

# Dietary Environment Assessed Using Visual Measurements of Different Seated Wheelchair Postures

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## Purpose

The present study aimed to examine the visual information obtained from different postural angles to elucidate the amount of information obtained through the line-of-sight from a wheelchair in a dietary environment.

## Methods

**Measuring device** The line-of-sight was measured : The Eye Tracking System EMR-8B (NAC Image Technology, Tokyo, Japan; hereinafter, EMR). < Fig.1 >  
Non-invasive device weighing 250 g.

The line-of-sight positions of images in the user's visual field from a relative distance between the position of near-infrared illumination corneal reflection and the central pupil position.

We used a visual field camera at a horizontal angle of 92° , with a data sampling rate of 29.96 Hz and data resolution at a viewing angle of 0.1° .



Fig.1 : Experimental system

## Procedure

7 pelvic inclination angle patterns (0° ,5° ,10° ,15° ,20° ,25° ,and 30° ) were examined while subjects were seated in a wheelchair. .

The visual information from 1 min in the middle of the 3-min measurement period was used to analyze the line-of-sight.

## Analysis

The height of line-of-sight was examined from the following 2 points taken from the recorded images: the **distance from the corner of the eye to the meal** and **the vertical height of the table**. < Fig.2 >

Using an angle of 0° as a basic value, we used the Friedman test and Wilcoxon signed-rank test to examine the values between each postural angle.

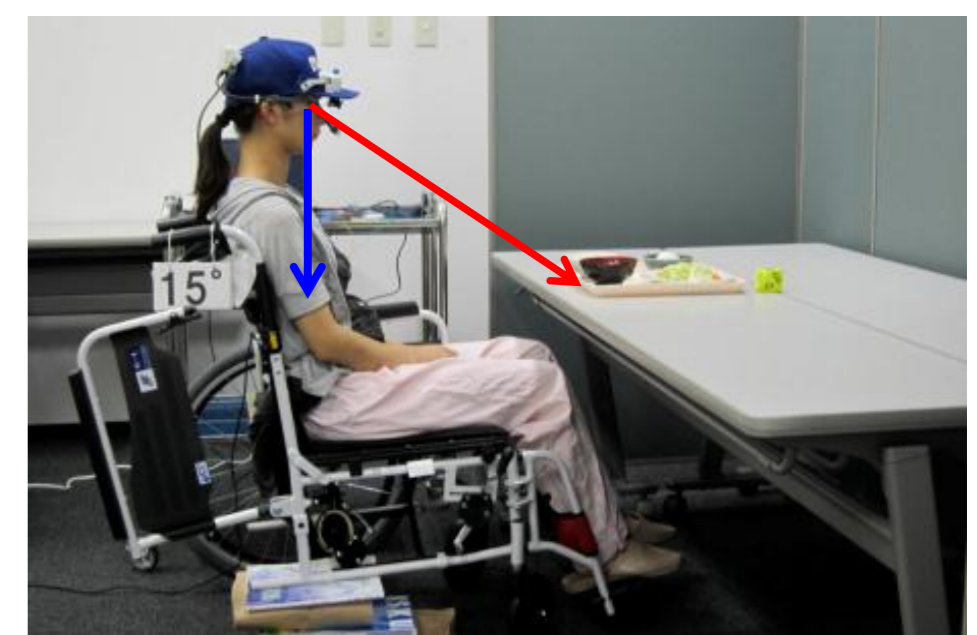


Fig.2: Experimental environment

## Results

**participants** 13 healthy adult women with no lower back pain and no visual function abnormalities.  
All female. Mean age 23 ± 6 yrs.

### line-of-sight measurements

- The time spent gazing at things other than the meal.  
⇒ no significant differences between the postural angles
- The height of the line-of-sight  
⇒ significant differences between the angles (p<0.000).  
When a pelvic inclination angle of 0° was compared with the other angles, significant differences were seen at angles of 10° , 20° , 25° , and 30° , and the line-of-sight increased with each increase in angle (p<0.05). < Fig.3•4 >

### The distance from the corner of the eye to the meal

- Significant differences between the postural angles (p<0.00).
- angles of 20° , 25° , and 30° , compared with the inclination angle of 0° (p<0.05).

### The vertical height of the table

- Significant differences between the postural angles (p<0.001).
- With differences noted at inclination angles of 10–30° when compared with an inclination angle of 0° (p<0.05).

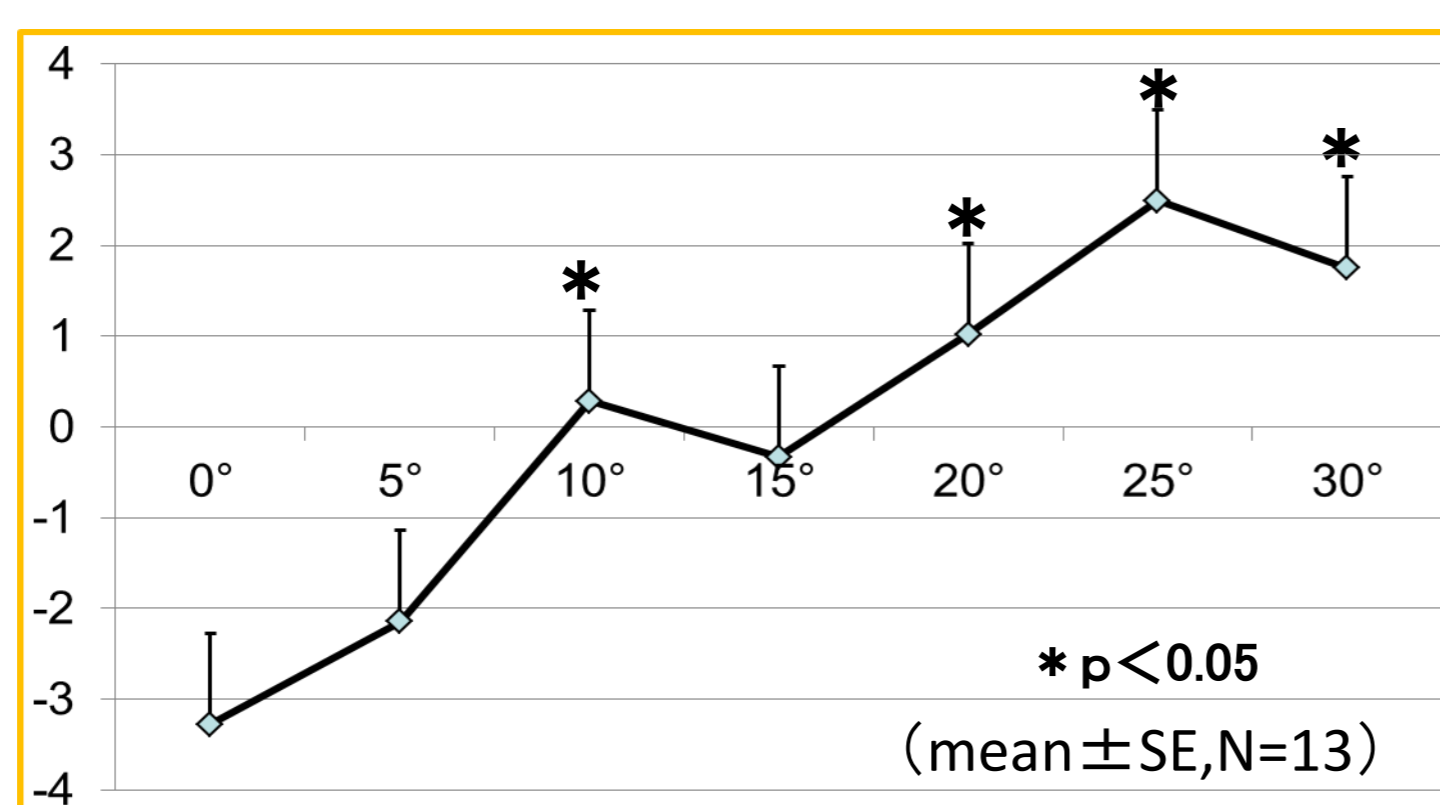


Fig.3: Position of the line-of-sight angle of attitude

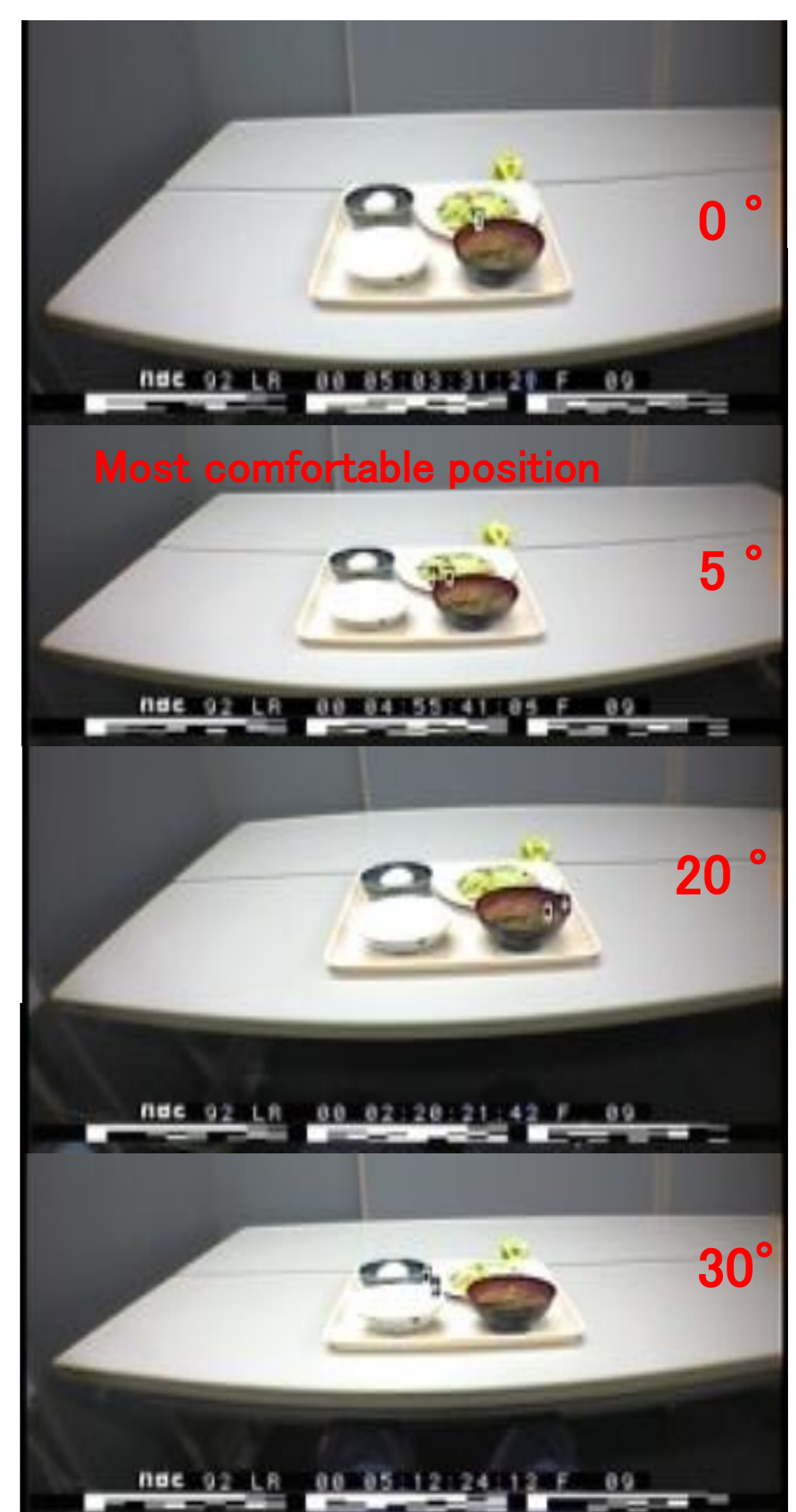


Fig.4: Visual-field image of the attitude angle

## Discussion

Dietary intake is a basic criterion for maintaining quality of life. The visual field images obtained from the EMR showed that the distances from which the side dishes (egg, stir-fried vegetables) on the far side of the meal tray were perceived lengthened with the increased pelvic backward inclination angle, suggesting that meal contents that are placed at a greater distance are not perceived 3-dimensionally, but as a planar image. Therefore, the dietary environment should be examined in terms of the table height and the meal placement at which the colors and shapes of foods can be visually perceived to enhance appetite while considering an individuals' posture.

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