

Generative AI and Second/Foreign Language Education from Vygotsky's Cultural-Historical Perspective

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Abstract

ChatGPT is a conversation-based generative artificial intelligence (GAI) chatbot with impressive capabilities for performing language processing tasks, such as answering questions, generating texts in various styles, making plans, and providing feedback. In this article, we explore how Vygotsky's cultural-historical perspective could be applied to explain ChatGPT's facilitation of the second/foreign language learning process. Major theoretical tenets from Vygotsky's theory utilized involve *perezhivanie*, speech development, and the zone of proximal development. Three principles for understanding L2 acquisition from this perspective include: (1) the environment as a source of the ideal forms of the target language, (2) internalization through active and meaningful social interactions, and (3) optimal L2 acquisition when effectively scaffolded in the ZPD of the individual. Additionally, we highlight the significance of ChatGPT's capabilities to provide target language input, simulate authentic conversations, answer questions on diverse topics, and offer feedback as crucial functions for fostering the second/foreign language learning process. Implications, challenges, and future directions in integrating and researching ChatGPT in L2 training and research are discussed.

Keywords: *ChatGPT, artificial intelligence, EFL, second language, Vygotsky*

Introduction

The launch of ChatGPT by OpenAI on November 30, 2022, marked a significant stride in the progression of Generative Artificial Intelligence (GAI) technology. ChatGPT is a Large Language Model that is trained on a massive dataset of various text corpora using deep learning techniques such as neural networks to mimic human language capabilities (Casella et al., 2023). It can

provide articulate and refined responses to questions, adeptly summarise and paraphrase information, interpret the meaning of texts, and compose texts in various genres and styles (e.g., Adeshola & Adepoju, 2023). ChatGPT, with its impressive capabilities, has attracted immense interest from the public, and it only took two months for ChatGPT to reach 100 million users, establishing it as the fastest-growing app in history (Milmo, 2023). Other technology companies have also introduced similar GAI chatbots, like Google Bard by Google and Bing Chat by Microsoft.

The GAI chatbot has been adopted in various fields, from medical science to information technology, engineering, and education (Adeshola & Adepoju, 2023; Cascella et al., 2023). Regarding the field of second/foreign language education, ChatGPT holds the potential to “revolutionize the ways in which language is learned, taught, and assessed in the fast-changing world where globalization and technological advancement have dramatically changed the education landscape” (Liu & Ma, 2023, p. 2). Recent L2 research has explored teachers' and learners' perceptions and behaviours regarding ChatGPT, pedagogical applications of ChatGPT in creating teaching materials and learning tasks, and academic integrity issues (e.g., Cong-Lem et al., 2024; Kim & Park, 2023; Yan, 2023).

While the recognition of ChatGPT's value in foreign language learning is widespread, there is a gap in understanding how its use can be theoretically supported and informed. This knowledge is crucial for guiding the design and implementation of ChatGPT and similar GAI tools in L2 teaching and research. This article aims to address this gap by leveraging Vygotsky's cultural-historical perspective as an influential theory to examine the affordances of ChatGPT in facilitating second language acquisition. Implications and recommendations for L2 teaching and research are discussed.

Vygotsky's Cultural-Historical Theory

Lev Vygotsky was a Russian psychologist who proposed a cultural-historical perspective for the field of developmental psychology focusing on human development in the early 20th century. His theory suggests that human psychological development is shaped through social interaction and collaboration with others in the social environment. Vygotsky's cultural-historical perspective has become increasingly influential in the field of L2 education and has been widely adopted to explore various aspects of language teaching and learning practices such as the role of private speech and the relationship between emotions and professional learning of teachers (e.g., Cong-Lem et al., 2023; Lantolf, 2006; Daneshfar, 2023). In the context of this book chapter, three major concepts of Vygotsky's cultural-historical theory are examined including the concept of Speech

Development, *Perezhivanie*, and Zone of Proximal Development (ZPD). These concepts serve to inform our later discussion on the affordances of ChatGPT for language learning.

Perezhivanie

One of Vygotsky's key concepts is *perezhivanie*, which is a Russian word that means "living through" or "experiencing", which primarily deals with the relation between environment and individuals' psychological development or more specifically, the differential role of the former in the latter's development. In other words, it is concerned with the relationship between the environment and a person's development (Cong-Lem, 2022; Vygotsky, 1994). *Perezhivanie* informs our understanding of the role of the environment and its impact on individual psychological development in two important ways:

- (1) The environment serves as the source of development.
- (2) The impact of the environment on an individual's development is relative and contingent on personal characteristics.

First, from a cultural-historical perspective, the environment provides a critical source of ideal input or forms of development, with which individuals interact to advance their currently maturing forms.

... the social environment is the source for the appearance of all specific human properties of the personality gradually acquired by the child or the source of social development of the child, which is concluded in the process of actual interaction of "ideal" and present forms. (Vygotsky, 1998, p. 203)

This point is illustrated in an example of the characteristics of a mother's talk to her child:

We have a child who has only just begun to speak and he pronounces single words ... The child speaks in one word phrases, but *his mother talks to him in language which is already grammatically and syntactically formed and which has a large vocabulary, even though it is being toned down for the child's benefit* [emphasis added]. All the same, she speaks using *the fully perfected form of speech* [emphasis added]. Let us agree to call this developed form, which is supposed to make its appearance at the end of the child's development, the final or ideal form - *ideal in the sense that it acts as a model for that which should be achieved at the end of the developmental period; and final in the sense that it represents what the child is supposed to attain at the end of his development* [emphasis added]. And let us call the child's form of speech the primary or rudimentary form. (Vygotsky, 1994, p. 348, cited in Veresov, 2017a)

In the example above, the mother's communication encompasses linguistic features that epitomise the ideal levels of development in the child's speech. This underscores the crucial role of the environment as a source of development, providing essential cultural materials. Exposure to these exemplary forms stands as the initial imperative for subsequent developmental stages.

Second, the influence of the environment on individuals' development is dynamic and individualised. *Perezhivanie* refers to the internal relation of the child to the environment, which refracts the influence of external environmental factors and accordingly shapes the child's psychological development. Vygotsky (1994) stipulates that:

environment should not be regarded as a condition of development which purely objectively determines the development of a child by virtue of the fact that it contains certain qualities or features, but one should always approach environment from the point of view of *the relationship which exists between the child and its environment at a given stage of his development* [emphasis added]. (p. 338)

We, therefore, cannot assume a similar impact of an environmental condition on an individual's development without taking into account the personal characteristics of the individuals at that given stage of development in that situation. In examining the role of environment on the course of a person's development, it is crucial to find "the particular prism through which the influence of the environment on the child is refracted, ... the child's *perezhivanie*, in other words *how a child becomes aware of, interprets, [and] emotionally relates to a certain event*" (Vygotsky, 1994, p. 341). This implies that, to elucidate development, the individual's emotions, interpretation, and attitude toward the environment or situation of interest should be carefully examined, as they play an important role in shaping how external influences from the environment refract upon their development.

In summary, the concept of *perezhivanie* stipulates the necessity to consider the true relationship between the individual and the environment in its unity, dynamics and situatedness. The environment provides the source of ideal forms leading the direction of development for an individual but its impact is subjectively refracted depending on the characteristics of the person and the quality of interaction (Vygotsky, 1994, 1998). Veresov (2017a) succinctly encapsulates this idea by stating that the trajectory of a person's psychological development in an environment

depends on (1) what kind of social situation the child is involved in, (2) what kind of ideal forms the social surrounding presents to the child, and (3) what kind of interactions take place between the child's real forms and social ideal forms. (p. 53)

The understanding of L2 learning and the role of ChatGPT in L2 learning from a Vygotskian cultural-historical perspective are essentially informed by these principles, which will be discussed in the later sections below.

Speech Development

Furthermore, one of the main interests of Vygotsky's work was to study the process of speech development which he believed to be a process initiating from the social plane and gradually becoming individual/internal (Vygotsky, 1987). The exploration of speech development and its relationship with human thinking has intrigued scholars since the twentieth century. Before Vygotsky, Piaget understood the process of speech development to start from the individual side to the social plane. According to Vygotsky, the process of speech development begins with social speech and ultimately evolves into inner speech, or verbal thinking passing through the transitional stage of private speech (Daneshfar et al., 2022). Social/external speech (oral or written) represents the externalised form of communication, or the use of language intended for interaction with others, sharing feelings, and expressing emotions. The second or the intermediary stage is private speech which pertains to an individual's overt self-talk, whether articulated in solitude or within the company of others. Finally, inner speech or verbal thinking is the internalised form of speech that happens when speech becomes an internal tool for the human.

The process of speech development is critical for human development as the result of this process highlights not only the development of speech but also its interconnections with thinking. For instance, regarding the second stage, private speech happens when an individual verbalises language to regulate their behaviour, plan their activity, and solve problems in a real-life or a specifically created situation such as a test (Daneshfar, 2023). Furthermore, in a Vygotskian based language learning approach, beyond the enhancement of communicative skills, there exists an opportunity for language learners to cultivate novel language applications for cognitive processes, encompassing thinking, problem-solving, and self-regulation (Lantolf et al., 2018). This has raised the importance of looking at L2 learning similar to what Vygotsky proposed for the development of speech. To this end, the purpose of language education entails attention to studying a process starting based on interpersonal communication practices towards developing the intramental plane and aspects of language (Daneshfar, 2023).

Zone of Proximal Development

The Zone of Proximal Development (ZPD) is another central concept productively employed in educational research drawing on a Vygotskian cultural-historical perspective. The significance of this concept lies in that ZPD "opens up the internal relation between development and education,

with the process of education leading the development of intellectual functions" (Kostogriz & Veresov, 2021, p.1). Accordingly, it informs our understanding of the crucial role of formal instruction in leading the developmental trajectory for learners.

Conceptually, ZPD refers to

the distance between the level of his actual development, as identified with the help of the tasks the child solves independently, and the level of possible development, identified with the help of tasks the child solves under the guidance of adults and in cooperation with more intelligent peers. (Vygotsky, 1935, p.42, cited in Veresov, 2017b)

In the educational context, ZPD indicates the distance between what a learner can do independently and what they can do with the guidance or assistance of a more knowledgeable or experienced person. ZPD thus represents the potential for learning and development, and the optimal level of challenge for a learner. Vygotsky (1978) argued that learning occurs when a learner is engaged in activities that are within their ZPD and that the role of a teacher or a peer is to provide scaffolding, or support, to help the individuals ultimately perform the activity independently.

Second/Foreign Language Learning as Informed by Vygotsky's Theory

This section delves into the application of Vygotsky's theory to enhance our understanding and research on second language learning. It is crucial to note that Vygotsky, a psychologist by profession, primarily focused his research on broader psychological aspects rather than language acquisition. Although he did explore speech development, it primarily pertained to first language acquisition for children, which is largely examined from a psychological approach. The transferability of knowledge from first language acquisition to second language acquisition remains a topic of ongoing research and debate. Nonetheless, past research that has embraced Vygotsky's theory has proven to be productive, and the widespread recognition of its value in informing our understanding of second language learning is evident.

Vygotsky's cultural-historical perspective is particularly relevant for language learning, as language is a social and cultural phenomenon that mediates cognition and communication. This theory viewed language as a tool for thinking and learning and as a means of expressing and sharing ideas, emotions, and experiences (Vygotsky, 1987, 1994, 1998). It also believes that language development is influenced by the social and cultural context, and that language learning is a social process that involves interaction and negotiation with others. In other words, from a sociocultural perspective, the process of learning another language could be facilitated and take a movement from social interactions and gradually become a tool for the learner.

Drawing on Vygotsky's theory as a whole and the three concepts discussed above specifically, L2 acquisition can be informed by Vygotsky's theory in three specific principles:

- (1) environment as a source of the ideal forms of the target language,
- (2) internalisation through active and meaningful social interactions,
- (3) optimal L2 acquisition when effectively scaffolded in ZPD of the individual.

From a cultural-historical viewpoint, the environment plays a critical role in language acquisition by providing language input in the ideal/final forms toward which the individual's language competency is progressing. Vygotsky (1994) contends that "it is necessary for this ideal form to be present in the environment and to interact with the child's rudimentary form; only then can speech development be achieved" (p. 349). In the same vein, L2 acquisition can be facilitated through the interaction between the ideal form and the current form of the target language. This points to the existence of an interaction of the two forms of language during the process of speech development, as in the ideal or the developed form of the mother and the developing form of the child discussed in the previous sections.

Second, L2 learning occurs through internalisation, which is enabled by meaningful social interactions. Drawing on Vygotsky's perspective, Lantolf (2006) postulates:

internalization of the features of a L2 takes place through imitation, especially as occurs in private speech. Imitation, based on recent neuroscience and child development research, is seen as an intentional and potentially transformative process rather than as rote mimicking. (p. 67)

Importantly, the theory places significant emphasis on the pivotal role of the individual within these interactions, as highlighted by Vygotsky (1998) when discussing the role of experience (*perezhivanie*) in forming personality and psychological development. He points out that "every experience [*perezhivanie*] is my experience [*perezhivanie*]" (p. 294). The individual's active involvement in cultural and social contexts is underscored from Vygotsky's perspective, contributing to the shaping of the person's experiences and development. Here, social interaction and feedback are crucial for language learning, as they provide learners with input, output, and scaffolding that can enhance their linguistic and communicative competence. This process in a second language is argued to be "an active, and frequently creative, reasoning process" rather than a simple imitation of the social source (Lantolf & Thorne, 2006, p. 209) which highlights the uniqueness of the process through the learners' central role in social interactions.

These social interactions encompass various settings like family dynamics, and interactions within peer groups, and extend into institutional contexts such as educational settings, organised sports activities, and workplaces, among others (Lantolf & Thorne, 2006; Lantolf et al., 2015). The value

of social interactions is also informed by Vygotsky's general genetic law of cultural development, which states that "every function in the cultural development of the child appears on the stage twice, in two planes, first, the social, then the psychological, first between people as an intermental category, then within the child as an intramental category" (Vygotsky, 1997, p. 106). In other words, every function in the process of development manifests twice—initially on the social plane and subsequently on the psychological/personal plane. The social plane exists between individuals or in an interpsychological form and consequently transforms into an intrapsychological/intrapersonal form. This is evident in Vygotsky's example of the mother and child talk mentioned in the section Perezhivanie above. The child interacts and collaborates with the mother's speech, a developed form of speech initially used on the social plane. Gradually, as the child's speech develops, it transforms into an internal tool.

The general genetic law addresses two important aspects in the development of speech/language from a cultural-historical perspective; first, its facilitation through social interaction as discussed above and second the significance of mediation within the learners' ZPD, which is explained below.

The third principle suggests that L2 acquisition conceivably best occurs in the learners' ZPD. The ZPD looks beyond current development, suggesting that present abilities with mediation indicate future independent capabilities. L2 learning should be personalised to the individual's existing actual level of development (ALD) as well as to the possible development of the learners' L2 capacity. This is to both support more optimal L2 acquisition and appeal to the learners' personal interests for engendering their L2 learning motivation. Additionally, from a cultural-historical perspective, the concept of ZPD highlights the significance of peer support in enhancing interaction and aiding or providing mediation. In the context of second language learning, it is crucial to establish an engaging learning atmosphere where learners can connect and collectively build their L2 skills with the help of their peers and mediation from the educator. Aljaafreh and Lantolf (1994) delineated several efficacious mechanisms of assistance, emphasising that mediation should be responsive to the L2 learner's specific needs. This involves a continuum starting with implicit hints and progressing to explicit correction when required.

ChatGPT and Language Learning as Informed by a Vygotsky's Perspective on L2 Learning *ChatGPT's Affordances for L2 Learning*

The affordances of ChatGPT for language learning have been recognised in the literature. In general, major affordances of ChatGPT with respect to facilitating L2 learning involve a source of

rich linguistic input in the target language, social interactions in conversations, and individualised feedback.

First, as stated above, from a Vygotskian view one important aspect of the development of humans is the use of signs and tools. Human psychological development is a mediated process organised by cultural tools and signs. In the context of this paper, this includes the tools/signs that the language learner applies as a way to enhance their learning. ChatGPT, a complex human artifact, falls into this category.

Second, the design of ChatGPT allows for human-like conversations in the target language. ChatGPT can generate realistic and engaging dialogues on various topics and scenarios, and it can respond to the user's input in a natural and appropriate way. This holds various values for learning as informed by the concept of *perezhivanie*. In particular, interacting with ChatGPT using the target language can help increase exposure to target input, and lower learners' interaction anxiety when having to engage in face-to-face interactions with other people such as their teachers or peers. It also caters for a wide range of topics of personal interest to the learners, thereby potentially engendering motivation and acquisition.

Third, learners can receive feedback for their language output with the support of ChatGPT. Language learners can receive feedback from ChatGPT for their learning activities, tailored to their input. This can promote more favourable learning in the learner's ZPD. ChatGPT can also provide scaffolding for language development, as it can give feedback, correction, and explanation to the learner's language output or cultural context awareness. An advantage of ChatGPT in feedback provision is that it is always available to the learners without time and space constraints and that the learners can ask for further clarification/follow-up on an ongoing basis.

How ChatGPT Enhances L2 Learning: A Theoretical Discussion Drawing on Vygotsky's Perspective

The three affordances of ChatGPT discussed above align well with how Vygotsky theorises learning and development. First, it can be argued that ChatGPT has been developed using authentic language resources. This aligns with the Vygotskian based L2 sociocultural theory, emphasising the social environment as the source of development. ChatGPT can simulate real-world social situations, thereby making it a potent cultural tool mediating second/foreign language learning process. Consequently, this can be likened to the process of speech development, which begins on the social plane or social speech and subsequently evolves on the intrapersonal plane or inner speech. The existence of private speech in this model might be of interest to observe in researching ChatGPT as a tool and social source for speech development.

Second, ChatGPT can simulate real-life social interactions, which can appeal to the learners' personal interests and foster positive emotional experiences and internationalisation of L2 input. From the theoretical lens of perezhivanie, this would allow for positive emotions and experiences and an overall positive attitude towards L2 learning, thereby enhancing language learning outcomes. As discussed in the second principle above, meaningful social interactions is an essential condition for L2 acquisition.

An important point to consider is that how much learners find ChatGPT helpful depends on their personal characteristics, which vary in different situations. For instance, ChatGPT is like a cultural tool, and learners must learn how to use it well before it becomes effective in their language learning. The value of ChatGPT may be different for students who are not familiar with how to use it. Therefore, the main idea here is that the impact of ChatGPT on learners' L2 learning is not the same for everyone but relies on whether and how individuals can use it for their language learning.

Third, individualised feedback and guidance from ChatGPT can further create input and learning activities that are likely to occur in the learners' ZPD. ChatGPT can also simulate the role of a more experienced or advanced interlocutor, who can provide the language learner with rich input and feedback. The type of feedback from ChatGPT can vary depending on the learners' prompts and needs, including but not limited to feedback on their written L2 output (i.e., as of the writing of this chapter, ChatGPT-3 can only receive written input and provide written output), knowledge of language and cultures, and language learning strategies. Additionally, learners can ask the chatbot for its feedback on their language learning plan. Overall, ChatGPT can thus enhance language learning by creating a personalised, dynamic, and engaging learning environment.

Considerations for An Effective Integration of Generative AI in Foreign Language Education from a Vygotskian Perspective

Implications for Relevant Stakeholders

The preceding sections have examined the values of ChatGPT as an exemplar of GAI chatbots for L2 learning within the framework of Vygotsky's theoretical perspective. This section provides pragmatic guidance on the appropriate utilisation of GAI tools to bolster L2 teaching and learning.

Firstly, for policymakers, recognising the mounting concerns surrounding academic integrity in the context of ChatGPT usage, it is crucial that policymakers and school administrators collaborate with relevant stakeholders to establish regulations. These regulations should ensure the responsible, ethical and effective use of ChatGPT and similar AI tools.

Secondly, the potential applications of GAI tools in L2 learning, teaching, and assessment are vast and warrant exploration. Consequently, it is recommended that language teachers and learners be afforded opportunities and encouragement to leverage GAI chatbots effectively. For instance, these tools can be employed to generate English language teaching materials, act as virtual consultants for planning and designing tasks, and serve as teaching assistants or tutors, facilitating student interaction and feedback on language output (e.g., Ulla et al., 2023).

Lastly, it is crucial to emphasise that the use of ChatGPT, like any other tools, is informed by research evidence. The use of available evidence in informing the use of GAI tools serves a dual purpose: it keeps educators and students abreast of best practices while also optimising time and resources. Drawing on established research findings can help institutions streamline the integration of GAI tools into the pedagogical environment and make more informed decisions to ensure an efficient and effective educational experience.

Potential Legal, Ethical and Privacy Issues in Using ChatGPT

Despite the potential benefits of using ChatGPT as a language learning tool and virtual environment, there are also some challenges and considerations in adopting the chatbot in formal language education. First, the information a GAI chatbot provides can be incorrect and biased (Lee et al., 2023; Peters et al., 2023). It is, therefore, important to raise educators' and students' awareness of the quality and reliability of ChatGPT's output and the necessity to exercise caution in double-checking the validity of the information before implementing it.

Second, the privacy and security of the user's data and identity, or the impact of ChatGPT on the user's behaviour, attitude, or values should also be acknowledged and addressed with appropriate measures. For instance, learners should be cautioned against providing sensitive information (e.g., their identity) to the chatbot to protect them from privacy/information breach concerns.

Third, despite the capability of ChatGPT as a learning peer, there is always the need for human involvement and supervision in the language learning process, as ChatGPT cannot truly replace the role of a human teacher or a peer. Language learning and the learners per se need more than just input. The full range of social and emotional support and guidance are essential to ensure their well-being and holistic development.

Future Research Directions

With respect to future research directions, the use of theory in informing the application of GAI tools in L2 research is essential, with Vygotsky's cultural-historical theory potentially serving as a potent theoretical framework, as discussed in this paper. While current L2 research evidence seems to focus on the perception and attitude of relevant stakeholders towards ChatGPT (e.g., Ulla

et al., 2023; Yan, 2023), more research is needed to investigate the efficacy of ChatGPT in enhancing L2 learning and teaching effectiveness.

On the other hand, in addition to linguistic outcomes, this exploration can extend to examining various outcomes such as L2 learning motivation, engagement, enjoyment, anxiety, competence, awareness, and identity. An urgent need also exists to explore measures and methods addressing academic integrity concerns associated with the use of ChatGPT (e.g., Cong-Lem et al., 2024).

Lastly, a promising research avenue involves the exploration of how ChatGPT can be integrated within existing or emerging language learning platforms, including online or mobile applications, as well as virtual or augmented reality environments.

Conclusion

In this article, we explore how ChatGPT, as an exemplary GAI tool, holds great potential in supporting L2 acquisition, learning, and teaching, drawing on three key concepts from Vygotsky's cultural-historical theory: perezhivanie, speech development, and ZPD. We emphasise three principles for effective L2 acquisition from the Vygotskian CHT perspective: (1) environment as a source of the ideal forms of the target language, (2) internalisation through active and meaningful social interactions, and (3) optimal L2 acquisition when effectively scaffolded in ZPD of the individual.

Building on these principles, we elaborate on how ChatGPT can create a virtual social interaction environment with ideal language forms for language learners, facilitate meaningful and authentic social interactions in L2 language, and provide individualised feedback tailored to the learners' levels. Regarding its integration into formal language education programs, we stress the importance of making relevant stakeholders, especially language educators and learners, aware of potential biases and inaccuracies in ChatGPT's responses, as well as other legal, ethical, and privacy concerns associated with the use of the GAI chatbot. We also outline future research directions. While GAI-informed language education is still in its nascent stage, we believe that this article offers a much-needed theoretical discussion to enable a more informed and strategic approach to leverage the affordances of GAI tools in the field of L2 education.

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Please cite this paper as:

Cong-Lem, N. & Daneshfar, D. (2024). Generative AI and second/foreign language education from Vygotsky's cultural-historical perspective. *Monash University Bridges*. <https://doi.org/10.26180/25140089>

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Please cite this paper as:

Cong-Lem, N. & Daneshfar, D. (2024). Generative AI and second/foreign language education from Vygotsky's cultural-historical perspective. *Monash University Bridges*. <https://doi.org/10.26180/25140089>

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Please cite this paper as:

Cong-Lem, N. & Daneshfar, D. (2024). Generative AI and second/foreign language education from Vygotsky's cultural-historical perspective. Monash University Bridges. <https://doi.org/10.26180/25140089>

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