

Facial Expression Processing of Children Orphaned by Parental HIV/AIDS: ERP Study with Rapid Serial Visual Presentation

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INTRODUCTION

Children orphaned by Acquired Immunodeficiency Syndrome (AIDS) ("AIDS orphans") are defined as children under 18 years of age who have lost one or both of their parents to HIV (The human immunodeficiency viruses) infection [1]. As established in the literature over the past decade, these AIDS orphans were exposed to numerous challenges, such as parental death, poverty, disrupted school attendance, and stigma [2–3]. All of these early life stress events have long-lasting effects on cognitive function and emotional response [4]. Individuals exposed to early life stress were more vulnerable to negative emotions, such as anxiety, loneliness, and depression [5], and also exhibited poorer emotion and cognitive outcomes, such as anger/hostility, attention problems, and aggressive behavior [6]. Recently, the underlying mechanism of these behavioral alterations was discussed in a substantial body of neurocognitive studies [7]. Neuroimaging studies showed that exposure to childhood life stress was associated with the aberrant development of emotional cognitive circuits, including the prefrontal cortex, amygdala, and hippocampus [8]. However, data are limited regarding how early life adverse events affects the neural dynamic associated with facial emotion recognition processing in AIDS Orphans with Event-related brain Potentials (ERP) technique. Therefore, the current study aims to investigate whether there are behavioral and neurological obstacles in the recognition of emotional faces in AIDS orphans and also to further explore the processing stage at which the difference in facial emotion recognition exists.

METHODS

Participants

81 AIDS orphans (14.64 ± 1.43 yrs) and 60 non-orphan children (12.43 ± 1.62 yrs) were recruited through the local communities and school systems in Henan, China.

Stimuli and Procedure

The rapid serial visual presentation (RSVP) paradigm chosen for the present study can be used to investigate the characters of the time-based attention [6]. Materials consisted of 30 face pictures and 3 upright house pictures. Face pictures including 18 upright faces (6 happy faces, 6 fearful faces, 6 neutral faces) and 12 inverted neutral faces (male: female = 1:1), which were selected from the Chinese Facial Affective Picture System (CFAPS). An example of experimental trial is shown in Figure 1.

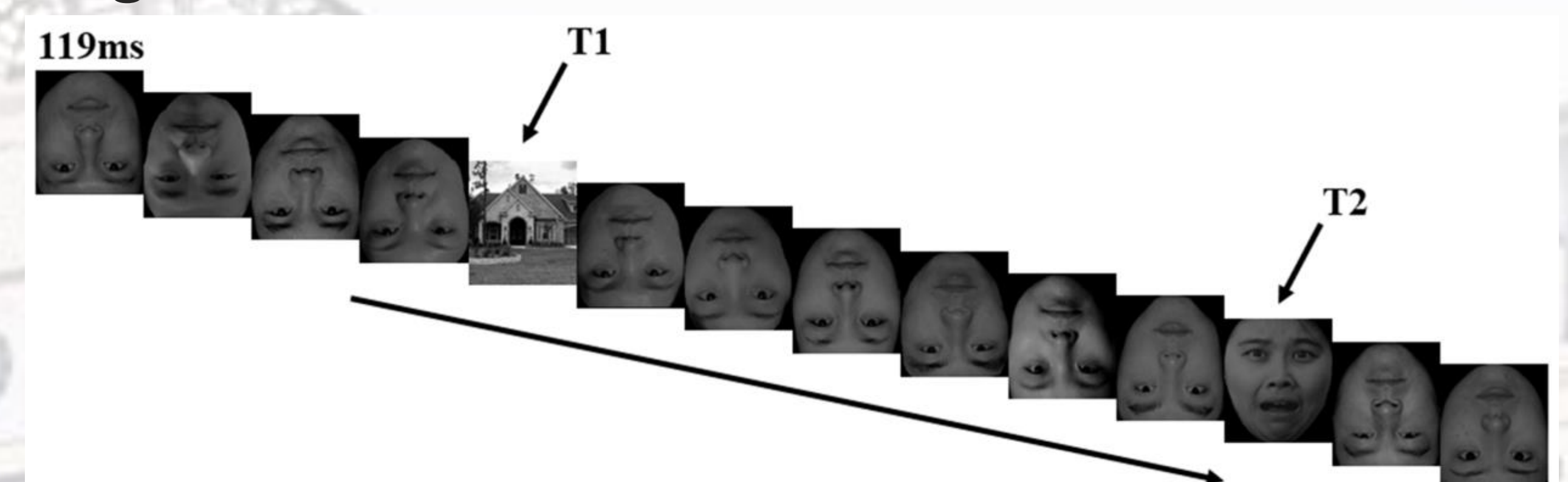


Figure 1. Overview of a representative experimental trial.

Apparatus

The EEG was recorded from 32 channels using the standard 10–20 system (Brain Products, Gilching, Germany) with a bandpass from 0.01 to 100 Hz and a 500 Hz sampling rate. All channels were online referenced to FCz during recording. Recording impedance for all electrodes was held beneath 10 kΩ.

RESULTS

Behavioral Results

Behavioral results showed that orphans displayed higher response accuracy and shorter reaction time than the control ($p < 0.05$).

Table 1. Demographic variables and behavioral performance between groups.

	Orphan Group	Control Group	F or χ^2	p
Number of subjects	81	60		
Gender N(%)	Boys	24 (34.3%)	3.887	0.061
	Girls	36 (50.7%)		
age (years)	14.64 ± 1.43	12.43 ± 1.62	87.372	<0.001
Accuracy(%)	0.87 ± 0.11	0.84 ± 0.13	9.674	0.002
Response time (ms)	745.05 ± 256.72	904.32 ± 318.92	4.539	0.035

Note. Values are presented as mean \pm standard deviation (SD).

ERP Results

The attenuated amplitude of N170 was observed in AIDS orphans compared to the non-orphan control with happy and neutral faces;

P300 component showed significant differences in parietal lobe between groups, the non-orphan control group produced larger P300 amplitudes than orphans.

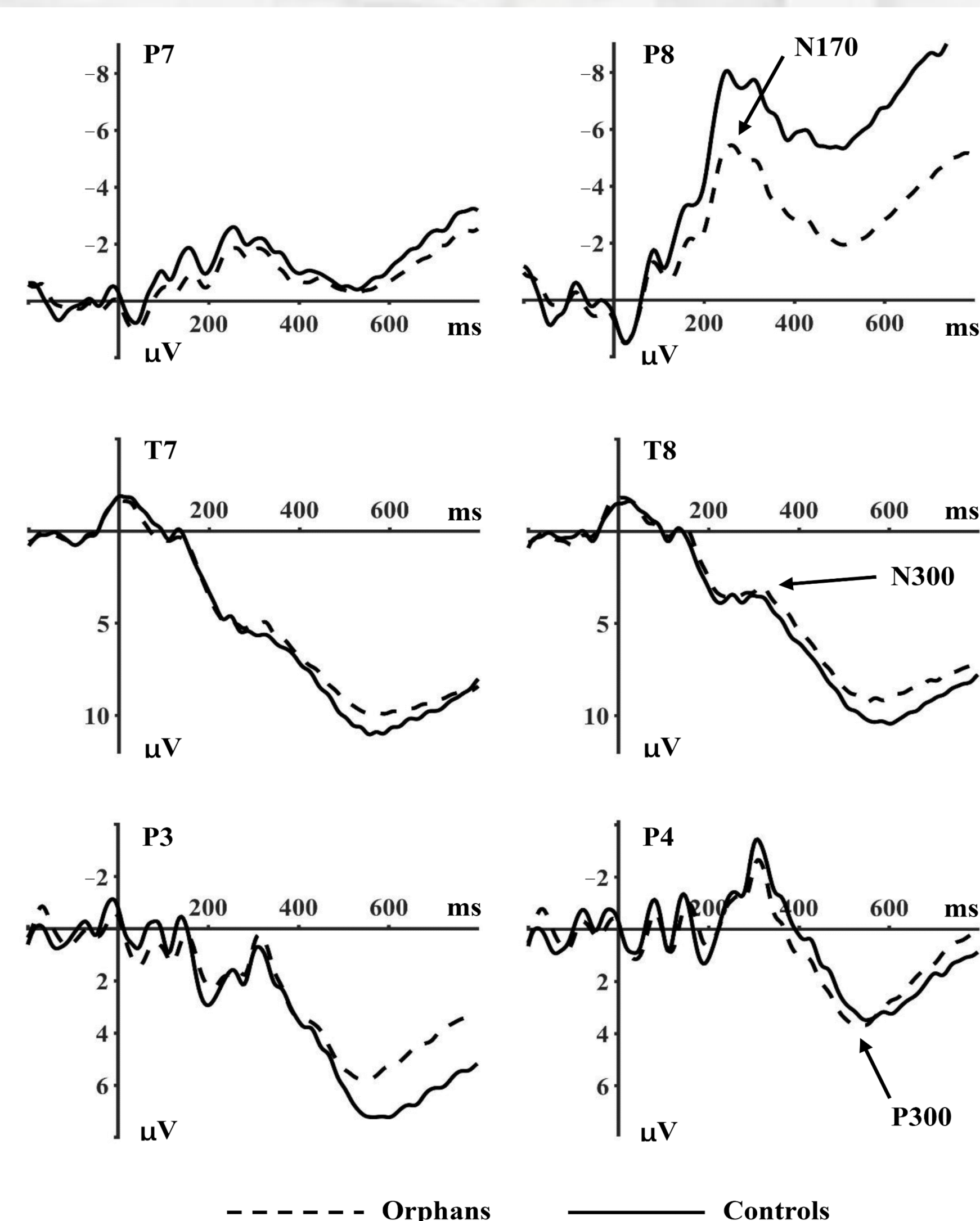


Figure 2. Grand average ERPs for orphans and control group.

CONCLUSION

The current study investigated the impact of early life stress events on children's processing of facial displays of emotion. According to the results, AIDS orphans may have difficulty in structural processing of the face, especially with happy and neutral faces. They also showed a worsened evaluation ability of information related to the affective valence of a face. However, negative stimuli were given more weight during strained attention conditions. Overall, the findings indicate that early life adversity may result in worse emotional outcomes among AIDS orphans through impaired configuration and evaluation processing.

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