Meta-perceptual Helmets for the Dead Zoo

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Mentored by Dr. Sally Duensing

In collaboration with the National Museum of Ireland

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Is the act of "looking" passive or active?

According to Prof. Kevin O'Regan of the Vision Lab at University Paris Descartes, looking is one of our most engaged activities, bringing into play huge cognitive reserves for the construction of visual models to comprehend and analyse our surroundings. Our eyes are highly complex machines, perfectly placed to allow us to understand a 3 dimensional world, to calculate size and distance or deduce invaluable information from a scene.

So looking is a very active activity. Does the institution attempt to de-activate it? The focus of our work for many years has been this question, when we are in a museum, looking at art, or history, what is our role, how active should we be?

We asked ourselves, if we see differently, under different viewing conditions, how would that affect our perception? The Irish Museum gave us the opportunity to think about the Dead Zoo, and building on our work on visual perception we devised the project "Meta-perceptual Headsets".

Animal eyes gave us our first inspiration: the Hammerhead Shark's widely placed eyes give him 'hyperstereo' vision; a chameleon can look backwards with one eye and forwards with the other, while a horse's 350° vision helps him keep a really good eye out for predators. Our project involves the construction of 6 perceptual helmets that replicate or refer to animal vision, and make these available to visitors to the Dead Zoo, as part of the experience of visiting the Museum.

The visitor, while trying the helmets, perceives the space and exhibits differently, but also becomes part of the strange and wonderful museum-scape that is the Dead Zoo: they become exhibits. This magnificent space, packed with stuffed animals, skeletons, jars and cabinets, is one of the finest examples of a Victorian display space. The headsets—combining animal references with optical arrangements reminiscent of 19th Century optical devices (Charles Wheatstone 1802-1875; George Stratton 1865-1957)—complement this magical universe, adding a living element to the perfectly still display.

The project will involve a period of research and development in association the National Museum of Ireland, and with Dr. Sally Duensing, our mentor since 2010. The National Museum will allow us access to their extensive collections and archives and provide exhibition support. This research period will culminate in the detail design, fabrication and exhibition of the helmets, which will be exhibited in the Dead Zoo for a six-month period, facilitating public access to the project through a wide communication campaign.

Creating work for such a venerable public institution is an extraordinary opportunity for us, allowing us to build on ideas that have been central to our work for so long: free and democratic access to culture; cross-disciplinary creativity recognizing the value of scientific knowledge as an inspiration for art and establishing the role of the spectator in the spectacle of art.

Anne Cleary May 2013

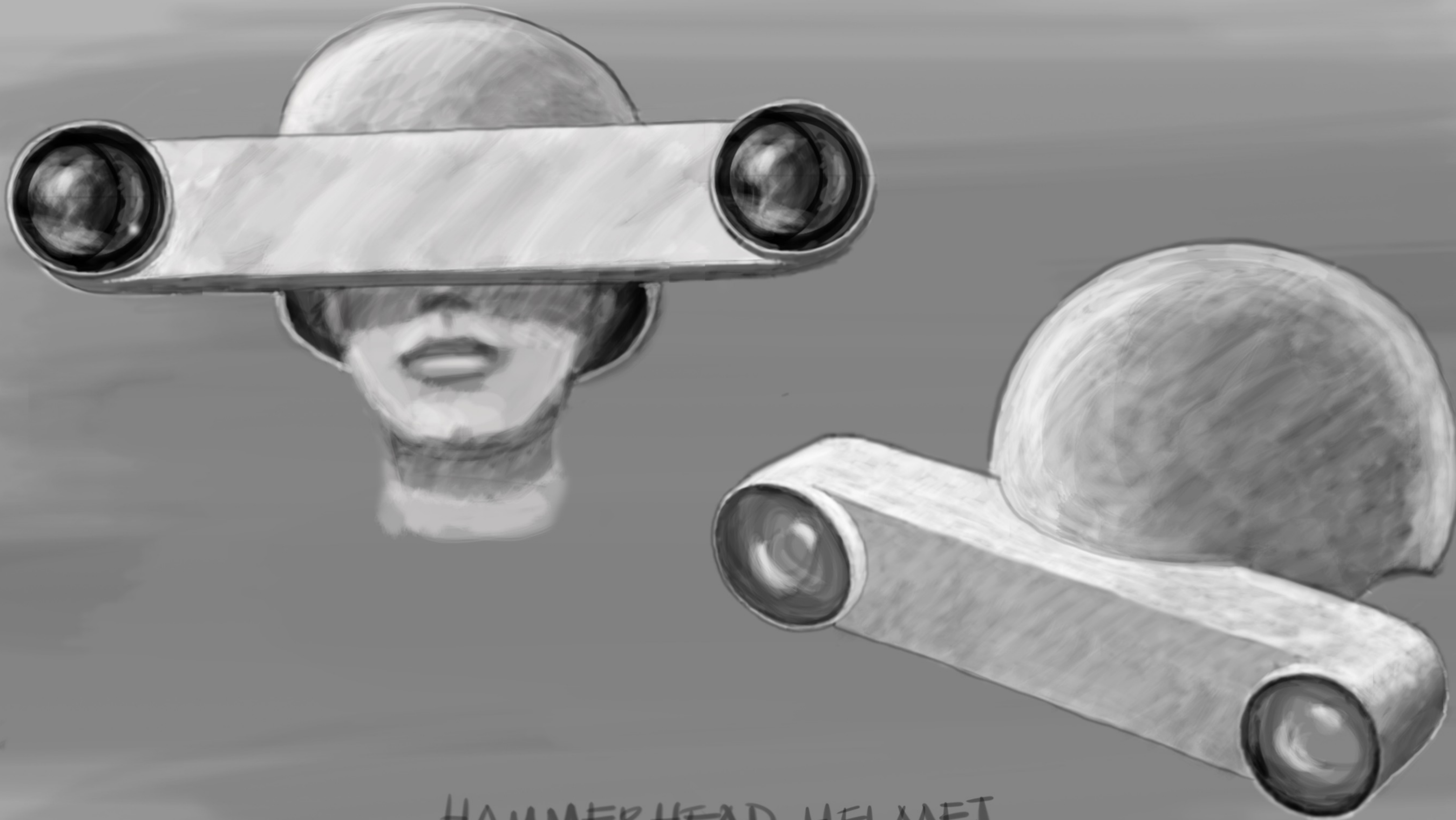
… *in the Dead Zoo*

We are developing this project for the Natural History Museum of Ireland, known affectionately as the ‘Dead Zoo’, a preserved zoological collection that, like the building itself, dates from the 19th Century, a familiar and well-loved piece of Dublin’s Victorian legacy, a sort of ‘museum of a museum’. Our hope is that the meta-perceptual experience will complement this strange and familiar historical environment.

“I made a hyperstereoscope, using a cardboard tube about a yard long with four little mirrors. With this I could turn myself, in effect, into a creature with eyes a yard apart. I could look through the hyperstereoscope at a very distant object, like the dome of St. Paul’s Cathedral, which normally appeared as a flat semicircle on the horizon, and see it in its full rotundity, projecting towards me.”
Oliver Sacks. The Mind’s Eye (2010).

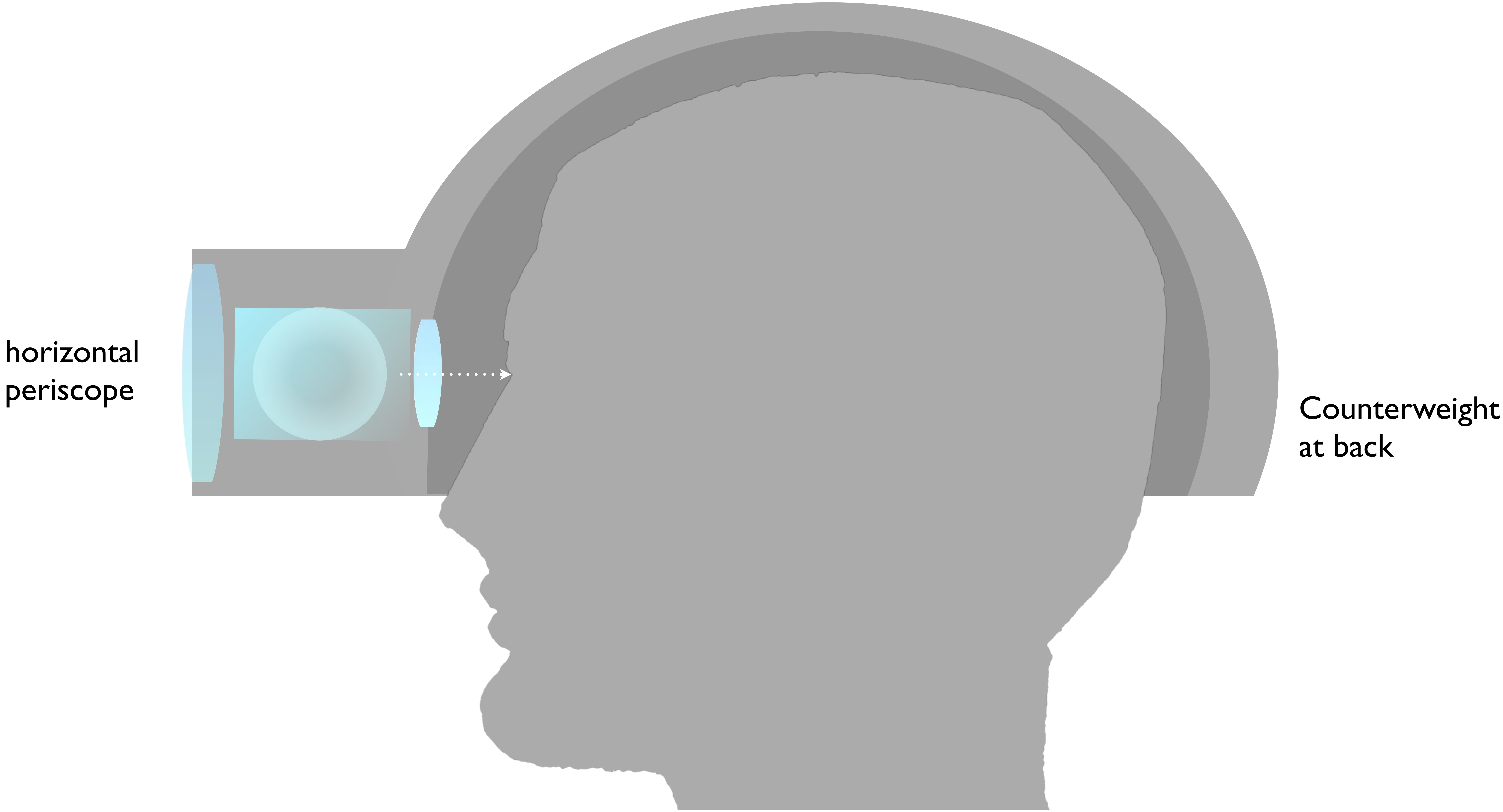
Hammerhead Helmet

The distance between our eyes - between 6 and 7 centimetres - allowing us to make fine depth perception in our immediate environment - up to around 5 to 7 metres. Beyond this we see the world as flat. We can assume that this was all we needed to survive as a forest-bound hunter-gatherer, but the modern world offers us a feast of visual information beyond our intimate environment. If the distance between our eyes was greater, would our perception of depth extend into the world proportionally?



HAMMERHEAD HELMET

Hammerhead Helmet Plan



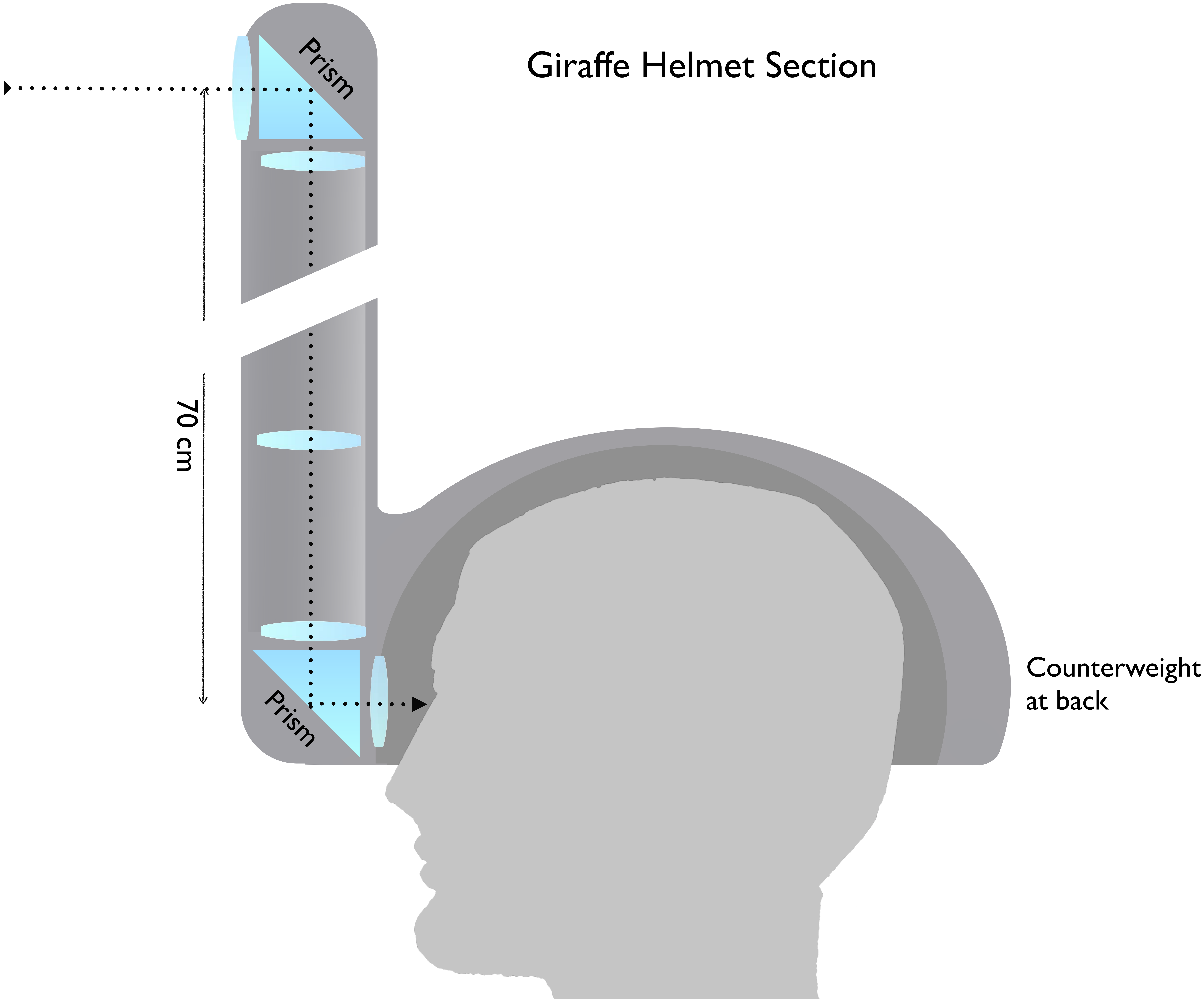
Hammerhead Helmet Section

Giraffe-Helmet

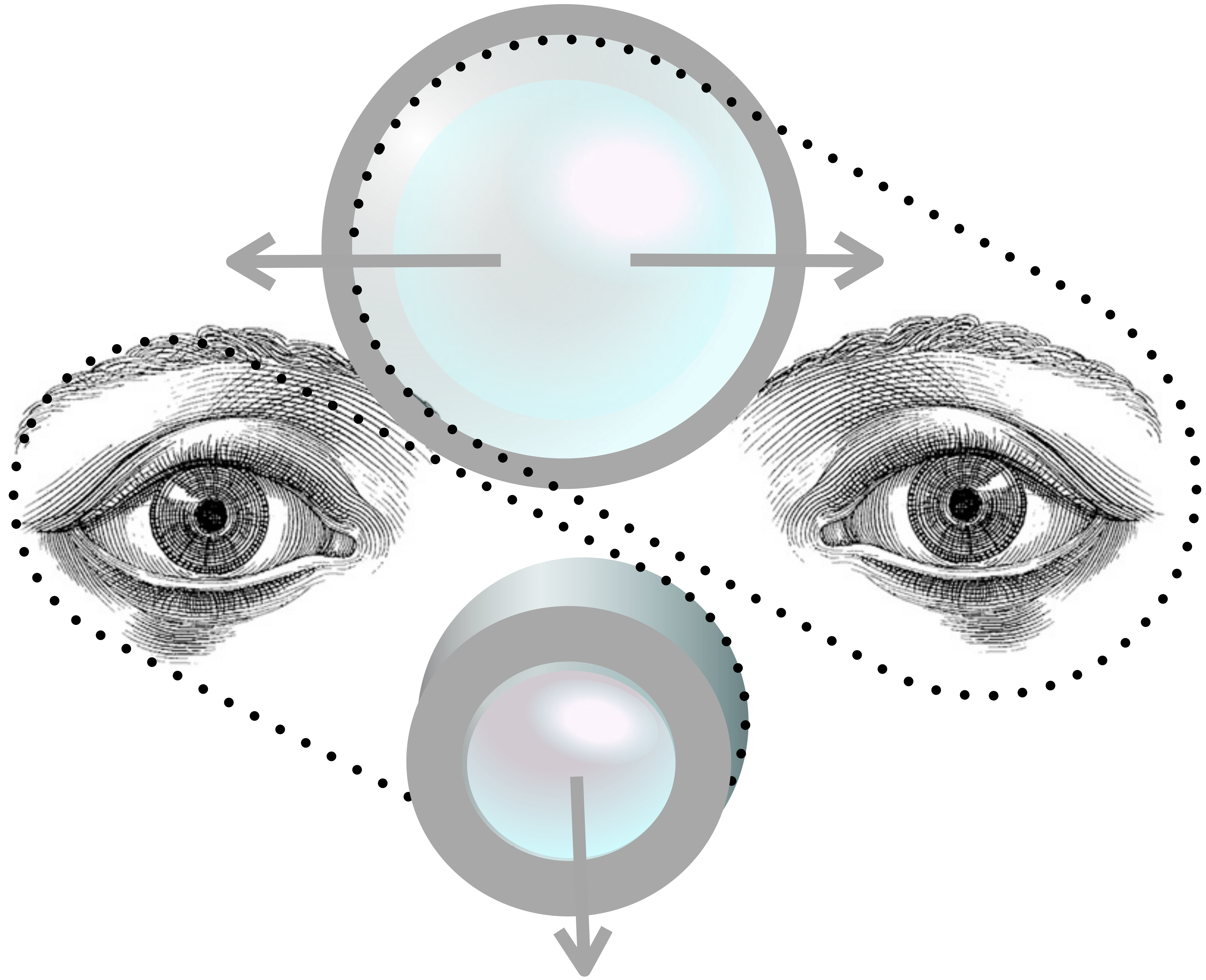
Anyone who has ever worn a pair of platform shoes knows what a few inches of extra height can do to change your perspective on the world.

This helmet - the simplest and least aggressive of the series - will help point out the strong dependance of our senses on our bodily disposition. The modification of the height of our eyes - leaving our frontal stereo-vision otherwise intact - may transform our sensorimotor perception of the world more than we would expect, especially in a human-designed world that assumes we are all between 1.5 and 2 metres tall…

Giraffe Helmet Section



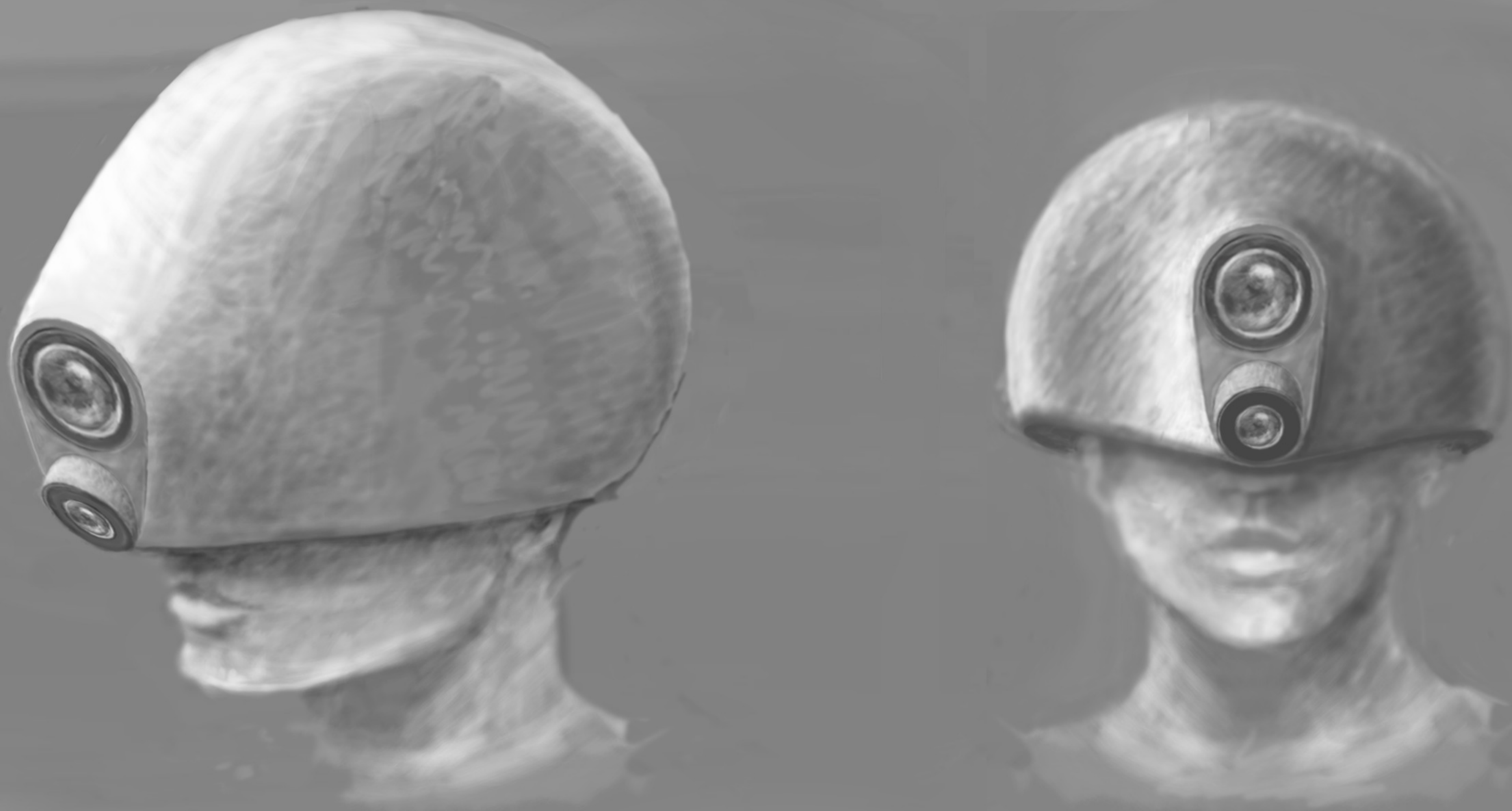

GIRAFFE
HELMET



Cyclops-Helmet

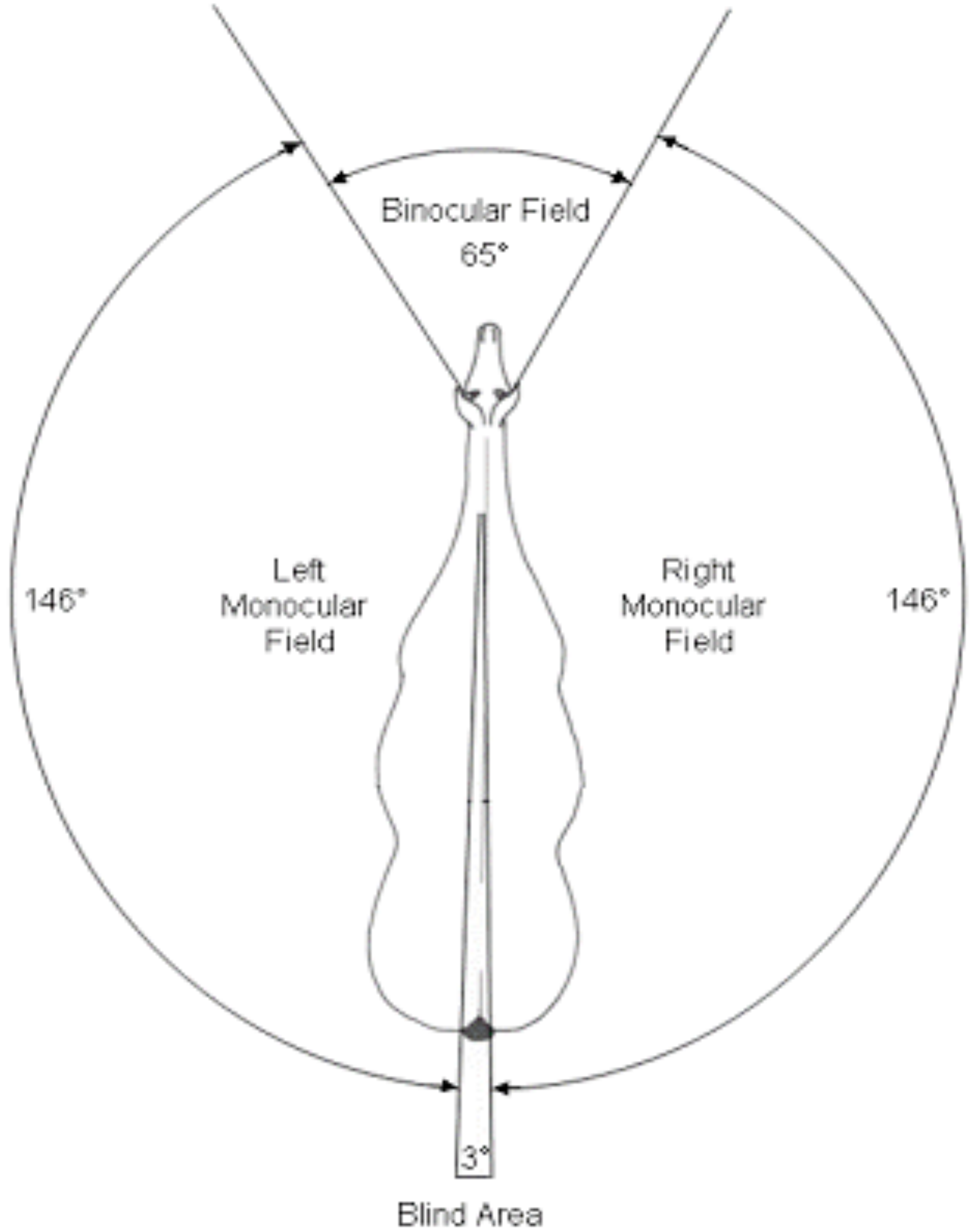
The advent of bi-focal lenses in eye-glasses poses an intriguing question: what if this was how we used our two eyes? What if one eye was free to survey the general environment, while the other focuses downwards and close-up for reading and precise work?

Binocular vision needs two identical eyes which move and focus together. Their horizontal arrangement - about 6 centimetres apart - gives us a sense of depth (stereopsis) in our immediate environment as well as a wider horizontal field of view. But, in the modern world, are these advantages essential? If we could chose an alternative ocular arrangement, wouldn't this bifocal setup be more 'modern'?



CYCLOPS HELMET

Cyclops-Helmet Section

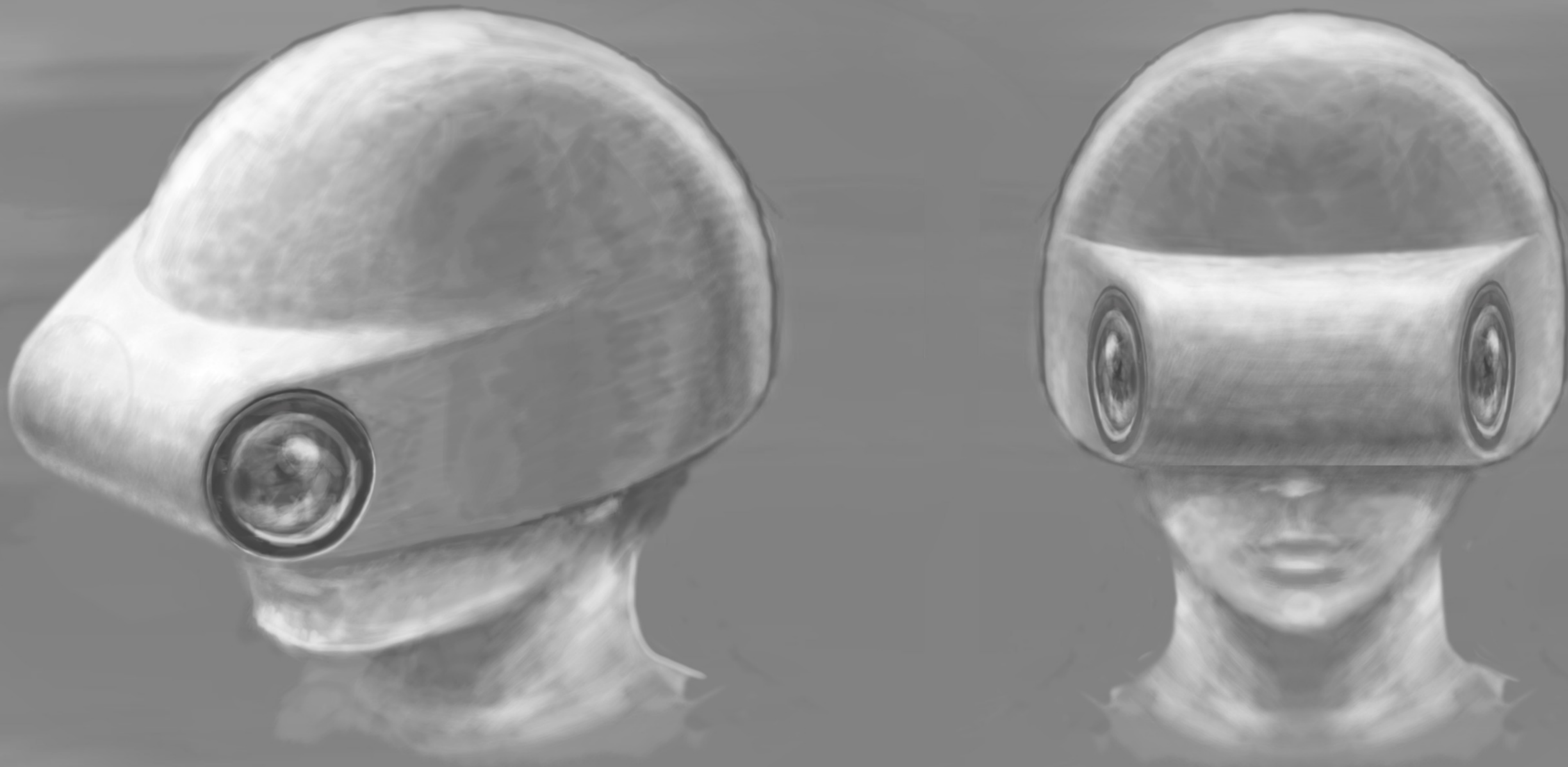


Horse Helmet

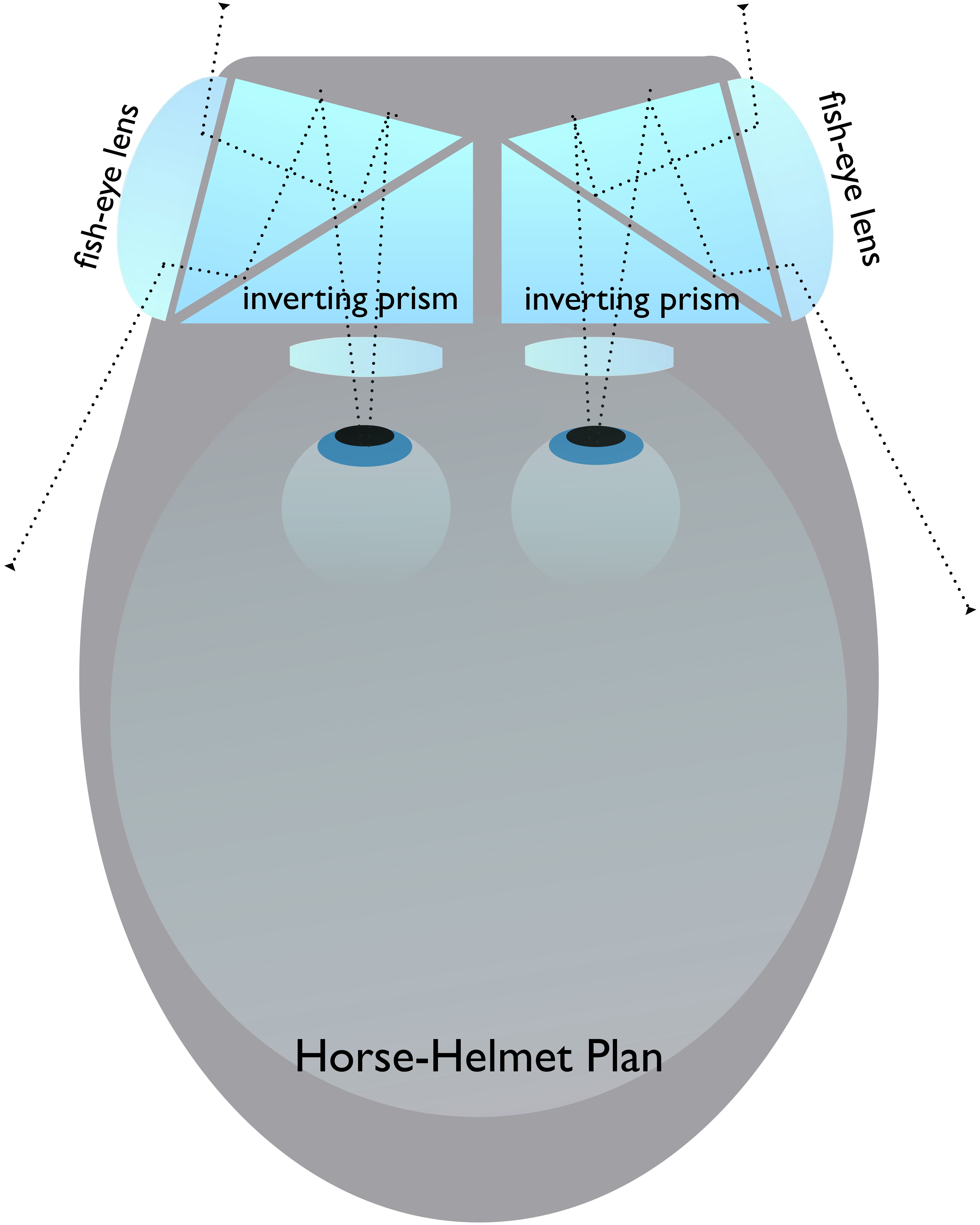
The equine eye is the largest of any land mammal.

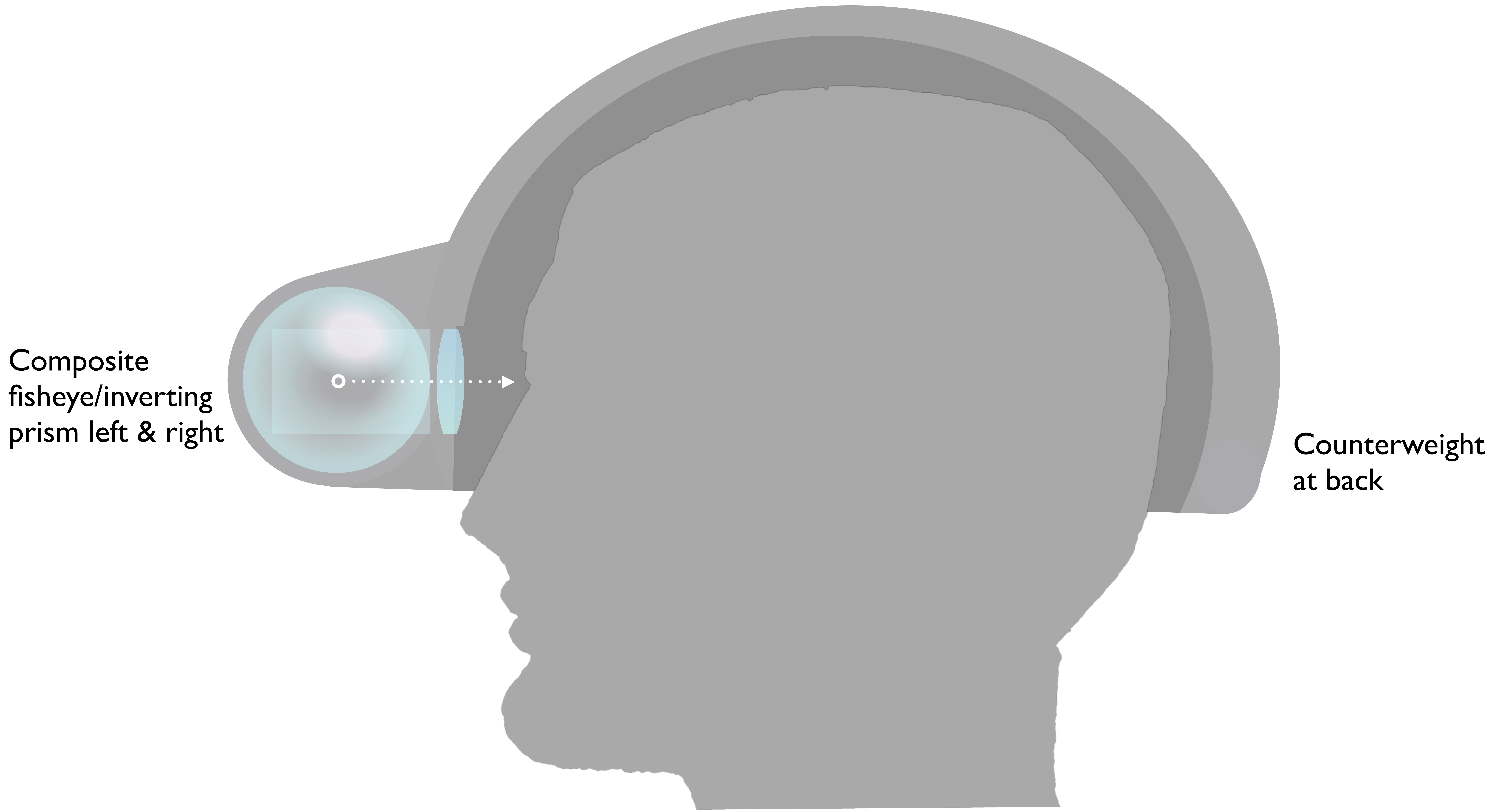
The position (lateral) and constitution (wide-angled) of a horses eyes give them a large peripheral vision - almost 350° - with little binocular vision since left and right eye have almost no overlap (in fact the horse has a blind-spot in front of its forehead).

Could a human adapt to such a vision of the world? The transformation of our visual field would be radical: we would be abandonning the singleness of vision offered by our front-set eyes, and with it the stereopsis that gives our vision its depth. But the panoramic vision of equine eyes would offer us a generous and global perspective of the world we are moving through. It would render unnecessary the continuous head-turning, darting glances and 'saccades' that we use to scan our environment and, we might assume, allow us a calmer perceptive experience.

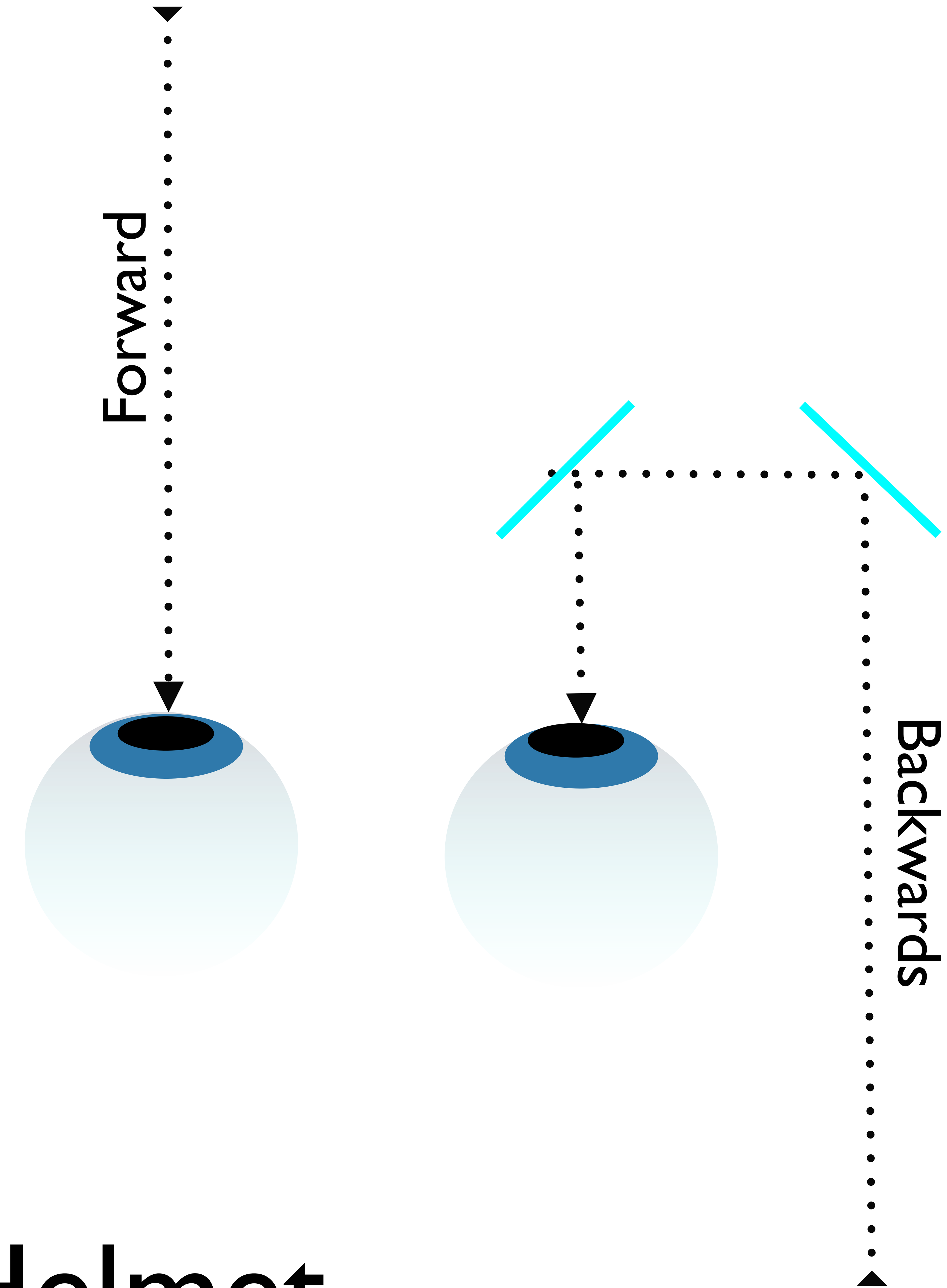


HORSEHEAD-HELMET


fish-eye lens
fish-eye lens
inverting prism
inverting prism
Horse-Helmet Plan



Horse-Helmet Section

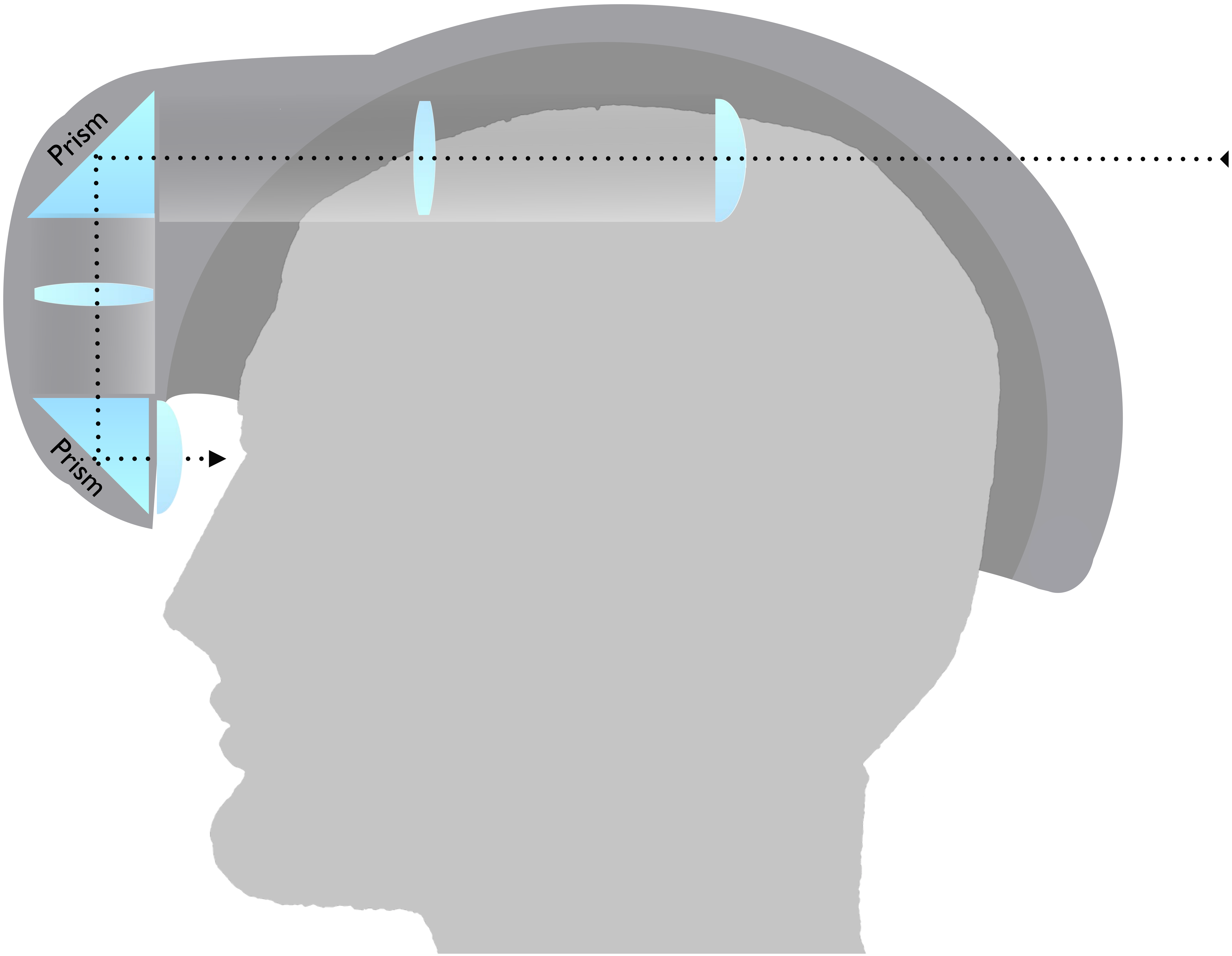


Chameleon-Helmet

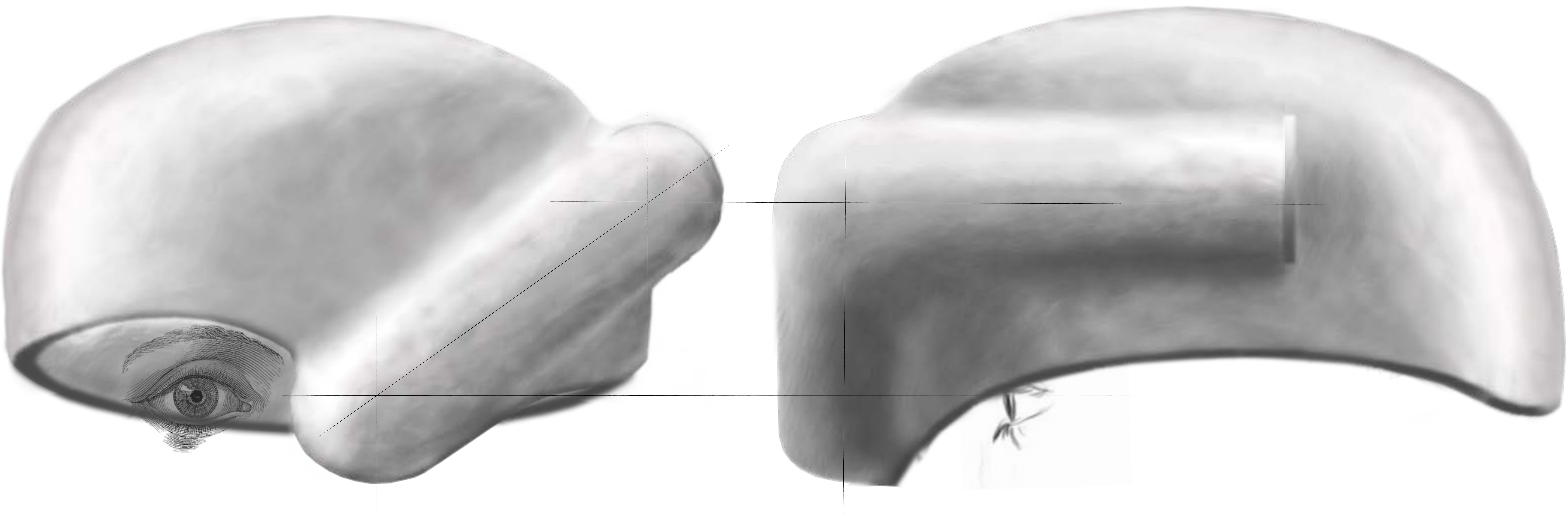
Thanks to their separately mobile eyes, chameleons are capable of looking behind and in front at the same time.

Our own binocular vision uses two front-facing eyes which move and focus together, allowing us finely-tuned frontal stereo vision, but leaving us with little lateral and no rear vision. Automobile design goes to considerable efforts to correct this flaw. But what about pedestrians? This headset explores an anthropometric setup where one eye sees normally (frontally) while the other has its perspective rotated by 180°. Could a human being navigate the world with forward/backward vision?

CHAMELEON
HELMET



Chameleon-Helmet Section



Chameleon-Helmet front & side elevations

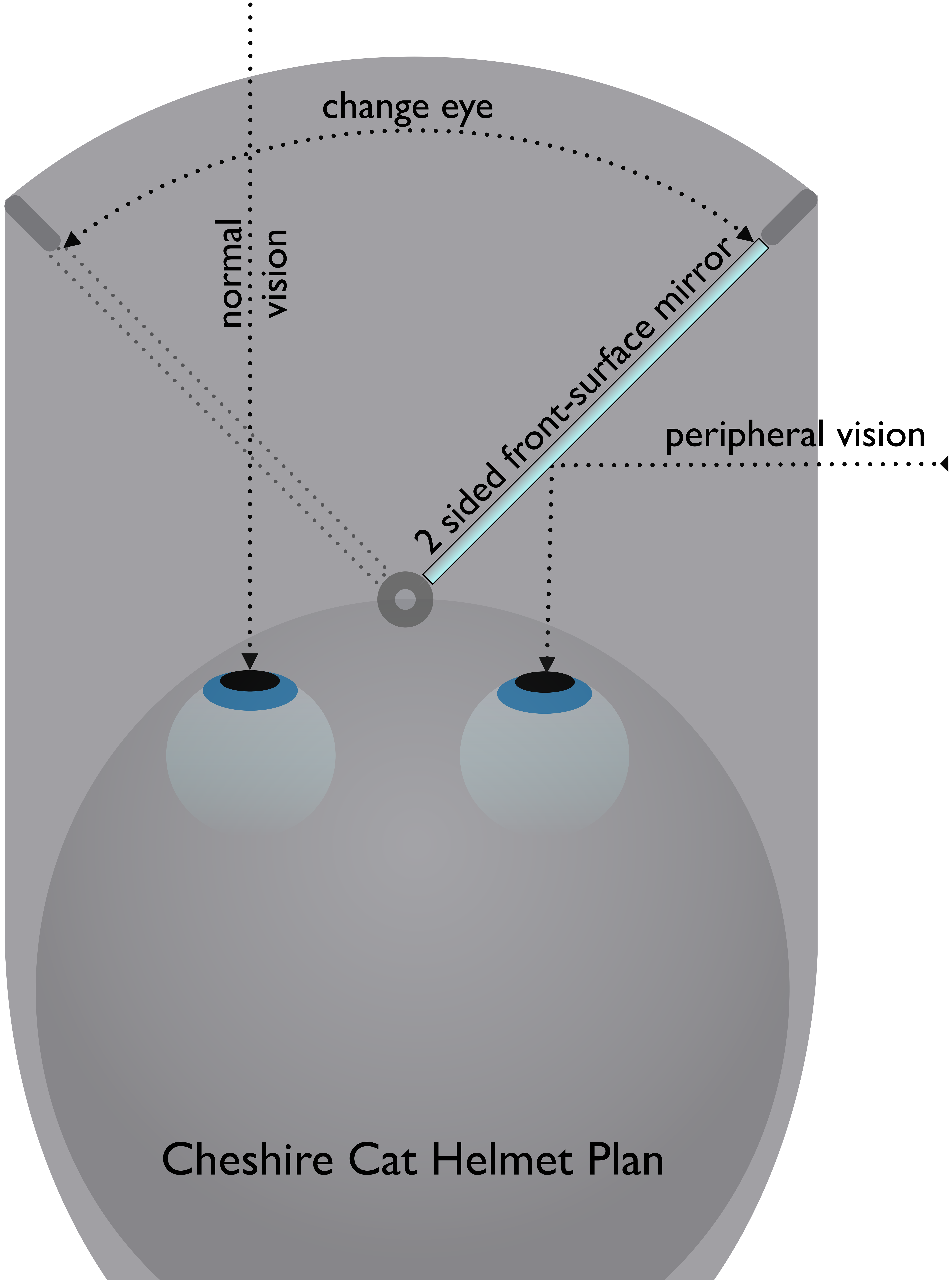
Cheshire Cat* Headset

Could we adapt to having peripheral vision in one eye, while the other sees normally?

* The title refers to a binocular rivalry exhibit - and subsequent paper - at the Exploratorium in San Francisco by Sally Duensing and Bob Miller. Placing a 45° mirror over one eye allows visitors to see the face of a person in front of them mixed with the image of their own moving hand. For most people, the brain converges the two images and the movement of the hand appears to 'erase' the face. But the eyes and mouth tend to persist, giving the piece its title.

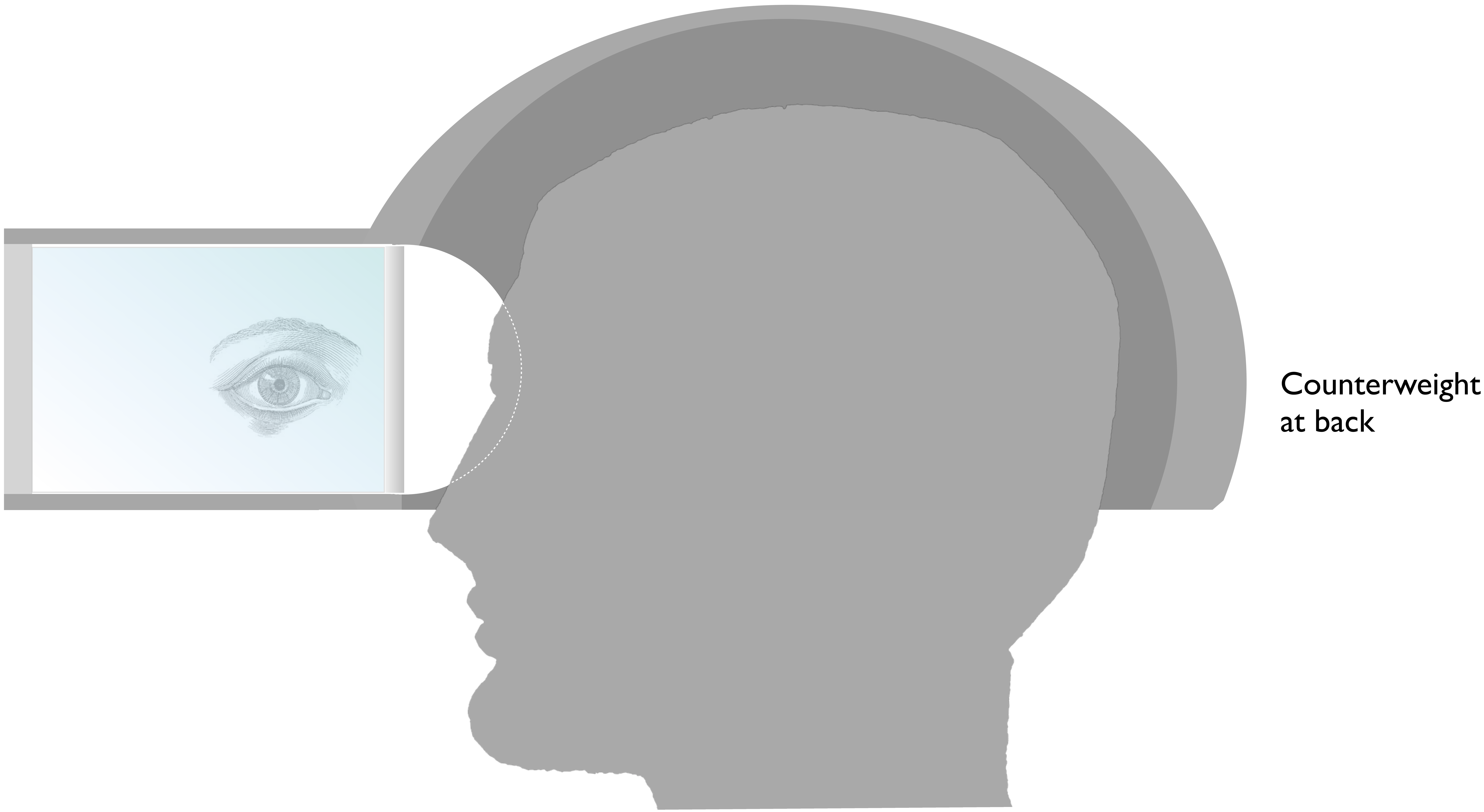
In general predators have frontal binocular vision to help them to chase prey who - in general - have more peripheral vision to help them to spot predators. A complicating factor is that most predators - including ourselves - are themselves the prey of some other predator. The only way we could deal with this double-role in our natural habitat was to glance around nervously while we hunted. But in the relative safety of the modern world, could we not adapt our vision to function both ways?

Perceptive scientists have shown us how well the brain tolerates differences in information coming from left and right eyes ('binocular rivalry'). This headset works with the a 45° front-surface mirrors over one eye (rotating the view 90°) while the other eye's vision is unimpeded. Setting the mirror on a hinge just in front of the nose allows users to switch eye (or to switch back to normal vision with the mirror full forward).


change eye
normal vision
2 sided front-surface mirror
peripheral vision
Cheshire Cat Helmet Plan

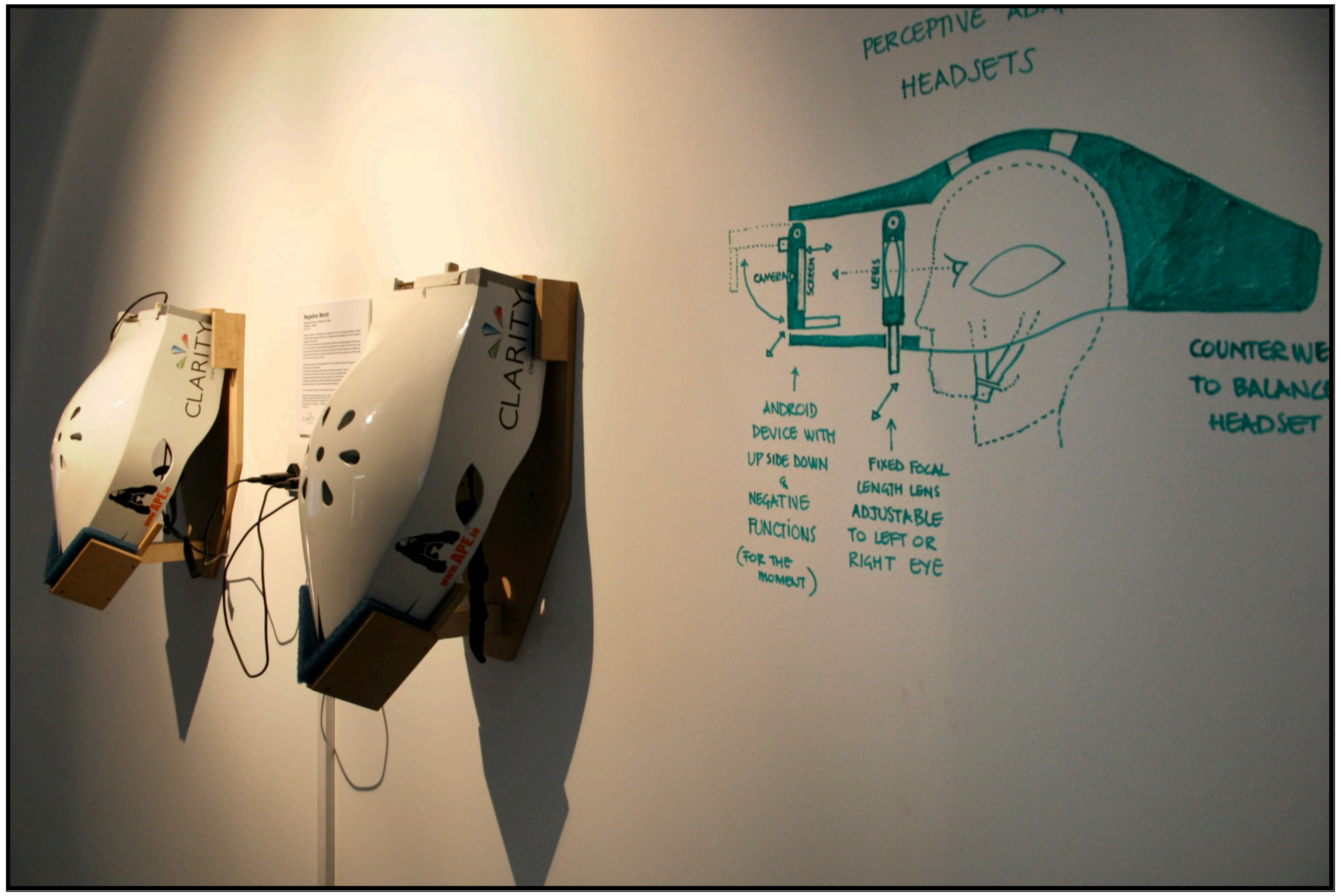
Left-hand frontal Right-hand

CHESHIRE CAT HELMET



Cheshire Cat Helmet Section

From electronics to optics



First generation headsets, 2011

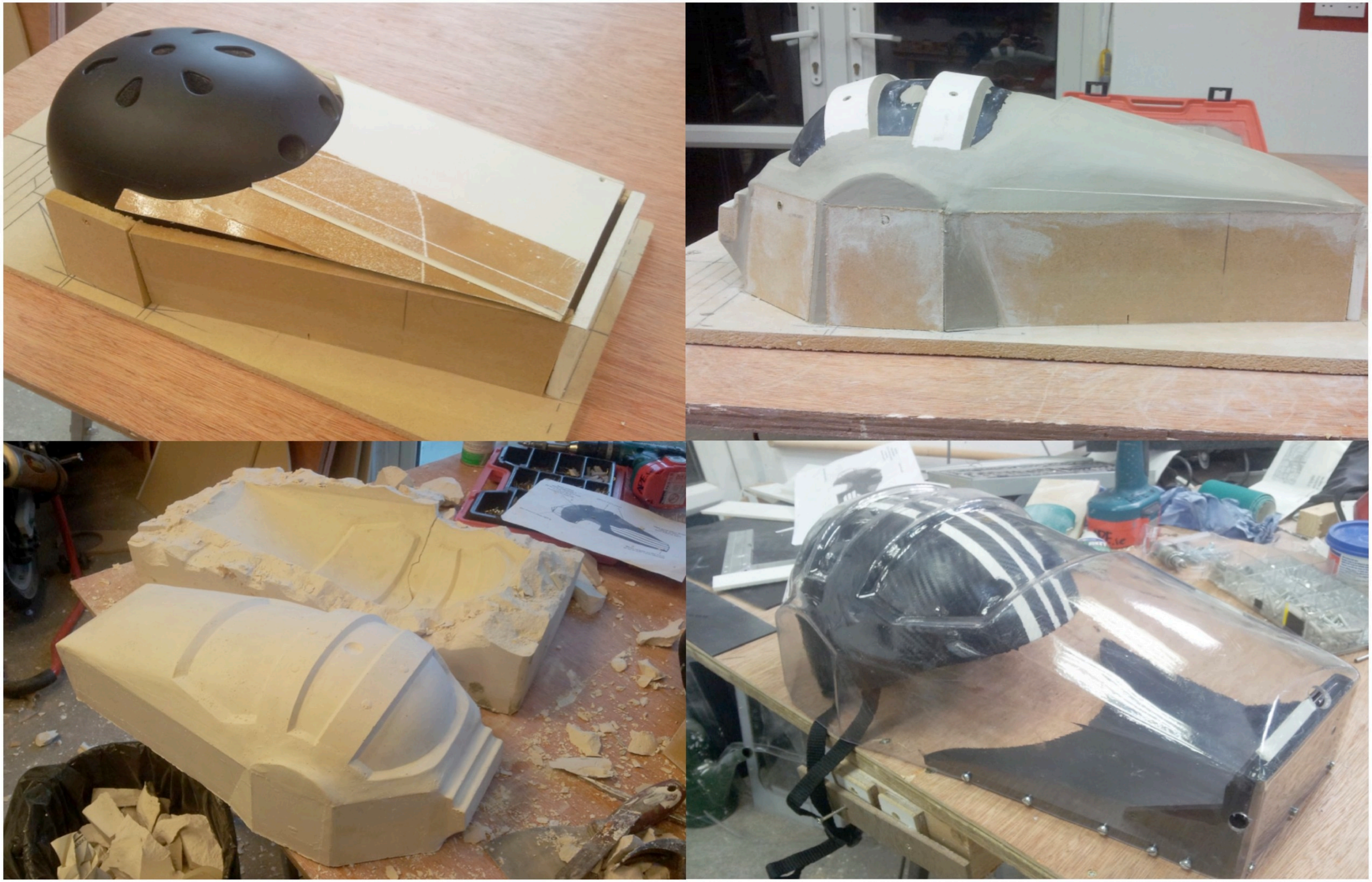

Second generation headset, 2012

Our first 'headset' project was a reboot of George Stratton's classic perceptual adaptation experiment in the late 19th Century - using prisms to make 'upside-down' glasses which he wore for eight days running. Inspired by work we saw at the Laboratoire Psychology de la Perception in Paris we decided to explore how our perception might adapt to colour/luminosity (negative) inversion. In 2011 and 2012, with CLARITY in Dublin, we designed and built two electronic headsets to explore the 'Inverse-Universe'. But we were aware that an electronic image can still not match the sort of lucid image offered by Stratton's prisms.

We began thinking about working with purely optical modifications to our vision. Dr. Sally Duensing introduced us to exhibits in the exploratorium in San Francisco that play with rotation of view-point. She pointed out the field limitations of human binocular vision: no possibility of independant movement of each eye; limited depth perception; limited peripheral vision; no rear-vision… In autumn 2012 we began to sketch a series of meta-perceptual helmets with a view to challenging these limitations.

Denis Connolly & Anne Cleary January 2013

Building the first headsets. July 2011



Building the second headsets. October, 2012

Headsets in the ‘Hall of Mirrors’ exhibition. October, 2012