Purposeful Versus Automatic Measures of Social Attention: The Impact on ERP Correlates During Face Perception

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Background

- Face perception, an ability guided by social attention, underlies higher-ordered cognitive processes.[1]
- An individual's ability to distinguish between an upright and inverted face develops early on and can be detected by distinct neural biomarkers.[2]
- Some biomarkers are early and automatic (e.g., P1, N170), while others occur later and are associated with greater stimulus evaluation (e.g., P3).[2-3]
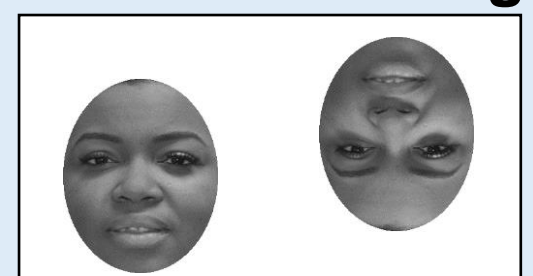
Objective

- To investigate how different types of face perception tasks influence face inversion amplitudes (P1, N170, and P3) in adults [Study 1] and youth [Study 2].

Method

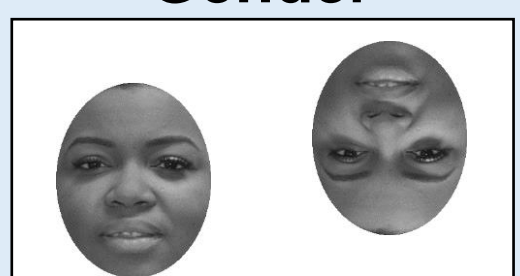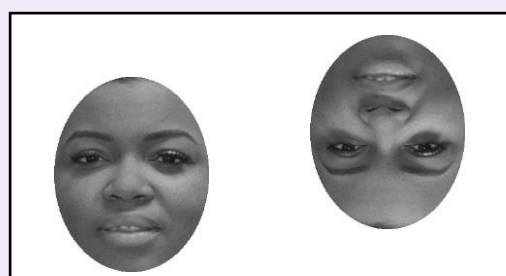Study 1 / Study 2

Passive Viewing — No Decision
Gender — *Does this person identify as male or female?* — Social + Perceptual Decision
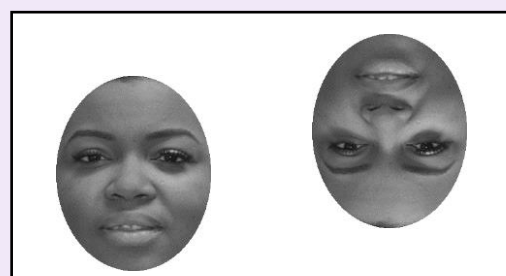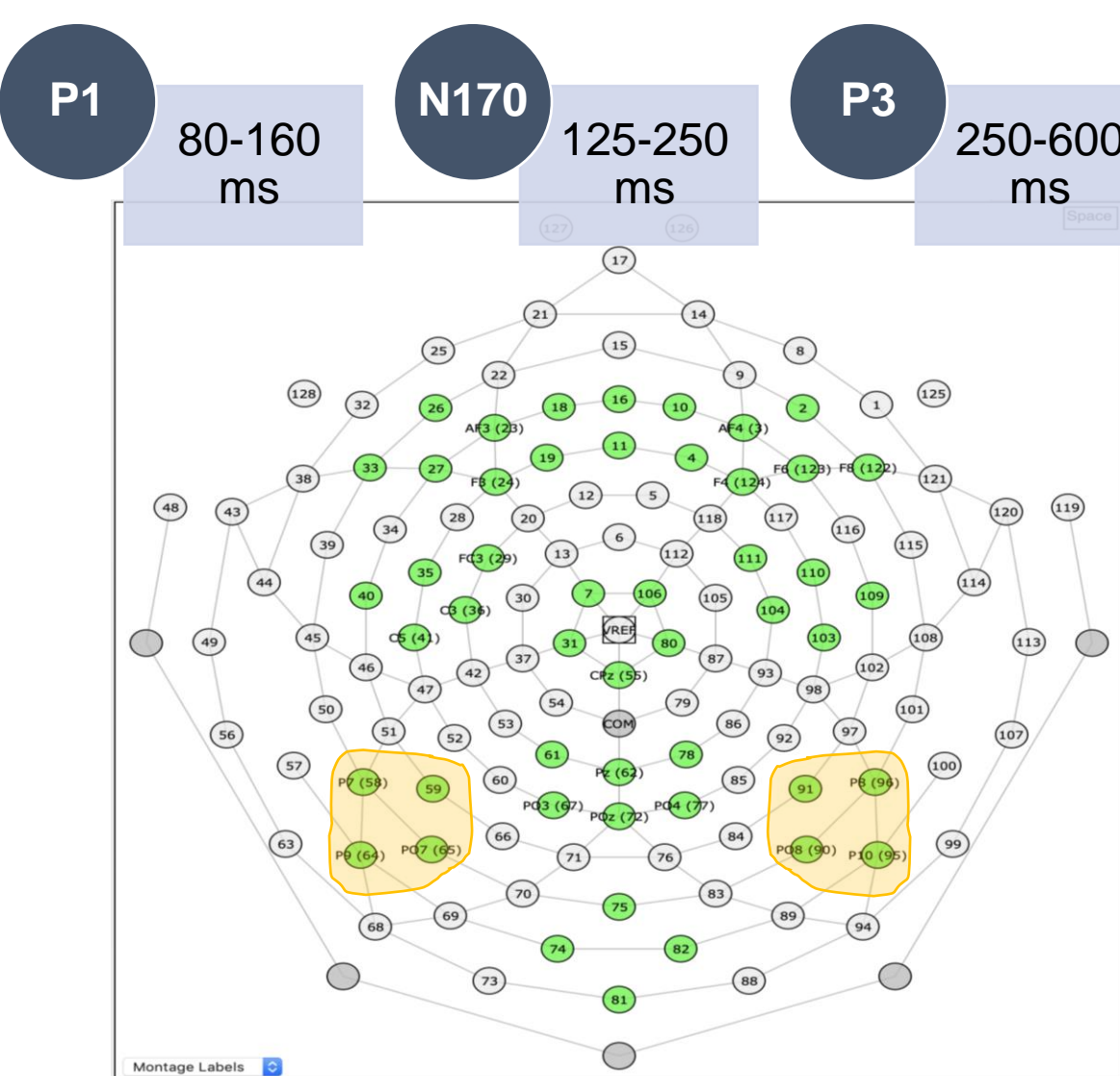Handedness — *Is this person right- or left-handed?* — Nonsocial + Perceptual Decision
Pet — *Does this person identify as a dog or cat person?* — Social + Cognitive Decision

P1 80-160 ms | N170 125-250 ms | P3 250-600 ms

		Study 1	Study 2	
		Adult n = 36	Adult n = 71	Youth n = 65
Age (M, SD)		20.95 (2.16)	20.28 (2.39)	11.98 (1.26)
Gender	Female	27 (75.00)	47 (66.20)	29 (44.62)
	Male	8 (22.22)	19 (26.76)	35 (53.85)
	Other	1 (2.77)	2 (2.82)	1 (1.54)
	Not Reported		3 (4.22)	
Eth.	Hispanic/Latine	3 (8.33)	8 (11.27)	2 (3.08)
	Not Hispanic/ Latine	33 (91.67)	58 (81.69)	62 (95.38)
	Not Reported	-	5 (7.04)	1 (1.54)
Race	Asian	4 (11.11)	6 (8.45)	3 (4.62)
	Native Hawaiian/Pacific Islander	1 (2.78)	1 (1.41)	
	Black/African American	6 (16.67)	7 (9.86)	13 (20.00)
	White	23 (63.89)	53 (74.65)	41 (63.08)
	More than one race	1 (2.77)	2 (2.82)	8 (12.31)
	Not Reported	1 (2.77)	1 (1.41)	-

Brain Research Across Development Laboratory
PI: Dr. Caitlin Hudac
www.-b-radlab.com
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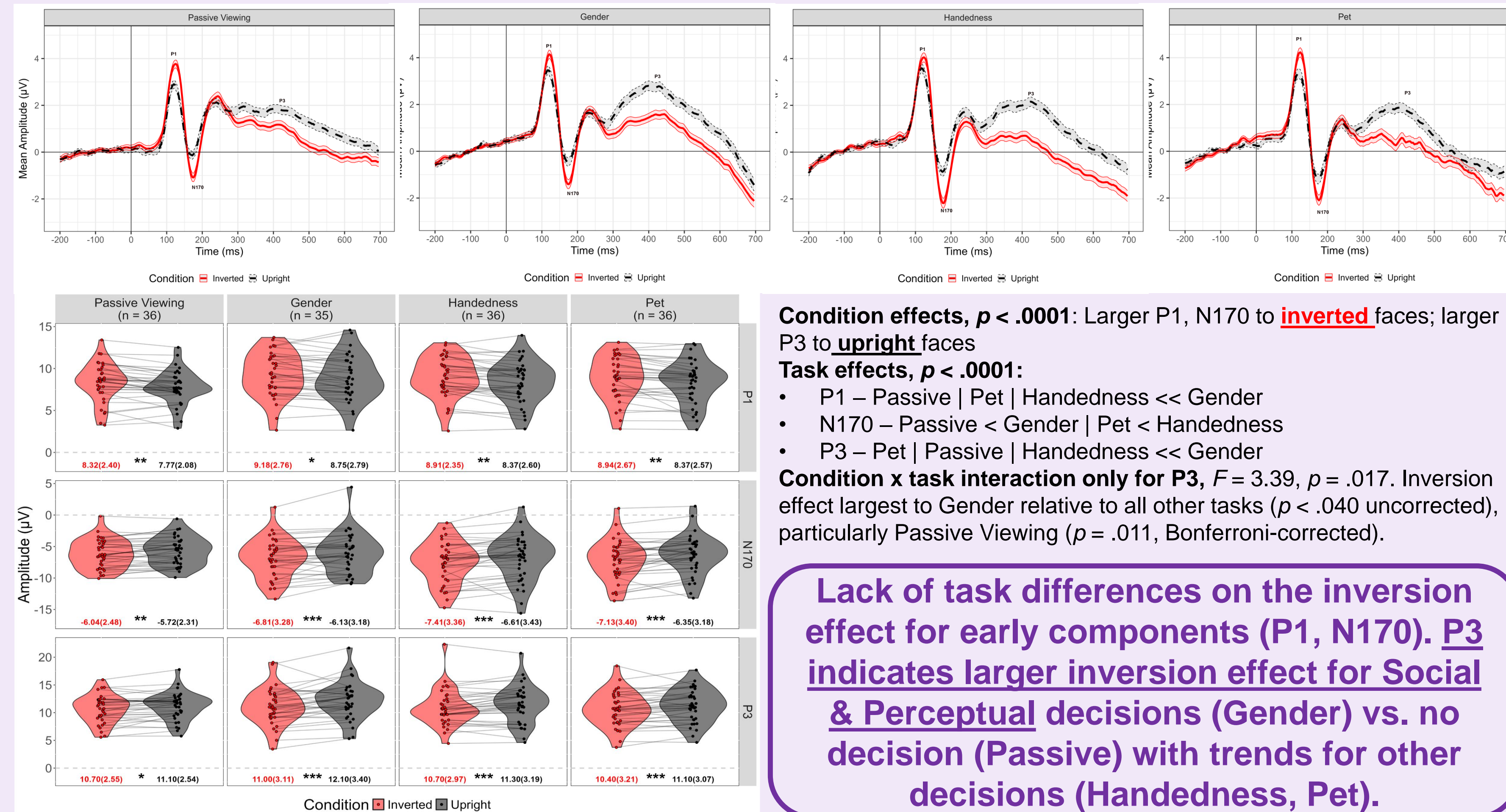
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References
1. Haxby et al., (2000). *Trends in Cognitive Sciences, 4(6)* 223-233.
2. Johnson & de Haan (2015). *Developmental cognitive neuroscience.* Wiley Blackwell.
3. Polich & Comerchero (2003). *Brain Topography, 15(3),* 141-152.

Study 1: Adults

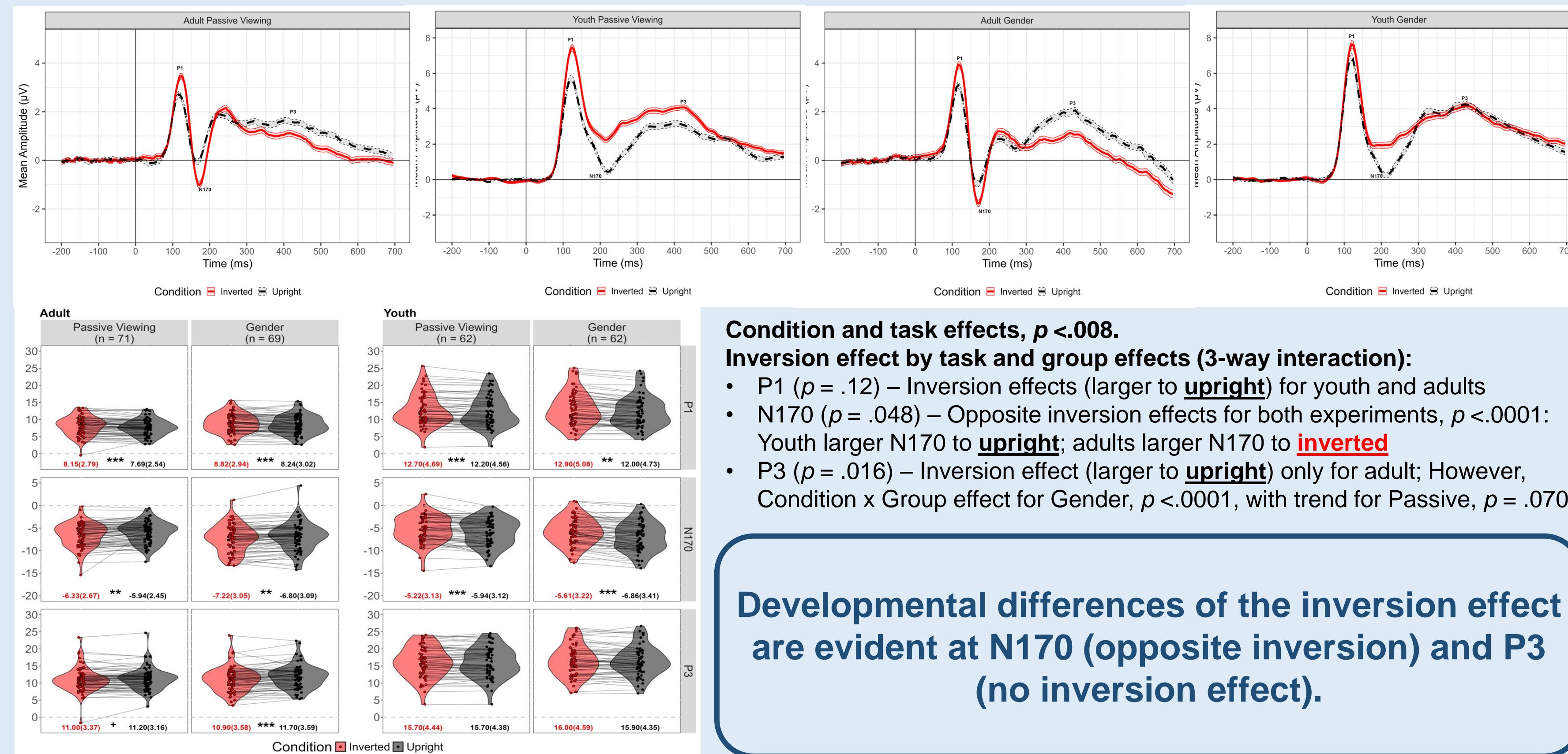**Condition effects, $p < .0001$**: Larger P1, N170 to **inverted** faces; larger P3 to **upright** faces.
Task effects, $p < .0001$:
- P1 – Passive | Pet | Handedness << Gender
- N170 – Passive < Gender | Pet < Handedness
- P3 – Pet | Passive | Handedness << Gender

Condition x task interaction only for P3, $F = 3.39$, $p = .017$. Inversion effect largest to Gender relative to all other tasks ($p < .040$ uncorrected), particularly Passive Viewing ($p = .011$, Bonferroni-corrected).

Lack of task differences on the inversion effect for early components (P1, N170). P3 indicates larger inversion effect for Social & Perceptual decisions (Gender) vs. no decision (Passive) with trends for other decisions (Handedness, Pet).

Study 2: Youth & Adults

Condition and task effects, $p < .008$.
Inversion effect by task and group effects (3-way interaction):
- P1 ($p = .12$) – Inversion effects (larger to **upright**) for youth and adults
- N170 ($p = .048$) – Opposite inversion effects for both experiments, $p < .0001$: Youth larger N170 to **upright**; adults larger N170 to **inverted**
- P3 ($p = .016$) – Inversion effect (larger to **upright**) only for adult; However, Condition x Group effect for Gender, $p < .0001$, with trend for Passive, $p = .070$.

Developmental differences of the inversion effect are evident at N170 (opposite inversion) and P3 (no inversion effect).

Social and perceptual decisions (Gender) elicit large inversion effects in adults and youth. However, developmental differences are indicated in N170 and P3 components.