Embodied Spatial Cognition in Tangible Computing

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CCS Concepts: •**Human-centered computing** → **Human computer interaction (HCI); Laboratory experiments;**

Additional Key Words and Phrases: Human-computer interaction, tangible interfaces, interaction design, physical computation, embodied cognition, spatial thinking, geospatial modeling

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Table I. Percent cells with concentrated flow

Method	Reference	Mean	Stdev
Digital	0.89	1.12	1.64
Hand	0.89	0.80	1.26
Projected	0.89	0.77	1.87
Difference	1.07	0.73	7.25
Water flow	2.55	1.99	4.80

Table II. Percent cells with ridges

Method	Reference	Mean	Stdev
Digital	2.10	0.69	3.38
Hand	2.10	4.00	4.18
Projected	2.10	4.13	4.08
Difference	4.27	3.46	3.25
Water flow	1.18	3.72	4.12

Table III. Percent cells with valleys

Method	Reference	Mean	Stdev
Digital	2.90	0.56	1.28
Hand	2.90	1.66	1.73
Projected	2.90	1.48	2.43
Difference	2.96	0.22	3.67
Water flow	4.77	3.86	6.29

1. RESULTS

Table IV. Percent cells

method	concentrated flow			ridges			valleys		
	reference	mean	stdev	reference	mean	stdev	reference	mean	stdev
digital	0.89	1.12	1.64	2.10	0.69	3.38	2.90	0.56	1.28
hand	0.89	0.80	1.26	2.10	4.00	4.18	2.90	1.66	1.73
augmented	0.89	0.77	1.87	2.10	4.13	4.08	2.90	1.48	2.43
difference	1.07	0.73	7.25	4.27	3.46	3.25	2.96	0.22	3.67
water flow	2.55	1.99	4.80	1.18	3.72	4.12	4.77	3.86	6.29

Table V. Minimum distance (ft)

method	concentrated flow			ridges			valleys		
	reference	mean	stdev	reference	mean	stdev	reference	mean	stdev
digital	0	12916	24164	0	110419	61542	0	98806	159530
hand	0	10162	16355	0	24005	26580	0	676450	71046
augmented	0	7121	7389	0	19599	18970	0	31401	43772
difference	0	25073	14236	0	35656	98100	0	114378	79671
water flow	0	28321	45308	0	37918	22562	0	26166	64814