

Table 1

*Results of the Games-Howell post-hoc test for selection time.*

Test Scene	Group A	Group B	Mean Difference (A-B)	Standard Error	Significance	95%-Confidence Interval
Propane Tanks Close	Expand	IntenSelect	1.047s	0.057s	< 0.001	[0.935s, 1.158s]
	Expand	LenSelect Combined	1.079s	0.057s	< 0.001	[0.968s, 1.191s]
	Expand	LenSelect Root	1.041s	0.057s	< 0.001	[0.929s, 1.152s]
	Expand	RaySelection	1.073s	0.056s	< 0.001	[0.962s, 1.183s]
Propane Tanks Far	Expand	IntenSelect	1.313s	0.051s	< 0.001	[1.212s, 1.414s]
	Expand	LenSelect Combined	1.390s	0.051s	< 0.001	[1.290s, 1.490s]
	Expand	LenSelect Root	1.310s	0.051s	< 0.001	[1.210s, 1.410s]
	Expand	RaySelection	1.318s	0.050s	< 0.001	[1.220s, 1.420s]
	LenSelect Root	LenSelect Combined	0.079s	0.019s	0.022	[0.116s, 0.043s]
	RaySelection	LenSelect Combined	0.072s	0.017s	0.02	[0.105s, 0.039s]
Rotating Spheres	Expand	IntenSelect	1.477s	0.06s	< 0.001	[1.359s, 1.596s]
	Expand	LenSelect Combined	1.41s	0.062s	< 0.001	[1.288s, 1.532s]
	Expand	LenSelect Root	1.477s	0.06s	< 0.001	[1.358s, 1.595s]
	Expand	RaySelection	1.316s	0.062s	< 0.001	[1.193s, 1.438s]
	RaySelection	IntenSelect	0.161s	0.025s	< 0.001	[0.211s, 0.112s]
	RaySelection	LenSelect Root	0.161s	0.025s	< 0.001	[0.210s, 0.112s]
Miscellaneous	Expand	IntenSelect	1.624s	0.052s	< 0.001	[1.523s, 1.726s]
	Expand	LenSelect Combined	1.636s	0.052s	< 0.001	[1.534s, 1.738s]
	Expand	LenSelect Root	0.051s	0.051s	< 0.001	[1.527s, 1.726s]
	Expand	RaySelection	1.583s	0.051s	< 0.001	[1.483s, 1.683s]
Erratic Spheres	Expand	IntenSelect	1.370s	0.079s	< 0.001	[1.215s, 1.526s]
	Expand	LenSelect Combined	1.432s	0.078s	< 0.001	[1.278s, 1.587s]

	Expand	LenSelect Root	1.413s	0.080s	< 0.001	[1.255s, 1.571s]
	Expand	RaySelection	1.198s	0.083s	< 0.001	[1.035s, 1.362s]
	RaySelection	LenSelect Combined	0.234s	0.052s	0.014	[0.337s, 0.131s]
	RaySelection	LenSelect Root	0.215s	0.055s	0.047	[0.323s, 0.106s]
Fast Sphere	Expand	IntenSelect	1.354s	0.044s	< 0.001	[1.268s, 1.441s]
	Expand	LenSelect Combined	1.168s	0.049s	< 0.001	[1.071s, 1.266s]
	Expand	LenSelect Root	1.139s	0.051s	< 0.001	[1.039s, 1.240s]
	Expand	RaySelection	0.666s	0.0670s	< 0.001	[0.534s, 0.798s]
	LenSelect Combined	IntenSelect	0.186s	0.036s	0.003	[0.258s, 0.114s]
	LenSelect Root	IntenSelect	0.215s	0.039s	< 0.001	[0.291s, 0.139s]
	RaySelection	IntenSelect	0.688s	0.058s	< 0.001	[0.802s, 0.574s]
	RaySelection	LenSelect Combined	0.502s	0.062s	< 0.001	[0.625s, 0.379s]
	RaySelection	LenSelect Root	0.473s	0.064s	< 0.001	[0.598s, 0.347s]
Stacked Cubes	Expand	IntenSelect	1.049s	0.038	< 0.001	[0.974s, 1.124s]
	Expand	LenSelect Combined	1.021s	0.038s	< 0.001	[0.946s, 1.096s]
	Expand	LenSelect Root	0.996s	0.038s	< 0.001	[0.921s, 1.071s]
	Expand	RaySelection	1.071s	0.037s	< 0.001	[0.998s, 1.144s]
	LenSelect Root	RaySelection	0.075s	0.016s	0.006	[0.045s, 0.106s]
Cluttered Cans	Expand	IntenSelect	1.115s	0.127s	< 0.001	[0.866s, 1.365s]
	Expand	LenSelect Combined	1.521s	0.077s	< 0.001	[1.368s, 1.673s]
	Expand	LenSelect Root	1.514s	0.074s	< 0.001	[1.368s, 1.659s]
	Expand	RaySelection	1.445s	0.080s	< 0.001	[1.288s, 1.602s]
Rotating Cans	Expand	IntenSelect	0.603s	0.152s	0.041	[0.304s, 0.902s]
	Expand	LenSelect Combined	1.272s	0.088s	< 0.001	[1.097s, 1.446s]
	Expand	LenSelect Root	1.222s	0.093s	< 0.001	[1.039s, 1.405s]
	Expand	RaySelection	1.196s	0.092s	< 0.001	[1.015s, 1.378s]

IntenSelect	LenSelect Combined	0.669s	0.130s	0.003	[0.412s, 0.925s]
IntenSelect	LenSelect Root	0.619s	0.133s	0.010	[0.356s, 0.882s]
IntenSelect	RaySelection	0.593s	0.133s	0.015	[0.331s, 0.855s]

Table 2

*Results of the Games-Howell post-hoc test for ID.*

Test Scene	Group A	Group B	Mean Difference (A-B)	Standard Error	Significance	95%-Confidence Interval
Propane Tanks Close	Expand	IntenSelect	1.558	0.021	<0.001	[1.515, 1.600]
	Expand	LenSelect Combined	1.680	0.021	<0.001	[1.637, 1.720]
	Expand	LenSelect Root	1.828	0.021	<0.001	[1.786, 1.869]
	Expand	RaySelection	1.126	0.021	<0.001	[1.084, 1.168]
	IntenSelect	LenSelect Combined	0.121	0.008	<0.001	[0.105, 0.137]
	IntenSelect	LenSelect Root	0.270	0.008	<0.001	[0.253, 0.286]
	RaySelection	IntenSelect	0.431	0.008	<0.001	[-0.448, -0.414]
	LenSelect Combined	LenSelect Root	0.149	0.006	<0.001	[0.135, 0.161]
	RaySelection	LenSelect Combined	0.553	0.006	<0.001	[-0.566, -0.539]
	RaySelection	LenSelect Root	0.702	0.007	<0.001	[-0.715, -0.687]
Propane Tanks Far	Expand	IntenSelect	1.513	0.028	<0.001	[1.457, 1.569]
	Expand	LenSelect Combined	1.546	0.029	<0.001	[1.487, 1.603]
	Expand	LenSelect Root	1.080	0.027	<0.001	[1.025, 1.134]
	Expand	RaySelection	0.373	0.028	<0.001	[0.317, 0.428]
	IntenSelect	LenSelect Root	-0.433	0.012	<0.001	[-0.457, -0.408]
	IntenSelect	RaySelection	-1.141	0.013	<0.001	[-1.167, -1.114]
	LenSelect Combined	LenSelect Root	-0.465	0.014	<0.001	[-0.494, -0.435]
	LenSelect Combined	RaySelection	-1.173	0.015	<0.001	[-1.204, -1.141]
	LenSelect Root	RaySelection	-0.708	0.012	<0.001	[-0.731, -0.683]

Rotating Spheres	Expand	IntenSelect	2.736	0.035	<0.001	[2.665, 2.805]
	Expand	LenSelect Combined	1.536	0.037	<0.001	[1.462, 1.608]
	Expand	LenSelect Root	1.725	0.038	<0.001	[1.649, 1.800]
	Expand	RaySelection	0.878	0.042	<0.001	[0.794, 0.962]
	IntenSelect	LenSelect Combined	-1.200	0.017	<0.001	[-1.235, -1.164]
	IntenSelect	LenSelect Root	-1.011	0.019	<0.001	[-1.050, -0.971]
	IntenSelect	RaySelection	-1.857	0.027	<0.001	[-1.911, -1.802]
	LenSelect Combined	LenSelect Root	0.189	0.022	<0.001	[0.144, 0.233]
	LenSelect Combined	RaySelection	-0.657	0.029	<0.001	[-0.715, -0.599]
	LenSelect Root	RaySelection	-0.846	0.030	<0.001	[-0.906, -0.786]
Miscellaneous	Expand	IntenSelect	1.749	0.054	<0.001	[1.642, 1.857]
	Expand	LenSelect Combined	1.883	0.050	<0.001	[1.784, 1.982]
	Expand	LenSelect Root	1.878	0.051	<0.001	[1.776, 1.979]
	Expand	RaySelection	1.257	0.051	<0.001	[1.155, 1.358]
	IntenSelect	RaySelection	-0.492	0.044	<0.001	[-0.580, -0.404]
	LenSelect Combined	RaySelection	-0.626	0.039	<0.001	[-0.703, -0.548]
	LenSelect Root	RaySelection	-0.620	0.041	<0.001	[-0.702, -0.539]
Erratic Spheres	Expand	IntenSelect	2.625	0.075	<0.001	[2.477, 2.773]
	Expand	LenSelect Combined	1.898	0.053	<0.001	[1.792, 2.005]
	Expand	LenSelect Root	2.003	0.059	<0.001	[1.885, 2.121]
	Expand	RaySelection	1.132	0.053	<0.001	[1.025, 1.238]
	IntenSelect	LenSelect Combined	-0.726	0.070	<0.001	[-0.864, -0.587]
	IntenSelect	LenSelect Root	-0.621	0.075	<0.001	[-0.769, -0.473]
	IntenSelect	RaySelection	-1.492	0.070	<0.001	[-1.631, -1.354]
	LenSelect Combined	RaySelection	-0.766	0.047	<0.001	[-0.859, -0.674]

	LenSelect Root	RaySelection	-0.871	0.053	<0.001	[-0.977, -0.765]
Fast Sphere	Expand	IntenSelect	2.897	0.046	<0.001	[2.805, 2.990]
	Expand	LenSelect Combined	1.629	0.054	<0.001	[1.521, 1.737]
	Expand	LenSelect Root	1.601	0.056	<0.001	[1.490, 1.712]
	Expand	RaySelection	0.687	0.063	<0.001	[0.562, 0.812]
	IntenSelect	LenSelect Combined	-1.268	0.059	<0.001	[-1.385, -1.150]
	IntenSelect	LenSelect Root	-1.296	0.060	<0.001	[-1.416, -1.176]
	IntenSelect	RaySelection	-2.210	0.067	<0.001	[-2.343, -2.076]
	LenSelect Combined	RaySelection	-0.941	0.073	<0.001	[-1.086, -0.797]
	LenSelect Root	RaySelection	-0.913	0.074	<0.001	[-1.060, -0.767]
Stacked Cubes	Expand	IntenSelect	1.513	0.030	<0.001	[1.453, 1.572]
	Expand	LenSelect Combined	1.470	0.019	<0.001	[1.430, 1.509]
	Expand	LenSelect Root	1.592	0.018	<0.001	[1.555, 1.629]
	Expand	RaySelection	1.036	0.019	<0.001	[0.997, 1.075]
	IntenSelect	RaySelection	-0.476	0.027	<0.001	[-0.531, -0.422]
	LenSelect Combined	LenSelect Root	0.122	0.014	<0.001	[0.094, 0.150]
	LenSelect Combined	RaySelection	-0.433	0.015	<0.001	[-0.464, -0.403]
	LenSelect Root	RaySelection	-0.556	0.014	<0.001	[-0.584, -0.528]
Cluttered Cans	Expand	IntenSelect	1.952	0.097	<0.001	[1.760, 2.14]
	Expand	LenSelect Combined	1.421	0.040	<0.001	[1.341, 1.501]
	Expand	LenSelect Root	1.520	0.047	<0.001	[1.426, 1.614]
	Expand	RaySelection	1.164	0.038	<0.001	[1.087, 1.240]
	IntenSelect	LenSelect Combined	-0.530	0.099	0.001	[-0.726, -0.335]
	IntenSelect	LenSelect Root	-0.432	0.102	0.024	[-0.633, -0.230]
	IntenSelect	RaySelection	-0.788	0.098	<0.001	[-0.982, -0.594]

	LenSelect Combined	RaySelection	-0.257	0.042	<0.001	[-0.340, -0.174]
	LenSelect Root	RaySelection	-0.356	0.049	<0.001	[-0.452, -0.259]
Rotating Cans	Expand	IntenSelect	1.423	0.105	<0.001	[1.215, 1.631]
	Expand	LenSelect Combined	1.828	0.053	<0.001	[1.723, 1.932]
	Expand	LenSelect Root	1.925	0.066	<0.001	[1.795, 2.055]
	Expand	RaySelection	1.513	0.060	<0.001	[1.394, 1.632]
	IntenSelect	LenSelect Root	0.502	0.115	0.001	[0.275, 0.729]
	LenSelect Combined	RaySelection	-0.314	0.065	0.024	[-0.443, -0.185]
	LenSelect Root	RaySelection	-0.412	0.076	0.001	[-0.562, -0.261]

Table 3

*Results of the Games-Howell post-hoc test for selection errors.*

Test Scene	Group A	Group B	Mean Difference (A-B)	Standard Error	Significance	95%-Confidence Interval
Rotating Spheres	LenSelect Root	LenSelect Root	-0.195	0.049	0.029	[-0.293, -0.096]
Miscellaneous	Expand	IntenSelect	0.165	0.026	<0.001	[0.112, 0.218]
	Expand	LenSelect Combined	0.135	0.028	0.007	[0.079, 0.190]
	Expand	LenSelect Root	0.170	0.026	<0.001	[0.118, 0.222]
Erratic Spheres	Expand	RaySelection	-0.220	0.055	0.041	[-0.329, -0.110]
	IntenSelect	RaySelection	-0.260	0.053	0.005	[-0.364, -0.155]
Fast Sphere	Expand	IntenSelect	0.130	0.029	0.015	[0.072, 0.187]
	Expand	RaySelection	-0.730	0.078	<0.001	[-0.884, -0.575]
	IntenSelect	LenSelect Combined	-0.320	0.050	<0.001	[-0.420, -0.219]
	IntenSelect	LenSelect Root	-0.290	0.055	0.002	[-0.398, -0.181]
	IntenSelect	RaySelection	-0.860	0.073	<0.001	[-1.004, -0.715]
	LenSelect Combined	RaySelection	-0.540	0.088	<0.001	[-0.714, -0.365]
	LenSelect Root	RaySelection	-0.570	0.091	<0.001	[-0.749, -0.390]

Rotating Cans	Expand	IntenSelect	-0.587	0.128	0.011	[-0.840 -0.335]
	IntenSelect	LenSelect Combined	0.552	0.119	0.010	[0.316, 0.788]
	IntenSelect	LenSelect Root	0.582	0.121	0.007	[0.342, 0.822]
	IntenSelect	RaySelection	0.532	0.126	0.025	[0.283, 0.781]

Table 4

*Results of the Tukey post-hoc test for fun, complexity, ques total and user ranking metrics.*

Test Scene	Group A	Group B	Mean Difference (A-B)	Standard Error	Significance	95%-Confidence Interval
Fun	Expand	IntenSelect	-1.100	0.349	0.015	[-2.070, -0.129]
	Expand	LenSelect Combined	-1.350	0.349	0.001	[-2.320, -0.379]
	Expand	LenSelect Root	-1.190	0.349	0.006	[-2.170 -0.229]
	Expand	RaySelection	-1.350	0.349	0.001	[-2.320 -0.379]
Complexity	Expand	IntenSelect	0.899	0.300	0.024	[0.066 1.733]
	Expand	LenSelect Combined	1.650	0.300	<0.001	[0.816, 2.483]
	Expand	LenSelect Root	1.400	0.300	<0.001	[0.566, 2.233]
	Expand	RaySelection	1.850	0.300	<0.001	[1.016, 2.683]
	IntenSelect	RaySelection	0.950	0.300	0.014	[0.116, 1.783]
Quesi Total	Expand	LenSelect Combined	-1.070	0.215	<0.001	[-1.670, -0.472]
	Expand	LenSelect Root	-0.990	0.215	<0.001	[-1.591, -0.393]
	Expand	RaySelection	-1.280	0.215	<0.001	[-1.881, -0.683]
	IntenSelect	LenSelect Combined	-0.730	0.215	0.006	[-1.338 -0.140]
	IntenSelect	LenSelect Root	-0.660	0.215	0.020	[-1.259, -0.061]
	IntenSelect	RaySelection	-0.950	0.215	<0.001	[-1.549, -0.350]
User Ranking	Expand	IntenSelect	-1.450	0.393	0.001	[-2.590, -0.409]
	Expand	LenSelect Combined	-1.850	0.393	<0.001	[-2.940, -0.759]
	Expand	LenSelect Root	-1.950	0.393	<0.001	[-3.040, -0.859]
	Expand	RaySelection	-1.850	0.393	<0.001	[-2.940, -0.759]