right (offside priority) has of B2

The efficiency of any general rule was questioned as early as 1923 when the Commissioner of Police in Detroit wrote to Eno, who had omitted a right-of-way rule from the revised CND code:

> As to the omission of the rule for right of way, I think you are right in omitting it, in fact, experience has taught me that a right-of-way regulation, so far as it relates to street crossings is always confusing and the cause of more harm than good. The party thinking he has the right of way always takes a greater chance than he should, and really infringes on the rights of others.[24]

3.2 The 'first-in' rule

The phrase 'the party thinking he has right of way' illustrates well the confusion which has persisted ever since, over the apparent conflict between the 'give-way-to-the-right' rule and the 'first-in-the-intersection' rule. Edward C. Fisher in Vehicle Traffic Law[29] considers the 'first-in' rule to be redundant:

> Incorporation of this discredited principle into the Uniform Vehicle Code (1956) served to perpetuate it in those states which adopted it, but the courts have effectively nullified it by holding it applicable only when there is no danger of collision.

Fisher in his book quotes a number of significant judgments. First as stated by the Supreme Court of Iowa in 1955:

> The directional right-of-way statute has meaning. It does not depend for its effect upon which car first entered the intersection, nor upon which car struck the other, nor at what point upon the car or in the intersection. The statute is intended to promote safety, to give motorists a guiding rule by which rights at intersections may be determined. It does not contemplate a race for the intersection; if at their respective distances and speeds the two cars approaching at right angles will collide it is the duty of the one on the left to give way.

Rather earlier, in 1950, the Supreme Court of North Carolina had said:

> When the driver of a motor vehicle on the left comes to an intersection and finds no one approaching it on the other street within such distance as reasonably to indicate danger of collision, he is under no obligation to stop or wait, but may proceed to use the intersection as a matter of right.

In a major revision of the UVC carried out in 1968 the 'first-in' rule was in fact deleted from the Code, but not without much debate.[87]

3.3 The role of the Courts in eliminating ambiguities and modifying the general rule

The last phrase of the second judgment quoted above illustrates particularly well an important aspect of traffic control as it has developed in the United States; as well as giving the world the directional system of right of way, the most significant feature of U.S. traffic control has been the progressive elimination of ambiguities, a process in which the courts have played no small part.[29]

In eliminating ambiguities, a major factor has been the development of the system of 'through' highways to which precedence is assigned by yield signs (equivalent to 'Give Way' signs) and by 'Stop' signs (with the international meaning of 'stop and give way'). In the U.S.A., cities tend to be laid out on a grid pattern which does not concentrate traffic on any particular route other than the main highway on which there is perhaps the crossroads at which a town sprang up. So far as arterial roads are concerned near-side priority was, in fact, unworkable as traffic entering from side streets could claim immediate precedence over through traffic.[74] (Figure 6).

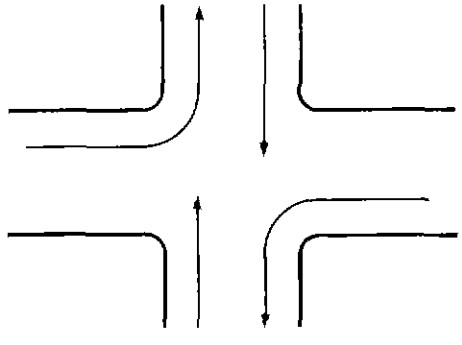

Fig. 6 Under near-side priority entering traffic has precedence.

This was recognised and, rather than change the general rule, appropriate expenditures were made on signs to give priority to through traffic In this the courts again played a part as evidenced by this judgement of the Supreme Court of North Dakota in 1947, quoted by Fisher:

> It seems altogether clear that the legislative body of this state authorised the designation of 'through' highways with the thought in mind that the user thereof might and should travel upon the same with some ease and with a greater degree of safety than would exist in the absence of 'stop' signs at the crossroads. We must believe also from common experience and from frequent observation that nearly every motorist, consistent with the legislative intent, travels along a 'through' highway with a feeling of confidence that users of crossroads will not only exercise reasonable care in entering upon or crossing the highway but that such users will not enter or cross a highway without coming to a stop as the law requires.[29]

That the Court should recognise the 'feeling of confidence' with which drivers might use 'through' highways is surely significant in view of the negative attitude to the introduction of similar systems in Australia which persisted into the 1970s.

The use of 'Stop' and 'Yield' (Give Way) signs has now reached the stage where, with almost all intersections marked over most of the country, the directional rule is rarely invoked in the U.S.A. One application is where '4-way' Stops, marked by a separate '4-way' plate below the 'Stop' sign, are considered necessary as a holding operation before signalisation or where the priority situation at a particular intersection is in process of being reversed from one street to the other.[24] In such cases drivers are guided by the sequence of arrival in resolving who should proceed.

3.4 Near-side priority at divided highways

The situation at intersections along divided highways operating under near-side priority is by no means the mirror image of that which applies under offside priority.

Under offside priority a defacto priority road can be created by providing a continuous median. However, the expectation of priority thus created is denied at any intersection where a break is provided for cross-street traffic to pass through the median. This is not the case under near-side priority.

In the United States a driver approaching an uncontrolled intersection would be required to yield the right of way to the traffic stream furthest from him (Figure 7).

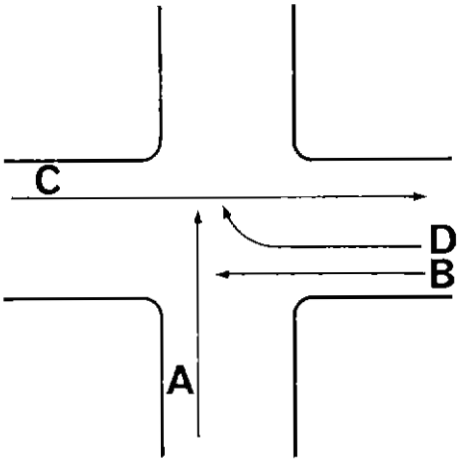

Fig 7 Near-side priority at uncontrolled intersection.

A has priority over B and D. C has priority over A and D

The advantage of this at divided highways is immediately apparent as traffic crossing through a median or turning through a median is required to yield the right of way to all traffic encountered so that the ambiguity which exists under offside priority is absent under near-side priority (Figures 8 and 9).

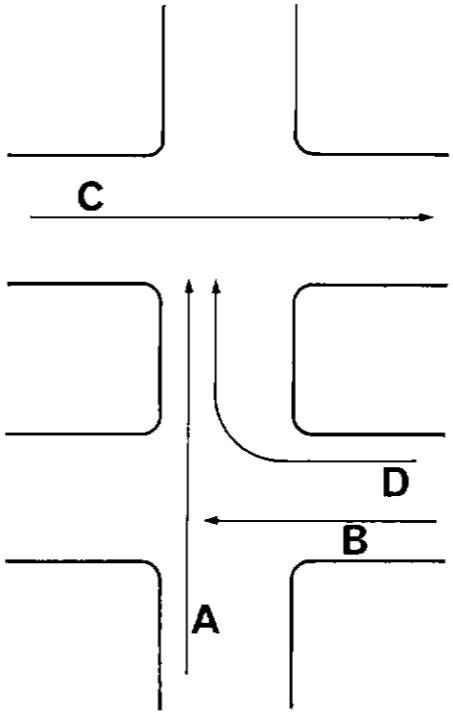

Fig. 8 Near-side priority at uncontrolled divided highway intersections is consistent for crossing and turning vehicles.

A has priority over B and D; C has priority over A and D.

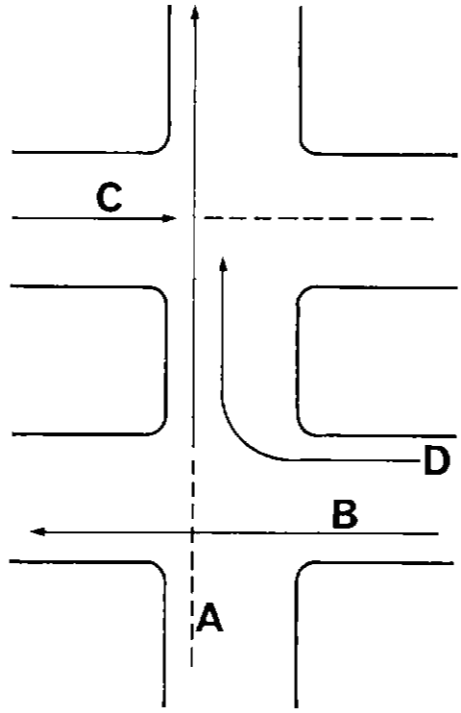

Fig. 9 Offside priority at uncontrolled divided highway intersection creates ambiguous situation at the median.

A must give way to B and D; C must give way to A, but has priority over D.

3.5 Developing priority roads from near-side priority

Although it has been noted that the adoption of near-side priority in the United States virtually dictated the development of a system of priority roads, near-side priority in fact represented a better starting point for the development of a motorised road traffic system.

For instance, the change from the normal rules of precedence which apply at a priority road affects the driver on the minor street as soon as he reaches the intersection. Normally, a driver in the United States would expect traffic on his left to yield to

him (the traffic stream nearest to him). At a 'Stop' sign or a 'Yield' sign the reverse is the case. (Figure 10).

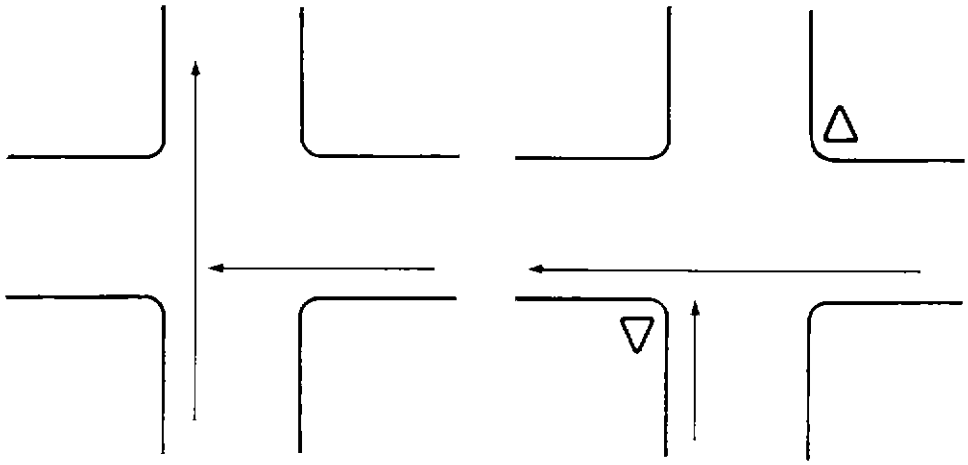

Fig. 10 Under near-side priority a 'Give Way' sign changes the rule of precedence at the entrance of the intersection.

By contrast, under offside priority no change of behaviour is required with respect to the nearest stream of traffic so that the immediate effect of the 'Stop' sign or 'Give Way' sign is to merely reinforce the existing obligation to give way to the offside (Figure 11) and thus the impact of the 'Stop' sign or 'Give Way' sign is diminished.

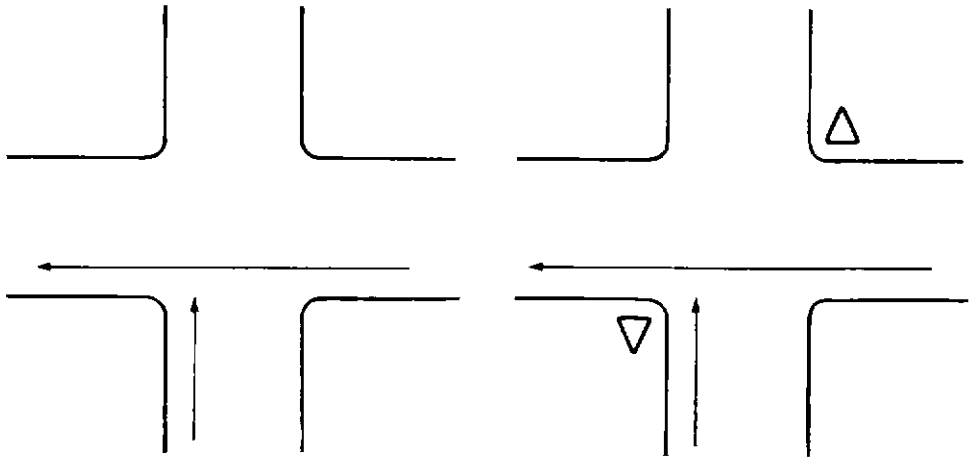

Fig. 11 Under offside priority the rule of precedence is the same at the entrance to the intersection—give way to the first stream.

To establish priority control at a divided highway under near-side priority is also simpler as there is no need for 'Give Way' or 'Stop' signs to be located on the median, or indeed for road markings to be provided there, to indicate the change in the rules of precedence (Figure 12) By contrast, it is at the median that signs are required under offside priority, by which time the crossing driver has negotiated half the intersection under the normal rules of precedence and may well expect priority there as well. (Figure 13).

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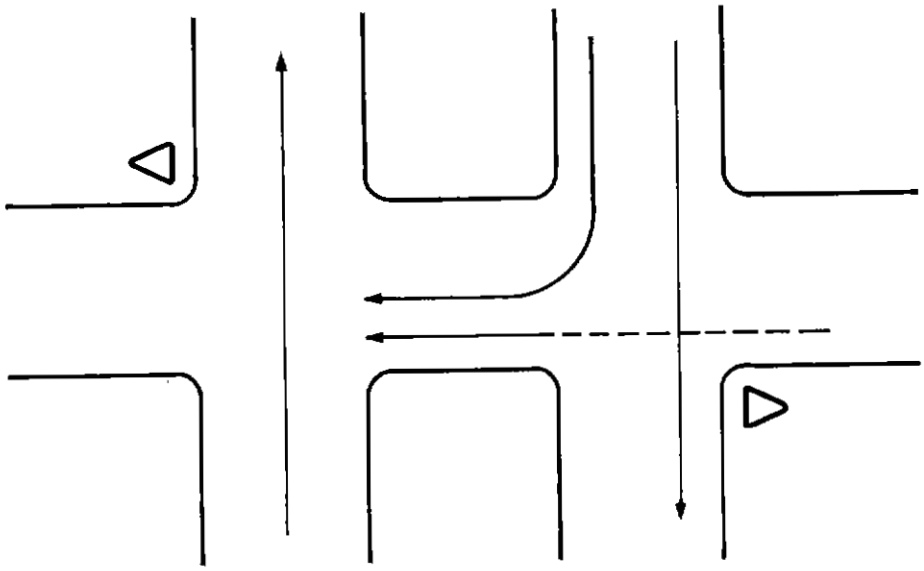

Fig. 12 Priority control at divided highways under near-side priority requires only placement of 'Give Way' signs in normal location plus road marking

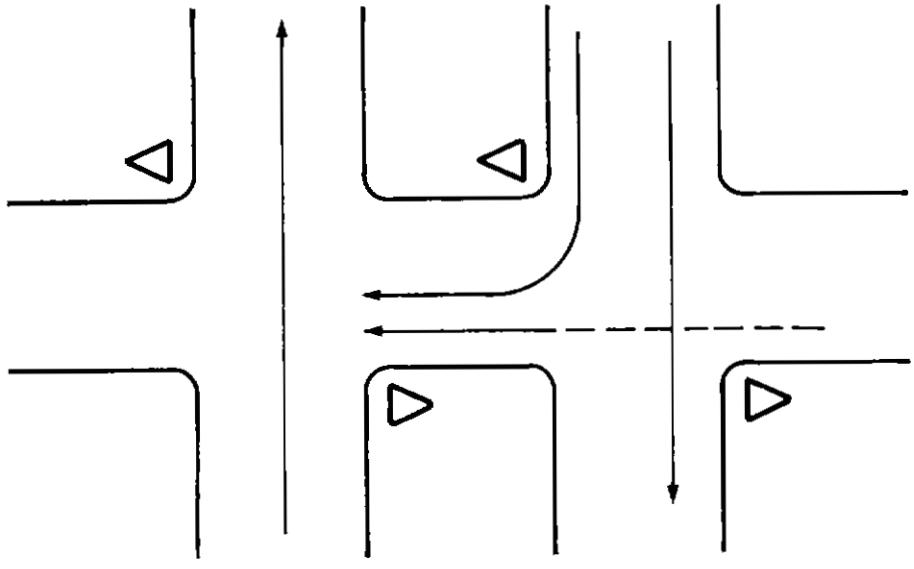

Fig. 13 Priority control at divided highways under offside priority requires 'Give Way' signs on median plus road markings (other signs and road markings only reinforce normal obligations).

3.6 Right-of-way as a privilege

One major contribution of the United States in the field of traffic regulation remains to be commented upon—this finds expression in the inclusion of the following definition of right of way in the Uniform Vehicle Code of 1962 (replacing the earlier definition 'the privilege of immediate use of the highway').

> Sec. 1-156—Right of Way—The right of one vehicle or pedestrian to proceed in a lawful manner in preference to another vehicle or pedestrian approaching under such circumstances of direction, speed and proximity as to give rise to danger of collision unless one grants precedence to the other.

Fisher's comments from his article in *Traffic Digest and Review*, November 1967[23], are most apt:

> Notice that the favoured driver or person must be proceeding in a lawful manner in order to enjoy precedence. This is on the simple premise that one cannot gain preference or legal right by unlawful conduct. This has been the rule in court decisions for many many years. Incorporating it into a statutory definition does not give it life or validity, it merely recognises what has been the rule all the time.

Fisher even considers specific provisions for forfeiture of right of way to be redundant and none appear in the Uniform Vehicle Code.[23] He says:

> Such provisions serve only to emphasise an essential element of right of way that one must be proceeding in a lawful manner or he does not have right of way to start with . . . one cannot forfeit what he never had. In this connection, perhaps the most important consideration is that even when one may lose his preferred status by unlawful driving, this does not transfer the preference to the other. In such situations neither of them has it.
>
> When forfeiture occurs, there is no right of way recognisable in either, and in such cases each driver is under the obligation to exercise due care to avoid the collision—the common law rule.

3.7 Traffic signals as mechanised policemen

In the United States, there has never been any confusion concerning the function and character of automatic traffic control signals. As Fisher puts it 'Automatic signals simply replaced the old-time corner policeman'.[23]

In his book *The Story of Highway Traffic Control, 1899–1939*, Eno describes how the world's first traffic signal tower was erected in Detroit in 1922 as a direct development of the traffic 'crow's nest' put there in 1917 in which a policeman placed some 7′ 6″ above the ground operated semaphore arms inscribed 'stop' and 'go'. This was copied shortly after in New York.[24] In 1922, the Commissioner of Police in Detroit wrote of the first traffic signals.

> I think that our latest type of tower in this city and our arrangement of lights, which coincide with the universal danger signals all over the world—a green light presented to the driver giving the right of way, and the red light stopping—is so much superior to the New York idea, that it ought to be called to the attention of European cities, if they are going to try the tower system

That no mention is made in American legislation of anything but the duty of drivers to obey the signals, and to allow traffic lawfully within the intersection to clear it, is clear evidence that different rules are considered fitting for different situations, which they then govern to the exclusion of all other rules.

3.8 Summary

It is clear that by design, instinct or good fortune the formulators of the Uniform Vehicle Code got the basic ground rules right in 1926 from the point of view of developing a sound philosophy of driving. The UVC's concept of right of way as a privilege dependent upon lawful behaviour, combined with helpful rulings by the Courts with regard to the 'first-in' rule and forfeiture provisions, would appear more conducive to safe driver behaviour than the creation of an obligation 'to give way' which applies in Australia.

The limitations of any directional system of right of way to cope with arterial traffic flows were recognised early in the United States and appropriate expenditures made on signs and signals, although the safe operation of divided highways was facilitated by the near-side priority rule. Similarly in those situations where the rule applies, the U.S. driver can observe through the windscreen those vehicles to which he is required to give the right of way rather than past the blind spot of the A-pillar.

Combined with a system of roads whose standard of access control matches their actual status in the hierarchy it is not surprising that the United States achieves such low accident rates.

4. Off-side priority: The Australian experience

Intersection rules in Australia can be questioned on a number of grounds: effectiveness in preventing accidents (as opposed to assigning blame once they occur); concurrence with natural expectancies; and appropriateness to Australian conditions.

4.1 Comparative accident rates

The first of the points noted above is difficult to assess on an international basis, however, it is known that accidents at intersections account for more than 45 per cent of all road casualties in Australia.[4] Taking urban intersections separately, their contribution to fatalities is more than twice that in the U.S.A., Canada, France or Belgium, whilst, expressed as a rate per million population, the Victorian figure for 1970 was 86.2 compared with 32 in the United States.[20] Although no indices of exposure are available on an international basis, it is improbable that so large a disparity in urban accident rates can be explained in terms of the standard of the road facilities themselves. Even in Los Angeles with a population in excess of 7 000 000 the 800 kilometres of freeway[65] carry only 60 per cent of the traffic[21] still leaving perhaps fifty times as much other road mileage riddled with intersections, often on a gridiron pattern.

The year 1970 has been taken as a baseline for statistical comparisons as the situation since then has been affected by the introduction of compulsory seat-belt wearing in Australia and New Zealand. This secondary safety measure has influenced the severity, not the number, of accidents in those countries where it applies. This renders subsequent comparison even more difficult than would otherwise be the case

On a more general level, Australia's fatality rate per 10 000 vehicles was, until 1970, among the highest in the world having regard to its degree of motorisation (i.e the ratio of vehicles to persons). The fatality rate per 10 000 vehicles is in fact an indicator of the safety of the traffic system since in Australia, the United Kingdom and the United States motor vehicles tend to average about 15 000 kilometres per year. Its validity as an indicator is not greatly affected by the degree of motorisation [5,80,85]

However, the fatality rate per 10 000 vehicles tends to fall as motorisation rises. International comparisons need to take this into account although the reasons behind this tendency are not well-understood.[78]

Should the rise in motorisation not be matched by an improvement in the performance of the traffic system (as measured by the fatality rates noted above), the road accident mortality rate (fatalities per 100 000 population) rises. This occurred in Australia and by 1970 this country had the third or fourth highest road accident mortality rate in the world, depending upon whether Luxembourg (with 132 road accident fatalities that year) was included ahead of Western Germany and Austria.

Since 1970 the Australian fatality rates have fallen dramatically under the influence of compulsory seat-belt wearing, the continued implementation of vehicle safety features through the Australian Design Rules for Motor Vehicle Safety, the wider use of traffic control devices, and road improvements such as street lighting and the provision of divided highways. The comparable 1976 data for the above table are 3583, 5.4, 492 and 26.4. As it happens, a similar improvement has taken place in the United States[85] where the figures for 1976 were 46 150, 3.2, 663 and 21.5 respectively, under the influence of factors arising from the fuel crisis of 1974 including the adoption of the 55 m.p.h. speed limit.

The table below documents the 1970 situation so far as the four countries discussed in this paper are concerned.

Fatality rates and motorisation: Selected countries 1970

Country	*Persons killed*	*Persons killed per 10 000 vehicles*	*Motorisation (vehicles per 1000 population)*	*Persons killed per 100 000 population*
Australia	3 798	8.0	381	30 4
United Kingdom	7 499	5.2	269	13.9
United States	54 800	4.9	547	26.9
New Zealand	655	5.8	397	23 2

Sources:
Australia--Publications of Australian Bureau of Statistics
United Kingdom—*Road Accidents in Great Britain 1975*
United States—National Safety Council *Accident Facts*
New Zealand—Ministry of Transport *Annual Report, 1971*

4.2 The National Road Traffic Code

The general intersection rule of give-way-to-the-right is contained in the National Road Traffic Code (NRTC) and applies, with some variations, to a greater or lesser degree throughout Australia. Traffic moves on the left-hand side of the road.

The NRTC was produced in 1962 as a model for uniform legislation in the States and Territories.[7] It was prepared by the Australian Road Traffic Code Committee, one of the advisory bodies to the Australian Transport Advisory Council (ATAC) which is the ministerial forum for Commonwealth/State discussions of land transport policy matters. ATAC endorsement is required for amendments to the Code, the provisions of which do not, however, have the force of law until passed into State or Territory legislation.

The relevant portions of the original NRTC were as follows:

> 601. Meaning of 'Give Way'
> Where these Regulations require a driver to give way to a vehicle or person, the driver shall, in circumstances where if he proceeded there would be a reasonable possibility of his colliding with that vehicle or person or otherwise creating a dangerous situation, slow down to such an extent, or stop and remain stationary for such time, as is necessary to allow that vehicle or person to continue on its or his course without risk of collision or as is necessary to avoid creating a dangerous situation.
> 602. Right of way at intersections
> Except as provided in Regulations 402 (9) relating to Give Way signs and 603 relating to turns, when a vehicle has entered or is approaching an intersection from a carriageway and there is danger of a collision with a vehicle which has entered or is approaching the intersection from another carriageway the driver who has the other vehicle on his right shall give way.

Regulation 601 has remained unchanged but amendments have been made to the wording, but not the intent of Regulation 602. Other alterations and additions have been made to Regulation 602 and elsewhere in the Code in respect of intersection operations and these changes are commented upon later.

4.3 Ambiguities and risk-taking

One of the themes developed by Austin in *Accident Black Spot*[2] is that ambiguity breeds risk-taking and that risk-taking breeds more risk-taking. One of the recurring points of criticism of the Australian application of the give-way-to-the-right rule has

been that it leads very often to ambiguous situations when the fundamental need is for a rule or rules which can be instantly acted upon by drivers for the prevention of collisions.

Perhaps the most dangerously ambiguous situations encouraging risk-taking are those which occur where heavy two-way traffic flows develop and main road drivers are normally shielded from side-street traffic by the presence of oncoming vehicles. (Figures 14 and 15). As the Expert Group on Road Safety pointed out in 1972:

> . . . when a vehicle on the right attempts to enter (the main road)—contrary to the driver's priority expectations—an unexpected hazard is created [26]

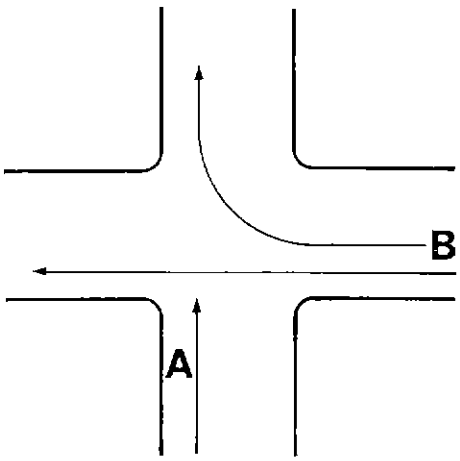

Fig. 14 In the absence of oncoming traffic 'A' must give way to 'B'.

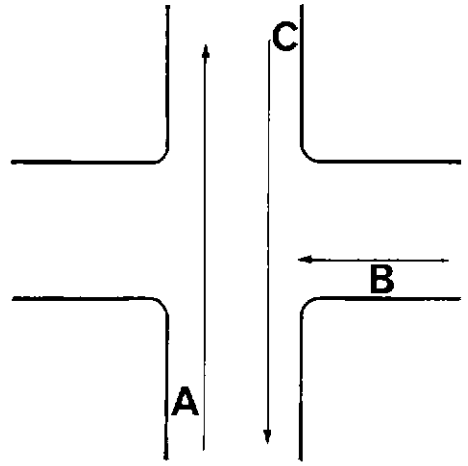

Fig. 15 Oncoming traffic 'C' shields 'A' from having to give way to 'B'.

Moreover, where three vehicles approach any intersection from different directions at approximately the same time the driver who has another vehicle preceding in the opposite direction to him must assess correctly whether the driver on his right will give way to the third, oncoming, vehicle. If the third vehicle turns left, or the second driver fails to give way, the first driver is considered to be at fault although he has no control over the second driver's actions (Figure 4). A similar situation is created wherever the Stop sign does not have the international meaning of 'stop and give way'.

In the urban arterial road situation where Blunden[10] noted that 'it is more dangerous to stop too quickly than to follow too close', Bryant[14] observes that when perhaps 20 percent of vehicles are travelling at speeds in excess of the speed limits 'it is of little value to adjure the drivers that they must exercise special care and where appropriate drive at a reduced speed when approaching an intersection', which is what the NRTC now requires in sub-regulation (1) at Regulation 602.

This sub-regulation was introduced into the Code in 1969 when it became evident that the situation was not adequately covered by the original provisions of the Code.

On rural highways a similar dangerous situation exists. Speeds are higher and a grave risk may exist at every intersection, to which drivers tend to become inured. A New Zealand study over twenty years ago showed the benefits of priority control by Give Way and Stop signs in such situations.[61]

It is small wonder that to American eyes a greater degree of aggressiveness should be evident in Australian drivers schooled in the give-way-to-the-right rule that applies here. After a visit in 1969 Patrick[62] commented on this and said that 'the main cause

for concern is the give-way-to-the-right rule'. Similar comments were made by Coppin[17] in 1977 before the House of Representatives Standing Committee on Road Safety following a year's experience of driving in Australia.

More recently, evidence presented by Browning and Wilde[13] at the Seventh International Conference on Alcohol, Drugs and Traffic Safety indicated that one of the major effects of over-indulgence in alcohol is to increase the propensity to take risks. A driving situation which abounds in ambiguities is a particularly dangerous one in which to drive after consuming alcohol to excess.

Ambiguities in fact manifest themselves at a number of levels, both legislative and practical, thus affecting the psychology of driving in Australia.

4.4 Legislative problems

Difficulties at the legislative level came to a head in the Victorian controversy regarding the comparative applicability of the general and 'first-in' rules during the mid-1960s.

Victoria in September 1964 had fallen into line with the NRTC relating to intersection operations by deleting the 'first-in' provision which formerly applied in association with a give-way-to-the-right rule:

> The driver of a vehicle about to enter an intersection shall give the right of way to any vehicle which has entered or is upon the intersection.

Harper[39] in 1967 concluded that this change led to an increase in certain types of intersection accidents.

The fact that NRTC Regulation 602 has always contained the phrase 'has entered or is approaching' appears to introduce an ambiguity not present in the U.S. Uniform Vehicle Code (UVC).

Paragraph 11-401 of the UVC uses the words 'when two vehicle[s] enter . . . at approximately the same time . . . '. The original code [used] 'approach or enter'. However, the word 'approach' was dropped in [1944] 'approximately', the latter being reinserted in 1944.[29]

NRTC Regulation 601 in referring to the reasonable possi[bility] the concept of approximation in time, but the time scale [allows] clusion in the wording of NRTC Regulation 602 of th[e]

Furthermore, the original UVC also carried a [clause]

> The driver of any vehicle travelling at an un[lawful] way he might otherwise have had.

As noted earlier, the American [courts] [such] a clause was redundant—a driver cannot for[feit]

In the absence of a defi[nite] [rights] (as opposed to 'giving way') comparable to p[riority] [in] the absence of the tradition of forfeiture of pre[-existing] [has] entered or is approaching' in NRTC Regula[tion] strain being placed on the driver in deciding wh[en] [action]. He is not protected by the wording of the l[aw] [of] approaching at an excessive speed from his right, n[or] [ing] from his right whilst he is traversing the intersection. T[he] [re]striction of the application of the rule to vehicles at the poi[nt] [of] . . . at approximately the same time' appears much safer and fai[r]

Until 1968 paragraph 11-401 of the UVC used the words 'when two vehicles enter... at approximately the same time.... The 1968 revision and the original code of 1926 used 'approach or enter'. The word 'approach' was dropped in 1930 along with 'approximately', the latter being reinserted in 1944. (29) NRTC Regulation 601 in referring to the reasonable possibility of collision covers the concept of approximation in time, but the time scale is much magnified by the inclusion in NRTC Regulation 602 of the words 'has entered or is approaching'.

Indeed, it [has] been demonstrated by Richardson[66] that in some situations, especially those with good sight distances, a driver with a speedy reaction time who tries to comply with the obligation to give way may in fact be simply ensuring that he

has a collision. On the other hand, a driver with a slower reaction time may avoid collision by passing through the collision zone before he applies the brakes. It is clear that an implicit or explicit 'first-in' rule is a necessary adjunct to any directional rule.

4.5 The Winneke Judgment

A major influence on intersection operations in Australia was a judgment by Mr Justice Winneke in 1966 in a Victorian State Appeal case, Payne v. West, in which a defendant was held to be liable to give way to the right even though the other party had driven through a Stop sign.[63] (At this time the Stop sign had the meaning of stop and then proceed in accordance with the give-way-to-the-right rule, a uniquely Australian meaning, now retained only in Queensland*, but then applying everwhere except in Tasmania). As the Victorian provision was in line with the NRTC the significance of this view was far-reaching although other States did not see so strict an interpretation being applied. As Bryant[14] comments:

> In Victoria, at least, the rule of giving way to the right is very strong and a driver though breaking every other rule in the book may yet retain his right to expect another to give way to him.

To make matters even worse the judgment also had the effect of creating uncertainty, where there had been none before, as to the right of way dispensed by traffic control signals. Australian authorities enthusiastically accepted these devices but the philosophy behind them did not find its way into the NRTC even though the 1956 Victorian Road Law[26] was quite clear on the point:

> The indications given by these signals are equivalent to the hand signals of a policeman and should be as implicitly obeyed.

It was not until 1973 that intersections controlled by traffic signals were specifically exempted in the NRTC from the give-way-to-the-right rule In the light of their genealogy as mechanised policeman it is incredible that the status at the right of way dispensed by traffic signals could for so long have been a matter for debate in Australia.

In a later Victorian case, also a State Appeal, Schuett v. McKenzie, the ostensible point of the case was whether the prior entry into the intersection of the defendant removed his obligation to give way to the right: as it could not, the magistrate was ruled to be in error in dismissing the information on this ground and the State's appeal was upheld.[70] However, the more significant aspect of the case was that the defendant came before the court for the very reason that the driver of the vehicle on the right was unable to stop his vehicle and collided with the defendant so giving rise to the assumption that the defendant failed to give way. As the Chief Justice remarked, it was quite irrelevant whether the driver on the right was travelling at an excessive speed or not. Following upon this case similar judgments were made in cases in suburban magistrates courts.[91] [92] This interpretation of obligations at intersections contrasted disastrously with the American tradition where right of way is not recognised where the approach is made at an excessive speed, although of course it is not transferred to the other party either.

The driver turning from the centre of the road, is also vulnerable and is reluctant to commit himself to turning in the absence of a 'give and take' tradition where an oncoming driver might ease up to permit the turning driver to cross. In the United States, by contrast, an oncoming driver is not permitted to put the turning driver in legal jeopardy by approaching him at an excessive speed: by doing so he would not

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* Queensland will adopt the international meaning from 1 July 1979

be 'proceeding in a lawful manner' and could not claim to have had the privilege of right of way in the event of a collision.

4.6 Visual angle and speed of approach

It is a matter of simple geometry to show that two vehicles on a collision course will maintain the same visual angle to each other if their speeds remain constant, but not necessarily identical. Clearly it is desirable on safety grounds that there be a change in the relative rate of approach so as to alter the visual angle; this is achieved in complying with a 'Stop' sign or a 'Give Way' sign.

Moreover, in order not to be obscured by the windscreen pillar it can be shown that the rate of approach of a vehicle on the right must be slower than that of the subject vehicle[8]; if it is approaching at twice the speed it will be observed only obliquely through the side window and at higher speeds only in peripheral vision. Indeed the more excessive is the speed of the vehicle on the right relative to that on the left the greater is the chance that the driver on the left will be involved in a collision for which he could be cited for failing to give way. This accords with Richardson's finding noted earlier.

4.7. Risk-taking behaviour at intersections

Data from the in-depth study of accidents in Adelaide during 1963–1964 showed that only 19 per cent of drivers approached intersections at such a speed that they could hope to avoid all vehicles approaching from their right.[67] The intervening period has not seen any improvement in behaviour at uncontrolled intersections. As part of the analysis of data from the second in-depth study of accidents in Adelaide conducted during 1976–1977, McLean[53] calculated safe approach speeds at intersections where accidents had occurred. These averaged 14 km/h, ranging from 3 km/h to 29 km/h, for vehicles approaching from the direction of the vehicle which should have yielded in the accident studied. Actual approach speeds ranged as high as 64 km/h with a mean of 31 km/h, twice the mean safe approach speed.

Similar results had been reported by Harper[37] who showed that in a middle-suburban Melbourne residential area the 85th percentile operating speed between intersections was 51 km/h, yet in the same area safe approach speeds at intersections varied from 10 km/h to 40 km/h with a mean of 18 km/h. Data from that study indicated that one in every 9000 potential conflicts at a particular intersection resulted in a collision.

Experiments conducted in Melbourne by Lovegrove[47] demonstrate that drivers exceed the safe approach speed when the probability of another vehicle approaching from the right is low. He hypothesises that in such cases drivers are relying on taking evasive action in order to avoid a collision, McLean[53] however, has shown that by the time most drivers become aware of the other vehicle approaching it is too late to take any effective avoiding action.

Bryant has demonstrated that where two drivers are approaching an intersection at right angles the driver on the left will in one-third of cases bluff his way through; this is the most profitable strategy given that drivers have a preference for not stopping.[14]

A study by Rubin, Steinberg and Gerrein has gone further and demonstrated a strategem for gaining the right of way when one is not entitled to it.[68] The mechanism for this was basically to avoid eye contact with the other driver. Certainly there can be no better way to do this than to bear down on the hapless victim at an excessive speed.

The practical utility of the give-way-to-the-right rule in a situation where 81 per-cent of drivers exceed the safe speed of approach is at best questionable. It is certainly

indicative of a high degree of risk-taking, either intentionally or out of ignorance Either situation is intolerable.

4.8 Saving clauses

The application of game theory to the situation demonstrates the lack of respect for others which the Australian situation generates.

As Bryant[14] has observed 'give way has a punitive rather than a rewarding connotation and wilful behaviour is no more reprehensible and blameworthy than an error of judgment'. Indeed it could be said that a weapon has been placed in the hands of the 'highway bully' with which to gain precedence over his victim.

In an endeavour to at least partly redress this whole situation a provision, Regulation 602 (4), was inserted in the NRTC in 1973 similar to one first appearing in South Australian legislation.

> It shall be a defence to a charge for an offence of failing to give way to the right to prove that the defendant was not aware of and could not by the exercise of reasonable care have become aware of the approach of the other vehicle.

It is of interest to note that the 1954 Progress Report the Australian Road Traffic Code Committee,[6] whilst rejecting the creation of priority roads, had recommended that a general 'saving clause' be included in the motor traffic laws in all States, such a clause to be along the lines of a New South Wales regulation which read:

> No person shall be liable to a penalty for any offence under these regulations if he proves to the satisfaction of the Court hearing the case that such offence was the result of accident, or could not have been avoided by any reasonable efforts on his part.

In the light of subsequent events, especially in Victoria, it is a pity that this admirable recommendation did not find expression in the NRTC

4.9 To give way or give the right of way

It would of course have been more just, and logical, in the first place to have merely recognised that one must be proceeding in a lawful manner in order to have right of way at all. In the United States, right of way is construed in the context of one driver yielding precedence to another for the purpose of preventing accidents from happening; it has never been regarded as an arbitrary obeisance to be paid to the law whenever anyone happens to loom up on the driver's right. Victorian law, at least, encouraged drivers on the right to willy-nilly consider themselves to be in the right

The attempt to curb this arrogance by legislating right of way out of existence—by substituting for 'give the right of way' the expression 'give way'—failed precisely because the creation of an absolute obligation to give way has as its concomitant an absolute right to proceed, so arriving back at the situation which the new terminology was supposed to cure. It is unfortunate that the 'give way' usage also found its way into the 1968 United Nations Convention on Road Traffic.[83]

4.10 Ambiguities in the driving situation

At the practical driving level, even if the basic rule had been formulated differently, the practice of driving on the left and giving way on the right leads to a number of ambiguous situations which would not arise if right of way were accorded to the left or if a major/minor system operated. Some of these situations concerning the relative precedence accorded to the second as opposed to the first traffic stream have already been commented upon. This is not to say that Australia should necessarily have changed to a give-way-to-the-left rule.

Rather, the ambiguities which necessarily arise under offside priority needed to be identified and resolved by the use of signs and by modification of the rules in the direction of a major/minor system.

4.11 Reinforcement of the driver's major/minor concepts

Despite objections to the major/minor concept in Australia, the give-way-to-the-right rule in fact has the effect of reinforcing the major/minor expectancies of drivers so that Australia could well have had the worst of both worlds. Having rejected the British major/minor system in favour of the American system of directional right of way, the decision to give way to the right (rather than the left, which would have been the equivalent of the American rule) merely served to reinforce the driver's major/minor expectancy, which the American application of the rule does not do. Under near-side priority a driver is not shielded by oncoming traffic from his obligation to give way; under offside priority he is. Moreover, on arterial roads, the presence or absence of oncoming traffic becomes the major determinant of the need to give way. (Figures 14 and 15.)

As Cameron points out:

> Although this aspect of the system is not well known, the intention of preserving continuity of high volume flow in this way is quite deliberate, and is viewed by some traffic engineers as a means of obtaining some of the advantages of a major/minor system without accepting its disadvantages.[15]

However, the folly of this easy way out is evident from the findings of a study conducted for the Highway Research Board by De Leuw, Cather[22] which involved a detailed examination of driver behaviour at a number of intersections in New York, Chicago, San Francisco and Toronto. A major finding was that the type of control plays a large part in determining the way in which a street or road is used; surely one of the most significant forms of control is the open intersection right of way rule. A further finding was that drivers respond to the implied character of a street or road, as gauged from design, traffic flow and presence of stop signs facing cross traffic, by assuming priority at intersections. Moreover, the authors state quite firmly that, in using the equations developed in the study, a careful examination must be made to determine whether the character of a street fits its official designation.

It is manifestly dangerous to create the expectation of priority by the application of the general right of way rule and then, when drivers respond to the implied character of a street or road, to deny that in most situations one street is major and the other minor. The classic case is of course the divided highway which has few median openings. As noted earlier the give-way-to-the-right rule grants precedence to traffic on the divided highway, thus creating an expectation of priority, which is denied at an intersection which breaks the median, unless priority is changed by a sign. This situation, as has also been noted, is compounded since a driver may not know whether a vehicle approaching through a wide median is turning right—and therefore must give way—or is crossing and must be allowed to proceed* (Figure 9).

As a matter of principle, traffic on divided highways should have precedence over other traffic so that the ambiguities, brought about by normally yielding to the first rather than the second traffic stream, may be avoided.

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* The author is indebted to James O'Day for drawing attention to an eighteenth century convention of giving way at sea to senior captains as being only slightly crazier than the right-of-way rule here (Journal of Navigation, Vol 29, No. 4, p. 342, refers.)

4.12 The early usage of Give Way signs

'Give Way' signs were used during the 1960s to change priorities on divided highways in particular but elsewhere the basis for use was often unfortunate. The policy in Victoria,[89] for example, was to use 'Give Way' signs 'where there is a high approach speed from the side street . . ., interruption to the flow of traffic on the main street cannot be tolerated, and the intersection is . . . easily identifiable'. In other words, in high volume situations where delays would be greatest, considerations of flow were allowed to dominate; yet where volume was lower and gaps more likely to occur naturally (or by the action of signals installed on a warrant for 'interruption of continuous flow') the concept of priority was rejected on the basis of delay

There were also grave dangers in the initial use of 'Give Way' signs as the only indication of any change to the rules of precedence came from local knowledge or from a glimpse of the back of the 'Give Way' sign. This was hardly an effective means of communicating vital information. Appropriate road markings are now included in the Manual of Uniform Traffic Central Devices.[75] (The manual is in fact an Australian Standard. A revision of the manual was recently completed by the Australian Committee on Road Devices which included representatives of State and Territory road and traffic authorities, and other interested bodies.)

In the context of removing ambiguities it is also clear that 'Stop' signs need to have the meaning 'stop and give way'. On logical grounds alone, there seems very little point in bringing two vehicles to a halt when one has already been required to stop anyway. In 1966, McGill,[50] made the point that:

> It is apparent that 'Stop' and 'Give Way' signs conform to the major/minor expectancies. However, 'Stop' signs do not legalise the behaviour they encourage. 'Give Way' signs, although legalising this behaviour, do so without informing drivers of the change.

4.13 Delays at 'Stop' signs and 'Give Way' signs

As to the delays which would be involved for side street traffic under a priority system—a major obstacle habitually raised by Australian traffic authorities—the nomographs developed in the De Leuw, Cather[23] study referred to earlier envisage a maximum delay of 11 seconds under 'Yield' control and 16 seconds under 'Stop' (and Give Way) control under U.S. conditions.

The more recent study of the Western Australian experience with the use of 'Stop' signs meaning 'stop and give way' confirmed these findings under Australian conditions.[95] With medium traffic average vehicle delay was 19 seconds and with heavy traffic 50 seconds. Either period is surely a small price to pay for subsequent priority once the route is entered

Nevertheless it is important that adequate opportunities be provided for traffic to cross and enter major roads since there is probably a limit to the patience of minor road drivers. The installation of traffic control signals on a warrant for the interruption of continuous flow, or simply to provide the necessary gaps, will have both site and system benefits.

4.14 Street patterns and intersection priority

A major question still remains: whether a give-way-to-the-right (or even the left) rule was ever appropriate at all or most intersections in Australia.

The presence of different street patterns has been noted as an important determinant in the differing approaches to right of way adopted in the United Kingdom and the United States.

The American system developed largely because the characteristic gridiron street pattern itself offered no guide by which to establish a rule for arbitrarily according precedence to one of two vehicles which would collide unless one yielded precedence to the other. However, in the new suburban areas the gridiron pattern has been replaced by what Marks,[48] in his pioneer study in 1957, called 'limited access' subdivisions where junctions rather than cross-intersections predominate. Marks' study drew attention to the much better safety record of 'T' rather than cross-intersections and this he attributed to three factors: the first being that the need of the emerging driver to slow down merely in order to turn reduces operating speed to a level nearer the safe approach speed; the second that there are many fewer potential conflict points in a three-legged intersection; and the third, as stated by Marks:

> Another built-in advantage of 'T' intersections is the automatic assignment of right of way. Vehicles entering the intersection from the discontinuous leg must slow down to turn left or right; they normally expect to yield to traffic on the continuous street which is automatically assigned right of way. This eliminates the usual indecision as to which vehicle has right of way which is typical of the uncontrolled four-legged intersection.

This statement carried the more weight because in the U.S.A. the emerging driver has legal precedence over drivers in the first traffic stream. (Figure 6).

Experimental confirmation of Marks' statement is provided in a recent Swedish study.[40] Subjects on the continuous street, irrespective of their knowledge of the (same) general rule, did not obey this rule in at least 19 of the 23 intersections where it applied. Moreover, all of the subjects approaching on the discontinuous leg drove as if they should give way.

It is remarkable that these principles were not acted upon in Australia where the unco-ordinated development of the world's first suburban nation has in fact resulted in local street systems of the limited access type with a preponderance of 'T' intersections. Data from the Commonwealth Bureau of Roads[42] place the proportion of 'T' junctions at at least 75 per cent of all intersections in the five mainland State capitals.

Marks' findings regarding safety were confirmed in a study 'Design of the Local Street System' conducted by Harper whilst he was Chief Engineer of the Traffic Commission, Victoria.[37] A slightly later article,[77] in 1968, showed how Sydney's suburban councils were using street patterns to reduce accidents: in one, Holroyd, all intersections in new subdivisions were to be 'T' junctions and in older areas of the municipality the council was improving gridiron pattern areas by closing off roads. Such measures have since become common.

Thus the proportion of 'T' junctions is rising all the time, yet the built-in advantages of automatic assignment of priority, in line with driver expectancies, which could have eliminated conflict at many intersections are still being largely ignored in a zeal for standardisation at times imposed, it would seem, for its own sake. What is more, the emphasis placed on the requirement to give-way-to-the-right inhibits the inherently safe operation of 'T' intersections by creating uncertainties where none need exist.

It would appear reasonable to amend the right of way rules to provide that traffic approaching an uncontrolled 'T' intersection along the stem of the junction should be required to give precedence to all traffic on the continuous leg. This is important for its own sake and also for the manner in which it would enable the development of a priority system with a use of far fewer signs than have previously been thought necessary. Such a provision was in fact adopted in Western Australia on 1 June 1975: the results of this change are discussed later. It is of interest that on 1 January 1966 Western Australia had deleted a rule requiring vehicles turning right to give way to all other traffic, presumably to bring its law into line with the NRTC.[25]

4.15 Freeway operations under offside priority

At the other end of the road hierarchy from the local street system, even freeway driving suffers as a result of the Australian conditioning. It has been commented upon that Australian drivers are much more aggressive than American drivers[17] and that the absence of a 'give and take' tradition is particularly noticeable in the freeway merging situation. This is, of course, only one more manifestation of the inappropriateness to modern conditions of the Australian decision to opt for offside priority.

Freeway on-ramps are most usually located on the near-side, both here and in the United States. The obligations with regard to priority as between the freeway driver and a driver merging from a ramp are therefore reversed as between the two countries.

The American driver travelling along a freeway towards a junction with an on-ramp is conditioned to give way to the driver merging from his right. Moreover, of the two drivers it is the freeway driver who generally has the better view of the situation, since the ramp driver would normally be looking behind him as he approaches the end of the ramp to judge his entry into a gap between two vehicles.

The merging driver in the American situation can, however, time his entry into the kerb lane with the expectation that the oncoming driver will ease up slightly to let the merge take place as smoothly as possible and with as little delay or disruption or delay to all concerned, including following drivers as well. As the roles of all the participants are frequently reversed in the course of a day's driving, what makes life easier for one does so for the other as well. In the United States it has been estimated that as many as 80 percent of local passenger cars appear on freeways in the course of a week.[16] Such a 'golden rule' approach is not encouraged by the Australian conditioning.

In Australia the merging driver is in the position of having to give way absolutely to his right and the freeway driver can ignore his need to merge; to do otherwise would confuse following traffic and indeed the merging driver himself, who could be legally at fault should a collision occur.

This reversal of obligations at freeway on-ramps would appear to be a factor in explaining, at least in part, the discrepancy between freeway-merging ramp capacities set out in the U.S. Highway Capacity Manual (1965) and the theoretical capacity calculated for Australian conditions by Smith and Swzed.[73] These authors admit, however, that they were 'of course quite unaware if present American or Australian driver practices are based on the same gap acceptance performance'. It is hardly surprising therefore that their simulation model provided only for a 'forced merge' if the ramp driver misjudged the available gap. It was noted that this would have a 'highly disruptive effect on kerb lane flow', but nevertheless the kerb flow was not simulated. This omission mirrors the lack of co-operative interaction under the Australian conditions.

4.16 The influence of turning vehicles on simulations

On the surface street system the importance of co-operation between drivers in increasing capacity was commented upon by Blunden[10] who saw the traffic stream as a series of gaps punctuated by vehicles rather than the other way around. This applies equally for right-turning vehicles awaiting gaps in the oncoming traffic stream as it does for drivers crossing or merging.

Because of this simulations tend to produce an incomplete view of real world intersection operations. The simulation of a four-way intersection operating under offside, nearside and major/minor conditions conducted by Forward and Pretty[32]

ignored turning vehicles. In view of the significance of turning vehicles in creating intransitive situations[36], pointed out earlier, their exclusion made it almost a foregone conclusion that offside priority would give the highest capacity.[19]

4.17 Not one rule but a hierarchy of rules

The paper by Generowicz[36] is also of interest from the point of historical perspective, echoing in its condemnation of the give-way-to-the-right rule the thoughts of the U.K. Royal Commission of 1929 with regard to intransitive situations.

Cumming[20] also comments that the lack of applicability of the give-way-to-the-right rule to all but the simplest two-vehicles-at-right-angles situation in fact necessitates the development of a hierarchy of rules. Bryant[14] has detailed these rules and observed that the behaviour of vehicles subsequent to the initial resolution of intransitive conflict is not in accordance with the various rules of right of way; rather 'it is probable that the order in which the conflicting vehicles clear the intersection is entirely contingent on their opportunity to move safely'.

This situation makes a mockery of any claims that the give-way-to-the-right rule is simple and easily understood. Generowicz[36] in fact went further and ended his consideration of priority at unsignalised road intersections in Australia with the comment that:

> In conclusion, it should be said that the success in persuading no fewer than seven (sic) separate Australian State governments to adopt a legislation so contrary to all logic and so oblivious to fundamental phenomena of traffic flow must rank as a truly outstanding achievement.

The fact is, of course, that it did not happen quite like that. No other country relies on offside priority the way Australia does and so there is little research evidence comparing one rule with another.[71] Other countries appear satisfied with their rules: in Australia there has been continual controversy. 'Perhaps' as Harper[38] commented in 1972 'we are so used to indigestion that we do not know what good food is like'.

4.18 Offside priority for capacity rather than safety

A major point in the advocacy of the give-way-to-the-right rule in Australia has always been that it provides the greatest capacity with the minimum number of signs and signals.[31]

The give-way-to-the-right rule was obviously firmly entrenched when the NRTC was being framed as a model for State and Territory legislation, yet only a year or so earlier the Senate Select Committee on Road Safety (1960)[3] had reported having been given thought-provoking evidence in favour of near-side priority and considered that the case deserved close study. What has happened down the years has in fact been a sacrifice of safety for capacity.

Indeed, almost from the beginning of traffic regulation, it has been on the basis of factors other than safety that offside priority has been advocated. Worse still, even the basic advocacies such as that by Eno have been shown to be incomplete or based on premises no longer relevant to the modern driving environment. It is unfortunate that the first Superintendent of Traffic Police in Sydney, Alfred Edward, should have been a disciple of Eno on offside priority[21], especially since Sydney has an irregular main road layout following the ridges of high ground.[35] Such a pattern has more in common with English than American cities and could have formed a logical basis for a major/minor priority system.

The continued advocacy of offside priority by the Comite International pur la Priorite a Gauche (CIPAG) has also tended to be on the basis of intersection capacity,[69] supplemented by critical comments such as Foldvary's about major road

driver attitudes and the alleged effect on journey times of delays encountered when crossing main roads.[30] The former criticism denies the reality of the situation which exists already, encouraged, as it happens, by offside priority; the latter assumes a continual crossing of main roads which simply does not occur on a properly planned journey.

Greater detail on Foldvary's position is given in the Review of Intersection Priority in Relation to Road Safety by Sinclair and Knight.[72]

Clearly, however, it is inappropriate to promote a general intersection rule as an access facilitation and capacity-increasing measure when other traffic management tools exist to carry out these functions in a more efficient and integrated manner.

In the wider context of urban mobility, it is likely that offside priority has been a major factor in enabling governments in Australia to cope with the community's expressed desire for mobility without significant construction of high standard road facilities. The dearth of such facilities was commented upon by Webb as far back as 1963[93] and reiterated by Mathews in 1968.[49]

4.19 Metropolitan traffic management and the local street system

In their review of Town Planning in Relation to Road Safety, Loder and Bayly[46] noted that in a grid design every street potentially serves as an access road and a collector. As already pointed out, one of the deficiencies of the Australian approach is that it causes local streets to be used for through traffic.

Because of the deleterious effect on residential streets of drivers using them to bypass traffic signals and then force their entry onto main roads, Harper[38] at the National Road Safety Symposium went so far as to say that:

> From an amenity point of view alone a change in the priority rule for intersections would probably be justified in order to remove traffic from local streets.

Such a move cannot, however, be taken in isolation and if traffic is to be taken out of residential streets additional capacity must be provided elsewhere. As one municipal council in Melbourne concluded after an experimental program of street closures and intersection capacity improvements on the bordering arterials:[57]

> The root of the problem lies in an inadequate metropolitan transport system.

Negus and Barton tabulate street classification criteria at four levels: local, collector, arterial and expressway.[57] In place of the latter category, Australian cities characteristically have what might be described as 'hyper-arterials', in the sense that they are over-active. Although this situation arises in part from the fact that the inner and middle suburbs pre-date the motor car, it has also been influenced by the offside priority rule which by now has saturated the entire road system with volumes of traffic all but impossible to handle even on the 'hyper-arterials'. Moreover these surface arterials are often of the most dangerous type: four-lane, undivided, with no control of access.[45]

It is curious that those who oppose the construction of new high standard limited-access urban traffic arteries which would ultimately improve residential amenity throughout the community tend to ignore the safety and other benefits of freeways seeing them only in terms of reduced journey times for their users[55] instead of an essential part of the complete hierarchy of roads necessary to cope with a rate of motorisation approaching one vehicle for every two persons.

4.20 Mass mobility in 'Austerica'

The fact that the give-way-to-the-right rule has imposed obligations at variance with the expectancies it creates and stultified the provision of an adequate road network conforms with the observations of the late architect-commentator Robin Boyd. In 1969 Boyd[11] noted an Australian pattern of putting sports cars before freeways and the use of repressive measures that keep problems at bay while taking nothing from the public purse.

In his best known book *The Australian Ugliness*, Boyd[12] also provided a social context into which the uniquely Australian traffic system fits as snugly as any of the other aspects of our way of life of which he was critical. Apropos of the comments of the Senate Select Committee on Road Safety concerning near-side priority, it is a pity no one saw the relevance of Boyd's observation that

> . . . the essential thing to be noted about American influence in Australia is that, unlike the English, it never survives the ocean crossing intact. The most mesmerised imitators of America always add a touch of Australian accent and subtract a measure of sophistication, tending continuously to transform Australia into a State which can be called Austerica . . . found in any country, including parts of America, where the austerity version of the American dream overtakes an indigenous culture.

The way in which Australia has become one of the most motorised nations on earth with so little provision of specialised facilities to provide mobility with safety is witness to this view, quite apart from the transplantation of the give-way-to-the-right to the other side of the road. Boyd further comments that:

> The most fearful aspect of Austericanism . . . is a terrible kind of smugness, an acceptance of the frankly secondhand and the second class, a wallowing in the kernel of the cultural underdog.

That a State Minister of Transport[76] could claim in 1968 that 'The give-way-to-the-right rule is the best available' is testimony to the accuracy of Boyd's observation which, although directed mainly at the visual shaping of the Australian environment, was tragically true for the traffic system as well.

As to the undoubted need to change the rules of precedence Pretty perhaps might provide the last word:

> Australian authorities should . . . at least ponder why so many countries have a priority rule in their regulations but drive to a major/minor system.[64]

5. Modified offside priority in New Zealand

The rules of precedence at intersections in New Zealand represent a hybrid of systems discussed so far The New Zealand approach combines elements of the major/minor system yet retains, to a much-limited degree, offside priority.

In terms of preventing vehicle conflicts the most significant rule in New Zealand is probably that which requires drivers turning right (both to leave a road and to merge into a road) to give way to all other traffic. With a high proportion of 'T' junctions, as in Australia, priority especially in rural areas is effectively controlled at most intersections without the use of signs although extensive use is made of 'Give Way' and 'Stop' signs (having the international meaning)

Taking the more motorised nations of the world into account, New Zealand, relative to its vehicle/population ratio, has traditionally had a road traffic accident fatality rate lower than other countries apart from Norway, Sweden and the United Kingdom.[78] In the last year for which even approximately comparable data were available, 1971, only 20 5 percent of reported accidents in New Zealand were stated to have resulted from failure to give way at intersections compared with 28 percent in New South Wales in the same year.[6][58]

The rule on giving way at intersections states that turning drivers must give way to all vehicles that are not turning. In all other situations the rule is to give way to traffic crossing or approaching from the right.

The rules were in fact slightly modified from 1 February 1977 to clarify obligations where both vehicles were turning and where one faced a 'Give Way' sign and the other a 'Stop' sign.[59] The potential conflict between left-turning and right-turning vehicles has in fact been resolved in favour of the right-turning vehicle, as is the case in Victoria. Where one turning driver faces a 'Stop' sign and the other a 'Give Way' sign, the latter has precedence as he faces the less restrictive device.

An interesting clarification has also been included in the new rules in respect of curved intersections: if a road is marked with a centre line or a line to show the normal path of traffic, a driver is considered to be turning if he leaves the path of this line This takes care of the awkward situations which arise where the main route diverges but a road continues straight on and drivers continuing straight on might otherwise claim precedence over the main traffic stream by virtue of being on the right (Figures 16 and 17)

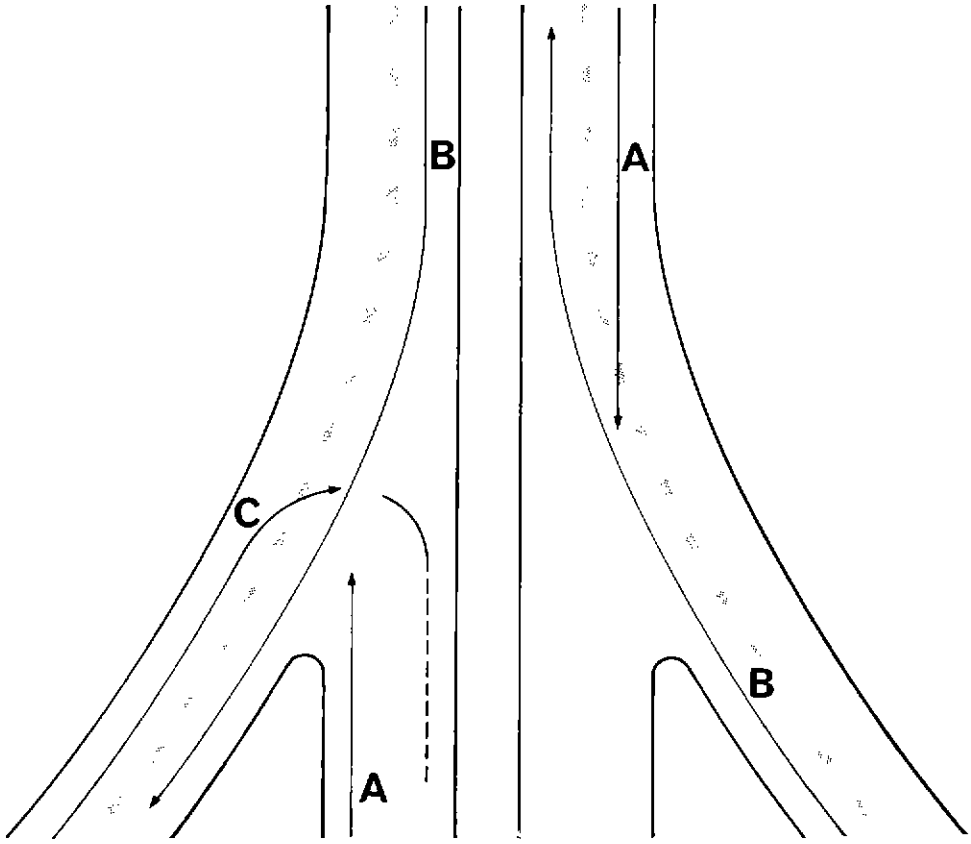

Fig. 16 In New Zealand if the marked centre line curves, 'A' who is going straight ahead must give way to 'B' who is following the centre line, as must 'C'.

Fig. 17 In New Zealand 'A' who is leaving the path of the marked centre line must give way to 'B'.

Clearly there are important lessons for Australia in the New Zealand experience.

6. Recent developments in Australia

So far this paper has documented the case against offside priority based on the Australian experience up to 1970 and pointed to alternative models which could have been more profitably adopted.

In the past few years, however, there has been a greater use of signs and signals to allocate priority at intersections as growing traffic volumes make the weaknesses of the give-way-to-the-right rule all too obvious. Nevertheless no commitment has been made to the adoption of a system wide alternative to offside priority throughout Australia.

6.1 Priority roads

The first device to be sanctioned in the NRTC as altering priorities at intersections was the 'Give Way' sign although its use was often to reinforce existing obligations and therefore not in accordance with European or American practice

In Canberra, however, a limited number of priority routes were established using 'Give Way' signs and their record in reducing accidents was promising.[93] In Tasmania, where the 'Stop' sign has always meant 'stop and give way', a de facto system of priority roads operated protecting rural and urban arterial routes. Interest in establishing protected arterial road systems spread to Victoria following the success of the Perth system implemented in 1970 and the New South Wales decision to experiment along Victoria Road in Sydney in 1972. Moreover, in Victoria, the number of casualty accidents occurring at intersections had risen by 30 percent between 1966 and 1970 compared with an increase of 16.7 percent in all accidents.[94]

It was, however, the experience in Perth which represented the watershed in priority control of intersections in Australia. The priority road system was first established in Perth using only 'Give Way' signs since 'Stop' signs retained their uniquely Australian meaning. On one route in particular, Shepperton Road, an increase in accidents at intersections with poor sight distances formerly controlled by 'Stop' signs caused grave misgivings. The solution to the problem was clear—change the meaning of the 'Stop' sign. This was done and subsequent studies have shown a high level of observance of 'Stop' signs both with regard to stopping and giving way, reduction in accidents also occurred.[95]

Around the same time Sydney's Victoria Road experiment proved successful in reducing both journey times and accidents, the latter by 9 percent compared with a 16 percent rise elsewhere, and plans were made to convert other routes in Sydney.[54]

Priority routes have been established in Adelaide and are now operating in all capital cities except Brisbane, but most extensively of all in Melbourne, Victoria. Priority routes are also being established in the country areas of most States.

6.2 Metcon/statcon

In 1972, the decision was taken in Victoria to adopt the international meaning of the 'Stop' sign and to inform drivers of the change in priority conditions at 'Stop' signs and 'Give Way' signs by means of the international priority intersection sign.[94] These complementary signs became known as 'rocket signs' and, because of the unfortunate connotations of this, the future of priority roads in Victoria was in some doubt, apart altogether from the profusion in which the priority intersection signs would have been required.

Late in 1974, following an overseas visit, the Victorian Premier, Mr Hamer, announced that Victoria would change to the major/minor road system operating in the United Kingdom.[34] With commendable enthusiasm, having regard to the previously guarded attitude to replacing the give-way-to-the-right rule, the Road Safety and Traffic Authority embarked on the METCON (Metropolitan Intersection Control)—and now STATCON (State-wide Intersection Control)—program. Under this ambitious program all intersections along arterial and sub-arterial roads are to be protected by 'Stop' signs, 'Give Way' signs or traffic control signals. At a few locations where signals will later be installed, a unique 'Give Way to Right' sign is used to indicate that the offside priority rule still applies. At all treated intersections, which initially included some isolated ones as well, road markings are used to indicate the priority condition to the major road driver. Ultimately all intersections will be controlled, with a possible change to the law at 'T' intersections similar to that adopted in Western Australia.[34]

At low volume cross-intersections, roundabouts are also coming into increasing use.[33] So as to make it clear that a location is in fact operating as a roundabout, as opposed to a series of separate intersections, a unique roundabout sign has been introduced in Victoria. This sign will ultimately define, by its presence, whether the roundabout rule applies to a particular location. The sign takes the form of an inverted red triangle similar to a 'Give Way' sign but with the three-arrow roundabout symbol in place of the 'Give Way' legend. It has been adopted on the basis that drivers have come to expect that intersections on the classes of road concerned will have 'Give Way' signs, 'Stop' signs or traffic signals controlling them. The Victorian traffic regulations were also amended from 27 November 1978 to require a driver entering a roundabout to give way to any vehicle which is within the roundabout and approaching that driver from the right, thus covering merging movements within the roundabout as well as entering movements.

6.3 The terminating street law

On 1 June 1975 a law unique to Western Australia was introduced requiring drivers approaching a three-way junction along the terminating road to give way to all traffic on the continuing road.[96] This exception to the give-way-to-the-right rule had been canvassed in the first report of the Expert Group on Road Safety in 1972 and was recommended in its second report in 1975.[27]

As the vast majority of intersections along urban and rural arterial roads are 'T' junctions it is clear that the terminating street law allows priority roads to be created at a fraction of the cost which would be required if it were necessary to erect 'Give Way' or 'Stop' signs at every intersection. In Western Australia it has been estimated that on rural highways and main roads around 85 percent of intersections are covered by the terminating street law.

A study into the effects of the law, covering 200 intersections, indicated no statistically significant changes with respect to accidents, although there was some indication that the new law may have reduced rear end collisions on the continuing road.[96]

The study revealed that prior to the new regulation the majority of drivers were already adopting the major/minor road concept. This driver behaviour pattern was strengthened by the new regulation and hesitancies have been reduced with benefits to smoothness of traffic flow. The previous conflict between law and expectancies was illustrated by the fact that whilst only 4 percent of terminating-road drivers forced their right of way before the change, 20 percent of continuing-road drivers who had to decide whether to give way to the right in fact attempted to do so. After the change

only 2 percent of terminating-road drivers attempted to gain the right of way, illegally, and only 1 percent of continuing road drivers attempted to give way to the right. These results mirror the Swedish findings under the opposite general rule.[49]

The aligning of law and expectancy, of course, also benefits the law enforcement authority which is not now compelled to enforce a regulation with which at least 80 percent of drivers failed to comply.

Delays for drivers on the terminating road may have increased, but in absolute terms such increases are considered to be only marginal. At one site with a flow on the continuing road of 1300 to 1500 vehicles per hour, the average delay, although doubled, was still only 16 seconds. As noted earlier, this is a small price for subsequent priority along the arterial route once it is entered

6.4 The Monash Study

The introduction of METCON also provided an opportunity to establish for the driving population of a large metropolitan city, Melbourne, the effect of an extensive change in the rules of precedence at intersections. A study by McKelvey *et al*[51] of Monash University deals with the understanding and perception of priority rules at the introduction of METCON and a year later; and also with behavioural measures of intersection negotiation before and after the change-over.

The four-part study shows that there was a partial appreciation of the principles of the new system before its introduction but that in the practical driving situation there was, not unexpectedly, inconsistent behaviour. In fact under the give-way-to-the-right rule some 20–25 percent of main road drivers failed to give way to side road drivers under any circumstances.

Comparison between 'before' and 'after' questionnaire results indicated that on the pencil and paper simulation of a main road journey there was an increase in overall driver consensus in the allocation of intersection priorities. The field observation results post-METCON show generally reduced uncertainty.

The authors noted, however, that with a reduction in the threat of untimely entry from the right, there was an increase in overtaking, not always optimally Lane marking was seen as desirable to contain traffic within the centre line on suburban roads wide enough for four lanes of traffic.

The authors also observed that there was a tendency for responses appropriate to the streets treated under METCON to carry over to untreated streets, especially at 'T' junctions. It is therefore clear that once the process of reducing the applicability of the give-way-to-the-right rule has commenced it should be completed as soon as possible.

In the past, a conditioning to give-way-to-the-right has been imposed on the natural major/minor expectancies Once official recognition is accorded to these major/minor expectancies they should not be denied in situations where the natural response can be readily accommodated. For instance, the change proposed to the law in respect of 'T' junctions should be introduced as an integral part of the initial process of establishing future systems.

6.5 Left-turn/right-turn conflicts

McKelvey *et al* also included in their study a consideration of the situation in which Victorian law requires left-turning drivers to give way to right-turning drivers Respondents in their survey split fifty-fifty as to who should proceed. [52]

Although the intention is to clear the centre of the road as soon as possible, an advantage where trams are operating, the right-turning driver is critically dependant upon approaching drivers not inadvertently leaving their left-turn indicators on

There is considerable potential for confusion in a situation where movements back to the left after overtaking or diverging around an obstruction are required to be signalled. The need for this might be investigated.

In the light of the Monash survey and the ambiguities inherent in the arrangement, there is strong reason for Victoria to fall into line with the remainder of Australia and require right-turning drivers to give precedence to left-turning drivers.

6.6 Legislative changes

As noted earlier the meaning of the 'Stop' sign in the NRTC was changed in 1974 whilst in 1973 an amendment had been made which guaranteed the status of priority accorded by traffic control signals. The obligations of turning drivers facing 'Stop' or 'Give Way' signs were clarified in the NRTC in 1974.

As noted earlier the NRTC now contains a defence to a charge of failing to give way to the right that the defendant was not aware and could not by the exercise of reasonable care have become aware of the approach of the other vehicle, but this has not been adopted outside South Australia where it originated, although recent case law tends to embrace this principle.[88]

6.7 The question of cost

It was often argued in favour of the give-way-to-the-right rule that adoption of the major/minor alternative would be too costly. In February 1972 the Transportation and Highways Branch of the Victorian Division of the Institution of Engineers gave a dramatic rebuttal to this contention.[43] In a public statement 'Give Way to the Right' it was pointed out that if the 'T' junction rule were applied in Melbourne only 25 percent of the 40 000 or so intersections would remain to be treated by signs and signals. It was estimated that the cost of implementing the proposed major/minor system, plus maintenance charges, would be recouped within ten years if only 2 percent of angle collisions at intersections were prevented. The costing given, however, appears not to have taken traffic control signal requirements into account.

At the time the METCON/STATCON program was announced in 1975 the cost of treating all intersections was estimated at $37.17 million, of which $15.02 million was for signals.[41] So far the component for signals has been higher and that for signs and marks rather lower than these estimates.[90] Nevertheless, the sums involved represent only a fraction of the amount expended on roadworks and could have been reduced had it been considered opportune to introduce the 'T' junction rule.

6.8 Benefit/cost analysis

The total cost of road traffic accidents in Australia has been estimated to be in excess of $1000 million per year. Bearing in mind that more than 45 percent of casualty accidents occur at intersections, the scope for savings from the general application of the STATCON approach is considerable. This is recommended on the basis of the benefit/cost analysis which follows.

At the time the METCON program was commenced the total number of intersections in the State of Victoria was estimated at 160 000.[41] Over the remainder of Australia there would by now probably be no more than four times this number to be treated, with around 80 percent being 'T' junctions to which the terminating street law could be applied.

At $65 per approach at cross intersections, the initial cost of treatment would be about $16.64 million.

Early evidence from a sample evaluation of METCON indicates a reduction of 13 percent in casualty accidents where a 'give-way' decision is required.[34] Although other factors may have been at work, preliminary results indicate as well a reduction in the incidence of severe collisions, improved traffic flow on primary routes and some shift of through traffic out of residential streets.

In Australia in 1976, 46.2 percent of all casualty accidents were at intersections.[4] Detailed data for 1974 on casualty accidents in Victoria, i.e. prior to METCON, indicate that 62.2 per cent of intersection accidents were vehicle-to-vehicle angle collisions to which, in the vast majority of cases, the give-way-to-the-right rule would have been applicable. Combining these two sets of figures indicates that some 28.7 percent of Australia's injury-producing accidents could be affected by a change in intersection rules.

Applying the 13 percent reduction figure from the METCON evaluation yields a potential reduction of 3.7 percent in the nation's casualty accidents.

Using data from the Commonwealth Bureau of Roads the cost of fatal and non-fatal injury accidents has been estimated at $712.9 million for 1976.[35] The potential benefit in casualty accident reduction from the application of a STATCON-type program throughout Australia is therefore in the order of $26.4 million per year.

Allowing for the repainting of line markings associated with the 'Give Way' and 'Stop' signs even twice per year at $12 per approach and allowing $3 per approach for the replacement of damaged signs[36] produces an annual maintenance cost of $3.456 million.

Assuming a seven-year life for the signs, and discounting benefits and costs at the long-term bond rate of 8.5 percent per annum, yields a benefit/cost ratio of 6. This takes into account only benefits from reduction in injury accidents since these are the only ones on which the necessary data are available. The benefit/cost ratio is therefore likely to be understated, although no allowance has been made in the calculations for traffic signals which might be required specifically to provide for access facilitation. Additional signals would, of course, have their own site and system benefits including the provision of gaps for pedestrians to more safely cross arterial roads.

6.9 Other benefits from priority control

The developments in priority control in Australia over recent years are encouraging to those who see the give-way-to-the-right rule as a national disaster. Hopefully a new generation of drivers will emerge whose behaviour is not tainted by the attitudes it engenders. At the same time all levels of government are acknowledging that money spent on providing signs and signals to regulate traffic at intersections can produce benefits to the community which greatly outweigh their cost, especially since angle collisions represent a class of accident particularly difficult to deal with through vehicle design measures.

The greater provision of traffic control devices to allocate priority at intersections, especially along arterial roads, however, should not be regarded as doing anything more than buying time with respect to accommodating existing urban traffic flows and the construction of at least a skeletal system of freeways and expressways should not be deferred. As Andreassend commented in 1972,

> Metropolitan traffic management can confer some of the benefits of a freeway system, but at lower costs, until the freeways arrive.[1]

6.10 Implementation

'Give Way' signs, 'Stop' signs and traffic signals were eligible projects under the Commonwealth's Traffic Engineering and Road Safety Improvement Program in 1973–74 and assistance towards their provision is continued under the Minor Traffic Engineering and Road Safety Improvements (MITERS) category of the subsequent Roads Grants legislation. Already, a number of priority road schemes have been funded through MITERS.

The machinery exists through the ATAC structure for the orderly implementation of STATCON-type priority control on a national basis. Acceptance at the same time of the terminating street law for the principle that no new unsignalised cross intersections be created would enable the change-over to be made with a minimum of cost.

7. Summary

From a philosophic standpoint, the underlying thrust of this paper is summed up in two quotations, the first from Fisher,[29] the second from McGill:[60]

> Traffic laws are supposed to follow and codify common custom not to impose human conduct by fiat.

> Tasks tend to be performed faster and more accurately when they require responses which, in view of past experience, are the most expected or natural ones

The offside priority rule operating in Australia stands condemned as having proved increasingly inappropriate to modern driving conditions. Moreover, it has contributed directly to the urban mobility and residential street amenity crisis now facing Australian cities by enabling the spreading over both local and arterial street networks of volumes of traffic which in fact required the construction of limited-access road facilities for their safe and efficient movement.

Even the simple expedient of making use of the high proportion of 'T' junctions to form the base of a hierarchy has not been exploited, except in Western Australia

The absolute nature of the obligation to give-way-to-the-right, combined with the massive ambiguities in the operation of intersections under offside priority, has led to aggressive, risk-taking, driver behaviour. Australia has a higher proportion of intersection accidents than comparably motorised countries and a mortality rate from road traffic accidents amongst the highest in the world. The parsimonious achievement of capacity at minimum cost to the public purse is in fact a false economy.

The success of the METCON/STATCON program in Victoria, however, is encouraging. Similar systems should be adopted throughout Australia.

A new set of obligations at intersections should also be defined, based on the concept of giving the right of way, which itself should be defined as a privilege dependant upon lawful behaviour.

8. Conclusions

1. In defining the obligation to grant precedence at intersections, the usage 'to give way' should be replaced by 'to-give-the-right-of-way'.
2. Right of way should be defined (as it is in the UVC) as:

   > The right of one vehicle or pedestrian to proceed in a lawful manner in preference to another vehicle or pedestrian approaching under such circumstances of direction, speed and proximity as to give rise to danger of collision unless one grants precedence to the other.

3. Traffic control signals should be recognised as standing in place of point-duty policemen and dispensing the right of way with the same authority.
4. At 'T' junctions traffic on the terminating street should give the right of way to the traffic on the continuing street in the absence of indication to the contrary
5. Traffic crossing or turning off a divided highway should give the right of way to traffic on the divided highway in the absence of indication to the contrary.
6. The 'Stop' sign should have the meaning 'Stop and yield the right of way'.
7. In the interests of national consistency right-turning traffic should yield to left-turning traffic.
8. Programs of traffic management should be complemented by selective construction of freeways and expressways.
9. The give-way-to-the-right rule should become simply a last resort provision applicable only in emergencies.

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