

Response to “Boats & Deckchairs”

Dear Drs. Gould and Shearer,

Thank you for your interesting article in the December issue of *Natural History*. It led me to an alternative interpretation of his boat/deckchair illusion using the notion of a cross-section, which is implicit in the passage from *Flatland* that you quoted.

Imagine three spheres in space. One can obtain a 2-dimensional representation of them by taking a cross-section, that is, slicing through them with a plane. The result would be a collection of circles in the plane. Depending on which plane one chooses, the relative sizes of the circles will be different; as one moves the plane, they will grow and shrink in the way Abbot describes.

Now imagine three objects in 4-space (three 4-spheres, for example). One can obtain 3-dimensional representations by slicing them with a 3-dimensional space (a “hyperplane”) and, again, depending on which hyperplane one chooses the objects will have different sizes. If the objects are 4-spheres, then the 3-dimensional hyperplane slice will be a collection of ordinary 3-dimensional spheres of different sizes. And again, as one moves the hyperplane around the spheres will grow and shrink. Thus, rotating Duchamp’s postcard achieves the optical illusion of this growing and shrinking process by causing one to reassess the sizes of the objects. Duchamp invites one to replicate the growing and shrinking process involved in moving the hyperplane around by holding the card vertically and “considering the optical illusion produced by the difference in their dimensions.”

This interpretation may capture more precisely the

mathematical intent of his words.

Sincerely,

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