

3D scans make Chinese helmets fit properly

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Asian users experience poor fit in products used on the head, like helmets. The reason is that designers only use data from Western heads. To solve this problem, product designer and researcher Roger Ball set up the award winning SizeChina project, in which 2000 Chinese heads were scanned. On Tuesday May 17th he defends his PhD-thesis on this subject at the Delft University of Technology.

Over the past twenty years, Canadian Roger Ball has been a leading force in the world of international top selling sports products. As a co-founder of Paradox Design in Canada in 1987, he created high performance sports products for clients such as Nike, Fisher-Price and Burton Snowboards. Ball has extensive experience in anthropometrics, manufacturing, testing and safety standards for sports headgear.

Ball currently serves at the Hong Kong Polytechnic University as an Associate Professor in the School of Design. Ball describes the background of the SizeChina research project: "The design of consumer products that are worn on the head relies on accurate information describing the shape and size of the human head and face. Studies that provide simple data (such as single numbers for head length, head width and circumference) show differences between Asian and Western head shapes, but the information that is available to designers, has traditionally only been based on Western data."

"As a result, Asian users have often experienced poor fit in products used on the head. In addition, the geometry of the head is complex, making traditional data unsatisfactory as a description for its form, as it

typically includes only numerical values for head length, head width and circumference."

"Proper fit is not just an issue of comfort. A motorcycle helmet that does not fit well, also puts its wearer at risk of serious injury or death. Designers need accurate 3D information to create products that fit the Asian/Chinese head properly."

This information has recently become within reach with the application of digital 3D scanning methods to anthropometric research. To meet the need for accurate high resolution data, Ball set up the successful SizeChina project. It created a survey to gather specialized 3D head scans using a head scanner.

Adult subjects, equally male and female, were recruited from three age groups (18-30, 31-50, 51-70+) to provide a statistically significant cross section of the adult Chinese population. SizeChina collected 2000 high resolution 3D head and face scans from subjects in six provinces across mainland [China](#).

"Statistical comparisons of the 3D scan data with another survey (CAESAr) confirm that there is a significant morphological difference between the shape of the Western head and the shape of the Chinese head", says Ball. The comparison shows that Chinese heads can be generally characterized as rounder than their western counterparts with a flatter back and forehead.

The study shows that headgear designed using Western head shape are not appropriate for the Chinese [head](#). The research outcomes of the project have generated specific data aimed at solving the problem of 'Asian fit' in commercial headwear products.

Provided by Delft University of Technology

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