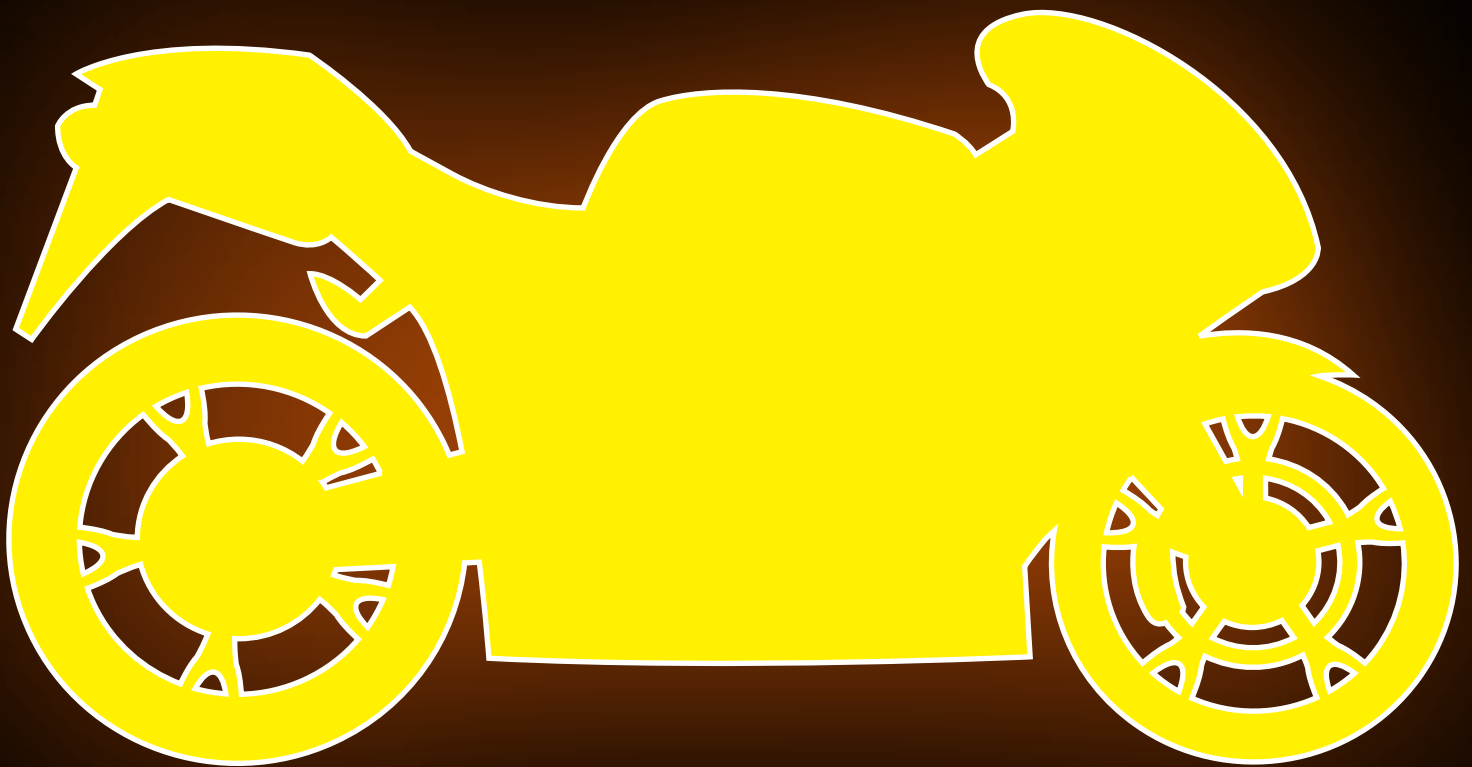


Motorcycle Conspicuity In Europe

A response to recent proposals
from
France And The EU



relating to motorcycle conspicuity

16th June 2011

Introduction

In nature, iridescent colours have a purpose and in the case of the Mantellas, small, brightly-coloured frogs only found on Madagascar, the iridescent colours reflect their poisonous nature and thus act as a warning to predators to keep their distance.

Equally, vipers have prominent zig-zag colours in order to warn of their poisonous nature. Indeed throughout the animal world, colour is used for a variety of reasons, including camouflage.

The French government has recently set out a number of proposals for legislation which include amongst other things, the obligation for motorcyclists to wear Hi-Viz jackets. It seems that the logic of this action is to ensure that motorcyclists are more visible and therefore car drivers will see them and avoid colliding with them. According to this logic, there will be less motorcycle fatalities.



This is an interesting prospect and it follows that the discourse relating to motorcycle conspicuity perhaps needs to be reviewed.

Another proposal which is in pipelines from the European Commission is the obligation of automatic headlights on motorcycles. This too is an attempt to make motorcyclists more conspicuous to other road users in order to reduce accidents. Will these solutions actually work? Do bright colours and bright lights increase conspicuity?

Colour and Conspicuity

It is not just the animal world that uses colours to warn or hide. Military strategy contains methods of camouflage and the art of concealment. For example during the Second World War, the American Navy¹ used to break up outlines of quite large ships by the use of zigzag splashes of sometimes very bright colour.

These methods of camouflage were first used in the 1914/18 war on both British and German ships as a measure to fool the eye when taking ranges for gun action. The stripes and abstract shapes made it hard for the user to focus and hence get an accurate distance on a visual range. (With the advent of radar, this form of camouflage became redundant). The paradox of this strategy is that motorcyclists are encouraged by government to wear bright colours and 'whizzy' patterns, when distinctive colouring and patterns were part of standard methods of concealment techniques used by the military.

Ward (2003) found that conspicuity can affect inattentional blindness and that two types of factors affect conspicuity: sensory conspicuity factors and cognitive conspicuity factors. According to Green (2003), the most important sensory conspicuity factor is contrast. Objects that are large and move or flicker are more conspicuous i.e. an ambulance. He found that there were other incidences, for example there was a series of accidents involving car drivers running into police cars parked on road (hard) shoulders.

In response to this, the authorities painted the rear of the police cars with big red and while stripes. Rather than decrease, the rate of accidents actually increased. Ward suggests that these factors (bright colours) do not guarantee – by themselves – conspicuity.

¹ <http://www.history.navy.mil/photos/sh-usn/usnsh-c/bb44.htm>

It is a fact that cars are the major cause of deaths on European roads therefore it follows that the focus of government safety reduction strategies should first and foremost consider better road awareness through changing the attitude and behaviour of car drivers as well as motorcyclists.

Collisions between vehicles at Junctions

The European Road Safety Observatory document “Traffic Safety Basic Facts 2007”² indicates that more than 65.500 persons were killed in traffic accidents at intersections (junctions), in 13 European Union countries between 1996 and 2005 about 21% of all traffic accident fatalities in those countries. In the United Kingdom, more than one third of the overall road accident fatalities in 2005 occurred at intersections (34,5%), whereas in Greece fatalities at intersections constitute a minority of the overall road accident fatalities (7,1%).

As highlighted in the table below, the mode of transport more likely to crash at intersections is the car (or taxi). This mode of transport represents 40% of all fatalities for the driver and passenger. Moped and motorcycle riders combined, represent the next highest proportion of fatalities at junctions at 26%, followed by pedestrians at 18.5% and cyclists at 11%. Overall the proportion of fatalities for vulnerable road users (VRU) pedestrians, cyclists and motorcyclists in Europe represents 55.5% of all road users – which presents a conundrum when considering conspicuity.

Table : Fatalities at intersections in 16 EU countries by mode of transport in 2005

	agricultural tractor	bus or coach	car or taxi	heavy goods vehicle	lorry, under 3.5 tonnes	moped	motorcycle	other	pedal cycle	pedestrian	Total
BE	0	0	96	1	4	15	29	3	34	24	206
DK	0	1	37	0	5	11	6	0	23	11	94
EE	0	0	16	2	0	2	2	0	1	6	29
EL	0	2	41	0	2	3	37	2	0	31	118
ES	2	8	280	11	28	121	120	10	23	143	745
FR	0	2	296	3	5	71	171	1	36	79	664
IT*	3	9	745	1	12	161	392	11	141	143	1.618
LU***	0	0	5	1	0	0	0	0	0	2	8
HU	0	1	90	3	7	17	31	3	54	54	260
NL**	3	0	90	2	14	44	33	2	110	26	324
AT	3	2	55	1	3	16	22	3	19	24	148
PL	13	7	326	32	0	15	32	2	152	319	898
PT	3	2	43	1	14	34	49	0	15	34	196
FI	0	0	32	0	3	1	6	0	21	10	73
SE	0	1	41	1	0	3	16	1	17	18	98
UK	0	7	460	9	9	13	254	10	86	304	1.152
EU-16 ²	28	42	2.653	68	106	527	1.200	48	732	1.228	6.631
% by mode of transport	0,4%	0,6%	40,0%	1,0%	1,6%	7,9%	18,1%	0,7%	11,0%	18,5%	100,0%

* Data from 2004
 ** Data from 2003
 *** Data from 2002

Source: CARE Database / EC
 Date of query: December 2007

Automatic headlight on (AHO) and Conspicuity

The proposals from the European Commission “Approval and market surveillance of two – or three-wheel vehicles and quadricycles” now being discussed within the Committee on the Internal Market and Consumer Protection (IMCO, include the mandatory fitting of Automatic Headlights On.)

The reason for these proposals is due to the fact that other road users, cars, trucks and vans are now obliged to have permanent dedicated running lights. However there are issues in the research

carried out by the EU Commission, which they chose to ignore, but which was highlighted in extracts from the TRL report on *“Daytime Running Lights (DRL): A Review of the reports from the European Commission”*, which indicated that:

- “The conspicuity of motorcycles in the presence of differing intensities of DRL and different ambient lighting conditions was not investigated”.
- “There was some concern that the photographic methods used may potentially not have replicated the real world environment sufficiently realistically”.
- “The relative positions of cars and motorcycles that were evaluated by the work did not include situations at a junction where the motorcycle was approaching from the side and was positioned in front of a car equipped with DRL. All road scenes considered appeared to place the motorcycle to the side of the car such that daylight was visible between the two to physically separate them in the image”.

However In the Executive summary of the EU Commission’s Consultation Paper, Presented by the inland transport services of the Directorate General for Energy and Transport in 2006, the justification for the introduction of the mandatory application of DRL for all vehicles in Europe included *“The following research findings should also be noted in the course of assessing whether legislation on DRL for all vehicles is appropriate: Road users not having lighting devices, i.e. pedestrians, cyclists, mopeds (or indeed any PTW - ed) do not become less conspicuous if all vehicles feature DRL”*.

This suggests that vulnerable road users will be conspicuous to car, van and truck drivers and therefore do not need to have lighting or any form of clothing to make themselves conspicuous – and back once more to our conundrum – will mandatory AHO make a difference?

That was in 2006. Moving forward to 2011, the Rapporteur of the Internal Market and Consumer Protection Committee (IMCO) states that he “therefore welcomes the proposal to improve the visibility of PTWs by the automatic switching of lighting (AHO Automatic Headlights On).” He mentions the voluntary industry agreement regarding AHO, that has been in place since 2002 and comments that not seeing a PTW (Powered Two Wheel) has been reported to be a common cause of collisions, during both the hours of daylight and at night.

The reasoning behind this mandatory introduction appears to be that motorcycle manufacturers who are not part of motorcycle industry in Europe (ACEM) do not have to equip their motorcycles with AHO, even though they are obliged to conform to whole type vehicle approval. So the logic behind this proposal seems to aim to reduce competition from extra-EU manufacturers.

Whether this is the case or not, ACEM manufacturers have the largest share of sales in Europe. Therefore if the majority of (ACEM) motorcycles have been fitted with AHO since 2002, this infers that the majority of motorcyclists ride with their headlights on during daylight. It follows therefore that not seeing a motorcycle would not be the common cause of collisions with motorcycles. By using the Commission and Rapporteur’s same logic, AHO on motorcycles has little or no effect.

The Rapporteur also mentions that all new car models will be fitted (DRL on cars and light vans has already come into effect since February 2011. By summer 2012 buses and large/heavy vehicles will also have to be so fitted.) with ‘daytime running lights’ (DRL), but these are actually Dedicated Running Lights – DRL – powered by diode type lights which although within the regulations effectively make the vehicle without headlights on even less visible in relative terms, the reason for this is that diode lights glare and obfuscate vision.

It appears that the Rapporteur and the European Commission are both suggesting that the legislation on DRL for cars and vans etc will make motorcycles less visible, therefore AHO or rather Dedicated Running Lights, need to be made mandatory for motorcycles as well.

As we understand it, the purpose of DRL is so that vulnerable road users can see vehicles (not vice versa). But if this holds true, then one of the most important elements – pedestrians (and to a lesser degree, cyclists) – has been excluded, because the DRL legislation does not consider that car drivers (and if this proposal goes through), motorcyclists, will not have the onus to see pedestrians (which appears to contradict the statement made by the Commission in its consultation paper on DRL).

What seems to be implied is that there is a shift towards the more vulnerable being responsible to “see” the vehicle which moves liability away from the vehicle driver. In other words, the thrust of this legislation appears to be driven by cost (to insurers) rather than for reasons of safety, furthermore, even the Commission’s own report has been unable to provide sufficient evidence that DRL will reduce fatalities (Elvik)³.

By observing the annual percentage changes in the table below, there does not appear to be any advantage to having mandatory DRL, indeed in the case of Finland, the data demonstrate an increase in fatalities in 1996/1997 (+8.4%), in 1998/1999 (+7.8%), in 2000/2001 (+9.3%) and again in 2004/2005 (+1.1%).

Annual Percentage change in Fatalities between 1990 and 2005

	Austria	Belgium	Finland	G.B.	Ireland	NL	Norway	Sweden
1990/1991	-0.4	-5.2	-2.6	-12.4	-6.9	-6.9	-2.7	-3.5
1991/1992	-9.5	-10.7	-4.9	-7.4	-6.7	0.3	0.6	1.9
1992/1993	-8.6	-0.7	-19.5	-9.8	3.9	-2.6	-13.5	-16.7
1993/1994	4.3	1.9	-0.8	-4.3	-6.3	3.7	0.7	-6.8
1994/1995	-9.6	-14.4	-8.1	-0.8	8.2	2.8	7.8	-2.9
1995/1996	-15.1	-6.4	-8.4	-0.6	3.7	-11.5	-16.4	-6.1
1996/1997	7.6	0.6	8.4	0.0	4.2	-1.4	18.8	0.7
1997/1998	-12.9	10.0	-8.7	-4.9	-3.0	-8.3	16.2	-1.8
1998/1999	12.0	-6.9	7.8	0.1	-9.8	2.3	-13.6	9.2
1999/2000	-9.5	5.2	-8.1	-0.4	0.5	7.0	12.2	1.9
2000/2001	-1.8	1.1	9.3	1.2	-1.0	-7.1	-19.4	-6.3
2001/2002	-0.2	-9.0	-4.2	-0.6	-8.5	-1.6	12.7	1.1
2002/2003	-2.6	-10.2	-8.7	2.2	-10.9	2.1	-9.7	-5.5
2003/2004	-5.7	-4.3	-1.1	-8.2	11.6	-19.0	-8.2	-9.1
2004/2005	-12.5	-6.4	1.1	-0.6	6.7	-6.7	-14.7	-8.5

(NB: Increases in fatalities are in bold and identified by the colour orange)

As mentioned previously, the Commission’s consultation paper stated that, ‘road users not having lighting devices, i.e. pedestrians, cyclists, mopeds do not become less conspicuous if all vehicles feature DRL; A negative effect of DRL on the visibility of motorcyclists cannot be ascertained’.

However a document from Denmark, published in 2001 by the United Nations Economic Council⁴ demonstrates that this does not seem to be the case, indeed the findings of the document are clear. The Danes acknowledge that a significant negative effect is found in accidents involving pedestrians: The authors comment that ‘The result is surprising, as these accidents were found unaffected in the analysis based on 5 after-quarters. No specific reason for the increase has been identified, but no other explanations than the Daytime Running Lights can be pointed out’. The document also comments that there is a negative effect with regards to accidents involving motorcycles which was the same as the first evaluation carried out in 1993 – so no improvement due to DRL.

³ http://ec.europa.eu/transport/roadsafety/publications/doc/IR2_report3_ver_oct_2004.pdf

⁴ INLAND TRANSPORT COMMITTEE Working Party on Road Traffic Safety (Thirty-sixth session, 3-6 April 2001, agenda item 4 (e)); REVISION OF THE CONSOLIDATED RESOLUTIONS ON ROAD TRAFFIC (R.E.1) AND ON ROAD SIGNS AND SIGNALS (R.E.2) Daytime running lights; Transmitted by Denmark

The document concludes that *'The safety effect of Daytime Running Lights is now considered to be somewhat smaller than after the first analysis'*. The TRL report supports this conclusion and comments that "there appears to be greater scientific uncertainty concerning the size of the expected effect. Some of the parameters in the statistical analysis were not found to be statistically significant and should, therefore, be treated with some caution. In particular, the evidence for assuming a 15% improvement on fatal accidents is weak (...)"⁵

This suggests that the 'experts' providing the research to support the EU Commission's consultation paper have not considered all the evidence.

Motorcyclists (and indeed cyclists) are constantly encouraged to enhance their conspicuity by use of daytime running lights and brightly coloured clothing. However, there are contradictory opinions about the effectiveness of DRL and conspicuous clothing: Under some circumstances, e.g. when riding on motorways in heavy rain, the positive effects of fluorescent rain suits and daytime running lights are well known and accepted.

However, under other circumstances, e.g. when riding in cities in bright sunshine, brightly coloured clothing and daytime running lights may have a "camouflaging" effect, in that they make the motorcycle and rider "blend" with colourful, bright objects in the traffic environment as the photographs below demonstrate.



In countries already having introduced mandatory daytime running lights for all vehicles, studies of placing fluorescent tape on specific locations on the bike and using additional motorcycle light arrangements, such as triangular lights, to maintain conspicuity, show little or no effect.

Indeed in a study carried out by DD Clarke, P Ward, W Truman and C Bartle⁶. the most significant finding of this study with regards to right of way violation (ROWV) accidents, suggests that in particular, *'there is a marked problem with other road users observing motorcyclists. This is the phenomenon whereby drivers overlook a motorcyclist in the immediate foreground seems to be in agreement with the work of Mack and Rock (op. cit.), whose theory of 'inattention blindness' showed that subjects may be less likely to perceive an object if they are looking at it directly than if it falls outside the centre of the visual field. 'Inattention blindness' is suggested by research to be affected by four main factors: conspicuity, expectation, mental workload, and capacity'* (page 8).

The report finds that *'Some results would seem to permit the discussion of conspicuity and expectation. The fact that many motorcyclists in our sample appear to be trying to make themselves more conspicuous but are not seen (however the report does not indicate what methods were used*

⁵ TRL Limited PUBLISHED PROJECT REPORT PPR 170 DAYTIME RUNNING LIGHTS (DRL): A REVIEW OF THE REPORTS FROM THE EUROPEAN COMMISSION Version: 1.0 by I Knight, B Sexton, R Bartlett, T Barlow, S Latham & I McCrae (TRL Limited) (October 2006, Page one)

⁶ Brown, ID. (2002): A review of the 'look but failed to see' accident causation factor. In Behavioural Research in Road Safety XI. Department of Transport, Local Government and the Regions, London. Clarke DD. et al (2004): An in-depth case study of motorcycle accidents using police road accident files in Behavioural Research in Road Safety 2004: Fourteenth Seminar.

– i.e. whether this conspicuity included bright clothing, headlights on etc), nevertheless lends credence to the idea that there is something amiss in the cognitive processes of the other involved driver. The ‘expectation’ factor, in particular, raises the possibility that some road users have a poor perceptual ‘schema’⁷ for motorcycles in the traffic scene, and therefore do not process the information fast enough when motorcyclists are observed’ (page 14).

Conclusions

Research from experts⁸ has supported the case that the most obvious method of reducing road casualties is to improve car driver training and motorcycle rider training, with the support of enforcement. Practical training for car drivers should include consideration of inattentive blindness at junctions.

If the objective is to reduce road casualties, then European governments need to address training and awareness techniques for motorcycle riders rather than imposing Hi Viz jackets, mandatory automatic headlights on in the hope that this will improve conspicuity. The present system does not equip motorcyclists with the necessary accident avoidance and evasion strategies, this could be easily modified and avoidance and evasion strategies should be included in initial rider training.

Unfortunately, politicians tend to look for quick fixes, perhaps due to the fact that they are too close to powerful lobbying concerns. Solutions such as Hi Viz (aka Day Glo) jackets and/or automatic headlights on seem like a “good idea” and the easy way out, it doesn’t really matter that these “good ideas” actually work, what is important is that governments and the Commission appear to be “doing something”.

Elaine Hardy, PhD
Director of Research
Right To Ride Ltd

16th June, 2011

Included in this paper are excerpts from previous research carried out by this author while MAG UK’s Research Officer, including “How Close is Too Close” Concerning Car Collisions and Motorcycles, March 2006; MAG UK Response to the Consultation Paper Presented by the inland transport services of the Directorate General for Energy and Transport “Saving Lives with Daytime Running Lights (DRL) (November, 2006). The research and analysis in these documents is the intellectual property of Elaine Hardy.

⁷ A mental representation that consists of general knowledge about events, objects or actions

⁸ - Hurt, HH, Ouellet, JV and Thom, DR. (1981): Motorcycle Accident Cause Factors and Identification of Countermeasures, Volume 1: Technical Report, Traffic Safety Center, University of Southern California, Los Angeles, California 90007, Contract No. DOT HS-5-01160.
- Clarke DD. et al (2004): An in-depth case study of motorcycle accidents using police road accident files in Behavioural Research in Road Safety 2004: Fourteenth Seminar. Department for Transport.

Bibliography

1. Clarke DD. et al (2004): An in-depth case study of motorcycle accidents using police road accident files in Behavioural Research in Road Safety 2004: Fourteenth Seminar. Department for Transport.
2. Green G (2003): Inattention blindness and conspicuity. Retrieved Nov. 22, 2003 www.visualexpert.com/Resources/inattentionblindness.html Downloaded 20.2.2006.
3. Hurt, HH, Ouellet, JV and Thom, DR. (1981): Motorcycle Accident Cause Factors and Identification of Countermeasures, Volume 1: Technical Report, Traffic Safety Center, University of Southern California, Los Angeles, California 90007, Contract No. DOT HS-5-01160.
4. Isler, RB, Parsonson, BS and Hansson, GJ. (1997): Age-Related Effects of Restrictive Head Movements on the Useful Field of View of Drivers. Accident Analysis and Prevention, 29 (6), 793–801.
5. Knight I, et al (2006): Daytime Running Lights (DRL): A REVIEW OF THE REPORTS FROM THE EUROPEAN COMMISSION Version: 1.0 TRL Limited Published Project Report PPR 170: Page one.
6. Mack, A and Rock, I. (1998): Inattention Blindness. MIT Press: Cambridge, MA.
7. Mizutani, A., Chahl, JS & Srinivasan, MV. (2003): Motion camouflage in dragonflies. Nature, 423, 604.
8. Regan DM Hamstra SJ (1993): Visual Research. 33, 447-462.
9. Ward TA. (2003): An Overview and Some Applications of Inattentional Blindness Research. http://hubel.sfasu.edu/courseinfo/SL03/inattentional_blindness.htm Downloaded 20.2.2006