Innovations in Pedagogy and Technology
https://journals.zycentre.com/ipt

ARTICLE

Reimagining Krashen's Input Hypothesis: The Role of AI and Multimodal Strategies in Language Acquisition

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ABSTRACT

Krashen's Input Hypothesis, a foundational theory in second language acquisition (SLA), emphasizes the importance of comprehensible input slightly beyond a learner's current proficiency level, or "i+1," as the key to language development. While the hypothesis has significantly influenced language pedagogy, its practical implementation often falls short in addressing the diverse needs of learners in traditional settings. Advances in artificial intelligence (AI) now present an opportunity to operationalize and expand this hypothesis in transformative ways. AI-powered tools, such as adaptive learning platforms and conversational chatbots, dynamically assess learner proficiency by curating personalized and progressively challenging input to support linguistic growth. Multimodal input delivery, through text, audio, video, and immersive simulations, further enriches learning by accommodating diverse cognitive styles and creating contextually meaningful experiences. Moreover, AI aligns with Krashen's Affective Filter Hypothesis by reducing learner anxiety through gamified interfaces, immediate nonjudgmental feedback, and engaging, low-pressure practice environments. This article explores the integration of AI into Krashen's theoretical framework and provides practical strategies for language teachers to enhance teaching practices and ensure human-AI synergy in classrooms. It also identifies key areas for future research, including the long-term efficacy of AI-enhanced input and its alignment with SLA principles. By merging AI's

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ARTICLE INFO
Received: 29 August 2025 | Revised: 9 October 2025 | Accepted: 17 October 2025 | Published Online: 26 October 2025
DOI: https://doi.org/10.63385/ipt.v1i3.50

CITATION
Javahery, P., Alizadeh, M.J., 2025. Reimagining Krashen's Input Hypothesis: The Role of AI and Multimodal Strategies in Language Acquisition. Innovations in Pedagogy and Technology. 1(3): 156–168. DOI: https://doi.org/10.63385/ipt.v1i3.50

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capabilities with Krashen's enduring ideas, this article reimagines the delivery of comprehensible input, bridging theoretical insights with technological innovations for modern language learning.

Keywords: Krashen's Input Hypothesis; Artificial Intelligence; Second Language Acquisition; Multimodal Input; Affective Filter Hypothesis; Ai-Driven Tools

1. Introduction

Language learning is, at its core, a deeply human endeavor, a journey of connection, self-expression, and cultural exploration[1]. Yet, it is also a journey fraught with challenges: the frustration of incomprehension, the fear of making mistakes, and the constant balancing act between progress and stagnation. Stephen Krashen's Input Hypothesis provides a beacon in this journey by offering a simple yet profound insight: learners acquire language most effectively when exposed to comprehensible input that is just beyond their current level of proficiency, the now-famous "i+1"[2]. But as the demands of language education grow and diversify, so too must the methods by which this principle is delivered[3].

In a world reshaped by digital innovation, the tools at our disposal have transformed the way we engage with language. Artificial intelligence (AI), once confined to the realm of science fiction, now permeates every aspect of our lives, including education[4]. From adaptive language learning platforms to conversational chatbots and immersive virtual environments, AI has the potential to deliver input that is not only comprehensible but also personalized, adaptive, and multimodal[5]. Such innovations breathe new life into Krashen's theory, reimagining the ways we can operationalize i+1 for diverse learners in diverse contexts.

At the same time, the concept of "input" itself has evolved. Where Krashen envisioned comprehensible input as text and speech, today we recognize that learning can be enriched through a symphony of modalities, visual, auditory, kinesthetic, and interactive. Multimodal input aligns with the cognitive diversity of learners, breaking down barriers of accessibility and preference while amplifying engagement[6]. Combined with AI's ability to deliver such input at scale, we stand at the precipice of a revolution in second language acquisition, where theory and technology converge[7].

This article contributes to the field of Digital Applied Linguistics (DAL) by exploring how AI-driven tools can extend the relevance and application of Krashen's Input Hypothesis in the modern classroom. It examines the intersections of adaptive learning, multimodal input, and affective support, demonstrating how digital technologies are reshaping language learning in ways that align with both established and evolving theories. By providing insights into the transformative potential of AI, this work seeks to contribute to the ongoing dialogue in DAL on the intersection of applied linguistics and digital interfaces, offering new perspectives on how language learning can be enhanced in the digital age.

2. Review of Literature

2.1. The Input Hypothesis: Foundations and Implications

Stephen Krashen's *Input Hypothesis* has been a cornerstone of second language acquisition (SLA) theory for decades by offering a model in which comprehensible input plays a central role in language learning[8]. According to Krashen, language learners acquire new linguistic structures when exposed to input that is slightly above their current proficiency level, denoted as $i+1$(2)[9]. This principle suggests that language acquisition is most effective when learners are presented with language that is challenging yet still understandable, fostering cognitive engagement while maintaining learner confidence. The *Input Hypothesis* underscores the importance of providing learners with rich, meaningful input in an environment where they feel emotionally supported.

Krashen's *Affective Filter Hypothesis* complements the Input Hypothesis by asserting that emotional factors such as anxiety, motivation, and self-confidence can either facilitate or impede language acquisition[10]. A "low affective filter," characterized by positive emotional states, creates optimal conditions for absorbing comprehensible input, whereas a "high affective filter," triggered by negative emotions, can block language learning[11]. Taken together, these theories emphasize the need to deliver comprehensible input in a context where learners feel comfortable, motivated, and emo-

tionally supported.

While these foundational theories have been widely influential, their application to digital language learning contexts has been limited, especially as new technological tools have emerged. Thus, this article offers a theoretical exploration of how AI-powered tools can support the application of Krashen's hypotheses in modern language learning environments.

2.2. AI in Language Education: Opportunities and Challenges

Recent advances in artificial intelligence (AI) have led to the development of numerous language learning tools designed to enhance learner engagement and provide personalized experiences. Applications like Duolingo, Rosetta Stone, and more recently, ChatGPT, leverage algorithms to personalize content, track learner progress, and deliver instant feedback[12]. These tools have revolutionized the way language learning takes place by providing scalable, accessible solutions that can be used outside traditional classrooms[13].

However, despite their widespread use, many of these AI-driven platforms do not explicitly align with established SLA theories, particularly the *Input Hypothesis*. While AI tools like Duolingo personalize content based on the learner's level, the input they provide may not always align with Krashen's concept of *i+1*. In many cases, the content may be adapted for the learner's current proficiency level, but it does not necessarily challenge them in a way that promotes deeper language acquisition. Moreover, the emotional aspect of learning, particularly motivation and anxiety, has not been sufficiently integrated into these tools[14], potentially hindering their effectiveness in promoting a supportive learning environment.

Similarly, another ethical concern caused by the use of AI is the possibility of encouraging plagiarism and overlooking the importance of original thinking[14]. Furthermore, Dilzhan[15] asserts that over-reliance on AI can hinder learner autonomy and lead to student disengagement from learning process. Moreover, the ability of self-regulation, as a critical factor in language acquisition, is negatively influenced by overuse of AI without proper guidance[16].

Despite these limitations, the potential for AI to address these gaps is significant. Theorists have suggested that AI can be used to create more personalized and adaptive language learning experiences, not only by adjusting the difficulty level of content but also by integrating emotional support mechanisms. For example, AI tools could be designed to provide motivational feedback, reduce learner anxiety, and offer scaffolding that encourages continued engagement. Additionally, the possibility of multimodal input—incorporating text, audio, visual, and interactive elements—holds promise for enriching the learning process in ways that align with cognitive diversity and individual learner preferences[17].

2.3. Multimodal Input and Its Role in Enhancing Language Learning

The inclusion of multimodal input in AI-driven language learning tools represents an exciting opportunity to enhance the effectiveness of language acquisition[18]. Multimodal input refers to the integration of various forms of communication, such as visual, auditory, kinesthetic, and interactive elements. This approach acknowledges the diversity of learners' cognitive styles and offers a more engaging and holistic learning experience[19]. Multimodal input has been shown to increase learner engagement and retention by catering to different sensory channels, thereby making the learning process more dynamic and memorable[20].

Krashen's theory of comprehensible input primarily focuses on linguistic input through spoken or written forms of communication. However, by expanding this concept to include multimodal forms, Krashen's framework can be enriched to account for the diversity of learners' preferences and cognitive processing. For example, learners may benefit from visual aids, interactive exercises, and real-time feedback, all of which can be integrated into AI-powered tools. Such approaches provide more comprehensive and accessible input, accommodating learners who may otherwise struggle with traditional language input forms.

Research has also suggested that multimodal input can enhance emotional engagement, which is crucial for reducing learner anxiety and increasing motivation[21]. Interactive and visually engaging learning materials, for instance, can foster a positive learning environment that encourages learners to persist even when faced with challenges. In addition, various types of learning styles are taken into consideration by exposing students to multimodal input which helps them experience language through different senses, and accordingly language learning process is facilitated[22]. This notion is also supported in the investigation of Xu[23] suggesting

that multimedia resources enhance learning outcomes by engaging students actively in the classroom. Furthermore, presenting input through AI-based systems can create authentic language learning contexts where learning environment is supportive and learning process is highly enhanced[24]. The integration of multimodal input aligns with Krashen's broader view of creating a supportive environment conducive to language acquisition.

This theoretical exploration highlights the intersection of Krashen's Input Hypothesis and AI-driven language learning tools, with a particular focus on how multimodal input and adaptive learning can enhance language acquisition. While existing AI tools have made strides in personalizing content and providing scalable learning experiences, they have not fully addressed the theoretical principles outlined by Krashen. By integrating emotional support and multimodal forms of input, AI tools have the potential to operationalize Krashen's theories more effectively, offering learners not only the right level of linguistic challenge but also the emotional and cognitive support needed to succeed in language learning. As AI continues to evolve, future developments in AI-driven education could provide new pathways for applying established SLA theories, fostering more dynamic and effective language learning environments.

3. Discussion: Adapting the Input Hypothesis with AI and Multimodal Strategies

Educational technology is evolving rapidly—particularly AI—and this evolution is changing the form of existing pedagogical theories of second language acquisition. Consequently, many researchers and scholars tend to revisit basic theories according to modern advancements. One such theory is Input hypothesis proposed by Krashen which highlights the significance of "comprehensible input" that is just beyond current language level of a learner (*i*+1). Digital tools, and specifically AI tools can be implemented to present personal and various types input according to Krashen's theory. This discussion explores how evolving technologies interact with and enhance the input hypothesis, and as a result present a reimagined framework of Krashen's theory for new era of language learning.

This section investigates how AI and multimodal strategies reshape different aspects of language input, and bridge the theoretical aspect with practical mode of second language acquisition. Affordances of AI in enhancing language learning experience, benefits of multimodal resources in considering various types of cognitive processes, and the effect of technology in lowering affective filters are analyzed within this section: 1) Personalizing input 2) Enriching language acquisition, and 3) Lowering the affective filter. Each section also offers practical implications that can be beneficial for the reinterpretation of Krashen's theory in this age of technology.

3.1. Personalizing Input

Krashen's Input Hypothesis hinges on the principle that learners acquire language most effectively when exposed to comprehensible input slightly beyond their current proficiency level (*i*+1). Traditional approaches to delivering this tailored input often face limitations, such as large class sizes, fixed curricula, and the inability to cater to individual learners' evolving needs. Artificial intelligence (AI) addresses these challenges by introducing tools that dynamically adjust content and interactions to match each learner's proficiency and learning trajectory.

AI-driven adaptive learning platforms leverage sophisticated algorithms, such as natural language processing (NLP) and machine learning, to assess learner performance in real time. These tools utilize extensive data analysis, tracking user errors, response times, and engagement patterns to create a feedback loop that fine-tunes subsequent input. This dynamic adjustment mirrors Krashen's concept of *i*+1, ensuring that learners are consistently exposed to language that challenges them without overwhelming their cognitive resources.

For example, tools like Duolingo and Babbel employ spaced repetition systems to introduce vocabulary and grammatical structures in progressive increments, optimizing retention while gradually increasing complexity. Similarly, Grammarly analyzes written input and provides feedback that aligns with the learner's current level while introducing advanced structures to facilitate growth. AI tools thus operationalize Krashen's theory by delivering input that adapts not only to linguistic proficiency but also to cognitive and emotional states, offering learners a customized pathway to language acquisition.

How AI Achieves Personalization

Adaptive Learning Systems: AI-powered platforms, such as Duolingo or Rosetta Stone, can dynamically adjust the difficulty of lessons based on a learner's progress and performance. If a learner masters a particular concept, the system introduces more advanced material, preventing boredom. Conversely, if a learner struggles with certain tasks, the system can slow down and offer additional practice, allowing the learner to reinforce weaker areas.

Customized Content Delivery: AI tools analyze user behavior to determine the most effective types of content for each learner. For example, some learners may prefer interactive activities, while others may benefit from more structured explanations or multimedia content. AI systems tailor lessons accordingly, making the learning process more engaging and less overwhelming.

Pacing and Progression: AI can assess a learner's pacing and adjust accordingly, preventing frustration from a mismatch between their speed of learning and the curriculum. This allows learners to feel more in control of their journey, helping them stay motivated and reducing stress that could arise from struggling to keep up with a fixed pace.

AI's ability to deliver a personalized learning experience represents a transformative shift in language education, particularly in the context of reducing the affective filter. By tailoring content to the unique needs, preferences, and progress of each learner, AI fosters a more engaging, manageable, and individualized learning environment. Through adaptive learning systems, customized content delivery, and pacing adjustments, AI ensures that learners encounter the right level of challenge at the right time, which prevents frustration and promotes sustained motivation. This dynamic personalization empowers learners to take control of their learning journey, enhances their confidence, and encourages a more relaxed, self-directed approach to language acquisition. Ultimately, AI's capacity to adapt to each learner's pace and style not only optimizes the learning process but also plays a critical role in creating a supportive and emotionally conducive environment for effective language learning.

Challenges and Considerations

Despite its benefits, the use of adaptive AI tools is not without challenges. Over-reliance on AI may lead learners to neglect critical aspects of language learning, such as collaborative problem-solving and authentic human communication. Moreover, technical barriers, such as the need for high-speed internet or access to devices, may limit the equitable implementation of these tools. Educators must therefore adopt a balanced approach, combining AI-driven input with traditional teaching methods to ensure comprehensive language development.

3.2. Enriching the Language Acquisition

Multimodal input refers to the use of multiple channels, such as visual, auditory, textual, and kinesthetic modalities, to facilitate language acquisition. Rooted in Mayer's [25] *Cognitive Theory of Multimedia Learning*, multimodal learning supports second language acquisition by engaging multiple cognitive pathways, enhancing input retention, and addressing the diverse preferences and needs of learners. The incorporation of multimodal resources aligns with the *Dual Coding Theory* [26], which posits that information encoded both verbally and nonverbally is more likely to be retained and retrieved effectively.

In SLA contexts, multimodal input enriches learners' exposure to language by providing contextualized meaning through complementary modalities. For example, learners watching a video with subtitles simultaneously engage with spoken language (auditory), written language (textual), and visual context (images and gestures), fostering a deeper understanding of linguistic structures and vocabulary. This layered approach enhances comprehensible input [27] by making language accessible to learners at varying proficiency levels. Moreover, multimodal input supports the development of multiple language skills—listening, reading, and speaking—by offering integrated, contextualized practice.

Emerging technologies, particularly those employing artificial intelligence (AI), have revolutionized the delivery of multimodal input. AI-driven tools such as virtual reality (VR), augmented reality (AR), and multimedia platforms like Flipgrid and Edpuzzle combine modalities to simulate authentic language use. These tools not only promote learner engagement but also enable scaffolding tailored to individual needs, bridging the gap between traditional classroom methods and the demands of diverse learning profiles.

3.3. Lowering the Affective Filter

The affective filter hypothesis, which posits that emotional factors such as anxiety, motivation, and self-

confidence play a significant role in language learning, underscores the importance of creating a supportive and engaging learning environment. Artificial Intelligence (AI) offers a unique opportunity to address these emotional factors by reducing barriers that hinder language acquisition. Through features such as personalized learning experiences, non-judgmental interaction, consistent encouragement and motivation, and stress-free practice environments, AI fosters an atmosphere where learners can engage with the language more comfortably and confidently. By adapting to the individual needs of each learner, AI systems provide tailored content and feedback, ensuring that learners feel empowered and capable. These technological innovations help mitigate the anxiety often associated with language learning by offering private, flexible, and judgment-free spaces to practice. Furthermore, AI's ability to continuously motivate and encourage learners through gamification and personalized feedback enhances their emotional engagement, reinforcing a sense of achievement and progress. Together, these elements work synergistically to lower the affective filter, promoting a more effective, enjoyable, and emotionally supportive language learning journey.

3.3.1. Non-Judgmental Interaction

One of the most significant sources of anxiety for language learners is the fear of making mistakes in front of others. Non-judgmental interaction through AI systems creates a safe space for learners to practice without fear of embarrassment or criticism, which is essential for reducing the affective filter.

How AI Facilitates Non-judgmental Interaction:

- **Instant, Constructive Feedback**: AI systems provide immediate responses to learners' actions, such as speaking or writing, without any social judgment. This type of interaction removes the fear of being judged by a teacher or peers, allowing learners to experiment freely with the language. For example, AI can provide feedback on pronunciation, grammar, or vocabulary in a neutral tone, guiding the learner without negative reinforcement.
- **Mistakes as Learning Opportunities**: Unlike traditional classroom settings where errors might feel more pronounced, AI systems can offer corrections as part of the learning process. For instance, when a learner makes a grammatical mistake in a sentence, AI can offer a suggestion to improve the sentence while also explaining why the change is necessary. This helps learners view mistakes as an integral part of learning rather than something to be ashamed of.
- **Simulated Conversations**: AI-driven chatbots or virtual tutors can engage in dialogues with learners, offering a judgment-free environment where learners can practice speaking and writing. These AI tools can simulate real-world scenarios, enabling learners to develop their language skills without the pressure of face-to-face interactions. As a result, learners feel more comfortable making mistakes and taking risks with the language.

AI's role in facilitating non-judgmental interaction is a key factor in alleviating the anxiety that often hinders language learners. By providing instant, constructive feedback and reframing mistakes as valuable learning opportunities, AI creates a secure environment where learners are free to experiment with language without fear of criticism. The ability of AI systems to engage learners in simulated conversations further diminishes the emotional stakes associated with real-world communication, allowing learners to practice speaking and writing with increased confidence. This supportive, low-pressure interaction not only encourages risk-taking and resilience in the face of mistakes but also contributes to a deeper sense of self-efficacy and motivation. Ultimately, AI's capacity to reduce social judgment plays a pivotal role in lowering the affective filter, thereby fostering a more positive, engaging, and effective language learning experience.

3.3.2. Encouragement and Motivation

AI can act as a powerful motivator by offering consistent encouragement and maintaining learners' enthusiasm throughout their learning journey. Positive reinforcement can significantly impact learners' attitudes, helping them maintain motivation, especially during challenging moments in their learning process.

How AI Promotes Encouragement and Motivation:

- **Gamification and Rewards**: Many AI-driven language platforms incorporate gamification techniques, such as points, badges, or levels, to reward learners for their progress. These rewards create a sense of achievement and incentivize learners to continue practicing, reinforcing the idea that every small step contributes to overall

progress. Gamified elements make learning fun and interactive, which can enhance a learner's intrinsic motivation to improve their skills.

- **Personalized Motivation**: AI tools can track individual learner progress and send **motivational messages** or reminders. For example, if a learner hasn't logged in for a while, the AI might send a gentle reminder, such as, "Great job on your last lesson! Keep it up, and you'll be speaking fluently in no time." These personalized messages not only acknowledge learners' achievements but also encourage them to stay on track without feeling pressured.
- **Celebrating Milestones**: AI can recognize significant learning milestones, such as completing a certain number of lessons or mastering a difficult concept. This recognition provides learners with a sense of accomplishment and boosts their confidence, motivating them to continue learning.

AI's ability to foster encouragement and motivation plays a crucial role in sustaining learners' enthusiasm and commitment to their language learning journey. Through the integration of gamification and rewards, personalized motivation, and the celebration of milestones, AI systems provide learners with a continuous stream of positive reinforcement that nurtures both intrinsic and extrinsic motivation. These mechanisms create a dynamic and supportive learning environment where learners are regularly acknowledged for their progress, boosting their confidence and reinforcing a sense of accomplishment. By maintaining engagement and providing personalized encouragement, AI not only helps learners overcome challenges but also inspires them to persist, even in the face of difficulties. Ultimately, AI's capacity to motivate and encourage significantly contributes to reducing the affective filter, enhancing both the emotional and cognitive aspects of language acquisition.

3.3.3. Stress-Free Practice Environments

AI can help create a stress-free practice environment that encourages learners to engage with the language without the pressure that often accompanies traditional classroom settings. This environment is essential for reducing the affective filter and ensuring that learners can practice and improve without fear of failure.

How AI Creates a Stress-free Practice Environment:

- **Flexible Timing and Availability**: AI-driven platforms offer 24/7 access, enabling learners to practice whenever it's most convenient for them. This flexibility removes the time constraints that often cause stress in traditional learning environments. Learners can take their time, reattempt tasks, and learn at their own pace, which helps build confidence and reduces anxiety.
- **Individualized Challenges**: AI systems can provide learners with challenges that are specifically tailored to their level and progress. These challenges are calibrated to ensure that they are neither too easy nor too difficult, creating an optimal learning experience. When learners are presented with tasks that match their current abilities, they are more likely to feel accomplished, and less likely to feel frustrated or overwhelmed.
- **Anonymity in Practice**: For many learners, practicing a new language in front of others can be daunting. AI can offer a private, anonymous space for learners to practice speaking, writing, and even making mistakes without anyone watching or judging them. This lowers the emotional stakes of making errors and allows learners to focus purely on improving their skills.
- **Relaxed Learning Atmosphere**: The lack of external pressure in AI-driven environments helps reduce anxiety. Features like background music, engaging visuals, or friendly virtual tutors can all contribute to a calm, welcoming atmosphere that makes the learning experience feel enjoyable and non-threatening.

In conclusion, AI's ability to create a stress-free practice environment is fundamental in fostering a conducive space for language learners to engage with the language without the pressures and anxieties often present in traditional classroom settings. Through the provision of flexible timing and availability, learners are empowered to practice at their own pace, removing time constraints that could otherwise induce stress. AI also tailors individualized challenges, ensuring that learners face tasks that match their abilities, thereby promoting a sense of achievement and preventing frustration. Moreover, the anonymity that AI offers, particularly in speaking and writing practice, allows learners to make mistakes without fear of judgment, further lowering the emotional stakes of learning. With features that enhance a relaxed learning atmosphere, such as calming visuals and friendly virtual tutors, AI systems create a welcoming environment where learners

feel safe to explore and grow. This low-pressure, supportive space ultimately reduces the affective filter, enhancing both the emotional and cognitive aspects of the learning process, leading to more effective and enjoyable language acquisition.

3.4. Implications for Educators

The incorporation of AI and multimodal resources in language acquisition, which are constantly advancing in this modern era, offers various practical implications for educators to apply for facilitating engagement and instruction. The integration of these developed digital tools with Krashen's input hypothesis provides teachers with opportunities to effectively utilize these innovations in real-world classrooms.

3.4.1. Differentiating Instruction with Multimodal Resources

Input through AI and multimodal resources provides opportunities to address learners' diverse needs, preferences, and proficiency levels. Platforms such as Quizlet and Memrise can generate individualized vocabulary sets, grammar activities, and review tasks based on diagnostic assessments. Through these AI tools, teachers can give assignment to students with higher level of proficiency while providing less complex tasks for students who need more support. This ensures equitable access to learning without compromising the progress of any subgroup.

Similarly, multimedia resources like auditory resources (e.g., songs, podcasts) for auditory learners, visual aids (e.g., diagrams, videos, charts) for visual learners, and kinesthetic tools (e.g., interactive simulations, physical games) for tactile learners can be utilized. This helps meet needs of students with different learning styles. In addition, teachers can use images or subtitled videos to provide additional scaffolding for learners who need more support. In the same vein, For learners who struggle with a specific aspect of language, for example listening-only tasks, resources like subtitled videos, audiobooks with synchronized text, or annotated screenshots from instructional videos can provide extra context and improve comprehension.

3.4.2. Enhancing Learner Autonomy and Self-Regulation

Adaptive tools enable learners to take control of their language development. Educators can encourage students to use apps like ELSA Speak or Write & Improve to practice independently. These tools provide immediate, level-appropriate feedback that fosters self-regulation and promotes consistent exposure to i+1 input beyond the classroom. In addition, platforms like Edpuzzle or Flipgrid are multimodal resources that can support autonomous engagement by providing students with formative tasks.

3.4.3. Enhancing Engagement and Motivation

Technology offers an array of tools for integrating AI and multimodal input effectively. AI platforms can provide learners with the opportunity to learn the language through games. These gamified AI tools promote motivation and engagement due to their progress bars, competitiveness, and rewarding system. Learners earn points, and a sense of achievement by being actively engaged in the games. This motivational dynamic can help teachers make language challenges in the classroom, and promote participation.

Similarly, multimodal content can improve motivation and engagement. Video platforms like PlayPosit empower teachers to shift passive watching into active learning by presenting comprehension questions, reflections, and asking for summaries from students. Additionally, virtual reality (VR) and augmented reality (AR) are multimodal resources that promote engagement and motivation in classroom due to their visual features. Teachers can create environments through these tools to help students learn the language in the real context.

3.4.4. Supporting Emotional and Psychological Needs

Reducing affective filter, as an important factor in Krashen's input hypothesis, can be supported by the use of AI and multimodal strategies. Private and non-judgmental features of AI tools create a space for students where they can make mistakes without feeling embarrassed. Chatbots, like ChatGPT make authentic conversations with learners, and provide them with feedback useful feedback in a safe space with no pressure from the society.

In addition, exposure to input through multimodal resources help students witness how language is used authentically in context, and also their cultural awareness increases. This builds confidence since they know how to use language according to the context. In addition, affective filters can be lowered when teachers provide students with contexts that they are already familiar with.

3.4.5. Designing Integrated Skill Activities

Multimodal and AI input can bridge skills and create holistic language learning experiences. Teachers can pair audio clips or videos with images, subtitles, and gestures to support comprehension. In addition, these activities can be followed up with speaking activities where learners use the vocabulary or structures from the input. For example, after watching a cooking video, learners could describe the recipe in pairs, reinforcing vocabulary and sequencing expressions.

Similarly, teachers can incorporate infographics, charts, or videos as pre-reading tasks to build background knowledge and introduce key terms. For writing tasks, learners can create multimodal presentations (e.g., a narrated slideshow or video) that combine text, visuals, and audio, enhancing their expressive abilities, technical skills and oral communication.

3.4.6. Scaffolding Academic Language Development

Academic contexts often expose students to different discipline-related vocabulary and challenging structures. AI and multimodal input can be particularly effective in preparing learners for these situations. AI tools can be utilized by teachers to simplify these structures or create simplified explanations for them. In addition**,** teachers can use multimodal resources such as visual tools like concept maps, annotated diagrams, or power point visualizations to introduce discipline-specific vocabulary and structures.

Similarly, teachers have the opportunity to provide learners with multimodal academic lectures, such as videos with integrated slides, voiceovers, and captions. They can encourage note-taking with guided frameworks to ensure learners capture key ideas. For example, in a science-based ESL course, presenting a video about photosynthesis alongside labeled diagrams and captions can help learners grasp technical terms and processes.

3.4.7. Monitoring Progress and Providing Feedback

Teachers can use platforms like Flipgrid to gather data on their students' performance. AI tools have the ability to give feedback on students' recorded voices or writings, or teachers use these tools to assist them in giving proper feedback. These AI tools may help teachers find potential patterns in their students' learning process.

Additionally, students may record their videos and voices by digital tools to reflect on their performance, and even ask for feedback on it from their peers. This helps them get involved in the process of language development more deeply. It should be noted that teachers need to provide a clear framework that assess their students' performance based on the tasks they do through digital resources.

3.4.8. Ensuring Accessibility and Capacity for Students and Teachers

Although these technology-developed tools offer many advantages, teachers need to ensure that students have equal accessibility to them. Alternative options and low-tech resources like offline videos and printed images should be provided. Proper use of AI or multimodal tools that seem unfamiliar or complex to students should be taught to them, and teachers should be available for scaffolding. Peer modelling can also help learners who have less experience using digital tools.

In addition to students, teachers also need professional development courses like training programs or workshops on how to utilize AI tools or multimodal resources meaningfully in their practice. These courses can enable teachers to use AI tools or multimodal strategies effectively in their lesson planning. As a result, teachers can gain the knowledge and confidence to use these digital tools. These professional development sessions, that include AI and multimedia literacy for teachers, should be prioritized by authorities.

3.4.9. Monitoring and Assessing Learning Through Multimodal Tasks

Assessment can also leverage multimodal input to evaluate learners holistically:

- **Formative Assessment:** Use multimodal input to scaffold learners' self-assessment skills. For example, ask learners to record themselves responding to a video prompt and evaluate their pronunciation, fluency, and vocabulary using a rubric.
- **Creative Summative Projects:** Assign learners' projects where they synthesize multimodal input into a cohesive product, such as a short documentary, a blog post with embedded media, or a social media campaign using text, images, and videos. These projects encourage language use in real-world contexts while develop-

ing 21st century skills.

3.4.10. Managing Challenges in Multimodal Integration

- **Avoiding Cognitive Overload:** Teachers should carefully sequence multimodal tasks, starting with simpler inputs and progressively increasing complexity. For example, introduce a listening task with visual cues before moving to audio-only input.
- **Ensuring Accessibility:** Not all learners have access to advanced technology. As previously mentioned, teachers should provide low-tech alternatives, such as printed images or offline video materials, and design activities that do not rely on high-speed internet.
- **Building Teacher Expertise:** Schools and training programs should prioritize professional development for teachers to use multimodal tools effectively. Workshops on incorporating multimedia into lesson plans and troubleshooting common issues can empower educators to implement these approaches confidently.

3.5. Implications for Researchers

3.5.1. Investigating the Effectiveness of Multimodal Input in Diverse Contexts

Researchers can examine how multimodal input impacts learners across various contexts and settings.

- **Context-Specific Studies:** Explore how multimodal input functions in different educational environments, such as K-12 classrooms, adult education, and English for Specific Purposes (ESP) courses. For instance, studies could analyze whether visual aids improve comprehension in technical writing courses or if subtitles in videos aid learners in business English contexts.
- **Cultural Adaptation:** Investigate how culturally relevant multimodal materials impact learner engagement and comprehension. Comparative studies can assess whether localized multimodal resources yield better results than universally designed materials.
- **Modality-Specific Impact:** Research could focus on how individual modalities—visuals, audio, or kinesthetic elements—contribute to specific language skills (e.g., reading comprehension, speaking fluency).

3.5.2. Analyzing Learner Preferences and Profiles

Understanding individual differences is essential in multimodal learning research.

- **Learner Preferences and Outcomes:** Study how preferences for certain modalities (visual, auditory, kinesthetic) align with language proficiency gains. Are visual learners more likely to benefit from image-based resources, or is multimodality universally effective?
- **Cognitive Load Analysis:** Investigate how multimodal input influences cognitive processing, focusing on whether combining multiple inputs overwhelms learners or enhances understanding.
- **Role of Learning Styles:** Although the concept of learning styles is debated, studying how learners respond to various modalities in combination with other variables (e.g., motivation, cultural background) could refine multimodal teaching strategies.

3.5.3. Longitudinal Studies on Multimodal Learning

Long-term research can reveal the sustained impact of multimodal input.

- **Skill Retention:** Investigate whether learners retain vocabulary, grammar, or pronunciation better when exposed to multimodal input versus unimodal input.
- **Skill Transfer:** Explore if learners exposed to multimodal resources can apply their language skills in real-world scenarios more effectively. For example, do learners who practice with multimodal academic lectures perform better in actual university settings?
- **Developmental Trajectories:** Study how multimodal input affects learners at different proficiency levels over time, from beginner to advanced stages.

3.5.4. Integration of Emerging Technologies

Multimodal learning often involves technological tools, offering a rich field for investigation.

- **AI-Powered Tools:** Examine how AI-based tools like adaptive learning platforms, interactive simulations, or AI tutors enhance multimodal learning experiences. Do they adapt input better to individual learner needs compared to traditional multimodal resources?

- **Virtual and Augmented Reality:** Investigate the role of immersive technologies in language acquisition. For example, does engaging with VR scenarios that combine visual, auditory, and interactive elements accelerate language learning?
- **Gamification and Multimodal Design:** Research the effects of gamified, multimodal tasks on learner motivation, engagement, and skill acquisition.

3.5.5. Bridging Multimodal Input and Learner Agency

Multimodal input can empower learners to take control of their learning processes, offering avenues for research:

- **Self-Regulated Learning:** Explore how learners use multimodal resources to set goals, monitor progress, and reflect on their achievements.
- **Autonomy in Resource Selection:** Investigate whether learners who actively choose multimodal materials develop language skills more effectively than those following teacher-curated input.

3.5.6. Exploring Equity and Accessibility in Multimodal Input

Accessibility remains a critical area of concern in multimodal education.

- **Accessibility Studies:** Examine whether multimodal input effectively serves learners with disabilities. For example, do captions in videos support learners with hearing impairments, or do text-to-speech tools help those with visual impairments?
- **Digital Divide Analysis:** Research how the availability (or lack) of multimodal technologies impacts learning outcomes in under-resourced educational settings.
- **Inclusive Design Principles:** Evaluate whether universally designed multimodal materials meet the needs of diverse learners effectively.

3.5.7. Methodological Innovations in Multimodal Research

Research on multimodal input calls for innovative methodologies.

- **Multimodal Data Analysis:** Develop frameworks to analyze how learners interact with multimodal input. For instance, eye-tracking studies could assess how learners process visual and textual elements simultaneously, while think-aloud protocols could explore cognitive engagement with multimodal tasks.
- **Qualitative and Quantitative Blends:** Use mixed-methods research to capture the nuanced effects of multimodal input. Quantitative data can measure proficiency gains, while qualitative insights can explore learner perceptions and experiences.
- **Task-Based Approaches:** Investigate the impact of multimodal input within specific task types, such as collaborative problem-solving, presentations, or debates.

3.5.8. Developing and Validating Theoretical Models

Researchers can contribute to the theoretical understanding of multimodal input in language learning.

- **Cognitive Theories:** Expand on existing frameworks, such as Mayer's Cognitive Theory of Multimedia Learning, to better understand how multimodal input interacts with cognitive processes in second language acquisition.
- **Social-Cultural Models:** Explore how multimodal learning aligns with Vygotskian theories of mediated learning, particularly the role of multimodal tools in collaborative learning contexts.
- **Practical Frameworks for Teachers:** Create evidence-based guidelines to help educators integrate multimodal input effectively into curricula.

3.5.9. Building Research-Practitioner Collaboration

Engaging educators in research offers practical benefits:

- **Teacher-Researcher Partnerships:** Collaborate with teachers to co-develop and test multimodal resources in real classrooms. This ensures findings are grounded in practical realities.
- **Action Research:** Encourage educators to conduct classroom-based action research on the implementation of multimodal tools, creating a continuous feedback loop between theory and practice.
- **Professional Development:** Research how teacher training programs can better prepare educators to integrate multimodal strategies effectively.

3.5.10. Expanding Multimodal Input Beyond Language Learning

Finally, researchers can explore how multimodal approaches in language education transfer to other domains:

- **Interdisciplinary Studies:** Investigate whether multimodal learning methods used in language acquisition could benefit STEM education, critical thinking development, or professional communication training.
- **Lifelong Learning Applications:** Study how multimodal resources impact adult learners in non-formal or workplace learning environments.

4. Conclusions

Krashen's Input Hypothesis remains a cornerstone in understanding second language acquisition, emphasizing the importance of comprehensible input as the driving force behind language learning. In light of this, the integration of multimodal input—enriched through technological advancements—offers a practical and powerful way to actualize this theory in modern classrooms. By leveraging diverse modes such as visual, auditory, and interactive input, educators can ensure accessibility, contextualization, and engagement for learners across all levels.

Multimodal input not only aligns with Krashen's theory but also addresses the challenges of individual learner differences, making input more comprehensible and lowering affective barriers to learning. From authentic video simulations to gamified apps and AI tools, multimodal strategies provide rich opportunities for i+1 input that fosters language acquisition in varied contexts. For educators, adopting multimodal methods creates inclusive and engaging learning environments, while for researchers, it opens avenues for exploring new dimensions of how input is processed and retained. Ultimately, combining Krashen's theoretical insights with the potential of multimodal input represents a transformative step forward in language education, bridging theory and practice in ways that are both innovative and impactful.

The future of language teaching lies in leveraging these tools to ensure that input remains not only comprehensible but also compelling, fostering lifelong learning and communicative competence. However, potential limitations caused by the use of AI and multimodal resources—such as plagiarism and a lack of originality or authentic engagement with learning—should be taken into consideration. By doing so, educators and researchers alike can continue to unlock the transformative potential of language acquisition in an ever-evolving educational landscape.

Author Contributions

Conceptualization, P.J.; methodology, P.J. and M.J.A.; writing—original draft preparation, P.J.; writing—review and editing, M.J.A.; supervision, P.J. All authors have read and agreed to the published version of the manuscript.

Funding

This work received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

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