

Using Biomechanics

Packaging

Biomechanics

Ergonomic Data

Inclusive Design

Generating Design-relevant Biomechanical Data

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The Investigation

Objectives

- Investigate the various grip styles and hand postures used while opening 6 types of packaging through an observational study
- Conduct a comprehensive biomechanical analysis of the forces, moments and joint angles used by older adults during package opening, and compare them with a control group
- Enhance the body of knowledge surrounding older adults hand and upper limb abilities and inabilities

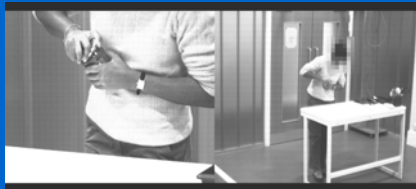


Figure 1



Figure 2



Figure 3

Plan

The observational study will be conducted in a laboratory with a standard height kitchen work surface using 2 cameras; one capturing the subject's whole body posture, the other capturing their precise hand movements (figure 1).

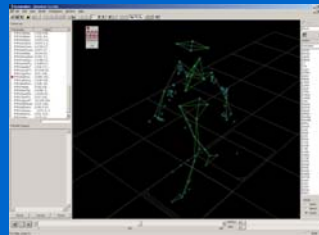


Figure 4

The biomechanical testing will be conducted in a biomechanics testing suite using an 8-Camera Vicon Motion Analysis System. The individual subjects will wear a series of reflective markers (figure 2 – Fowler & Nicol) and be asked to perform a series of package opening tasks. The 8 cameras (figure 3) will record the motion of the reflective markers while the instrumented packaging will simultaneously record the forces applied by each individual finger.

Following the subject testing the results will be analysed using Vicon Bodybuilder software (figure 4 – example of output) which will generate precise data on the various forces exerted, joint angles used and moments caused at the various hand and finger joints.

Potential Benefits

For older people

It is intended that the work should not only lead to improved packaging design, but also to the broader use of biomechanical data for the design of inclusive products which reflect the abilities of the older adult.

For society

By introducing the use of biomechanical data to designers, this work aims to provide designers with a new tool to facilitate an enhanced understanding of human abilities, allowing more user-centred design.

Resources

- Labview + 2 x IEEE 1394 Cameras
- 8-Camera Vicon Motion Analysis System
- Vicon BodyBuilder Software
- Custom Instrumented Packaging
- Hand strength and dexterity testing equipment

References

Fowler, N. K. & Nicol, A. C. (1999) Measurement of external three-dimensional interphalangeal loads applied during activities of daily living. *Clinical Biomechanics*, 14, 646-652.



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