Human-Scale Hallway Quantification

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The notion of relativity in physical properties is most commonly associated with Einstein's early 20th century work but has remained underdeveloped since. This study elucidates a form of human relativity in the built environment previously absent from scholarly discourse. We show that the human-scale length of any hallway is exactly described by a simple three parameter model with empirically tractable applications.

Hallways | Human Behavior

Hallways are an everyday facilitator of human social interaction. Yet few hallways are measured by their human length. To resolve this, we stacked Feytopians lengthwise along the upstairs hallway of the Chateau du Feÿ to determine its span. Figure 1 depicts the implementation of our measurement protocol. Feytopians were convenience sampled from open rooms and induced with non-pecuniary rewards to lay foot-to-scalp along the carpet lined hall beginning at one end. As the length of the hallway exceeded the total height of the participants, we asked them to leapfrog one at a time from one end of the hallway towards the other while recording the total number of body lengths required to complete the endeavor. Our findings reveal the hallway is 16 ± 1 Feytopians long.

A simple model of hallway length

Based on this result we derived a simple model of human-scale hallway length based on the the metric length of the hallway L, average human metric height $\bar{h}$ and instantaneous angle of the hallway floor to the moon θ:

$$\text{HSHL} = L\left[\sin^2(\theta) + \cos^2(\theta)\right]\bar{h}^{-1} \qquad [1]$$

The error of this model shrinks to zero as the average height of sampled humans approaches the average height of the human population, roughly 170cm (1). If the angle of the hallway floor to the moon cannot be measured (e.g. due to daytime conditions), θ can be substituted with the angle of the floor to the sun.

Behavioral roots of participation in hall quantification

Participation with the measurement protocol (see Fig.1) is explained by a simple threshhold model in which the population of exposed Feÿtopians complies with requests to lay in the hallway after a critical mass—known colloquially as a "tipping point"—of initial adopters is reached (2, 3).

Previous theoretical and empirical results suggest a critical mass of between 10% and 30% is required for population-wide adoption to occur. The initial recruitment period at the Chateau, by the researcher's memory, consisted of three out of a total of 9 ±1 Feytopians who were eventually exposed; suggesting a tipping point of greater than 20% and less than 33%, in line with prior studies.

Discussion

The model introduced in this paper explains the length of all hallways past and present and provides new results on a particularly important hallway, upstairs at the Chateau du Feÿ in which significant cultural and reproductive activity occurs. In doing so we expand prior work by Oliver Smoot and brothers (4) who used their aforementioned colleague to measure the length of the Harvard bridge.

Fig. 1. Implementation of the measurement protocol.

While we focus here on the salient case of hallways and hall spaces, our model generalizes trivially to other natural and built objects including various lengths of elephants, ceilings, trees, and doors. Furthermore, it suggests that non-pecuniary motivation of a critical mass of participants is sufficient to provoke spontaneous measurement behavior. Together, these contributions establish a new field of research at the intersection of physical, psychological, and social science.

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Significance Statement

While the characters in Beckett's famed play spend their time waiting in one place for Godot, most humans spend significant time between places, in spaces known as hallways. Understanding the human-hallway nexus is therefore of critical significance. This is the first study to quantify the length of hallways or hall spaces in terms of human height. It provides a simple, universally applicable model to do so, and characterizes the conditions under which empirical measurement can be achieved.

The authors declare no competing interests.

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