

Kinematic characteristics of daily gait patterns perceived as beautiful by third parties

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Summary

This study analyzed the kinematic features of daily gaits perceived as beautiful. Using markerless motion capture, the walking motions of 50 healthy adults were recorded and rated for aesthetic appeal through a questionnaire. The data revealed seven key characteristics of beautiful gait, such as long cycle time, narrow step width, large arm swing, and minimal knee flexion during the double limb support phase.

Introduction

The study explored the concept of a "beautiful gait," focusing on daily walking rather than specialized movements like ballet [1]. Previous studies on gait largely emphasized functionality or pathology [2], leaving aesthetic attributes less understood. The research aimed to identify characteristics of visually appealing gaits as rated by third-party observers.

Methods

Participants and Data Collection

Fifty healthy adults walked at a self-selected speed on a flat surface. Their movements were recorded using a 10-camera markerless motion capture system. Animations were created from sagittal and frontal views, isolating gait movements from visual distractions such as clothing or physical appearance.

Gait Evaluation

Aesthetic evaluations were conducted by 166 (sagittal view) and 175 (frontal view) raters, using a four-point Likert scale. Based on the ratings, gaits were grouped into four categories: Group A (most beautiful) through Group D (least beautiful). Statistical comparisons of spatiotemporal parameters were performed among groups.

Results and Discussion

The aesthetic evaluations and subsequent analyses highlighted several key characteristics associated with beautiful gaits:

1. Long Cycle Time and Double Limb Support Time: Group A, rated as the most beautiful, had significantly longer cycle times and double limb support durations compared to other groups (Figure 1). These features reflect a smooth, controlled gait that emphasizes stability and grace. Due to the extended double limb support time might lead to reduce knee flexion.
2. Narrow Step Width: The step width in Group A was significantly smaller than in other groups, with an average of 4.57 cm. Narrower step widths likely contribute to a more streamlined and cohesive appearance, enhancing visual appeal.

3. Large Arm Swing: Participants in Group A exhibited larger arm swings, particularly in the sagittal plane, with minimal lateral separation from the body. This movement is known to improve gait efficiency and coordination, contributing to a balanced and graceful impression.
4. Alignment of Hands and Feet with the Body's Axis: Beautiful gaits featured hands and feet moving closer to the body's central axis. This alignment creates symmetry and reduces unnecessary lateral movement, which may appear more visually cohesive.
5. Neutral or Posterior Trunk Tilt: The trunk in Group A was maintained in a neutral or slightly posterior tilt throughout the gait cycle. This posture may help reduce impact forces on the leading leg and promote an upright, poised appearance.
6. Reduced Knee Flexion: During double limb support, Group A demonstrated minimal knee flexion, maintaining extended legs. This characteristic enhances the impression of stability and smooth motion, as excessive knee flexion can appear abrupt or inefficient.

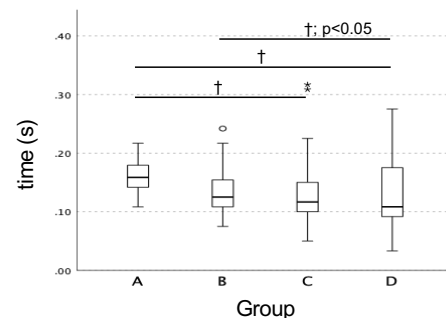


Figure 1: double limb support time

Conclusions

This study identified seven kinematic traits of beautiful gait. The findings have implications for fashion, rehabilitation, and robotics, offering insights into designing movements or devices that emulate beautiful gait characteristics. Future research could explore cultural and psychological factors influencing aesthetic perception, expanding the understanding of beauty in human movement.

References

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