*Original Paper*

# Input Enhancement on Foreign Language Vocabulary Acquisition: Current Status and Future Prospect

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*Abstract*

*This study reviewed the empirical research on the role of input enhancement on foreign language vocabulary acquisition published in core journals from 2009 to 2023, from which the current status and future trends of the studies were analyzed. The results manifested that (1) the number of input enhancement research demonstrated a trend of a spiral upward development; (2) the studies used different types of input enhancement as independent variable to explore their effects on the acquisition of target vocabulary; (3) the research materials applied in input enhancement were mostly in the reading mode, while lacked investigation in the listening mode. Therefore, future research could further examine the interactive and comparative effects of input enhancement on vocabulary acquisition as well as enhancing vocabulary in the materials with a variety of modes.*

*Keywords*

*input enhancement, textual enhancement, foreign language vocabulary learning, vocabulary acquisition*

The dominant role of input materials on foreign language acquisition has been widely studied since Krashen proposed "comprehensible input". Scholars worldwide argue that the design of input materials exerts an important effect on foreign language vocabulary acquisition (Wen, 2015; Wang M. & Wang C., 2014; Boers et al., 2017; Webb, 2016). Currently, research mainly investigated the effect of input enhancement as an independent variable on target foreign language vocabulary acquisition as a dependent variable. Input enhancement is a technique which could promote learners' attention to and processing of the input materials though improving the quality of input (Smith, 1993). It aims at attracting students' attention to the formal features of the input by making the target language knowledge salient (Kim, 2006). Different means of input enhancement, including textual enhancement, input flood, and gloss attachment (Toomer & Elgort, 2019), etc., may yield different learning outcomes. The most investigated means is typographic enhancement, which modifies language forms in written text by means

of bolding, underlining, or changing fonts or colors to highlight the forms of the target language visually, by which it could increase the opportunity for students to notice target forms (Wong, 2007). Input flood is a technique of increasing the frequency of target forms in input materials (Szudarski & Conklin, 2014). Gloss is the addition of explanations to target forms to promote understanding and direct attention (Boers, 2022; Chen et al., 2020).

Given the importance of input materials, this study reviewed 28 empirical research on input enhancement and vocabulary acquisition published in the core journals between 2009 and 2023 from theoretical background, research methodology, and research findings, so as to summarize and discuss recent research themes and future research trends.

## 1. Noticing Hypothesis

In the meaning-based reading tasks, noticing occupies a primary and crucial role in incidental vocabulary acquisition. Laufer advocated word-focused instruction, which was derived from form-focused instruction in second language grammar acquisition, including Focus on Forms and Focus on Form. And these two types have been transferred to vocabulary instruction (Laufer, 2010). Focus on Forms is defined as teaching and learning individual words in non-communicative and non-authentic language tasks, that is, learning vocabulary in the traditional way. While Focus on Form refers to paying attention to vocabulary in the communicative tasks to accomplish the them, that is, incidentally acquiring vocabulary in real-language input environments, in which "attention" is crucial.

Noticing Hypothesis highlights the importance of noticing in learning. It refers to the subjective experience of external stimuli, and is a prerequisite for the transformation of input into intake. On the basis of consciousness, Schmidt argued that almost all the theories of consciousness attempted to explain attention and the system of attracting attention. The contrast between consciousness-engaged learning and learning without consciousness was primarily consciousness at the noticing level. Consciousness-engaged learning refers to the acquisition of target knowledge after noticing it, whereas learning without consciousness is the acquisition of target knowledge without any noticing (Schmidt, 1990). However, Schmidt did not believe that a foreign language could be learned only through subliminal perception. Although subliminal perception does exist and activate existing memory structures, but no new memory structures could be established because processing familiar memory structures is automatic, while processing new knowledge needs to take up limited cognitive resources (Schmidt, 1990). Therefore, the target language knowledge structures must be noticed before being integrated into memory structures and stored in long-term memory system. The important role of noticing in learning determines its important position in foreign language instruction. The goal of any pedagogical intervention is to change students' focus when processing the foreign language (Smith, 1993) and to increase the possibility of specific linguistic features being noticed (Schmidt, 1990). An approach to distinguish various pedagogical philosophy lies in different noticing object, such as noticing meaning, noticing form, noticing form in the process of meaning-based tasks (Li Z. & Li Y., 2019).

## 2. Empirical Studies on Input Enhancement

In order to analyze the research findings of input enhancement on second language vocabulary acquisition during the 15-year period from 2009 to 2023, two databases, Web of Science and CNKI were selected and concepts "visual input enhancement", "textual enhancement", "typographic enhancement", "input flood", "input enhancement", and their Chinese translation were chosen as keywords for searching related research. And then through reading and classifying, papers not about input enhancement on second language vocabulary acquisition and papers focused on reviewing were eliminated, from which 13 empirical studies were identified, and from the references in these 13 papers, a total of 28 empirical research papers on input enhancement were obtained.

*2.1 Characteristics of the Research Trend*

The Figure below demonstrated that the number of research on input enhancement and second language vocabulary acquisition basically showed a spiral upward development from 2009 to 2023. Input enhancement and second language vocabulary acquisition research could be roughly divided into three stages. The first stage is the budding stage from 2009 to 2012, and the second stage is the accelerated development stage in 2013-2016. But then a sudden decline could be witnessed, indicating that the research in this field might need a search for new hotspots and innovations after several years of stable development. The third stage is after 2017, from which a boom could be witnessed, especially the number of papers published peaked in 2022.
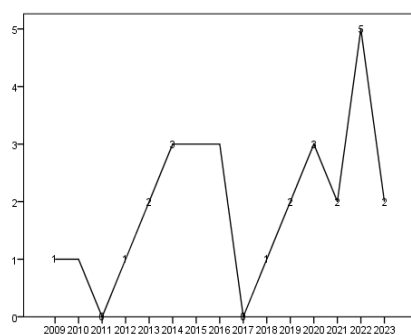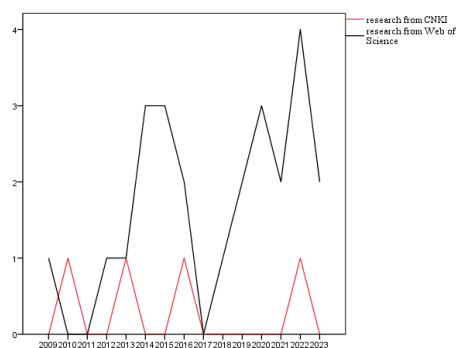


Figure 1: trends of input enhancement research

Figure 2: a comparsion between research from CNKI and from Web of Science

**Figure 1. Research Trend**

The right figure compared the historical development trend of input enhancement on second language vocabulary acquisition between papers published in Web of Science and papers published in CNKI. In general, the related research internationally tends to rise slowly, while the number of papers published in China during the last 15 years was only four. This trend indicated that the role of input enhancement in second language vocabulary acquisition in China has not yet been widely investigated. Nevertheless, taking into account the fact that textual enhancement is an effective means to improve the material for incidental vocabulary acquisition without taking up extra time and increasing the burden of teachers'

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teaching, scholars in China can explore whether students learning English in a classroom environment with Chinese as their mother tongue and English as their second language can acquire vocabulary independently in the enhanced condition.

*2.2 Characteristics of Various Input Enhancement Techniques*

Among the 28 studies selected, most of them investigated the function of typographic enhancement and frequency of occurrence in vocabulary acquisition, while very few took frequency of occurrence as an individual variable, which usually examined together with typographic enhancement. Another discovery was that some studies employed direct or indirect enhancement techniques in audiovisual input, such as highlighting target items in the caption as direct means and as captioning only keywords which include target items as indirect means. Besides, some studies have investigated the role of test announcement in directing attention to vocabulary. The presence or absence of test announcement had been regarded as a criterion for distinguishing intentional and incidental learning (Hulstijn, 2001). Test announcement allows students to focus their attention on unfamiliar and important vocabulary in a meaning-based reading task, though it does not straightly direct learners' attention to the target words, as opposed to the textual reinforcement that is a more implicit means of directing attention to the target vocabulary. Otherwise, very few studies also investigated other input enhancement techniques such as gloss attachment, dynamic visual enhancement, augmenting volume, and the order of input enhancement on vocabulary acquisition.

*2.3 Characteristics of the Input Mode and Input Language*

Most research was conducted in the reading mode context, which included 18 studies and 7 studies used audiovisual materials. The techniques of enhancement in the audiovisual materials mainly encompassed adding captions (Montero Perez et al., 2014; Montero Perez et al., 2015; Montero Perez et al., 2018; Cintrón-Valentín, 2019; Majuddin et al., 2021; Puimège et al., 2023) and increasing the volume of target items (Liu, 2022). And two aforementioned means for adding captions were either implicit or explicit. In addition, three studies considered input enhancement as a mode and compared the effects of various input modes on target vocabulary acquisition. Currently examined modes were reading, reading-while-listening, reading plus textual enhancement (Vu & Peters, 2022a; Vu & Peters, 2022b), and reading-while-listening plus textual enhancement (Vu & Peters, 2023). Nevertheless, few considered the listening materials in the current empirical research comparatively. And contrastive studies between different modes mainly focused on reading and reading-while-listening. Therefore, future studies could investigate the function of input enhancement in listening mode, such as augmenting the volume of target items in the context of classroom instruction. Otherwise, it is worthy to compare a variety of modes, such as reading, listening, reading-while-listening, and captioned videos, in which input enhancement could also be considered as a variable.

Four major languages of the input material studied previously were English, French, German, and Spanish. One meta-analytic study on the same research strand only found 2 languages studied before, Spanish and English (Lee & Huang, 2008). A systemic review discovered that the number of input

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language has increased in recent years (Lee & Huang, 2008). However, none of these studies used Chinese as the second language, which should be further explored as Chinese has received more and more attention in the international arena.

*2.4 Characteristics of Target Vocabulary Classes*

Statistical analysis of the target vocabulary in the 28 studies disclosed that most studies targeted on multiword expressions (MWEs), then on words, and the remaining studies on both words and MWEs. The study of words principally focused on verbs, adjectives, and nouns. While the study of MWEs was mainly on collocations, with 10 studies using collocations as the target vocabulary, and the types of collocations included adjective-noun and verb-noun collocations. Currently, no studies have explored the effect of input enhancement on the acquisition of noun-noun collocations. Of the 16 studies whose target was MWEs, only two reported on the semantic transparency of word units, with one considering only semantically transparent MWEs (Vu & Peters, 2023), and with the other one encompassing both semantically transparent and semantically obscure idioms (Campillo, 2015). The former study included only semantically transparent word but did not demonstrate whether transparency influence the learning gains. The latter study found that textual enhancement facilitated the comprehension of idioms, and that semantically transparent idioms were more effective than semantically obscure idioms in the acquisition of lexical meaning knowledge, but the study indicated that transparency might not lead to higher learning gains in form knowledge. Nevertheless, the study had a small number of subjects and the data was not statistically analyzed which restricted the explanatory power. Future research could be expanded to investigate the similarities and differences in the effects of input enhancement on semantically transparent and semantically ambiguous phrases.

There are two main reasons that the acquisition of MWEs by foreign language learners of English lags far behind that of native English speakers. First, most MWEs do not occur frequently in the input, and second, the chances for noticing the form features of MWEs are relatively low in the meaning-focused learning, especially those semantically transparent ones (Boers et al., 2017). However, frequency of occurrence is a dominant factor in vocabulary learning, in which learners could enhance the memory trace of the vocabulary in their long-term memory system, constantly refine the meaning, and acquire the pragmatic knowledge for using the vocabulary in specific context. The contextual view of vocabulary learning proposed that vocabulary is acquired during repeated encounters, with each encounter leaving a memory trace of the vocabulary and the context in which it occurs, and through encountering the vocabulary in different contexts, knowledge of the overlapping parts of the meaning and use is refined and strengthened, and finally the meaning, form as well as use knowledge of the vocabulary is stored and could be retrieved in hand (Elgort et al., 2017). One feature of MWEs is that the combination of several words may be semantically transparent or semantically ambiguous; semantically ambiguous ones might attract attention and require learners to guess the meaning based on the context, while semantically transparent ones enable students to understand the meaning, but might pose difficulties for noticing, processing and acquiring. Thus, most studies targeting at MWEs were determined by the nature of the

MWEs themselves. Words that are unknown to learners or words that interrupted the construction of general meaning of the input could generate internal salience, i.e., unfamiliarity and significance for comprehension induce words to be noticed, even if without any enhancement (Liu, 2013). In contrast, if MWEs, especially semantically transparent ones, are not enhanced, L2 learners may perceive such items as several words rather than as fixed phrases, and such perception might restrict learners from acquiring the knowledge of collocation and their use.

*2.5 The Characteristics of Vocabulary Measurement Tasks*

An analysis of the types of vocabulary measurement tasks in the studies published in the last 15 years revealed that the empirical studies mainly measured the effects of input enhancement on lexical form and meaning knowledge, with 15 studies measuring form recall, 14 studies measuring form recognition, 12 studies measuring meaning recall, and 7 studies measuring meaning recognition. And among these studies, nine measured form knowledge alone, and two measured meaning knowledge alone which were both gloss-related studies (Zuo, 2020; Shabani & Rahimy, 2020). There were three studies considering eye movement data (Choi, 2016; Jung et al., 2022; Puimège, 2023), which provided direct statistical support for the role of input enhancement in directing attention, while previously, the role of noticing was confirmed indirectly through vocabulary form test scores. In addition, three studies conducted reading comprehension tests, with one being designed to measure comprehension of target idioms (Campillo, 2015), and with the other two to measure whether learners' comprehension of the text was impaired while attention was drawn to target vocabulary form through input enhancement techniques (Majuddin et al., 2021; Liu, 2013). Other tests such as use recognition, morpheme recall, look-up behavior, phrase priming, and reaction time were only used in 1 or 2 studies. Future studies could further measure whether the treatment of target lexical items could enhance students' acquisition of the use knowledge. And future studies could explore the impact of input enhancement on the learning of implicit knowledge through various sensitive measurements such as eye movement, self-paced reading, and vocabulary priming judgment (Toomer & Elgort, 2019).

## 3. Discussion

Based on the aforementioned characteristics of the 28 studies on the effects of input enhancement on foreign language vocabulary acquisition, this section would compare and discuss these 28 empirical studies and analyze them around three themes: comparative effects among different input enhancement techniques, interactive effects between different input enhancement techniques, and the order of input enhancement.

*3.1 Comparative Effects among Different Input Enhancement Techniques*

Studies on the comparative effects among various input enhancement techniques could be further divided into the comparison between input enhancement and no enhancement, and the comparison among various input enhancement techniques. The overall findings were that input enhancement indeed stimulated the

acquisition of form knowledge, meaning knowledge, and one enhancement technique resulted in more learning than two techniques (Toomer & Elgort, 2013; LaBrozzi & Villegas, 2020).

Among sixteen studies focusing on this strand, only one did not measure form knowledge, and only two studies did not observe the higher learning gains on form knowledge (Szudarski & Conklin, 2014; Campillo, 2015). Six of the 16 studies reported on the effects on the acquisition of meaning knowledge, with one not finding any significant effect on the growth of meaning knowledge (Szudarski & Conklin, 2014). Two studies measuring noticing revealed that input enhancement could direct attention to target vocabulary (Puimège, 2023; Choi, 2016). One study investigating the effects on reading comprehension discovered that gloss produced no significant effect on reading comprehension (Liu, 2013).

The inconsistent results were mainly caused by different research participants and research designs. One study found no effect of input enhancement on promoting the vocabulary acquisition (Vu & Peters, 2023), which might result from the number of research subjects, the difficulty of the idioms themselves, and the test format, etc. The other study explored whether there was an effect of textual enhancement on vocabulary acquisition together with mechanical memorization, which found no effect (Szudarski & Conklin, 2014). It indicated that mechanical memorization itself exerted an impact on vocabulary acquisition, while additional enhancement had no further contribution to vocabulary acquisition.

*3.2 Interactive Effects between Different Input Enhancement Techniques*

For studies of interactive effects among input enhancement techniques, the focus was on demonstrating whether two or more techniques would promote vocabulary acquisition jointly and interactively. The general conclusion could be drawn from the ten related studies which disclosed the impact of input enhancement on the growth of form knowledge, meaning knowledge, noticing but inconsistent findings were witnessed.

Of the 10 relevant studies, only two did not measure form knowledge, with one measuring meaning and attention (Zuo, 2020), and with the other measuring reaction time (Noethbeook & Conklin, 2021). Among studies targeting at form knowledge, four independent variables including textual enhancement, frequency of occurrence, caption, and involvement load were found to facilitate the growth of learning gains. Studies comparing various caption types had found that caption itself also prompted the acquisition of lexical form, with one study finding no significant difference in lexical form knowledge acquisition among different caption types (Majuddin et al., 2021), i.e., additional enhancement such as keyword captioning and captioning with enhanced target items did not further result in form knowledge learning. while two other studies found that the facilitative role of enhancement including keyword captioning, keyword annotation on the acquisition of form knowledge. Given the inconsistent findings, future research could continue to compare effects between keyword captioning and captioning with enhanced target items. The effect of test announcement was also found to be inconsistent in four studies, with only one discovering a positive impact of announcing vocabulary tasks before experiment on the acquisition of vocabulary form (Peters et al., 2009), which suggested that using test announcement to differentiate between intentional and incidental acquisition might not be an appropriate approach to achieve the goal.

Seven studies measured the acquisition of vocabulary meaning knowledge, there was no agreement on the function of the same input enhancement techniques, such as textual enhancement and test announcement. Two studies targeting at the meaning knowledge acquisition with typographic enhancement found a significant effect in one study (Jung & Tran, 2022), but no significant effect in the other (Zuo, 2020). Studies on the effect of test announcement on meaning acquisition found a significant impact on meaning acquisition in two studies (Zuo, 2020; Montero Perez et al., 2015), while no significant differences in the other two research (Montero Perez et al., 2018; Peters et al., 2009). One study of various caption demonstrated that gloss positively influenced the acquisition of meaning knowledge, but keyword captioning did not have a significant impact on meaning knowledge growth (Montero Perez et al., 2018).

There were only three studies also considered the retention of vocabulary knowledge, which revealed that input enhancement, involvement load, and captioning enabled form knowledge to retain (Majuddin et al., 2021; Zhou, 2010), while typographic enhancement might not promote retention of vocabulary knowledge (Peters, 2012). However, considering that long-term memory of vocabulary knowledge was more significant while few studies included the delayed posttests, it would be necessary to explore the effect of input enhancement on the retention of vocabulary knowledge, future research designs should conduct delayed posttests. It might be hard for vocabulary knowledge to retain after one or two weeks with typographic enhancement studied only in the cross-sectional research but not in the longitudinal research.

Two studies investigated the role of typographic enhancement on attention and both found its positive role on noticing, as well as test announcement and the frequency of occurrence (Zuo, 2020; Jung et al., 2022). Only one study investigated whether input enhancement could affect reading comprehension, which discovered a significant effect of captioning on reading comprehension, while no significant effect was found on reading comprehension among different types of captions (Majuddin et al., 2021).

*3.3 The Order of Input Enhancement*

There were only 2 studies comparing different sequence of input enhancement and they were both published in CNKI. The theoretical basis was the input processing theory (VanPattern, 1990), which claimed that vocabulary knowledge had multiple facets and different facets could not be learnt simultaneously when they were all new to a student. These two studies confirmed this theory, and one found that gloss given before reading texts or after reading texts significantly outperformed the group reading the gloss attached texts or texts with no gloss in terms of the acquisition of vocabulary form and meaning knowledge (Liu, 2013), suggesting that providing reading and gloss at the same time might divert students' attention and disperse cognitive resources. The other study compared the form, meaning, and usage knowledge in different sequence of enhancement, which found the proactive interference on the acquisition of form and meaning knowledge (Yang M. & Yang L., 2016), i.e., the knowledge learned first acquired better, i.e., if the meaning was enhanced first, the learning outcome of meaning knowledge was better, while if the form was provided first, the acquisition of form knowledge was better; when the

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form, meaning and usage were enhanced at the same time, the sequence of vocabulary acquisition followed the order of general principle of vocabulary acquisition, i.e., meaning first, then form, and use knowledge was acquired latter.

## 4. Conclusion of Current Status and Prospect on Future Research

In the 28 research on the effects of input enhancement on foreign language vocabulary learning from 2009 to 2023, the language of the research materials were mostly alphabetic languages. While the distance between languages might also influence the impact of input enhancement, so it is worthy of investigating whether learners with Chinese as the L2 respond to input enhancement differently. The analysis of the research characteristics revealed that the target vocabulary was mostly multiword expressions, but there were few studies on semantically transparent ones; the research materials were basically in the reading mode, but very few in the listening or audiovisual mode; the measurement of vocabulary knowledge focused on the growth of the vocabulary form and meaning knowledge. Given that input enhancement is a more implicit pedagogical tool, it may be necessary to measure implicit vocabulary knowledge with the help of more sensitive test formats. Finally, the analysis of the research themes revealed that most studies were about comparative studies between different enhancement techniques. Based on the above analysis, future research can be carried out in the following ways: (1) in terms of research design, studies could systematically investigate Chinese input materials and listening materials; (2) in terms of research themes, studies could investigate the interactive effects of different input enhancement techniques on foreign language vocabulary acquisition.

In conclusion, input enhancement can be widely used in foreign language teaching at all levels of education as a means of facilitating teaching and learning without occupying extra learning time.

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