RECOMMENDATION ITU-R BT.1702

Guidance for the reduction of photosensitive epileptic seizures caused by television

(Question ITU-R 47/6)

(2005)

Scope

Extensive studies on the subject of photosensitive epilepsy, which have taken place around the world, have led to formulation of this Recommendation. The guidance proposed in this Recommendation is for the protection of the vulnerable section of the viewing population who have photosensitive epilepsy, and who are therefore prone to seizures triggered by flashing lights, including certain types of flashing television images. Broadcasting organizations are encouraged to raise awareness among programme producers of the risks of creating television image content which may induce photosensitive epileptic seizures in susceptible viewers. Appendices 1 to 5 provide additional information on this subject.

The ITU Radiocommunication Assembly,

considering

a) that several cases of individual or collective photosensitive epileptic seizures in vulnerable persons, in particular children, induced by flickering television images have been reported from various parts of the world;

b) that while television images displayed on television receivers do not themselves cause photosensitive epilepsy, they can be a trigger of seizures in individuals who happen to be prone to photosensitive epilepsy;

c) that it is useful to identify measures to help avoid the inadvertent creation of material for transmission on broadcast television that would be likely to induce photosensitive epileptic seizures;

d) that measures should be proportionate to the risks and should not place undue burdens on broadcasting organizations or programme producers;

e) that the impact of measures on broadcasters or programme producers may vary with their programme genres;

f) that, to be applied effectively, such measures should be simple and easy to understand by non-technical programme producers:

– that in the case of some live programming, such as news, programme production is often beyond the control of the broadcaster;

– that measurement results to check compliance with the guidelines depend on a number of measurement parameters;

– that the viewing environment and the display device, which can affect the likelihood of problems arising in susceptible viewers, may be different depending on a style of living around the world;

g) that the risk of seizures cannot be eliminated for the most susceptible viewers:

– that a small number of highly susceptible viewers may benefit from protection by means of filtering applied in the receiver;

– that due to the complexity of the end-to-end broadcast chain that involves many organizations and technologies, from capture, through production, mastering, broadcast, reception to display, and considering the viewing environment, no single organization has end-to-end control over this effect,

recommends

1 that broadcasting organizations should be encouraged to raise awareness among programme producers of the risks of creating television image content which may induce photosensitive epileptic seizures in susceptible viewers of television broadcasts,

further recommends

1 that producers of programme material for television broadcasting, consumer equipment manufacturers, and viewers, should refer to the technical information provided in the Appendices;

2 that further studies are required recognizing that different programme genres exist in broadcasting environments;

3 that due to the complexity of the medical issues involved, appropriate international medical organizations (e.g. World Health Organization) should be consulted, and routinely informed on this issue.

Appendix 1

Technical information for production organizations on flashing images in television

Flickering or intermittent images and certain types of regular pattern can cause problems for some viewers who have photosensitive epilepsy. Consideration of information from leading medical opinion in this area [Abramov *et al.*, 2000; Binnie *et al.*, 2001; Binnie *et al.*, 2002; Clippingdale and Isono, 1999; Harding, 1998; Harding and Jeavons, 1994; Nemtsova, 2001; Wilkins, 1995] and the experience of broadcasting organizations have led to drawing up guidelines aimed at reducing the risk of exposure to potentially harmful stimuli.

Television is by nature a flickering medium. Transmitted pictures are refreshed at typically 50 or 60 times each second, in which case interlaced scanning generates flicker 25 or 30 times each second. It is therefore impossible to eliminate the risk of flashing images on television causing convulsions in viewers with photosensitive epilepsy. To reduce risk, the following guidelines on visual content should be applied when flashing or regular patterns are clearly discernible in normal domestic viewing conditions. It should be noted that the level of any cumulative risk arising from successive sequences of "potentially harmful" flashes over a prolonged period is unknown. If, as medical opinion suggests, the risk of seizures increases with the duration of flashing, it has been calculated that a sequence of flashing images lasting more than 5 s might constitute a risk even when it complies with the guidelines below.

A potentially harmful flash occurs when there is a pair of opposing changes in luminance (i.e. an increase in luminance followed by a decrease, or a decrease followed by an increase) of 20 cd/m^2 or more (see Notes 1 and 2). This applies only when the screen luminance of the darker image is below 160 cd/m^2. Irrespective of luminance, a transition to or from a saturated red is also potentially harmful.

Isolated single, double, or triple flashes are acceptable, but a sequence of flashes is not permitted when both the following occur:

– the combined area of flashes occurring concurrently occupies more than one quarter of the displayed (see Note 3) screen area; and

– there are more than three flashes within any one-second period. For clarification, successive flashes for which the leading edges are separated by nine frames or more are acceptable in a 50 Hz environment, or separated by ten frames or more are acceptable in a 60 Hz environment, irrespective of their brightness or screen area.

Rapidly changing image sequences (for example, fast cuts) are provocative if they result in areas of the screen that flash, in which case the same constraints apply as for flashes.

NOTE 1 – Video waveform luminance is not a direct measure of display screen brightness. Not all domestic display devices have the same gamma characteristic, but a display with a gamma of 2.2 may be assumed for the purpose of determining electrical measurements made to check compliance with these guidelines (see Appendix 2).

NOTE 2 – For the purpose of measurements made to check compliance with these guidelines, pictures are assumed to be displayed in accordance with the "home viewing environment" described in Recommendation ITU-R BT.500 in which peak white corresponds to a screen illumination of 200 cd/m^2.

NOTE 3 – It may be assumed that overscan on modern domestic television receiver displays will normally be in the range 3.5% to ± 1% of the overall picture width or height (as indicated in European Broadcasting Union Technical Recommendation R95-2000).

NOTE 4 – The use of automatic video analysers to help alert production staff to potential guideline violations in video material can be beneficial.