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Ergonomics, Systems, and Toothbrushes

Even for something as simple as toothbrushes, ergonomics and systems can have a significant impact.

Fig. 1: What's wrong with this picture?

Consider the image to the right. It's one of those typical, “squishy-handled” toothbrushes, the curvy shape of which is supposed to be *ergonomic*. It's also a toothbrush that is prone to tipping over, leading to toothpaste all over your countertop.

Since it seems clear that ergonomic toothbrush handles help one to properly clean one's teeth, this stability problem really needs to be fixed. If users find that their toothbrushes often tip, then they are less likely to buy the same toothbrush again. If that toothbrush will help them keep their teeth clean, then users not buying it will lead to worse oral hygiene, regardless of how ergonomic the toothbrush may be.

In the **See Also** section below are a number of links to documents that suggest:

- There is a connection between handle design and proper teeth cleaning.
- The connection is modest compared to the design of the bristles.
- No one interested in toothbrush design appears to be taking a systemic view of the product.

A systemic view would require one to think of the interactions the toothbrush will have throughout *all stages of use* and not just the act of brushing one's teeth. Construction of reasonable situated use cases for all the stages of use of a toothbrush will reveal that at least some users will put the toothbrush on the bathroom counter after putting toothpaste on it but before using it. This will lead to investigations of how loaded/prepared toothbrushes rest on countertops, and that would lead to a clear indication of the potential for instability.

Some may wonder if it even matters. After all, it's just a toothbrush.

Of course it matters. Think of it this way. Say you're the designer of a poor toothbrush. The retail market for toothbrushes in the US, for instance, is well over a billion dollars; that's a lot of tooth brushes. Say only one in a million users of your toothbrush suffer ill effects from it; that will likely be hundreds of people.

Do you want to be the person who causes hundreds of people suffering one or another kind of oral disease? Do you want to be the root[1)] cause of the resulting expenses incurred by the health care system, just because you thought a systems perspective on toothbrush design was overkill?

See Also

- Dental plaque removal efficacy of three toothbrushes with different designs: a comparative analysis. Users prefer some handles over others, and the toothbrush head can be treated as separate design issue than the handle. No information given on the reasons for the handle preferences, so it is not clear if they are rational preferences - i.e. preferences that lead to better oral hygiene.
- The reverse ergonomics and engineering process of a toothbrush handle. Accommodating the range of use of toothbrush handles in design via concepts of “mass customization.” No indication is given that ergonomics actually lead to better outcomes.
- Ergonomic toothbrush? While on the surface this design may seem reasonable, it really isn't. It is hyper-efficient, but it's a very brittle design because the range of use in which this design works well is extremely limited, and beyond that range it fails miserably. This shows how ergonomics alone isn't enough to design a usable product.
- Do Ergonomic Toothbrushes Clean Teeth Better? In this article, the emphasis is on the head rather than the handle. (This point is also made here.)
- A Design Principle of Toothbrush Handle Based on Ergonomic Theory. Some work on toothbrush handles exists, but stability of the toothbrush when lying on a counter is barely considered.

case, critical thinking

1)

No pun intended.