

The Effects of Processing Paths on the Acquisition of Collocation Knowledge of Different Semantic Types by English Beginners

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Abstract: This study explores the effects of two processing paths contextual guessing and motivational processing on the acquisition of verb-noun collocation knowledge of three semantic types: semantically consistent, semantically related, and semantically unrelated collocations. The main findings are as follows: (1) The main effect of processing paths is significant; collocation acquisition through the contextual guessing path is superior to that through the motivational processing path, and performance in the immediate test is better than that in Delayed Test A and Delayed Test B. (2) Under the contextual guessing path, semantically unrelated collocations show the most prominent acquisition advantage and the best memory retention. Under the motivational processing path, semantically consistent collocations perform slightly better than semantically unrelated collocations in both acquisition and memory retention. (3) Under different processing paths, semantically consistent and semantically unrelated collocations each have their advantages, and semantically unrelated collocations are consistently better acquired than semantically related collocations.

1. Introduction

In second language (L2) lexical collocation acquisition, processing paths and input formats have long been key influencing factors. Specifically, the processing paths learners adopt and the input formats they receive shape how collocation knowledge is acquired. To date, much research on L2 lexical processing strategies and construal mechanisms has centered on two core paths: motivational processing and contextual guessing [7][17][34]. Motivational processing initiates construal from internal clues of lexical collocations, taking motivational information as the key to understanding and internalizing collocation knowledge [37]. Contextual guessing activates construal based on the external linguistic environment, emphasizing the role of context and contextual cues in guessing word meanings and linking form and meaning [10][12]. These two paths realize the construal of metaphorical knowledge through distinct cognitive procedures, with scholars supporting each path holding divergent views [30][34].

In L2 collocation learning, collocation types involving semantic transparency—such as non-literal collocations where source and target meanings are semantically unrelated—have been

compared in terms of learning effectiveness. For instance, studies have examined the facilitative effects of multimodal input on L2 collocations of different semantic types [1]. However, few studies have combined processing paths with multimodal input to investigate learning outcomes for different semantic types of collocations. In particular, comparative research on the acquisition of semantically consistent, semantically related, and metaphorical semantically unrelated verb-noun collocations carries important implications for L2 collocation teaching.

2. Literature Review

2.1 Applied Research on Processing Paths

Most existing L2 lexical acquisition studies focus on explicit teaching of motivational information to explain L2 collocation meanings. As an intra-lexical processing strategy, motivational processing guides learners to start construal from internal cues of collocations and treat motivational information as critical for understanding and internalizing collocation knowledge [17]. Tang (2024) [36] found that advanced learners achieve more accurate results using intra-lexical processing strategies than lower-proficiency learners, directly supporting motivational processing as a core intra-lexical path.

Contextual guessing, by contrast, relies on the external linguistic context to initiate construal. It highlights the guessing function of context and co-text for target items, thereby connecting form and meaning [34]. Based on the context effect [25], Searle (1979) [6] proposed the indirect access model, arguing that learners follow the cooperative principle of context and may even interpret meanings faster than through motivational sources. Wei (2018) [38] further emphasized that context plays a decisive role in metaphor comprehension.

Because semantic cues from context often conflict with intra-lexical cues, scholars generally agree that meaning guessing integrated with context is more effective than relying on a single cue, underscoring the importance of context-based strategies for learners [18] [31].

2.2 Effects of Contextual Input and Corresponding Modalities

In domestic and international research on word meaning guessing, contextual factors are regarded as the main determinants of guessing accuracy [33]. In Hong & Zhang's (2017) [41] experimental design, contextual tasks were limited to discourse reading, without exploring multimedia-based contextual input. Davis et al. (2020) [2] proposed the situational systematicity hypothesis, stating that higher situational systematicity strengthens synesthetic associations between linguistic signs and contexts, and vice versa.

Using eye-tracking technology, Pagán & Nation (2019) [19] tracked adults reading materials containing new words in identical and varied contexts, showing that variability in learning environment content and structure significantly affects vocabulary learning through reading. Xu et al. (2024) [35] provided neural evidence that multi-context learning activates both episodic and semantic memory systems, boosting learning. The contextual system refers to human memory sensitivity to environments, real events, and diverse contexts, which strengthens semantic representations formed by repeated co-occurrence of contexts and linguistic signs.

Studies have compared unimodal and multimodal presentation of English expressions on L2 Chinese learners' metaphor comprehension, finding that unimodal input yields significantly lower accuracy than multimodal input [39]. Overall, scholarly consensus favors video-based multimodal input over text-centered unimodal input for L2 knowledge acquisition [15]. Contextual input assists L2 learners in accessing collocation knowledge via audio-visual modalities, while motivational processing is presented through picture-text modalities.

Existing research also relies heavily on single measures of word guessing success, mostly limited to meaning judgment tasks [8][33]. Scholars have noted that successful meaning guessing does not equal lexical acquisition [11]; long-term memory retention must be measured to confirm learning [3]. Thus, this study uses contextual guessing and motivational processing to train learners on unfamiliar collocations, paired with modality-specific input, to examine whether context supports collocation cognition and whether contextual guessing fosters long-term memory.

2.3 Semantic Types of Lexical Collocations

For L2 learners, lexical collocations are stored as holistic chunks rather than individual words, requiring effective mapping between L2 form and meaning [29]. Unlike native language (L1) learners who acquire new words with integrated form and meaning, L2 learners gradually shift from formal connection to conceptual access through repeated language exposure and proficiency development [24]. Beginning L2 learners mainly access L2 word meanings through L1 translation [14]. That is, consistent cross-linguistic concepts and semantics facilitate faster and more accurate L2 access, while inconsistency may interfere with L2 learning in child beginners [22] and adult learners of novel words [26].

Cross-linguistic collocation meanings vary: for example, Chinese *kong jun* corresponds to English *air force*, not *sky army*. Collocations lacking direct semantic correspondence are semantically related. Collocations with direct cross-linguistic semantic correspondence (e.g., *drink water/beer* in English and Chinese equivalents) are semantically consistent. Fixed, non-literal English collocations whose meanings cannot be derived from literal word combinations and carry metaphorical extensions (e.g., *hold water* meaning “be valid,” *in case* meaning “just in case”) are semantically unrelated.

Most existing research targets cognitively mature university students. Adolescents—at a critical stage of L2 development and social cognition—face low language automaticity and underdeveloped cooperative skills [13]. English beginners rely heavily on L1 for L2 semantic access. It is therefore necessary to explore how beginning learners acquire clearly defined semantically different collocations through diverse learning methods to improve accuracy and retention.

In summary, this study investigates which processing path best supports the acquisition and long-term retention of different semantic types of collocations among English beginners, providing empirical evidence for L2 collocation learning strategies. It addresses three research questions:

(1) How effective is contextual guessing for beginner acquisition of three semantic types of collocations, and what is their retention?

(2) How effective is motivational processing for beginner acquisition of three semantic types of collocations, and what is their retention?

(3) Do processing paths and semantic types interact to affect L2 collocation acquisition?

3. Research Design

3.1 Variable Design

A 2 (processing path) × 3 (semantic type) × 3 (test phase) mixed factorial design was adopted. Between-subjects independent variables were processing path (contextual guessing, motivational processing) and semantic type (semantically consistent, semantically related, semantically unrelated). The within-subjects independent variable was test phase: immediate test, Delayed Test A (3 days later), Delayed Test B (7 days later). The dependent variable was total test score across item types.

3.2 Participants

Participants were 96 eighth-grade students from a county-level middle school, after screening for experimental schedule, compliance, motivation, and test validity. Mean age was 14.5 years, with an average of 4.5 years of English learning experience, classified as beginner level per the *Chinese Standards of English Ability*. A pre-test of target collocations showed no significant differences among the three semantic types ($F=0.000$, $p>0.05$).

3.3 Experimental Materials

Materials included target collocations and test sentences. Node verbs were high-frequency words suitable for middle school, selected from the COCA and BNC corpora and verified by English teachers. Verb-noun (V+N) collocations were chosen for three semantic types: semantically consistent, semantically related, and semantically unrelated (metaphorical). All target collocations were unfamiliar to participants, with MI scores >3 . Three senior English teachers (≥ 10 years of experience) validated the semantic classification. A total of 18 collocations were selected (6 per type), each presented in four distinct contextual inputs on a multimedia platform.

Test sentences were authentic utterances containing target collocations from COCA, BNC, *Oxford Advanced Learner's English-Chinese Dictionary*, *Collins COBUILD Advanced English-Chinese Dictionary*, and authoritative online dictionaries. Sentences were simple and comprehensible, with few or no unknown words outside target collocations.

Tests included productive (Chinese-English and English-Chinese translation) and receptive (multiple-choice) items adapted from Sonbul & Schmitt (2013)[23], measuring productive, receptive, and comprehensive collocation knowledge appropriate for junior high school students.

Contextual guessing used video modality (subtitles hidden for meaning inference), with clips from European and American TV dramas and English programs. Motivational processing used picture-text modality, with motivational explanations and illustrations from authoritative dictionaries and websites. One class learned via video-based contextual guessing; the other via picture-text based motivational processing.

3.4 Procedure

The two classes learned target collocations via their respective processing paths, one 45-minute session per week, three collocation types per session, completing 18 collocations over six weeks. Learning lasted ~30 minutes, followed by a 10-minute immediate test. Productive multiple-choice tests were administered first, then Chinese-English and English-Chinese translation. Delayed Test A was given 3 days later, Delayed Test B 7 days later. All tests used identical items: 3 target collocations and 3 distractors per task, 1 point per item, total 18 points. Minor spelling and formatting errors in translation were not penalized; distractors were unscored.

4. Results Analysis

Data were analyzed via three-way ANOVA (processing path \times semantic type \times test phase) using SPSS 26.0.

Table 1: Inter-subject effects of each factor

Source	Df	Mean Square	F	Sig.
Processing Path	1	68.063	88.292	0.000
Semantic Type	2	3.907	5.068	0.006
Test Phase	2	161.883	209.996	0.000
Path × Type	2	9.007	11.684	0.000
Path × Phase	2	4.247	5.509	0.004
Type × Phase	4	0.371	0.481	0.750
Path × Type × Phase	4	1.030	1.336	0.254

As shown in Table 1, the main effect of the processing path was highly significant ($p=0.000$; $p<0.05$ indicates significance, same below). The situational guessing path ($M=2.38$) outperformed the rationale processing path ($M=2.10$), with the difference being highly significant. The main effect of semantic type was significant ($p=0.006$): semantic irrelevance ($M=2.30$) was superior to semantic relevance ($M=2.22$), which in turn surpassed semantic consistency ($M=2.19$). A significant difference was observed between semantic consistency and semantic irrelevance.

Table 2 Main effects of various factors across different measurement periods

Source	Immediate Test				Delayed Test A				Delayed Test B			
	Df	MS	F	Sig.	Df	MS	F	Sig.	Df	MS	F	Sig.
Processing Path	1	6.272	14.066	0.000	1	27.503	30.247	0.000	1	37.195	38.400	0.000
Semantic Type	2	0.662	1.485	0.227	2	2.212	2.432	0.088	2	2.204	2.275	0.103
Path × Type	2	0.803	1.801	0.166	2	3.983	4.380	0.013	2	4.721	4.874	0.008

The main effects of processing path and measurement period were significant ($p=0.004$). Further analysis of the interaction effects between processing path and measurement period is presented in Table 2. Significant differences were observed for both processing paths across all three measurement periods. Descriptive statistics revealed that in the immediate measurement, situational guessing ($M=2.73$) outperformed rationale processing ($M=2.58$); in delayed measurement A, situational guessing ($M=2.29$) was superior to rationale processing ($M=1.98$); and in delayed measurement B, the situational guessing path ($M=2.12$) demonstrated better long-term learning effects than rationale processing ($M=1.76$). These results indicate that the situational guessing processing path yielded superior long-term learning outcomes compared to the rationale processing path. However, no significant effects were observed for semantic types across all measurement periods ($p>0.05$).

4.1 Acquisition by Semantic Type under Contextual Guessing

Overall order: semantically unrelated ($M=2.48$) > semantically related ($M=2.42$) > semantically consistent ($M=2.23$), with significant differences between consistent vs. related and consistent vs. unrelated.

No significant differences among semantic types in the immediate test ($p>0.05$). In Delayed Test A: unrelated ($M=2.40$) > related ($M=2.32$) > consistent ($M=2.14$), with a significant difference between unrelated and consistent. In Delayed Test B: unrelated ($M=2.23$) > related ($M=2.21$) > consistent ($M=1.93$), with significant differences between consistent vs. unrelated and consistent vs. related. Contextual guessing yielded the strongest and most durable retention for metaphorical semantically unrelated collocations.

4.2 Acquisition by Semantic Type under Motivational Processing

Overall order: semantically consistent (M=2.16) > semantically unrelated (M=2.13) > semantically related (M=2.01), with a significant difference between consistent and related ($p=0.016$).

No significant differences in the immediate test ($p>0.05$). In Delayed Test A: consistent (M=2.06) > unrelated (M=2.04) > related (M=1.84), with a significant difference between consistent and related. In Delayed Test B: consistent and unrelated tied (M=1.81) > related (M=1.66), with no significant differences.

4.3 Interaction between Processing Path and Semantic Type

As shown in Table 1, there is a significant interaction effect between processing paths and semantic types ($F=11.684$, $p=0.000$). Further analysis of this interaction effect is presented in Table 3 and Table 4.

Table 3 The Interaction Effect Between Processing Paths and Semantic Types

Processing Path	(I) Semantic Type	(J) Semantic Type	Mean Diff. (I-J)	S.E.	Sig.
Contextual Guessing	Consistent	Related	-0.189	0.052	0.001*
	Consistent	Unrelated	-0.245	0.052	0.000*
	Unrelated	Related	0.056	0.052	0.631
Motivational Processing	Consistent	Related	0.144	0.052	0.016*
	Consistent	Unrelated	0.024	0.052	0.953
	Unrelated	Related	0.120	0.052	0.061
* $p < .05$					

In the contextual guessing processing pathway, semantic consistency showed significant differences from both semantic relevance and semantic irrelevance. Among these, semantic irrelevance (M=2.48) demonstrated the strongest acquisition effect, followed by semantic relevance (M=2.42), with semantic consistency (M=2.23) ranking last. In the rationale processing pathway, semantic consistency exhibited significant differences only with semantic relevance, showing the highest acquisition effect (M=2.15), followed by semantic irrelevance (M=2.13), and semantic relevance (M=2.01) ranking lowest.

Table 4 The Interactive Effect Between Semantic Types and Processing Paths

Semantic Type	(I) Path	(J) Path	Mean Diff. (I-J)	S.E.	Sig.
Consistent	Contextual	Motivational	0.080	0.052	0.123
Related	Contextual	Motivational	0.413	0.052	0.000*
Unrelated	Contextual	Motivational	0.349	0.052	0.000*
* $p < .05$					

As shown in Table 4, there were no significant differences in the acquisition effects of semantic consistency pairs across the two processing paths; however, significant differences were observed for both semantic relevance pairs and semantic irrelevance pairs, with the contextual guessing path outperforming the rationale processing path.

5. Discussion

Contextual guessing is significantly more effective than motivational processing for collocation acquisition. Under contextual guessing, semantically unrelated collocations are best learned and retained longest. Under motivational processing, semantically consistent collocations are best learned, with retention limited to Delayed Test A. These findings differ slightly from Wang et al. (2022)[34], who reported advantages for motivational processing, and from Zhang & Fang (2020)[40], who found weaker acquisition for non-literal collocations.

Two factors may explain the differences:

Contextual input frequency: Repeated exposure to diverse contexts strengthened memory traces, consistent with research on the positive effect of frequency on L2 acquisition[5][16][21][41].

Distinctiveness of semantically unrelated collocations: Metaphorical, semantically unrelated collocations are highly distinctive [1], making them salient and memorable. English-specific fixed collocations are easily stored once understood via L1 equivalents [28]. The advantage of semantically consistent collocations under motivational processing reflects cross-linguistic congruence, enabling holistic storage in the mental lexicon [4].

The significant path-type interaction shows that semantically consistent collocations are equally accessible via both paths, indicating high learner acceptance of cross-linguistically equivalent collocations and stable activation of corresponding L1 chunks[32], consistent with prior research on congruent collocations [27][41].

Semantically related and unrelated collocations favor contextual guessing, with related collocations lagging behind unrelated ones. Possible reasons:

Semantically related collocations are less recognizable and semantically incongruent, requiring more attentional resources and hindering retrieval [20][28].

Contextual input frequency may not fully support form-meaning mapping for related collocations, but the distinctiveness of unrelated collocations enhances memorization, supporting Hunt & Mitchell's (1982)[9] distinctiveness hypothesis: distinctive materials attract more attention and are better learned.

6. Conclusion

This study compares acquisition effectiveness, retention, and interactions of contextual guessing and motivational processing for three semantic types of collocations. Contextual guessing best supports learning and retention of semantically unrelated collocations. Motivational processing favors semantically consistent collocations, with limited retention. A significant path-type interaction exists; only semantically consistent collocations show no path difference, and contextual guessing is overall superior.

Findings inform collocation teaching: emphasize holistic chunk storage, leverage L1 advantages for semantically consistent collocations, and highlight the distinctiveness of semantically unrelated collocations to boost retention.

Limitations include potential unregulated learner exposure to target collocations during the intervention, which may have affected familiarity, context, and frequency. Future research could use other teaching interventions and longitudinal multimodal/multi-context studies to clarify L2 collocation acquisition mechanisms and improve L2 instruction.

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