

Supplementary materials to:

Art History 2.0: learning art through embodied experience with virtual reality

S1. Examples of questions from the Final Test

1. What details in the work show the idea of a “return” to classical ideas?
2. Compared to medieval art, what visual innovations can you describe?
3. What details suggest the humanistic philosophy of the time?

Look at these images and talk about which characteristics would make them “typical” or not of the Renaissance.



Examples of images from the final test. Left: Scrovegni Chapel, Giotto. Right: Christ and the Samaritan woman, Duccio (Wikipedia commons).

S2. Examples of Spatial Perception Questions

Bridal Chamber:

- 1-Why are the figures in the oculus giggling?
- 2-How does the piece signify the importance of the Gonzaga Family?

Hall of Giants:

- 1-How does the piece show differences in power?
- 2-How does the piece create movement?

S3. Examples of scavenger hunt probes

Bridal Chamber:

1-Touch the peacock (explicitly mentioned)

2-Besides the ceiling, where is there a statue painted in the fresco (non-explicitly mentioned)

3-Touch the self portrait of the artist that is among the décor (non-explicitly mentioned)

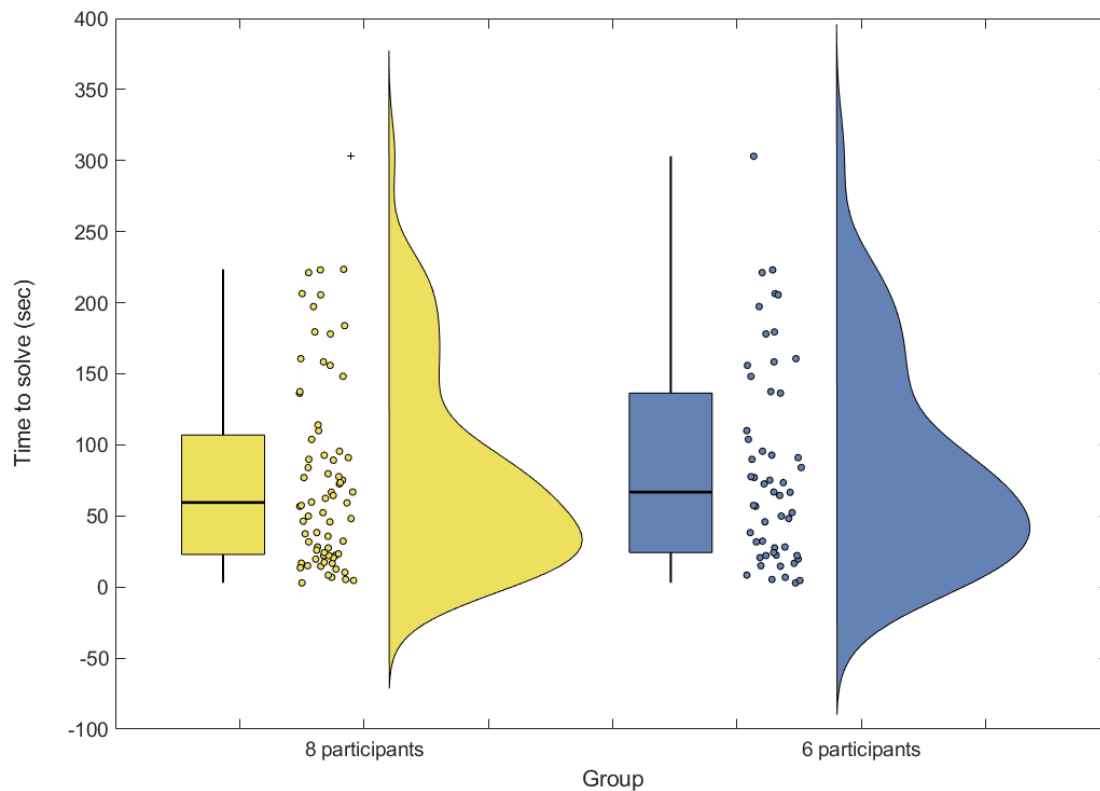
Hall of Giants:

1-Find and touch the cyclops (non-explicitly mentioned)

2-find the four winds (explicitly mentioned)

3-Find the man in renaissance armor (non-explicitly mentioned)

S4. Raincloud plot of SH data for the 2D group showing no difference between n=8 and n= 6. The Mixed Factors ANOVA for the 2D group showed no significant difference between the n=8 data (yellow) and the n=6 data (blue) groups ($F_{1,12}=0.214$, $p=0.652$).



Supplementary Table 1: Counts of correct answers per participant in the Spatial Perception Tests.

VR group	2D group
5	4
5	4
6	2
4	2
4	5
6	1
5	4

Supplementary Table 2. Scavenger Hunt data. CP corresponds to the Bridal Chamber, HG to the Hall of giants. Exp refers to explicitly mentioned items, Imp refers to non-explicitly-mentioned items.

ExQ1-CP	ExQ2-CP	ExQ3-CP	ExQ4-CP	ImpQ1-CP	ImpQ2-CP	ImpQ3-CP	ImpQ4-CP
15.63	4.81	74.44	36.42	20.68	13.49	85.39	32.8
10	13.73	112	96	85	45	180	10
16.26	49.8	128.78	16.29	15.69	43.66	42.78	2.76
35.56	16.1	60.2	25.2	40.72	22.48	39.14	5.59
25.64	32.01	106.94	11.37	45.9	34.51	86.54	15.4
10.34	8.92	92.78	10.65	35	25.62	109.59	9.59
6.78	8.41	105.36	20.17	54.85	13.83	64.54	16.69
12.72	7.13	44.46	12.59	12.23	42.17	58.9	23.42
22.45	112.93	73.47	27.56	103.86	136.4	303.04	38.33
16.68	16.5	221.21	22.14	66.66	197.3	91.03	14.61
19.63	10.01	84.05	15	20.66	52.34	155.95	2.96
32.31	23.07	49.91	6.86	75.17	160.64	77.65	48.15
28.19	42.64	148.2	22.15	64.42	89.84	137.47	72.57
45.87	17.19	92.75	31.75	66.84	57.41	205.55	56.84

Supplementary Table 2. Continued.

ExQ1-HG	ExQ2-HG	ExQ3-HG	ExQ4-HG	ImpQ1-HG	ImpQ2-HG	ImpQ3-HG	ImpQ4-HG	Group
2.95	4.81	9.18	60.43	7.48	29.44	14.92	4.71	VR
84.33	13.73	12.26	22.25	9.48	72.03	29.69	13.71	VR
74.17	49.8	12.64	17.1	9.14	23.94	36.93	6.09	VR
80.93	16.1	22.8	8.61	11.89	53.15	63.18	22.86	VR
12.74	32.01	16.15	4.7	10.59	41.78	29.85	10.59	VR
42.76	8.92	18.31	35.55	8.22	45.3	15.66	32.59	VR
18.2	8.41	21.52	8.02	1.18	55.22	15.91	19.41	VR

10.5	7.13	13.18	11.56	2.77	35.73	13.59	10.96	VR
173.37	112.93	31.93	10.81	50.05	129.32	180.29	79.52	2D
35.47	16.5	24.67	15.33	21.77	55.81	112.24	19.37	2D
41.3	10.01	23.94	7.31	10.78	81.23	12.78	6.94	2D
128.85	23.07	7.12	8.68	26.42	5.25	24.09	5.51	2D
48.61	42.64	19.18	22.85	67.43	74.39	78.63	37.39	2D
116.12	17.19	37.26	75.85	23.82	48.54	30.15	58.86	2D

Supplementary Table 3: 8 vs. 6 2D participants contains the data for the comparison between the performance of 6 participants versus 8 participants in the 2D group in the scavenger hunts (see raincloud plot above).

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Group
22.45	178.04	38.33	103.86	27.56	136.4	110.02	303.04	73.47	VR
23.4	183.89	16.81	79.67	12.54	62.4	89.25	114.03	59.16	VR
10.33	223.53	59.76	25.94	13.53	46.31	35.71	37.46	17.35	VR
16.68	223.12	14.61	66.66	22.14	197.3	77.03	91.03	221.21	VR
19.63	95.51	2.96	20.66	15	52.34	4.61	155.95	84.05	VR
32.31	158.43	48.15	75.17	6.86	160.64	5.37	77.65	49.91	VR
28.19	206.4	72.57	64.42	22.15	89.84	8.4	137.47	148.2	VR
45.87	179.51	56.84	66.84	31.75	57.41	24.25	205.55	92.75	VR
22.45	178.04	38.33	103.86	27.56	136.4	110.02	303.04	73.47	2D
16.68	223.12	14.61	66.66	22.14	197.3	77.03	91.03	221.21	2D
19.63	95.51	2.96	20.66	15	52.34	4.61	155.95	84.05	2D
32.31	158.43	48.15	75.17	6.86	160.64	5.37	77.65	49.91	2D
28.19	206.4	72.57	64.42	22.15	89.84	8.4	137.47	148.2	2D
45.87	179.51	56.84	66.84	31.75	57.41	24.25	205.55	92.75	2D