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

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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. Digital human figures are two-dimensional drawings or photos of human bodies. However, human bodies are three-dimensional. With guidance, non-programmers can easily set-up and use DAZ3D in a way consistent with other research.

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., Fantomorph, Body Visualizer). Additionally, DAZ3D gave visual and bone marker cues for real-life measurements. The downside to DAZ3D is that it can be confusing to set-up and use. We needed a way to DAZ3D software in a way that is intuitive and easy to use. DAZ3D gives visual and bone marker cues for real measurements. We had participants use the DAZ3D software to display their own body, allowing them to manipulate a 3D avatar to resemble their own body size.

Participants
• 30 undergraduate women at Linfield College with varied body size

Materials
• Genesis 2 Female Body Morphs plugin for DAZ3D.
• Measure Metrics plugin for DAZ3D.

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.

Results

Table 1

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Mean DAZ3D to Real Life Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS</td>
<td>.81</td>
</tr>
<tr>
<td>BIC</td>
<td>.95</td>
</tr>
<tr>
<td>BUC</td>
<td>.92</td>
</tr>
<tr>
<td>UBUC</td>
<td>.92</td>
</tr>
<tr>
<td>WaiC</td>
<td>.96</td>
</tr>
<tr>
<td>HiPF</td>
<td>1.07</td>
</tr>
<tr>
<td>ThC</td>
<td>1.07</td>
</tr>
<tr>
<td>NF</td>
<td>.96</td>
</tr>
</tbody>
</table>

Note: SS = shoulder to shoulder, BIC = Bicep circumference, BUC = Bicep circumference, UBUC = under bust circumference, WaiC = waist circumference, HiPF = hip to floor, ThC = thigh circumference, CaliC = 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.