

**NAVIGATING IDIOMS PROCESSING IN BILINGUALS:
A SYSTEMATIC LITERATURE REVIEW**

Bagus Pragnya Paramarta

Universitas Mercu Buana, STIBA LPI Indonesia Jakarta, Indonesia

bagus.pragnya@gmail.com

Mila Irmawati

UIN Sunan Gunung Djati Bandung, Bandung, Indonesia

Abstrak

Idiom adalah salah satu bentuk metafora dengan struktur khusus dan makna kiasan. Untuk memahami makna di balik arti harfiah sebuah idiom, kita perlu menerapkan strategi pemrosesan tertentu agar dapat menangkap konsep dan maknanya. Perbedaan strategi pemrosesan semantik antara teks sumber dan teks sasarannya *juga* berperan penting dalam pemrosesan kognitif dan pemahaman idiom. Dalam hal metode penelitian, kajian pemrosesan idiom telah dilakukan secara *offline* (analisis tertutup) maupun *online* (pengukuran real-time, seperti *eye-tracking*) untuk memahami mekanisme pemrosesan idiom pada monolingual dan bilingual. Seiring pesatnya perkembangan penelitian tentang bilingual, studi ini bertujuan untuk mengeksplorasi tren terkini dalam penelitian pemrosesan idiom pada penutur bilingual guna memberikan gambaran perkembangan mutakhir di bidang ini. Dengan menerapkan *systematic literature review* menggunakan *PRISMA Flow Diagram*, penelitian ini menunjukkan bahwa pemahaman idiom pada bilingual melibatkan keseimbangan antara pemrosesan analitis dan pengambilan makna secara otomatis, yang dipengaruhi oleh interferensi antarbahasa dan kontrol kognitif. Meski demikian, masih terdapat pertanyaan yang belum terjawab, sehingga penelitian lanjutan diperlukan untuk memperkuat bukti empiris terkait pemrosesan idiom pada penutur bilingual.

Kata kunci: idiomatic, proses idiomatic, multi Bahasa,

Abstract

An idiom is an instance of metaphor with a specific form and figurative meaning. To interpret the meaning behind the literal meaning of the idiom, we need to perform a specific processing strategy to help us understand the concept and meaning of a certain idiom. Many studies have examined the idiom processing in monolinguals and bilinguals. Particularly in bilinguals, idiom processing requires a certain complex process since there will be a competition and influence from L1 to L2 and vice versa. Semantic processing strategy differences between source text and target text also play a crucial role in the idiom cognitive processing and comprehension. In terms of processing, both offline and online processing research have been documented to better understand the idiom processing in monolinguals and bilinguals. Since the fast-changing research on bilinguals, the present study aims to navigate the idioms processing in bilingual research to shed light on the current trend and development in such studies. By implementing a systematic literature review using the PRISMA Flow Diagram, the current study shows that the current condition of bilingual idiom comprehension involves a finely tuned balance between analytical processing and automatic retrieval, where moderated by cross-language interference and cognitive control. The results depict that from 11.100 studies on language processing, there are 999 have focused on idiom language processing, and only 100 have been reported in studies from 2000-2025. Moreover, 26 research reports were assessed for eligibility due to having focused on idiom processing in bilinguals, and finally, 16 studies were included in the review. The majority of studies on idiom processing have discussed how bilinguals have a positive effect on idiom processing. While there are still some open questions remain open, future research needs to be done to gain more empirical evidence of idiom processing in bilinguals.

Keywords: idioms, idioms processing, bilinguals, systematic review

1. INTRODUCTION

An idiom is categorized as a non-compositional meaning, whose meaning cannot be directly inferred

from its constituents. It has been an interesting topic in psycholinguistics and cognitive neuroscience in the last decade. The fixed expression of idiom in every language may become the parameter of language proficiency. In a bilingual population, idiom processing presents fascinating research because idioms display the complexities in the individual's mind when managing the two language systems simultaneously. The individual should choose the precise meaning from the two different languages. This process will involve cross-language interference and the interplay of literal and figurative decoding. Therefore, the study of idioms can help us to understand how they cognitively control their attention and manage their thinking process (Cieślicka et al., 2021; Marian & Spivey, 2003; Desmet & Duyck, 2019).

The prior research demonstrates that bilinguals have a challenge when they want to interpret the expression of an idiom. While monolinguals can usually understand the meaning of an expression quickly because they are used to it. Bilingual people have to deal with the two language systems at once, so this process is more complicated compared to monolinguals. (Marian & Spivey, 2003) said that bilingual listeners retrieve phonemic information from both languages. This means that their lexicon automatically activates the lexical items from those two languages at the same time, not only one language, suggesting that the lexical activation in bilinguals is inherently parallel. Thereby, the lexical activation also leads to distraction or confusion, especially when bilinguals encounter idioms that do not have the same meaning in both languages (Jared et al., 2024; Senaldi & Titone, 2022).

However, Beck & Weber (2016), (Carrol & Conklin (2014) emphasize that bilinguals may access their native language more easily compared to their second language, indicating that familiarity with idioms in their native language leads to cognitive advantages. These findings are strongly related to Desmet and Duyck's overview of bilingual processing mechanisms. This involved two dynamic processes, the first is how bilinguals search for word meanings (lexical access). The second is how they combine the meanings of words into a complete meaning (semantic integration) (Desmet & Duyck, 2019; Ginkel & Dijkstra, 2019).

The experimental paradigm emphasizes that bilinguals apply different patterns when they process idioms compared to literal phrases. (Cieślicka, 2006) reveals that when understanding idioms, the cognitive system tries to interpret the meaning of idioms literally, especially if the figurative meaning of the idioms is not immediately clear from the context. In bilinguals, this phenomenon is more difficult because it may be due to cross-language transfer, which can

trigger interference effects. Tzou et al. (2016) discuss how formal training in translation or interpretation can improve the bilingual's capacity to navigate idiomatic expression, indicating influence on their semantic processing efficiency.

For instance, a study by Cieślicka et al. (2021) has explored that anaphoric referential cues can help bilinguals to predict the figurative meaning of idioms. However, how much this helps depends on language proficiency and language dominance of bilinguals. These two pathways of idiom comprehension engage both literal and figurative meanings, emphasizing the direct retrieval and compositional analysis as a fundamental mechanism (Togato et al., 2022).

The role of cognitive control and inhibitory processes in bilingual idioms processing has been a primary concern of recent investigation. Bilinguals need to use their executive control abilities to control or ignore words from the non-target language when switching between two languages. (Giezen et al., 2015) suggested that inhibitory control is fundamental for bilinguals as they manage the simultaneous activation of both languages. This process involves the general executive function that is responsible for organizing and controlling attentional resources during bilingual language processing. Rodriguez-Fornells et al. (2005) indicate that second language interference correlates with the executive control mechanisms which responsible for maintaining focus on the target language. This finding implies that bilingual idiom processing not only involves retrieving stored lexical entries but also demands executive control to maintain focus to not use the unneeded words. Therefore, understanding idioms extends beyond merely remembering the lexical items. (Togato et al., 2022) and Beauchamp et al. (2023) highlight that bilinguals have good executive control abilities, so they can immediately move between literal meaning and figurative meaning in the language transfer. As in the learning context, formal training in translation or interpretation can improve the capacity to navigate the idiomatic expressions between two languages (Tzou et al., 2016)

Another dimension of bilingual idiom processing literature concerns the influence of language exposure, age of acquisition, and the resulting degree of automaticity in language processing (Yun, 2021). (Perani et al., 2003) provide evidence by fMRI which demonstrates that increased language exposure that individuals receive facilitates more efficient and faster neural processes the language. This may influence the enhancement of automaticity, where factors such as frequency, context, and emotional engagement facilitate the automatic storage of lexical items in bilinguals. Consequently, this process also affects a smoother transition between

literal and non-literal interpretations. Hernandez et al. (2000) indicate that early bilinguals tend to have superior performance in idiomatic language processing due to earlier and balanced exposure to both languages, which enhances cognitive ability.

Combining the literal and figurative dimensions of idiom processing remain a challenge. The literal interpretation may delay the figurative interpretation (Cieślicka, 2006). Katz et al. (2004) explain that in understanding figurative language, the brain uses a way to choose the most appropriate meaning. For bilinguals, it is important to decide between the literal meaning and the figurative meaning to understand the expression correctly. If there are no clear hints from the situation or context, bilinguals tend to use literal reading. If there is a context or situation, they need to elaborate on the hints of the context to interpret the figurative meaning. Therefore, without a precise clue, increased cognitive effort is required to derive the intended meaning accurately.

The study of idioms reveals a lack of direct mapping between their language; when the idioms do not have equivalents in both languages, they tend to use decompositional strategies (Zhu & Minda, 2021). They break down idioms into smaller units to interpret their meaning based on the components. (Jared et al., 2024) documented that cross-linguistic transfer of idioms is determined by the degree of idiomatic equivalence. This emphasized that bilinguals' ability to process idioms may depend on several factors such as cognitive control, the level of automatic processing, and the similar typology between their two languages. A systematic review by Or-Kan et al. (2020) has underscored a significant gap in focused studies related to idioms processing in bilinguals. Such reviews are essential to understanding the cognitive mechanism underlying idiom comprehension.

The interplay of the idiomatic expression in bilinguals extends to the cultural context. Idioms are deeply connected to cultural expression. The bilingual's comprehension relies on shared cultural knowledge. A dual set of cultural schemas may affect bilinguals in interpreting the idioms. Veisbergs (2019) provides evidence that bilingual dictionaries represent the cultural aspect of idiomatic expression, demonstrating the crucial role of cultural context in shaping idiom processing strategies.

Moreover, neuroimaging studies show that bilingual language processing involves the brain area that functions as cognitive control, such as the dorsolateral prefrontal cortex and inferior frontal gyrus (Perani et al., 2003; Rodriguez-Fornells et al., 2005). This suggests that figurative language in bilinguals relies on both automatic retrieval and controlled reinterpretation. In addition, research on unimodal and bimodal bilinguals (Poarch, 2016) underscores that

typological distinctions also determine the idiom processing, indicating the necessity of developing models for specific language types.

This review combines integrated findings from behavioural experiments, neuroimaging studies, neuroimaging studies, and theoretical models to give insight into how bilinguals process both literal and figurative meaning in language. By synthesizing data on simultaneous lexical activation, the cognitive control mechanism, language exposure, automaticity, and the role of cultural context. To the best of our knowledge, there is no prior review regarding idioms in bilingual; thus, the research problem of current study is to highlight and describing how idioms are processed in bilinguals. This study aims to develop a comprehensive framework that deepens our knowledge of how bilinguals process language. The implications of this review is to reconcile evidence from the diverse fields and build a foundation for future research that may be useful for an effective pedagogical approach in language education. We recommend that future researchers explore the interaction among components of bilingual processing. Such research will give a massive contribution to language learning and translation strategies to the world that is becoming increasingly multilingual.

2. METHODS

This review uses the PRISMA-P guideline and PRISMA Statement (Moher et al., 2015; Moher et al., 2009) as the protocol to standardize the quality of the review. Following this protocol, ensure that all steps are clear and reproducible, and also reduce potential bias in the selection, analysis, and synthesis of data. This protocol includes research questions, inclusion and exclusion criteria, search strategy, data management procedure, and planned methods for synthesis, to provide a detailed plan for the process of systematic review (Moher et al., 2015; Moher et al., 2009). In addition, this review implements the same framework as (Giovannoli et al., 2020) to provide consistency in the systematic review methodologies regarding bilingualism.

The process of identifying relevant studies started with a search across several online databases. Google Scholar, EBSCOhost, Scopus, and Web of Science were selected due to providing a wide research database in the field of psychology, language, and cognitive science. Therefore, using this database can help find many relevant and complete materials for this topic. The Specific terms that applied to the search are the specific terms that related to idioms (e.g., "language processing," "idioms", "idiom and language processing") or ("idioms processing", "idioms

processing in bilinguals”) using Boolean operator (AND, OR) to make an accurate search. Moreover, initial searches were conducted to verify the accuracy of keywords in effectively selecting relevant articles for inclusion (Saberian & Fotovatnia, 2011).

Eligibility criteria were specified based on population, phenomenon of interest, comparison, outcomes, and study design. Studies were included if they provided empirical evidence on idiom processing in bilingual participants or involved comparisons between bilinguals and the monolingual population. In addition, both experimental and observational studies were included, offered adequate methodological information, and reported qualitative or quantitative results regarding idiom processing. A study primarily focusing on language processing (e.g., processing disorder) will be excluded, except that it includes a particular discussion of idioms in that article. Furthermore, studies published in a language other than English will be excluded. These criteria were crucial to maintain a balance between broad inclusion and methodological rigor, as emphasized in earlier systematic reviews within the same fields (Karunanathan et al., 2009; Oh et al., 2023).

Study selection is divided into two stages. The first stage is the initial screening. In this phase, titles and abstracts were reviewed by two researchers to assess whether the articles were relevant or not based on the inclusion and exclusion criteria. Dissenting opinion will be consulted in the third reviewer when necessary. The second stage is full-text screening of the article that has already passed the initial screening. This process also employs a dual-reviewer approach to reduce missing important studies and ensure that the selected studies are robust and reflect the current state of research (Moher et al., 2009).

Data extraction was conducted using a predesign extraction form by Saberian & Fotovatnia (2011), which has been used in their prior systematic review on bilingual and idiomatic expression processing. Hubers et al. (2019) suggest that pilot tests also need to be applied to the subset study to ensure clarity and comprehensiveness. The extracted data covered various aspects, including study details (such as authors, publication year, and sample size), participant information (like age, language skills, and bilingualism features), and the utilization of methodology (including experimental design and quality of idiom processing tasks). Outcome measurements, key findings, and noted limitations. This data extraction enables us to systematically organize the evidence on idiom processing mechanisms and to pinpoint possible moderators and mediators specific to the bilingual population (Moher et al., 2015; Giovannoli et al., 2020).

After data extraction and quality control, a narrative review was performed to elaborate on findings across selected studies. Due to heterogeneity in study design and measures of idiom processing, a qualitative synthesis will be appropriate for this review. The synthesis used thematic analysis to find similar patterns, key concepts, and explain the disagreement throughout the literature. Whenever feasible, numerical data were organized into a table to point out the comparisons between various studies. The narrative review not only summarizes the important findings but also explains the methodological strengths and limitations of the current literature, offering valuable insight for future research direction (Saberian & Fotovatnia, 2011; Hubers et al., 2019).

To sum up, this systematic review demonstrates PRISMA guidelines. Through this process, including inclusion criteria, study selection by two reviewers, careful data extraction, and consistent quality assessment, this review aims to provide a trustworthy summary of the existing evidence on idiom processing in bilingual individuals. This systematic approach reduces bias and improves the clarity and repeatability of the review, offering an important contribution to the field of bilingualism and figurative language.

3. RESULT

This systematic review elaborates findings from various studies on idiom processing in bilinguals, demonstrating cognitive mechanisms that underscore how bilinguals comprehend and utilize idiomatic expressions in both languages. After searching, 26 studies were initially considered for review, and 16 of them were selected due to appropriate research design and relevance to idiomatic comprehension in a bilingual population, as shown in Figure 1 below. The studies employ various methodologies, including experimental research, eye-tracking, and a self-paced reading paradigm, to present a comprehensive exploration of this discussed topic.

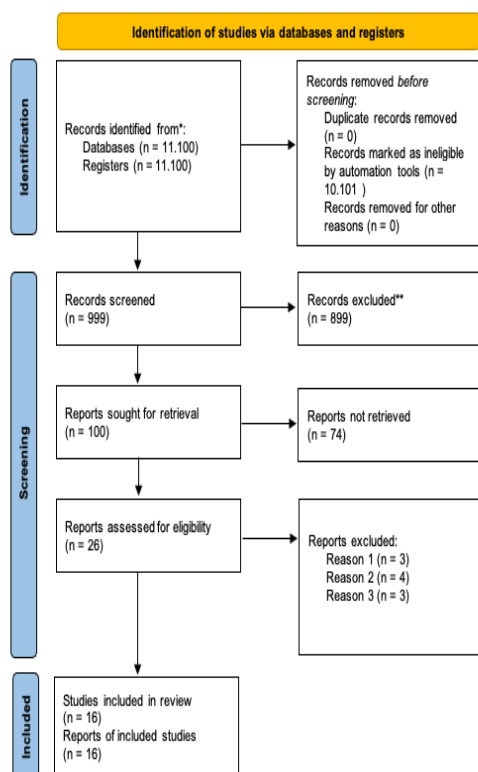


Figure 1. Literature Search Flow Diagram

From the flow diagram above, it can be seen that the total records identified for studies on language processing is around 11,100 studies. However, not all those studies have focused on idioms processing, where only 999 studies focused on idiom processing. Also, since the present study limits the studies only from 2000-2025, the report decreased by 100 studies, and only 26 studies explore the idiom processing in bilinguals in general. From those 26 studies, 3 studies were not specifically examining the cognitive processing of idiom comprehension in bilinguals, 4 studies were not written or reported in English, and 3 studies were more explaining other aspects beyond the bilinguals' advantages in idiom processing. Therefore, in the end only 16 studies are reviewed in the present study.

First, in terms of contextual and lexical transfer, the selected studies reveal a complex landscape of idiom processing among bilinguals. For instance, Marian & Spivey, (2003) said that bilinguals tend to rely on contextual cues from the situation or condition to comprehend the idioms. They predict the idiom's meaning based on their existing frame of reference. These findings underscore that contextual knowledge has a significant role in idiomatic transfer among different languages.

Conversely, Cieřlicka (2006) further informed that bilinguals tend to interpret the idiom's meaning literally, especially for a non-native language. This also happens to an advanced English learner who indicates a delay during familiar idiom processing, demonstrating the necessity of literal meaning before idiomatic meaning. In further exploration, Cieřlicka et al. (2021) investigate the automaticity of idiom

processing. They focus on observing how proficient bilinguals navigate idiomatic expressions compared to less proficient speakers. Their finding reveal that automaticity can run smoothly in high-proficiency bilinguals, indicating that the fluency of the individuals influences the cognitive accessibility of idiomatic meanings.

Moreover, Desmet and Duyck (2019) and Ayadin (2019) contribute significantly to the understanding of lexical access and processing advantages. Bilinguals were often able to access idiomatic expressions more quickly when their idioms had strong associations with their native language. This proves that interlanguage activation was turned on during idiom comprehension.

Consistent with a broader theme emerging from the synthesis of extracted data, these findings highlight the significance of familiarity, context, age, and individual differences on idiom processing, as well as the implication of professional training for bilingual translators.

Concerning familiarity, a study by Togato et al. (2022) indicates that processing speed improves with which individuals are familiar. Participants perform quicker responses when they are faced with idioms that they use in everyday language, compared to unfamiliar idioms. This notion is strengthened by Rodriguez-Fornells et al., (2005), who posit that previous exposure may affect bilinguals' ability to navigate idiomatic meaning.

Concerning influence, the contextual theme of idiom has a significant role. Marian & Spivey (2003) highlight that bilinguals utilize contextual cues to predict the meaning of idiomatic expressions, which can guide them when direct translation fails to interpret the appropriate meaning. This finding was strengthened by Or-Kan et al. (2020), who demonstrated through an eye-tracking experiment that bilinguals rely more on the surrounding context to interpret idiomatic expressions in their second language, compared to less proficient bilinguals.

Concerning age factors, the individual differences in cognitive and linguistic capability are also crucial. Cieřlicka (2006) found that language ability and the age when individuals begin to learn a new language may determine how they comprehend idioms. The idioms processing in early bilinguals is different from simultaneous bilinguals. In short, the higher level of language proficiency and earlier age of second language acquisition are equally associated with different patterns of language processing

Yun (2021) and Zhu & Minda (2021) suggest that the increase of language exposure and across-language experience strengthens the executive control

mechanism. This may enhance the efficiency of literal and figurative semantic constructions. Furthermore, concerning the impact of the professional training. A worthy theme has arisen among various studies in the role of particular training of translators. Togato et al. (2022) reveal that translators use a different strategy in idiom processing compared to non-translators, due to they have more experience in the bilingual environment. This indicates that professional and language experience may influence how idiomatic expressions are approached and processed during a translation task.

4. Discussion

This systematic review elaborates on the prior studies on idioms processing in bilinguals, particularly on the selected group by Cieřlicka et al., (2021), Marian & Spivey, (2003), Rodriguez-Fornells et al., (2005), Togato et al., (2022), Cieřlicka, (2006), (Jared et al., 2024), Or-Kan et al., (2020), Desmet and Duyck (2019), Tzou et al., (2016), Yun, (2021), (Zhu & Minda, 2021), and Veisbergs, (2019) These research findings reveal a complex dynamic in which automatic memory-based retrieval processes and deliberate analytical strategies interact to overcome the challenge of idioms comprehension in two languages. In the following discussion, we elaborate on several key themes that have been summarized from the prior studies and suggest directions for future exploration.

A common finding across various studies is that different models of idioms processing are proposed in the literature. Cieřlicka et al., (2021) and Cieřlicka, (2006) reveal that bilinguals initially receive idiomatic expressions through their exposure. This retrieval is efficient when the idioms are familiar among their shared cultural knowledge of languages. Thereby, when the idioms do not have a direct reference in the second language, the processing of these idioms is significantly slower.

The topics of cross-language interference and the simultaneous activation of lexical items between two languages have also become a notable issue in the literature. Marian & Spivey (2003) demonstrated that bilingual speakers automatically activate lexical items from the target language, even when the context does not require that activation. This co-activation can lead to language interference, especially when idiomatic expressions are not congruent between two languages. Jared et al. (2024) further documented that when bilinguals face idioms for which the direct translation does not exist, they are supposed to choose whether literally or figuratively from those idioms. This will increase the duration of idiom processing and require more cognitive effort. These findings strengthen the notion that idiom processing in bilinguals is complex due to the continuous requirement to apply the interference across languages.

Rodriguez-Fornells et al. (2005) and Togato et al. (2022) have explored the role of the cognitive control mechanism, suggesting that the cognitive control process helps manage and reduce the interface between languages in bilingual individuals. This study demonstrates that executive control function, especially inhibitory control, plays a significant role in preventing the activation of the non-target language during idiom comprehension. When lexical competition is still high, a strong cognitive control system helps bilinguals to eliminate irrelevant information, suggesting precise selection of meaning. Tzou et al. (2016) and Yun (2021) broaden this viewpoint by demonstrating that targeted language training, like professional translator, can improve executive control abilities. This type of training enhances the capacity to control competing lexical items and speeds up resolving semantic ambiguities, underscoring the crucial role of cognitive control in bilingual contexts

In addition, language exposure and cultural context also become a crucial factor in idioms processing in bilinguals. Or-Kan et al. (2020) demonstrate that early and balanced age exposure may lead to comprehensive knowledge of bilinguals. Early dual language experience not only improves the automatic retrieval of idiom by associating similar connections but also situates this expression within a rich cultural framework. Desmet and Duyck (2019) further explain that when idioms are deeply connected with the cultural context of both languages, bilinguals often prioritize memory-based retrieval of idiomatic meaning, reducing complex compositional analysis.

Further cultural phenomena explored by Veisbergs (2019) indicate that idioms are not only the linguistic form but also reflect the cultural environment in which they originate. When bilinguals possess a shared cultural background, they can access idiomatic meaning easily, due to interpretive cues from the familiar culture that allow them to bypass extensive literal analysis. Conversely, bilinguals may have to do a decompositional analysis when idioms are culturally ambiguous or unique to one language.

Studies from Yun (2021) reveal that bilinguals face temporal dynamics when processing language. This means that bilinguals encounter unique challenges when they are managing two languages simultaneously. Their brain has to regulate when and how to use one language, to prevent, and to manage the use order between languages. (Zhu & Minda, 2021) propose that maximal exposure and experience may enhance the executive control system. This improvement may lead to more efficient processing of both lateral and figurative meaning. Thereby, Togato et al. (2022) find that processing speed improves when individuals are familiar with the language material. Individuals respond more quickly to the common

idiom than unfamiliar idiom. This aligns with Rodriguez-Fornells et al. (2005), who argue that bilingual experience may affect the ability to interpret idiomatic meanings.

5. CONCLUSION

In summary, the reviewed literature demonstrates that idioms processing in bilinguals is a complex interplay of multiple factors rather than a single, separated process. Evidence from the various studies shows that elements including familiarity, language exposure, experience, cross-language similarity, and transparency all contribute to shaping idioms comprehension in bilinguals. This result indicates that the familiarity between two languages in bilinguals is equal to their processing approach. This multifaceted approach highlights that idiom comprehension in bilinguals is governed by dynamic and interconnected mechanisms rather than a static process. For future research, we recommend doing such exploration in the neurocognitive processes involved in idiomatic interpretation and exploring these dynamic differences across language, age groups, and proficiency levels.

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