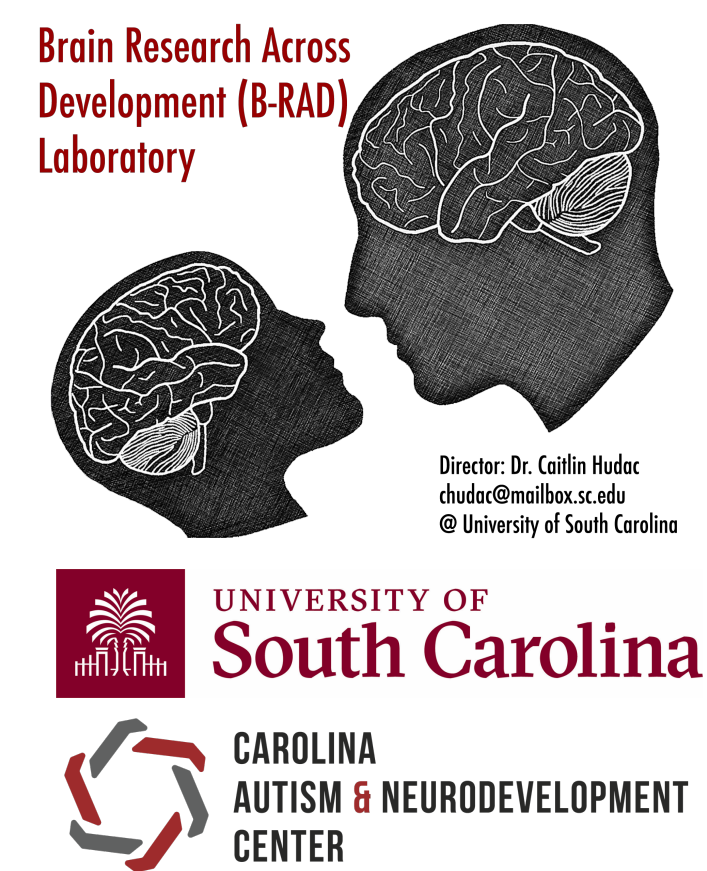


# Attention biomarkers in genetic subgroups linked to neurodevelopmental disorders: Preliminary evidence from *DYRK1A* and *SCN2A*

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**Atypical attention is well-known in ASD and NDDs and may serve as a target biomarker.** Current ASD biomarker development studies tend to exclude minimally verbal/non-speaking or low IQ. However, these features are present in ~30% of all ASD cases, limiting the relevance of these biomarker efforts. Many genetic etiologies linked to ASD/NDDs are saturated for these features, and a genetics-first approach better captures underlying shared biology. **Here, we test two proposed biomarkers in children with a known genetic mutation (N=9 *DYRK1A*, N=5 *SCN2A*) compared to idiopathic ASD (N=12 iASD) and neurotypical development (N=47 NT).**

Bradshaw et al., 2019; Hadjikhani, Baduel, & Rogé; Hudac et al., 2018; Tager-Flusber & Kasari, 2013

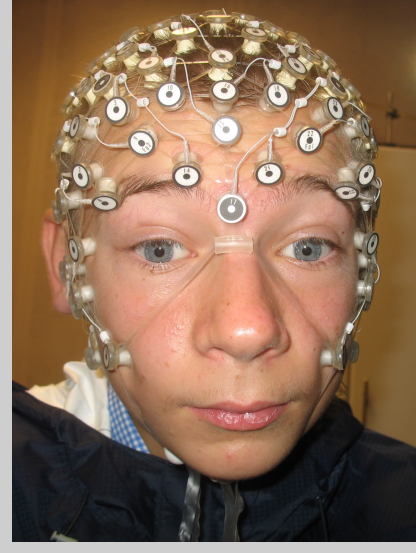
***DYRK1A*:**  
Down syndrome region of chr21; neurogenesis



- ASD
- ID/DD
- Microcephaly
- Speech/Motor issues
- Feeding difficulties

van Bon 2016; van Bon 2011; Earl 2017; Kurtz-Nelson et al, under review

***SCN2A*:**  
Encodes NAV1.2 sodium channel



- ASD
- ID/DD
- Microcephaly
- Infantile seizures
- Hypotonia

Ben-Shalom 2017; Weiss 2003; Gazina 2015; Hudac in prep

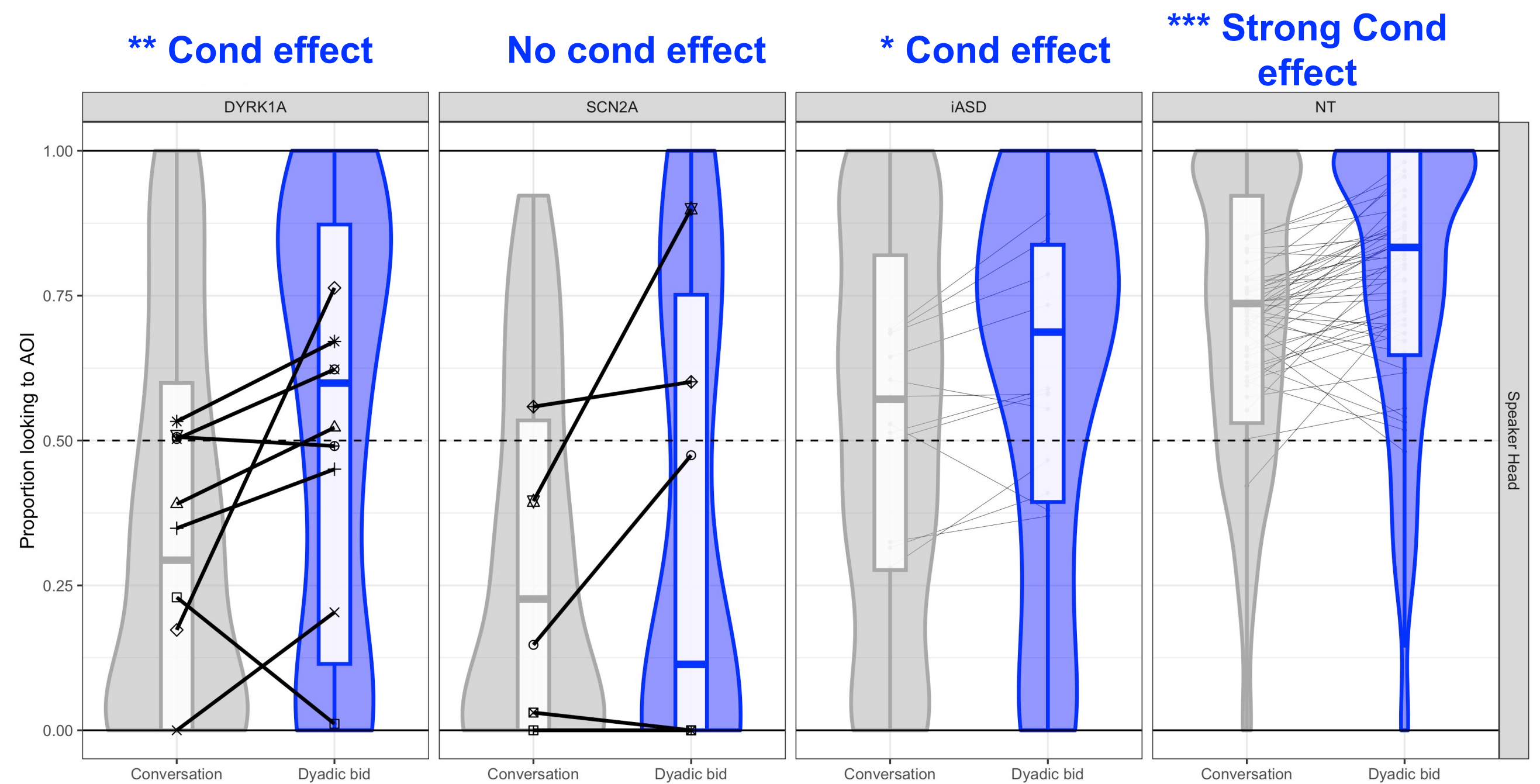
## (1) Eye tracking during 16 sec videos:

### Dyadic bid

- Speaker looks at camera
- Foil looks down
- Direct gaze control at camera

### Conversational flow

- Look at each other
- Take turns speaking



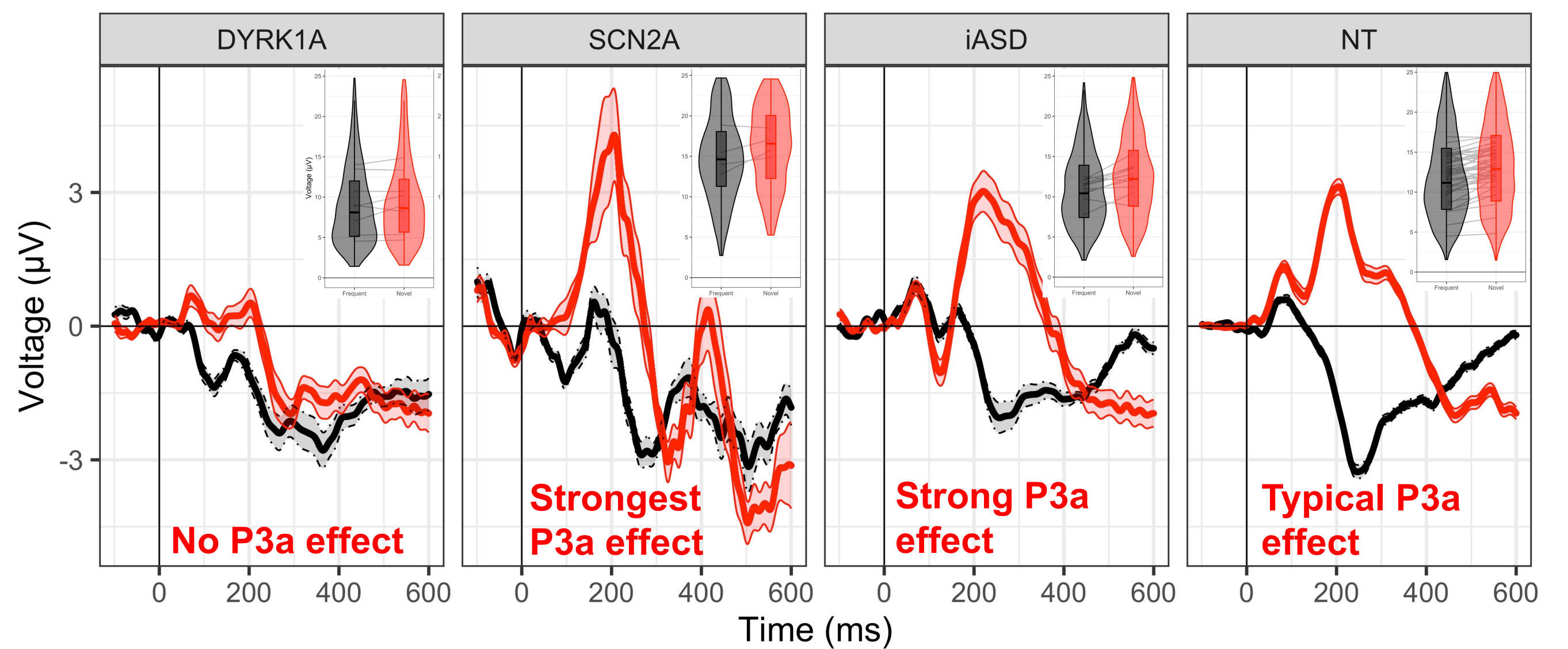
## (2) Electroencephalography (EEG) while listening to sounds

### Novel sounds

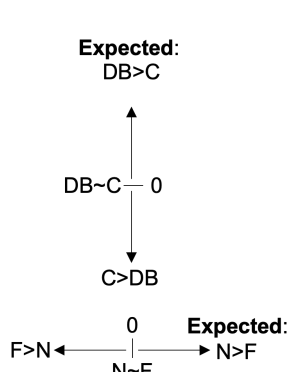
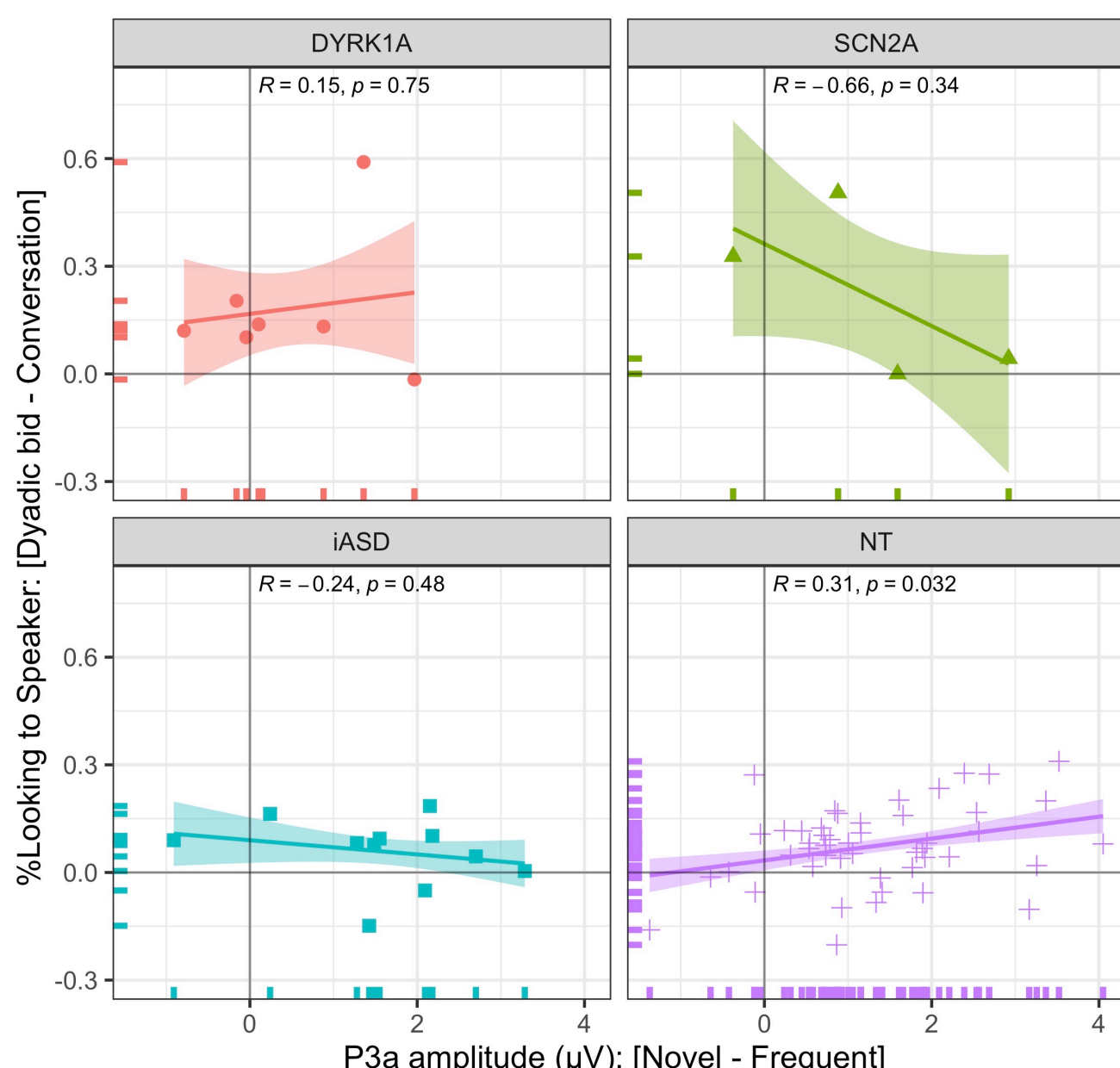
- Odd noises, 15% trials

### Frequent tone

- Repeated tone, 70% trials



## (3) EEG vs ET Effects



Correspondence between attention measures only in NT group

Summary	<i>DYRK1A</i>	<i>SCN2A</i>
<b>Visual social attention (ET)</b>	Heightened but expected pattern (similar to iASD)	<b>Atypical:</b> Lack of attention to speaker head during dyadic bid
<b>Auditory attention (EEG)</b>	<b>Atypical:</b> Lack of P3 condition effect	Heightened but expected pattern (similar to iASD)

**Although preliminary data, our results suggest that attention biomarkers are unique for *SCN2A* and *DYRK1A* subgroups. Next, we plan to continue to explore potential mechanisms with specific consideration for how attention is modulated across different sensory domains.**

Find our posters here:



[www.b-radlab.com](http://www.b-radlab.com)  
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