

Research Report

ERP correlates of the development of orthographical and phonological processing during Chinese sentence reading

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Article history:

far-near

因 because of 阴 negative

诚 honest 城 city

成 suc-

cess

Hanja

Hangul

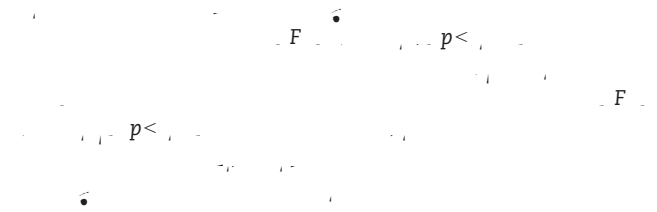
服 clothes 报 newspaper

Table 1 – Design and sample stimuli

过新年, 孩子们都穿上漂亮的 <u>衣服</u> (衣服).
节假日, 人们喜欢到郊外观赏自然风 <u>景</u> (风景).
刮大风时, 我出门都要穿 <u>挡</u> 风的风衣.

2. Results

2.1. Behavioral data



2.2. ERP data



2.2.1. P200

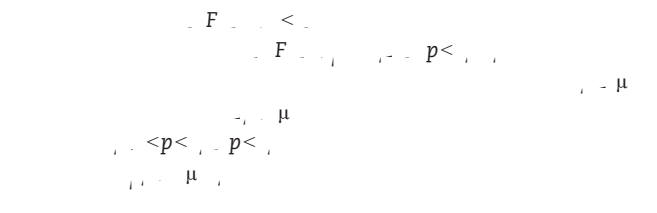


Table 2 – Mean of RTs (in milliseconds) and error percentages for the adult and child readers

Group	Condition	Mean RT (ms)	Error (%)
Adult	Match	215	1.2
	Mismatch	235	1.5
Child	Match	245	1.8
	Mismatch	265	2.2

Adults

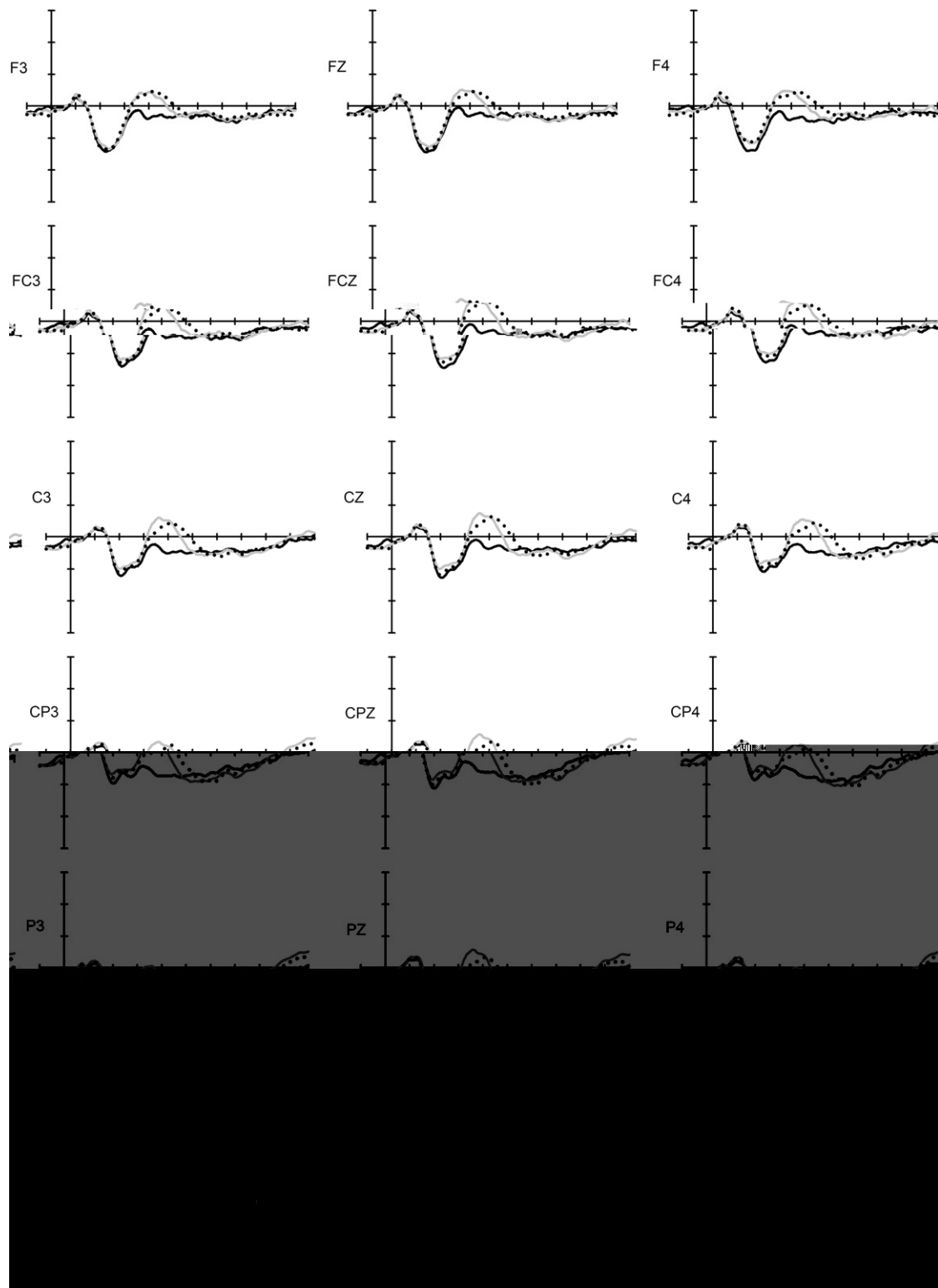


Fig. 1 – Grand average ERPs for the adult participants at 15 typical electrodes. The solid line was for the baseline condition, the dotted line for the orthographic condition, and the gray line for the homophonic condition.

$F(1, 14) = 10.1, p < .01$
 $\mu = -0.15$
 $\mu = -0.15$

$F(1, 14) = 10.1, p < .01$

Children

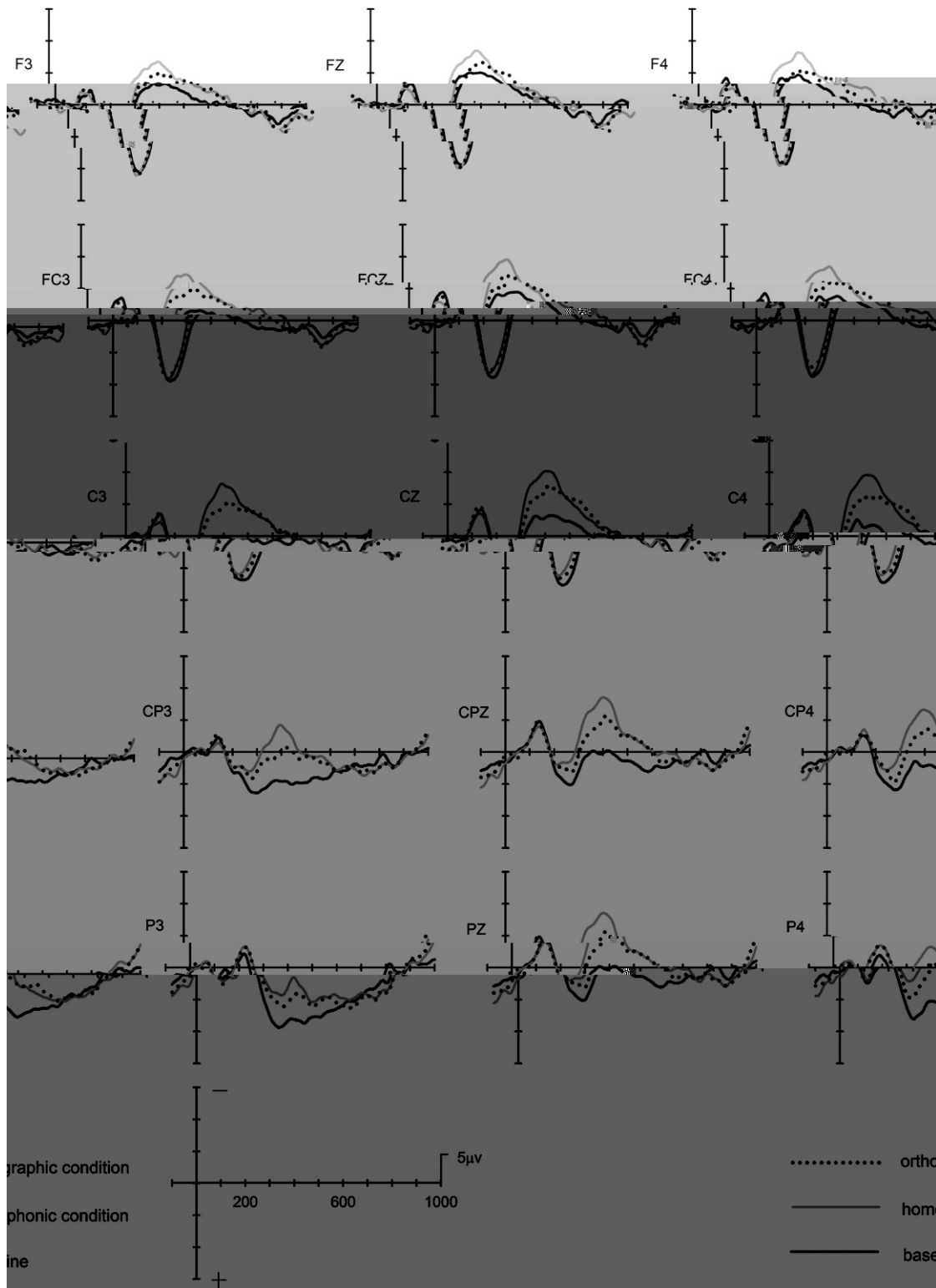


Fig. 2 – Grand average ERPs for the child participants at 15 typical electrodes. The solid line was for the baseline condition, the dotted line for the orthographic condition, and the gray line for the homophonic condition.

$F(1, 14) = 10.2, p < .01$, $\eta^2_p = .42$. The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the F3 electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the FZ electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the F4 electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the FC3 electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the FCZ electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the FC4 electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the C3 electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the CZ electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the C4 electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the CP3 electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the CPZ electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the CP4 electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the P3 electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the PZ electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$). The orthographic condition elicited a larger positive deflection ($M = 1.2 \mu V$) than the homophonic condition ($M = -0.8 \mu V$) at the P4 electrode ($F(1, 14) = 10.2, p < .01, \eta^2_p = .42$).

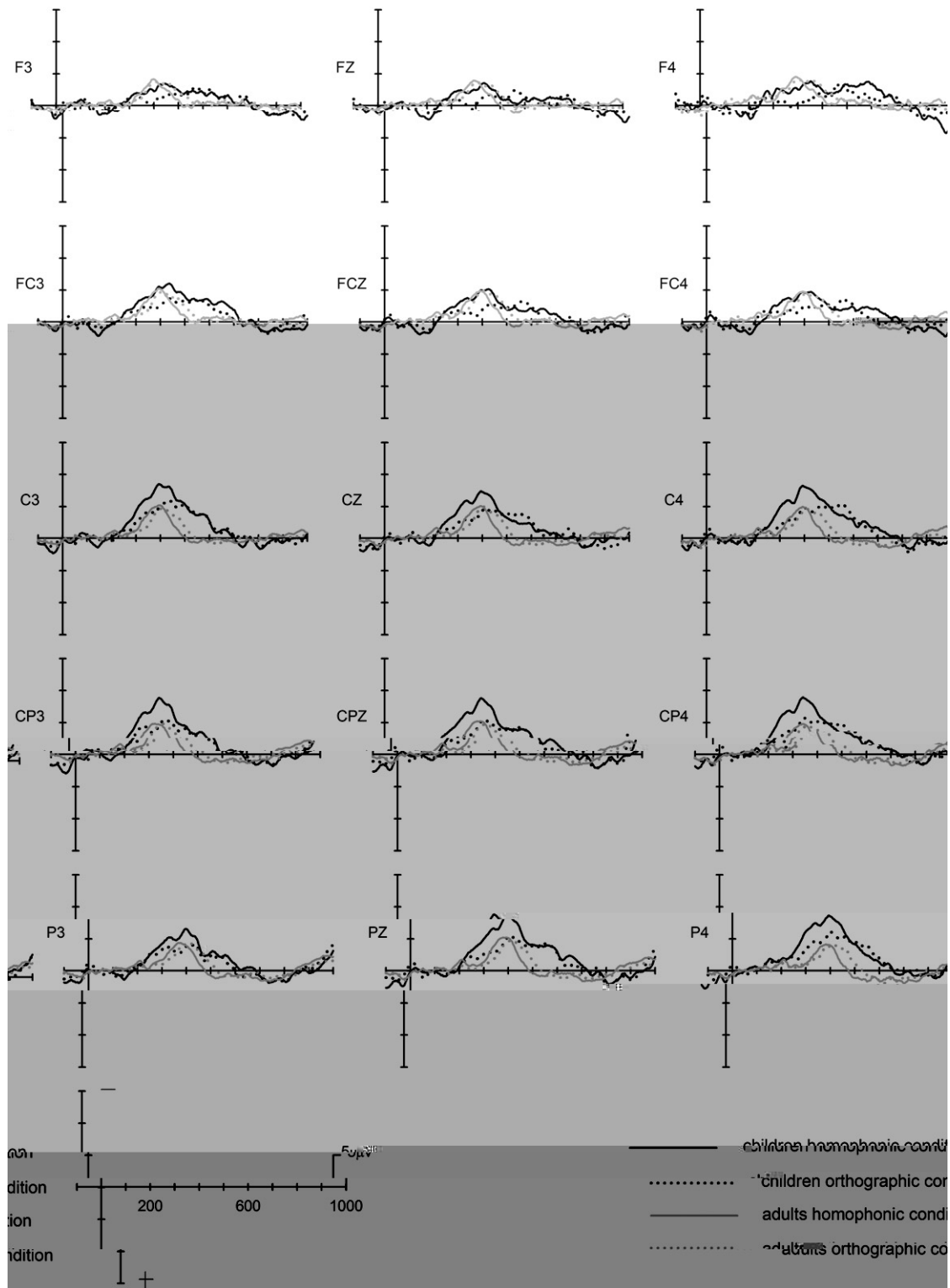


Fig. 3 – Difference waveforms contrasting the homophonic and the baseline conditions and contrasting the orthographic and the baseline conditions for the adult and the child participants.

... p <math>< p</math> ... F ... $μ$... p ... $μ$... F ... p ...

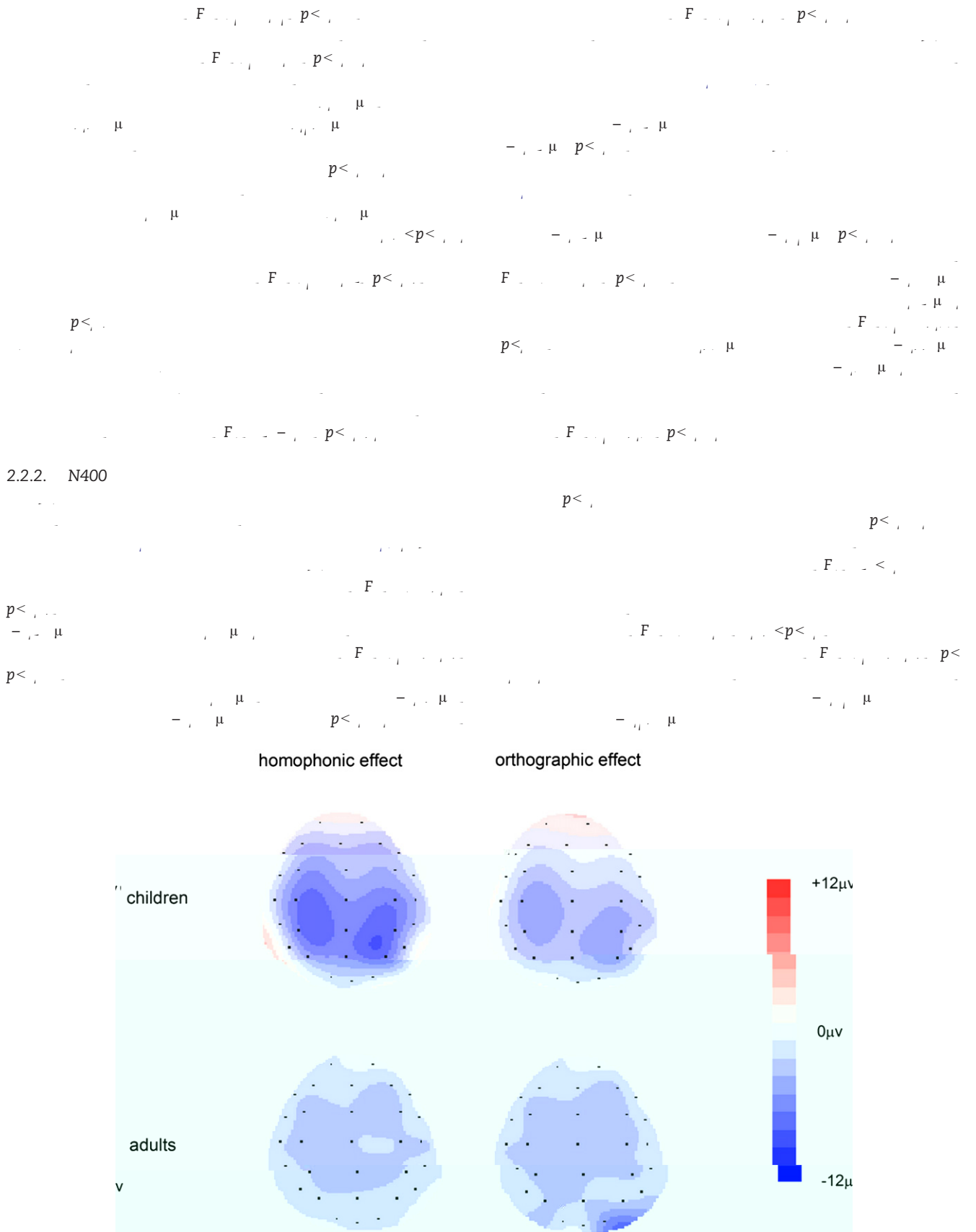


Fig. 4 – Topographic maps for the averaged N400 effects in the 300-500 ms time window for the child and adult participants, contrasting the homophonic or the orthographic condition with the baseline.

$p < \mu$

$< p <$

F

$p < \mu$

F

$p < \mu$

μ

μ

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$p <$

μ

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$p <$

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F

$p <$

$p <$

$p <$

$p >$

$p <$

F

$p <$



Table 3 – The mean frequencies (per million) and the numbers of strokes for the critical characters and the characters in the original base words

Character	Mean frequency (per million)	Number of strokes	Character in original base word	Number of strokes
尘	1.1	6	晨	11
晨	1.1	11	晨	11
晨	1.1	11	晨	11

尘 dust 晨 morning

4. Experimental procedures

4.1. Participants

4.2.2. Pretests of stimuli

4.2. Stimuli

4.2.1. Stimuli and design

服 clothes 报 newspaper

龟 tortoise 电 power

“ ” “ ” “ ” “ ”

4.3. Procedure

The first step in the process is the identification of the specific area of the brain that is affected by the stroke. This is done through a series of tests, including a physical examination, a neurological examination, and imaging studies such as CT scans and MRI. Once the location of the stroke is determined, the next step is to assess the severity of the stroke and the patient's overall health. This is done through a series of tests, including a blood test, a chest X-ray, and a heart rate monitor.

The third step in the process is the selection of the most appropriate treatment for the patient. This is done based on the location and severity of the stroke, as well as the patient's overall health. The most common treatment for stroke is the use of thrombolytic drugs, which help to dissolve the blood clot that caused the stroke. Other treatments include surgery, physical therapy, and occupational therapy.

The fourth step in the process is the implementation of the treatment plan. This involves the use of the selected treatment, as well as the monitoring of the patient's progress. The patient's progress is monitored through a series of tests, including a physical examination, a neurological examination, and imaging studies.

The fifth step in the process is the evaluation of the patient's response to treatment. This is done through a series of tests, including a physical examination, a neurological examination, and imaging studies. The patient's response to treatment is evaluated based on the patient's overall health, the severity of the stroke, and the patient's ability to perform daily activities.

The sixth step in the process is the continuation of the treatment plan. This involves the use of the selected treatment, as well as the monitoring of the patient's progress. The patient's progress is monitored through a series of tests, including a physical examination, a neurological examination, and imaging studies.

The seventh step in the process is the evaluation of the patient's long-term outcome. This is done through a series of tests, including a physical examination, a neurological examination, and imaging studies. The patient's long-term outcome is evaluated based on the patient's overall health, the severity of the stroke, and the patient's ability to perform daily activities.

The eighth step in the process is the continuation of the treatment plan. This involves the use of the selected treatment, as well as the monitoring of the patient's progress. The patient's progress is monitored through a series of tests, including a physical examination, a neurological examination, and imaging studies.

The ninth step in the process is the evaluation of the patient's long-term outcome. This is done through a series of tests, including a physical examination, a neurological examination, and imaging studies. The patient's long-term outcome is evaluated based on the patient's overall health, the severity of the stroke, and the patient's ability to perform daily activities.

The tenth step in the process is the continuation of the treatment plan. This involves the use of the selected treatment, as well as the monitoring of the patient's progress. The patient's progress is monitored through a series of tests, including a physical examination, a neurological examination, and imaging studies.

The eleventh step in the process is the evaluation of the patient's long-term outcome. This is done through a series of tests, including a physical examination, a neurological examination, and imaging studies. The patient's long-term outcome is evaluated based on the patient's overall health, the severity of the stroke, and the patient's ability to perform daily activities.

The twelfth step in the process is the continuation of the treatment plan. This involves the use of the selected treatment, as well as the monitoring of the patient's progress. The patient's progress is monitored through a series of tests, including a physical examination, a neurological examination, and imaging studies.

The thirteenth step in the process is the evaluation of the patient's long-term outcome. This is done through a series of tests, including a physical examination, a neurological examination, and imaging studies. The patient's long-term outcome is evaluated based on the patient's overall health, the severity of the stroke, and the patient's ability to perform daily activities.

The fourteenth step in the process is the continuation of the treatment plan. This involves the use of the selected treatment, as well as the monitoring of the patient's progress. The patient's progress is monitored through a series of tests, including a physical examination, a neurological examination, and imaging studies.

The fifteenth step in the process is the evaluation of the patient's long-term outcome. This is done through a series of tests, including a physical examination, a neurological examination, and imaging studies. The patient's long-term outcome is evaluated based on the patient's overall health, the severity of the stroke, and the patient's ability to perform daily activities.

The sixteenth step in the process is the continuation of the treatment plan. This involves the use of the selected treatment, as well as the monitoring of the patient's progress. The patient's progress is monitored through a series of tests, including a physical examination, a neurological examination, and imaging studies.

The seventeenth step in the process is the evaluation of the patient's long-term outcome. This is done through a series of tests, including a physical examination, a neurological examination, and imaging studies. The patient's long-term outcome is evaluated based on the patient's overall health, the severity of the stroke, and the patient's ability to perform daily activities.

The eighteenth step in the process is the continuation of the treatment plan. This involves the use of the selected treatment, as well as the monitoring of the patient's progress. The patient's progress is monitored through a series of tests, including a physical examination, a neurological examination, and imaging studies.

The nineteenth step in the process is the evaluation of the patient's long-term outcome. This is done through a series of tests, including a physical examination, a neurological examination, and imaging studies. The patient's long-term outcome is evaluated based on the patient's overall health, the severity of the stroke, and the patient's ability to perform daily activities.

The twentieth step in the process is the continuation of the treatment plan. This involves the use of the selected treatment, as well as the monitoring of the patient's progress. The patient's progress is monitored through a series of tests, including a physical examination, a neurological examination, and imaging studies.