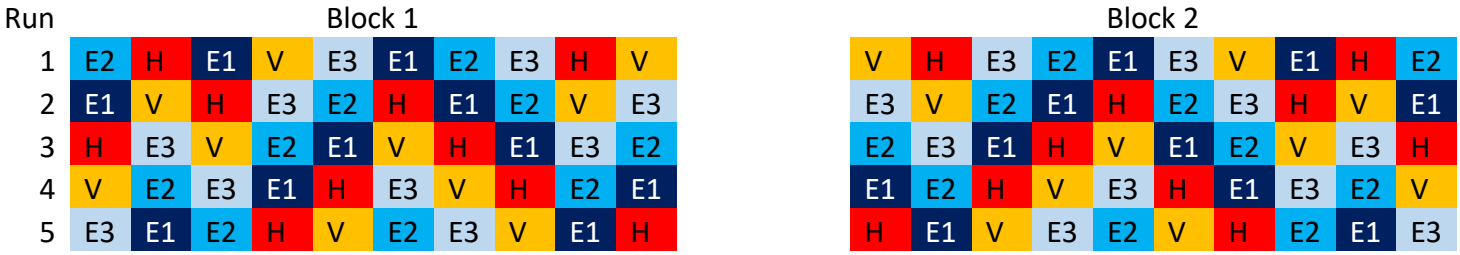
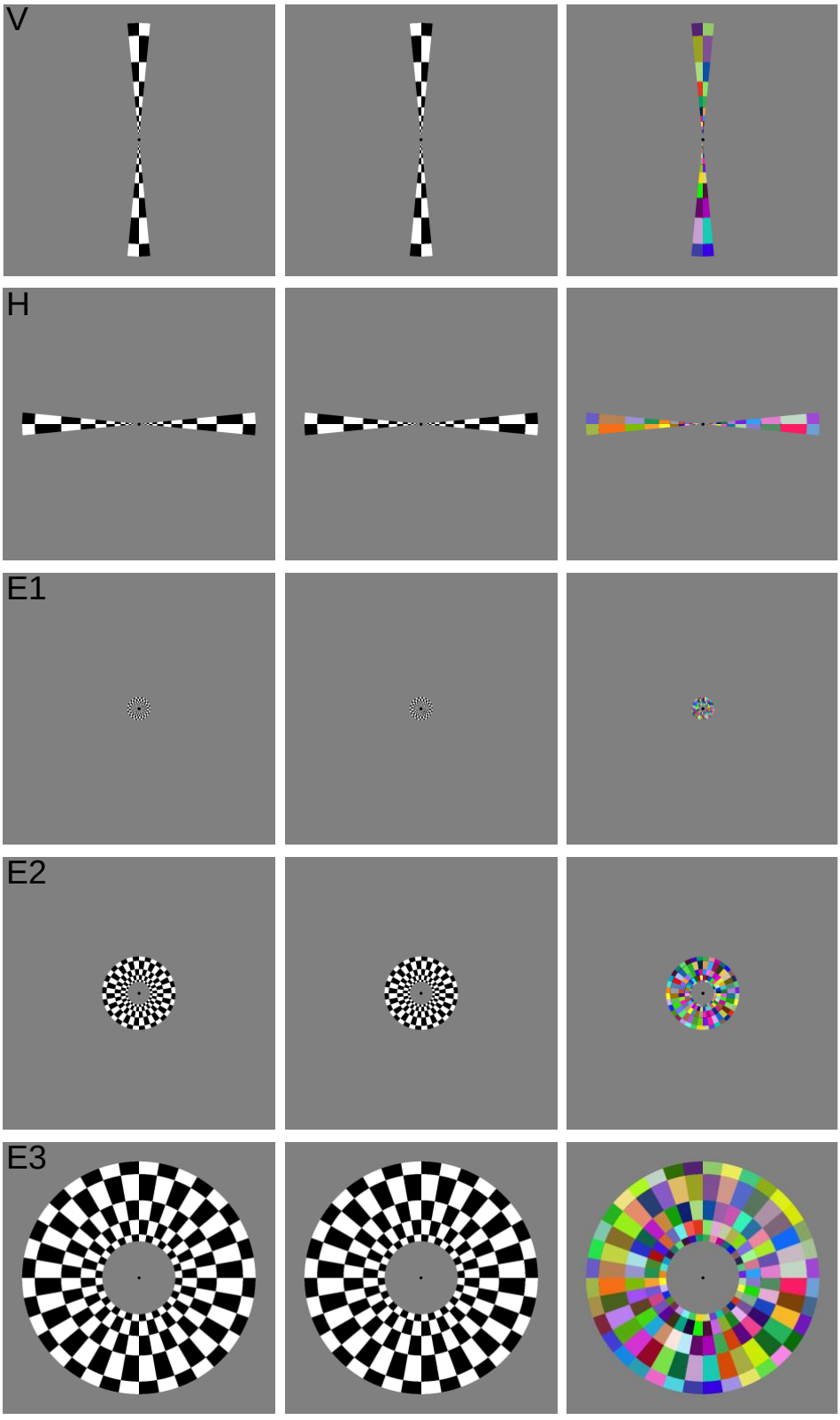
Task	Retinotopic Meridian and Eccentricity Localizer
Abbreviation	VISME
Duration (s)	270 (plus 10s reference scans for multi-echo, as "Stay very still" screen shown)
Volume #	270 (6 T1 stabilization + 260 trial + 4 end)
TR (s)	1.00s
Stimuli	Expanding checkerboards, 1 & 2 are alternating black and white, while 3 is random colors (see "Stimuli" below). The expansion is defined by a linear log step to approximate cortical expansion in the visual cortex. Each ring has 36 segments, and the radius of each ring increases in log steps by 0.29 (e.g. ring1=e^0, ring2=e^0.29, ring3=e^0.58, etc.). This was calculated out to 36 rings, and then displayed and captured at a resolution of 2560px x1440px (not all rings were visible at this resolution). The resulting images were then cropped to resolution of 1024px x 1024px around the central point. During the task, each second the checkboard changes 6 times (every 10 frames on a 60Hz projector, ~.166s) in this order: 1-3-2-3-1-2. This repeats every second. This background is then masked by either an image with wedges at the horizontal and vertical meridians, or apertures at various eccentricities (see below). This produces the effect of a checkboard at a given eccentricity or polar angle flickering at 6 Hz. Center fixation dot (.148° diameter) is either fully opaque black ([-1, -1, -1]) or grey ([.76, .76, .76]) (See "Fixation Dot Changes" below). **Meridian Masks (All extend from 0.5° - 16.2298° Ecc. Each 1/16th of full polar angle)** Horizontal Meridian (H)): 354.37° - 5.625° & 174.375° - 185.625° Vertical Meridian (V): 84.375° - 95.625° & 264.375° - 275.625° **Eccentricity Apertures (All cover entire 360° polar angle. Calculated along 1.16 log step)** Central Aperture (E1): 0.5° - 1.594° Middle Aperture (E2): 1.594° - 5.0878° Peripheral Aperture (E3): 5.0878° - 16.2298°
Display Parameters	Resolution: 1280 x 1024 Viewing Distance: 104cm Screen Width: 43cm Pixels per Visual Degree: 54
Task requirements	Participants are asked to fixate on the central fixation circle, and press with their right index finger every time the fixation dot changes color from black to grey
Other task notes	
# of Runs	5
# of sets	1 set of stimuli, outlined above
Possibility of more sets	Yes, could add more polar angle masks, and change the eccentricity step to include more eccentricity rings.
Design	During the trials, the central dot changes to grey for 400ms at the beginning of a TR (1s) randomly every 1-5 seconds. See exact order for blocks in "Fix Dot Changes" below. At the same time, a given wedge pattern is flickering at 6Hz in blocks of 10s. The ordering of these stimuli is given below in this section.

	VISME1 "Stay Very Still" (10s); + (6s); + (20s); E2 (10s); H (10s); E1 (10s); V (10s); E3 (10s); E1 (10s); E2 (10s); E3 (10s); H (10s); V (10s); + (20s); V (10s); H (10s); E3 (10s); E2 (10s); E1 (10s); E3 (10s); V (10s); E1 (10s); H (10s); E2 (10s); + (20s); + (4s); **VISME2** "Stay Very Still" (10s); + (6s); + (20s); E1 (10s); V (10s); H (10s); E3 (10s); E2 (10s); H (10s); E1 (10s); E2 (10s); V (10s); E3 (10s); + (20s); E3 (10s); V (10s); E2 (10s); E1 (10s); H (10s); E2 (10s); E3 (10s); H (10s); V (10s); E1 (10s); + (20s); + (4s); **VISME3** "Stay Very Still" (10s); + (6s); + (20s); H (10s); E3 (10s); V (10s); E2 (10s); E1 (10s); V (10s); H (10s); E1 (10s); E3 (10s); E2 (10s); + (20s); E2 (10s); E3 (10s); E1 (10s); H (10s); V (10s); E1 (10s); E2 (10s); V (10s); E3 (10s); H (10s); + (20s); + (4s); **VISME4** "Stay Very Still" (10s); + (6s); + (20s); V (10s); E2 (10s); E3 (10s); E1 (10s); H (10s); E3 (10s); V (10s); H (10s); E2 (10s); E1 (10s); + (20s); E1 (10s); E2 (10s); H (10s); V (10s); E3 (10s); H (10s); E1 (10s); E3 (10s); E2 (10s); V (10s); + (20s); + (4s); **VISME5** "Stay Very Still" (10s); + (6s); + (20s); E3 (10s); E1 (10s); E2 (10s); H (10s); V (10s); E2 (10s); E3 (10s); V (10s); E1 (10s); H (10s); + (20s); H (10s); E1 (10s); V (10s); E3 (10s); E2 (10s); V (10s); H (10s); E2 (10s); E1 (10s); E3 (10s); + (20s); + (4s); The first 6s of run are discarded for T1 stabilization
Trials/Block/Run	10 10s trials per block 2 100s blocks per run, separated by 20s fixation
Goal	Map retinotopic eccentricity and horizontal + vertical meridians in both cortex and the cerebellum

Condition Order Visualization

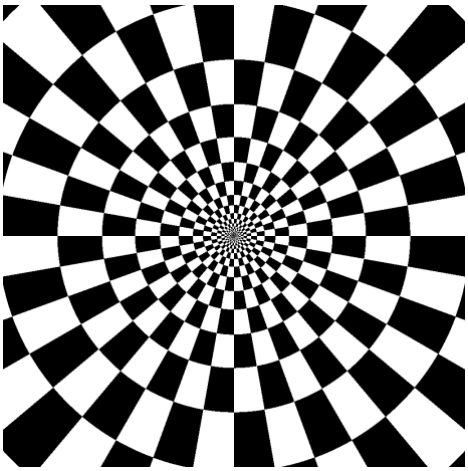


Stimuli

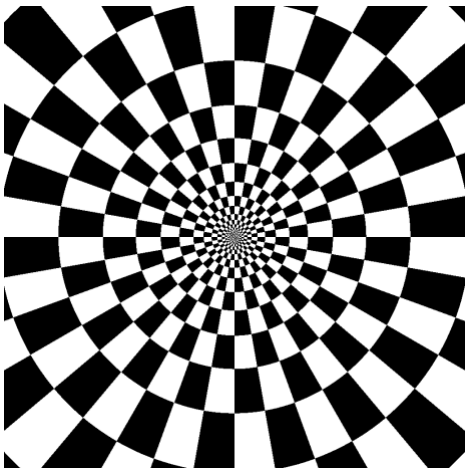


Checkerboards

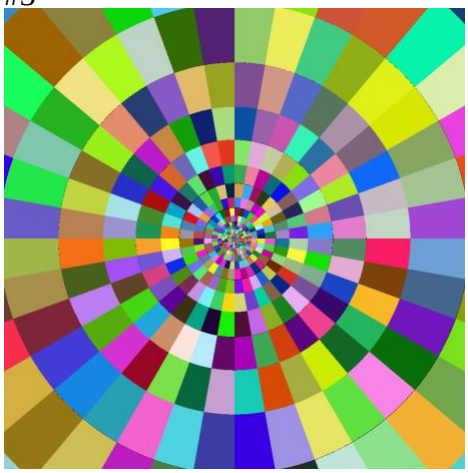
#1



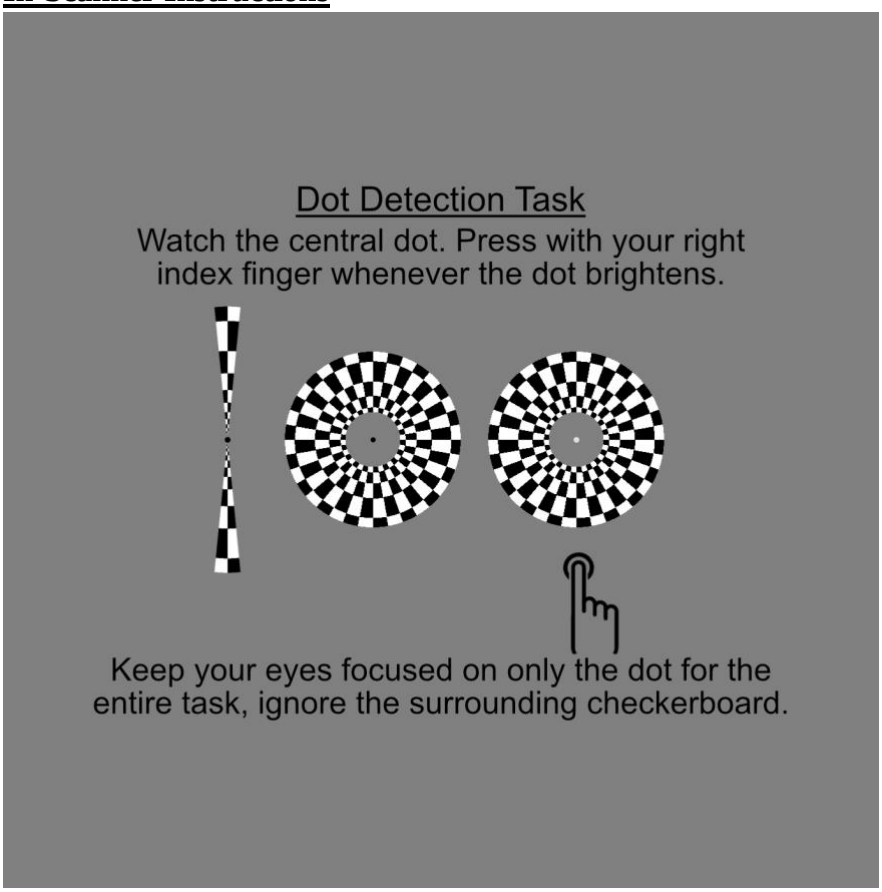
#2



#3



In-Scanner Instructions



"Stay Very Still" Screen

Fixation Dot Changes

Run 1, Block 1		Run 1, Block 2		Run 2, Block 1		Run 2, Block 2	
Time (s)	startColor	Time (s)	startColor	Time (s)	startColor	Time (s)	startColor
0	black	0	black	0	black	0	black
1	black	1	black	1	black	1	black
2	black	2	black	2	grey	2	grey
3	grey	3	grey	3	black	3	black
4	grey	4	black	4	black	4	black
5	black	5	grey	5	black	5	black
6	grey	6	black	6	grey	6	black
7	black	7	black	7	black	7	grey
8	black	8	black	8	grey	8	grey
9	black	9	black	9	grey	9	black
10	grey	10	grey	10	black	10	black
11	black	11	grey	11	black	11	grey
12	black	12	grey	12	grey	12	grey
13	grey	13	grey	13	black	13	grey
14	black	14	black	14	black	14	black
15	grey	15	black	15	black	15	black
16	black	16	black	16	grey	16	black
17	grey	17	black	17	black	17	grey
18	black	18	grey	18	black	18	black
19	grey	19	black	19	black	19	black
20	black	20	grey	20	grey	20	black
21	black	21	grey	21	black	21	black
22	black	22	grey	22	black	22	grey
23	black	23	black	23	black	23	black
24	grey	24	grey	24	black	24	black
25	black	25	black	25	grey	25	black
26	black	26	black	26	black	26	grey
27	grey	27	black	27	black	27	black
28	black	28	black	28	grey	28	black
29	grey	29	grey	29	grey	29	black
30	black	30	black	30	black	30	black
31	black	31	black	31	black	31	grey
32	black	32	black	32	black	32	black
33	black	33	grey	33	grey	33	black
34	grey	34	black	34	grey	34	black
35	black	35	black	35	black	35	black
36	black	36	grey	36	black	36	grey
37	black	37	grey	37	grey	37	black
38	black	38	black	38	black	38	black

39	grey	39	black	39	black	39	black
40	black	40	grey	40	black	40	grey
41	black	41	black	41	grey	41	black
42	black	42	grey	42	black	42	grey
43	black	43	black	43	black	43	black
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47	black	47	black	47	black	47	grey
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49	grey	49	black	49	black	49	black
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66	grey	66	grey	66	grey	66	black
67	black	67	black	67	black	67	black
68	grey	68	black	68	black	68	grey
69	black	69	black	69	grey	69	black
70	grey	70	black	70	black	70	black
71	grey	71	grey	71	black	71	grey
72	black	72	black	72	grey	72	black
73	black	73	black	73	black	73	black
74	black	74	grey	74	black	74	black
75	grey	75	grey	75	black	75	black
76	black	76	black	76	grey	76	grey
77	black	77	grey	77	black	77	black
78	black	78	black	78	grey	78	black
79	black	79	black	79	grey	79	grey
80	grey	80	grey	80	black	80	black

81	black	81	black	81	black	81	black
82	grey	82	grey	82	black	82	grey
83	black	83	black	83	black	83	black
84	black	84	grey	84	grey	84	black
85	grey	85	black	85	black	85	black
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92	black	92	black	92	black	92	grey
93	grey	93	grey	93	grey	93	black
94	grey	94	black	94	black	94	black
95	black	95	black	95	black	95	grey
96	grey	96	black	96	black	96	black
97	black	97	black	97	grey	97	grey
98	black	98	grey	98	black	98	black
99	black	99	black	99	black	99	black

Run 3, Block 1		Run 3, Block 2		Run 4, Block 1		Run 4, Block 2	
Time (s)	startColor	Time (s)	startColor	Time (s)	startColor	Time (s)	startColor
0	black	0	black	0	black	0	black
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2	black	2	black	2	black	2	grey
3	black	3	black	3	grey	3	black
4	black	4	black	4	black	4	black
5	grey	5	grey	5	black	5	black
6	grey	6	black	6	black	6	grey
7	black	7	grey	7	grey	7	black
8	grey	8	black	8	black	8	black
9	black	9	black	9	black	9	black
10	black	10	black	10	black	10	grey
11	black	11	black	11	black	11	black
12	grey	12	grey	12	grey	12	black
13	grey	13	black	13	grey	13	black
14	black	14	black	14	grey	14	grey
15	black	15	black	15	black	15	black
16	black	16	black	16	black	16	black
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24	black	24	black	24	grey	24	grey
25	black	25	grey	25	black	25	black
26	black	26	black	26	black	26	grey
27	black	27	grey	27	black	27	grey
28	grey	28	black	28	grey	28	grey
29	black	29	grey	29	black	29	grey
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36	black	36	black	36	black	36	grey
37	black	37	grey	37	black	37	black
38	grey	38	black	38	black	38	black
39	black	39	black	39	grey	39	grey

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41	black	41	grey	41	black	41	black
42	grey	42	black	42	grey	42	black
43	black	43	black	43	black	43	grey
44	black	44	black	44	black	44	grey
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47	grey	47	grey	47	black	47	black
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51	grey	51	black	51	grey	51	black
52	black	52	black	52	black	52	grey
53	grey	53	grey	53	black	53	grey
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71	black	71	grey	71	grey	71	black
72	black	72	grey	72	black	72	grey
73	black	73	grey	73	black	73	black
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76	black	76	black	76	grey	76	grey
77	grey	77	grey	77	black	77	grey
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82	grey	82	black	82	black	82	grey
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84	black	84	black	84	grey	84	grey
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90	black	90	black	90	black	90	black
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92	black	92	grey	92	grey	92	black
93	grey	93	black	93	black	93	grey
94	black	94	black	94	black	94	black
95	black	95	grey	95	grey	95	grey
96	black	96	black	96	black	96	black
97	grey	97	black	97	black	97	black
98	grey	98	grey	98	black	98	black
99	black	99	black	99	grey	99	black

Run 5, Block 1		Run 5, Block 2	
Time (s)	startColor	Time (s)	startColor
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1	grey	1	black
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4	black	4	black
5	grey	5	grey
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7	grey	7	grey
8	grey	8	black
9	black	9	black
10	grey	10	black
11	black	11	grey
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14	grey	14	black
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37	grey	37	black
38	black	38	grey
39	black	39	black

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44	black	44	black
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48	black	48	black
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80	black	80	grey
81	grey	81	black

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85	grey	85	grey
86	grey	86	black
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88	grey	88	black
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90	black	90	black
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95	black	95	black
96	grey	96	grey
97	grey	97	black
98	black	98	black
99	black	99	grey