Contextual Prediction Processing in Chinese Reading and Its Effect on Lexical Identification: Evidence from Fixation-Related Potentials

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Abstract

This study employed fixation-related potential techniques to investigate predictive processing in Chinese reading and the cognitive mechanisms by which it influences lexical recognition effects. By analyzing eye movement and electrophysiological data in both the pre-target and target word regions, the results revealed: (1) contextual predictability increased gaze duration in the pre-target region and also affected negative amplitudes within the early time window, leading to enhanced negative amplitudes across various brain regions; (2) fixation durations and EEG amplitudes in the target word region were both modulated by contextual predictability, with higher predictability resulting in reduced fixation durations (including first fixation duration and gaze duration) and decreased EEG amplitudes. These findings demonstrate that before fixating on and processing target words, high-predictability contexts elicit predictive processing mechanisms; when fixating target words, readers utilize prior predictive processing to facilitate various stages of target word recognition.

Full Text

Preamble

Predictive Processing and Its Effects on Word Identification in Chinese Reading: Evidence from Fixation-Related Potentials

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Abstract

This study employed fixation-related potential (FRP) technology to investigate predictive processing in Chinese reading and the cognitive mechanisms through which it influences lexical identification. By analyzing eye movement and EEG data from both pre-target and target word regions, we found: (1) Contextual predictability increased gaze duration in the pre-target region and affected early time-window negativity, resulting in larger negative amplitudes across brain regions. (2) Both fixation times and EEG amplitudes in the target word region were modulated by contextual predictability, with higher predictability leading to reduced fixation times (including first fixation duration and gaze duration) and decreased EEG amplitudes. These findings indicate that before fixating on target words, Chinese readers engage predictive processing mechanisms in high-predictability contexts, and subsequently utilize these predictions to facilitate various stages of target word identification during fixation.

Keywords: predictive effects; Chinese reading; fixation-related potentials

Introduction

During reading, readers predict upcoming words based on context in real time. When the predicted word matches or resembles the actual target word, this prediction facilitates subsequent lexical identification. However, evidence regarding predictive processing *before* target word identification remains inconsistent. Using experimental rating methods to manipulate contextual predictability, Fernández et al. found that in Spanish reading, fixation times on pre-target words increased as contextual predictability of the target word increased (Fernández et al., 2014a). Patients with memory-impairing dementia, however, showed no such effect (Fernández et al., 2014b, 2014c, 2015). The authors speculated that when reading high-predictability sentences, readers extract target word representations from long-term memory based on contextual cues to generate predictions, whereas such predictive processing does not occur when reading low-predictability sentences. In contrast, two corpus-based studies that manipulated contextual predictability through statistical probabilities found opposite results in English and German reading: higher contextual predictability of target words *decreased* fixation times on pre-target words (Kennedy et al., 2012; Kliegl et al., 2006).

Evidence for readers' ability to use contextual predictability to facilitate target word identification is highly consistent. Eye movement studies in alphabetic scripts show that readers fixate high-predictability words for shorter durations (including first fixation duration, gaze duration, and total fixation time) and skip them more frequently than low-predictability words (Rayner et al., 2001, 2006; Kliegl et al., 2006; Kennedy & Pynte, 2005; Kennedy et al., 2012). Event-related potential studies reveal that contextual predictability reduces EEG amplitudes within 50-90 ms after word presentation (Dambacher et al., 2006, 2009, 2012), decreases occipital N1 and N2 amplitudes (Sereno et al., 2020), and reduces

N400 amplitudes in parietal and occipital regions (Federmeier & Kutas, 1999; DeLong et al., 2005; Otten & Van Berkum, 2008; Freunberger & Roehm, 2016; Maess et al., 2016; Ito et al., 2016, 2017; Urbach et al., 2020). In summary, extensive evidence demonstrates that contextual predictability facilitates lexical identification, promoting visual analysis, lexical form access, and semantic access (DeLong et al., 2014; Nieuwland, 2019; Yan & Jaeger, 2020).

Generative grammar theory, a cornerstone of traditional linguistics, posits that the human brain stores a universal, discrete set of grammatical rules upon which language comprehension and production are based, making predictive processing an active, controlled process. However, recent large language models (e.g., ChatGPT) challenge this traditional view. Characteristically, these models eschew deep grammatical rules, instead learning linguistic patterns and associations from massive text corpora through statistical probabilities alone. Large language models excel at language tasks such as translation, summarization, and question-answering (袁毓林, 2024, 2025). Their explanation for contextual predictability effects is that language models generate predictions based on probability. While large language models can account for the phenomenon of contextual predictability facilitating target word identification, they cannot explain why fixation times on pre-target words increase with target word predictability (Fernández et al., 2014a).

Numerous studies have investigated Chinese cognition through the lens of generative grammar theory (杨洋, 石定栩, 2024). Meanwhile, large language models successfully perform various Chinese language tasks. As a logographic script, Chinese differs substantially from alphabetic writing systems in orthography and lexical structure, yet research on predictive processing mechanisms in Chinese reading remains scarce. Existing studies have only examined how contextual predictability facilitates lexical identification. For instance, eye movement evidence shows that Chinese readers fixate high-predictability words for shorter durations and skip them more frequently than low-predictability words (Rayner et al., 2005; Liu et al., 2018; Zhao et al., 2019; Liu et al., 2021; 刘志方 et al., 2020). EEG studies also find that contextual predictability reduces N1, P200, and N400 amplitudes during target word processing (Lee et al., 2012). Other research shows that changing filler sentence types does not affect N400 contextual predictability effects in target word identification (Zhang et al., 2019).

Previous research suffers from several limitations. First, studies examining predictive processing in Chinese reading are rare, and nearly all manipulate target word predictability by altering the target word within high-predictability sentence frames. This approach makes it difficult to investigate prediction mechanisms and memory retrieval processes and cannot exclude interference from prediction error costs (Höltje & Mecklinger, 2022; Petten & Luka, 2012; Federmeier et al., 2007). Second, eye movement and EEG techniques each have methodological limitations. Eye movement studies possess high ecological validity but only reflect processing outcomes, making it difficult to characterize the specific processes through which context facilitates lexical identification (Degno

& Liversedge, 2020; Li et al., 2015). While EEG data can compensate for these limitations to some extent, previous studies have used word-by-word presentation, which disrupts attentional shifts, parafoveal preview, and natural skipping during reading, compromising ecological validity (Hutzler et al., 2007, 2013).

In summary, existing research is insufficient to clarify the cognitive mechanisms underlying contextual predictability effects during natural reading. The present study aims to address these methodological limitations and fill gaps in current research content.

First, we constructed high-predictability and low-predictability sentence frames for the *same* target words to eliminate prediction error costs. Second, we employed fixation-related potential (FRP) technology to overcome the limitations of separate eye movement and EEG studies while leveraging the advantages of both. This study investigated two questions: (1) The cognitive mechanism of prediction in Chinese reading. Hypothesis: Before fixating target words, readers predict words based on context; as contextual predictability increases, both fixation times and EEG amplitudes in the pre-target region will increase. (2) The process characteristics of how reading context facilitates Chinese lexical identification. Hypothesis: Readers use contextual predictability to facilitate lexical identification; as contextual predictability increases, fixation times and EEG amplitudes in the target word region will decrease.

Method

Participants

We used G*Power to estimate the required sample size. Referencing previous FRP studies investigating contextual predictability (Kretzschmar et al., 2015), we set relevant parameters. The current study focused on contextual predictability effects within time windows before 400 ms. The reference literature provided ten sets of statistical data examining these effects. We used the two median values from these ten datasets to set G*Power parameters: significance level at 0.01, statistical power at 0.99, and effect size lower bounds of 0.25 and 0.28, yielding estimated sample sizes of 31-38. We therefore recruited 32 university students (14 male, 18 female). All participants had normal or corrected-to-normal vision, no prior experience with similar experiments, and were unaware of the experimental purpose. Eye movement data from two participants were excluded due to poor quality. All participants received compensation after completing the experiment.

Design and Materials

The experiment used a single-factor within-subjects design, with sentence predictability as the independent variable at two levels: high and low predictability. Sentence construction proceeded as follows: First, we selected 240 target words from the SUBTLEX-CH corpus (Cai & Brysbaert, 2010), all nouns, with strict control over whole-word frequency, stroke count, and character frequency and stroke count within words. Second, we constructed sentences for each target word, with each target word appearing in two sentence frames: high-predictability and low-predictability (see Table 1 for examples). To ensure sentences met predictability requirements, we invited 20 university students to rate sentence predictability and selected 480 sentences meeting criteria: 240 low-predictability and 240 high-predictability sentences. Sentences ranged from 11-23 characters, with matched character frequency and stroke count for the two characters preceding and following target words. Statistical information appears in Table 2 . In low-predictability sentences, the average probability of correctly guessing target words was 1.7%; in high-predictability sentences, the mean guess rate was 84.35%. The difference in predictability between conditions was significant: t = -72.24, SE = 0.2, $p < 0.001$.

Table 1 Example sentences manipulating target word frequency and predictability

High-predictability condition	他赌博欠下的债务这辈子是还不清了。
Low-predictability condition	叔叔为了繁重债务不停奔走日渐消瘦。

Note: Bold italicized characters indicate target words (same below).

Table 2 Mean and standard deviation of character frequency and stroke count for the two characters preceding and following target words in high- and low-predictability frames

	Left 1 char frequency	Left 2 char frequency	Left 1 char strokes	Left 2 char strokes	Right 1 char frequency	Right 2 char frequency	Right 1 char strokes	Right 2 char strokes
High-predictability	1576 (3227)	7892 (13839)	7.80 (2.94)	7.83 (2.75)	5720 (9800)	2721 (4825)	7.06 (2.91)	7.31 (2.88)
Low-predictability	1343 (1893)	6958 (12201)	8.09 (3.23)	7.76 (2.34)	5810 (10332)	3571 (6329)	7.35 (2.82)	7.41 (2.91)

Note: Frequency units are occurrences per million; values in parentheses are standard deviations (same below).

Apparatus

Eye movement data were collected using an EyeLink 1000 eye tracker (SR Research, Canada) with a 1000 Hz sampling rate and 0.01° spatial resolution. Experiment Builder software presented stimuli on a 19-inch monitor (1024$×$768 pixels, 60 Hz refresh rate). Participants viewed the screen from 60 cm, with materials presented in a single line using 20-point FangSong font, subtending approximately 1° of visual angle.

EEG data were recorded using a BP (Brain Products) system with a 64-channel electrode cap based on the extended international 10-20 system, sampled at 1000 Hz. The FPz electrode served as ground, and FCz as online reference.

Horizontal and vertical electrooculograms (EOG) were recorded to correct for blinks. All electrode impedances were maintained below 5 kΩ. EOG and EEG data were recorded with a 0.1–100 Hz bandpass filter. Eye movement and EEG data were synchronized online using TTL (transistor-transistor logic) pulses: TTL pulses were sent to the EEG recording computer at experiment start and end, and during each trial when participants first fixated target words.

Procedure

Preparation: The experimenter guided participants into the lab, seated them 60 cm from the screen, fitted the EEG cap, and adjusted each electrode' s impedance below 5 kΩ. Participants placed their chin on a chinrest, were instructed to minimize head movements, and the table height was adjusted for comfort. A three-point horizontal calibration followed, requiring participants to fixate calibration points until error for all points was below 0.5°. The lab environment remained quiet with constant lighting, temperature, and ventilation.

Formal experiment: Instructions appeared first; after comprehension, participants pressed the spacebar to begin 10 practice trials. Sentence presentation: A black dot appeared at a fixed left-side position as the sentence start point. The experimental sentence appeared only when participants fixated the dot and simultaneously pressed the spacebar. After reading and comprehending the sentence, participants pressed the "↓" arrow key to terminate presentation. For 120 sentences, a comprehension question appeared after sentence offset, requiring a true/false response ("←" for false, "→" for true) to verify sentence understanding. All sentences were presented randomly until completion.

Results

Participants' mean comprehension accuracy was 97%, confirming attentive reading and reliable dependent variable data. Eye movement dependent variables included first fixation duration and gaze duration during first-pass reading for pre-target and target word regions. First fixation duration was the duration of the initial fixation within the target word interest area (excluding skipped words); gaze duration was the sum of all fixation durations during first-pass reading. We analyzed these variables using linear mixed models in the R environment (lme4 package; Bates et al., 2015), with participants and items as random effects and contextual predictability as a fixed effect.

Offline raw EEG data were filtered with a 0.1–40 Hz bandpass filter. Ocular artifacts were corrected using ICA methods specifically developed for FRP research (Dimigen, 2020). Automatic artifact rejection removed trials exceeding $±$100 V before averaging from 200 ms pre-fixation to 1000 ms post-fixation onset. Offline trial data were segmented, and low-quality data were excluded from statistical analysis. We analyzed EEG amplitudes in the 0-200 ms window to explore early cognitive mechanisms of contextual prediction effects and examined N400 effects to investigate how prediction facilitates lexical semantic processing. Previous research shows N400 components in FRP studies occur primarily within 200-400 ms (Kretzschmar et al., 2015).

After averaging, we divided the brain into anterior/posterior halves along the horizontal line through T7, T8, Cz, C1, C2, C3, C4, C5, and C6, and into left/right halves along the vertical axis through AFz, Fz, Cz, CPz, Pz, POz, and Oz. EEG amplitude data in each time window were analyzed using linear mixed models with participants and electrodes as random effects and contextual predictability, anterior/posterior region, and left/right hemisphere as fixed effects.

Pre-Target Region Results

Increased contextual predictability of target words led to longer gaze durations and larger negative EEG amplitudes in the pre-target region. Means for pre-target fixation times appear in Figure 1 [Figure 1: see original paper]; EEG means appear in Figure 2 [Figure 2: see original paper]. For first fixation duration, the main effect of contextual predictability was not significant ($b = -3.30$, $SE = 2.27$, $t = 1.46$, $p = 0.15$). Gaze duration was significantly longer in high- than low-predictability conditions ($b = -5.48$, $SE = 2.69$, $t = -2.04$, $p = 0.04$).

0-200 ms window: High-predictability sentences elicited significantly larger negativities than low-predictability sentences ($b = 0.65$, $SE = 0.24$, $t = 2.63$, $p = 0.008$). Anterior negativities were significantly larger than posterior ($b = 3.79$, $SE = 0.70$, $t = 5.66$, $p < 0.001$). Left hemisphere negativities were significantly larger than right ($b = 1.42$, $SE = 0.70$, $t = 2.13$, $p = 0.04$). The anterior/posterior × left/right interaction was significant ($b = -4.20$, $SE = 1.40$, $t = -3.14$, $p = 0.003$). Simple effects revealed that in the anterior hemisphere, left negativities were significantly larger than right ($b = 3.53$, $SE = 0.95$, $t = 3.72$, $p < 0.001$), while in the posterior hemisphere, left and right did not differ ($b = -0.68$, $SE = 0.95$, $t = -0.72$, $p = 0.48$). Contextual predictability did not interact with anterior/posterior region ($b = 0.67$, $SE = 0.50$, $t = 1.33$, $p = 0.18$) or left/right hemisphere ($b = -0.24$, $SE = 0.50$, $t = -0.50$, $p = 0.62$). The three-way interaction was not significant ($b = -1.07$, $SE = 1.00$, $t = -1.08$, $p = 0.28$).

200-400 ms window: The main effect of contextual predictability was not significant ($b = 0.33$, $SE = 0.29$, $t = 1.13$, $p = 0.26$). Anterior/posterior main effect was significant ($b = 2.54$, $SE = 1.01$, $t = 2.53$, $p = 0.02$). Left/right hemisphere main effect was significant ($b = 4.87$, $SE = 1.01$, $t = 4.84$, $p < 0.001$). The anterior/posterior × left/right interaction was significant ($b = -8.05$, $SE = 2.02$, $t = -4.00$, $p < 0.001$). Simple effects showed that in the left hemisphere, posterior amplitudes were significantly smaller than anterior ($b = 6.57$, $SE = 1.42$, $t = 4.61$, $p < 0.001$), while in the right hemisphere, amplitudes did not differ ($b = -1.48$, $SE = 1.42$, $t = -1.04$, $p = 0.30$). Contextual predictability did not interact with anterior/posterior region ($b = 0.65$, $SE = 0.59$, $t = 1.11$, $p =$

0.27) or left/right hemisphere (b = -0.17, SE = 0.59, t = -0.30, p = 0.77). The three-way interaction was not significant (b = -1.24, SE = 1.18, t = -1.06, p = 0.29).

Target Region Results

Increased contextual predictability reduced first-fixation duration and gaze duration in the target region and decreased negative EEG amplitudes during target word fixation. Means for target region fixation times appear in Figure 3 [Figure 3: see original paper]; EEG means appear in Figure 4 [Figure 4: see original paper]. Eye movement results showed that high-predictability conditions yielded significantly shorter first-fixation and gaze durations than low-predictability conditions (first-fixation: b = 6.99, SE = 2.14, t = 3.27, p = 0.001; gaze duration: b = 10.45, SE = 2.36, t = 4.43, $p < 0.001$).

0-200 ms window: High-predictability sentences elicited significantly smaller negativities than low-predictability sentences (b = -0.76, SE = 0.29, t = -2.65, p = 0.008). Anterior negativities were significantly larger than posterior (b = 3.80, SE = 0.90, t = 4.27, $p < 0.001$). Left hemisphere negativities were significantly larger than right (b = 3.32, SE = 0.90, t = 3.73, $p < 0.001$). The contextual predictability × left/right hemisphere interaction was significant (b = 4.05, SE = 0.57, t = 7.05, $p < 0.001$). Simple effects showed that in the left hemisphere, high-predictability sentences elicited significantly smaller negativities than low-predictability sentences (b = -2.79, SE = 0.41, t = -6.86, $p < 0.001$), while in the right hemisphere, high-predictability sentences elicited significantly larger negativities (b = 1.27, SE = 0.41, t = 3.12, p = 0.001). The left/right × anterior/posterior interaction was significant (b = -6.40, SE = 1.78, t = -3.60, $p < 0.001$). Simple effects revealed that in the left hemisphere, anterior amplitudes were significantly smaller than posterior (b = 7.00, SE = 1.26, t = 5.56, $p < 0.001$), while in the right hemisphere, anterior and posterior did not differ (b = 6.00, SE = 1.25, t = 0.48, p = 0.64). Contextual predictability did not interact with anterior/posterior region (b = -0.63, SE = 0.58, t = -1.09, p = 0.28). The three-way interaction was significant (b = -3.31, SE = 1.15, t = -2.89, p = 0.004). Simple effects showed no contextual predictability × anterior/posterior interaction in the left hemisphere (b = 1.03, SE = 0.81, t = 1.27, p = 0.20), but a significant interaction in the right hemisphere (b = -2.28, SE = 0.81, t = -2.81, p = 0.005).

200-400 ms window: The main effect of contextual predictability was not significant (b = -0.07, SE = 0.32, t = -0.22, p = 0.82). Right hemisphere amplitudes were smaller than left (b = 5.95, SE = 1.12, t = 5.28, $p < 0.001$). Anterior/posterior main effect was marginally significant (b = 2.17, SE = 1.13, t = 1.92, p = 0.06). The contextual predictability × anterior/posterior interaction was significant (b = -1.38, SE = 0.64, t = -2.61, p = 0.03). Simple effects showed no predictability effect in the anterior hemisphere (b = 0.62, SE = 0.45, t = 1.37, p = 0.17) and a marginally significant effect in the posterior hemisphere (b = -0.76, SE = 0.45, t = -1.69, p = 0.09). The contextual predictability × left/right interaction was also significant (b = 2.37, SE = 0.64, t = 3.70, p < 0.001). Simple effects revealed that in the left hemisphere, low-predictability sentences elicited larger negativities than high-predictability sentences (b = -1.25, SE = 0.45, t = -2.78, p = 0.005), while in the right hemisphere, high-predictability sentences elicited larger negativities (b = 1.11, SE = 0.45, t = 2.46, p = 0.013). The anterior/posterior × left/right interaction was significant (b = -9.25, SE = 2.25, t = -4.10, p < 0.001). Simple effects showed that in the anterior hemisphere, left hemisphere negativities were significantly larger than right (b = 10.58, SE = 1.60, t = 6.63, p < 0.001), while in the posterior hemisphere, left and right did not differ (b = 1.33, SE = 1.60, t = 0.84, p = 0.41). The three-way interaction was not significant (b = -1.14, SE = 1.28, t = -0.90, p = 0.37).

Discussion

Using fixation-related potential evidence from natural reading, this study examined the cognitive mechanisms underlying contextual predictability effects in Chinese reading—specifically, how predictive processing emerges and influences lexical identification. Results showed: (1) Increased contextual predictability led to longer gaze durations and larger EEG amplitudes in the pre-target region; (2) Target word fixation times decreased with higher predictability, as did EEG amplitudes during target word fixation.

Context-Based Predictive Processing in Reading

Large language models and generative grammar theory offer divergent explanations for prediction mechanisms in language. The former suggests predictions emerge from statistical probabilities, while the latter emphasizes prediction as a controlled, active process (袁毓林, 2024, 2025). Both perspectives receive support from alphabetic script reading: corpus-based statistical approaches show decreasing pre-target word fixation times with increasing target word predictability, suggesting probability-based prediction (Kliegl et al., 2006; Kennedy et al., 2012), whereas experimental rating methods show *increasing* pre-target fixation times with predictability, consistent with generative grammar theory (Fernández et al., 2014a).

Our study investigated predictive processing mechanisms in Chinese reading. We found that pre-target first-fixation duration was unaffected by contextual predictability, but gaze duration increased with predictability. In early time windows, high-predictability contexts elicited significantly larger negativities than low-predictability contexts, though this effect disappeared in later windows. EEG data reflect cognitive processes, while eye movement data reflect processing outcomes (Degno & Liversedge, 2020; Li et al., 2015). Integrating both suggests that before fixating high-predictability words, Chinese readers generate predictions based on contextual cues, whereas before low-predictability words, contextual cues are insufficient to support such mechanisms. As time progresses, predictions are completed and predictive processing shifts toward facilitating lexical identification. These findings support generative grammar theory' s core speculation that active, controlled predictive processing exists in Chinese reading.

Despite Chinese' s substantial differences from alphabetic scripts in orthography and lexical structure, our conclusions about predictive processing mechanisms align with findings from Spanish reading (Fernández et al., 2014a, 2014b, 2014c), indicating that active, controlled prediction is universal across Chinese and alphabetic reading. We did not find evidence for statistical probability-based prediction, which differs from German and English reading studies (Kliegl et al., 2006; Kennedy et al., 2012). However, this does not deny the existence of such mechanisms in Chinese reading, as probability-based prediction may be insensitive to our contextual predictability manipulation. We propose that large language models and generative grammar theory offer complementary rather than contradictory explanations, each revealing different types of predictive processing. Large language models could incorporate active prediction modules to improve efficiency, while generative grammar theory could assimilate probabilistic prediction mechanisms to expand its explanatory scope.

Facilitatory Effects of Predictive Processing on Lexical Identification

Readers generate predictive mechanisms before fixating target words. When predicted words mismatch actual words, prediction interferes with subsequent identification, incurring prediction error costs (Petten & Luka, 2012). By constructing different contexts for identical target words, we manipulated contextual predictability while eliminating prediction error costs from low-predictability contexts to examine facilitation mechanisms. Eye movement results align with previous alphabetic script studies (Kennedy & Pynte, 2005; Kennedy et al., 2012; Kliegl et al., 2006; Rayner et al., 2001, 2006) and Chinese reading studies (Liu et al., 2018; Liu et al., 2021; Zhao et al., 2019; Rayner et al., 2005; 刘志方 et al., 2020), showing significantly shorter fixation times for high- than low-predictability target words. These results demonstrate cross-linguistic consistency in contextual facilitation of lexical identification.

Modular theory posits that lexical identification comprises pre-lexical processing and semantic access stages (Forster, 1981). Fixation time data only reflect processing outcomes (Degno & Liversedge, 2020; Li et al., 2015), making them insufficient alone to reveal facilitation mechanisms. Our study time-locked EEG data to first fixations on target words. Early time-window EEG data reflect pre-lexical processing, while N400 reflects semantic access (Kutas & Federmeier, 2011). EEG results showed that in the left hemisphere, high-predictability contexts elicited significantly smaller negativities than low-predictability contexts in both early and late windows. This indicates that Chinese readers use contextual predictability to facilitate both pre-lexical processing and semantic access, with facilitatory effects occurring throughout the entire lexical identification process (Nieuwland, 2019; Federmeier, 2021; Burnsky et al., 2023).

Time Course of Contextual Prediction Mechanisms

Lexical identification and context construction are essential for reading comprehension. Predictability effects reflect how context guides lexical processing, showing interactions among visual information, lexical decoding, and context (Schuster et al., 2016). Our findings suggest that high-predictability contexts trigger additional predictive (or memory retrieval) mechanisms that subsequently enhance identification efficiency during target word fixation. Specifically, before fixating target words, high-predictability contexts activated negative wave activity across all brain regions. Over time, this activation decreased: during target word fixation, only right anterior regions maintained the pattern of increased negativity for high-predictability contexts, while other regions showed decreased negativity. Thus, contextual predictability effects in reading involve at least two cognitive mechanisms: (1) context pre-activation (or memory retrieval), and (2) facilitation of subsequent lexical identification. While this study advances understanding of contextual predictability mechanisms, EEG' s limited spatial resolution necessitates additional methods for comprehensive investigation of the neural mechanisms underlying these effects.

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Note: Figure translations are in progress. See original paper for figures.