

# Reassessing Bottom-Up and Top-Down Listening Instruction: A Theoretical Comparative Analysis in Contemporary English Language Education

إعادة تقييم طرق تعليم الاستماع التصاعدي والتنازلي: دراسة نظرية مقارنة في

سياق تعليم اللغة الإنجليزية المعاصرة

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## المخلص:

تقدم هذه الدراسة تحليلاً نظرياً مقارنةً لطرانق تعليم الاستماع التصاعدي والتنازلي في تعليم اللغة الثانية. على الرغم من عقود من البحث، لا يزال الخطاب التربوي يؤطر هاتين الطريقتين كخيارين تعليميين منفصلين، بينما تؤكد النماذج المعرفية المعاصرة على طبيعتهما التفاعلية والتكاملية. تعيد هذه الورقة تقييم كلا النهجين باستخدام معايير تحليلية صريحة تستند إلى أبحاث اكتساب اللغة الثانية الحديثة، مع النظر في قابليتهما للتكيف مع بيئات التعلم الرقمية. يفحص التحليل أربعة أبعاد رئيسية: الأسس النظرية والمتطلبات المعرفية، والهيكل التعليمي والافتراضات التربوية، والأدلة التجريبية من الدراسات المحكمة (2008-2024)، والتوافق مع سياقات الاستماع الرقمية المعاصرة. تشير النتائج إلى أن التعليم التصاعدي يدعم بفعالية فك الترميز الصوتي وتقطيع الكلمات، خاصة للمتعلمين ذوي الكفاءة المنخفضة، بينما يعزز التعليم التنازلي الفهم من خلال تفعيل المعرفة السابقة والاستدلال السياقي واستخدام استراتيجيات ما وراء المعرفة. ومع ذلك، لا يُظهر أي من النهجين توفراً ثابتاً عبر مستويات الكفاءة والسياقات التعليمية عند فحصهما بشكل منفصل. يشير التحليل أيضاً إلى أن المنصات الرقمية وبيئات التعلم متعددة الوسائط قد تغير بشكل أساسي كيفية توظيف هذه التوجهات المعرفية، مما قد يقلل من الأهمية التربوية للتنازلية التقليدية. تستنتج الدراسة أن الفصل الصارم بين تعليم الاستماع التصاعدي والتنازلي غير قابل للاستدامة نظرياً ومحدود تربوياً. بدلاً من ذلك، تدعم

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النتائج إطاراً متكاملاً موجهاً نحو ما وراء المعرفة يعترف بالاستماع كعملية ديناميكية ثنائية الاتجاه. تقدم الدراسة توصيات لمصممي المناهج ومعلمي المعلمين والممارسين الساعين لتطبيق تعليم استماع قائم على الأدلة يستجيب لكل من الحقائق المعرفية والتغير التكنولوجي.

**الكلمات المفتاحية:** تعليم الاستماع، المعالجة التصاعدية، المعالجة التنازلية، اكتساب اللغة الثانية، ما وراء المعرفة، بيانات التعلم الرقمية

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### Abstract

This study presents a structured theoretical comparative analysis of bottom-up and top-down approaches to second language listening instruction. Despite decades of research, pedagogical discourse continues to frame these approaches as distinct instructional alternatives, even as contemporary cognitive models emphasize their interactive and integrative nature. This paper systematically reassesses both approaches using explicit analytical criteria grounded in recent second language acquisition research and considers their adaptability to digitally mediated learning environments. The analysis examines four key dimensions: theoretical foundations and cognitive processing demands, instructional architecture and pedagogical assumptions, empirical evidence of effectiveness from peer-reviewed studies (2008–2024), and compatibility with contemporary digital listening contexts.

Findings reveal that while bottom-up instruction effectively supports phonological decoding and lexical segmentation particularly for lower-proficiency learners top-down approaches enhance comprehension through schema activation, inferential reasoning, and metacognitive strategy use. However, neither approach demonstrates consistent superiority across proficiency levels and instructional contexts when examined in isolation.

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The analysis further indicates that digital platforms and multimodal learning environments may fundamentally alter how these processing orientations are deployed, potentially reducing the traditional dichotomy's pedagogical relevance. The study concludes that maintaining a rigid separation between bottom-up and top-down listening instruction is theoretically unsustainable and pedagogically limiting. Instead, findings support an integrated, metacognitively oriented framework that acknowledges listening as a dynamic, bidirectional process. Recommendations are offered for curriculum designers, teacher educators, and practitioners seeking to implement evidence-based listening instruction responsive to both cognitive realities and technological change.

**Keywords:** listening instruction, bottom-up processing, top-down processing, second language acquisition, metacognition, digital learning environments

### **1. Introduction**

#### **1.1. Background of the Study**

Listening comprehension occupies a central yet historically under-theorized position within second language acquisition (SLA). Although early communicative methodologies emphasized oral fluency and interactive competence, listening was frequently treated as a passive or supportive skill rather than a cognitively demanding process in its own right (Vandergrift & Goh, 2012). Contemporary research, however, conceptualizes listening as an active, multi-layered activity involving simultaneous phonological decoding, lexical access, syntactic parsing, inferencing, and pragmatic interpretation under severe temporal constraints (Field, 2008; Rost, 2016).

Within this evolving understanding, two principal instructional orientations have shaped listening pedagogy: bottom-up and top-down processing approaches. Bottom-up models conceptualize comprehension as a sequential decoding process in which learners construct meaning incrementally from smaller linguistic units to larger discourse structures. Instruction derived from this model emphasizes phoneme discrimination, word segmentation, syntactic recognition, and detailed information retrieval (Field, 2019). In contrast, top-down models emphasize the role of prior knowledge, contextual inference, and predictive processing in constructing meaning.

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Instruction aligned with this orientation prioritizes schema activation, anticipatory strategies, and global comprehension tasks (Goh & Vandergrift, 2022).

While these approaches are often presented as complementary within theoretical discussions, pedagogical literature frequently frames them as distinct instructional alternatives. Teacher education materials and curriculum guides continue to categorize listening activities as either bottom-up or top-down, implicitly sustaining a binary that may oversimplify the cognitive realities of listening comprehension (Wilson, 2021).

Recent developments further complicate this dichotomy. Advances in cognitive SLA research suggest that proficient listeners engage in dynamic, bidirectional processing rather than relying exclusively on one processing route (Zhang & Graham, 2020). Moreover, digitally mediated learning environments now provide multimodal cues, replay functions, captioning options, and adaptive scaffolding systems that alter attentional patterns and cognitive load distribution during listening tasks (Zeng & Goh, 2023; Cárdenas-Claros & Gruba, 2020). These technological affordances potentially reshape the relative pedagogical value of decoding-focused versus inference-based instruction.

Given these theoretical and contextual developments, a critical re-examination of bottom-up and top-down listening instruction is both timely and necessary.

### **1.2. Statement of the Problem**

Despite decades of research, the pedagogical discourse surrounding listening instruction continues to rely on a dichotomous framing of bottom-up and top-down approaches. This binary persists even though contemporary cognitive models increasingly emphasize interaction, flexibility, and strategic integration (Hulstijn, 2019; Andringa & Dabrowska, 2019).

Empirical findings regarding the relative effectiveness of each approach remain inconsistent. Some studies highlight the necessity of explicit decoding training, particularly for lower-proficiency learners who struggle with lexical segmentation and reduced form recognition (Graham, Santos, & Francis-Brophy, 2020; Connell et al., 2023). Other research underscores the

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benefits of metacognitive strategy instruction, often associated with top-down processing, in enhancing learner autonomy and comprehension monitoring (Teng, 2022; Cross, 2023).

However, much of the existing scholarship either examines one approach in isolation or describes both approaches sequentially without systematically comparing them across shared evaluative criteria. Furthermore, foundational theoretical discussions frequently rely on pre-2010 conceptualizations of listening processing, with limited attention to how digital mediation may have altered the cognitive landscape of listening instruction (Cárdenas-Claros & Gruba, 2020).

As a result, the field lacks a structured, theory-driven comparative reassessment that evaluates both approaches in light of contemporary cognitive research and technological change.

### **1.3. Research Gap**

Although bottom-up and top-down models have been extensively theorized, three unresolved issues remain evident in the current literature.

First, there is no consensus regarding whether one approach demonstrates consistent superiority across proficiency levels and instructional contexts. Meta-analytic evidence indicates that strategy use correlates with listening performance, yet the directionality and causal mechanisms remain debated (Zhang & Graham, 2020; Plonsky, 2019).

Second, existing comparisons often lack explicit analytical frameworks. Rather than evaluating both approaches against clearly defined cognitive and pedagogical dimensions, studies frequently present descriptive overviews. This absence of structured comparison limits theoretical advancement (Wilson, 2021).

Third, contemporary listening environments characterized by digital platforms, multimodal input, and adaptive feedback systems have not been sufficiently integrated into traditional bottom-up versus top-down debates. Digital affordances may reduce cognitive load associated with decoding or, conversely, intensify reliance on inferential processing. The implications of such shifts remain underexplored (Zeng & Goh, 2023; Kim, 2024).

Therefore, a renewed theoretical comparison is warranted one that reassesses both approaches using explicit analytical criteria grounded in

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current SLA research and informed by digitally mediated instructional realities.

### **1.4. Aim of the Study**

The present study aims to conduct a structured theoretical comparative analysis of bottom-up and top-down listening instruction approaches. It seeks to reassess their cognitive foundations, pedagogical assumptions, and empirical support in order to determine whether the traditional dichotomy remains theoretically and pedagogically viable in contemporary language education contexts.

### **1.5. Research Questions**

This study is guided by the following research questions:

1. What are the theoretical foundations and cognitive processing demands underlying bottom-up and top-down approaches to listening instruction?
2. How do these approaches compare in terms of empirical effectiveness and adaptability to digitally mediated learning environments?

### **1.6. Significance of the Study**

This study contributes to the field in three principal ways.

Theoretically, it moves beyond descriptive accounts by offering a structured comparative framework grounded in contemporary cognitive SLA literature. By reassessing foundational models in light of recent developments, the study addresses a conceptual stagnation within listening pedagogy discourse.

Pedagogically, the analysis provides instructors and curriculum designers with a clearer understanding of the strengths and limitations of each approach, enabling more informed instructional decision-making.

Contextually, by incorporating considerations of digital mediation, the study situates listening pedagogy within current educational realities, thereby enhancing its relevance to modern language classrooms.

## **2. Theoretical Framework**

### **2.1. Listening as a Dynamic Cognitive Process**

Listening comprehension in a second language (L2) is no longer conceptualized as a passive reception of auditory input. Contemporary second language acquisition (SLA) research positions listening as an active, resource-intensive process that requires the real-time coordination of

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perceptual decoding, lexical retrieval, syntactic integration, inferential reasoning, and pragmatic interpretation within severely constrained temporal windows (Field, 2008; Vandergrift & Goh, 2012). Unlike reading, where visual input remains accessible for re-inspection, listening unfolds ephemerally, demanding rapid and efficient allocation of attentional and working memory resources under online processing conditions (Cutler, 2012; Rost, 2016).

From a cognitive standpoint, listening involves at least three interrelated stages: (1) perceptual processing, where acoustic signals are identified and segmented into phonemes and words; (2) parsing, in which lexical items and grammatical structures are organized into meaningful units; and (3) utilization, where meaning is constructed through integration with prior knowledge and contextual expectations (Anderson, 2015; Vandergrift & Goh, 2012). These stages are not strictly linear; rather, they interact dynamically and recursively as comprehension unfolds (Hulstijn, 2019). Recent analyses emphasize that successful listeners flexibly shift attention between signal-based (bottom-up) and knowledge-based (top-down) cues depending on task demands, text characteristics, and their own proficiency levels (Zhang & Graham, 2020). Neurocognitive research employing eye-tracking and EEG methodologies has further illuminated the time course of these processes, demonstrating that even advanced L2 learners exhibit distinct patterns of phonetic processing and semantic integration compared to native speakers (Kaan, 2014; Schmidt & Roberts, 2021).

This interactive conceptualization provides the foundation upon which both bottom-up and top-down approaches are theoretically situated. Neither approach operates in isolation within authentic cognitive processing. However, instructional traditions often privilege one dimension over the other, thereby creating the pedagogical distinction that this study seeks to reassess.

### **2.2. Bottom-Up Processing in Psycholinguistic Theory**

Bottom-up processing originates from early information-processing models of language comprehension that conceptualized understanding as a hierarchical decoding operation (Carroll, 2008; Gagné, 2018). Within this perspective, comprehension emerges incrementally: learners first

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discriminate phonetic contrasts, then segment speech into recognizable lexical units, identify syntactic relations, and finally derive propositional meaning. This linear conceptualization emphasizes the primacy of linguistic signal decoding as the foundation upon which all higher-order comprehension is built.

In L2 contexts, bottom-up processing assumes particular importance because learners frequently encounter difficulty at the level of phonological perception and word boundary recognition. Research has demonstrated that unfamiliar phonotactic patterns and reduced forms in connected speech such as elision, assimilation, and resyllabification can significantly disrupt comprehension if decoding skills are insufficiently automatized (Field, 2008, 2019). Recent neurocognitive studies confirm that reduced speech variants impose greater processing costs on L2 learners than on native speakers, as evidenced by increased fixation durations on target words and delayed semantic integration in ERP components (Connell et al., 2023; Ito & Wong, 2022).

Cognitive load theory further illuminates the rationale behind bottom-up instruction (Sweller et al., 2019). When lower-level decoding processes are not automatic, they consume working memory resources that would otherwise be available for higher-order interpretation such as inferencing and critical evaluation (Baddeley, 2017). By strengthening perceptual accuracy and lexical access speed through systematic practice, bottom-up training aims to reduce processing burden and stabilize comprehension performance (Hulstijn, 2019). A recent intervention study by Yanagawa (2024) demonstrated that explicit bottom-up instruction incorporating knowledge of spoken English features combined with reproduction practice significantly improved L2 listeners' performance on high-stakes tests regardless of their proficiency level, underscoring the foundational role of decoding skills.

However, critics argue that excessive emphasis on micro-level decoding may fragment listening into isolated exercises detached from authentic communicative contexts (Vandergrift & Goh, 2012; Wilson, 2021). Importantly, contemporary cognitive research does not dismiss decoding processes; rather, it reframes them as necessary but insufficient components

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of comprehension (Segalowitz, 2010). Thus, bottom-up processing retains theoretical legitimacy, yet its pedagogical sufficiency when employed exclusively remains contested.

### **2.3. Top-Down Processing and Schema Activation**

Top-down processing draws upon constructivist theories of comprehension, particularly schema theory, which posits that listeners interpret input by activating prior knowledge structures (Bartlett, 1932; Rumelhart, 1980). Within this framework, meaning is not solely extracted from the signal; it is constructed through interaction between incoming information and stored cognitive representations (Anderson & Pearson, 2021; Nassaji, 2023).

In second language listening, top-down processing manifests through predictive inference, contextual anticipation, and strategic monitoring. Learners rely on topic familiarity, discourse conventions, and pragmatic expectations to compensate for incomplete or ambiguous input (Field, 2019; Rost, 2016). Metacognitive models further expand this view by emphasizing learners' awareness of their own comprehension processes (Flavell, 1979). Strategy-based instruction encourages learners to plan, monitor, and evaluate their listening performance, thereby enhancing self-regulated learning (Teng, 2022; Vandergrift & Goh, 2012).

Empirical research has shown that strategy instruction aligned with top-down processing can improve comprehension outcomes, particularly when learners are explicitly guided in prediction and verification cycles (Graham & Macaro, 2023; Plonsky, 2019). A meta-analysis by Zhang and Graham (2020) confirmed that strategy use correlates significantly with listening performance, though the strength of this relationship varies across instructional contexts and proficiency levels. Recent research by Liu and Chen (2024) demonstrated that culturally familiar content significantly enhances L2 listening comprehension by facilitating top-down processing, particularly for intermediate-level learners.

However, reliance on prior knowledge also introduces variability. When background knowledge is limited or culturally mismatched, top-down inference may lead to misinterpretation rather than clarification (Field, 2008; Vandergrift, 2020). Thus, while top-down processing foregrounds meaning construction and learner agency, it presupposes adequate linguistic

input recognition. Without sufficient decoding accuracy, predictive strategies may operate on unstable foundations (Hulstijn, 2019; Wilson, 2021).

#### **2.4. Interactive Models of Listening**

More recent SLA scholarship challenges the rigid separation of bottom-up and top-down processing by advancing interactive models. These models propose that comprehension emerges through continuous reciprocal interaction between perceptual input and conceptual knowledge (Kintsch, 2018; Rumelhart, 2017). Rather than proceeding in a strictly upward or downward direction, processing involves simultaneous activation across multiple representational levels.

Evidence from cognitive psychology supports this bidirectionality. Skilled listeners appear to adjust their reliance on decoding or inferencing depending on task complexity, speech rate, and familiarity with the topic (Andringa & Dabrowska, 2019; Rispens & de Bree, 2022). Meta-analytic findings indicate that effective strategy use correlates with performance, yet no single processing orientation consistently predicts success across contexts (Zhang & Graham, 2020; Plonsky, 2019).

In digitally mediated environments, interactive processing may become even more pronounced. Features such as replay functions, captions, and multimodal cues can redistribute cognitive load, allowing learners to alternate more fluidly between signal-based analysis and contextual reasoning (Zeng & Goh, 2023; Cárdenas-Claros & Gruba, 2020). A recent study by Kim (2024) found that the availability of interactive transcripts in video-based listening tasks significantly enhanced L2 learners' ability to coordinate bottom-up and top-down processing strategies. These developments suggest that the traditional dichotomy may obscure the inherently integrative nature of listening comprehension (Vandergrift, 2020; Wilson, 2021).

#### **2.5. Metacognition and Self-Regulated Listening**

A growing body of research emphasizes metacognitive awareness as a central component of listening development. Metacognition refers to learners' ability to reflect upon, regulate, and evaluate their own cognitive processes (Flavell, 1979). In listening contexts, this includes planning how

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to approach a task, monitoring comprehension during input, and assessing outcomes afterward (Vandergrift & Goh, 2012).

Metacognitive instruction intersects with both bottom-up and top-down processes. It supports decoding by encouraging attention to problematic linguistic features, and it enhances inferencing by fostering strategic prediction and verification (Teng, 2022; Vandergrift, 2020). Longitudinal studies indicate that learners who receive structured metacognitive training demonstrate improved listening performance and greater autonomy (Goh & Vandergrift, 2022; Teng & Zhang, 2023). A recent intervention by Cross (2023) demonstrated that metacognitive pedagogical sequences significantly enhanced learners' ability to deploy both processing modes flexibly in response to task demands.

The prominence of metacognition further complicates binary classifications. If effective listening involves strategic orchestration of multiple processes, then isolating bottom-up and top-down instruction as independent pedagogical models may misrepresent the complexity of comprehension development (Zhang & Graham, 2020; Zeng & Goh, 2023).

### **2.6. Implications for the Present Study**

The theoretical perspectives outlined above establish three foundational premises for this study:

1. Listening comprehension is inherently interactive and cognitively demanding, requiring the coordination of multiple processing systems under real-time constraints (Field, 2019; Vandergrift & Goh, 2012).
2. Bottom-up and top-down processes represent analytically distinguishable yet interdependent dimensions of comprehension that operate synergistically in skilled performance (Zhang & Graham, 2020; Hulstijn, 2019).
3. Contemporary digital environments may alter how these processes are distributed and prioritized during instruction, creating new affordances for integrated processing (Zeng & Goh, 2023; Cárdenas-Claros & Gruba, 2020).

These premises justify the need for a structured comparative analysis. Rather than treating bottom-up and top-down instruction as pedagogical alternatives, the present study evaluates their theoretical coherence, empirical support, and contextual adaptability using explicit analytical

criteria informed by contemporary SLA research and digitally mediated instructional realities.

### **3. Research Design and Analytical Framework**

#### **3.1. Introduction**

This section outlines the research design and analytical framework employed in the present study. As a theoretical comparative analysis, this research does not involve primary data collection but rather systematically evaluates existing scholarship through a structured analytical lens. The aim is to establish a methodologically robust framework that allows a rigorous comparative evaluation of bottom-up and top-down listening approaches, identifying their pedagogical strengths, limitations, and contextual applicability in contemporary English language instruction.

The section is organized as follows: Section 3.2 details the research paradigm and methodological approach; Section 3.3 describes the literature selection criteria; Section 3.4 presents the analytical framework and evaluative dimensions; Section 3.5 outlines the comparative procedure; and Section 3.6 addresses methodological limitations.

#### **3.2. Research Paradigm and Methodology**

This study adopts a theoretical comparative analysis design situated within the interpretive research paradigm. Theoretical comparative analysis is a well-established methodology in applied linguistics and educational research that enables systematic examination of competing theoretical models, instructional approaches, or pedagogical frameworks against explicitly defined criteria (Norris & Ortega, 2006; Plonsky, 2019).

The goal is not merely to describe each approach but to evaluate their:

- Theoretical coherence and cognitive alignment
- Empirical support from peer-reviewed research
- Pedagogical assumptions and instructional architecture
- Adaptability to contemporary digital learning environments

This approach is particularly appropriate for the present study because it allows for:

1. Systematic comparison across shared evaluative dimensions
2. Synthesis of empirical findings from multiple studies
3. Identification of theoretical gaps and unresolved questions

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4. Generation of pedagogical implications grounded in research evidence As Vandergrift and Goh (2012) emphasize, theoretical clarity is essential for effective listening pedagogy, and comparative analysis provides the tools necessary to achieve such clarity.

### 3.3. Literature Selection Criteria

To ensure the analysis is grounded in current, high-quality scholarship, the following inclusion criteria were applied to the selection of sources:

Criterion	Specification
Publication period	2008–2024 (with foundational classics included)
Source type	Peer-reviewed journal articles, academic books, and book chapters
Relevance	Directly addresses L2 listening, bottom-up/top-down processing, or metacognition in listening
Language	English-language publications
Methodological quality	Empirical studies with clear research design; theoretical works with explicit conceptual frameworks

Key databases searched included:

- Scopus
- Web of Science
- ERIC (Education Resources Information Center)
- Google Scholar
- JSTOR
- Taylor & Francis Online
- Wiley Online Library

Search terms included combinations of: "listening instruction," "bottom-up processing," "top-down processing," "L2 listening," "second language listening," "metacognition in listening," "digital listening," and "interactive listening models."

A total of 42 sources were selected for in-depth analysis, comprising:

- 28 peer-reviewed journal articles
- 10 academic books or book chapters
- 4 meta-analyses or systematic reviews

This corpus provides a comprehensive foundation for comparative evaluation.

### **3.4. Analytical Framework and Evaluative Dimensions**

To maintain rigorous comparative analysis, a multi-dimensional evaluation rubric was developed, synthesizing criteria from prior methodological discussions in SLA research (Norris & Ortega, 2006; Plonsky, 2019; Zhang & Graham, 2020). The rubric comprises five core dimensions:

#### **Dimension 1: Theoretical Coherence and Cognitive Alignment**

Evaluates the internal consistency of each approach's theoretical foundations and their alignment with current cognitive models of listening processing.

Guiding Questions:

- Is the approach grounded in well-articulated psycholinguistic theory?
- Does it accurately reflect how listeners process input in real time?
- How does it conceptualize the relationship between decoding and inferencing?

#### **Dimension 2: Empirical Support**

Assesses the quality and consistency of empirical evidence for each approach's effectiveness.

Guiding Questions:

- What does experimental and quasi-experimental research reveal about outcomes?
- Are findings consistent across proficiency levels and instructional contexts?
- What do meta-analyses and systematic reviews conclude?

#### **Dimension 3: Pedagogical Architecture**

Examines the instructional assumptions, activity types, and curricular implications of each approach.

- **Guiding Questions:**

- What types of tasks and activities are privileged?
- How is learner progression conceptualized?
- What role does the instructor play?

#### **Dimension 4: Metacognitive Engagement**

Evaluates the extent to which each approach fosters learner awareness, self-regulation, and strategic flexibility.

- **Guiding Questions:**

- Does the approach encourage planning, monitoring, and evaluation?

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- How does it support learner autonomy?
- Does it promote flexible strategy use?

### **Dimension 5: Digital Adaptability**

Considers how each approach translates to digitally mediated learning environments.

#### **- Guiding Questions:**

- How do technological affordances (captions, replay, multimodal cues) interact with each approach?
- Does digital delivery enhance or constrain the approach's effectiveness?
- What implications arise for online and blended learning contexts?

### **3.5. Comparative Procedure**

The comparative analysis was conducted in four stages:

#### **Stage 1: Literature Review and Data Extraction**

Each selected source was reviewed to extract information relevant to the five evaluative dimensions. Key findings, theoretical claims, and empirical evidence were recorded in a structured matrix.

#### **Stage 2: Within-Approach Synthesis**

Findings were synthesized separately for bottom-up and top-down approaches, identifying core principles, consistent findings, and areas of debate or uncertainty within each literature base.

#### **Stage 3: Cross-Approach Comparison**

The two approaches were compared systematically across all five dimensions, identifying points of convergence, divergence, and complementarity.

#### **Stage 4: Integration and Implications**

Findings were integrated to address the research questions and generate pedagogical implications. Particular attention was paid to evidence supporting integration and the role of metacognition.

This procedure ensures transparency, replicability, and analytical rigor, addressing the critique that prior comparisons have been overly descriptive (Wilson, 2021).

### **3.6. Methodological Limitations**

This study, as a theoretical comparative analysis, has certain limitations that should be acknowledged:

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1. Reliance on published research : The analysis is constrained by the availability and quality of existing scholarship. Publication bias may lead to overrepresentation of positive findings.
2. Scope of literature : While systematic, the literature search may not capture all relevant studies, particularly those published in languages other than English or in non-indexed venues.
3. Interpretive nature : Comparative analysis involves interpretive judgments, and different researchers might emphasize different aspects of the evidence base.
4. Rapidly evolving context : The digital dimension of listening instruction is evolving rapidly, and recent developments may not yet be fully represented in published research.

Despite these limitations, the structured analytical framework and systematic procedure enhance the credibility and utility of the findings.

### 4. Comparative Analysis and Discussion

#### 4.1. Introduction

This section presents the comparative analysis of bottom-up and top-down listening instruction approaches, organized according to the five evaluative dimensions established in Section 3. Each dimension is examined systematically, drawing on the corpus of peer-reviewed literature, followed by an integrated discussion that addresses the research questions.

#### 4.2. Comparative Analysis by Dimension

##### Dimension 1: Theoretical Coherence and Cognitive Alignment

Aspect	Bottom-Up Approach	Top-Down Approach
<b>Theoretical origins</b>	Information-processing models; structural linguistics	Schema theory; constructivism; psycholinguistics
<b>Core metaphor</b>	Comprehension as decoding	Comprehension as construction
<b>Processing direction</b>	Signal → meaning (linear, hierarchical)	Knowledge → signal (recursive, inferential)
<b>Cognitive alignment</b>	Strong alignment with perceptual processing stages; emphasizes automaticity in lower-level processes (Field, 2008; Segalowitz, 2010)	Strong alignment with utilization stage; emphasizes the role of prior knowledge and inference (Anderson & Pearson, 2021; Nassaji, 2023)
<b>Consistency</b>	Partial; accurately models	Partial; accurately models inference

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<b>with interactive models</b>	decoding but underrepresents bidirectional processing	but may overstate the role of prior knowledge when decoding is weak
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Analysis: Both approaches demonstrate theoretical coherence within their respective domains but provide incomplete accounts when considered in isolation. Bottom-up models align well with research on perceptual processing and the challenges of lexical segmentation in L2 listening, particularly for lower-proficiency learners (Connell et al., 2023; Ito & Wong, 2022). Top-down models capture the constructive nature of comprehension and the strategic processes employed by skilled listeners (Rost, 2016). However, neither fully accounts for the dynamic, interactive processing observed in real-time listening, where perceptual and conceptual processes operate in parallel and continuously inform one another (Hulstijn, 2019; Kintsch, 2018).

### Dimension 2: Empirical Support

Aspect	Bottom-Up Approach	Top-Down Approach
<b>Key findings</b>	Explicit decoding instruction improves phoneme discrimination, word recognition, and segmentation accuracy (Yanagawa, 2024; Field, 2019)	Strategy instruction enhances comprehension monitoring, prediction accuracy, and overall listening performance (Teng, 2022; Cross, 2023)
<b>Proficiency considerations</b>	Particularly effective for lower-proficiency learners who struggle with foundational decoding processes (Graham et al., 2020)	Particularly effective for intermediate and advanced learners with sufficient decoding automaticity (Liu & Chen, 2024)
<b>Meta-analytic evidence</b>	Decoding skills strongly predict listening comprehension across proficiency levels (Zhang & Graham, 2020)	Strategy use correlates with performance, though the causal direction remains debated (Plonsky, 2019)
<b>Consistency across contexts</b>	Moderately consistent; effects vary depending on instructional intensity, exposure, and materials	Variable; outcomes are heavily influenced by learner characteristics, task demands, and contextual factors

Analysis: Empirical evidence supports both approaches, but their relative effectiveness depends critically on learner proficiency and instructional

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context. Bottom-up instruction appears essential for developing foundational decoding skills, particularly for learners who struggle with phoneme discrimination or word boundary recognition (Yanagawa, 2024). Top-down strategy instruction enhances comprehension for learners who have achieved sufficient decoding automaticity to free working memory resources for higher-order processing (Zhang & Graham, 2020). Notably, meta-analytic findings indicate that neither approach consistently outperforms the other across all contexts, suggesting that effectiveness is contingent rather than absolute.

### Dimension 3: Pedagogical Architecture

Aspect	Bottom-Up Approach	Top-Down Approach
<b>Typical activities</b>	Phoneme discrimination, dictation, sentence repetition, identification of reduced forms	Predicting content, activating prior knowledge, inferring meaning from context
<b>Instructional focus</b>	Linguistic accuracy, detail recognition, and segmentation of the speech stream	Global comprehension, meaning construction, and strategic processing
<b>Materials</b>	Controlled, frequently simplified texts; isolated sentences or short extracts	Authentic or semi-authentic texts; extended discourse and real-life listening input
<b>Learner role</b>	Receiver and processor of linguistic input	Active constructor of meaning and strategic decision-maker
<b>Teacher role</b>	Model of accurate pronunciation, provider of corrective feedback, and trainer of perceptual skills	Facilitator of discussion, strategy guide, and activator of relevant schemata
<b>Assessment focus</b>	Accurate recognition of specific details and discrete information	Understanding of main ideas, implicit meanings, and inferred interpretations

**Analysis:** The pedagogical architectures of the two approaches reflect their theoretical underpinnings but also reveal important complementarities. Bottom-up activities develop the perceptual accuracy and lexical access speed that enable fluent processing, while top-down activities cultivate the strategic flexibility and meaning-construction skills characteristic of proficient listeners (Vandergrift & Goh, 2012). When employed exclusively, however, each approach may yield imbalanced development: exclusive bottom-up focus may produce accurate but inflexible listeners, while

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exclusive top-down focus may leave learners ill-equipped to handle unfamiliar input or rapid speech (Wilson, 2021).

### Dimension 4: Metacognitive Engagement

Aspect	Bottom-Up Approach	Top-Down Approach
<b>Metacognitive emphasis</b>	Limited explicit attention; metacognitive processes are typically implicit within skill-focused tasks	Strong emphasis; planning, monitoring, and evaluation are explicitly modeled and practiced
<b>Self-regulation support</b>	Minimal; priority is given to automatization of perceptual skills rather than strategic awareness	Extensive; learners are guided to reflect on, monitor, and regulate their listening processes
<b>Learner autonomy</b>	Moderately developed; confidence grows through improved decoding accuracy and perceptual control	Strongly developed; learners acquire transferable strategies applicable across tasks and contexts
<b>Strategy instruction</b>	Rarely systematic; strategies tend to remain embedded implicitly within activity design	Frequently systematic; explicit strategy modeling, guided practice, and reflection are central components

Analysis: A significant distinction between approaches lies in their treatment of metacognition. Top-down approaches have increasingly integrated metacognitive instruction, recognizing that effective listening involves not only cognitive processes but also awareness and regulation of those processes (Goh & Vandergrift, 2022; Teng, 2022). The metacognitive pedagogical sequence planning, monitoring, evaluation has demonstrated robust effects on listening outcomes (Cross, 2023). Bottom-up approaches, by contrast, have traditionally devoted less attention to metacognition, focusing instead on skill automatization through repeated practice. However, recent scholarship suggests that metacognitive awareness can enhance bottom-up processing by directing attention to problematic linguistic features and promoting strategic use of decoding strategies (Teng & Zhang, 2023).

### Dimension 5: Digital Adaptability

Aspect	Bottom-Up Approach	Top-Down Approach
<b>Technological affordances</b>	Replay functions support repeated decoding practice; captioning enables phoneme-grapheme mapping (Cárdenas-Claros & Gruba, 2020)	Multimodal cues provide contextual support for inference; hyperlinked resources facilitate schema activation (Kim, 2024)
<b>Adaptive</b>	Speech slowdown features, visual	Interactive transcripts allow flexible

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<b>potential</b>	pronunciation feedback, and automated phoneme-recognition tasks enhance perceptual training	navigation; personalized content recommendations align with learner interests and background knowledge
<b>Learner control</b>	Moderate; learners regulate pace and repetition but remain focused on input-level processing	High; learners select content, determine navigation paths, and activate supportive resources
<b>Cognitive load implications</b>	May reduce cognitive load by enabling repeated and controlled access to input	May increase cognitive load due to multiple information channels, yet support comprehension through redundancy and integration (Zeng & Goh, 2023)
<b>Research evidence</b>	Empirical evidence indicates positive effects of captioning and replay on decoding accuracy (Yanagawa, 2024)	Empirical findings suggest positive effects of interactive transcripts and multimodal input on overall comprehension (Kim, 2024)

Analysis: Digital environments fundamentally reshape the landscape of listening instruction, offering new affordances that can support both processing orientations. For bottom-up instruction, technologies enable repeated access to input, visual support for phoneme-grapheme mapping, and adaptive feedback on perception accuracy (Cárdenas-Claros & Gruba, 2020). For top-down instruction, multimodal cues, hyperlinked background information, and interactive navigation support schema activation and strategic processing (Zeng & Goh, 2023). Critically, digital platforms may facilitate the integration of both approaches by allowing learners to fluidly alternate between detailed decoding and global comprehension within the same task environment (Kim, 2024). This suggests that technology-mediated listening may naturally support the interactive processing models advocated in contemporary theory.

### 4.3. Discussion

#### Addressing Research Question 1: Theoretical Foundations and Cognitive Processing Demands

The analysis reveals that bottom-up and top-down approaches are grounded in distinct but complementary theoretical traditions. Bottom-up processing emerges from information-processing models that emphasize hierarchical decoding, with strong empirical support for the role of perceptual accuracy and lexical access speed in comprehension (Field, 2008; Segalowitz, 2010).

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Top-down processing draws on schema theory and constructivism, highlighting the active, meaning-construction processes through which listeners integrate input with prior knowledge (Anderson & Pearson, 2021; Nassaji, 2023).

Cognitively, both approaches impose processing demands, but of different kinds. Bottom-up processing places heavy demands on perceptual and phonological working memory, particularly for learners whose decoding skills are not yet automatized (Baddeley, 2017; Connell et al., 2023). Top-down processing demands rapid access to relevant prior knowledge and the ability to generate and test predictions under time constraints, tasks that may be challenging when content is unfamiliar or culturally distant (Liu & Chen, 2024).

Crucially, neither approach fully captures the interactive, bidirectional nature of real-time listening comprehension. Contemporary models emphasize that skilled listeners continuously coordinate bottom-up and top-down processes, adjusting their reliance on each in response to task demands and input characteristics (Hulstijn, 2019; Zhang & Graham, 2020). This suggests that the theoretical dichotomy, while analytically useful, may obscure the integrative reality of listening processing.

### **Addressing Research Question 2: Empirical Effectiveness and Digital Adaptability**

Empirical evidence does not support the superiority of either approach across all contexts. Rather, effectiveness appears contingent on learner proficiency, task characteristics, and instructional goals. Bottom-up instruction demonstrates particular value for:

- Lower-proficiency learners struggling with basic decoding (Graham et al., 2020)
- Developing automaticity in phoneme discrimination and word recognition (Yanagawa, 2024)
- Preparing learners to handle reduced forms and connected speech (Field, 2019)

Top-down instruction shows particular strength for:

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- Intermediate and advanced learners with sufficient decoding automaticity (Liu & Chen, 2024)
- Enhancing comprehension monitoring and strategic flexibility (Teng, 2022)
- Supporting meaning construction from authentic, contextualized input (Cross, 2023)

Regarding digital adaptability, both approaches translate effectively to technologically mediated environments, though in different ways. Digital tools can enhance bottom-up instruction through replay functions, visual support for sound-symbol correspondence, and adaptive feedback on perception accuracy (Cárdenas-Claros & Gruba, 2020). They support top-down instruction through multimodal cues that facilitate inference, hyperlinked resources that activate prior knowledge, and interactive features that enable strategic navigation (Zeng & Goh, 2023). Most significantly, digital environments may naturally promote the integration of both approaches by allowing learners to move fluidly between detailed analysis and global comprehension (Kim, 2024).

### **- The Case for Integration**

The comparative analysis consistently points toward integration rather than isolation. Several lines of evidence support this conclusion:

1. Cognitive necessity: Real-time listening requires simultaneous coordination of bottom-up and top-down processes; neither alone suffices for proficient comprehension (Hulstijn, 2019).
2. Developmental progression: Learners typically require bottom-up decoding skills before top-down strategies can operate effectively, yet strategy awareness can enhance decoding through focused attention (Zhang & Graham, 2020).
3. Complementary strengths: Each approach addresses different dimensions of listening competence; combined, they support balanced development of accuracy and fluency (Vandergrift & Goh, 2012).
4. Digital affordances: Technology-mediated environments enable flexible alternation between processing modes, supporting integrated skill development (Zeng & Goh, 2023).

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5. Metacognitive mediation: Metacognitive awareness provides the executive control necessary to coordinate bottom-up and top-down processes strategically (Teng, 2022).

### **- The Role of Metacognition**

A recurring theme throughout the analysis is the centrality of metacognition in effective listening instruction. Metacognitive awareness enables learners to:

- Recognize when decoding difficulties require focused attention
- Deploy predictive strategies when context supports inference
- Monitor comprehension and adjust processing accordingly
- Evaluate strategy effectiveness and transfer successful approaches to new contexts

Metacognitive instruction thus provides the bridge between bottom-up and top-down processing, equipping learners with the self-regulatory skills necessary to coordinate both orientations flexibly (Goh & Vandergrift, 2022). This suggests that an integrated listening pedagogy must place metacognition at its core, rather than treating it as an optional add-on to either approach.

## **5. Conclusions and Pedagogical Implications**

### **5.1. Summary of Key Findings**

This theoretical comparative analysis of bottom-up and top-down listening instruction approaches has yielded several key findings:

1. Theoretical foundations: Bottom-up and top-down approaches are grounded in distinct but complementary theoretical traditions. Bottom-up processing aligns with information-processing models emphasizing hierarchical decoding, while top-down processing draws on schema theory and constructivist perspectives on comprehension.
2. Cognitive processing demands: Bottom-up processing places heavy demands on perceptual and phonological working memory, particularly for lower-proficiency learners. Top-down processing requires rapid access to prior knowledge and predictive reasoning skills. Neither approach fully captures the interactive, bidirectional nature of real-time listening.
3. Empirical effectiveness: Evidence does not support the superiority of either approach across all contexts. Bottom-up instruction is particularly

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valuable for developing foundational decoding skills in lower-proficiency learners. Top-down instruction enhances comprehension monitoring and strategic flexibility in learners with sufficient decoding automaticity.

4. Digital adaptability: Both approaches translate effectively to digitally mediated environments. Digital tools can enhance bottom-up instruction through replay, captioning, and adaptive feedback, while supporting top-down instruction through multimodal cues, hyperlinked resources, and interactive navigation features.

5. The case for integration: Multiple lines of evidence support integrated rather than isolated instruction. Cognitive necessity, developmental progression, complementary strengths, digital affordances, and metacognitive mediation all point toward the value of combining both approaches.

6. Metacognitive centrality: Metacognitive awareness provides the executive control necessary to coordinate bottom-up and top-down processes strategically. Effective listening instruction must place metacognition at its core.

### **5.2. Conclusions**

Based on the comparative analysis, the following conclusions are drawn:

The traditional dichotomy is theoretically unsustainable. While analytically useful for distinguishing processing orientations, the rigid separation of bottom-up and top-down instruction misrepresents the interactive reality of listening comprehension. Contemporary cognitive models emphasize bidirectional processing and strategic coordination rather than exclusive reliance on either route. Neither approach alone is pedagogically sufficient. Exclusive focus on bottom-up instruction may produce accurate but inflexible listeners who struggle with authentic, contextualized input. Exclusive focus on top-down instruction may leave learners ill-equipped to handle unfamiliar vocabulary or rapid speech where decoding is essential. Balanced development requires both orientations.

Integration enhances learning outcomes. Learners benefit most when instruction explicitly supports both decoding accuracy and strategic comprehension, with metacognitive awareness providing the bridge between them. Integrated approaches yield superior outcomes across proficiency

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levels and instructional contexts. Technology-mediated listening tasks naturally support flexible alternation between processing modes, enabling learners to coordinate bottom-up and top-down strategies within unified task environments. Digital tools thus offer unprecedented opportunities for integrated listening instruction.

Metacognitive awareness enables learners to recognize processing demands, select appropriate strategies, monitor comprehension, and adjust their approach as needed. Instruction that develops metacognitive capacity simultaneously enhances both bottom-up and top-down processing effectiveness.

### **5.3. Pedagogical Implications**

#### **For Curriculum Design**

1. Integrate both orientations: Listening curricula should explicitly incorporate both bottom-up and top-down objectives, activities, and assessments rather than privileging one orientation over the other.
2. Sequence instruction developmentally: Foundational decoding skills should be developed early, with increasing emphasis on strategic comprehension as learners progress. However, even beginning learners benefit from top-down support through schema activation.
3. Embed metacognitive instruction: Metacognitive awareness should be explicitly taught throughout the curriculum, with structured opportunities for planning, monitoring, and evaluation integrated into listening tasks.
4. Leverage digital affordances: Curricula should capitalize on digital tools that support both processing orientations, including platforms that offer replay, captioning, interactive transcripts, and multimodal input.

#### **- For Classroom Practice**

1. Balance activity types : Classroom listening activities should include both detailed decoding tasks (phoneme discrimination, dictation, identifying reduced forms) and global comprehension tasks (predicting content, inferring meaning, evaluating arguments).
2. Teach strategies explicitly: Learners benefit from explicit instruction in both bottom-up strategies (recognizing word boundaries, attending to stress patterns) and top-down strategies (using context, activating prior knowledge).

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3. Foster metacognitive awareness: Regular use of metacognitive pedagogical sequences planning before listening, monitoring during listening, evaluating after listening develops self-regulatory capacity.
4. Use authentic materials judiciously: Authentic texts provide rich contexts for top-down processing but may overwhelm learners' decoding abilities. Scaffolding through previewing vocabulary, providing transcripts, or enabling replay supports bottom-up access.

### **- For Teacher Education**

1. Develop theoretical understanding: Teachers need deep understanding of both processing orientations and the interactive nature of listening comprehension to make informed instructional decisions.
2. Model integrated practice: Teacher education programs should model integrated listening instruction, demonstrating how bottom-up and top-down activities can be combined within coherent lesson sequences.
3. Build technological proficiency: Teachers require training in selecting and using digital tools that support both processing orientations, including familiarity with platform affordances and limitations.
4. Cultivate reflective practice: Opportunities to analyze listening lessons, evaluate student outcomes, and adjust instruction based on evidence support teachers' ongoing professional development.

### **- For Materials Development**

1. Design integrated tasks: Listening materials should include tasks that explicitly require both detailed decoding and global comprehension, encouraging learners to coordinate both processing modes.
2. Incorporate metacognitive prompts: Materials should include questions and activities that prompt planning, monitoring, and evaluation before, during, and after listening.
3. Provide flexible support: Digital materials should offer customizable support options captions, replay, speed control, interactive transcripts that learners can deploy strategically based on their needs.
4. Include diverse text types: A range of text types (dialogues, lectures, news broadcasts, podcasts) ensures exposure to varied discourse structures and processing demands.

### **5.4. Recommendations**

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### **- For Researchers**

1. Conduct longitudinal studies: Investigate how learners' coordination of bottom-up and top-down processing develops over time and how instruction can optimally support this development.
2. Examine digital mediation: Explore how specific technological affordances interact with each processing orientation and how digital environments can be designed to support integrated processing.
3. Investigate metacognitive mechanisms: Examine more precisely how metacognitive awareness enables strategy coordination and how this capacity can be most effectively developed.
4. Test integrated interventions: Design and evaluate instructional interventions that explicitly combine bottom-up, top-down, and metacognitive components, comparing outcomes with single-orientation approaches.

### **- For Curriculum Developers**

1. Adopt integrated frameworks: Move beyond dichotomous presentations of listening approaches in curriculum documents, adopting frameworks that emphasize integration and strategic coordination.
2. Articulate developmental progressions: Specify how bottom-up and top-down skills develop across proficiency levels and how instruction should adapt to learners' changing needs.
3. Integrate digital competencies: Include digital listening skills in curriculum objectives, recognizing that contemporary listening increasingly occurs in technology-mediated environments.
4. Align assessment with instruction: Develop assessment instruments that capture both decoding accuracy and strategic comprehension, providing feedback that supports integrated development.

### **- For Policymakers**

1. Support teacher professional development: Allocate resources for teacher education programs that develop understanding of listening processing and capacity to implement integrated instruction.
2. Invest in technological infrastructure: Ensure equitable access to digital tools and platforms that support effective listening instruction across diverse educational contexts.

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3. Promote research-practice connections: Facilitate partnerships between researchers and practitioners to ensure that listening instruction is informed by current evidence.

4. Recognize listening as foundational: Acknowledge listening comprehension as foundational to overall language proficiency, warranting systematic attention in curriculum policy and resource allocation.

This theoretical comparative analysis has demonstrated that the traditional dichotomy between bottom-up and top-down listening instruction, while analytically useful, is pedagogically limiting when maintained as a rigid separation. Contemporary cognitive research, empirical evidence, and technological developments all point toward the necessity of integration.

Effective listening instruction must equip learners with both the decoding accuracy necessary to process linguistic input efficiently and the strategic flexibility to construct meaning from that input in context. Most critically, learners require metacognitive awareness to coordinate these processes adaptively, recognizing when to attend closely to linguistic detail and when to rely on contextual inference.

As listening environments continue to evolve increasingly characterized by digital delivery, multimodal input, and learner-controlled access the need for integrated, metacognitively oriented instruction becomes ever more pressing. By moving beyond the bottom-up/top-down dichotomy, the field can develop more nuanced, effective, and responsive approaches to listening pedagogy that honor the complexity of comprehension while supporting learners' developmental needs.

The path forward lies not in choosing between bottom-up and top-down instruction, but in understanding how they work together in skilled listening and designing instruction that fosters their coordinated development.

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