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Why the European Commission's proposal of mandatory motorcar daytime running lights is wrong

*The response of DADRL (UK) to European Commission 2006
'Saving lives with daytime running lights'*

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Table of contents

DADRL (UK): Statement of position	1
DADRL (UK): Short facts	1
1. Failure of North European motorcar daytime running light studies.....	1
2. Commission's motorcar counter-evidence grossly defective	1
3. Conflicting findings of Commission studies Koornstra et al 1997 and Elvik et al 2003	2
4. Commission's cost-benefit analysis founded upon unsupported guesswork.....	2
5. High energy and environmental costs	3
6. Issue 'conspicuity', not 'visibility', of motorcars.....	3
7. Omission of Japanese motorcycle masking studies	4
8. Commission's motorcycle counter-evidence weak, partial and inconclusive.....	4
9. Effect upon pedal cyclists & pedestrians.....	5
DADRL (UK): Full evidence & arguments.....	6
1. Failure of North European motorcar daytime running light studies.....	7
2. Commission's motorcar counter-evidence grossly defective	10
3. Conflicting findings of Commission studies Koornstra et al 1997 and Elvik et al 2003	13
4. Commission's cost-benefit analysis founded upon unsupported guesswork.....	15
5. High energy and environmental costs	17
6. Issue 'conspicuity', not 'visibility', of motorcars.....	19
7. Omission of Japanese motorcycle masking studies	20
8. Commission's motorcycle counter-evidence weak, partial and inconclusive.....	22
9. Effect upon pedal cyclists & pedestrians.....	25
References.....	26

Why the European Commission's proposal of mandatory motorcar daytime running lights is wrong

*The response of DADRL (UK)¹ to European Commission 2006
'Saving lives with daytime running lights'*

DADRL (UK): Statement of position

The European Commission proposes that the EU make motorcar daytime running lights mandatory.

It claims the support of defective major studies by Koornstra et al 1997 and Elvik et al 2003, and a baseless cost-benefit analysis by the latter. It too easily dismisses the energy and environmental costs. It ignores the Japanese Government's evidence that motorcar daytime running lights will mask motorcycle lights. It ignores that they will operate as a peripheral reflex distraction away from pedestrians and pedal cyclists.

DADRL (UK) say that this is bad legislation. It will not further European road safety. It may indeed in the event rather diminish it.

DADRL (UK): Short facts

1. Failure of North European motorcar daytime running light studies

Upon scrutiny, the monitoring studies of the effect of motorcar daytime running light laws in Finland (1972), Sweden (1977), and Norway (1985 & 1988) failed to find a reduction of accidents, apart from a reduction of animal accidents in Finland.

The monitoring study of the law in Denmark (1990) did find a reduction of motorcar accidents, but the reduction was offset by an increase of pedestrian accidents.

2. Commission's motorcar counter-evidence grossly defective

Elvik 1996, and Commission authors Koornstra et al 1997 responded by conducting reanalyses of the worldwide data of motorcar monitoring studies, including the North European studies. They claimed to have found that motorcar daytime running lights do reduce accidents.

Present Commission authors Elvik et al 2003 now respond again in the same way.

But whereas critics had revealed the failure of the North European daytime running light laws by disaggregating the data of the monitoring studies in order to supply the actual year-by-year changes of the data, Elvik 1996 merely aggregated the worldwide data to make from it a single global 'finding'.

Koornstra et al 1997 claimed that they reanalysed the data of each study in the proper scientific way, consistently employing the same methodology.

¹ The Association of Drivers Against Daytime Running Lights (United Kingdom)

But scrutiny of their text shows that they only achieved new findings in favour of motorcar daytime running lights in Sweden and Norway by inconsistently changing methodology when their Swedish methodology failed to yield a favourable finding in Norway.

And Elvik et al 2003, first, base their worldwide finding upon the common finding in favour of motorcar daytime running lights of three tests that they admit are not specific for the effect of daytime running lights, and so scientifically inadequate.

Accordingly Elvik et al rely for the validity of their finding upon the metaphysical and non-scientific proposition that 'three wrongs can somehow make a right'.

Elvik et al, second, fail to demonstrate a dose-response relationship for daytime running lights, or to show that they pass various other tests of the plausibility of their finding.

In other words if motorcar daytime running lights were a drug, it would not be deemed safe by the medical authorities on the evidence of Elvik et al 2003 to prescribe it to patients.

3. Conflicting findings of Commission studies Koornstra et al 1997 and Elvik et al 2003

A fundamental claim of Commission study Koornstra et al 1997 was that the reduction of accidents that they found from the data of the worldwide studies of the effect of motorcar daytime running lights rose proportionately with latitude.

Koornstra et al 1997 went on to base the calculations of a cost-benefit analysis in favour of daytime running lights, and a consequent recommendation to the Commission that it mandate motorcar daytime running lights in Europe, upon the claim in question.

However Elvik et al 2003, as one of the failed plausibility tests of motorcar daytime running lights, now report their finding from the same data as Koornstra et al 1997 that, to the contrary (*p86*):

'There is hardly any relationship between latitude and effects of DRL'.

le one set of Commission authors is saying, unsatisfactorily, that the other set of authors' recommendation that the Commission mandate motorcar daytime running lights was based upon a spurious and wrong finding from the data that they analysed.

4. Commission's cost-benefit analysis founded upon unsupported guesswork

The Commission rely for the cost-benefit analysis in support of the present Commission proposal upon the analysis of Elvik et al 2003.

Elvik et al report that they put the following valuations upon a road accident injury at Euro 2000 prices (*p94*):

Fatal	1,265,000
Serious	125,000
Slight	2,720

Correspondingly it is critical for the validity of Elvik et al's cost-benefit analysis that the reduction of accidents that they claim to have found from motorcar daytime running lights be accurately and reliably apportioned between fatal, serious and slight injury accidents.

However all that Elvik et al are able to say is (p87):

'The relationship between accident severity and the effects of DRL was discussed in Chapter 3. There is not very much evidence regarding this relationship.'

or (*ibid*):

'This means that available evidence is too unreliable to predict the effect of DRL on fatal accidents with much confidence.'

Likewise for the purposes of a meaningful cost-benefit analysis, Elvik et al 2003 need to have before them a plausible—ie proportionate—finding of the dose-response relationship of daytime running lights and accidents.

But as previously mentioned, all that Elvik et al were able to find on the subject was (p84):

'As can be seen from Figure 7, there is no apparent dose-response relationship between the variables. It does not seem to be the case that the greater the increase in the use of DRL, the larger the effect on accidents.'

Elvik et al 2003 go on, in default of access to the above two items of essential information, to rely for the findings of their cost-benefit analysis upon unsupported assumptions, namely plain guesswork.

The findings of the analysis, as in turn relied upon by the Commission, therefore fall to be dismissed as baseless.

5. High energy and environmental costs

Daytime running lights are powered by electricity. And to generate electricity from a vehicle engine is extremely inefficient due to mechanical and engine heat losses. To run two 55 watt headlights and associated lamps takes 970 watts of fuel energy.

Likewise vehicle engines emit Carbon Dioxide (CO₂) into the atmosphere. Milnes of DADRL (UK) is an accredited Carbon Trust survey engineer. He calculates that motorcar daytime running lights will add some 1.85 million tonnes annually of CO₂ into the UK's atmosphere.

The UK emits as whole around 560 million tonnes annually of CO₂. Nevertheless to compare 1.85 million tonnes on a different scale, the Carbon Trust is a government funded body helping industry to save energy. During 2005/06 with an army of 250 surveyors, the estimated savings were 3.9 million tonnes of CO₂. The use of daytime running lights will negate 50% of the hard won environmental gains.

6. Issue 'conspicuity', not 'visibility', of motorcars

What attracts, also distracts.

Hörberg & Rumar 1975 found that their experimental subjects were able to see a motorcar without its lights on at distances over 3000 metres.

Rather the original purpose-designed daytime running lights that Hörberg & Rumar 1975 recommended were specified to be sufficiently powerful to engage the reflex attraction of the peripheral vision to a bright light at up to 30° peripheral angle.

le the purpose of daytime running lights is to enhance the noticeability, or conspicuity, not the mere visibility, of vehicles.

But in doing so daytime running lights have the inherent adverse side-effect that as well as attract the attention of other road users, they may equally also distract it.

The Commission's proposal fails to make it clear to a lay readership that, in this way, motorcar daytime running lights are, not a 'passive' road safety measure that has only beneficial effects, but an 'active' road safety measure that has potential adverse side-effects.

7. Omission of Japanese motorcycle masking studies

Just as the European Commission recites in the proposal the findings of a Dutch motorcycle masking study, Brouwer et al 2004, that it commissioned, so too some three or four years ago the Japanese Government commissioned its own motorcycle masking studies, Morita et al 2001 and JASIC 2003.

As treated below, JASIC 2003, in particular, found, 'against' motorcar daytime running lights, that the daytime headlight of a motorcycle could be masked by the daytime headlights of a following motorcar.

Wrongly and partially, the Commission ignores, and utterly fails to mention the existence or findings of two Japanese motorcycle masking studies.

Instead, as above, it mentions only the findings of its own masking study, Brouwer et al 2004, which found, by contrast with JASIC 2003 'in favour of' motorcar daytime running lights, that the daytime headlight of a motorcycle was not masked by the daytime headlights of motorcar alongside it.

Likewise the Commission fails to mention that, as a result of the findings of JASIC 2003, as communicated to UN/ECE GRE² before its meeting in June 2004 the Japanese Government prohibits motorcar daytime running lights of over 400 candlepower in Japan, and wishes to retain the discretion under international agreements to prohibit motorcar daytime running lights, as well as mandate them.

8. Commission's motorcycle counter-evidence weak, partial and inconclusive

The special concerns of motorcyclists who use daytime running lights are that, when motorcars also use daytime running lights:

Motorcyclists will:

- Lose the message 'motorcycle' that their light conveys to other drivers
- Be outshone and rendered less noticeable by more powerful motorcar lights in the scenarios:

² United Nations Economic Commission for Europe at Geneva, Inland Transport Committee, World Forum for Harmonization of Vehicle Regulations (WP.29), Working Party on Lighting and Light-Signalling (GRE). The European Commission is a member of GRE

- ‘Motorcar and motorcycle side by side’
 - ‘Following motorcar’;
- they will experience the adverse effects of:
- Confusion in the scenarios:
 - ‘Motorcar and motorcycle side by side’
 - ‘Following motorcar’
 - Masking in the scenario:
 - ‘Headlight in line with headlight of following motorcar’;
- they will encounter motorcar drivers who are:
- Over-confident that other drivers will see and give way to them
 - Over-assertive that other drivers must see and give way to them
 - Distracted by motorcar lights
 - Subject to glare;
- and they will themselves be:
- Distracted by motorcar lights
 - Subject to glare.

The Commission answer that Elvik 1993's Norwegian study and Hansen 1993 & 1995's Danish study failed to show any adverse effect of motorcar daytime running lights upon motorcycle accidents.

But Commission authors Elvik et al 2003 caution that their estimates of effect are ‘based on small samples and are very far from statistical significance at conventional levels’ (p65).

The Commission point out, as already stated, that Brouwer et al 2004 made the experimental finding that the daytime headlight of a stationary motorcycle was not masked by the daytime headlights of a stationary motorcar alongside.

But to repeat, the Commission omit to mention that JASIC 2003 more realistically employed the experimental scenario of a moving motorcycle followed by a moving motorcar, and did find that the headlights of the motorcar masked the motorcycle.

The Commission attempts to reassure the plausible concerns of motorcyclists with weak, partial and inconclusive counter-evidence.

9. Effect upon pedal cyclists & pedestrians

Pedal cyclists and pedestrians share many of motorcyclists' concerns at the effect of motorcar daytime running lights upon them.

DADRL (UK) does not respond to the Commission's proposal on their behalf.

But it does point out that if, as DADRL (UK) has demonstrated in Sections 1 to 3, motorcar daytime running lights remain on the evidence to date not proven to reduce accidents, then even one additional pedal cyclist or pedestrian casualty from such side-effects of daytime running lights as glare, masking, or distraction is on road safety grounds unacceptable.

DADRL (UK)

14 September 2006

DADRL (UK)

DADRL (UK): Full evidence & arguments

1. Failure of North European motorcar daytime running light studies

1970: *Finland officially recommends the use of motorcar (and motorcycle) daytime running lights*

1972: *Finland enacts motorcar daytime running light law*

1976: Andersson et al 1976 monitor effect of Finnish motorcar daytime running light recommendation and law.

Upon scrutiny of the tables of data in Andersson et al's Swedish-language main text, they only find a fall in the 'odds-ratio' (their chosen test measure) for 'other' accidents (which they explain comprise mainly animal accidents) following the law. The odds ratio for motor vehicle and pedestrian accidents does not effectively alter.

But in their English, Finnish and Swedish-language summaries, Andersson et al 1976 fail to mention that their post-law finding is confined to animal accidents, and claim without qualification that the Finnish recommendation and law reduced accidents.

[It is observed at the same time that Lehtimäki 1984 conducted an extensive study of elk and white-tailed deer accidents in Finland from 1965 to 1979. The period includes the full period of Andersson et al's study (1968–1974). Lehtimäki found no evidence that elk or deer responded to motorcar lights at all]

1977: *Sweden enacts motorcar (and motorcycle) law upon basis of Andersson et al 1976's findings*

1979: Andersson & Nilsson 1979 monitor effect of Swedish motorcar law, and make their preliminary report.

They say that, employing the methods that they used, it was not possible to prove statistically that the law had had any effect

1977: *Denmark enacts motorcycle law upon basis of conclusions of a Nordic Road Safety Council report*

1979: Lund 1979 monitors effect of Danish motorcycle law as an intended precedent for a Danish motorcar law.

But Lund finds not a fall, but a slight rise in the odds-ratio for motorcycle accidents following the law

1979–90: *Seemingly influenced by findings of Andersson & Nilsson 1979 and Lund 1979, Denmark does not enact a motorcar law*

1981: Andersson & Nilsson 1981 make their final report of the effect of the Swedish motorcar law.

By calculation from Andersson & Nilsson's data, by the year after the law the odds-ratio for motorcar accidents had recovered its pre-law level — ie the law had had no effect to reduce accidents.

But Andersson & Nilsson subject the data to extensive statistical manipulation and claim that the law had been followed by a non-statistically significant reduction of accidents

1985: Norway enacts motorcar fitting law (ie law mandating the fitting of daytime running lights to new motorcars), it is thought upon the basis of Andersson et al 1976 and Andersson & Nilsson 1981's findings

1986: Vaaje 1986 provisionally monitors the effect of the Norwegian fitting law (and previous campaigns in Norway in favour of the use of motorcar daytime running lights).

As digested by Koornstra 1989, from his data Vaaje 1986 finds a reduction of accidents from daytime running lights. But Vaaje declares that the figure of the reduction is implausibly large. He suspects that other factors besides daytime running lights contributed to the reduction, but is unable to identify them

1988: Norway enacts motorcar use law (ie law mandating the use of daytime running lights by motorcar drivers), it is thought upon the basis of Andersson et al 1976, Andersson & Nilsson 1981 and Vaaje 1986's findings

1993: Elvik 1993 finally monitors the effect of the Norwegian motorcar fitting and use laws.

However Elvik does not find any overall reduction of accidents following the laws

circa 1988–91: Holland canvasses the proposal of a trial motorcar law in Holland and the other Benelux countries

1988: Alofs, supported by findings of Prower 1985 and prior communication of findings of Prower 1990, contests the claimed findings of Andersson et al 1976 and Andersson & Nilsson 1981. He recites the actual findings of the two studies as outlined above

1989: Koornstra 1989 conducts a literature review of nine worldwide studies, including Andersson et al 1976, Andersson & Nilsson 1981 and Vaaje 1986.

Koornstra concedes the existence of weaknesses in the findings of the nine studies, including the findings of the above three studies, but nevertheless concludes that daytime running lights have a 'significant effect on road safety'

1990: Denmark ignores the adverse precedent of the findings of Lund 1979, and enacts motorcar law, it is thought upon the basis of Andersson et al 1976, Andersson & Nilsson 1981's findings

circa 1990: Holland withdraws the proposal of a trial motorcar law in Holland and the other Benelux countries

1993–95: Hansen 1993 & 1995 monitors the effect of the Danish law.

As digested by Koornstra et al 1997 and Elvik et al 2003, Hansen 1993 & 1995 finds an overall decrease of multi-vehicle accidents following the law.

But Hansen also finds an increase of pedestrian accidents

1995: Theeuwes & Riemersma 1995 review Andersson & Nilsson 1981's data, and conclude that Andersson & Nilsson's claimed finding from their statistical manipulation of the data that accidents fell following the Swedish law is 'spurious'.

In summary, in Europe between 1970 and 1990 Finland, Sweden, Norway and Denmark enacted motorcar daytime running light laws.

The effect of each law was monitored, but either openly upon the face of them, or upon scrutiny of their data, the relevant monitoring studies supplied little or no evidence that the laws had been effective to reduce accidents.

After Theeuwes & Riemersma 1995 published their re-analysis of Andersson & Nilsson 1981's Swedish data in the leading road safety journal, 'Accident Analysis & Prevention', mandatory motorcar daytime running light laws could only be described as a North European road safety 'experiment' that had failed.

2. Commission's motorcar counter-evidence grossly defective

The European Commission's counter-evidence is essentially the findings of two global reanalyses that it commissioned of the data of the worldwide studies of motorcar daytime running lights: Koornstra et al 1997, and Elvik et al 2003.

Elvik et al 2003 in particular is one of the studies that formed part of the Commission's 2003 Daytime Running Light project, namely the project whose conclusions represent the basis in evidence of the present Commission proposal.

Part of the task that Koornstra et al 1997 set themselves was to answer criticisms of the methodology of the daytime running light studies that had been made by academic authors Elvik 1993 and Theeuwes & Riemersma 1995 (and the latter's finding that daytime running lights had failed to reduce accidents in Sweden).

About the same time, with the same purpose, Elvik 1996 also conducted his own independent reanalysis of the data of the worldwide studies.

The purpose of Elvik et al 2003 was in turn at the Commission's request to update the findings of Elvik 1996 and Koornstra et al 1997

To describe the three studies:

Elvik 1996 conducted a 'meta-analysis' of the data of 17 worldwide motorcar studies.

Koornstra et al 1997 reanalysed the data of 24 worldwide motorcar studies employing what they claimed to be a common methodology.

Elvik et al 2003 conducted a meta-analysis of the data of 25 worldwide motorcar studies (and 16 worldwide motorcycle studies).

However, although Elvik 1996, Koornstra et al 1997 and Elvik et al 2003 included the data of the North European monitoring studies together with the data of the other worldwide studies that they reanalysed, as follows, they failed to restore findings in favour of motorcar daytime running lights from the data in question:

(Elvik 1996)

First, Elvik 1996 failed to supply a valid scientific answer to the criticisms of the claimed findings of the original authors of the North European studies Andersson et al 1976 and Andersson & Nilsson 1981 in favour of motorcar daytime running lights.

He likewise failed to answer the open failure of his own paper, Elvik 1993, to find in favour of daytime running lights.

The critics had revealed the true findings of the studies by 'disaggregating' the two year-by-two year accident data that had been presented by the original study authors into separate year-by-year data for each category of accident (ie motor vehicle, pedal cyclist, pedestrian, or animal accident).

Elvik 1996 merely obscured the true findings of Andersson et al 1976 and Andersson & Nilsson 1981 even more thoroughly than the original study authors by proceeding further to 'super-aggregate' the data of the two studies together with data of his other 15 worldwide studies.

And by the same super-aggregation of the data, Elvik also removed from view the open findings against motorcar daytime running lights of Elvik 1993.

Koornstra et al 1997

Second, Koornstra et al 1997 were obliged, in order to assure the scientific validity of their findings, to reanalyse the data of each individual study by a 'consistent' methodology — ie to reanalyse the data of each study by as closely as possible the same methodology.

And Koornstra et al professed to the world in the 'Summary, conclusions and recommendations' section of their paper to have done so (*p4*).

As a result of their reanalyses, Koornstra et al 1997 claimed to have found a statistically significant positive 'DRL effect'—namely reduction of casualties in multiple daytime accidents from a notional 0–100% increase in the use of motorcar daytime running lights—increasing proportionately in size with increasing latitude in Europe as follows (*p137*):

Sweden	76.9% (Nov–Feb); 30.2% (May–Sep); 26.1% (Mar, Apr, Oct)
Finland	66.7% (Nov–Mar)
Norway	42.7%
Denmark	30.1%
Austria	24.0%
Hungary	12.2%

On the basis of this finding, Koornstra et al predicted a saving of 5500 fatalities from the full application of daytime running lights across all European Union countries (*p5*).

However close examination of Koornstra et al 1997's text³ shows that the profession that they had reanalysed the data of each individual study by a consistent methodology was wrong and misleading.

In order for Koornstra et al 1997 to establish their latitude 'model', it was necessary that their reanalyses should improve upon, or overturn the findings of the original authors for Norway and Sweden, namely:

- Andersson & Nilsson 1981's non-statistically significant finding of a reduction of daytime multiple accidents in Sweden
- Elvik 1993's failure to find an overall reduction of daytime multiple accidents in Norway.

By adopting the methodology of **disaggregating the Swedish summer and winter data, and reanalysing them separately**, Koornstra et al succeeded in transforming Andersson & Nilsson 1981's non-statistically significant finding, as above, into a statistically significant finding of a 'data effect' of 76.9% (*p100*).

But when Koornstra et al went on also to reanalyse the Norwegian summer and winter data in the same way, they failed utterly to achieve a plausible positive data effect (*p112*).

It was only by then changing methodology, and instead **aggregating the Norwegian summer and winter data, and reanalysing them together** (*p112*), that Koornstra et al 1997 were eventually able to transform Elvik 1993's zero finding into a positive finding of a 'data effect' of 42.7% (*p113*).

³ See Prower 2001

As a result of this gross defect of conduct, Koornstra et al 1997's study is scientifically discredited, and its findings accordingly fall to be treated as worthless.

Elvik et al 2003

And third, by also employing the method of 'meta-analysis', Elvik et al 2003 is subject to the same fundamental criticism as Elvik 1996.

At the same time Elvik et al 2003 is subject to two further fundamental criticisms of its own, namely that:

- The method of Elvik et al is not scientific, but metaphysical
- The claimed findings of Elvik et al in favour of daytime running lights fail to satisfy the tests of credibility, in particular the dose-response test, that are demanded of study authors in the closely parallel field of the evaluation of the effectiveness of a medical drug.

Thus (1) as to method, Elvik et al 2003 appraise the three main measures of the effect of daytime running lights—the 'accident rate ratio', the 'odds ratio', & the 'ratio of odds ratios'—that have been used to date by the worldwide studies, and properly pronounce them to be unspecific to daytime running lights and so defective (*p78*).

However they go on nevertheless to employ the three measures in their reanalysis. The global finding from each of the three measures is in favour of daytime running lights.

So de facto asserting the metaphysical proposition that 'three wrongs can make a right', Elvik et al contend that since all three defective tests yield the same finding, the common finding is therefore valid (*ibid*).

Or in short Elvik et al 2003 adopt a method that is unscientific, and their findings correspondingly lack any scientific validity.

Thus (2) as to findings, Elvik et al 2003 qualify their main finding in favour of motorcar daytime running lights by reporting that their supporting analyses have failed:

- a) To demonstrate a dose-response relationship for daytime running lights (*p84*)
- b) To establish how far the effect of daytime running lights may be expected to endure over time (*p4*)
- c) To confirm, by way of 'plausibility' tests, that the effect of daytime running lights is greater:
 - In winter than in summer (*p88*)
 - In countries of high latitude than in countries of low latitude (*p86*).

Between them the failures do not merely qualify Elvik et al 2003's main finding; they remove scientific credibility from it.

In short, like the findings of Elvik 1996 and Koornstra et al 1997, the claimed findings of Elvik et al 2003 in favour of daytime running lights are also discredited.

The method of Elvik et al 2003 is unscientific, and the findings of the study fail to satisfy ordinary scientific tests of their plausibility and strength.

3. Conflicting findings of Commission studies Koornstra et al 1997 and Elvik et al 2003

The Commission in its proposal glosses over the fact that the second of the two Commission studies—Koornstra et al 1997 and Elvik et al 2003—that it relies upon in support of its proposal of mandatory motorcar daytime running lights disputes the validity of the findings of the first study.

This is not a satisfactory basis for safety legislation.

The two studies of daytime running lights that the Commission commissioned are, as just stated, Koornstra et al 1997 and Elvik et al 2003.

On the one hand, as recited in the previous section, Koornstra et al 1997 claim to have found a statistically significant positive 'DRL effect' that increases in size proportionately with increasing latitude in Europe.

Koornstra et al go on to base their estimated saving of casualties, cost-benefit analysis, and recommendation that the Commission mandate daytime running lights upon the finding (pp4–6):

'...The result of this analysis is the establishment of statistically significant curvilinear relationships between latitude and national DRL effects with respect to both accidents and casualties. ...

...

Savings and costs associated with DRL

Based on the intrinsic DRL-effects related to latitudes, estimates have been made for all the countries in the EU. The best estimation is that full DRL in the EU, corrected for the existing DRL usage (mainly in Finland, Sweden and Denmark), would prevent:

- 24.6% of fatalities in multiple daytime accidents;
- 20.0% of casualties in multiple daytime accidents;
- 12.4% multiple daytime accidents.

...

Recommendations for action

1. Both the scale of potential saving of lives and the benefit/cost-ratio demonstrated in this study indicate that the introduction of DRL across the whole EU is desirable and urgent.

...'

Whereas on the other hand, totally to the contrary, Elvik et al 2003's finding as to the relation of the effect of daytime running lights and latitude is (p86):

'Figure 8 shows the results of the analysis. The outlying estimate of effect for Israel (25% increase of accidents) has been omitted. **There is hardly any relationship between latitude and effects of DRL.**'

The conflict between the findings of Koornstra et al 1997 and Elvik et al 2003 could not be expressed in a more clear-cut fashion.

Nevertheless in the proposal the Commission wrongly and misleadingly re-renders Elvik et al 2003's finding as follows (p5):

'The study concluded that the use of DRL reduces the number of multi-party daytime accidents for cars by between 5–15%. All studies that have evaluated the effects of using DRL for cars have found a reduction of the number of accidents, but the size of the estimated reduction varies from one study to another. **The benefits of DRL are greater for fatal accidents than for injury accidents and are likely to be greater at latitudes further away from the Equator than at latitudes close to the Equator.**'

But to repeat, as to the second part of the last finding, Elvik et al 2003 found no such thing.

[And incidentally, to correct at the same time also the Commission's rendition of the first part of the finding, namely:

'The benefits of DRL are greater for fatal accidents than for injury accidents ...',

what Elvik et al 2003 actually found was (p5):

'Unfortunately, **evidence concerning the effects on fatal accidents is rather weak and inconsistent, and does not permit a very reliable prediction of the effect to be made.**'

or (p105):

'Evidence of effects for fatal accidents is, however, highly uncertain.']

4. Commission's cost-benefit analysis founded upon unsupported guesswork

For its cost-benefit analysis of motorcar daytime running lights, the European Commission repeats, without qualification, the findings of the cost-benefit analysis of Elvik et al 2003 (p6):

‘A cost-benefit analysis was performed for each of these five policy options for the mandatory use of DRL. The results of these analyses are summarised in the following table:

...

For all five options, the benefits are greater than the costs.’

In fact the findings of Elvik et al 2003's cost-benefit analysis are statistically highly qualified. They report (p101):

‘It is obvious that the results of the cost-benefit analysis are highly uncertain. The possibility cannot be ruled out that benefits are smaller than costs. How likely is such an outcome? Is it possible to estimate the probability that benefits are greater than costs?

As indicated above, the answer to this question is, strictly speaking, no. The reason is that not all sources of uncertainty are known and can be meaningfully quantified.

A crude estimate is, however, possible by making some assumptions ...’,

and then list the four statistical assumptions that they make.

Likewise, upon scrutiny, the basic factual assumptions that Elvik et al make as part of the analysis so lack foundation that factually also the findings are highly qualified — indeed so highly qualified as to amount to no more than guesswork.

Elvik et al 2003 report the basic factual assumptions of the cost-benefit calculation that they make for motorcar daytime running lights as follows (p93):

‘Based on the systematic review of evidence presented in this report, it is assumed that mandatory use of DRL will be associated with a:

- Reduction of 15% in MD-accidents leading to fatal injury.
- Reduction of 10% in MD-accidents leading to serious injury.
- Reduction of 5% in MD-accidents leading to slight injury.
- No reduction in MD-accidents leading to property damage only.

These reductions are assumed to be the result of an increase in DRL-use from 10% to 90%. ...’

In fact, the assumptions in question are almost entirely unproven.

Failure to establish dose-response relationship for daytime running lights

Thus, first, to repeat from Section 2, Elvik et al fail in their analyses of the effect of daytime running lights to establish a dose-response relationship (p84):

‘As can be seen from Figure 7, there is no apparent dose-response relationship between the variables. It does not seem to be the case that the greater the increase in the use of DRL, the larger the effect on accidents.’.

So Elvik et al cannot make any meaningful prediction of the effect upon accidents of an ‘increase in DRL-use from 10% to 90%’.

Failure to establish effect of daytime running lights upon accidents by degree of severity

And, second, the assumption that mandatory use of daytime running lights will be associated with precise figures of a reduction of fatal injury accidents, etc, or a regular progression from a 0% reduction of property damage only accidents to a 15% reduction of fatal injury accidents does not accord at all with Elvik et al's summary elsewhere in the text of their actual findings of the relative effect of motorcar daytime running lights upon accidents of different severity (p87):

‘The relationship between accident severity and the effects of DRL was discussed in Chapter 3. There is not very much evidence regarding this relationship.’

Indeed Elvik et al conclude the discussion from which this citation is drawn by openly guessing at a higher reduction of fatal accidents than injury accidents from motorcar daytime running lights (*ibid*):

‘This means that available evidence is too unreliable to predict the effect of DRL on fatal accidents with much confidence. It is likely that the effect of DRL on fatal accidents is larger than the effect on other injury accidents, but it is currently not possible to quantify the effect on fatal accidents with very great precision.’

Likewise none of daytime running lights studies whose data Elvik et al reanalyses breaks down injury accidents into serious and slight injury accidents — so Elvik et al possess no information at all of how daytime running lights separately affect serious and slight injury accidents.

Elvik et al report that they put the following valuations upon a road accident injury at Euro 2000 prices (p94):

Fatal	1,265,000
Serious	125,000
Slight	2,720

Given the very large differences between the figures of the three valuations, for Elvik et al to base a cost-benefit calculation in the above way upon:

- A largely guessed at figure of the reduction of fatal injuries from daytime running lights
- A wholly guessed at split of the reduction of injury accidents from daytime running lights between serious injury accidents, and slight injury accidents

is a travesty of how the cost-benefit calculation of a road safety measure should be conducted.

5. High energy and environmental costs

Environment

At the stroke of a pen, by withdrawing its proposal of motorcar daytime running lights, the European Commission could save as high a figure of Carbon Dioxide (CO₂) emissions annually in the UK as the total figure of emissions that the Carbon Trust⁴ saved in 2003/2004.

On 30 March 2005 Dr. Pieter Tans director of the US government's Climate Monitoring Diagnostics Laboratory, part of the National Oceanic and Atmospheric Administration (NOAA) at Mauna Loa Hawaii reported that World CO₂ levels had risen from 315 to 378 parts per million (ppm) a 20% increase since 1990.

The European Commission's proposal will require motorcar driver in the UK to use headlights in good daylight. Milnes of DADRL (UK) is an accredited energy survey engineer for the Carbon Trust. He calculates that this will add about 1.85 million tonnes of CO₂ annually into the UK's atmosphere (annually the UK emits around 560 million tonnes of CO₂)⁵.

The Carbon Trust is a government funded body helping industry and commerce to save energy. During 2005/06 with an army of 250 surveyors backed by a national press and TV campaign, the estimated savings were 3.9 million tonnes of CO₂. The use of DRL will negate 50% of the hard won environmental gains.

Energy

The energy saving from the withdrawal of the European Commission's proposal would be equally important.

The fact is that to generate electricity from a vehicle engine is extremely inefficient due to mechanical and engine heat losses. To run two 55 watt headlights and associated lamps takes 970 watts of fuel energy.

It is calculated by an anonymous contributor to the website 'Howstuffworks'⁶ that daytime running lights will cost the USA \$600 million dollars using 406 million US gallons of fuel p.a., and creating 33 million tonnes of carbon dioxide pollution p.a. Across the EU, probably the emissions would be similar to the USA.

⁴ <http://www.carbontrust.co.uk/about/>

'The Carbon Trust is an independent company funded by Government. Our role is to help the UK move to a low carbon economy by helping business and the public sector reduce carbon emissions now and capture the commercial opportunities of low carbon technologies'

⁵ Using daytime running lights in good daylight means a vehicle is causing unnecessary environmental pollution. Two 55 watt headlights plus four 10 watt parking lights plus amber side lights and instrument lights give an electrical load of around 170 watts. Alternator and drive belt losses have an efficiency of around 70% and conversion of chemical fuel energy via an internal combustion engine is around 25% efficient so 970 watts of fuel input is required. Small per vehicle, but at an average of 35 mph for 12,000 miles from 29.5 million UK vehicles 75% in daytime equates to 1.85 million tonnes of CO₂ into the UK's atmosphere.

⁶ <http://auto.howstuffworks.com/question424.htm>

Accordingly as part of the calculation of the environmental cost of daytime running lights, Milnes quantifies the fuel cost of daytime running lights for the UK as:

UK Daytime driving only	No. of vehicles	Litres of fuel p.a. (millions)	MWh	Costs (millions)	[Tonnes of CO ₂ p.a.]
Present DRL users	812,000	19,135	202,834	£17.6	[50,709]
Total UK vehicle parc	30 million	696,271	7,380,470	£640.6	[1,845,118]

To put the potential waste of energy in perspective this is more than the annual output of Oldbury on Severn nuclear power station — more than 2.4 TIMES all the power generated by green renewable sources last year in the UK.

[There are in addition also energy (and environmental) issues related to the manufacture, distribution, collection and disposal of failed lamp bulbs: if used during daytime they can burn out after 10,000–12,000 miles.]

6. Issue 'conspicuity', not 'visibility', of motorcars

In its proposal the Commission shows itself to be unfamiliar with the purpose of daytime running lights.

The purpose of daytime running lights is not to enhance the 'passive' visibility of a vehicle, but to enhance the 'active' noticeability, or as it is termed in the literature, 'conspicuity', of the vehicle.

So the original purpose-designed daytime running lights that Hörberg & Rumar 1975 recommended in Sweden were specified to engage the reflex attraction of the peripheral vision to a bright light at up to 30° peripheral angle.

In fact, as to the visibility of motorcars, Hörberg & Rumar reported that their experimental subjects were able to see a motorcar on a flat airfield runway, without its lights on, against a sky background, at distances over 3000 metres.

Instead in the footnotes to the proposal the Commission incorrectly defines 'conspicuity' to include both 'visibility' and 'noticeability':

⁴Conspicuity: the fact of being obvious to the eye or mind or attracting attention.'

Or the Commission incorrectly states the purpose of daytime running lights to be to enhance the contrast, and so visibility of vehicles, not to engage the reflex attraction of the peripheral vision to a bright light, and so enhance the conspicuity of vehicles:

⁹There are several steps to process information in road traffic. The first step is to detect an object. Detection in visual terms depends among other parameters on the contrast of an object. DRL increases the contrast of vehicles. If all vehicles are using DRL, it becomes not only a means of better detecting an object but also of better identifying this object as a vehicle.'

The errors are significant, because what attracts, equally also distracts.

So the Commission fails to discuss adequately the fact that daytime running lights are not a wholly beneficial road safety measure, but a road safety measure with potentially important adverse side-effects.

Namely mandatory motorcar daytime running lights threaten to create a more hostile and confusing driving environment: more 'hostile' because of the distracting effect of the universal presence of lights; and more 'confusing' because drivers no longer see 'vehicles', but just 'lights'.

7. Omission of Japanese motorcycle masking studies

The Commission ignores, and utterly fails to mention the findings of two Japanese studies, Morita et al 2001 and JASIC 2003, that found that the daytime headlight of a motorcycle could be masked by the daytime headlights of a following motorcar.

Instead, partially, it mentions only the findings of its own Dutch study, Brouwer et al 2004, which found that the daytime headlight of a motorcycle was not masked by the daytime headlights of motorcar alongside it.

The Commission likewise fails to mention that, as a result of the findings of JASIC 2003, the Japanese Government prohibits the installation of motorcar daytime running lights of greater intensity than 400 candlepower, and generally wishes to retain the discretion under international agreements to prohibit motorcar daytime running lights in Japan as well as mandate them.

As the Japanese Government commented in paperwork that was circulated before the 5th GRE-gtr^{7,8} informal meeting at Ottawa on 7–11 June 2004:

‘Draft Comment upon Paragraph 5.19 DRL of the Proposal of a GTR
(doc.2001/6/rev3)

In Japan, for example, DRLs (400 cd or more in central luminous intensity) equivalent to the requirement of ECE R87 are prohibited.

As the study reported by Japan at the 51st session of GRE indicates, even with DRLs of 400 cd in luminous intensity, the glare against oncoming vehicles will cause safety concerns if the ambient illuminance is 1,000 lx or less. In addition, the ambient illuminance of 5,000 lx or less will constitute a limiting factor for automobile drivers of the visibility of motorcycles. That is why Japan cannot agree to the proposal.

Therefore, Japan hopes that the note should be replaced by the text:

DRL function may be made mandatory by a Contracting Party, while, on the contrary, it can also be prohibited.’

[A representative of the European Commission participates with representatives of national governments at meetings of GRE, and receives the paperwork, such as the draft comment of the Japanese Government—or previously the texts of Morita et al 2001 and JASIC 2003—that is circulated by the secretariat of WP.29 before the meetings.]

The full grounds of the Japanese Government's attitude towards mandatory motorcar daytime running lights probably include ‘insufficient net safety benefit’: ie too many motorcyclists would suffer injuries in proportion to the number of motorcar drivers who were saved from injury.

⁷ GRE = Groupe de Rapporteurs Éclairage (Group of Representatives: Lighting)

gtr = Global Technical Regulation (ie Regulation under Economic Commission for Europe Inland Transport Committee, ‘Agreement concerning the establishing of global technical regulations for wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles’, Geneva, 25 June 1998)

⁸ In full GRE is the United Nations Economic Commission for Europe at Geneva, Inland Transport Committee, World Forum for Harmonization of Vehicle Regulations (WP.29), Working Party on Lighting and Light-Signalling (GRE)

And it is notorious that there are proportionately more motorcycles to motorcars on the road in Japan than in Europe.

Nevertheless it would represent a callous attitude towards motorcyclists if 'sufficient net safety benefit' was the Commission's reason for ignoring the Japanese studies.

Or if, less culpably, the reason was simply that the Commission overlooked the studies in the preparation of its proposal, it would still represent a wrong casual attitude on the part of the Commission towards road safety.

8. Commission's motorcycle counter-evidence weak, partial and inconclusive

The full set of concerns of motorcyclists who use daytime running lights at the prospect of the mandatory use of daytime running lights by motorcars is that:

Motorcyclists will:

- Lose the message 'motorcycle' that their light conveys to other drivers
- Be outshone and rendered less noticeable by more powerful motorcar lights in the scenarios:
 - 'Motorcar and motorcycle side by side'
 - 'Following motorcar';

that they will experience the adverse effects of:

- Confusion in the scenarios:
 - 'Motorcar and motorcycle side by side'
 - 'Following motorcar'
- Masking in the scenario:
 - 'Headlight in line with headlight of following motorcar';

that they will encounter:

- Motorcar drivers who are over-confident that other drivers will see and give way to them
- Motorcar drivers who are over-assertive that other drivers must see and give way to them
- Motorcar drivers distracted by motorcar lights
- Motorcar drivers subject to glare;

and that they themselves will be:

- Distracted by motorcar lights
- Subject to glare.

The Commission counters in short:

1) As to all of the concerns together, that such of the motorcar monitoring studies as also recorded data of motorcycle accidents—namely Elvik 1993's Norwegian study, and Hansen 1993 & 1995's Danish study—failed to show any adverse effect of motorcar daytime running lights upon motorcycle accidents.

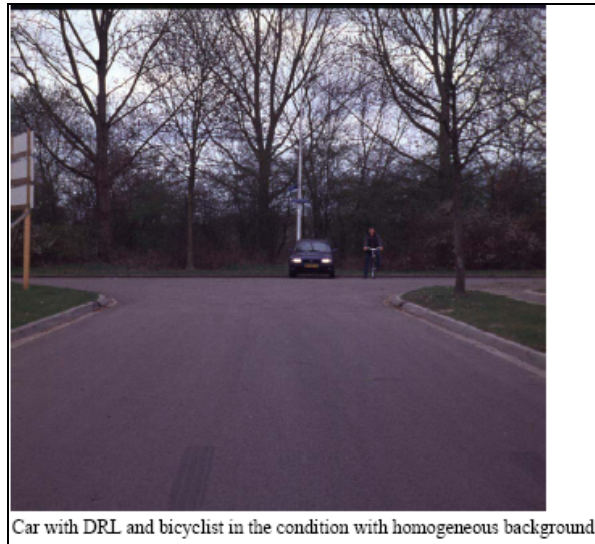
The Commission no doubt bases itself upon the findings of Elvik et al 2003.

2) As to the list of individual concerns, to repeat from the previous section, that the Dutch study that it commissioned, Brouwer et al 2004, included an experimental study in which subjects viewed coloured slides of a motorcycle using daytime running lights stationed side by side with a motorcar using daytime running lights.

Brouwer et al 2004 found no evidence from the experimental study that the daytime running lights of the motorcar involuntarily 'grabbed' experimental subjects' attention, and directed it away from the motorcycle with daytime running lights.

However to treat first the Commission's counter to all of the concerns together, Elvik et al 2003 caution that their estimates of effect are 'based on small samples and are very far from statistical significance at conventional levels' (p65).

Or to treat second the Commission's counter to the list of individual concerns, by contrast with Brouwer et al 2004's non-adverse findings from the two Dutch stationary, 'side by side' scenarios as illustrated below (p29 & 30⁹):



JASIC 2003 made adverse findings from the Japanese moving, 'following motorcar' scenario (p5):



⁹ Brouwer et al 2004's figure of car & bicyclist, not car & motorcyclist, against the homogeneous background is shown because they do not include a figure of car & motorcyclist against the background in their illustrations

Further the findings of JASIC 2003 are more persuasive than the findings of Brouwer et al 2004:

- The background of JASIC 2003's scenario is more representative of the typical motorcycle accident scenario
- In JASIC 2003's scenario the vehicles are more realistically moving, not stationary
- Should motorcar daytime running lights be made mandatory, JASIC 2003's 'following motorcar' scenario could well turn out in practice to be more 'important' (ie more frequently represented in accidents) than Brouwer et al 2004's 'side by side' scenario,

In conclusion, when set against the strong experimental findings of JASIC 2003, the Commission's weak evidence of Elvik et al 2003's qualified estimates of effect from Norway and Denmark, or Brouwer et al 2004's unpersuasive findings from an unrealistic experimental scenario is insufficient to allay the concerns of motorcyclists who use daytime running lights.

9. Effect upon pedal cyclists & pedestrians

Many of the motorcyclists' concerns that are listed above are pedestrians and pedal cyclists' concerns too.

However DADRL (UK) does not propose to make its own response to the pedal cyclist or pedestrian content of the Commission's proposal, save to say that, if as DADRL (UK) demonstrates, motorcar daytime running lights are not proven to reduce accidents, then even the addition of one pedestrian or pedal cyclist to the casualty total from the adverse effects of daytime running lights—glare, masking, distraction etc—that have been listed in the previous section cannot be justified.

References

Andersson K & Nilsson G, '**Preliminary report on the effects of the DNRL-law regarding traffic accidents**', The Swedish Road and Traffic Research Institute Traffic Department, 30 March 1979

Andersson K & Nilsson G, '**The effect on accidents of compulsory use of running lights during daylight in Sweden**', Statens Väg- och Trafik- Institutet (VTI), Linköping, Sweden, Rapport Nr208A, 1981
[Swedish Road and Traffic Research Institute]

Andersson K, Nilsson G & Salusjärvi M, '**Effekt på trafikolyckor av rekommenderad och påkallad användning av varselljus i Finland**', Statens Väg- och Trafik- Institutet (VTI), Linköping, Sweden, Rapport Nr102, 1976 (in Swedish: English & Finnish language summaries)

[Tr: '*The effect upon traffic accidents in Finland of the recommended and compulsory use of warning lights*']

[Swedish Road and Traffic Research Institute]

Brouwer RFT, Janssen WH & Theeuwes J, '**IR3 : D R L project : Do other road users suffer from the presence of cars that have their daytime running lights on?**', (Brouwer & Jansen) TNO Human Factors, Soesterberg, The Netherlands, (Theeuwes) Vrije Universiteit, Amsterdam, The Netherlands, 2004

[TNO = Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek (Organisation for Applied Scientific Research)]

[Free (sensu Independent) University]

http://ec.europa.eu/transport/road/roadsafety/equipment/daytimerunninglights/documents/IR3_oct_2004.pdf

Elvik, R, '**The effects on accidents of compulsory use of daytime running lights for cars in Norway**', Accident Analysis and Prevention 25(4) 383–398, 1993

Elvik R, '**A meta-analysis of studies concerning the safety effects of daytime running lights on cars**', Accident Analysis and Prevention 28(6) 685–694, 1996

Elvik R, Christensen P & Olsen SF, '**IR 2 : Daytime running lights – A systematic review of effects on road safety**', TØI report xxx/2003, Transportøkonomisk institutt, Norway

[Institute of Transport Economics]

http://ec.europa.eu/transport/road/roadsafety/equipment/daytimerunninglights/documents/IR2_report3_ver_oct_2004.pdf

Hansen LK, '**Daytime running lights in Denmark; Evaluation of the safety effect**', Danish Council of Road Safety Research, Gentofte, Techn. Report 2/1993

Hansen, LK '**Daytime running lights (DRL); Experience with compulsory use in Denmark**', Proc. Conf. Road safety in Europe and Strategic Highway Res. Program, VTI, Linköping, Sweden, 1994

Hörberg U & Rumar K, '**Running lights – conspicuity and glare**', Department of Psychology, University of Uppsala, Sweden, Report 178, 1975

JASIC, '**Study on the effects of four-wheeled vehicles' daytime running lights on the improvement of their conspicuity and on the impairment of conspicuity of motorcycles**', UN/ECE WP29, Informal document No. 10, 51st GRE, 15–19 September 2003, Agenda item 1.1.2.11.

[JASIC = Japan Automobile Standards Internationalization Center]

[GRE = Groupe de Rapporteurs Éclairage (Group of Representatives: Lighting)]

<http://www.unece.org/trans/doc/2003/wp29gre/TRANS-WP29-GRE-51-10e.pdf>

Koornstra M, '**Road safety and daytime running lights: A concise overview of the evidence**', Paper presented to Joint Meeting of ECMT's Road Safety Committee & Committee for Road Traffic, Signs and Signals, The Hague, The Netherlands, 15 March 1989, R-89-4, Leidschendam, 1989, SWOV Institute for Road Safety Research, The Netherlands

[SWOV = Stichting Wetenschappelijk Onderzoek Verkeersveiligheid (Institute for Road Safety Research)]

Koornstra M, Bijleveld F & Hagenzieker M, '**The safety effects of daytime running lights**', R-97-36, Leidschendam, 1997, SWOV Institute for Road Safety Research, The Netherlands (SWOV), Leidschendam, Netherlands

<http://www.swov.nl/rapport/R-97-36.pdf>

Lehtimäki R, '**Elk and white-tail deer as traffic hazard**', Research Department, Liikenneturva, Helsinki, Finland, Report 29, 1984

[Central Organisation for Traffic Safety]

Lund HV, '**Effekt af motorcyklisters brug af varsellys på uheldsdata i perioden 1. maj 1977 – 30. juni 1978**', Rådet for Trafiksikkerhedsforskning (RfT), Lyngby, Denmark, 29 Januar 1979 (Danish language)

[Danish Council of Road Safety Research]

Lund HV, '**Effect of motor cyclists' use of running lights based on accident data during the period of 1st May, 1977 – 30th June, 1978**', Rådet for Trafiksikkerhedsforskning (RfT), Lyngby, Denmark, 29 January 1979 (English language)

[Danish Council of Road Safety Research]

Morita K, '**Theoretical analysis of effect of daytime running lamps on the visibility of automobiles**' (Synopsis of 2001 PAL publication), UN/ECE WP29, Informal document No. 1, 47th GRE, 1–5 October 2001, Agenda item 3

[GRE = Groupe de Rapporteurs Éclairage (Group of Representatives: Lighting)]

<http://www.unece.org/trans/main/wp29/wp29wgs/wp29gre/greinfdoc/47inf01.pdf>

Nordisk Trafiksikkerhedsråd (NTR), **Rapport 17: 'Varselljus – bilbelysning under dagtid'** (1976)

[Tr: Report 17: 'Warning lights – motorcar lighting in daytime']

[Nordic Road Safety Council]

Prower SM, '**Daytime lights-on laws for motorcars and motorcycles: A nine-study review of the evidence that they reduce accidents**', British Motorcyclists Federation research paper, 10 October 1985

Prower SM, '**The case against daytime-light laws: Commentary**', British Motorcyclists Federation, 31 March 1990

Prower SM, '**How Koornstra et al 1997 'The safety effects of daytime running lights' only achieved consistent findings in favour of daytime running lights from their re-analysis of the Swedish and Norwegian data by the adoption of an inconsistent methodology**', British Motorcyclists Federation, 2 August 2001

<http://www.safespeed.org.uk/~dadrl/docs/BMFCritiqueKoornstra1997.pdf>

Theeuwes J & Riemersma JBJ, '**Daytime running lights as a vehicle collision countermeasure: The Swedish evidence reconsidered**', Accident Analysis and Prevention 27(5) 633–642, 1995

Vaaje T, '**Kjøreløys om dagen reduserer ulykkestallene**', Transportøkonomisk institutt, Etterstad, Norway, Q-38 CRASH, Arbeidsdokument 15–8–1986 (Norwegian language: Australian author, Hendtlass J holds English translation)

[Tr: '*Driving lights in daytime reduce the number of accidents*']

[Institute of Transport Economics]

[Tr: Working paper]

Japanese Government's position (Statement by Kiminori Hyodo of Koito Europe Technical Centre 1 Oct 2001)

http://www.lt.e-technik.tu-darmstadt.de/drl_Hyodo.pdf

Japanese Government's position (Japan's comment on TRANS/WP.29/GRE/2001/6/Rev.3: Working Paper No. GRE-gtr-5-6 (5th GRE-gtr informal meeting, Ottawa, 7–11 June 2004)

<http://www.unece.org/trans/doc/2004/wp29gre/gtr5-6e.pdf>

European Commission (DG TREN E3), '**Saving lives with daytime running lights (DRL)**', A consultation paper presented by the Inland Transport Services of the Directorate General for Energy and Transport, Brussels, 1 August 2006

http://ec.europa.eu/transport/roadsafety/library/consultations/consultation_paper_drl_20060727.pdf