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Results of a survey on television viewing distance

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Abstract

This White Paper records the results of a survey of the normal domestic TV viewing distances of BBC R&D staff made during April and May 2004.

Additional key words: TV, viewing distance, widescreen

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Results of a survey on television viewing distance

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1 Background

Much of the recent work done on picture quality assessment has been without particular reference to the distance at which our viewers sit from their television displays.

Historically, distances for “critical” viewing of conventional definition TV pictures of 4H (four time picture height) and 6H were established many years ago and still form the basis for picture quality assessment methods recommended by the ITU (eg. in ITU-R Recs. BT.654, BT.1128, BT.811 and BT.1129) and by the EBU (eg. EBU Rec. R28-1997). For HDTV critical viewing the ITU recommends 3H.

Apart from a BBC RD study in 1987 [1] which was specifically related to image sizes for (then) future flat screen HDTV displays there has been little published work to record the distances at which our audience do, in practice, view BBC output.

Furthermore BBC R&D work on possible methods of delivering a closed (elective) deaf-signing service (for which the rendition and resolution of facial detail is crucial) has posed the question “at what distance do the signing-deaf watch our signed output”.

To gain a greater insight into viewing habits, both of hearing and of British Sign Language (BSL) users, a survey has been conducted focussing particularly on normal domestic viewing distances. This note records the results of the survey of hearing users. The results of the BSL users survey will follow.

2 The Survey

A simple questionnaire was sent to all BBC R&D staff and to a number of BBC staff based in London and responses received during April and early May 2004. The questionnaire is reproduced in annex 1. [A similar questionnaire has been circulated around a group of BSL users by the UK RNID - this note does not reflect the responses of that particular group.]

Whilst such a survey offers a potential opportunity to enquire about many details of viewing habits, the questions were purposely limited to gauging viewing distance and the availability of widescreen display and digital reception. This elicited a prompt and numerically encouraging response.

3 Results

Relative distances are derived from the absolute measures of viewing distance and picture height recorded in the survey returns. In practice all respondents reported their viewing distance to the nearest 0.1 m. This is understandable given that a change of viewing pose can easily change this distance by 10-20 cm or more. Picture height was reported by about two thirds of the respondents to the nearest 10mm and by the remainder to 1mm.

The distribution of absolute viewing distance is shown overleaf in figure 1 and of relative viewing distance in figure 2. One respondent reported watching at 6.5 m (albeit with a

600mm high display resulting a relative distance of 10.8 H). Two respondents reported that they watch small displays at absolute distances greater than the median (i.e. >2.7 m) resulting in the two values of extreme relative distance evident in figure 2. The absence of any response with a derived relative distance of 8.5 H is due to the bin and sample size (102 respondents) – there is no corresponding lacuna in the original absolute data.

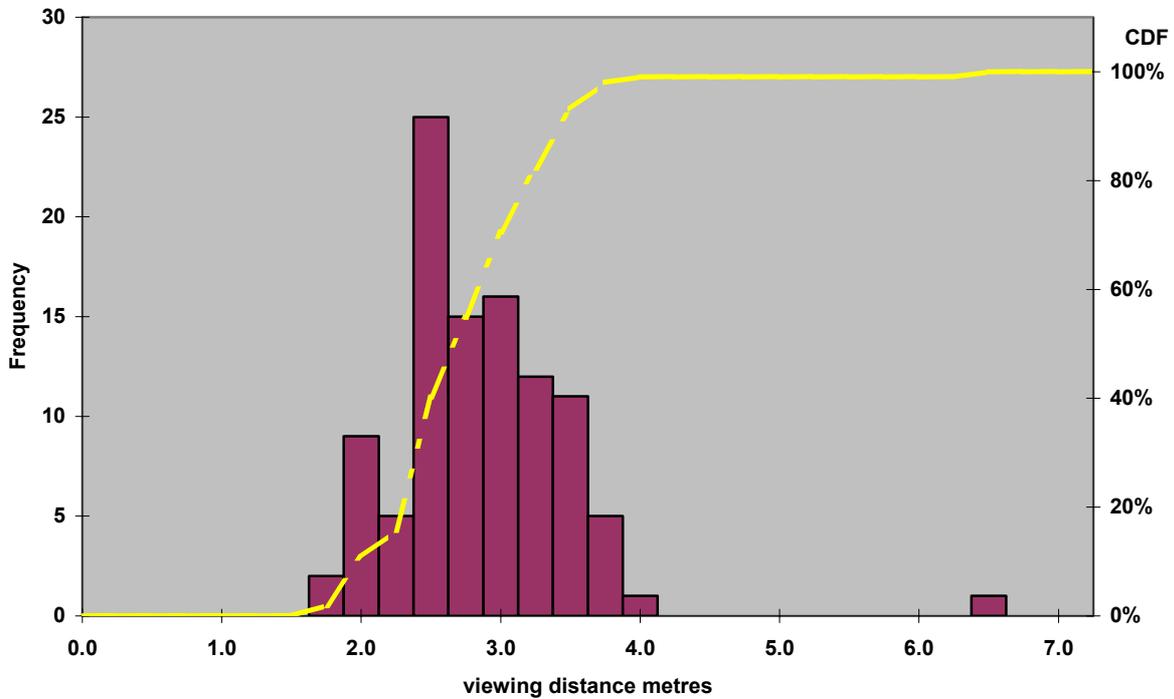


figure 1 : distribution of absolute viewing distance

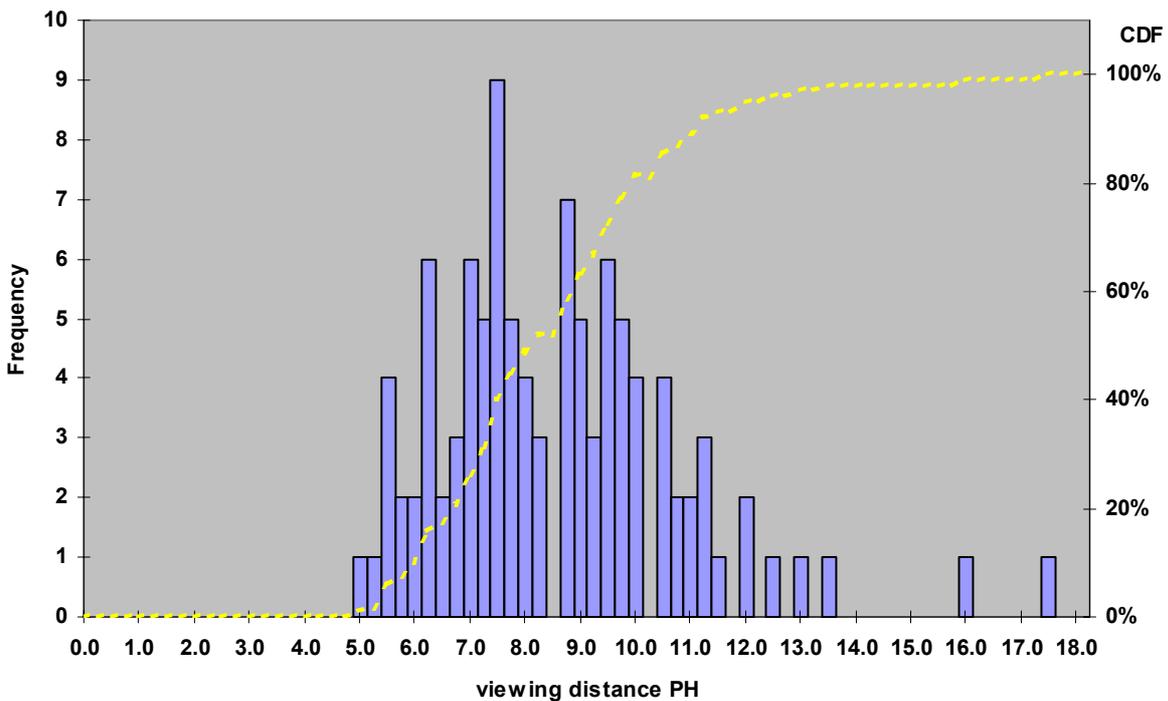


figure 2 : distribution of relative viewing distance

Figure 3 below shows the distribution of absolute picture height ¹ for all respondents.

As the gamut of actual picture size is determined in part by marketing decisions made by receiver manufacturers and by the availability of display devices of particular sizes, it is not entirely surprising that some picture heights are more probable than others. Equally the occasional absence of an instance of a particular absolute height is not thought significant given the sample size. The median for this data set is 325 mm.

The three instances of display heights greater than 500 mm are clear to see.

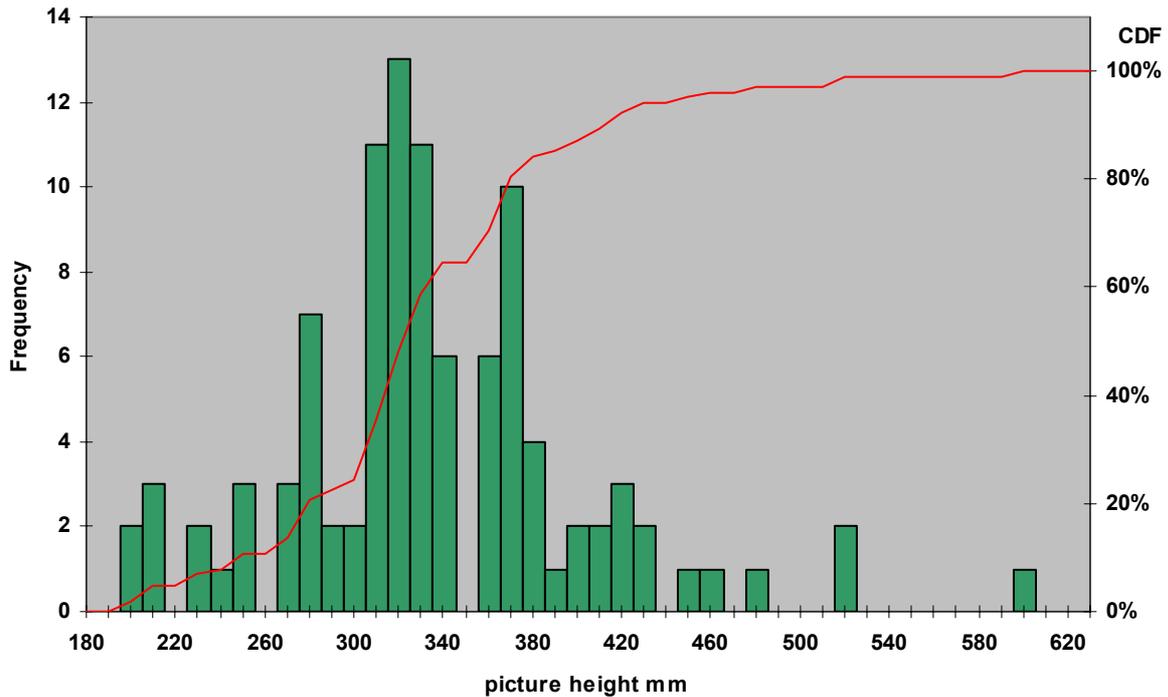


figure 3 : distribution of absolute picture height

Figure 4 overleaf summarises the statistics of the survey, showing the minimum, maximum, median and average values both for relative and for absolute viewing distance. The derived relative distance statistics are highlighted in yellow.

The table also shows the proportion of correspondents with widescreen and those who view none, one or more digital platforms.

¹ Note that our interest is in the height of the *illuminated* picture as viewed by the respondent in their preferred format – hence the wording of Q1 in the questionnaire. The diagonal size of the glass (the metric traditionally used to sell TVs) is of no particular interest particularly in a world of mixed 16:9 and 4:3 displays where, for example, those watching on a 4:3 display may have chosen to view 16:9 material in letter-box format.

If however the median height of 325mm is assumed to apply to a 16:9 display it would result in a diagonal of 663 mm (26 inches in old money).

Number of respondents	102	
minimum relative distance	4.8	PH
maximum relative distance	17.5	PH
median relative distance	8.1	PH
average relative distance	8.5	PH
minimum absolute distance	1.6	m
maximum absolute distance	6.5	m
median absolute distance	2.7	m
average absolute distance	2.7	m
number with widescreen	55	
proportion with widescreen	54%	
number with DSAT	10	
number with DTT	69	
number with DCable	14	
number without digital	18	
proportion without digital	18%	
number with digital	84	
proportion with digital	82%	
number with 2 digital platforms	7	
number with 3 digital platforms	1	
proportion with more than 1 platform	8%	

figure 4 : summary statistics from survey of hearing viewers

4 Conclusions & caveat

In this survey about 10% of the respondents watch from 6H or less and none from less than 5H. 6H might therefore still be deemed appropriate for critical viewing. For general picture evaluation and demonstration a distance of 8H seems to be appropriate being very close to the median figure of this survey.

In this survey 82% of respondents had some form of digital decoder, 54% had widescreen displays and 27% of respondents had display equipment less than 2 years old while only 38% had display equipment older than 5 years.

Whilst there is no apparent reason to question the viewing distance figures, projection of some of these results to a more general viewing public should however be done with some care. All the respondents in this survey are BBC staff and the majority have a strong technical background. The sample is thus not *necessarily* representative of a wider demographic group.

5 Reference

- [1] Tanton, N.E. & Stone, M.A. 1989 HDTV DISPLAYS : Subject effects of scanning standards and domestic picture sizes. [BBC RD Report 1989/9.](#)

BBC R&D System Design Group

Television Viewing Survey

To help us with our work we would like to know something about the way you watch TV.

Please would you take this form home and fill in the short questionnaire overleaf.

You will need a tape measure.

- The questions relate to your usual or main TV viewing environment.
Please ignore any additional sets which you may have elsewhere in the house.
- If your main TV is not widescreen but you sometimes watch widescreen digital services, please measure the picture height as if the whole screen was illuminated.
- In question 3b your preference for watching widescreen material on a 4:3 display should be one of these.



centre cut-out



letter-box



14:9

If none of these apply please tick the box labelled "other".

- In Q1 overleaf please measure the height from the lowest illuminated point in the displayed TV picture to the highest point with the picture in your preferred format eg. as below



- In Q2 please measure the distance horizontally from your face to the face of the TV display.
- If you have any questions please contact me by email or by phone.

Nick Tanton

AXXX Kingswood Warren

xxxxxx@rd.bbc.co.uk

(01) 00000

Name :
Date :
Office room number :
Telephone ext. :

Annex 1 (cont.)

1 What is the maximum height of your television picture ? mm
Please give this measurement in millimetres.

2 At what distance do you normally watch this television ? m
Please give this measurement in metres to the nearest tenth of a metre.

3a Is this television display widescreen ? YES
Please tick the applicable box. NO

3b If your answer to 3a is **NO** and you have digital TV how do you prefer to watch widescreen material ?
Please tick your strongest preference.

centre cut-out	<input type="checkbox"/>
letter-box	<input type="checkbox"/>
14:9	<input type="checkbox"/>
other	<input type="checkbox"/>

5 What is the approximate age of your main TV display ?
Please tick the applicable box.

less than 2 years	<input type="checkbox"/>
2 – 5 years	<input type="checkbox"/>
More than 5 years	<input type="checkbox"/>

6 On your main display do you watch any digital services ? NO
Please tick each applicable box.

Digital Satellite	<input type="checkbox"/>
Digital Terrestrial	<input type="checkbox"/>
Digital Cable	<input type="checkbox"/>

Thank you for taking part in this simple survey. Please return the completed form to me at room AXXX, KW.