Using Interactive 3D Software to Create Manipulatable Human Figures for Body Perception Research

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Abstract

The paper presents the use of the DAZ3D program as a measurement tool for body size perception. When studying body schema, researchers often rely on human figure comparisons to examine body size perceptions. Often these figures are two-dimensional drawings or photos of human bodies. However, human bodies are three-dimensional. Previous research has shown the advantage of using three-dimensional changeable figures in assessing body size perception (Crossley, Cornelissen, & Tovee, 2012). We chose the DAZ3D program over other options (e.g. Body Visualizer) because it allows the user to rotate the figure in space (both depth and plane), convert manipulated figure measures to real life metrics (e.g., inches or centimeters), input real life metrics to create figures, and manipulate over 50 parameters of measurement consisting of both length and circumference. The downside to DAZ3D is that is can be confusing to set-up and use. We explain how to use DAZ3D software effectively for use in body size perception research. We had participants use the DAZ3D software to represent their own body, allowing them to manipulate 17 body measurements. Our data suggests that participants can easily use the program and accurately represent their body size (their figure was compared to real life body measurements). Additionally, because DAZ3D has the ability to manipulate almost all aspects of the human figure (including parameters such as muscle mass), researchers will be able to make a more fine-grained analysis of distortions in body perception in both men and women

Introduction

In order to study body schema we identified five characteristics that our computer manipulation program would need to possess. The manipulated figure needed to be three-dimensional and have the ability to be rotated in plane and depth. We needed a program that allowed flexibility of measurement choices. These measurement choices needed to display arbitrary values to the participants, but also needed to be convertible to real world measurements.

We choose DAZ3D because of the flexibility and overall working capacity of the program compared to other options (e.g., Fantamorph, Body Visualizer). Additionally, DAZ3D gave visual and bone marker cues for real word measurement comparisons (see Figures 3, 4 and 5). Finally, DAZ3D was cost effective (important for those of us doing research on a budget). However, getting DAZ3D into a state where an avatar can be readily manipulated was a challenge. Thus, we have made a step-by-step guide to a working human avatar (please use the QR Code above to download a full step-by-step guide to installation

Guide to Installation

Go to http://www.daz3d.com/get_studio to download both the *DAZ Install Manager* and the *DAZ Studio 4.9 Pro*.
You will need to install the *Install Manager* before downloading *DAZ Studio Pro*, as the Studio is installed through the manager

Add plugins from the following links
http://www.daz3d.com/measure-metrics-for-daz-studio
http://www.daz3d.com/genesis-2-female-body-morphs

Activate the plugins
Go to https://www.daz3d.com/customer/account/
Select "*Serial Numbers"*. Copy the serial code next to Measure Metrics
Open DAZ3D and click the help tab, select "about installed plugins".
Paste the serial code for Measure Metrics in to the box with the grey wrench.

Once we created the avatar, we needed to test ease of use by participants and how well participants used the program to estimate their own body size.

Methods

Participants
•30 undergraduate women at Linfield College with varied body size (smallest waist circumference 24.5 in, largest was 48 in, mean 32.6).
Materials
•Genesis 2 Female Body Morphs plugin for DAZ3D.
•Measure Metrics plugin for DAZ3D.

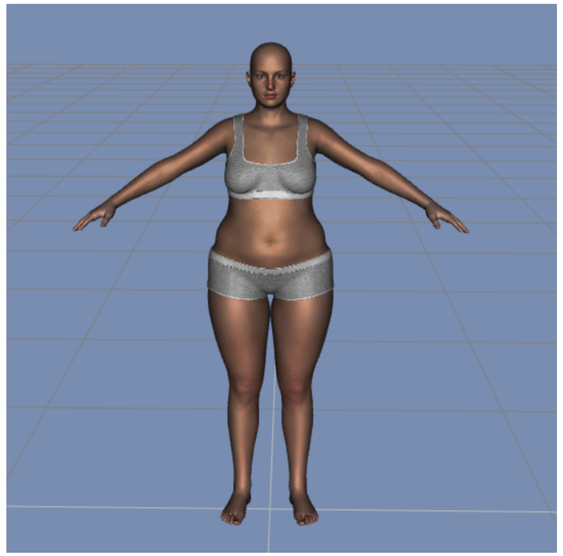

Figure 1. Starting figure for experiment. Body size based on CDC average female weight and height

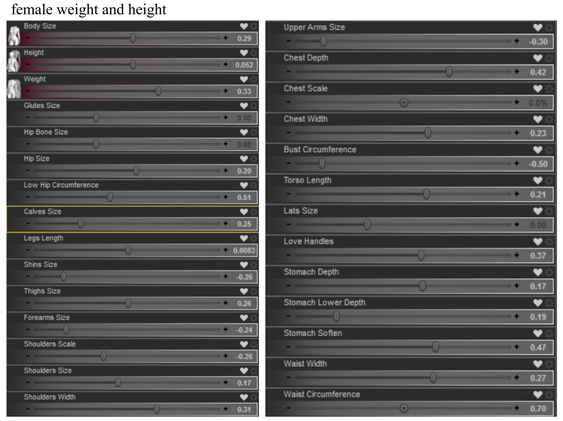

Figure 2.. Parameters participants could manipulate using an arbitrary scale of measurement.

Methods Cont.

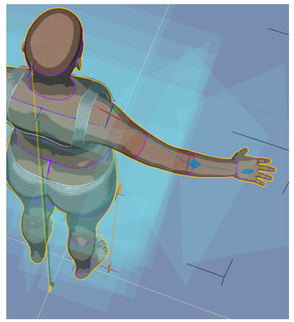

Figure 3. Example of length measurement.

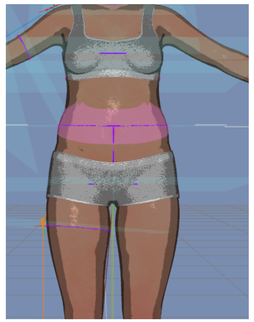

Figure 4. Example of circumference measurement.

Procedures

- Participants were presented with Figure 1 as a starting point.
- Participants were asked to manipulate the figure into the best representation of themselves.
- Participants were able to use parameters from Figure 2 for manipulation of Figure 1.
- Participants had real world measurements taken, using the same measurements as those seen in Figures 3, 4, and 5.
- The figure manipulated by participants then had manipulated parameters converted to real life figures via Measure Metrics, as seen in Figure 6.
- Ratios were calculated between DAZ measures and real-life measures, as seen in Table 1

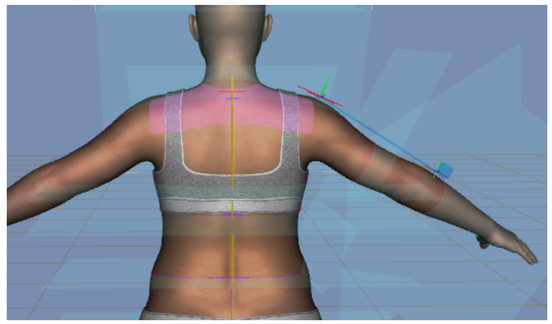

Figure 5. Shoulder to shoulder measurement, showing bone markers used for measurement allowing real measurements to mimic those taken in program.

Results

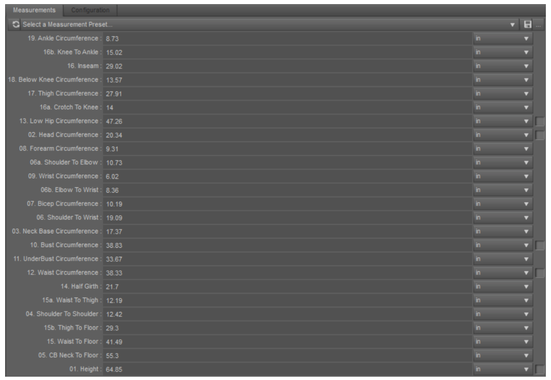

Figure 6. Measurements converted to real life figures from arbitrary DAZ measurements.

Table 1
Mean ratio of DAZ3D converted metric to real life measurement (DAZ3D/real life). Numbers less than 1 indicate underestimate of body size.

SS	BIC	BUC	UBUC	WaiC	LHC	HiPF	ThC	CalfC	NF
.81	.95	.94	.89	.92	.96	1.07	1.07	.85	.96

Note: SS = should to shoulder, BIC = Bicep circumference, BUC = Bust circumference, UBUC = under bust circumference, WaiC = waist circumference, LHC = lower hip circumference, HiPF = hip to floor, ThC = thigh circumference, CalfC = calf circumference, NF = neck to floor

Conclusions

- DAZ3D was able to create a manipulatable figure that was easy to use by participants.
- The ratio data suggests that the participants are good at estimating body size and do so in a way consistent with other research.
- DAZ3D can be modified to look more like your population. It is easy to change body size, and other features such as skin color, hair color, muscle tone, and clothing.
- With guidance, non-programmers can easily set-up and use DAZ3D in their research
- DAZ3D avatars should give researchers a tool to allow a more detailed analysis of body distortion.