A Macintosh and Windows program for assessing body-image disturbance using adjustable image distortion

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Body image is one of the most important concepts in the study of eating disorders. The assessment and treatment of body-image issues are considered to be integral aspects of assessment and clinical management of eating disorders (Thompson, 1996b). The program, BodyImage, is software for the assessment of body-image disturbance. It uses an image-distorting technique to estimate body size. The image of the whole body or parts of the body can be captured as a digital image by a digital camera. Response data from participants are recorded as ASCII files so that other computer programs such as spreadsheets or word processing programs can handle the data. BodyImage works on personal computers, both Macintosh and Windows. It is available at no cost, and it can be obtained from the following URL: http://homepage2.nifty.com/s_shibata/software/bodyimage.html.

Body-image disturbance is considered to be one of the most important factors in the study of eating disorders (Smeets, Smit, Panhuysen, & Ingleby, 1997), and to assess body image disturbance, various methods and techniques have been developed (Smeets et al., 1997; Thompson, 1996a). One of them is called the distorting photograph technique. The image-distorting technique displays a photograph of a distorted image of a person's body on the screen, and subjects are requested to adjust the distorted image on the screen to what they perceive to be the correct height/width proportion (Hasegawa, Hashimoto, & Sato, 1999). For this type of the procedure, we can find other examples from Allebeck, Hallberg, and Espmark's (1976) video-distorting technique and the distorting photograph technique of Garner, Garfinkel, Stancer, and Moldofsky (1976).

In the video-distorting technique, the video camera is placed in front of the subject and is focused on him or her; the image taken by the video camera is displayed on the TV monitor. With this technique, the TV monitor needs to be modified in order to allow a remote adjustment of the height/width proportions of the picture by changing the horizontal deflection of the monitor from the size-adjustment panel held in the subject's hands. With the distorting photograph technique of Garner et al. (1976), a slide photograph of the subject is used to display

the images of the subject to the subject, and the height/width proportions of the picture are manipulated by using a variable anamorphic lens. This technique uses more a general and simple apparatus than does the video-distorting technique. However, the development of the slide photograph requires much time.

The present program offers a way to assess body-image disturbance with the use of an image-distorting method that uses personal computers and that requires no special devices. It displays on the computer screen an image of a person's body part or of the whole body that is taken by a digital camera; the image is adjustable via a computer mouse or via the keyboard. Subjects' responses are recorded and stored as ASCII files. Thus, the data can be subjected to other computer programs (such as spreadsheets and statistics applications) for processing. This program was created with REALBasic and works on both Macintosh and Windows computers. REALBasic is an object-oriented BASIC compiler developed by REAL Software. Information about REALBasic is available at the following Internet address: <http://www.realsoftware.com/realbasic/index.html>.

Software Specifications

The program uses 480×640 digital images in PICT or JPEG (Macintosh) or BMP (Windows) formats. The graphic user interface (Figure 1) allows subject identification, selection of the image file, and the direction and mode of size changes that are to be presented. Either alternating or random starting sizes may be specified. The interface also permits the specification of an output file.

Algorithms of Adjusting Image Distortion

This program displays the image in the region of $640 (W) \times 320 (H)$ pixels using REALBasic's graphics class method `drawpicture()`. In this program, the parameters of

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Figure 1. Screen shot of the program.

the drawpicture() method are given as: drawpicture(picfile, 320 - dispW / 2, 0, dispW, 320, 0, 0, pictW, pictH). The displayed height of the image is fixed at 320, and the variables "pictW" and "pictH" are the width and height of the original image file in pixels. The displayed width, indicated as "dispW," is calculated with the use of the following algorithm: $\text{dispW} = (\text{distortion rate}) * \text{pictW} * (320/\text{pictH})$.

The subject can use the keyboard or the mouse to adjust the image width. When the left arrow key is pressed, the program recalculates the width of the image as $\text{dispW} = \text{dispW} - 5$; when the right arrow key is pressed, the program recalculates the width as $\text{dispW} = \text{dispW} + 5$; and when the mouse is dragged, the program recalculates the new width as $\text{dispW} = \text{dispW} - (X' - X)$. X' is x position of the pointer by pixels when the mouse button is pressed, and X is the current x position of the pointer.

Data File Format

The data file is the tab delimited ASCII file. A sample data file is illustrated in Figure 2. The first line of the data is the subject's identification and the date of the measurement. Response data in each trial are recorded from the second line. The data contains the trial number, the distortion rate of the image at the beginning of that trial, and the distortion rate of the image when the subject clicked on the "OK" or pressed the return key. The distortion rate

is calculated as (modified picture width)/(original picture width).

Conclusion

Previously used methods to evaluate bodily distortion (Allebeck et al., 1976; Garner et al., 1976) were expensive because they required specific devices to distort the image. Even the use of photographs required special images to be

Trial	Distortion Rate (Start)	Distortion Rate (End)
01	1.888	1.387
02	0.643	1.129
03	1.962	1.383
04	0.725	1.096
05	1.932	1.238
06	0.755	1.062
07	1.818	1.238
08	0.721	1.167
09	1.992	1.208
10	0.697	1.146

Figure 2. Sample record in the data file.

printed. The proposed program, BodyImage, by contrast, requires only a computer, including a portable one. The subject's own image can be easily obtained by using a digital camera. Moreover, by projecting the image through the video projector, it is possible to display the image of the subject's whole body in exact life size.

The main topic of this paper has been the introduction of new software for body-size estimation used to assess body-image disturbance. However, body-image disturbance is caused not only by the misperception of body size, it is also caused by various factors such as affective, developmental, and sociocultural aspects as Heinberg (1996) noted. Therefore, it is more desirable to use this software in combination with other test measures, such as the Multidimensional Body-Self Relations Questionnaire (Brown, Cash, & Mikulka, 1990), to assess body-image distortion in more detail. Moreover, as Thompson (1996a) has said, taking repeated measures of body image over time is helpful in providing a clearer indication of specific problems or in tracking the effects of treatment. With the use of this software, researchers can easily assess the subjects' body-image estimation periodically and see the changes in the treatment process; thus, in regard to this point, this software can be a powerful tool in the assessment and treatment of body-image disturbance.

Availability

BodyImage is a program developed by the author. Both Macintosh and Windows 95/98/NT versions of the program and the REALBasic project of the program may be downloaded from the following Internet address: [http://homepage2.nifty.com/s_shibata/softwares/body-](http://homepage2.nifty.com/s_shibata/softwares/body-image.html)

[image.html](http://homepage2.nifty.com/s_shibata/softwares/body-image.html). The programs may also be obtained as an e-mail attachment from the author at sshibata@hum.u-bunkyo.ac.jp.

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