

Texte zu den geplanten neuen EU-Regelungen zur umweltgerechten Produktgestaltung und zur Energieverbrauchs-kennzeichnung in der Beleuchtung – Zusammenstellung <sup>[1]</sup> des Umweltbundesamtes (UBA), Deutschland



## Diskussion über eine künftige Änderungsverordnung (Produktgestaltung)

Anhang II Nummer 2 – SVM-Höchstwert:  
**Zu der Stellungnahme von Lighting Europe vom 29. März  
2019: Gendarstellung von Peter Erwin <sup>[2]</sup> (Juli 2019)**

*Hinweis: Dies ist die englischsprachige Version; die deutschsprachige kann unter <sup>[3]</sup> heruntergeladen werden*

**EN:** Information on the coming EU Lighting Regulations – Ecodesign and Energy Labelling – Compilation <sup>[1]</sup> of the Federal Environment Agency (UBA), Germany

Discussion of a future amending regulation (Product Design)

**Annex II.2 – SVM limit value:  
Concerning Lighting Europe's comments as of 29 March:  
Reply by Peter Erwin <sup>[2]</sup> (July 2019)**

*Please notice: This is a text in English. A version in German language can be downloaded at <sup>[3]</sup>.*

**FR:** Informations sur les futures réglementations de l'UE concernant l'éclairage – l'écoconception et l'étiquetage énergétique – Compilation <sup>[1]</sup> de l'Agence Fédérale de l'Environnement (UBA), Allemagne

Discussion d'un futur règlement modificatif (Conception des produit)

**Annexe II, point 2 – Valeur maximale du SVM :  
Concernant les commentaires de Lighting Europe de 29 mars 2019 :  
Réponse de Peter Erwin <sup>[2]</sup> (juillet 2019)**

*Indication : C'est un texte en anglais. Une version allemande peut être téléchargé sous <sup>[3]</sup>.*

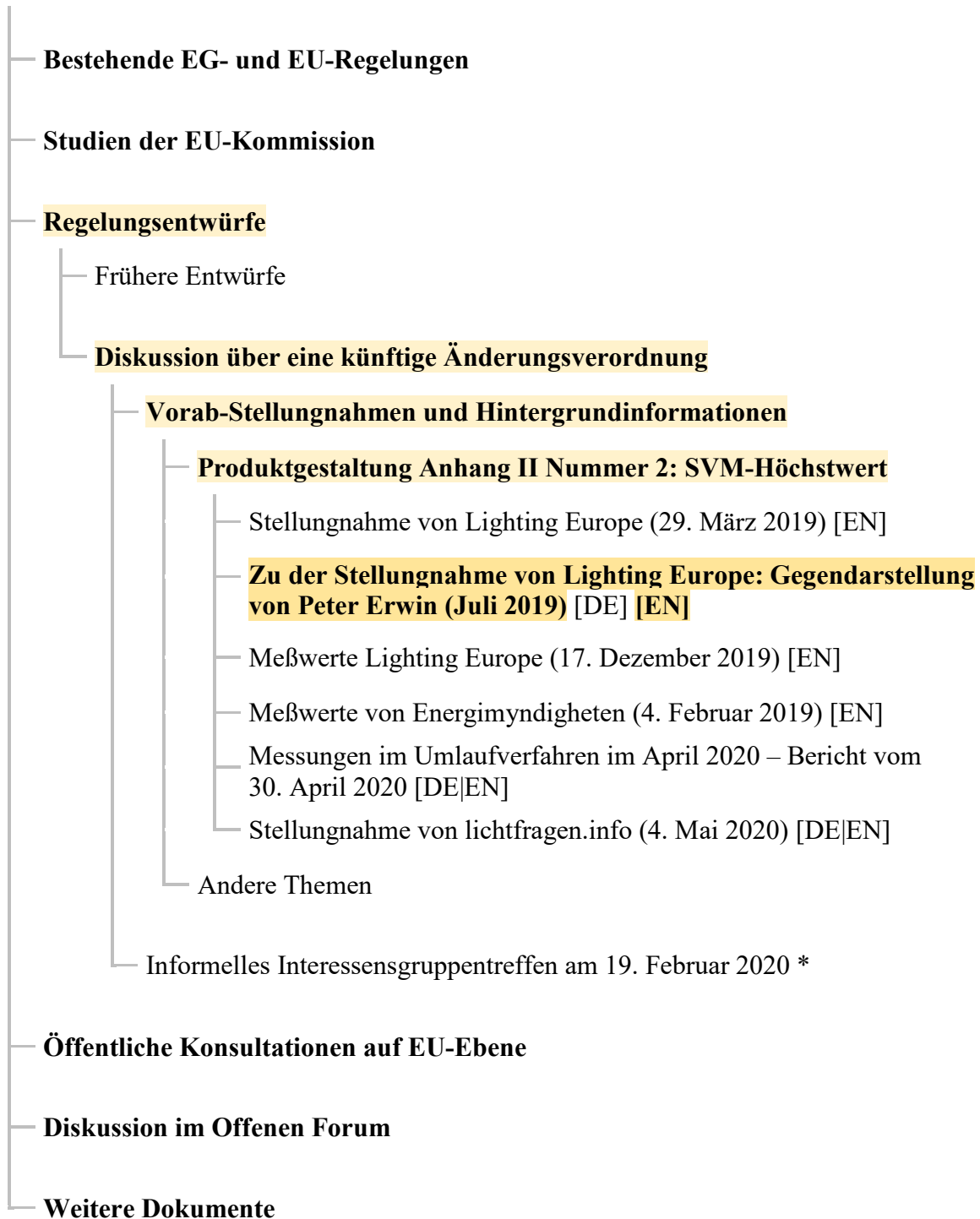
<sup>[1]</sup> <https://www.eup-network.de/de/eup-netzwerk-deutschland/offenes-forum-eu-regelungen-beleuchtung/dokumente/texte/>

<sup>[2]</sup> <https://www.derlichtpeter.de/>

<sup>[3]</sup> [https://www.eup-network.de/fileadmin/user\\_upload/Lichtquellen\\_Stellungnahme-Erwin\\_2019\\_07\\_DE.pdf](https://www.eup-network.de/fileadmin/user_upload/Lichtquellen_Stellungnahme-Erwin_2019_07_DE.pdf)

Texte im Offenen Forum

(abc = vorliegender Text)



\* Stand 20. März 2020: Diese Texte stehen noch nicht zur Verfügung.

Abkürzungen: ● EG = Europäische Gemeinschaft ● Energimyndigheten ist die staatliche Energieagentur Schwedens; <https://www.energimyndigheten.se/en/> ● EU = Europäische Union ● SVM : Maß für die Sichtbarkeit des Stroboskopeffektes

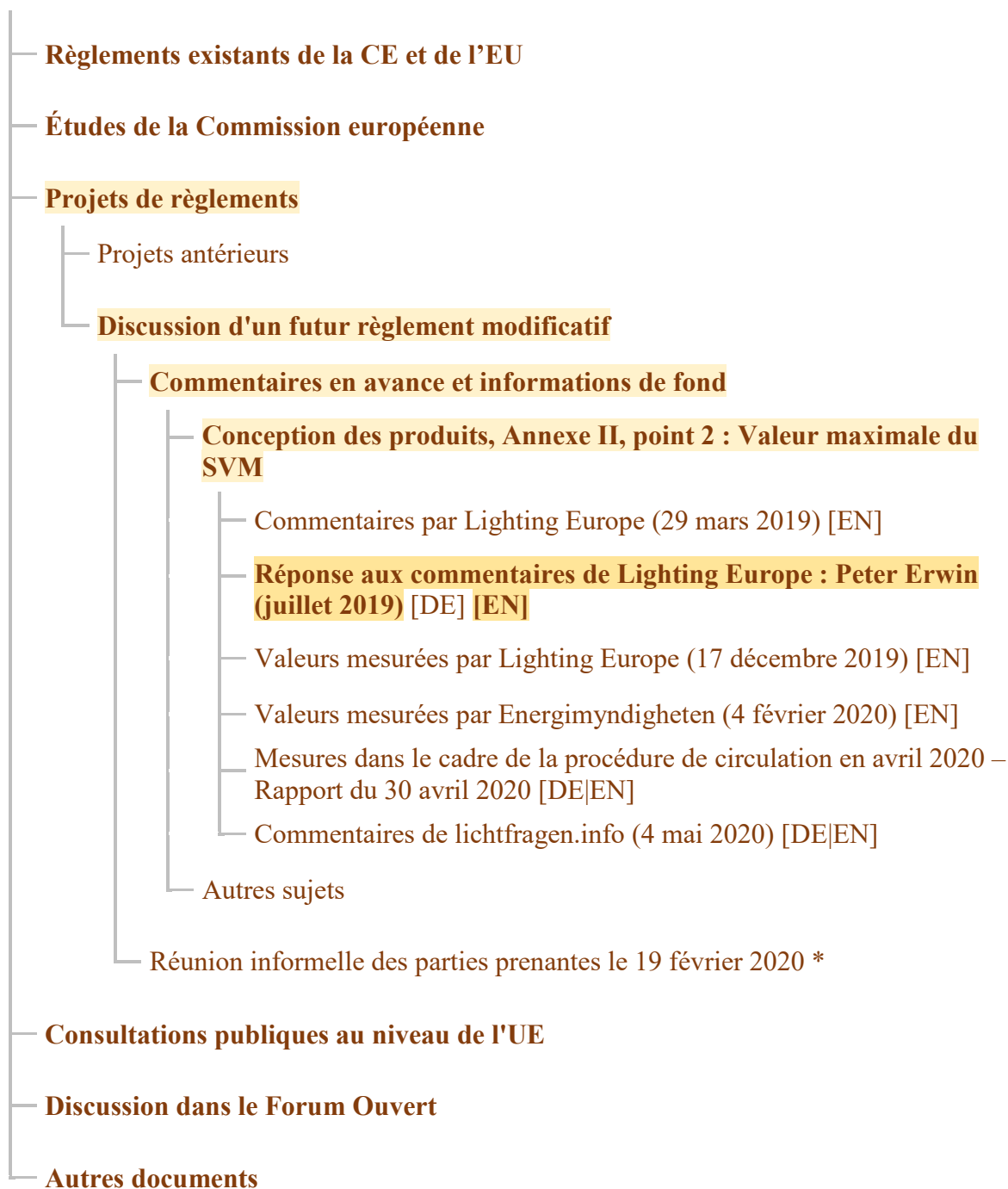
**Documents in the Open Forum**

(**abc** = text at hand)



\* Status as of 20 March 2020: These texts are not yet available.

Abbreviations: ● EC = European Communities ● Energimyndigheten is the national Energy Agency of Sweden (SEA); <https://www.energimyndigheten.se/en/> ● EU = European Union ● SVM = Stroboscopic Visibility Measure



\* État au 20 mars 2020 : Ces textes ne sont pas encore disponibles.

Abréviations : ● CE = Communauté européenne ● Energimyndigheten et l'administration nationale suédoise de l'énergie ; <https://www.energimyndigheten.se/en/> ● SVM : mesure de la visibilité stroboscopique ● UE = Union européenne

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Es folgt ein unveränderter Originaltext.

**EN:** The following is an unmodified original text.

**FR:** Ce qui suit est un texte original.

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# Counterstatement to the comments of LightingEurope; Affirmation of the SVM limitation of $\leq 0.4$

In the context of the Regulatory committee  
for the upcoming EU Lighting Regulations –  
Ecodesign and Energy Labelling  
of light sources

Submitted by

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## Summary:

By setting a limit of SVM  $\leq 0.4$  in the Ecodesign Regulation, the Ecodesign regulatory committee has very well estimated the impact on the market availability of mains voltage operated light sources.

The determination of the SVM limit value of 0.4 takes into account the research results and it is as in the classic incandescent lamp (SVM: Europe: 0.5, USA: 0.3), whose light modulation has caused no complaints in 100 years of experience. The consumer may continue to rely on health-friendly, low-fatigue light.

The statement by [LightingEurope](#) [1][2], that with an SVM [6] of  $\leq 0.4$ , lamp product families or luminaire product families would be at stake and the end consumer would have to end up without lighting is completely unfounded.

Lamps in the types A60, GU10, E14 and G9 with low SVM in non-dimmable version have been available on the market for several years now.

Likewise dimmable already variants are available. The dimmable G9 design brings up the rear in the development, first lamps will be offered at the end of this summer at a reasonable price.

The argument that an electrolytic capacitor (elcap) requires more space is correct in itself.

However, there is enough space for an electrolytic capacitor to allow an SVM of  $\leq 0.4$ . Thus, the lamps do not have to be larger, and the luminaires remain usable.

Consequently, the variety of lamps and luminaires is maintained in the usual way even at low light modulation.

## Effects of light modulation

Stroboscopic light, as the cause of the stroboscopic effect and the phantom array effect as well as flicker (i.e. high light modulation in the low, even at rest perceptible frequency range) are effects that occur in the first place due to technical inadequacies. Since today low-modulated artificial light is technically feasible at a reasonable price, all discussions regarding visibility, acceptance and health concerns would be able to be removed in advance.

An SVM of 1.6 allows endangering stroboscopic light [5], which is by no means acceptable.

### Frequencies above flicker fusion frequency

The SVM [6] (or, also for example, the [CFD](#) [3]) was developed to quantify the light modulation of a light source with respect to its effect on humans. This quantification is independent of the use of the light source.

It is true, that effects of stroboscopic light on the retina also occur in observations of periodic structures in daily life (e.g. fences, brick walls, rows of trees, striped clothes and spoked wheels), which is not fundamentally unacceptable. However, the examples mentioned only last very briefly, whereas the eye is exposed to artificial illumination over a longer period.

In everyday practice, the eye (of the viewer) is constantly in motion. So also when reading a book in which at best the body is at rest. The eyes move about 5 times per second in reading direction and then back to the next line and all this in saccades. Strobe light thus directly results in a stroboscopic effect. The brain largely compensates for the beta-motion of the individual images through higher cognitive processes to a nature-related flowing film. Only when meditating, resting of the eyes might be assumed. So if talking about **real situations** for the use of artificial light, then there is usually a lot of movement.

This happens under one or more light sources (daylight excluded in the evening). The main disturbance factor in the case of several mains-voltage-operated light sources is the mains power supply synchronicity of the light modulation (at 100 Hz), so that the light sources can be considered as a single large, modulated light source. The disturbances of the individual light sources do not compensate, but sum up.

Today, in office applications, fluorescent lamps with electronic ballasts, whose SVM  $\leq 0.1$ , are common. If the SVM value would be raised to 1.6 (significantly higher than outdated conventionally ballasted fluorescent lamps with SVM = 1.3), complaints (eyestrain, headache) are almost inevitable, and economic damage from lower cognitive performance and employee outage is not foreseeable [9].



For outside light, too, SVM limits should be set, because nocturnal organisms will suffer from stroboscopic light [7] and driving under stroboscopic light for sure leads to confusion. Insofar, the new directive is not quite sharp enough. If short-term exposure can be expected, the limits may be slightly higher. An example of this is today's street lighting with high- or low-pressure sodium lamps (HPS / LPS) with an SVM of 3.0.

It is not easy to determine the effects of light modulation on humans through studies. Accordingly, all studies could be criticized in a way. Nevertheless, from the synopsis of numerous independent studies (Perz / Sekulovski, Veitch / Martinsons, ...) it is clear how a meaningful limit could be set. Consequently the newly formulated directive is appropriate and should therefore remain unchanged.

### Frequencies below flicker fusion frequency

Below the flicker fusion frequency, the light modulation is also perceptible at rest and in the range of 5 Hz to 30 Hz can lead to epileptic seizures.

For mains operated light sources, such cases are extremely rare. [Der Lichtpeter](#) has encountered only one of 1200 products, which only in a dimmed state has been measured with a PstLM of 5.9 in this range and thus has exceeded the 'severity level' according to IEC 1789.

One source of danger that is not included in the new regulation is the new direct hub dynamo powered LED headlamps on bicycles that generate the most massive strobe flicker in the photosensitive frequency range when the driving slowly or pushed bicycle. The triggering of a photosensitive epilepsy is possible.

This creates a source of danger that is both frequent and most likely to hit a higher number of photosensitive people.

It is absolutely necessary to supplement the new regulation accordingly.

## Quite feasible

The statement that with SVM  $\leq 0.4$ , small bulbs would be at stake and the end consumer would have to end up without lighting is completely unfounded.

The extensive measurements by [Der Lichtpeter of about 1200 different products](#) show that at least half of the lamps already meet the upcoming requirement.

The following examples show that the feasibility is given, namely at an acceptable consumer price:

### Socket E14

From more than 450 different E14 products, 150 models from 52 manufacturers / brands have been measured with in an SVM  $\leq 0.4$ , including 100 filament LEDs.

This means:

**30 %** of the measured products already meet the upcoming requirements.

The obviously best product is a LED filament candle lamp of a German distributor in the classic glass bulb with:

- 420 lumens at 4 W (efficiency 105 lm / W)
- excellent dimming and switch-on behaviour
- No base structure (so complete electronics in the socket)
- Power factor  $\geq 0.9$
- Colour rendering index Ra (CRI):  $> 90$  Ra
- SVM: not dimmed: 0.2; dimmed: 0.0
- Lifespan: 25000 h
- Market price: gross 4 € / piece

### Socket GU10

The same applies to GU10 products:

From 105 different GU10 products, 52 models from 20 manufacturers / brands have been measured with an SVM  $\leq 0.4$ .

This means:

**Half** of the measured products already meet the upcoming requirements.

## R7s design

The design R7s has limited space.

But here, too, out of 27 different products, 17 models from 9 different manufacturers / brands have been measured with an SVM  $\leq 0.4$ .

In other words:

**Two-thirds** of the measured products already meet future requirements.

## Socket G9

And for the critical G9 products:

From over 100 different G9 products, 15 models from 11 manufacturers / brands have been measured with an SVM  $\leq 0.4$ .

This means:

**15 %** of the measured products already meet the upcoming requirements.

In addition to the already existing Far Eastern lamps, the first three **dimmable** products of German manufacturers / distributors will soon be available on the market with:

- Efficiency 100 lm / W
- excellent dimming and switch-on behaviour
- classic G9 LED housing with D = 15 mm and L = 50 mm, complete electronics integrated
- Power factor  $\geq 0.8$
- Colour rendering index Ra (CRI):  $\geq 95$  Ra
- SVM: not dimmed: 0.1; dimmed: 0.0
- Lifespan: 25000 h

## Socket E27 (A60)

About A60 products with a little more space in the E27 socket, one hardly has to come with words about that (also concerning the price):

From almost 370 different products with E27 socket, 230 models by almost 70 manufacturers / brands have been measured with an SVM  $\leq 0.4$ .

In other words:

**Two-thirds** of the measured products already meet future requirements.

Recently, a dimmable E27 filament product from a major Dutch distributor was offered:

- classic glass bulb, no base structure (so complete electronics in the base)
- Colour rendering index Ra (CRI):  $> 80$  Ra
- SVM: not dimmed: 0.0; dimmed: 0.2
- Market price: **0.99 € / piece**

## Conclusion:

[LightingEurope](#), which also refers to [NEMA](#) (i.e., economically oriented industrial consortia), argues against low SVM value by stating that lamp product families or luminaire product families are at stake and the end consumer would have to end up without lighting. This is, as has been proven, not comprehensible.

An SVM of 1.6 is so high that harmful stroboscopic light would be allowed [5], and that is by no means acceptable and certainly not intent of the Ecodesign Directive.

Although lamps without electrolytic capacitors are desirable because of their longer lifespan, the so-called "driverless" or "AC direct" technology is not yet well developed. Industry should take up this challenge and work with ecaps until then.

As an industry association in the European lighting industry, [LightingEurope is committed](#) to promoting efficient lighting practices for the benefit of the global environment, human well-being and consumer health and safety.

Saving energy, also in the sense of LightingEurope, must be combined with a quality of artificial light, which is as close to that of sunlight as Edison was able to at the time with flicker-free light. Everything else would be a step backwards rather than progress.

Since low-modulation artificial light is technically feasible at a reasonable price, it is necessary for the benefit of the global environment [7] (including birdlife [8] and nocturnal animals), human well-being as well as consumer health and safety SVM of  $\leq 0.4$  for any interior lighting and / or any workplace lighting (including outdoor).

Only other outdoor lighting, which can be assumed to be of short duration of stay, may have higher SVM values.

In fact, the set limits for PstLM  $\leq 1$  and SVM  $\leq 0.4$  should consequently also apply to dimmable light sources, for example, for the 25 % dimmed state.

## List of references

- [1] LightingEurope, Jan 2019:  
[Technical feedback on the SVM  \$\leq 0.4\$  limit \(stroboscopic effect\)](#)
- [2] LightingEurope, Mar 2019:  
[SVM  \$\leq 0.4\$ : Simple explanation](#)
- [3] Der Lichtpeter, Peter Erwin, Oct 2017:  
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- [4] EU-Kommission, Beleuchtungsregulierung, Jul 2018:  
[Entwurf für eine Regelung mit Anforderungen an die Produktgestaltung \(Anhang\)](#)
- [5] Der Lichtpeter, Peter Erwin, Jul 2018:  
[Light Modulation: SVM Limitation](#)
- [6] CIE: TC 1-83, D. Sekulovski (Chair), Aug 2016:  
[Visual Aspects of Time-Modulated Lighting Systems - Definitions and Measurement Models](#)
- [7] R. Inger, J. Bennie, TW. Davies, KJ. Gaston, May 2014:  
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- [8] JE. Boström, M. Dimitrova, C. Canton, O. Håstad, A. Qvarnström, A. Ödeen, Mar 2016  
[Ultra-Rapid Vision in Birds](#)
- [9] A. J. Wilkins, Oct 1988  
[Fluorescent lighting, headaches and eyestrain](#)