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## ЕТИЧНІ ПОЛОЖЕННЯ

Автори, які подають статтю до цього журналу, засвідчують, що стаття представляє стислий, точний звіт про проведене дослідження, а також об'єктивне обговорення його значення. Праця містить достатньо деталей та покликань на публічні джерела інформації. Фальсифікація даних, їхнє неповне висвітлення із метою введення в оману читачів, а також крадіжка даних або результатів досліджень у інших – це грубе порушення очікуваних етичних норм поведінки науковця. До подання статті в журнал автори повинні одержати дозвіл на використання будь-яких раніше опублікованих матеріалів від оригінального видавця. Плагіат представляє неетичну наукову поведінку і є категорично неприйнятним.

Усі співавтори статті мають однаковий ступінь відповідальності за неї. Одночасне подання одного й того самого рукопису до кількох журналів є неетичним і неприйнятним.

Визнаючи викладені вище факти, автори несуть персональну відповідальність за точність, вірогідність та автентичність результатів досліджень, викладених й описаних у своїх статтях.

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# ARTICLES

# The Russia-Ukraine War in Western Media: A Psycholinguistic Modelling of the 'Hybrid' Phase

**Ivan Danyliuk [a], Olena Bohucharova [b, *]**

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**Abstract.** The article presents a conceptualisation of English-language media discourse in the retrospective of the 'hybrid' phase of the Russia-Ukraine war from 2014 to 2021. The study aims to analyse the psycholinguistic features of the cognitive modelling of the war in Ukraine in English-language media and investigate the psychosemantic components of the Western media audience's attitude towards the war. Psycholinguistic media monitoring, discourse analysis, semantic-cognitive analysis, content analysis, and Semantic Differential (SD) were used to study the media discourse of the Russia-Ukraine war. The results indicate that the discourse is emotionally positive but controversial, which may hinder the Western audience's understanding of the realities of the war. The newspaper media discourse includes psychosemantic components such as neutral concepts like 'conflict' and 'crisis'. These concepts are often expressed through conceptual metaphors such as 'war', which can be viewed as a path, a game, a business, or a theatre. Additionally, euphemisms and abbreviations (such as ATO) are commonly used, along with an abundance of vocabulary that has positive connotations. There has been a shift in emphasis from the strong concept of 'war' to neutral academic nominalisations, such as 'event'. The study's results confirmed the Western media audience's paradoxical perception of the war. As military activity intensifies, positive assessments of the victorious war tend to decrease, leading to a drop in media ratings. These findings have potential applications in studying Western attitudes towards war and in the cognitive modelling of media content. This is particularly relevant given the future dangers of Russian aggression in 2022.

***Keywords:*** *hybrid phase, the Russia-Ukraine war, Western media, Semantic Differential, concept, media discourse, cognitive modelling.*

**Данилюк Іван, Богучарова Олена. Російсько-українська війна в західних масмедіа: Психолінгвістичне моделювання гібридної фази.**

**Анотація.** У статті представлено концептуалізацію англомовного медійного дискурсу в ретроспективі "гібридної" фази російсько-української війни 2014-2021 років. Мета дослідження – проаналізувати психолінгвістичні особливості когнітивного моделювання війни в Україні в англомовних ЗМІ та дослідити психосемантичні складники ставлення західної медіа-аудиторії до війни. Для дослідження медіа-дискурсу російсько-української війни було використано методи психолінгвістичного моніторингу ЗМІ, дискурс-аналізу,

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семантико-когнітивного аналізу, контент-аналізу та семантичного диференціалу (СД). Результати свідчать, що дискурс є емоційно позитивним, але суперечливим, що може перешкоджати розумінню західною аудиторією реалій війни. Дискурс газетних ЗМІ включає психосемантичні компоненти, такі як нейтральні поняття "конфлікт" і "криза". Ці поняття часто виражаються через концептуальні метафори, такі як "війна", яка може розглядатися як шлях, гра, бізнес або театр. Крім того, широко використовуються евфемізми та абревіатури (наприклад, АТО), а також велика кількість лексики з позитивною конотацією. Відбулося зміщення акцентів від радикального поняття "війна" до нейтральних академічних номінацій, таких як "подія". Результати дослідження засвідчили парадоксальне сприйняття війни західною медіа-аудиторією. Із посиленням військової активності позитивні оцінки переможної війни мають тенденцію до зниження, що призводить до падіння медіа-рейтингів. Ці висновки мають потенційне застосування у вивченні ставлення Заходу до війни та когнітивному моделюванні медіаконтенту. Це особливо актуально з огляду на майбутню небезпеку російської агресії у 2022 році.

***Ключові слова:*** *гібридна фаза, російсько-українська війна, західні медіа, семантичний диференціал, концепт, медіа-дискурс, когнітивне моделювання.*

# Introduction

Nowadays, the study of the different media discourses and their components – media concepts based on which the linguistic representation of war or problematic crises events of social reality is organised, is considered a priority linguistic task, in particular, cognitive linguistics, ethnolinguistics, media-linguistics, sociolinguistics (Geeraerts, 2006; Vasianovych, 2018).

At the same time, media discourse and its concepts are increasingly becoming the object of research in several psychological disciplines – psycholinguistics and media psycholinguistics, discursive psychology, cognitive psychology, and media psychology (Giles, 2003; Machykova, 2015; Naydonova, 2013; Zasiekina, 2010). Scientists from different disciplines are studying the discursive and conceptual sphere of the media because discourse and concept as communicative units are not purely linguistic notions. They have psychological, cognitive, psycholinguistic meaning and components. The psychological literature considers that the cognitive correctness of the linguistic modelling of an actual military event unfolds in a psycholinguistic context (Austin & Urmson, 1962). Meanwhile, discourse, concept, and text are critical as media-conceptual units in their essential psycholinguistic properties – logical perception and emotions (Saussure, 1995). In the psycholinguistic approach, moreover, the subject matter is the text as the speech message in the linguistic functioning processes in interactive media communication, as well as the discourse as verbal and thought activity in the processes of speech media broadcasting (Taranenko, 2017; Vilchynska, 2017), including on web platforms. In this way, the authors regard concepts and conceptual metaphors of war, armed confrontation, and military phenomena as a cognitive process of conceptualisation and verbal interpretation. Then, the potential of the concept to model the world is realised "in" and "by" the cognitive modelling of the war in media discourse (Bell, 1995). This fact confirms the psychological importance of the concepts for the human linguistic picture of the world.

It should also be remembered that the level of media discourse is interpersonal, and therefore, the one where the addressant (media) influences the addressee (mass audience) through language. For instance, it is considered that military conceptual metaphor imposes confrontational stereotypes on social reality (Lakoff, 1999; Panther & Thornburg, 2017; Rumiantseva, 2014). Otherwise, language often acts as a means of realising conflict confrontation in media (Howard, 2019b).

From this perspective, we turn to the real armed confrontation in the east of Ukraine in 2014-2021 to understand its media meaning as a factor of the war on 02/24/22. Problematic points are revealed in the actual military events and their media presentation, according to their psychological perception, particularly by the Western media audience (Buckholz, 2017; Driscoll, 2019).

In this regard, the media content of this real war needs authentic, valid conceptual media representation and psychologically adequate cognitive media modelling (Broslavska, 2015). That is why cognitive media modelling requires powerful linguistic and psycholinguistic analytics, in particular, according to one of the possible socio-psychological extensions (Kellner, 2010; Neverson & Adeyanju, 2018) of the sociological theory of media events (Dayan & Katz, 1992).

It should be considered that such analytics is proactive and is built around conflicting social interests, various controversial agendas, protest discourses, and conflictgenous speech communication in the media (Bacallao-Pino, 2016; Sumiala, 2016).

Furthermore, the Russia-Ukraine war is an example of a resonant, multi-vector armed confrontation with many alternative interpretations. The discourse of such phenomena in the mass media sometimes unfolds through concepts designed to convey not a particular meaning of acute military conflict reality as it aims to achieve a programmed pragmatic (communicative) positive/ negative impact on the audience. That is the basis of media concepts of Western democratic journalistic intelligence investigations regarding the hidden Russian aggression in Ukraine in 2014–2021, which lies in the purposeful, conscious selection of language material.

At the media-communicative and psycholinguistic level, this is often confirmed as the art of journalistic investigative mastery skill or successful media technologies of "soft power" and facilitating, soft positive influence (Imbir, 2017).

As american diplomat Nye (2011) formulated a the concept of "soft power", it "is the ability to change the behavior of others to get what you want. There are three ways to do this: coercion, payment, and attractiveness (soft power)"(p. 9).

It is the linguistic techniques of media processing of actual war that often act in the direction of "softening" the severity of armed confrontation and also achieving political correctness of language within the linguistic, conceptual field of the phenomenon of war itself, for example, thanks to euphemisms, embellishing its meaning and consequences.

These soft, delicate, positive means of psycholinguistic influence, in turn, significantly enhance the discourse of the so-called doublespeak. According to this, for the nomination of problematic phenomena of highly controversial events in the media, it is considered necessary to use valuative units to attract euphemisms of an argot nature (Tatsenko, 2013) and a "mannered and gentle way of paraphrasing"

problematic and military topics such as a war (Karimnia & Khodashenas, 2016, p. 65). In the era of the information revolution, as Western media theoreticians believe, the factor of attractiveness ("soft power") will be more critical than a devastating military advantage. Then, in the psycholinguistic and media-psychological context, the Russian-Ukrainian war is a hybrid war and a new form of hybrid media event, which consists of actual bloodied military fighting, dirty information and psychological operations (IPSO) and their "attractive"("soft") media content.

The abovementioned issues remain poorly studied, even though various interdisciplinary studies of the Russian-Ukrainian war in 2014–2021 have occupied their niche in the domestic and international scientific literature (Berg & Mölder, 2018; Matsievskyi, 2019).

This research aims to analyse the psycholinguistic features of cognitive media-modelling of the "hybrid" phase of the war in Ukraine in English-language media discourse to investigate the psychosomatic components of attitude in the mass consciousness of the Western media audience.

# Method

The material of the research is a set of publications in the World (English) section of English-language websites, such as *The Guardian, The Washington Post, The Economist, Time, Atlantic Council, Foreign Affairs, The New York Times, Reuters*, as well as sites, services, and platforms of the channels *BBC, CNN, Radio Free Europe, Radio Liberty*.

The method of psycholinguistic media monitoring involved searching both news and analytical materials of the above-mentioned English-language media outlets for information concerning the armed conflict in eastern Ukraine and attitudes to this one of the West. A large volume of media texts compiled randomly from 1072 articles and reports of 2014–2021 was analysed. The total number of words in the articles and radio reports is 891,415 (digital versions of relevant platforms and websites).

The content analysis method included a comparative analysis of the media activity of relevant websites during the specified period, qualitative analysis of lexical media content of articles and messages, detection of keywords, and frequency of their use (Foltovych et al., 2017).

Discourse analysis within discursive psychology has contributed to the study of the role of discursive means of mitigation, discredit, manipulation, masking, dissent – "doublespeak" and euphemism in the media presentation of controversial events and clarifying their essence from the standpoint of the psycholinguistic theory (Gomez, 2009). Besides, the semantic-cognitive analysis method consisted of the interpretation of the concepts as objects of cognitive modelling (Pavlenko, 2016)

The semantic differential method (SD scale) allowed us to identify the specifics of evaluation (perception, attitudes) of the modern English-language audience of the media concepts and their lexical derivatives as keywords of the armed conflict in eastern Ukraine and to rank the set of media key concepts proposed for evaluation by

the score. The methodological basis of the psychosemantic research was classical works (Osgood, 1952).

The sample of the vocabulary of media key concepts was formed by the "snowball" method. The criteria for selecting concepts were the frequency of their use and structural and semantic features. The empirical research was conducted online with a sample of respondents. It was carried out through a mailing list to 500 users of the social network Facebook, the subscribers to English-language electronic publications. Two hundred five volunteers answered our research request; among respondents aged 21 to 49, a majority of 96.5% was recorded; 100% of the following categories of respondents took part: executives (with higher education – 87.6%), master's students (with bachelor's degree, unfinished higher education – 12.4%) (females, n=180; males, n=45). Each term used to denote the events in eastern Ukraine had to be evaluated for each pair from a list of 12 pairs of antonyms on a scale of –5 to +5. The evaluation was performed for each of the words separately. The processing of results is presented as descriptive statistics (average calculation methods are the methods of average group analysis and intergroup correlations).

## Results and Discussion

Considering all the above, we analysed the медіа-activity of the British and American Mass Media in 2014–2020 (e-publication). The year's distribution of frequency rate is presented in Table 1.

### Descriptive Statistics and Comparisons

Table 1
*Distribution of the WAR in Media Discourse' Publications in the British and US Media, 2014–2021, Number/ Per Cent*

| Media country year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | Total number |
|---|---|---|---|---|---|---|---|---|---|
| **UK** | 35 / 8.3 | 67 / 15.9 | 75 / 17.8 | 83 / 19.7 | 90 / 21.3 | 44 / 10.4 | 20 / 4.7 | 8 / 1.9 | 422 / 39.4 |
| **USA** | 15 / 2.3 | 58 / 8.9 | 100 / 15.4 | 117 / 18.0 | 184 / 12.9 | 81/ 12.5 | 75 / 11.5 | 20 / 3.1 | 650 / 60.6 |
| **Total** | 50 / 10.6 | 125 / 24.8 | 175 / 33.2 | 200 / 38.4 | 174 / 34.2 | 125/ 22.9 | 95 / 16.2 | 28 / 5.0 | 1072 / 100 |

As we can see, there is a noticeable discrepancy between British and American media activity regarding the concept of war (the difference between the concepts and

their cognitive features peaks in 2014–2021). It was in 2014, and 2018 had the lowest and highest media activity. Moreover, it is precisely the concepts of "war", "conflict", and "crisis" that provoke the most significant interest in the respondent's samples in these years (87% of the sample of the entire English-speaking media audience). British e-publications were twice as much as American ones and vice versa, with Americans twice as much as British in 2014/2018.

Moreover, the concept that reflects the warfare in Ukraine and which is most often found in the British media is CRISIS (30% terminology' vocabulary). This concept is constantly reproduced even in the headlines of the British BBC and other news services and publications ("The UK is guilty of sleepwalking into the crisis in Ukraine and has not been as active or visible as it should be", "Russian minister accuses European politicians of stoking Ukraine CRISIS"). At the same time, the concept of CONFLICT is more prevalent in the American press (45% of the terminology's vocabulary). The validity of our data is strengthened by the results of different analytical monitoring reports (Eye et al., 2017).

In general, the concept sphere of the English-language media regarding the war in Ukraine is saturated with numerous concepts, metaphors, and slots of the following content: "short-lived war" (war is back on the high road); "confrontation" (for a more significant confrontation); "stoking crisis" (…stoking Ukraine crisis); "tense situation" (to further inflame the tense situation in the country); "conflict with pro-Russia rebels" (conflict with pro-Russia rebels); "military intervention" (to warn Russia against military intervention in Ukraine). So, eventually, interpreting the events in Ukraine in the English-language media seems to be based on semi-neutral concepts such as CRISIS and CONFLICT. However, they are followed by military nominations and even the WAR token.

In the coverage of the bloody conflict in Ukraine in the English-language media, along with nominations that have a sharply negative assessment ("the deaths"; "spark a war"; "danger, costing the lives of at least 1,500 people"), there are other lexemes: "hunting", "risk", "betting in the game", and "gambling or sports, or card game". This image of war as a game is usually formed by several phrases or meanings, in which, as a rule, one refutes the other. The military nominations of concepts like CRISIS and CONFLICT coexist and even compete with GAME nominations (56/43% military/game nominations). Thus, the structure of the concepts here shows another image of war – gambling, game, rivalry, hypocrisy, blasphemy, giveaways, and "Ukraine is a toy" (Ukraine is a toy in the hands of the Russian Federation and the EU). For instance, when the armed confrontation or reports of military movements are "The West responded with phone calls" and condemns. However, it emphasises that this is not enough (Condemnation is not enough for Russian actions in Crimea).

Hence, the concepts of CRISIS and CONFLICT are correlated with the concepts and metaphors of WAR – "uncertainty", "risk", "death", "chaos" as well as "game" – "gambling," "competition", "winning", "leader-winner" and so on. The most common concepts and conceptual metaphors in a sample of news and analytical materials in 2018 – the year of the highest media activity of the above publications of the

English-language media – as to a war are "road" (112 expressions), "combat theatre" (80), "armed journey" (63), "military commerce" (43), "gambling" (32 expressions).

Thus, the representation of these concepts in the media texts of news portals reflects the heterogeneity of their structural and semantic content in the frame of war cognitive media-modeling in mass media-discourse of the hybrid phase in 2014–2021.

The discourse analysis revealed that, in addition to concepts, media modelling is presented by three different mutually competing, highly conflictgenic media images of war with their corresponding ratio – 58/27/15% of the total volume of text units. These are 1) an emotionally-accentuated image of internal conflict or "civil war", on the West expertise's opinions, with metaphorical para-military models of rebellion, insurgency, separatism, bottom-up revolt; 2) a rationally symbolic image of external conflict or "hybrid war" with metaphorical military models of the fight, unjust, unfair Russia's hidden aggression against Ukraine, on the opinions of the West and Ukraine researchers (Bachmann & Gunneriusson, 2015; Buckholz, 2017; Dodonov, 2015), that symbolise "little green men", "the Russian aggressor" and "Ukrainian fighter-heroes"; 3) the image of peace – a pragmatic compromise by the metaphorical model of a peaceful world, a peaceful (conciliatory) consensus of Minsk-1, Minsk-2. We emphasise that in the entire volume of English-language texts, the image of internal conflict, rebellion (insurgency), resistance, and civil war prevails (58% of text units).

Suppose we analyse the English-language media discourse on bloody events in eastern Ukraine. In that case, using different nominatives requires the analytics of generating ambiguities of the concepts and their replacements. For example, shifting the emphasis from the acute nominative "war, "combatant," and "killed civilians" to the relatively positive ones "frozen conflict", "hybrid Internet warfare", "little green men", ATO, "the rebels" as the doublespeak and euphemism tools. The vast majority of the phrases describing the death of civilians are impersonal nominatives, such as black humour or code cypher – "collateral damage", "civilian impacting", "non-military casualty", or "soft target". In this sense, the discourse analysis showed that the discursive means of disguise, mitigation, discrediting, euphemism, and dissent play a significant role in the media coverage of the English-language media of the war in Ukraine as a hybrid event. Their use, as a rule, contributes to the deactualisation of the militarised image of the bloody conflict in Ukraine. That is why so-called doublespeak linguistic techniques of the media processing of the actual military bloody fights often work toward softening the conceptual field of these aggressive military operations, significantly enhancing the discourse effects of positive soft communicative influence.

To confirm the results of different linguistic and discursive analysis areas, we also considered it appropriate to use special psycholinguistic tools, particularly the Semantic Differential method (SD). The SD method allows us to assess, first of all, the connotative meaning of the concepts "war", "conflict", and "crisis" and their structural and semantic units-components.

Figure 1
*Assessment Ranks of Concepts and Their Structural and Semantic Units-Components with the Sphere-Target "War" in the English-speaking Mass Media of the Sample Within the Range 1 – 10*

| Ranks | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Terms** | W (C, H) | AC DF | OI MI | LGRM RA | REB INS MPR | C(G) PI | IC AA | FC CS | ATO JFO | DP PT |

*Note.* 1. war (civil, hybrid); 2. armed conflict / deadly fighting; 3. overt intervention/ military involvement; 4. "little green men" without insignia, polite people/Russian armour; 5. rebels, insurgents/ Maidan protesters; 6. crisis (geopolitical)/ peace initiatives; 7. international conflict/armed aid; 8. frozen conflict/ceasefire; 9. anti-terrorist operation/ joint forces operation; 10. diplomatic pressure/ peace talks

It is captivating that 'camouflage', 'mitigating', or truly neutral words (international conflict, frozen conflict, diplomatic pressure, ceasefire, peace initiatives, peace talks) have fallen into the positive part of the connotative meanings of the English language consciousness. The negative ones that characterised the war are armed conflict, the model of a peaceful world, forces and actions, and the main participants of the armed conflict. They received the lowest scores and accounted for the most significant part.

According to the algorithm of mathematical processing of data obtained by using the SD method, a statistical series of measured values – activity, potency (strength), and evaluation (assessment) were created, which are presented below (see Table 2):

Table 2
*The Statistical Series of the Assessments of the "War" Concept on the Semantic Differential Scales by the Sample Within the Range -5–+5*

| **Scales** | -5 | -4 | -3 | -2 | -1 | +1 | +2 | +3 | +4 | +5 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **activity** | 156 | 115 | 68 | 46 | 267 | 229 | 534 | 189 | 285 | 35 |
| **potency** | 13 | 22 | 84 | 58 | 52 | 127 | 10 | 10 | 2 | 3 |
| **evaluation** | 165 | 47 | 48 | 65 | 62 | 100 | 616 | 219 | 245 | 50 |

*Note.* The high assessments – in bold type

The data of the statistical series allowed the characteristics of the semantic space of the media audience to be calculated according to the formulas of averages and variance. The latter shows that according to the activity parameter, the concept of WAR is evaluated positively and moderately low (M = 1.082, SD = 1.62). The

concept is evaluated similarly according to the strength parameter (M=1.83, SD=1.24). Only with the evaluation parameter is the concept of WAR rated as medium-high (M = 2.159, SD = 1.62), but with significant variance.

At the level of connotative meaning, an increase in the evaluation parameter of the concept of WAR in Ukraine means that the English media audience perceives war events as significant, positively emotionally coloured, and, therefore, as those that cause sympathy and interest.

At the same time, the decrease along with the increase of the activity and strength parameters proves that due to its contradictory dynamics, the concept of WAR and its derivatives violate the coherence of the coordinate system of the semantic space of the media audience. This indirectly indicates the lack of group cohesion in assessing complex social phenomena. From there, it can be assumed that the linguistic slot of the complex concept of WAR and its derivatives is allocated to a separate cognitive context and is the target sphere of influence for difficult-to-understand phenomena of the socio-cultural level.

In general, the results obtained by the semantic differential method showed that the English-speaking audience's perception (attitudes) of the Ukrainian war is positive and sympathetic but paradoxically an unstable trend. The bipolar dimensions of activity and evaluation' (affective attitudes) scales are negatively correlated. With increasing tension of military activity in Ukraine, there is a tendency to decrease readability ratings of Ukrainian themes of military aggression in media by English-speaking mass audiences.

## Conclusions

The conducted study of the English-language media discourse in modern in the retrospective of the hybrid phase of the Russia-Ukraine war in 2014–2021 made it possible to identify the replacement of the concept "war" in cognitive modelling by the much more gentle and neutral concepts such as "crisis" and "conflict"; to define psycholinguistic techniques as unique markers of "soft" cognitive modelling of a hybrid media event in media; to reveal that with increasing tension of military activity in Ukraine, there is a tendency to decrease the positive attitudes to the victorious war.

The obtained results, both in a theoretical and practical sense, have prospects in developing psycholinguistic and psychological aspects of the media event theory, psychological technologies of hybrid warfare, and cognitive modelling of media discourse and individual linguistic consciousness.

## Disclosure Statement

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# Exploring the Impact of Directionality on Disfluencies in Simultaneous Interpreting

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**Abstract.** This paper focusses on the concept of directionality in interpreting. The main aim of this study is to investigate four types of disfluencies in simultaneous interpreting performed by students and the impact of pausal phenomenon on directionality. Disfluencies being inseparable element of speech are the factor that has a substantial influence on interpreting process including directionality. The participants in this study were 12 advanced interpreting students who interpreted simultaneously two texts from A language into B language and two texts from B language into A language. Their outputs were later analysed taking into consideration four types of disfluencies and verified how they influence directionality. This study offers some insights into occurrences of disfluencies. Research findings show that students display tendency to produce more disfluencies while interpreting into A language. In addition, the obtained results highlight the necessity to focus not only on fluency but also on disfluencies while interpreting training to improve quality in simultaneous interpreting in both directions.

***Keywords:*** *pausal phenomena, pauses, simultaneous interpreting, directionality, disfluencies.*

**Ґершал Сілвіа, Ліда Анджей. Дослідження впливу спрямованості на порушення в синхронному перекладі.**

**Анотація.** Цю статтю присвячено поняттю напрямку в усному перекладі. Головною метою цього дослідження є вивчення чотирьох типів порушень у синхронному перекладі, здійснюваному студентами, та вплив явища пауз на напрямок перекладу. Бувши невід'ємним елементом мовлення, порушення є чинником, який суттєво впливає на процес усного перекладу, зокрема на його напрямок. У дослідженні взяло участь 12 студентів-перекладачів, які перекладали синхронно два тексти з мови А на мову Б та два тексти з мови Б на мову А. Пізніше їхні результати було проаналізовано з урахуванням чотирьох типів порушень і перевірено, як вони впливають на спрямованість. Це дослідження дає певне уявлення про те, як виникають порушення в мовленні. Результати дослідження демонструють, що студенти виявляють тенденцію до більшої кількості порушень під час усного перекладу на мову А. Крім того, одержані дані вказують на необхідність зосередження уваги не лише на біжучості, а й на її порушеннях під час навчання усного перекладу для покращення якості синхронного перекладу в обох напрямках.

***Ключові слова:*** *паузальні явища, паузи, синхронний переклад, напрямок, порушення.*

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# Introduction

Directionality being one of the most contentious issues in the interpreting and translation studies is inherently connected with the question whether the interpreters should interpret only into the native language or also into a foreign language.

B-language interpreting has historically been perceived as being of lower quality, less fluent, as pointed out by Herbert (1953, p. 61), who claims that the interpreter should only use their mother tongue and by Seleskovitch (1978, p. 100) arguing that "simultaneous interpretation can only be done properly into one's native language." In addition, according to Seleskovitch (1968), it is the native language that allows the interpreter to best render the text, even though the interpreters have excellent knowledge of both A and B languages. In a similar vein, Selinker (1972) argues that interpreting into a foreign language is more likely to cause stress or 'backsliding', to use his term, and therefore the interpreter should only work in a language that causes less stress, i.e. the dominant or native language. Finally, it is often believed that simultaneous interpreting into a foreign language, or a non-dominant one, focuses on the extra cognitive load and greater need to monitor syntactic structures and prosodic features when speaking in B language and this is a reason for the loss of quality (Schweda-Nicholson, 1992).

However, This traditional approach presented by "Paris School" (i.e. Herbert, 1953; Déjean La Féal, 1998; Seleskovitch, 1999) has been questioned by many researchers (Denissenko, 1989; Snell-Hornby, 1997; Lorenzo, 1999; Campbell, 1998). At this point it is worth presenting Denissenko (1989), who argues that comprehension in the mother tongue being the most essential factor for transferring the message may also be the most constraining factor. This interpreter's limitation results from "a wider choice of possible ways and means of conveying the same message." Therefore, interpreting into A language may require more time than into B language where the scope of adequate means, for instance idiomatic phrases, to render the message is to some extent narrower.

Despite the plethora of studies on directionality, research that aims to explore the optimal interpreting direction still shows contradictory results, namely some researchers (Daro et al., 1996; Chang, 2005) find evidence in favour of interpreting into A language, while others (Tommola & Laakso, 1997; Tommola & Helevä, 1998, Wyatt et al., 2021) point out that interpreting into B may constitute equally or even more successful rendition. However, it should be noted that not only direction of the interpreting may influence interpreting output but other factors such as the source text context (Chang, 2005), expertise of interpreters (Barik, 1994; Bartłomiejczyk, 2004), language background of the recipients (Gile, 1990), the number of training hours in a particular direction (Donovan, 2004) and last but not least the combination of language pairs (Al-Salman & Al-Khanji, 2002; Kurz & Fäber, 2003).

Finally, the underlying rationale for interpreting both into A and B languages is geopolitical situation in the world which leaves behind historical dichotomy in favour of empirical studies on directionality. Therefore instead of rejecting the opposite

direction of interpreting performance of lower quality, it seems justified to investigate the reasons of disfluency to be able to provide a successful output in both directions.

Given the fact that in human communication words are almost always accompanied by additional components, i.e. disfluencies including hesitations, repetitions, restarting, false starts, restructuring, repairs, and consonant or vowel lengthening, the same pausal phenomena are reflected in simultaneous interpreting as there is a close affinity between these two processes, namely speech and simultaneous interpreting.

What needs to be emphasised here is that full understanding of speech production complexity including simultaneous interpreting requires investigating not only factors determining fluency but also disfluencies that constitute a fundamental area of research.

Disfluencies due to their multiple functions and the diversity of terms as observed by Shriberg (1994):

> A rather bewildering number of different terms have been used to refer to classes of DFs, including: abridged repair, aposiopesis, appropriateness repair, anacoluthon, correction, different repair, error repair, false starts, filler, fresh start, filled hesitation, filled pause, full sentence restart, insertion, lexical repair, modification repair, production repair, repeat, repetition, reformulation, restart, sentence correction, sentence incompletion, sentence restart, unfilled pause, word change and word omission. (p. 10)

reveal that in many cases they refer to the same hesitation phenomena analysed from various scientific perspectives, and this, in turn, generates a number of categorisation systems, just to name few: Johnson et al. 1961, Magno Caldognetto et al., 1982, Shriberg, 1994, Tissi, 2000, Cecot, 2001.

As regards diversity of taxonomy, the general character of the categories distinguished by Johnson (1961, p. 3–4) might serve as a background within many disciplines including simultaneous interpreting where it is successfully implemented into the analysis of disfluencies.

1. Interjections of sounds, syllables, words or phrases. This category includes “extraneous” sounds such as Uh, er and Hmm, corresponding to the filled pauses of later research.
2. Part-word repetitions.
3. Word-repetitions.
4. Phrase repetitions.
5. Revisions, i.e. instances in which the content of a phrase is modified, or in which there is grammatical modification. This category also includes change of pronunciation.
6. Incomplete phrases.
7. Broken words.
8. Prolonged sounds.

Based on the above categories, four types of disfluencies have been distinguished for the purpose of this study, namely filled pauses, restructurings, repetitions and lengthenings.

The first category – filled pauses, regardless of the discrepancies arising from the linguistic perspectives studied, are the most numerous type of disfluencies and occur in the interpreting output as prolonged *yyy*, short *y*, *uhh*, *uhm*, *ee* and several other phonological variants in different languages.

The second category comprises restructurings which in this study denotes corrections of single words, phrases and repairs due to lexical or grammar changes and false starts. In addition, restructurings may also be represented as truncated words which are either completed or left to be replaced by a new word or phrase.

As concerns the repetitions of words or phrases (self-repeats), they constitute the third group of disfluencies after filled pauses and restructurings and refer to particular words or phrases. Repetitions are tools used to replace one word or phrase by the same one which allows the interpreter to gain time to find the appropriate lexical item while rendering their text. Finally, the last category constitutes lengthenings where the speaker prolongs the particular sound to plan the continuation of speech. It should be noted here that lengthenings taken into consideration are not the result of stuttering.

To sum up, this study is an attempt to answer whether directionality impacts the quality in simultaneous interpreting output performed by students taking into consideration four aforementioned disfluencies.

# Method

## Participants

The study included 12 students of the Department of English Philology in Sosnowiec (University of Silesia), half the subjects were women, the other half men. The age span of the subjects ranged from 22 to 24. All the participants were native speakers of Polish and lived in Poland while English was their language B. All the subjects were students of the first year of a MA programme in translation and interpreting who started simultaneous interpreting classes during their third year of a BA programme. In the course of simultaneous interpreting classes the students practised interpreting from Polish into English and from English into Polish.

## Materials and Procedure

The corpus for analysis consists of 4 source texts, two from English into Polish and two from Polish into English, each text was about 15 minutes. The students were not familiar with the contents of the source texts before interpreting. The speakers and topics of speeches were presented before interpreting. The speeches have been selected and adjusted to the training level and referred to everyday aspects of life using simple language while specialised vocabulary occurred sporadically.

Each of the source texts was interpreted by 12 subjects, which amounts to 48 simultaneous interpreting outputs that were recorded during separate sessions in

the language laboratory and transcribed verbatim for analysis of disfluencies. The first stage was listening to the recordings and making transcripts, followed by a re-listening by the teacher with a review of the transcript to verify that all disfluencies had been covered. In the transcripts, the original spelling has been retained, along with additional comments from the trainee interpreters such as a grunt, a sigh or a laugh.

## Results and Discussion

As regards the analysis of disfluencies, they were investigated in terms of their number in a particular interpreting output, namely while interpreting into A language and into B language. Looking at the total numbers, the following tendencies can be observed as presented in Table 1 below.

Table 1
*Distribution of Disfluencies by Directionality*

| | Filled pauses | Restructurings | Repetitions | Lengthenings | Total |
|---|---|---|---|---|---|
| Eng-Pl | 878 | 334 | 178 | 108 | 1498 |
| Pl-Eng | 342 | 73 | 87 | 41 | 543 |

The results of the analysis reveal that that the usage of filled pauses prevailed in both interpreting directions, i.e. from English into Polish and from Polish into English. The number of filled pauses in interpreting outputs into Polish amounts 878 (58.61%) and into English 342 (63.06%). Noteworthy is the fact that filled pauses constitute the most numerous group of disfluencies in all analysed target texts and their occurrence is illustrated in two extracts below.

> //Kiedy **yy** Apple zaczęło rosnąć, zatrudniliśmy kogoś kto miał nam pomóc, ale potem nasze **yy** wizje przyszłości się różniły. Nasz zarząd **yy** stanął po jego stronie. Kiedy miałem 30 lat **yyy** straciłem pracę. Wszystko to było bardzo przytłaczające. Nie wiedziałem co robić przez kilka miesięcy. Miałem wrażenie, że zawiodłem **yy** przedsiębiorców//
> //It's being used in nuclear plants/ It's being used despite its … detrimental effects, detrimental … features/ It is being used by the **yyy** food industry and the **eee** drug industry/ So, approximately, half a century ago, Nathan Zohner conducted a study **yyy,** in America/

The findings show that students produce more filled pauses interpreting from English into Polish. Quite predictably, the tendency to overusing filled pauses in both directions can be attributed to difficulties with split attention between active listening and memorising, in particular working under the extreme time pressure. Therefore, whenever students encounter a problem with rendition of texts they resolve to using filled pauses as a time gaining strategy as argued by Clark and Wasow (1998, p. 201),

who emphasise that "When speakers cannot formulate an entire utterance at once, they may suspend their speech and introduce a pause or filler before going on".

As for the distribution of restructurings, they are used by students to replace a truncated word or self-repair to express the same message in a different way or to express a completely different message. Restructurings may result from uncertainty or errors that are instantly noticed and repaired as indicated in the following examples from transcripts:

> *//Ee.. **chcą normalnych żyć w żyć… chcą normalnych rzeczy w życiu**.//*
> *//and I'm willing to bet most of **you has started their… have started studying their studying** of foreign languages through knowing how to//*

The data obtained in the course of the analysis of restructurings confirm a tendency to use them in both interpreting directions, but it purports to be significantly more frequent in interpreting into Polish. For Fox et al. (2002) restructurings are the processes where the speakers "stop, abort, repeat or alter their turn before it comes to completion". It should be noted that sometimes it is difficult to find whether the student wants to change merely a structure or the meaning of the interpreting output.

Data collected in reference to repetitions show that they are used to help in preparing for the upcoming utterance and to formulate the appropriate content. Repetitions can be used not only as a repeating the same phrase or word but may acquire a different meaning in particular contexts as argued by Cook (2000, p. 29) "even where the repetitions are exact, the self-same sequences of words take on new meaning in new circumstances, or in the light of what has been done or said before". Moreover, repetitions are widely defined as "a monologic and psycholinguistic phenomenon, i.e. one of the speech disfluencies typically occurring in the interpreters' output" Straniero (2012, p. 29), which by and large, is considered as proof of self-monitoring process and online planning in the simultaneous interpreting.

> //I was teaching basically everything, many subjects/ I could enumerate them until the end of this speech/ And lately, in my life, there **was a great … a great** mile-milestone has been achieved and currently//
> **//Nie miałem… nie miałem** miejsca do spania więc zatrzymywałem się na podłodze mojego kolegi.//

Repetitions in this study are usually formed as a strategy of gaining time or reconnecting to an already spoken part of a sentence with the latter type being frequently reflected in students' interpreting output.

The analysis shows that lengthenings are the least numerous group of disfluencies but still used considerably more often while interpreting into Polish than into English. Many examples reflect not only final vowel lengthening which is in line with the general tendency to lengthen final vowels in words and sentences (Klatt, 1975; Lindblom, 1978) but initial phonemes as well.

//Oczywiście to było nie możliwe żeby połączyć kropki **kiedyyy** byłem na studiach.
//It was one of the, those were two big awakenings, it was like cold water on my- pouring on my hot head that maybe I should ss- change my thinking a little bit aaand I did that.//

The discerned trend to lengthening initial and final vowels, but also consonants is particularly evident when translating into Polish language, for example: rep */**t-toksyczny** gaz/, /**zzzyska** na tym/, /na całym terenie **uuu-niwersytetu**/, **uu..uczelnia** miała.*

It can be observed that lengthenings may serve to bridge the gap while waiting for a new material or express hesitation if supported by intonation. In addition, lengthening of the final vowel or consonant of a word does not mean interruption of speech, but continuation while processing the new part of speech to be uttered.

As illustrated below, students use disfluencies in their interpreting outputs in varying amounts, but with an indication that they use more of them when interpreting into Polish.

This observation is also confirmed by carrying out a statistical analysis.

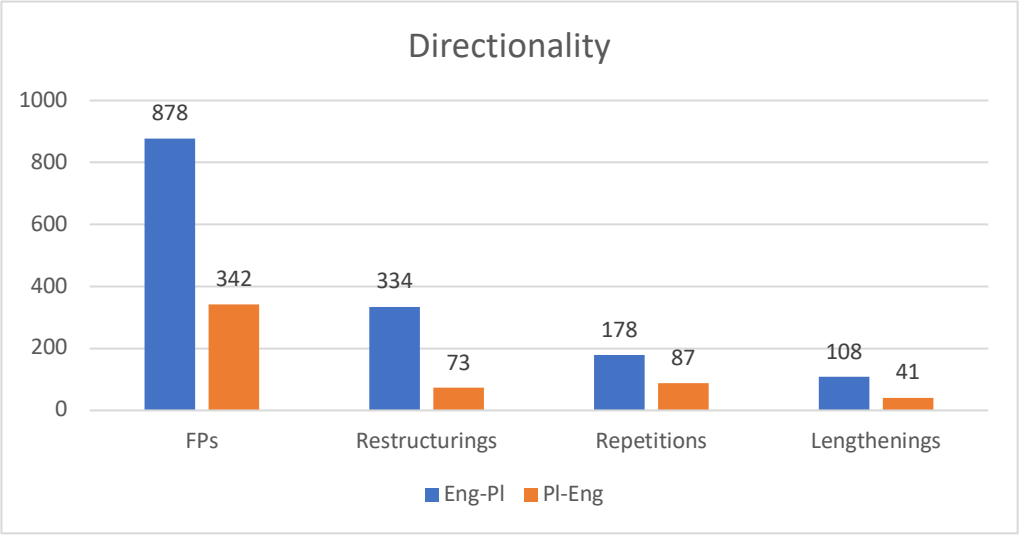



Figure 1
*Distribution of Disfluencies by Directionality*

The analysis of the target texts shows that filled pauses occupy a dominant position on the list of disfluencies, 58.61% in A language and 63.06% in B language and are followed by restructurings 22.30% for A and 13.44% for B, repetitions 11.89% for A and 16.02% for B and lengthenings 7.21% for A and 7.55% for B. It provides evidence that the direction in which the interpreting is conducted has a strong impact on the occurrence of disfluencies.

A statistical analysis was conducted to support the results obtained in the quantitative analysis to check whether there is a relationship between the incidence of disfluency and directionality.

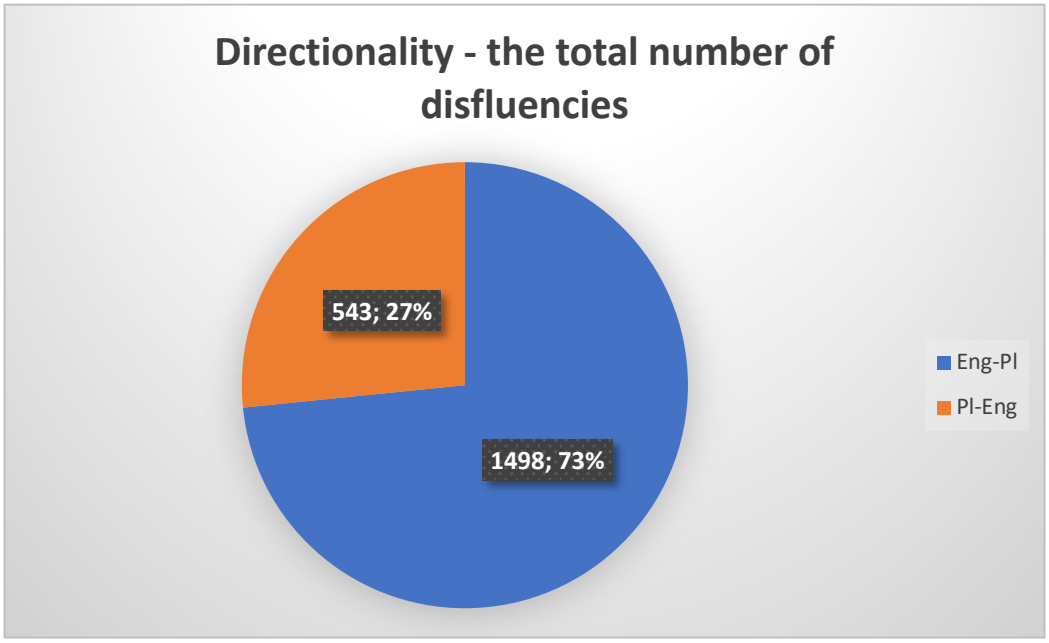
Table 2

*Interpreting Direction Versus Percentage of Discontinuity (Total) in the Utterances (Wilcoxon Test)*

| Directionality | N | Arithmetic mean | Median | Standard deviation | Wilcoxon Test p-value |
|---|---|---|---|---|---|
| English-Polish | 12 | 4.43666 | 3.73784 | 2.15245 | .012064 |
| Polish-English | 12 | 2.47831 | 1.98278 | 1.70433 | |

The results show that here are statistically significant differences in the percentage of disfluencies (Total) in the utterances in the considered populations determined by the interpreting directions (p-value < .05). It seems that significantly more disfluencies in the utterances concern the English-Polish direction (for this direction the mean and median are higher than for the Polish-English direction).

Figure 2






*Percentage and Number of the Total Disfluencies in the SI Output*

As can be seen from the Fig. 2 above, a marked difference was found between the two directions, which reflects the data obtained for particular categories of disfluencies. This may suggest that the impact of directionality on the interpreting output is prominent. The findings of significant differences in number of filled pauses and other disfluency factors in two interpreting directions provide evidence that interpreting into A language is more problematic for interpreting students than B language.

Finally, a possible reason for the preference of interpreting into B language lies in the approach presented by Tommola and Helevä (1998), who similarly to Denissenko (1989), accentuate that:

> If comprehension is central for the transmission of information content, one might expect that, for trainees, going from A to B might result in a more accurate performance than going in the standard direction of B to A. (p. 178)

This view is also supported by Al-Salman and Al-Khanji (2002), who conducted an empirical study on directionality and their results appear to be consistent with aforementioned and present studies, namely the majority of interpreting students were in favour of interpreting into their B language due to better comprehension of the source text. Nonetheless, according to Chmiel (2016) the reason behind this that students prefer interpreting into B language may be to some extent account for the fact that they are trained more in non-native language direction what is considered

mainstream practice in large international organizations such as the United Nations and the European Parliament.

Contrary to prior mentioned studies, Lin et al. (2018), investigated directionality in simultaneous interpreting fluency considering five factors, vide licet, hesitations, interruptions, repetitions, corrections and silent pauses. Their findings also show that directionality is a substantial facet that has an impact on disfluencies, however, they reveal that interpreting into non-native language tends to yield more disfluent output than into native language. This observation is consistent with earlier survey results on interpreters' preferences over native language interpreting (Pavlović, 2007; Nicodemus & Emmorey, 2013; Choi, 2015).



In conclusion, disfluencies appear to be the factor that has an impact on directionality in simultaneous interpreting. The obtained results clearly confirm that while interpreting from English into Polish students produce more disfluencies. Similar results were obtained by Bartłomiejczyk (2004, 2006) where students assessed their interpreting output into A language as more problematic due to problems with comprehension, and linguistic and extralinguistic knowledge in B language. The underlying rationale for such reasoning by students may be to some extent caused by the fact that in case of encountered problems students resort to omissions. Thus, on the one hand omissions contribute to fewer number of disfluencies but on the other hand, the omitted parts may be meaningful for further understanding of the output, which may have a bearing on the quality of interpreting.

Understanding interpreting as a direction-dependent process allows a broader and more critical perspective to be taken on disfluencies. Chou et al. (2021) in their study examined four factors of quality in interpreting (speech rate, quality of expression, completeness and delivery of information) performed by trainee interpreters. Their foundlings show an advantage for interpreting from language B into language A regarding delivery and quality of expression, contrary to the content category. Interestingly, they did not found any essential differences in filled and unfilled pauses between two interpreting directions which, in contrast, can be clearly observed in the case of filled pauses presented in the study that is the subject of this article.

In addition, in spite of the fact that directionality is still a controversial issue in interpreting studies, the current changing geopolitical situation requires a more flexible approach and therefore, it seems reasonable for students to practise translation in both directions while learning about their limitations.

Finally, this experimental study may contribute to a better understanding of the nature of disfluencies in terms of language direction and the above finding holds implications for interpreters training and practice. Regarding training, it appears recommendable to provide students not only with the notion of fluency but also disfluency which significantly affects the quality of their interpreting.

# Disclosure Statement

No potential conflict of interest was reported by the authors.

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# The Origins of Writing: A Neurolinguistic Perspective on Written Communication

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**Abstract.** If homo sapiens, understood as the evolution of the current human being, was characterized by a cerebral advance and a much more evolved communicative capacity than its ancestors, then it is not conceivable that the origin of writing as the maximum exponent of homo sapiens' need for communication did not improve until many thousands of years later. The fact that the first linguistic system perfected and agreed upon by an entire society dates from 3,500 years ago does not prove that this is the origin of writing. Writing, as the origin of the word itself indicates (both in Spanish and English), implies an attempt to communicate in writing and does not require a sophisticated and mature language with a developed grammar, phonetics, or semantics. No matter how rough, clumsy, crude, sparse, scanty, and incomprehensible these early written manifestations may have been, they are samples of writing. Taking into account this starting point, which is not new, the present study suggests a new classification of the origin of writing up to the present day. As long as no more ancient writing endeavors appear, the first attempts at written communication date back to about 40,000 years ago. From then until now, three periods have developed from the linguistic point of view: proto-writing, emergent writing, and maturity. These periods match the cognitive development of human beings with respect to their historical achievements of globalization.

***Keywords**: origin of writing, classification of writing stages, writing periods, globalization, psycholinguistics.*

**Хіменез-Перез, Елена дел Пілар, Ґірао Педро Ґарсія. Витоки письма: Нейролінгвістична перспектива писемної комунікації.**

**Анотація.** Якщо homo sapiens, що розуміють як еволюцію сучасної людини, характеризувався розвиненим мозком і набагато розвиненішою комунікативною здатністю, ніж його предки, то неможливо уявити, що походження писемності як максимального вираження потреби homo sapiens у спілкуванні відбулося лише за багато тисячоліть потому. Той факт, що перша мовна система, вдосконалена й узгоджена цілим суспільством, датується 3500 роками тому, не доводить, що це і є час походження письма. Письмо, як вказує саме походження слова (в іспанській і англійській мовах), передбачає спробу спілкування в письмовій формі і не вимагає складної і зрілої мови з розвиненою граматикою, фонетикою чи семантикою. Якими б грубими, незграбними, сирими, рідкісними, скупими і незрозумілими не були ці ранні письмові прояви, вони є зразками писемності. Беручи до уваги цю відправну точку, яка не є новою, це дослідження пропонує нову класифікацію походження писемності до сьогоднішнього дня.

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Оскільки давніших писемних пам'яток не виявлено, перші спроби писемної комунікації датуються приблизно 40 тис. років тому. Відтоді виокремлюють, із лінгвістичного погляду, три періоди: протописемність, зародження писемності та зрілість. Ці періоди відповідають когнітивному розвиткові людини та її історичним досягненням у глобальному вимірі.

***Ключові слова:*** *походження писемності, класифікація етапів писемності, періоди писемності, глобалізація, психолінгвістика.*

# Introduction

From a linguistic point of view, based on archaeological evidence that supports the paleographic perspective of the idea, some experts place the origin of writing in the history of humanity as an event that occurred around 3,500 BC, specifically in Mesopotamia and Egypt (Kramer, 1956; Winter, 1985; Loprieno, 1995; Glassner, 2003; Campos, 2022; Masó, 2023). The origin of writing, however, arouses interests that are rooted in different disciplines. For example, the transition of human societies from purely oral communication to the use of graphic symbols to represent language is a central topic at the intersection of neurolinguistics, archaeology, and anthropology. According to paleoanthropological research, Homo sapiens emerged in Africa about 300,000 years ago. The ability to use complex language is thought to have been an important evolutionary milestone, although its exact origin is debated. According to Pinker (1994), universal grammar is "hard-wired" into the human brain, suggesting a neurological basis for our linguistic abilities. Broca's and Wernicke's areas of the brain, which are associated with language, show greater complexity in humans than in other primates, according to research by neuroscientists such as Damasio (1994). In this sense, language is an evolutionary adaptation rooted in the structure of our brains (Pinker, 1994). And it is this neurolinguistic adaptation that paved the way for the development of writing. As human communities became more complex –and especially larger– the need to record information arose, leading to primitive accounting systems, for example. Probably even earlier, primordial religious feelings, fears, and manifestations could be written down using symbolism or very basic systems more or less agreed upon by a very small group. In this way, there is the logical possibility, by common sense in the absence of evidence, that the power that some groups could exercise over others and their ability to phagocytize each other popularized these symbologies or basic systems, and that in the simplification of the linguistic economy, the quickest to perform and easiest to understand were kept by pure mnemonics and its consequent linguistic economy. Although writing is ubiquitous today, its invention was a gradual process that evolved from older systems of graphic representation. According to Gelb (1963), writing emerged as an evolution of earlier systems of representation that were primarily countable. These systems were primarily logographic, meaning that each character represented a whole word or idea. Gelb introduced the taxonomy of writing systems, which distinguishes between logograms, syllabograms, and alphabets. Sumerian cuneiform, one of the oldest systems, began primarily as a logographic system and later incorporated syllabic elements. However, before systems such as Sumerian cuneiform

and Egyptian hieroglyphs emerged as complete forms of writing, various forms of graphic symbolism were used.

Von Petzinger (2016) documents prehistoric symbols found in Paleolithic caves and argues that certain recurring signs may have had specific meanings some 40,000 years ago, something also advocated by Schmandt-Besserat (1995), although many linguists do not consider these and later finds to be writing. The relationship between these Paleolithic symbols and true writing has been widely debated, given the evidence that humans have been inclined to represent ideas through graphic symbols for millennia. However, from a strictly linguistic and purist perspective, there are several researchers who disagree, as pointed out in the volume edited by Peter T. Daniels and William Bright, *The World's Writing Systems* (1996), and others such as (Goody, 1987; Schmandt-Bessera, 1992; Houston, 2004; Woods, 2010). Daniels and Bright's volume argues that writing can be defined as a graphic system that allows the reader to retrieve exactly the writer's original message. However, they confuse writing with literacy. These statements imply that signs must represent sounds or words of language in a systematic way. By this definition, although ancient symbols may convey ideas or concepts, they are not "writing" in the linguistic sense until there is a systematic correspondence with spoken language. This development is evident in Maya writing, as Houston (2004) discusses in his research. Maya writing, although logographic at its core, also had syllabic signs and was capable of accurately representing spoken language. In this regard, DeFrancis (1989) argues against the idea of a hierarchy of writing systems. While some earlier conceptions viewed logographic systems as "primitive", DeFrancis argues that systems such as Chinese, which are based on logograms, are equally capable of representing language accurately and systematically, thus challenging the notion that there is an evolutionary "end point" in the development of writing.

While it is true that writing is the basis of written communication and that, in order to fulfill this function, it must be understood by others, it has not been taken into account that the fact that we are unable to decipher certain symbols today does not mean that they were readable at the time they were created. Some interpretations are made from the point of view of presentism, that is, they look with the eyes of the 21st century at the reality of thousands of years ago, specifically of the Paleolithic. Neither has it been considered that the fact that this understanding was only possible in small groups and cannot be considered today as a complex system, a language like the present one, does not detract one iota from its written entity. Thus, in certain current linguistic perspectives, the meaning of writing is confused with that of a complex linguistic system, eliminating the original meaning of the term and thus confusing related but not synonymous realities.

Perhaps it is because writing has developed so much in recent centuries and has become so much a part of human genetics, that the development of humanity cannot be understood without it. As early as the 18th century, Diderot spoke of the importance of writing in preserving human memory. In his concept of written memory, he argued that writing allowed societies to record their past and transmit knowledge to future

generations. An extension of man, according to McLuhan (1964); or the ability to domesticate the spoken word, according to Godoy (1977). It is no longer a simple practical communicative fact, but a form of cultural awareness that transcends the purely linguistic to penetrate the vast reality of the human being, from the scientific and psychological terrain to the more practical, such as the political, cultural, or economic.

# Method

In the present theoretical, comparative, and constructive study, an information search on the origins of writing was carried out in the main databases: *Clarivate* (JCR), *Elsevier* (Scopus), *ResearchGate*, *Google Scholar*, and *Dialnet*. Using key words such as "origin of writing" in both English and Spanish, the references returned by these search engines were thoroughly reviewed.

It is important to note that theories about the origins of writing are not recent; consequently, many of the references are not from the last five years, as is often recommended; this does not mean that the publications are out of date. A similar situation arises when citing the theories of Saussure or Chomsky, which are still relevant, or Gardner or Salovey and Meyer (from the nineties of the last century, but indispensable for the theories of intelligences and psycholinguistic sciences).

# Results and Discussion

In the present theoretical, comparative, and constructive study, an information search on the origins of writing was carried out in the main databases: *Clarivate* (JCR), *Elsevier* (Scopus), *ResearchGate*, *Google Scholar*, and *Dialnet*. Using key words such as "origin of writing" in both English and Spanish, the references returned by these search engines were thoroughly reviewed.

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## Other origins of writing: a brief pre-historical background to the Iberian Peninsula

According to the current consensus, so-called prewriting, consisting of symbols and isolated marks, has its first manifestations in the archaeological record since at least 40,000 BC, in sites as diverse as the Blombos Cave in Africa and other European sites such as the Chauvet Cave in France. In this sense, prewriting is linked to prehistory, which would end with the discovery of what is now known as writing. Thus, prewriting

and protowriting converge in time with prehistory and protohistory as they have been conceived in recent decades.

Table 1
*Major Discoveries about Writing, Arranged Chronologically*

| Period | Description | Reference |
|---|---|---|
| c. 40,000–10,000 BC | Cave representations found in Europe show symbolic communication. The "Vogelherd Man" shows bone carvings with possible specific meanings | Von Petzinger (2016) |
| c. 8000–4000 BC | Clay tablets in the Middle East, known as "tokens", which may represent an accounting system and a precursor to writing | Schmandt-Besserat (1992) |
| c. 6.600 BC | Clay labels at Jiahu, China, which may be evidence of emergent writing. | Li et al., (2003) |
| c. 5300 BC | Romanian Tărtăria tablets with scriptural looking | Makkay (1969) |
| c. 5300–4000 BC | Vinča markings on clay figurines from the Vinča culture of Eastern Europe | Gimbutas (1982) |
| c. 5000–4000 BC | Marks on ceramics of the Yangshao culture in China, possible early forms of symbolic communication | Liu & Chen (2012) |
| c. 3500–3200 BC | Sumerian inscriptions considered "proto-writing", more advanced than simple symbols but not as developed as a full-fledged written language | Englund (2004) |
| c. 3200 BC | Sumerian cuneiform script, engraved with styli on clay tablets | Charpin (2010) |
| c. 3200 BC | Hieroglyphs in Egypt, another early writing system | Allen (2014) |
| c. 2600–1900 BC | Indus Valley script, not yet fully deciphered, shows the diversity and richness of early written traditions. | Parpola (1994) |

*Source:* Own elaboration based on references

The study of the first manifestations of writing in the Iberian Peninsula is closely linked to the global evolution of graphic and symbolic communication. One of the most emblematic sites is the caves of Altamira, in Cantabria (Spain), where cave paintings dated to around 15,000 BC show impressive artistic representations of animals and abstract figures. Although these paintings are not "writing" per se, they reveal a

sophisticated level of abstraction and symbolic ability on the part of the prehistoric inhabitants (Pike et al., 2012).

Similarly, artistic representations from a similar period have been found in the Maltravieso cave in Cáceres (Spain), demonstrating the spread of these artistic and symbolic practices throughout the peninsula. However, as in Altamira, although they reveal a symbolic capacity, they are not considered a form of writing (Bahn, 1998).

With the advent of the Neolithic, around 5000 BC, societies became more sedentary and complex. This change in lifestyle was also reflected in their communication systems. In Almeria (Spain), the Los Millares culture was characterized by the production of objects engraved with geometric signs. Although the exact meaning of these signs is still debated, some researchers suggest that they may represent an early form of proto-writing (Harrison, 2004; Chapman, 1990). More recently, stelae have been found, such as the Montoro stela (García Sanjuán et al., 2017), which may date between the 6th and 5th centuries BC. This stela, together with those found in Almadén de la Plata and Mirasiviene (Seville), as well as the revised ones from Almargen (Málaga) and Setefilla (Seville), contain inscriptions that, although enigmatic and not completely deciphered, demonstrate the existence of advanced symbolic systems in present-day Andalusia.

The Iron Age in the peninsula brought with it clearer examples of proto-writing. Stelae found in several places, such as Almadén de la Plata and Setefilla (both in Seville), have inscriptions that, although not completely deciphered, indicate the development of more complex symbolic systems. These inscriptions, possibly related to culture and religion, give us an insight into the evolution of graphic communication in the peninsula (Ruiz & Molinos, 1993).

However, it was not until the arrival of the Phoenicians, a trading people from the eastern Mediterranean, around 800 BC that a more formalized writing system was introduced to the Iberian Peninsula. Although the Phoenicians had their own writing system, over time it was adapted and developed into local scripts such as the Iberian script (Aubet, 2001).

Finally, the historical journey culminates with the Roman conquest in the third century BC, which marked a milestone in the history of writing in the region. Latin, together with its alphabet, was established in a dominant way, laying the foundations for the later development of Romance languages in the peninsula (Keay, 1988), such as Castilian, Catalan or Galician. In this sense, some scholars argue that Andalusian – another unrecognized Romance language- derives directly from Latin and not from Castilian, and that in the area now known as Andalusia, Castilian was never spoken except by the Castilians who went there, so that Andalusian is not a variant of Castilian but a parallel language that has not yet established norms, so that it would be a variety of today's Spanish, but not of Castilian. Although historically there have been attempts to impose Castilian in this area, the imposition has never been effective (Gutier, 2000).

## What Writing Is: From Pre-Writing to Proto-Writing

There is no unanimous consensus in the scholarly community on the concepts of prewriting, protowriting, and writing, and it may vary from discipline to discipline. It can be summarized as follows:

- Pre-writing: It reflects the first manifestations of human graphic representations that have meaning but do not represent a structured language. Examples: Petroglyphs, cave paintings, and other signs carved in various media. Chronology: These manifestations have been found since the Upper Paleolithic, about 40,000 years ago (Clottes, Lewis-Williams, 1998).
- Proto-writing: It represents an intermediate stage between prewriting and writing. Although more structured than prewriting, protowriting does not fully capture a language. Symbols with specific meanings. Chronology: Appears during the Neolithic period, approximately between 8000 and 3000 B.C. (Overmann, 2023; MAN, 2023; Dematte, 2022; Schmandt-Besserat, 1992).
- Writing: It refers to structured graphic systems that can represent language in its entirety. For example, codified systems such as Sumerian cuneiform and Egyptian hieroglyphs. Chronology: They originated around 3200 BC (Robinson, 2007).

Although there are also authors, such as Gorrochategui (1984), who avoid strict definitions and emphasize the progressive, heterogeneous, and conventional nature of the historical development of ancient writing systems (Robinson, 2007).

In this sense, Denise Schmandt-Besserat (1978; 1992) argues that true writing requires a versatile system of abstract signs capable of expressing any idea in a complex way, as opposed to proto-writing composed of fixed pictographic symbols. In his view, the first writing appeared in Sumer around 3500–3000 BC. with the cuneiform script. Thus, Gilman (1991) emphasizes that the ability to record complete speech through linearity distinguishes true alphabetic writing, discarding earlier proto-writings and placing the origin only with the Greek and Phoenician alphabets in 800 BC.

Damerow (2006), for his part, distinguishes between writing systems that serve only to record data and writing itself, which can generate new knowledge through more advanced syntactic structures. According to him, writing also appears in Sumer, but at a later stage, around 3100–3000 BC, with more complex cuneiform texts. However, Woods (2010) avoids precise dates and proposes several categories such as semasiographic, logographic and glottographic scripts. He emphasizes the gradual nature of the development of the true glottographic script, which emerged long after several earlier stages. On the other hand, de Hoz (2011) introduces the concept of "partial writing" to refer to systems such as Luvite, with logographic and phonographic components, and considers them an intermediate stage before the Greek and Phoenician alphabets, which appeared around 1500 BC.

## Writing

In the obsession to atomize the concept of writing, to dissect it to delimit the reality it contains by means of its most sophisticated manifestation, the closest thing to what is

currently conceived as writing is sought. However, it forgets the origin of the word and its essential function, something that is crucial in order to define what it is and thus be able to determine which of the written expressions found so far are writing and which are not. It is not a question of defining writing from the current concept of evolved language, but of recognizing what writing is beyond cultural anchorages and transversal analyses.

The word writing comes from the Latin *scriptúră* (-ri) – act of writing – which in turn comes from s*cribĕre* –to write. According to the *Dictionary of the Spanish Language of the Royal Spanish Academy* (DRAE), to write, in its first meaning, means "to represent words or ideas with letters or other signs drawn on paper or other surfaces". It also means "to communicate something to someone in writing" or "to trace the notes and other signs of music". That is, it also includes ideas and signs that can be used without going into specifications of what kind: something; also writing music, but most importantly, it is the communicative intention. If we rely on English, "to write" comes from Old English *writan* "to mark, outline, draw the figure of", then "to put in writing" (Class I strong verb; past tense *wrat*, past participle *written)*, from Proto-Germanic *writan* "to tear, scratch" (Harper's Online Etymology Dictionary), probably from the act of scratching a tree to leave a mark of communication, or carving a symbol on a tool to indicate ownership.

Writing, in this sense, as a direct result of writing, does not seek a well-defined semantics or a perfect grammar or a specific phonetics. Writing was, as it is today, the practical result of the desire to communicate beyond orality, either with oneself in order to remember something, or with the rest of the group in order to survive in the environment. This includes the possibility of expressing one's individualism through emotions, even fears and desires in the face of spirituality. If the first homo (*homo habilis*, with the greatest encephalization to date) appeared on Earth between 2 and 3 million years ago (Leakey, 1979), and *Homo sapiens* – with the greatest brain development and the ability to articulate complex language-, considered the first human (Crespo, 2017), ("Jebel Irhoud" dated to the Paleolithic era, found in Morocco by Jean-Jacques Hublin's team, is the earliest Homo sapiens ever recorded), it becomes very difficult to understand that none of them would have gotten it into their heads to write down what they were talking about until 3,500 years ago. Occam's razor. Another question is that, from a linguistic point of view, we want to categorize the types of writing according to their complexity or development, as writing is currently conceived, but what we have to differentiate in reality in its origin is the simple drawing, as an artistic manifestation for pure pleasure, from the communicative intention, even if it was crudely ingenious and tremendously restrictive (for a small group, even very small), since globalization did not exist before. The fact of the intention to leave a written record of reality is already writing, and in this sense the symbols carved in the bones of the "Vogelherd Man" (Vogelherdhöhle, Germany) 40 thousand years ago are one of the first manifestations of written communication of which data are available. The fact that no other symbols with the same characteristics have been found, which would imply their consensual use, only means that they have not been found, not that they did not exist. In

fact, if the communicative intention existed (which has already been made clear in the same idiosyncrasy of Homo sapiens), there must logically have been more written texts with the same minimum consensus. But since its use was not widespread (let's remember that until the Mesolithic period – about 10 thousand years ago – humans gathered in very small groups and were nomadic), since each small group created its own (probably what worked best were idiolects, isolects and microlects), the possibilities of survival of those written microlects (the lexis of small nomadic groups), throughout the millennia, is practically nil. And the possibility of narrowing them down, comparing them and even translating them, until quantum computers and big data through AI work miracles, is even less likely.

As the origin of writing is conceived, it defines the human being in its origins, the *homo sapiens* (ABC, 2017), in a paradoxical way, to say the least. It argues that he is capable of communicating in a much more sophisticated way than the rest of the hominis with a defined spirituality and yet without knowing how to write. To understand that writing is not writing until it is sufficiently expanded, regulated, and agreed upon – almost exclusively in an official way– in a culture or geographical area, is to continue the beliefs of past centuries in which the end was defended, but not the way. Writing consists in writing intentionally, not in how that graphic/symbolic/conceptual inscription is done, nor in what degree of development/complexity/perfection it is. That is another question.

## Conclusion

Experts cannot be obsessed with finding the earliest example of modern humans and pretend that their cognitive development was so limited that the concept of writing would not have emerged as a simple parallel need in its own context. That evolutionary sophistication has shaped more consensual and widespread communication in the last 5,000 years does not detract from the specificity of written communication in its original DNA. It is the sine qua non of human evolution itself. That the development of writing, and therefore reading, as a means of advanced communication is one of the issues that best defines us as a species is undeniable (Jiménez Pérez, 2023). To break the link between homo sapiens and one of its main characteristics by means of antonomasia does not follow common sense. To argue that writing did not evolve in parallel with Homo sapiens is simply irrational. To think that writing is so only in its maturity is to think that childhood is worthless simply because of its lack of perfection. Obviously, from a linguistic point of view, the origin of writing is worthless because of its lack of complexity and its impossibility of analysis due to the immense scarcity of data. Probably never in the history of mankind has written communication been as individualized as in its genesis, which does not invalidate its unity, oscillating between idiolect and microlect. But just as a demographic study provides useful but superficial statistical information without too many whys and wherefores, a case analysis, on the other hand, provides in-depth data that can reveal other types of information of vital

importance (Piaget formulated his hypotheses of human development by observing his daughters, Howard Gardner his theory of MI by studying great figures such as Picasso). Thus, the study of these written manifestations may not reveal a new language, but it may, for example, shed light on the development of the ego from a linguistic perspective at that time.

In other words, one cannot speak of writing as a watertight compartment from a linguistic evolutionary perspective without taking into account the neuroevolution of human beings within their own evolutionary history. Just as one cannot educate human beings in the development of their communicative skills from a single linguistic perspective without considering their neurocognitive, emotional, and physical evolution. Disciplines that do not consider their environment and mediators, such as human historical knowledge, are biased. Paleography, as part of the linguistic knowledge of the origin of writing, must go hand in hand with anthropology and archaeology, among other sciences. Likewise, for a true knowledge of the didactics of writing and reading today, pedagogy, psychology, and medicine are very useful disciplines that complement each other.

From all the above, it is clear that the use of the term pre-writing refers to the beginning of the process of learning to write in a human being, not to a moment in history when the invention of writing as a system of signs is still incipient and immature. And proto-writing, in the aseptic sense of the term, is the first stage within writing (as its own name indicates –from the Greek "*πρωτο- prōto*", first), not an earlier stage.

Thus, at present, the origin of **writing** could be considered to be about 40,000 years ago, with these bones carved with the symbols of the herdsman, and most likely, as more evidence is found, this date in the history of writing can be pushed back further. That would be the beginning of the **proto-writing** period, which would extend until the next differentiating find collected, the Jiahu clay tags in China, dated approximately 6,600 years ago, and would place a period of **emerging writing** and would include the Tărtăria tablets in Romania, with script-like markings, chronologically placed around 5300 BC. The Vinča marking system on clay figurines of the Vinča culture in Eastern Europe, dated to around 5300–4000 BC. The markings on pottery of the Yangshao culture in China, dated around 5000–4000 BC. And finally, the **mature period**, which would begin with what is now considered writing, from the Sumerian cuneiform script around 3500 BC. and which, in turn, would include the initial period of expansion, in which those who prosper in their culture, generally characterized by political-economic issues, would be maintained and would develop before the discovery of America, the first globalization, and the last, with the total globalization due to the Internet, which completely consolidates the beginning of globalization after the Second World War and the creation of international organizations.

Writing:

1. Proto-writing (about 40 thousand years ago)
2. Emergent writing (about 6.6 thousand years BC)
3. Maturation (about 3.5 thousand years BC)

a. Initial Expansion (3,500 BC- 1492 AD)
b. Globalizations:
1. First: Historical Globalization (1492–1945)
2. Second: Political Globalization (1945–1989)
3. Third: Technological Globalization (1989-present)

The dates are taken with the historical references that mark the society from multiple perspectives, but especially to take into account the linguistic and cognitive.

The origin can fluctuate, since it will depend on the ability to continue discovering the history (or prehistory, according to the traditional consensus) of the first written manifestations, but the subsequent historical facts are fixed anchors for a reasoned contextualization of the terms. From the origin of these manifestations to the evidence of the first mature languages used by each specific society (or part of it, the literate one), in which each one develops and accepts its symbolism in an unequivocal and unambiguous way, is the period in which they emerge. They emerge as neurons in search of a synaptic pruning that immortalizes the most accepted ones and denies to oblivion those whose use does not extend to universalizing them in a geographical area or in a specific group, because use is life. Like a kind of linguistic Big Bang, in which each attempt at communication gains importance according to the inertia of its energy when used by homo sapiens. Already in this third phase of maturity, a more political and cultural expansion takes place. Thus, since the world becomes navigable with the discovery of America and the communication of the globe as the first globalization, which defines its specificity by its historical nuance, until after the Second World War, the world begins to unite with the emergence of the United Nations in 1945 and the speed of technology, so that the human being can move by land, sea, and air. Finally, the quantitative leap that has meant for the world not even having to move physically to communicate easily and cheaply with the birth of the www in 1989, the universalized inter-nautical communication, for all, as the third and last important globalization so far (with the permission of the COVID pandemic).

Each of today's languages, always understood as a means of communication rather than as a cultural manifestation, has had a linguistic evolution that has fluctuated according to its environment, but has developed with a certain stability and at a pace that has allowed linguistic evolution to take place in a natural way. However, in recent globalization, which began just before the 21st century with the consolidation of a single global communication through the Internet, where most of the countries of the world are interconnected in real time in one way or another, the communicative use of languages has changed. The communicative use of languages has already become so automated that it has become part of a social DNA that some want to defend at all costs, as if it were an endangered animal, while others use it as a cultural identification that transcends its communicative origin. In any case, the fact that it has moved to a higher level (even beyond the literary manifestations that have always accompanied it as a form of aesthetic communication) implies that the sophistication of writing, in parallel with human

cognitive development, is probably preparing for a new qualitative leap: will we abandon handwriting?

## Disclosure Statement

No potential conflict of interest was reported by the authors.

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# Humor as a Resource for Confronting Wartime Challenges

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**Abstract.** The aim of the study is to identify Ukrainian social media audiences' preferences for humor styles to maintain/enhance their psychological resilience in different periods of wartime. Discourse analysis developed in the framework of social constructionism was used for collecting and analyzing data. We argue that 1) the preferences in humor styles is directly influenced not only by contextual factors and the duration of the stressor, but by the audience's psycho-emotional state and its intentions; 2) aggressive humor style is especially in demand in the period of adaptation to the traumatic event, but the audience can use its various forms depending on their effectiveness for a particular purpose. Thus, black humor is productive for emotional venting of negative emotion of anger and reducing of emotional distress; disparagement humor is effective for formation of collective identity and increasing of optimism; 3) self-enhancing humor style can serve as a sign of positive shifts in the process of adaptation to a psychologically traumatic situation, and restoration of the population's psychological stability; 4) self-defeating humor style is actualized in wartime as a form of adaptive humor, since it promotes a sense of community (belonging to a group) and identification through the experience of a shared stressful situation; and also positively correlates with self-esteem as a result of an individual's demonstration of his/her ability to maintain self-control and to keep calm and carry on when faced with stressful situations.

***Keywords:*** *emotion, humor, wartime stress, traumatic experience.*

**Храбан Тетяна. Гумор як ресурс для протистояння проти викликів воєнного часу.**

**Анотація.** Мета дослідження – виявити вподобання української аудиторії соціальних мереж щодо стилів гумору для підтримки/підвищення психологічної стійкості в різні періоди воєнного часу. Для збору та аналізу даних було використано дискурс-аналіз, розроблений у рамках соціального конструкціонізму. Авторка стверджує, що 1) на вподобання щодо стилів гумору безпосередньо впливають не лише контекстуальні чинники та тривалість дії стресора, але й психоемоційний стан аудиторії та її інтенції; 2) агресивний стиль гумору особливо затребуваний у період адаптації до травматичної події, але аудиторія може використовувати різні його форми залежно від їхньої ефективності для досягнення конкретної мети. Наприклад, чорний гумор є продуктивним для емоційного виходу негативної емоції гніву та зменшення емоційного дистресу; зневажливий гумор ефективний для формування колективної ідентичності та підвищення оптимізму; 3) самоствердкуючий стиль гумору може слугувати ознакою позитивних зрушень у процесі адаптації до психотравмуючої ситуації, відновлення психологічної стійкості населення; 4) самокритичний стиль гумору актуалізується у воєнний час як форма адаптивного гумору, оскільки сприяє формуванню

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почуття спільності (приналежності до групи) та ідентифікації через переживання спільної стресової ситуації, а також позитивно корелює зі самооцінкою внаслідок демонстрації індивідом своєї здатності зберігати самоконтроль, зберігати спокій та витримку у стресових ситуаціях.

***Ключові слова:*** *емоції, гумор, війна, стрес, травматичний досвід.*

# Introduction

War is the most terrible ordeal and traumatic experience not only for soldiers but also for civilians. An important distinction of the war currently going on in Ukraine is the occupant country's utter disregard for the norms of international law regulating the conduct of armed hostilities, justification of prohibited methods of warfare (terror, destruction of civilian infrastructure). All this is taking place against the backdrop of the Russian Federation's dissemination of hostile propaganda and various manipulative information. Psychologic traumatic experience (horrors of war, constant real and perceived threats to life, dealing with survivor's guilt, uncertainty and lack of information, change of routines and habits, insomnia and disrupted sleep patterns) can lead to emotional exhaustion and emotional instability, that is, the ability to withstand difficult situations hardship or stress (Basım & Çetin, 2011; Yavuz & Dilmaç, 2020), and, as a consequence, to emotional overstrain and inability to cope with stress. And this is a pressing issue not only for servicemen, but also for civilians. Possession of adaptability skills is a prerequisite for coping with the challenges of war. There are many different skills that can be helpful for psychological resilience (Cann & Collette, 2014), however, with the development of positive psychology, humor has become a frequently studied subject category within the framework of this research field (Başak & Can, 2014). According to psychological studies in positive psychology, humor can be used as a coping tool (Alvord et al., 2011; Satıcı & Deniz, 2017), and preferences for humor style can serve as criteria to identify the personality psychological states (Kuiper, 2012; Pidgeon & Keye, 2014; Gremigni, 2012). Arguing that humor benefits in struggle with upsetting emotions, memories, anxiety, Martin and Ford (2018) metaphorically describe humor mechanisms as the operation of a hydraulic engine, in which laughter acts as a pressure valve in a steam pipe and releases the pressure accumulated in the organism. However, it should be noted that in the context of coping with war related stress, of particular interest is humor (Kaya & Yağan, 2022) considered as individuals' emotional reaction to stressful experiences through laughter, and tendency to ridicule those experiences with others and joke about them (Martin, 2007) as well as the ability to positively reappraise stressors and to use humor to cope with them through support or enhance psychological resilience (Cann & Collette, 2014; Kuiper, 2012).

## Literature Review

This study is based on the model of adaptive and maladaptive humor styles developed by Martin and colleagues (2003). The style of humor is considered as a certain model that correlates with a personality behavior strategy that is most effective to manage and reduce psycho-emotional strain and pressure arising as

reactions to stressful situations. This model is founded on the idea that there are two positive styles of humor, they are affirmative and self-enhancing, and two negative styles, they are aggressive and self-defeating. Affiliative humor is friendly, funny, accepting of self and others, designed to enhance one's relationships with others by telling funny anecdotes and engaging in witty banter (Martin et al., 2003; Fritz, 2022). Self-enhancing humor is positive humor based on self-reflection on humorous aspects of daily life (Fritz et al., 2017), and designed to enhance one's own mood or the effectiveness of coping with difficulties through creating a humorous perspective when faced with stress or hardship (Fritz, 2022). Aggressive humor is sarcastic humor designed to treat others harshly by disparaging, ridiculing, or excessively mocking (Martin et al., 2003; Fritz, 2022). Self-defeating humor involves excessive self-criticism or self-mockery in an attempt to gain approval from others (Fritz, 2020; Kfrerer, 2018; Rnic et al., 2016).

Humor is a multidimensional phenomenon, which includes a complex of cognitive, behavioral, psychological, social and emotional aspects (Betha, 2001), therefore, there are several mediators that link humor with indicators of the individual's psychological resilience. Cognitive reappraisal is the main mediator to minimize the emotional and physiological effects of stressors (Fritz et al., 2017; Mallya et al., 2019; Perchtold et al., 2019). Reassessment is conceptualized as a person's ability to embrace a stressful event as a positive challenge rather than a negative threat (Fritz et al., 2017). Fritz (Fritz, 2020) points out that humor-driven cognitive reassessment enhances psychological resilience in two ways. First, putting the situation in perspective (through comparing it to other worse events) helps to mitigate its negative emotional impact on the individual, even if he or she is unable to change anything. Second, rethinking a stressful event in order to find some meaning, higher purpose or benefit in it may result in a feeling of control over the event or its consequences (Cann & Collette, 2014; Dozois, Martin & Bieling, 2009; Kuiper, 2012). Affirmative and self- enhancing styles of humor are the most conceptually close to positive reappraisal, while self- defeating humor does not correlate with positive reappraisal (Fritz, 2020).

Another mediator between humor styles and psychological resilience is social support. Humor styles are correlated with different models of support (Fritz, 2020). Self-enhancing and affirmative humor correlate with positive communication and with productive social interaction, while self-deprecating humor correlates with negative communication, which is a risk factor that can break down social interaction (Martin, 2007; Rieger & McGrail, 2015). The correlation of aggressive humor with psychological resilience and social support is ambivalent; it may vary depending on the communicative situation. For example, in the situation of creating a "friend-or-foe" opposition, aggressive humor can enhance social support within the group, but can also contribute to greater interpersonal difficulties and a breakdown of relations with outsiders.

Latest research on humor demonstrate that humor is often correlated with individual's different psychological and physical characteristics, which can provide resources in confronting difficulties (Cann & Collette, 2014). Research on humor as a resource of psychological resilience of the individual is focused on a comprehensive

study of 1) direct and stress-buffering effects of dispositional humor and different humor styles on health-related indicators; 2) relationships between humor constructs and cognitive reappraisal; 3) extent to which social interaction and reappraisal statistically mediate the correlation between humor and health (Fritz et al., 2017). Of interest for this study are works (Jiang et al., 2020; Schneider et al., 2018; Caird & Martin, 2014; Heintz, 2019; Heintz & Ruch, 2015; Ford et al., 2017; Kfrerer, 2018) that explain the correlation between humor styles and psychological well-being, one component of which is psychological resilience. Researchers have found that affirmational and self-enhancing humor are generally positively correlate with improvement in psychological well-being, while self-defeating humor correlates with psychological distress, and aggressive humor demonstrates a weak and inconsistent relationship with psychological well-being (Fritz, 2022). These findings have been reinforced, refined and further enriched in Fritz's later works (Fritz, 2020; 2022), in which a consistent pattern is identified: "Positive humor use predicted reduced psychological distress in response to stressful events, more positive social interactions, greater reappraisal of stressful events, and stress-buffering effects such that under high stress conditions, high humor use protected participants from elevated distress" (Fritz, 2020). The scholar also offered an explanation for the case in which aggressive humor is not associated with distress: since aggressive humor simu-ltaneously brings about both negative (through its relationship with poor social interactions) and positive results (through its stress-buffering, "better than nothing" effects under high stress levels), its net effect on distress may be limited (Fritz, 2020). The works also shed light on the relationship between self-defeating humor and social interaction: self-defeating humor may be very likely to provoke negative reactions from others, as people experiencing the same stressful event may perceive the humor as an action that negates their own efforts to manage the stress (Fritz, 2020). Thus, self-defeating humor, while not directly contributing to psychological distress, drives it through a deterioration of the relationship between the author of the humor and the audience.

The present study intents to expand the previous works on the effects of humor styles on psychological well-being. In this paper, we focus on studying how contextual factors and the duration of the stressor can shape the preference for humor styles. The aim of the study is to identify Ukrainian social media audiences' preferences for humor styles to maintain/enhance their psychological resilience in different periods of wartime.

# Method

## Material and Procedure

Basing on the premise that the relationship between humor styles and psychological resilience is extremely stable and consistent in various studies (Gremigni, 2012), we have made an assumption, that during different periods of a stressful situation, especially if that stressful situation is characterized by its duration,

people favor different humor styles to maintain/increase their psychological resilience, depending on contextual factors (environment, time, place, facts of reality). Study of the differences in humor style preferences on a diverse sample of participants (taking into account ethnicity, education/literacy; gender identity, age) and over a long period of time involves a longitudinal research design. The longitudinal strategy increases the likelihood that the cause-and-effect relationship between humor styles and contextual factors will be pronounced.

In the study, we applied discourse psychology, that is discourse analysis developed in the framework of social constructionism, the research direction of which is "comprehensive practical reasoning" (Edwards, 2005). Discourse psychology enables to focus on complex psychological issues such as cognition, emotions, attitudes, values, prejudices, memory, motives (Potter & Wiggins, 2007). Discursive psychology is the most empirically-oriented approach that considers the subject of research in the social context, and relies not on the direct study of the individual, but on indirect evidence of certain attitudes and beliefs that are manifested in oral and written language (Hepburn & Wiggins, 2007), that is, it is interested not in linguistic features, but in rhetorical practices of using language in social interactions. The main task of discursive psychology is to analyze how effectively people, who are both products and creators of discourses, use these discourses in discussing their views of the world, and what are the social consequences of such use for creating and changing the socio-cultural context (Hepburn & Potter, 2003). One of the priorities of discursive psychology is that the research conducted in its mainstream is based on materials produced in natural, unconstrained conditions. In this context, social networks are the most suitable environment for conducting research. In this context, social networks are the most ideal environment to conduct research. According to Dixon (1980), a proponent of the "pure" approach, only spontaneous texts have to be collected, so the study was conducted on the social network. To conduct this study, we have chosen the social network Facebook. This is explained by several reasons. Firstly, the social network Facebook is very popular in Ukraine, its audience is people with a wide variety of interests, which enables the study to cover different social strata of the population. Second, the profiles of Facebook users are much more informative than on other social networks. They contain a profile image, personal information, photos and albums, as well as a timeline of messages and updates. This makes it possible to assert that the study complied with the requirements of representativeness of the studied audience in terms of Ukrainian nationality. Humor patterns were picked in the groups with Ukrainian context "Jokes in Ukrainian" (1.2 million participants; URL: https://www.facebook.com/groups/782821332556472), "Ukrainian humor" (118.1 thousand participants; URL: https://www.facebook.com/groups/887796599077621), "Inspirations, quotes, thoughts in Ukrainian" (128.6 thousand participants; URL: https://www.facebook.com/groups/655994877875713), "Entice me in Ukrainian (humor, quotes, stories)" (203.0 thousand participants; URL: https://www.facebook.com/groups/spokusaukr); "On the positive" (913.2 thousand participants; URL: https://www.facebook.com/groups/376314733250163) in the period from the beginning of April to the end of December 2022. These are open

groups – anyone can find these groups, and anyone can view group members and their posts. During this period, 1,536 original posts, the conceptual content of which was humor were shared in these groups. The recurring posts were not considered. However, Heintz and Ruch (2015) argue that when contextual features that influence humor production (social and political environment, intentions, mood, etc.) are ignored, the relationship of humor styles to psychological well-being/sustainability is negated. Therefore, we selected 302 posts, in which there are references to facts directly related to the war in Ukraine, that is, there is a situational context/presupposition. Addressing the situational context helps to more accurately interpret the meaning of humorous utterances. Since the presentation of the results of this study is sensible on a quantitative parameter, we also used a statistical method of research.

The author of this paper translated the examples of humor that are given in the article.

# Results

The results of the study were summarized in a table outlining the characteristics of humor during a particular time period.

Table 1
*Characteristics of humor presented in the Ukrainian sector of the social network Facebook during the Russian-Ukrainian war (March – December 2022)*

| The time interval | Characteristics of humor | | | |
|---|---|---|---|---|
| | purpose | prevailing style | content | linguistic features |
| March 2022 | to reduce tensions between the Russians and the Ukrainians, resolve disagreements, and strengthen friendships | affiliative (non-confrontational) | the absurdity of the reason for the outbreak of war and the rupture of friendly relations between the countries | avoidance of negative evaluations and accusation |
| April-May 2022 | to build a collective identity | aggressive | the difficulties of the Russians in pronouncing certain phonemes typical for the Ukrainian language | demonstration of hostility through sarcasm |

| | | | | |
|---|---|---|---|---|
| June-September 2022 | 1) to reduce emotional stress and improve psychological well-being;<br>2) to belittle the enemy and express confrontation and disdain | 1) aggressive;<br>2) disparagement | 1) conceptualization of death;<br>2) the expression a low opinion of the enemy, the demonstration of its insignificance | 1) the use of iconic "likenesses" of death, playing with its artificial models;<br>2) the use of verbal insults |
| September - December 2022 | 1) to build resiliency and relieve psychological distress;<br>2) to increase self-esteem | 1) self-enhancing;<br>2) self-defeating | 1) positive reframing of negative events;<br>2) demonstration an ability to keep calm and carry on when faced with stressful situations | optimistic orientation |

The first month of Russia's armed aggression against Ukraine (March 2022) was characterized by low activity regarding the humor production in the Ukrainian sector of social networks. This fact can be explained from the perspective of the Ukrainian population's psychological state of confusion and panic, as well as the process of migration to safer parts of the country or to other countries where access to the Internet was impossible or complicated. However, the infrequent humor patterns posted on the social network indicated that affiliative humor (87%) associated with a non-confrontational type of conflict management strategies was prevalent during the first month of the war. Ukrainians turned to such humor forms as banter and good-humored teasing to reduce tensions, resolve disagreements, and strengthen friendships. The humor content was the absurdity of the reason for the outbreak of war and the rupture of friendly relations between the countries:

> We are Ukrainian war pigeons. And we start dirty bombing;
> Photo fact! The very same sparrows from the Ukrainian biolaboratories that smoke in the warehouses in Crimea!;
> If Gerasim had not drowned Mumu, in six hours she would have attacked the baroness from four positions (I will show the map now) (FB);
> "You're fascist and member of Stepan Bandera movement!" – "I know! The whole our synagogue is like that." (Inspirations, quotes, thoughts in Ukrainian. Facebook. 19.03.2022. URL: https://www.facebook.com/groups/655994877875713).

The linguistic characteristic of the humor produced in March is the avoidance of negative evaluations and accusation. This indicates that Ukrainians hoped for a speedy peaceful resolution of conflict between Russia and Ukraine, and further cooperation, so their dominant concern was "avoiding escalation of emotions and saving face" (Smith et al., 2000). These humor patterns were positively related to smoothing and compromise, when in order to convey their point of view to the interlocutor, the author of a humorous statement (joke) did it in a manner that did not hurt the feelings of other interlocutors and did not make them feel offended or defensive. The ambiguity of this humor enabled people to "save face" and increased the likelihood that they were willing to "give and take", in other words, to compromise (Smith et al., 2000).

By the end of March 2022, affiliative humor was no longer relevant. In our opinion, the reason for this was that users of the Ukrainian sector of the social network had come to believe that, in general, humor had little impact on the beliefs and attitudes of the opponent (Walter et al., 2018). Furthermore, the production of humor was strongly influenced by the revelation of the facts of Russian war crimes against civilians in Bucha and Irpen, resulting in a great emotional response among Ukrainians.

April-May 2022 was characterized by the prevalence of an aggressive humor style (81%) with such characteristics as hostility and sarcasm. This finding is consistent with those of Fritz (Fritz, 2017; 2020), who argues that due to stress buffering effects, aggressive humor under conditions of high stress can paradoxically provide some protection against distress, and "high aggressive humor users experienced less psychological distress than did low aggressive humor users" (Fritz, 2020). Ukrainians turned to aggressive humor as a last resort to defend their beliefs on social media. Moreover, the aggressive humor style between April and May 2022 was actively involved in the process of collective identity formation, which "included both creating a sense of solidarity or "who we are" and, as a necessary corollary, a sense of otherness or "who we are not" (Fominaya, 2007):

> Rashists are furious: it turns out that looted in Ukraine automatic washing machines work only if there is a running water in the apartment! (FB);
> As a child, I always wanted to know what happened next in the Russian fairy tale after Ivan the Fool became king. I have found out... (FB).

As can be seen from these examples, collective identity formation was based on cognitive constructs.

In the period April-May 2022 an important role "in generating a sense of common identification and solidarity, defining and critiquing the ''opposition'', integrating new and marginal group members, releasing tension and negotiating conflict, and expressing an alternative opposing political identity" (Fominaya, 2007) was played by derision of linguistic differences and, in particular, the difficulties of the Russians in pronouncing certain phonemes typical for the Ukrainian language:

"Are you an invader?" – "No." – "Tell me `ukrzaliznytsia vezla palianytsi`." – "Yes, I am invader." The password for tomorrow: "lysytsia zila palianytsiu." Response: "tse – nisenitnytsia." (FB).

Between June and August 2022, an aggressive humor style was still relevant in the Ukrainian social media sector (77%). Aggressive humor style continued to be involved in the process of collective identity formation based on the conceptualization "who we are"/"who we are not":

Zaluzhny threw a grenade and killed 50,000 Muscovites. And then the grenade exploded;
A rocket landed on a distillery in Kursk. It seems that our army is also attacking decision-making centers in Russia;
It's me, mailman Putin, who brought cargo 200 – your boy. But I will not give him to you, because there are no casualties in the Russian army;
"Hello, Mom, I'm a prisoner of war in Ukraine..." – "Who is this?" – "Mom, it's me, your son." – "Excuse me, sir, but they said on TV that I have a daughter. Don't call again." (FB).

In addition, the aggressive humor style not only was engaged in the collective identity formation, but also contributed to the process of improving of the Ukrainians' psychological well-being. This was accomplished in several ways. First, users of social networks in order to protect their psyche from the devastating effects of a traumatic situation, restore the functional state of the body and reduce emotional stress turned to such a form of aggressive humor as black humor (29%), which actualized the theme of death and issues related to it. A tendency to use black humor was related to emotional states such as confusion in the face of danger; anxiety caused by uncertainty; helplessness, that is, in which the basic emotion was fear (Khraban & Khraban, 2019; Khraban & Stepanenko, 2020). Black humor provided a perfect balance of both the cognitive and emotional demands of the wartime situation for the conceptualization of death. At the cognitive level, the use of iconic "likenesses" of death, playing with its artificial models (images of death situations or their verbal descriptions) enabled a person to handle the fear of death (Willinger et al., 2017). On an emotional level, simulation of situation models, in which it was the very enemy who came into contact with death, contributed to the emotional ventilation of the negative emotion of anger, and, thus, to the elimination or reducing of emotional distress:

The funeral services company states that it has no desire to leave the Russian market: "We will be with you to the end!";
"Thanks to Putin's incredibly successful foreign policy, we are going to always have full refrigerators!" – the director of the Rostov morgue stated
In Russia, supermarket cashiers were prohibited to ask 18 to 65-year-olds men: "Do you need a bag?";
You know, my friends, what is the only thing from my Soviet childhood that I genuinely miss? And I would like to see it again? A GORGEOUS, LUXURY KREMLIN FUNERAL (FB).

Second, social media users widely practiced disparagement humor (21%) as another form of aggressive humor style that could uniquely belittle a given target (e.g., individuals, social groups, political ideologies, material possessions) and simultaneously express confrontation and disdain (Ferguson & Ford, 2008). Gruner notes: "When we find humor in something, we laugh at the misfortune, stupidity, clumsiness, moral or cultural defect, suddenly revealed in someone else, to whom we instantly and momentarily feel "superior" since we are not, at that moment, unfortunate, stupid, clumsy, morally or culturally defective and so on. To feel superior in this way is "to feel good"; it is to "get what you want." It is to win!" (Gruner, 1997). Disparagement humor enabled to maintain a positive attitude and contributed to the development of optimism, that was, it formed "the generalized, relatively stable tendency to expect good outcomes across important life domains" (Scheier & Carver, 2018). In the period June-August 2022 this worked through the expression a low opinion of the enemy, the demonstration of his insignificance:

> "The Russian army is not powerful. It is long." – this phrase is going to be included in the textbooks of military history;
> The greatest army in the world could have turned America into nuclear ash, but did not have time because it was whipping in a hamlet in the Sumy Oblast;
> "Valeriy, what do you think our Armed Forces need to defeat the Russian army?" – "Well... First, to catch up with them." (FB),

as well as through the downward reassessment of threat objects:

> The first unmanned aerial vehicle I had ever seen was a slipper that my grandfather Mykola launched at me after I had smoked his packet of cigarettes (FB).

Beginning from September 2022 the proportion of the aggressive humor style in the Ukrainian sector of the social network began to decline, and the period September-December 2022 was generally characterized by the predominance of the self-enhancing style of humor (64%). The main stressful context that prompted the production of the self-enhancing style of humor was the consequences of the systematical shelling of the Ukrainian energy infrastructure, when millions of Ukrainians were left without light, heating and water:

> Now it is very easy to choose a birthday present: a power bank, a flashlight or a lamp. For the anniversary it is a generator;
> I propose to exchange the generator for an apartment;
> "Sweetheart, you've lost so much weight, you've become so shapely, have you gone on a diet?" – "Oh, no, my husband has bought a generator with pedals." (FB).

An effective mechanism for people to change their perspective on a stressful situation, to view it as a positive challenge rather than a negative threat (Cann & Collette, 2014; Dozois et al., 2009; Rnic, Dozois, & Martin, 2016; Kuiper & McHale, 2009) was positive reframing of negative events:

> None of the time management courses will teach you how to plan your time like the National Energy Company does;
> New challenging quest is “manage to shop in the supermarket between air raid and electric power outage.” (FB).

During this period the functions of the self-enhancing humor style were reduction in the perception of the severity of the harmful situation, building resiliency and relieving psychological distress.

Regarding the production of humor, the distinctive feature of the period September-December 2022 was the occurrence of self-defeating humor, which had not been in demand during previous periods:

> The light was cut off, it became dark in the house. I opened the closet in the dark, bumped my forehead against the corner of the door. I felt something warm on my forehead, I believed it was blood. I decided to disinfect it with rubbing alcohol. I got to the medicine cabinet, groped for a bottle of antiseptic, opened it, poured a full palm, rubbed it on my forehead, smelled the palm with the remnants of rubbing alcohol, tasted it on my tongue – it was disgusting. The other hand was also in rubbing alcohol – I scratched my ear with it and wiped my hand on my underwear. The light came on... What devil came up with the idea of antiseptic Brilliant Green? (FB).

The function of self-defeating humor in this example is to strengthen a sense of community (belonging to a group) and identification through the demonstration of experiencing a common stressful situation, as well as to increase self-esteem by demonstrating an ability to keep calm and carry on when faced with stressful situations.

The main distinguishing feature of the humor of September-December 2022 period was its optimistic orientation, that was the faith in the Ukrainian people and the imminent victory of Ukraine:

> So many things have happened this year that I will not be surprised if I get married;
> “You say we have to end the war by spring?” – “Yes, because then we are going to plant the seedlings.”
> Maybe the purpose of the blackout is to prevent the General Staff’s plans for a counteroffensive from being leaked in a Telegram? When the lights come back on, we’ll see that Crimea is already ours. And everyone is like, Wow!)));
> Horoscope for 2023! We will withstand! And we will win! Peace will come! This is true for all Zodiac signs! (FB).

Thus, a radical change in the preferences of Ukrainians in humor styles so far indicates that the stressful situation has begun to be seen as controlled and manageable, that is, there have been positive changes in the process of adaptation to the psychotraumatic situation and experiences; complete or partial restoring of the psychological stability of the population.

## Limitations of the Study

Since the study was conducted on Facebook, it can be argued that the focus was mainly on the age group 35+, which is dominant on this social media. Therefore, the main limitation of the study is related to the validity of the study results applicability to other age segments of society.

## Conclusions

Analysis of the preferences in humor styles typical for the Ukrainian audience of social network in different periods of wartime stressful situation has enabled us to come to the following conclusions:

– the preferences in humor styles is directly influenced not only by contextual factors and the duration of the stressor, but by the audience's psycho-emotional state and its intentions. This validates the fact that while the situation in the country is basically the same during the period March-September 2022, the preference in humor styles varies greatly;

– aggressive humor style is especially in demand in the period of adaptation to the traumatic event, but the audience can use its various forms depending on their effectiveness for a particular purpose. Thus, black humor proved to be productive for emotional venting of negative emotion of anger and reducing of emotional distress; disparagement humor proved to be effective for formation of collective identity and increasing of optimism;

– self-enhancing humor style can serve as a sign of positive shifts in the process of adaptation to a psychologically traumatic situation, and restoration of the population's psychological stability;

– self-defeating humor style is actualized in wartime as a form of adaptive humor, since it promotes a sense of community (belonging to a group) and identification through the experience of a shared stressful situation; and also positively correlates with self-esteem as a result of an individual's demonstration of his/her ability to maintain self-control in whatever situation.

The understanding of the preferences in humor styles presented in this paper can provide a framework for expanding our knowledge of the subjective dimensions of the war related stress experience and the psychological resources for resilience to psychological stress. This can increase the potential for psychosocial support and rehabilitation for war-affected populations.

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# Autism, Hypersensitivity and Language Ability

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**Abstract.** A study with 36 German participants (divided in 3 age groups: 1 gr. 7–11 years; 2 gr. 12–18 years and 3 gr. 19–50 years) was conducted to test the polyvagal theory. Our data analysis evaluated a therapeutic intervention using the so-called SSP (Safe and Sound Protocol) developed by Stephen Porges. Frequency modulated music stimulates the parasympathetic vagus nerve with an (musical) input process evaluated by the brain as social-communicatively salient (musical signals with enhanced prosodic characteristics of human voices). Thus, acoustical processes of (musical) perception become available to the brain's assessment of social signals via the neurophysiology of the ANS. This, in turn, allows for internally processed signals of social safety, resulting in a reduced sense of stress from external sensory inputs. The SSP aims to generally reduce sensoric hypersensitivity by stimulating the vagus nerve via the middle ear – and thus, to contribute to a better capacity of (down)-regulating sensoric hypersensitivity. In the current study, we demonstrated that participants with ASD showed reduced hyper-sensitivity (visual, auditory, tactile and digestive) after using the SSP. In a second data analysis, we tested the overall impact of language ability, age, self-care ability and its influence on hypersensory sensitivity in the autism spectrum. It seems that language ability in general already leads to better regulation and integration of sensory inputs via cognitive-linguistical processing in cortex areas: If a strong sensory stimulus can be assigned and evaluated linguistically, the strength of the stimulus is adjusted thereby. Conversely, different language abilities did not result in a more effective response to the SSP. Since the SSP amplifies prosodic elements of human speech in a characteristic way, the effect of reduced sensitivity to stimuli seems to be due to the autonomic response to paraverbal signals. The results are statistically analyzed using ANOVA.

***Keywords:*** *polyvagal theory, autism, hypersensitivity, language development.*

**Кючуков Хрісто, Акерманн Міхель. Аутизм, гіперчутливість і мовна здатність.**

**Анотація.** Дослідження за участі 36 німецьких учасників (розділених на 3 вікові групи: 1 гр. 7–11 років; 2 гр. 12–18 років і 3 гр. 19–50 років) було проведено з метою перевірки полівагальної теорії. Наш аналіз даних оцінював терапевтичне втручання з використанням так званого SSP (Safe and Sound Protocol), розробленого Стівеном Поргесом. Частотно-модульована музика стимулює парасимпатичний блукаючий нерв за допомогою (музичного) вхідного процесу, який мозок оцінює як соціально-комунікативно значущий (музичні сигнали з посиленими просодичними характеристиками людських голосів). Отже, акустичні процеси (музичного) сприйняття стають доступними для оцінки мозком соціальних сигналів через нейрофізіологію АНС. Це, в свою чергу, дає змогу внутрішньо обробляти сигнали соціальної безпеки, що приводить до зменшення відчуття стресу від зовнішніх сенсорних вхідних сигналів.

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SSP спрямований на загальне зниження сенсорної гіперчутливості шляхом стимуляції блукаючого нерва через середнє вухо, відтак сприяє кращій тенденції до зниження сенсорної гіперчутливості. У поточному дослідженні ми продемонстрували, що учасники з РАС показали зниження гіперчутливості (зорової, слухової, тактильної й травної) після використання SSP. У другому аналізі даних ми перевірили загальний вплив мовних здібностей та вплив на гіперчутливість у спектрі аутизму. Схоже, що мовна здатність загалом уже спричинює кращу регуляцію та інтеграцію сенсорних входів шляхом когнітивно-лінгвістичної обробки в ділянках кори: за умови, якщо потужний сенсорний стимул може бути сприйнято й перероблено лінгвістично, це й коригує силу цього стимулу. І навпаки, різні мовні здатності не приводять до ефективнішої реакції на SSP. Оскільки SSP характерним чином підсилює просодичні елементи людського мовлення, ефект зниження чутливості до стимулів, можливо, пов'язаний з вегетативною реакцією на паравербальні сигнали. Результати статистично оброблено за допомогою ANOVA.

***Ключові слова:*** *полівагальна теорія, аутизм, гіперчутливість, мовний розвиток.*

# Introduction

## The Polyvagal Theory

Stephen Porges has pointed to the context of research from the 1960s to the 1980s in the field of biopsychology, an area then predominantly dealt with by "psychophysiology". In a study (Porges, 1995) explained that the vagus, the 10th cranial nerve, contains pathways that contribute to the regulation of the internal viscera, including the heart. Vagal efferent fibers do not originate in a common brainstem structure. The Polyvagal Theory is introduced to explain the different functions of the two primary medullary source nuclei of the vagus: the nucleus ambiguous (NA) and the dorsal motor nucleus (DMNX). Although vagal pathways from both nuclei terminate on the sinoatrial node, the author argues that the fibers originating in NA are uniquely responsible for respiratory sinus arrhythmia (RSA). Divergent shifts in RSA and heart rate are explained by independent actions of DMNX and NA. The theory emphasizes a phylogenetic perspective and speculates that mammalian, but not reptilian, brainstem organization is characterized by a ventral vagal complex (including NA) related to processes associated with attention, motion, emotion, and communication.

Porges (2011) states that polyvagal theory reflected a paradigm that viewed "behavior" as a predominantly top-down controlled process. The physical ("bottom-up") influences within corresponding feedback loops were regarded as minor important, as rather instinctive reactions, e.g. within the well-known "fight-flight" system (Cannon, 1915). However, Porges is strongly interested in the influences of physiology on the psychology of behavior. In this context, he investigated feedback loops of the neuronal regulation of the heart in connection with the two source nuclei of the vagus nerve in the brain stem. Here, the initial focus was on the alteration of *Attention* with reference to heartrate-variability (HRV), later including respiratory rate (Porges, 2009).

Furthermore polyvagal theory is characterized by John H. Jackson's principle of "dissolution" (Konicarova and Bob, 2013). This principle describes the observation that higher developed structures of the brain (and its evolution) inhibit lower levels without these lower levels losing their function and meaning: thus, humans (see "fight-flight

principle") behave in situations of real or perceived real danger in reflexive behavioral mechanisms, the inhibition of which by higher brain parts is then no longer or hardly possible: They "fall back" one step on the evolutionary ladder of the brain, just fighting for their survival. Conversely, the evolution of autonomic control in our human neurophysiology has evolved the complex neuronal integration of the parasympathetic vagus nerves into efferent-motor and afferent-somatic feedback pathways, so that we can assess social situations not only according to an "on-off" principle (safe or dangerous): as mammals we can also fight playfully and use experiences thereby in a variety of social ways. Our autonomic nervous system, and primarily the para-sympathetically acting Vagus Nerves, supports us in practicing social situations (including interactive plays) without too much physiological stress. This is supported by the "vagus brake", so named by Porges, which allows for a flexible variation between heartbeat and respiration (Porges, 2008). In this context, more variability provides more stress resilience. However, this complex capacity (of the Vagus) also helps us to socially coregulate by supporting facial expressions, speech melody, and other aspects of our body language based on the "Social Engagement System" (SES) (Porges, 2022).

## The Polyvagal-Theory and Autism

The Social Engagement System is of importance in understanding autism, since in ASD it is assumed that the autonomic controlling of physiology in interaction with socio-cognitive processes of the frontal cortex cannot support social adaptation (Chua, 2023). In this context, the somatosensory cortex in the parietal lobe of the brain, which has recently been recognized as significant in autism research (Fanghella et al., 2022; Isacoglou et al., 2023) probably also plays an important role, a brain area which is also crucial for language perception processing (Kemmerer, 2023) but, as we assume, also an area of the brain whose insufficient integration with subcortical brain areas prevents the ability to effectively self-regulate stress. The latter is probably the case because altered "mappings" in the so-called "homunculus" (i.e. the mapping of body surfaces) impair the cognitive processing of sensory input via sensory organs and body surfaces in autistic individuals. Furthermore we assume that the processing of visual and auditory inputs also has an effect on self-awareness (proprioception) which is processed in the somatosensory cortex however, there is still little research in this field. (Alonso, 2023). The effect of language development on sensory hyper-responsiveness in individuals with ASD discussed in this article relates (as a consequence of all said above) to a triangle of the (1) neurophysiology of the autonomic nervous system (ANS), (2) the processing in the primary and secondary sensorimotor cortex, and (3) language-processing areas in the cortex that have connections to the limbic system (amygdala) and its connections to the ANS.

## Hypersensitivity, Stress, and Language Processing in ASD

In the autism-spectrum, hypersensitivity to sensory input from the environment triggers stress – mostly related to light and sounds, but – as a possible consequence –

also to social signals that cannot be read and assigned with sufficient safety. Stress impairs probably the variable adaptation of ("bottom-up") feedback loops of the ANS in interaction with the ongoing sensory processing, but also in interaction with the language-processing centers in the brain. This is because the language processing areas in the brain are connected to the amygdala in the limbic system, as well as with the processing areas of the sensorimotor cortex (Kemmerer, 2023). Thus, sensory and emotional stress (as registered via the amygdala) also has an effect on language processing in the brain. In this perspective, language processing seems to cause too high "costs" of internal processing for people in the autism spectrum, which may cause a refusal of speech as a medium of social communication. However, it is also possible that language processing is too heavily overlaid by other processing of hyper-sensory-processed input. Sensory signal-processing stress may even lead to an idiosyncratic manner of speech processing: Here, speech becomes a kind of psychomotor-induced release mechanism for compulsive and/or hyper-cognitively controlled speech: the ANS then upregulates the sympathetic nervous system in order to supply the motor systems of speech (Porges et al., 2013). Conversely, this doesn't mean that sympathetic up-regulation can none the more lead to a mitigation of sensorics hypersensitivity: Sympathetic influence does not automatically imply stress in sensorics sensitivity but, on the contrary, a shift in (stress-producing) interoception from sensory to somatic-motoric (heartbeat, respiration, speech musculature) signals. Considered in this way, language can be seen as a hyper-cognitive tool to down-regulate sensory stress. Here we find a hint as to why people with mild autism ("Asperger's autism") can be dominant and sometimes unnervingly long-winded talkers (not just these people, of course!). However, it is important to note, that in this process (described above) a variable down-regulation via para-sympathetic feedback loops may be inhibited, because speech in ASD in these cases is predominantly processed on semantic levels and not understood as a social calming process. This is where Porges' SSP (Safe and Sound Protocol) comes in as a down-regulatory sensory input.

Another study (Porges et al., 2013) evaluated processes underlying two common symptoms (i.e., state regulation problems and deficits in auditory processing) associated with a diagnosis of autism spectrum disorders. Although these symptoms have been treated in the literature as unrelated, when informed by the Polyvagal Theory, these symptoms may be viewed as the predictable consequences of suppressed neural regulation of an integrated social engagement system, in which there is not only down regulation of neural influences to the heart (i.e., via the vagus) and to the middle ear muscles (i.e., via the facial and trigeminal cranial nerves). Respiratory sinus arrhythmia (RSA) and heart period were monitored to evaluate state regulation during a baseline and two auditory processing tasks (i.e., the SCAN tests for Filtered Words and Competing Words), which were used to evaluate auditory processing performance. Children with a diagnosis of autism spectrum disorders (ASD) were contrasted with aged matched typically developing children. The study (Porges et al., 2013) identified three features that distinguished the ASD group from a group of typically developing children: 1) baseline RSA, 2) direction of RSA reactivity, and 3) auditory processing performance. In the ASD group, the pattern of change in RSA during the attention

demanding SCAN tests moderated the relation between performance on the Competing Words test and IQ. In addition, in a subset of ASD participants, auditory processing performance improved, and RSA increased following an intervention designed to improve auditory processing.

### Function of the SSP

Sensory hypersensitivity is to be mitigated via a calming (acoustic) stimulation of parasympathetically operating Cranial Nerves. The SSP takes advantage of the fact that the innervation of the middle ear not only supplies the auditory cortex with acoustic signals (cochlear nerve and vestibular nerve), but also has an evolutionarily ancient parasympathetic connection to the gillarch via the Facial Nerve (N. F. and its branches). Our middle ear is therefore connected via the N. F. with chewing, swallowing and sucking organs and, of course, also with the vocal organs. Involved in the innervation of the middle ear are also the Glosspharyngeal Nerve (IX: Cranial Nerve, which also innervates the tongue and pharynx) and the Vagus Nerve (X Cranial Nerve), which also innervates the outside of the tympanic membrane. Our listening organ, we might simplify, is parasympathetically innervated and thus a kind of afferent and efferent trigger organ for the ANS. Interestingly enough, via the involved innervation of the Vagus Nerve, we can also better perceive processes of our also viscerally oriented interoception, be it the beating of our own heart, be it the growling of our own stomach.

The music of the SSP is frequency modulated. In this process, frequency components that do not belong to human speech (frequencies that are too low and too high) are filtered out. This makes the music sound a bit like music heard through a telephone line, but with pleasant midrange frequencies and without too high frequency components. The goal is to bring our ANS into contact with the amplified prosodic parts (voice-melodic parts) by especially addressing the above-mentioned nerves of the middle and outer ear innervation.

The primary aim of this study was to evaluate the effectiveness of the SSP on sensory sensitivities and language development 1 week and 4 weeks post-SSP. A secondary exploratory aim was to examine potential differential age effects in the SSP response.

## Methodology

### Participants

All participants in the study are diagnosed with Autism and all of them are clients of a counseling Practice in the city of Hamburg, Germany. All the children and adults were asked to sign a document that they agree to take part in the study on a voluntary basis. For younger children the parents had to sign the agreement. They got information about the study and the new Safe and Sound Protocol. Table 1 presents the age and number of participants.

Table 1
*The Total Number of the Subjects by Age Groups*

| Age groups | Number |
|---|---|
| 1 gr. 7–11 years old | 13 |
| 2 gr. 12–18 years old | 14 |
| 3 gr. 19–50 years old | 9 |
| Total | 36 |

**The Safe and Sound Protocol Intervention (Heilman et al., 2023)**

The SSP was administered either in the presence of a therapist – at a private practice clinic or a private room in the participants' school – or at home by the child's caregivers with therapists' remote supervision. Intervention location was selected by the participants, based on proximity to clinic. Two participants in the clinic group completed 3 sessions of SSP in the clinic and 2 sessions of SSP in the home. In all cases, the SSP was administered for 1 hour per day, for 5 consecutive days. All study participants used a standardized music player with preloaded music tracks for each day of the intervention. The music players were outfitted with high fidelity semi-open over-the-ear headphones with a 53mm diameter speaker with a frequency response of 15 Hz – 28 kHz. Participants were shown how to adjust the volume before listening sessions and instructed to set the volume to a comfortable level.

During sessions provided in clinic or school, therapists were present to provide gentle motivation and non-verbal responses to participants via gestures and mimicry. The private practice room was approximately 22 square meters and outfitted with a sitting area, table, and a soft floor play area. Caregivers generally stayed in an adjacent waiting area during listening sessions but were allowed to be present during listening sessions if deemed necessary to make for participant comfortable. Sessions in the school were conducted in private rooms that included chairs, couches, and quiet games. In some instances, these rooms were not available and sessions took place in the child's typical classroom environment.

Participants who took part in the study at home received the SSP player by mail and aninstructional video was provided online. Prior to beginning the SSP, one of the study authors scheduled a video conference call with the participant or, if the participant was 18 or younger, the participant and a caregiver. During the call, the researcher demonstrated the use of the device, observed the participants as they practiced playing the music, and gave feedback on appropriate activities to do during the listening sessions. Examples of appropriate concurrent activities included coloring, building with blocks, and quiet games without screens (e.g., board games). Computer or mobile phone use, reading, and dancing during listening was discouraged.

### Brain-Body Center Sensory Scales (Heilman et al., 2023)

Participants or their guardians completed the Brain-Body Center Sensory Scales (BBCSS; Porges, 2012), a 50-item questionnaire to assess auditory hypersensitivity, auditory hyposensitivity to voices, visual hypersensitivity, tactile hypersensitivity, social touch aversion, digestive problems, selective eating. Subscale descriptions and example items are presented below. Item responses are on a 4-point Likert type scale:
1 = Almost always, 4 = Almost never and include a "not applicable/ not sure" option that is not scored. Subscale scores are calculated by taking the mean of item responses. The psychometric properties, reliability, and validity of the scale has been documented in children and adults with Fragile X Syndrome and ASD (Kolacz et al., 2018).

English-to-German translation of the BBCSS was conducted using a back-translation method. First, two native German speakers with English fluency conducted a forward translation. Both translators were therapists who work directly with ASD clients and their families in Germany. To test fidelity, the resulting German translation was then back translated to English by a native English/German-fluent researcher not involved in the study. The resulting version was evaluated by the first author, who was not involved in either translation. The English source and target text were grammatically and semantically equivalent, with text meaning being preserved during the translation.

BBCSS forms for participants age 18 or younger were completed by caregivers. Participants who were 19 years or older completed the self-assessment except for 2 adult participants with verbal abilities were too low, whose forms were completed by the caregiver. The questionnaires were completed prior to the SSP, one week after the last day of the SSP, and 4 weeks after the last day of SSP. For those participating at a clinic or school, the questionnaires were provided on paper forms. For home use clients, questionnaires were sent by email and participants either submitted their responses by electronic or traditional mail.

The Brain Body Center Sensory Scale (BBCSS) measures Auditory sensory scale , Visual processing scale, Tactile processing scale, Digestive processing scale. We are interested in the connection between the Auditory sensory scale and the *Language ability*, which has the following criteria:

- Non-verbal
- Limited verbal
- Age appropriate.

## Results

### First Data Collection

The impact of both factors, Age group and Language ability, on the Mean scale values of Auditory Senses scale as a dependent variable is not statistically significant (F(Age group)=.449; p=.508; F (Language ability)=1.75; p=.196).

## After 1 Week

After 1 week using the SSP the results do not change. The impact of both factors Age group and Language ability on the Mean scale values of Auditory Senses scale after 1 week as a dependent variable is not statistically significant (F(Age group)=.002; p=.965; F(Language ability)=1.023; p=.321).

## After 4 Weeks

Let us look at the results in 4 weeks. The impact of both factors Age group and Language ability on the Mean scale values of Auditory Senses scale after 4 weeks as a dependent variable is not statistically significant (F(Age group)=.014; p=.907; F(Language ability)=3.685; p=.066).

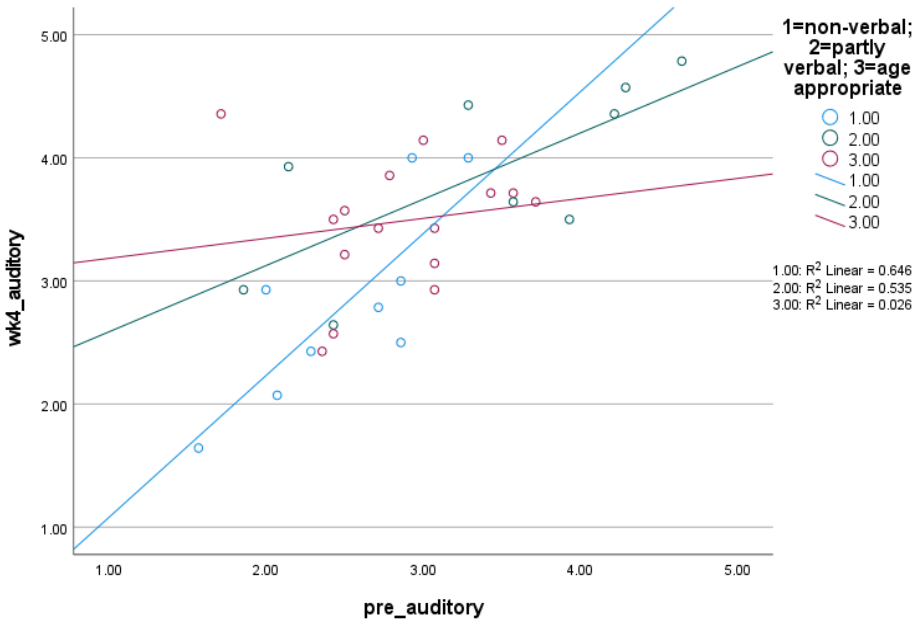
The poorer the language skill, the more linear pre-SSP is to post-SSP. While the individuals with better language skill have flatter regression lines documenting that pre-SSP levels are not strongly related to post-SSP levels. The results are shown in Figure 1.

The impact of factor *Time of data collection* on the Mean scale values of *Auditory Senses scale* as a dependent variable is statistically significant (F(Time of data collection)=4.0133; p=.02112). There are significant differences between First time data collection and data collection after 4 weeks. This is shown in Figure 1. The factor Age group is not statistically significant (F(Age group)=.053; p=.949). The interaction of both factors Age group and Time of data collection is not statistically significant either (F(Age group*Time of data collection)=.247; p=.911).

The impact of factor *Time of data collection* on the *Mean scale values of Auditory Sensory scale* as function of the factor Language ability as instead of dependent variable is statistically significant (F (Time of data collection)=4.0359; p=.02069).

Figure 1

*Auditory Sensory Scale as a Function of the Factor Time of Data Collection*



The factor Language ability is also statistically significant (F(Language ability)=11.590; p=.00003). This can be seen from Figure 2.

Figure 2
*Mean Scale Values of Auditory Sensory Scale as a Function of the Factor Language Ability*

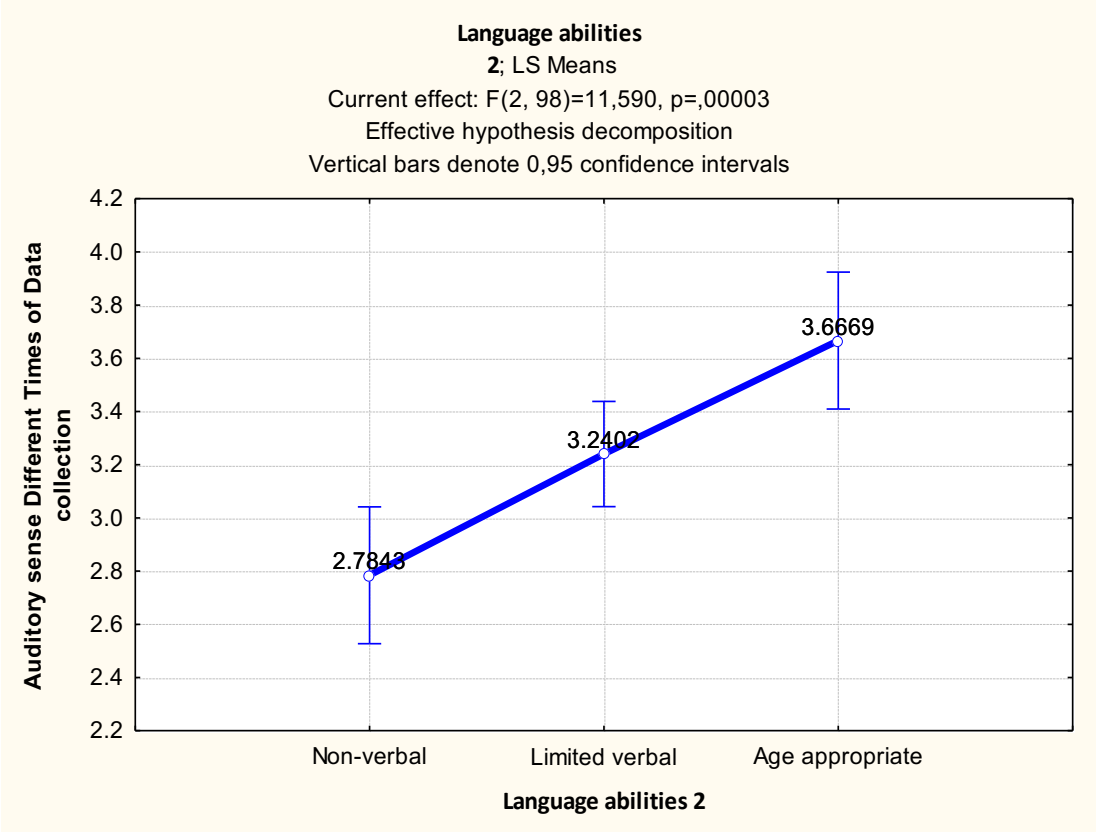


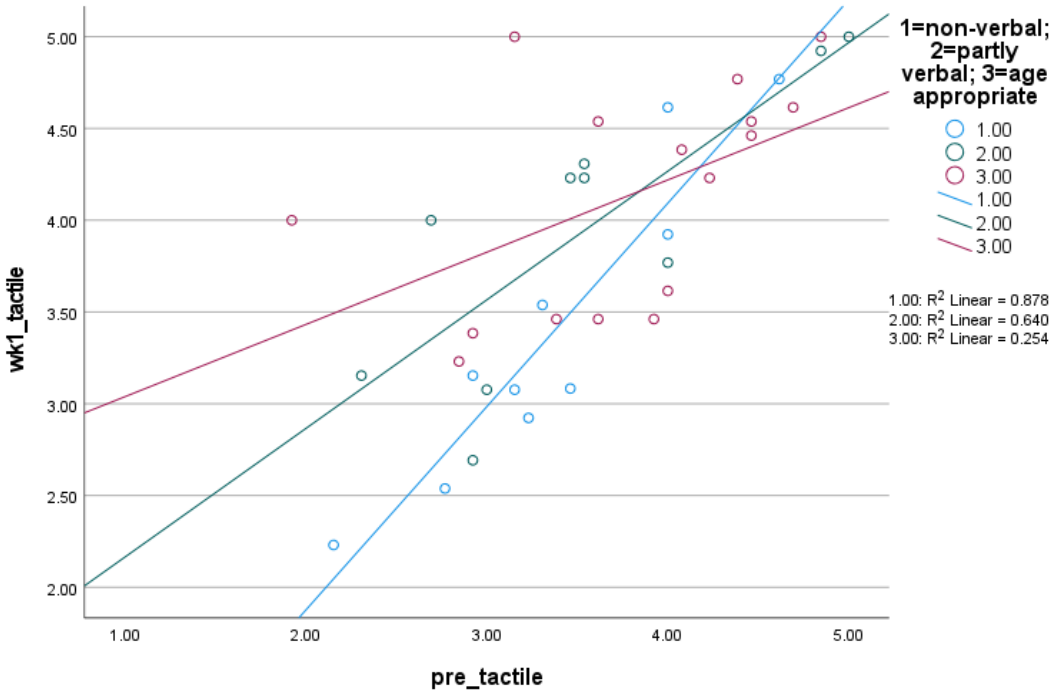

Figure 2 shows that the highest value of the language ability is appropriate to the age. Among all 3 criteria there are significant differences. This can be seen also in Table 3.

Table 3
*Post Hoc Comparison of Language Ability*

| | | | |
|---|---|---|---|
| Non-verbal | | .020841 | .000018 |
| Limited verbal | .020841 | | .031201 |
| Age appropriate | .000018 | .031201 | |

The other significant impact is the tactile hypersensitivities scale which is showing significant differences after the first week testing. The results for the tactile scale are shown in Figure 3.

Figure 3
*Tactile Hypersensitivity Scale as a Function of the Factor Time of Data Collection*




## Discussion and Conclusion

The three sessions with SSP did not help the participants in the research to increase their language abilities. The impact of both factors Age group and Language ability on the Mean scale values of Auditory Senses scale did not have statistically significant results. However, in general we could show, that language ability functions as a mitigating "buffer" against hyper-sensitivity. The factor Time of data collection on the Mean scale values of Auditory Senses scale showed statistically significant results.

In a similar study on Safe and Sound Protocol, Heilman et al. (2023) found out that the short-term effects of the SSP persisted to the 4 week assessment, with additional effects that were detected at the 4 week assessment only. Adolescents and adults had some of the strongest effects in response to the intervention, though all age groups showed improvements. The SSP is based on a theoretical foundation and method that is distinct from other sound therapies, and the effects described here cannot be generalized to any other type of sound therapy. The findings although limited suggest possible therapeutic benefit of the SSP language ability development.

## Disclosure Statement

No potential conflict of interest was reported by the authors.

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# Gender Asymmetry in German Phraseology: Linguistic, Cultural and Psycholinguistic Perspectives

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**Abstract.** The article is focused on identifying the specifics of gender asymmetry in German phraseology based on psycholinguistic analysis. The aim is to determine the essence of using the internal code of the speaker's intentions while verbalising gender in the target language culture. The study used the method of a controlled word association test. Google Forms were used to analyse the perception peculiarities of the German idioms components that directly or indirectly denote male and/or female gender. The typicality and individuality of responses to the 26 proposed phraseological units with masculine (*Mann, Mensch, Drache, Luder*) and feminine (*Mädchen, Frau, Dame, Weib*) components confirmed the asymmetry and unevenness of gender representation in German. The test involved 81 native speakers (56 women and 25 men) aged 14 to 71 residing in Germany and 82 non-native speakers (70 women and 12 men). None of the participants associated themselves with the third gender. Gender asymmetries characterise German phraseology due to the androcentricity of the German language. The associative representation of the male gender in phraseology due to the processes of metonymisation predicts its leading role in the target linguistic culture. Exclamatory and comparative phraseology registers traces of gender asymmetry neutralisation. However, researchers have discovered that phraseological units with a feminine component exclusively serve to denote feminine traits and homosexuality. The feminine component for a man mainly implicates negative connotations, while expressing neutral and positive ones indirectly. Pejorative idioms with a pronounced negative connotation, treating women as sexual objects or as an appendage of a man, deserve attention in the responses. The respondents' responses to phraseological units with neuter or masculine components predominantly denote the female gender through manifested negative connotations. The responses to the component *Mädchen*, the suffix *-chen* of which in German actualises the seme of the neuter category, were mainly negative due to the influence of the denotative and signifying meaning of the phraseological unit. The analysis of the zero associations of some phraseological units with women showed the dominant role of men in the target linguistic culture.

***Keywords:*** *phraseological unit, gender asymmetry, psycholinguistics, word association test, German language, connotation.*

**Лозицька Марія, Зубач Оксана. Гендерна асиметрія в німецькій фразеології: лінгвокультурологічний та психолінгвістичний аспекти.**

**Анотація.** Стаття спрямована на виявлення специфіки гендерної асиметрії в німецькій фразеології на засадах психолінгвістичного аналізу. Мета – визначення сутності розгортання внутрішнього коду мовленнєвих інтенцій в процесі вербалізації гендеру в цільовій

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лінгвокультурі. У дослідженні застосовано метод спрямованого асоціативного експерименту, в якому, за допомогою Google Forms, проаналізовано особливості сприйняття компонентів фразеологічних одиниць німецької мови, які прямо чи опосередковано позначають чоловічу та/або жіночу стать. Типовість та індивідуальність реакцій на запропоновані 26 фразеологічних одиниць з маскулінними (*Mann, Mensch, Drachen, Luder*) та фемінінними (*Mädchen, Frau, Dame, Weib*) компонентами підтвердили асиметричність та нерівномірність представлення статей в німецькій мові. В експерименті взяло участь 81 носій мови (56 жінок та 25 чоловіків) віком від 14 до 71 року, які проживають на території Німеччини, та 82 особи (70 жінок та 12 чоловіків), які не є носіями німецької мови. Зазначимо, що жоден з учасників дослідження не асоціював себе з третьою статтю. Німецькі фразеологізми характеризуються гендерними асиметріями через андроцентризм німецької мови. Асоціативна репрезентація чоловічої статі у фразеології внаслідок процесів метонімізації прогнозує його провідну роль у цільовій лінгвокультурі. Ознаки ж нейтралізації гендерної асиметрії зафіксовано у вигукових та компаративних фразеологізмах. Водночас встановлено, що фразеологічні одиниці з компонентом-фемінітивом використовуються виключно для маркування жіночих рис та гомосексуальності. Фемінінний компонент на позначення чоловіка імплікує переважно негативну конотацію, а нейтральна та позитивна – виражені опосередковано. На увагу заслуговують реакції на пейоративні фразеологічні одиниці з яскраво вираженою негативною конотацією, де жінки трактуються як сексуальний об'єкт чи додаток до чоловіка. Прояв переважно негативної конотації прослідковувався в реакціях респондентів на фразеологізми з компонентами середнього або чоловічого роду на позначення жіночої статі. Реакції на компонент *Mädchen,* суфікс *-chen* якого у німецькій мові актуалізує сему категорії середнього роду, були переважно негативні через вплив денотативно-сигніфікативного значення фразеологізму в цілому. Аналіз нульових асоціацій деяких фразеологізмів з жінкою засвідчив панівну роль чоловіка в цільовій лінгвокультурі.

***Ключові слова:*** *фразеологічна одиниця, гендерна асиметрія, психолінгвістика, асоціативний експеримент, німецька мова, конотація.*

# Introduction

Psycholinguistic studies of readers' and speakers' perceptions of gender show the existence of certain biases, primarily related to the linguistic implementation of gender in the language (Gygax et al., 2019) and the cognitive mechanisms of its perception in the target linguistic culture. At the heart of understanding social categories and language, speaker characteristics such as emotional status, age, gender and race are often considered separate in scholarly work. However, perceptual systems for social categories, including gender, clearly rely on interdependent cognitive processes (Tripp & Munson, 2002).

Understanding the essence and nature of gender perception helps to overcome discriminatory aspects in language, to find ways to form gender-neutral and gender-sensitive language (Greco, 2019; Hugues, 2020; Lindqvist et al., 2019), to distinguish different speech styles (Balachandra et al., 2021; Getchell & Skinner Beitelspacher, 2020), speech behaviour of the sexes in the target segment, targeting a specific demographic group (Bui, 2021), which are to some extent determined by brain characteristics and embodied in pitch, word choice (Wallentin, 2020).

Language accumulates and transmits the speaker's mental representations of men and women. Understanding these ideas directly depends on how the target language represents the sexes. Gender asymmetry is inherent in languages with grammatical gender, which includes German. In such languages, the masculine gender acquires the status of being non-marked and refers to a person in general. Coady (2018) explains the nature of such linguistic sexism through the thought processes of iconisation, fractal recursiveness, and erasure. Iconisation consists of dichotomising and attributing common characteristics to each of the two groups of people, embodying itself in the gender binary. In fact, grammatical gender reflects linguistically the binary social gender. In this case, it minimizes differences within the group, while emphasizing intergroup differences (p. 275–276). Variation or erasure takes the form of ignoring facts that contradict 'naturalness'. These processes have, in fact, led to the non-markedness (generativity) of masculine grammatical gender, viewed as one of the signs of the apparent asymmetry of the language. However, discrimination can also be implicit: quite often, insults directed at men contain discriminatory features against women (Sunderland, 2020).

Critical reflections on androcentrism and gender asymmetry in language from a feminist perspective in the German-speaking world developed into a literary and linguistic movement in the 1970s (Pober, 2007) and currently exacerbate due to the denial of the generativity of the masculine grammatical gender in German proposed by the editors of the Duden, one of the most influential spelling dictionaries in the German language (Rütten, 2021). Of course, such a move seems logical, as experiments with French (Gygax et al., 2012) have shown that people find it challenging to think of a person as a woman when referring to her in the masculine form.

A cross-linguistic study of 391 people conducted by Horvath et al. (2016) based on Italian and German confirmed the results: the use of only the masculine form creates more masculine images in the respondents' imagination, while the use of paired forms also makes women visible. The discovery of such facts proves once again the asymmetry of the language system, which usually favours the male gender and is not limited to masculine generativity.

Femininity and masculinity are sharply demarcated and opposed. Masculinity dominates and is a symbol of the universal, while femininity is a sign of the specifically female, which leads to gender asymmetries. The fundamental works of well-known feminists Pusch "German Is the Language of Men" (1984), Tremmel-Plotz "Women's Language Is the Language of Change" (1982), Lakoff "Language and the Place of Women" (1975) reveal the main aspects of discrimination against women in the linguistic picture of the world, asymmetries in the language system directed against women (Hellinger, 1990; Pober, 2007; Richardson & Robinson, 2008). In particular, Samel (2000) identifies nine sexist gender asymmetries in favour of men in the German vocabulary, among which idioms and set expressions occupy a prominent place. This is the reason why the cognitive interpretation of the concept of

"gender inequality" has shown that it has a more negative emotional colouring for women than for men, as it includes experiences related to sexism, discrimination, and violence (Kostina et al., 2022).

# Method

A person characterizes themselves by their ability to associate, which is a sign of their creative thinking. Associations, in turn, illustrate linguistic awareness, perception of the world and its major categories. For example, an associative test involves recording verbal responses to a stimulus and mathematical processing of the results (Lyubymova, 2020). Scientists have various explanations for the formation of associations: the objective and social experience of an individual, mental factors, and cultural and historical affiliation of a person (Surmach, 2012, p. 22).

Word association tests are widely used in psychology and sociolinguistics, especially to study the relationship between language and society, language and politics (Masenko, 2004). The word association test serves as a means of studying the social image of an individual (Denysevych, 2010) within the framework of gender linguistics as a special discipline of sociolinguistics (Stavytska, 2003), for studying gender specificity in language (Horoshko, 2001), for revealing the peculiarities of female and male linguistic worldviews (Kholod, 1997). This interest in the word association test stems from the desire to test linguistic hypotheses using methods and tools beyond "pure" linguistics (Zsarnoczaiova, 2020).

Among the interdisciplinary research methods, psycholinguistic methods, particularly the word association test, are the most proven.

Our study employed a controlled word association test to collect targeted material to confirm the linguistic hypothesis that German phraseology exhibits gender asymmetry, manifesting itself at both the linguistic and cognitive levels.) A controlled associative test was carried out in 2021–2022 using an online questionnaire created in Google Forms, where respondents identified, firstly, the gender orientation of idioms, secondly, the specifics of feminine components in idioms that nominate the male gender, and thirdly, the peculiarities of the connotation of individual phraseological units in the processes of verbalisation of speech. To obtain reliable results, two groups of respondents were involved in the test. The first group consisted of 81 native German speakers (56 women and 25 men) from different regions of Germany, representing different professions and aged between 14 and 71. The second group consisted of 82 respondents (70 women and 12 men) from different regions of Ukraine, aged 17 to 60, who were not native speakers but had studied German at educational institutions in Ukraine (see Figure 1). Regarding gender, we note the preference of female respondents – 77.3% of women and 22.7% of men (see Figure 2). It is noteworthy that not a single respondent identified or associated with the so-called third gender, which, by the way, has been officially recognised in Germany since January 2019.

Figure 1
*Age of Respondents*

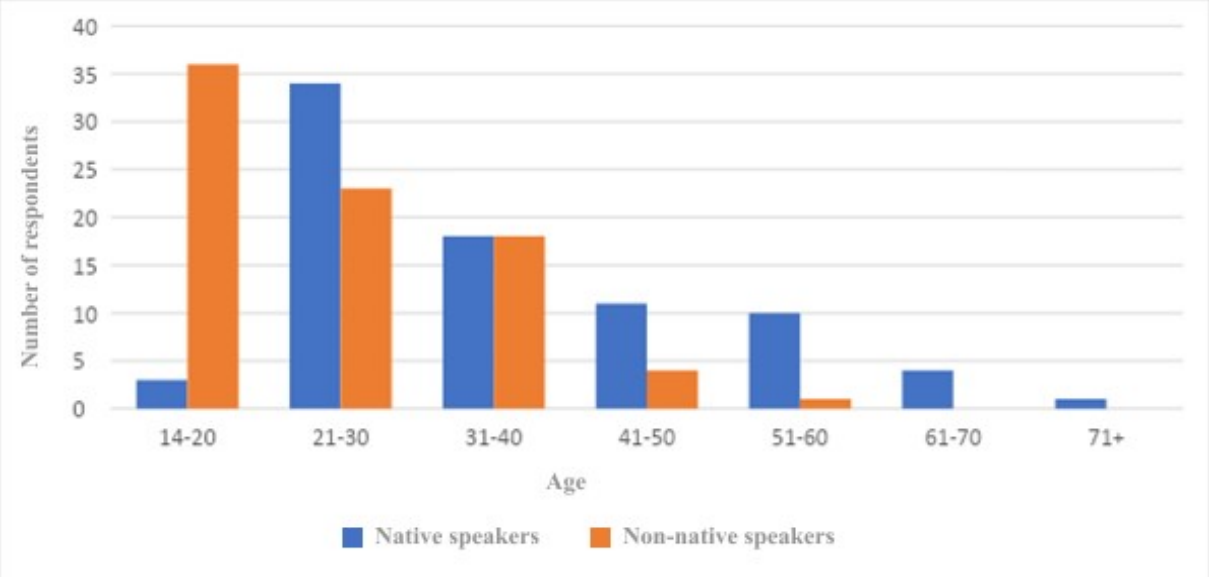
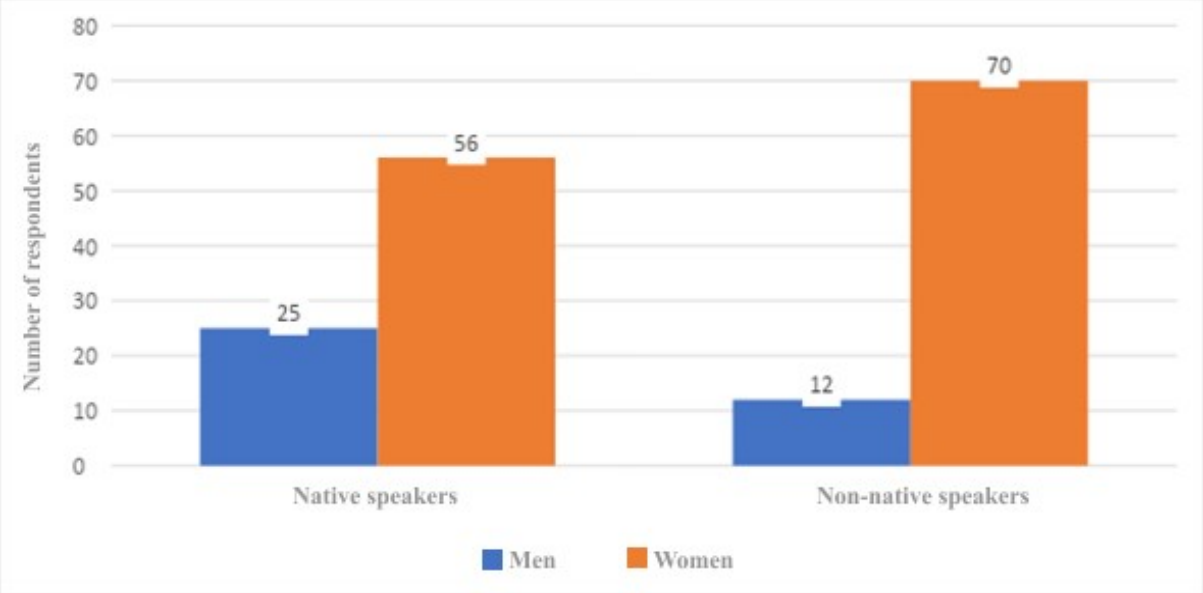



Figure 2
*Gender of Respondents*




The online questionnaire contained three blocks of questions on 26 phraseological units, selected based on indications of gender asymmetry in phraseology (Lozytska, 2021, p. 84–88). In the first block, respondents had to identify the association of specific idioms with the corresponding gender. All the selected phraseological units contained the masculine component *Mann*, postulating it to be generative and equally applicable to all genders. This was the purpose of this part of the test. The second set of questions contained idioms with feminine components (*Frau, Mädchen, Dame*), semantically addressing males. This block aims

to test the hypothesis that the feminine component in a stable expression nominating a man implies a reduction of his status.

The third set of questions concerned phraseological units with masculine and neuter grammatical gender components (*Drachen, Mädchen, Luder*), which traditionally refer to women. The respondents had to choose what colour (negative, positive, neutral) they thought these idioms had. The purpose of the third part of the test was to test the hypothesis that using masculine and neuter grammatical gender components in phraseological expressions implies a predominantly negative connotation of the expression as a whole.

In all three parts of the test, the word association test is defined as a controlled one, instructing respondents to choose from several stimuli their first association and to mark it in the questionnaire. The participants were informed about the purpose and structure of the study.

### Procedure

The procedure of the association test included three stages (see Zsarnoczaiova, 2020, p. 81). First, the subject and purpose of the study were determined. The subject of the study was gender-marked idioms in German. The aim was to verify the hypothesis of gender asymmetry in German phraseology, manifested in the unequal representation of the genders through their nomination using phraseological units. We chose respondents following the principle of representativeness including participants of different ages and social status and equivalence ensuring the number of non-native speakers matched the number of native speakers, which is an essential prerequisite for conducting comparative studies. Based on the subject matter and the purpose of the study, we formulated the questions for a controlled word association test both clearly and unambiguously, and provided the necessary stimuli based on the subject matter and the purpose of the study.

The second stage, testing, involved giving instructions to the respondents and monitoring the process.

The third stage was to analyse the results of the test. The data obtained formed the basis for drawing conclusions regarding the research hypothesis. The objectivity of the results was ensured through an associative test that took into account factors influencing specific errors in the associative process, the thoughtfulness of the questions, and the proposed stimuli (Zsarnoczaiova, 2020, p. 81).

## Results and Discussion

Gender asymmetry characterises the phraseology of the German language, resulting from the levelling of the use of paired forms. This levelling could make a woman visible not only in language and speech but also in the manifestation of reactions to her perception in the target linguistic culture. The controlled word association test helped to solve the problem of establishing the response profiles of two groups of respondents – native and non-native speakers – to phraseological

gender asymmetry, revealing linguistic sexism due to the peculiarities of androcentric processes.

The first block of the association test recorded the reactions of respondents, both native and non-native speakers, to phraseological units with the masculine component *Mann*, which not only explicated a gender-neutral semantic meaning but also implied intentions for both genders. It turned out that both native and non-native speakers associated the proposed units primarily with the masculine gender, probably due to the denotative meaning of the *Mann* component. It is noteworthy that when the meaning of an idiom did not refer to a person but to a trait or a phenomenon (e.g. *einen kleinen Mann im Ohr haben*), the respondents of both groups were more inclined to use such phrases concerning both genders, at a rate of 64.2% and 47.6% respectively. However, phraseological units explicating male identity through signifying elements and masculine components caused a clear association with the male gender (*Das ernährt seinen Mann!*) in both groups (30.9% and 32.9%) with an error of 2%. The idiom *Der große Mann braucht überall viel Boden* recorded zero associations with the female gender among native speaker respondents, a phenomenon we believe is linked to the emphasis on the importance of men in the target society. On the other hand, 3.7% of respondents in the second group correlated this phraseology with a woman, resulting from the desire for gender neutrality in language and speech that has emerged in Ukrainian society.

The associative responses of non-native speakers to phraseological units with the masculine component Mann show significant associations with the male gender, contrary to the neutral semantic meaning of the stable expression. The idioms (*alle Mann hoch / alle wie ein Mann / alle Mann / mit Mann und Maus*) with the *Mann* component to denote the target group with the denotative meaning "everyone" were more often associated with the male gender by non-native speakers (50%) than by native speakers (37%). These results document the priority of the non-native speaker's visual perception of the *Mann* component and the influence of its lexical meaning on the formation of language and linguistic competencies, which in their minds provokes a clear association of this component with the male gender, regardless of its holistic phraseological meaning. Thus, in two groups of respondents (67.9% and 45.1%), the typicality of associations with a man was observed for the idiom *der kleine Mann (von / auf der Straße)*, which describes an average person. At the same time, native speakers reduced the gender nomination of women through the prism of the above-mentioned stable expression to the level of 1.2%, while non-native speakers, on the contrary, actualised the proportion of the female gender during the test to 12.2%.

The test has shown the specificity of identifying the concepts *Mann* and *Mensch*, whose semantics not only label a man or implicate a woman but also reinforce feminine signifiers. The respondents of the two groups interpreted the component *Mann* in the phraseological units (*alle Mann hoch / alle wie ein Mann / alle Mann / mit Mann und Maus*) as a marker of a person in general (60.5% and 43.9%). The signs of unclear expression of perception or neutralisation of gender asymmetry in exclamatory (*Sie sind / Du bist mein Mann! Das ernährt seinen Mann!*) and

comparative (*voll sein wie tausend Mann*) phraseological units were found in two groups of respondents.

Both groups of participants were fine with the borrowed English phraseological units of *ein Allroundman / Allroundmann / Allround-Mann / Allrounder sein*. The content of these units elicited individual responses to male gender designation (48.1% and 37.8%), while their expression marked typical reactions to person perception in general (48.1% and 54.9%). At the same time, phraseological units containing the term *Mann*, which are burdened with adjectival components due to substitution mechanisms (e.g. *ein ganzer/ gelieferter Mann, ein Mann mit zugeknöpften Taschen/ aus (von) grobem Schrott*), and proverbs (e.g. *ein Mann ist kein Mann/ ein Mann allein kann das Feld nicht behaupten/ der große Mann braucht überall viel Boden/ der große Mann braucht überall viel Boden*) are commonly associated with the male gender by native speakers. Contrary to the beliefs of non-native speakers, these set expressions do not correlate with both genders. This misconception results from interlingual interference during the acquisition of the German language (see Table 1).

The respondents in both groups reacted differently to specific phraseological units. We are inclined to believe that this may be due to an incomplete understanding of the semantics of the set expression, resulting in the obscuring of its primary meaning and the activation of its secondary nomination. This leads to incorrect and inappropriate usage in communication. Responses to the phraseological unit *voll sein wie tausend Mann* colloquially translating as "very drunk" and encompassing two genders, have reinforced this assumption. However, more than 34% of non-native speakers and over 44% of native speakers associate this component directly with men, apparently guided by stereotypes that men eat too much and abuse alcohol. Slightly over 1% of the native speaker respondents (more than 1%) correlate the whole set expression with the female gender and the secondary nomination of the expression as "too drunk". We assume that using this set expression when referring to females exaggerates its meaning and is intended to highlight the person's high level of inebriation.

Table 1
*Productive Responses to Mann Component Semantics, in Per Cent*

| Phraseological unit with the component *Mann* | Gender profiles of responses | | | | | |
|---|---|---|---|---|---|---|
| | native speakers | | | non-native speakers | | |
| | men | women | both genders | men | women | both genders |
| alle Mann hoch / alle wie ein Mann / alle Mann / mit Mann und Maus | 37 | 2.5 | 60.5 | 50 | 6.1 | 43.9 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Er ist unser Mann! / Sie sind / Du bist mein Mann! | 75.3 | 3.7 | 21 | 61 | 11 | 28 |
| Das ernährt seinen Mann! | 66.7 | 2.5 | 30.9 | 47.6 | 19.5 | 32.9 |
| voll sein wie tausend Mann | 44.4 | 1.2 | 54.3 | 34.1 | 6.1 | 59.8 |
| der kleine Mann (von / auf der Straße) | 67.9 | 1.2 | 30.9 | 45.1 | 12.2 | 42.7 |
| Ein Allroundman / Allroundmann / Allround-Mann / Allrounder sein | 48.1 | 3.7 | 48.1 | 37.8 | 7.3 | 54.9 |
| auf den alten Mann sparen | 54.3 | 3.7 | 42 | 52.4 | 11 | 36.6 |
| einen kleinen Mann im Ohr haben | 33.3 | 2.5 | 64.2 | 36.6 | 15.9 | 47.6 |
| der rechte (richtige) Mann (an der rechten Stelle) | 66.7 | 1.2 | 32.1 | 41.5 | 6.1 | 52.4 |
| der große Mann braucht überall viel Boden | 77.8 | 0 | 22.2 | 45.1 | 3.7 | 51.2 |
| ein ganzer Mann | 88.9 | 6.2 | 4.9 | 54.9 | 4.9 | 40.2 |
| ein gelieferter Mann | 77.8 | 3.7 | 18.5 | 54.9 | 11 | 34.1 |
| ein Mann aus (von) grobem Schrott | 86.4 | 2.5 | 11.1 | 52.4 | 6.1 | 41.5 |
| ein Mann ist kein Mann (ein Mann allein kann das Feld nicht behaupten) | 79 | 2.5 | 18.5 | 35.4 | 11 | 53.7 |
| ein Mann mit zugeknöpften Taschen | 81.5 | 4.9 | 13.6 | 47.6 | 13.4 | 39 |

The conceptual level actualization of *Mann* occurs through the significative meaning of the entire phraseological unit. Simultaneously, the non-native speaker

group participants associated such phraseological units binary with both masculine and feminine genders (see Table 2). Clearly, the neutral semantic content of the above-mentioned phraseological units in Ukrainian influenced the production of associative responses of non-native speakers through a conditional or unconscious projection onto their mother tongue. The limited number of associations with the component denoting women in the two groups of respondents is based on the typical notion of women as representatives of fair sex, which can be signified through lexical units. Yet, the specificity of secondary nomination mechanisms and the effects of rethinking processes in phraseological units can entirely obscure this idea. These factors can alter the meaning of these units or contribute to their obscurity.

Table 2
*Associative Responses to the Semantics of the Mann Component in Phraseological Units, In Per Cent*

| Associations of the *Mann* component | Profiles of associative responses | |
|---|---|---|
| | native speakers | non-native speakers |
| with a man | 63 | 46 |
| with a woman | 6 | 10 |
| with both genders | 32 | 44 |

Based on the analysis of results obtained from the initial block of the test, we are able to refute the notion that phraseological units containing the generative component *Mann* hold equal meaning for both genders. It is worth mentioning that native speakers are more inclined to associate such expressions with men when compared to non-native speakers. Native speakers typically interpret their language in a more androcentric manner, while non-native speakers tend to rely on the dictionary definition of a given expression, where the gender component is neutralised.

The consistent perception and representation of men, who are prominent in the target linguistic culture worldview, is somewhat altered by the mechanisms of phraseologisation. In particular, gender-specific elements acquire additional meanings beyond male or female sex, through metonymic transfer, encompassing all associated attributes. According to this interpretation, women, children and even animals were considered the property of men. This predicted the leading role of men in the formation of associative reactions and thinking activities. Moreover, phraseological units that include the term *Frau* are exclusively employed to emphasise female traits and behaviours, especially in the context of homosexuality.

Negative reactions to the component corpus of the phraseological units *Frau mit Stiel* and *synthetische Dame* were predominantly recorded among both native and non-native speakers during the test. Meanwhile, the phraseological unit *die große alte*

*Dame des…* elicited less adverse responses from native speakers, likely because of the connotative aspect that clarifies the meaning of "respectable age" meaning. Additionally, the dictionary definition of the expression has a clear positive connotation. In this case, the *Dame* component serves to express the experience of the person referred to by the phraseological unit. The second group's associative responses to this phraseology produced noteworthy results. We observed a significantly higher percentage of negative connotations than native speakers (28.4% and 41.5%, respectively). We attribute this to the literal interpretation of the set expression by those who have not fully mastered German. Consequently, the association was similar to previous expressions with feminine components, where negative connotations prevailed.

The ironic responses to the phraseological unit *Mädchen für alles* from the participants in the two groups stemmed from their background knowledge and similarity associations. This is because in German, the word *Mädchen* denotes a neuter category and is not gendered. The culturally determined attitude of native speaker respondents (59.3%) contributes to their negative reaction towards the primary nomination of the term *Mädchen* in reference to "girl" or "minor," as well as the components that are perceived to induce a female minor to perform a specific action. The non-native respondents exhibited a negative response of 69.5% to the phraseological unit, as it carries a connotation of insult or humiliation in Ukrainian. The term "errand boy" is intended for use in relation to both sexes but with greater emphasis on the masculine gender.

Notably, the feminine component of the term for a man provokes mainly unfavourable associations for respondents of both genders, while neutral and positive connotations are expressed implicitly (see Table 3).

Table 3
*Productive Responses to Masculine Connotations in Phraseological Units, in Per Cent*

| Phraseological units | Responses to masculine connotations | | | | | |
|---|---|---|---|---|---|---|
| | Native speaker respondents | | | Non-native respondents | | |
| | positive | negative | neutral | positive | negative | neutral |
| Frau mit Stiel (homosexueller Mann) | 19.8 | 67.9 | 12.3 | 9.8 | 62.2 | 28 |
| Mädchen für alles | 13.6 | 59.3 | 27.2 | 9.8 | 69.5 | 20.7 |
| synthetische Dame | 4.9 | 66.7 | 28.4 | 13.4 | 59.8 | 26.8 |
| die große alte Dame des… | 39.5 | 28.4 | 32.1 | 12.2 | 41.5 | 46.3 |

The analysis of answers from the word association test from both groups of respondents indicates that nominating a man in terms of feminine attributes degrades his status. Native speakers notably favored the idiomatic expression for a homosexual man more than non-native speakers, a trend that may be attributed to the greater acceptance of same-sex relationships in German linguistic culture. Phraseological units regarding women often include components that fall under the masculine or neuter gender categories. Examples of such units are *ein leichtes Mädchen / ein spätes Mädchen / ein gefallenes Mädchen,* with *Mädchen* being a neuter noun in German, and its suffix *-chen* actualising the neuter seme. The respondents from both groups mainly demonstrated negative responses to the proposed phraseological units because of their denotative and signifying meaning, as illustrated in the projection of girl → woman of easy virtue → woman of unacceptable behaviour (demeanour/conduct) / woman of loose morals within the two linguistic cultures. Moreover, non-native speakers reacted considerably positively to the component in the phraseology *ein gefallenes Mädchen*, achieving a 24.4% mark. We presume that this outcome arises from the favorable connotation of the associated element in Ukrainian, where the female person is classified as belonging to the feminine grammatical gender. This leveling out mitigates the fact that the neuter gender expresses a woman.

The negative response of the two groups (90.1% and 65.9%) to the pejorative phraseological unit with a pronounced negative connotation *sei nicht solch altes Weib!*, which is based on the interpretation of a woman as a sexual object or as an appendage of a man, is remarkable. The percentages of favourable (1.2% and 11%) and neutral (8.6% and 23.2%) responses to this language suggest clues of linguistic culture association in the provision of language use, specifically stereotypical beliefs and viewpoints on women.

The responses of native speakers towards the partial or complete gender-based opposition expressed in the phrase *ein Mann, ein Wort, – eine Frau, ein Wörterbuch,* were shaped by the acceptance of the former as "correct" or neutral, and the latter as "negative". (Lembik, 2013). Consequently, the majority of native speakers (75.3%) reported a negative assessment of this phraseological unit, with fewer than 10% reacting favourably. We find that non-native speakers' responses are proportionally restrained (positive: 40.2%, negative: 30.5%, neutral: 29.3%) because of the functional opacity of the *Wörterbuch* component in denoting a woman. This is because the components *Wort and Wörterbuch* are interpreted as positive by non-native speakers' linguistic culture, depicting a man as "strong, reliable, responsible, a man of his word," and a woman as "intelligent, erudite, educated," or a symbol of verbosity.

No positive associations were found among native speakers regarding the phraseological unit *ein alter Drachen*. This is due to the direct meaning of the leading component which carries an explicit negative connotation, used to denote an imaginary object of large size. The recorded negative reactions in both groups (95.1%

and 59.8%) stem from a shared archetypal understanding of dragons as symbols of adversity, danger and negative phenomena.

Native speakers' lack of neutral responses to the expression *ein falsches Luder* can be explained by the pragmatic reinterpretation of the component *Luder* which traditionally refers to a piece of meat used to lure animals, to describe women who entice men with their physical appearance. This lack of reaction reflects a reluctance to contemplate or analyse its connotations and a rejection of the idea, manifesting as intentional aversion and maximum negativity. The similarity in positive reactions (1.2% and 1.2%) in both groups towards this phraseology provides evidence of a phenomenon in linguistic cultures.

Despite the negative connotation prevailing among non-native speakers, the number of positive and neutral reactions from them slightly exceeds that of native speakers. The responses indicated a mainly negative connotation due to linking with particular phrases and their constituent elements. Table 4 illustrates the demonstration of using neuter or masculine gender to refer to the female gender.

Table 4
*Productive Responses to Masculine Connotations in Phraseological Units, in Per Cent*

| Phraseological units | Responses to the connotations of the female gender | | | | | |
|---|---|---|---|---|---|---|
| | Native speaker respondents | | | Non-native respondents | | |
| | positive | negative | neutral | positive | negative | neutral |
| ein alter Drachen | 0 | 95.1 | 4.9 | 11 | 59.8 | 29.3 |
| ein falsches Luder | 1.2 | 98.8 | 0 | 1.2 | 89 | 9.8 |
| ein leichtes Mädchen | 2.5 | 90.1 | 7.4 | 15.9 | 58.5 | 25.6 |
| ein spätes Mädchen | 2.5 | 59.3 | 38.3 | 4.9 | 51.2 | 43.9 |
| ein gefallenes Mädchen | 1.2 | 74.1 | 24.7 | 24.4 | 52.4 | 23.2 |
| sei nicht solch altes Weib! | 1.2 | 90.1 | 8.6 | 11 % | 65.9 | 23.2 |
| ein Mann, ein Wort, – eine Frau, ein Wörterbuch | 8.6 | 75.3 | 16 | 40.2 | 30.5 | 29.3 |

Hence, analysing the data obtained during the test's third phase substantiates that employing masculine and neuter grammatical gender components to

phraseological units refer to women conveys predominantly negative connotations. The increased percentage of favourable reactions from non-native speakers supports this conclusion, as the positive connotation in this instance is primarily due to the feminine grammatical gender of the corresponding elements in Ukrainian. Therefore, utilising the masculine or neuter gender to refer to a female individual diminishes her status, is derogatory and is typically used in a negative context.

The study confirms that the German language's androcentricity generates asymmetries via the masculine referent that represents a person in general. Despite usually being considered "correct" and "neutral," the priority of masculine gender in phraseological units with masculine components is now in question. Additionally, referring to a male with a feminine pronoun signifies a dismissive attitude towards him. Using feminine components in phraseological units that denote attitudes towards men leads to a decreased perception of their social status amongst native speakers. Moreover, nominating the female gender through the prism of a neuter or masculine grammatical gender in phraseological units can impart a negative or abusive connotation.

## Conclusions

The gender representation asymmetry in phraseology arises from the cognitive dissonance in the composition of German phraseological units and the distinctive formation of phraseological semantics. The psycholinguistic analysis and word association test have uncovered typical and individual reactions to gender perception in German linguistic culture among native speakers and Ukrainian German language learners.

In the German language, phraseological units with the masculine component. People primarily associate *Mann* with the male gender. However, gender-neutralisation signs are present in the reactions to exclamatory and comparative phraseological units containing this component. The significance of men in the target linguistic culture is evident in the phraseological units denoting age-related human changes through the adjectival components *klein* and *alt*. In response to idiomatic expressions containing feminine components *Frau, Mädchen, Dame*, the status of a male is diminished. Expressions containing the *Frau* component solely indicate what pertains to women's domain and homosexuality. Traditionalism in the perception of women is evident in typical reactions to idioms comprising masculine and neuter grammatical gender components *Drachen, Mädchen, Luder.* The irony arises from the phrase *Mädchen für alles* due to its denotative and connotative meanings, compounded by the fact that the initial component belongs to the neuter grammatical category.

As indicated by the respondents, the absence of any feminine connotations in the phraseological unit *der große Mann braucht überall viel Boden* illustrates the dominant role that men hold within German linguistic culture. The predictability of the respondents' lack of reaction to the neutral connotations in the phraseology *ein*

*falsches Luder* and the positive ones in *ein alter Drachen* can be attributed to the negative meaning assigned to an imaginary object. The deployment of the internal code of speech intentions of a linguistic personality in a target linguistic culture and the verbalisation of gender in phraseology depend on the associative perception of the phraseology's component meanings, their grammatical categorisation responses and the level of interlingual interference. This pragmatises the linguistic culture specificity of the target linguistic environment and predicts the specificity of perception and production of linguistic units by both native and non-native speakers.

## Disclosure Statement

The authors did not report any potential conflict of interest.

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# Emotive and Metacognitive Processes in Post-Traumatic Growth of University Students

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**Abstract.** The purpose of the article was to find out the role of emotional and metacognitive processes in the post-traumatic growth of student youth. For this purpose, an online survey was conducted using the following methods: Emotion Regulation Questionnaire (ERQ), AAQ-II, Post Traumatic Growth Inventory (PTGI), The Changes in Outlook Questionnaire (CiOQ). The point-biserial correlation coefficient was used for the mathematical analysis of the data. As a result of the theoretical analysis, it was found that the prevailing theoretical models of posttraumatic growth are fundamentally cognitive. However, there are studies that have examined the relationship between PTG and metacognitive beliefs. A metacognitive way of thinking allows people to take a more critical stance on their cognitive capacities and can help facilitate PTG. It has also been found that emotivity as a linguistic embodiment of emotionality can play an important role in the development of PTG. The empirical study found that after 1 year of full-scale war in Ukraine, the average values of PTG indicators among the surveyed youth are quite high. Young people show positive changes in the perception of their own self, the emergence of new opportunities, an increase in personality strength, and a sense of inner integrity. We did not find a relationship between emotional expression and PTG. However, we did find a relationship between expression suppression and cognitive reappraisal, as well as significant relationships between cognitive reappraisal and PTG with all its components. These findings suggest that cognitive reappraisal can also be performed in relation to one's emotional reactions to traumatic events, helping young people to make sense of their traumatic experiences.

***Keywords****: post-traumatic growth, emotivity, metacognitive processes, suppression of expression, emotive flexibility, cognitive reappraisal, University students.*

**Матласевич Оксана, Балашов Едуард, Котовська Юлія. Емотивні та метакогнітивні процеси у посттравматичному зростанні студентської молоді.**

**Анотація.** Метою статті було з'ясувати роль емотивних та метакогнітивних процесів у посттравматичному зростанні студентської молоді. Для цього було проведено онлайн-опитування із використанням методик: шкала емоційної регуляції Гросса (ERQ), шкала емоційної гнучкості Хейса (AAQ-II), опитувальник посттравматичного зростання (PTGI), опитувальник змін у перспективі (CiOQ). Для математичного аналізу даних було використано точково-бісеріальний коефіцієнт кореляції. У результаті теоретичного аналізу з'ясовано, що переважаючі теоретичні моделі посттравматичного росту є фундаментально когнітивними. Проте є дослідження, які вивчали зв'язок PTG з метакогнітивними переконаннями. Метакогнітивний шлях мислення дозволяє людям зайняти більш критичну

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позицію щодо своїх пізнавальних можливостей та може допомогти полегшити PTG. З'ясовано також, що у розвитку PTG важливу роль може відіграти емотивність як мовне втілення емоційності. У результаті проведеного емпіричного дослідження з'ясовано, що після 1 року повномасштабної війни в Україні середні значення показників PTG серед опитаної молоді є досить високими. Молодь проявляє позитивні зміни у сфері сприйняття власного "Я", появу нових можливостей, збільшення сили особистості та появу відчуття внутрішньої цілісності. Ми не виявили зв'язку між вираженням емоцій (експресією) та PTG. Проте виявили зв'язок між придушенням експресії та когнітивною переоцінкою, а також значні зв'язки між когнітивною переоцінкою та PTG з усіма його компонентами. Отримані результати дають підстави для висновку, що когнітивна переоцінка може здійснюватися і щодо своїх емоційних реакцій на травматичні події, допомагаючи молодим людям витягувати сенс із свого травматичного досвіду. Початa нами спроба проаналізувати роль емотивних та метакогнітивних процесів у PTG студентської молоді під час війни вказує на необхідність проведення подальших психолінгвістичних досліджень у цьому напрямку, використовуючи метод наративу з подальшим аналізом емоційної лексики, особливостей поєднання слів тощо.

***Ключові слова:*** *посттравматичне зростання, емотивність, метакогнітивні процеси, придушення експресії, емоційна гнучкість, когнітивна переоцінка, студентська молодь.*

# Introduction

Traumatic events, of which the war is the most profound and devastating and which Ukrainian society is currently experiencing, are a severe problem not only in the present but also in the long-term emotional perspective. Traumatic events seriously "shake, challenge, or sometimes destroy" a person's perception of the world (Calhoun et al., 2012). There are many potential negative consequences of traumatic events, such as post-traumatic stress disorder, depression, dissociation, and substance abuse. However, over the past decades, trauma researchers have become increasingly interested in post-traumatic growth (PTG), a concept that suggests that some people develop as a result of exposure to traumatic or difficult events (Tedeschi, 2004; 2018; Dewey, 2021).

In order to thrive, not just survive, after a traumatic life event, it is essential to understand the psychological mechanisms that will facilitate adaptation and personal development. To date, it has been established that gratitude, intentional reflection, sharing negative emotions or experiences, adaptive coping styles such as positive reappraisal, and mindfulness practices have a positive impact on PTG (Henson et al., 2021; Ochoa et al., 2016). There are studies aimed at understanding the impact of metacognitive strategies on the ability to respond to negative emotions after traumatic events (Li et al., 2020). They showed that high internal attention to one's emotions helps to maintain emotive balance during the recovery process and improves the ability to cope with adversity. Radini-Tedeschi and Calhoun investigated the relationship between metacognitive processes and self-efficacy in the context of PTG (Radini-Tedeschi & Calhoun, 2018). They found that student's ability to analyze their capabilities and develop coping strategies helps them to believe in their abilities and respond more effectively to stressful situations. They also found that certain personality traits can influence PTG. In particular, extroverts are more likely to

demonstrate PTG because of their active responses and tendency to seek help and communication (Collier, 2016). Expressing one's own emotions (positive or negative) in a safe and supportive environment can reduce the risk of developing depression after a traumatic event, as well as promote the development of PTG (Baños et al., 2022). In addition, the volume of gray matter in the brain regions associated with empathy and emotive intelligence increases in individuals who demonstrate PTG (Nakagawa et al., 2016; Ord et al., 2020). Interestingly, these neurological effects occur in the same brain regions as trauma and stress but in opposite ways.

Although the interest in PTG and its mechanisms is growing every year, there is still very little empirical research aimed at clarifying the role of emotive and metacognitive processes in the post-traumatic growth of student youth. We decided to focus our attention on students because the student period is a stage of intense changes in a young person, which, in turn, will depend on how young people analyze and evaluate traumatic events, how aware they are of their thoughts, feelings, and strategies for regulating their emotions, and whether they find constructive ways to express them. In addition, student youth are more open to change, as their views of the world are usually still in development. Research suggests that PTG may "disintegrate" over time more quickly in children and adolescents than in adults, indicating that the opportunity for growth may be optimal during the student years (Meyerson et al., 2011). Another study found that older adolescents were more capable of developing higher levels of PTG than younger participants (Zhou et al., 2019). It is because students are more interested in connecting with the world, which means building more interpersonal relationships and seeking social support.

## Theoretical Basis

PTG is considered a positive psychological effect that can occur after an individual has experienced a significant traumatic event. A systematic review and meta-analysis conducted in 2019 analyzed 26 articles focusing on specific types of trauma and PTG that individuals demonstrated (Wuetal, 2019). As a result of the analysis, the authors concluded that nearly half of the survivors of traumatic events showed moderate to high levels of PTG. PTGs were also found in refugees who witnessed the death of family members or friends, sexual violence or torture, and who were forced to flee their home country after facing various dangers and overwhelming experiences along the way (Acar et al., 2021). A study of PTG among veterans found that 50.1% had moderate or higher levels of PTG (Tsai et al., 2015). The most essential factors in PTG among veterans are social connections and purposefulness. These statistics show great hope for injured veterans while serving their country.

Early concepts of PTG identified three categories that help measure it: perceived changes in oneself, changes in interpersonal relationships, and changed philosophy of life (Tedeschi & Calhoun, 1996). *Changes in self-perception* reflect an improved perception of one's strengths and abilities, improving one's self-assessment of

competence. If these people experience traumatic events in the future, they will have a source of confidence that they can draw on from their past. Living with such confidence is like having a superpower. Improvements in both depth and quality characterize *changes in interpersonal relationships* due to the realization of their importance and how quickly they can potentially dissipate. Certain traumatic events may prompt a person to be more emotively expressive in order to talk through the events or ask for help. It can lead to using new or more resources (which is interesting in the context of our study). *A changed philosophy of life* involves the struggle to understand the traumatic event and the search for new meaning in life. Making sense is a cognitive process that allows a person to integrate new life events into existing mental structures (Mangelsdorf & Eid, 2015). The researchers argue that "gaining a new perspective on the altered reality may facilitate the use of adaptive coping strategies and stimulation of PTG after ABI" (Grace et al., 2015, p. 12).

When it comes to PTG, the scale of the challenge matters. "PTG theory states that an event must be so upsetting that it challenges a person's goals, beliefs, and coping abilities or causes a change in their view of the world or themselves for growth to occur" (Shakespeare-Finch et al., 2020, p. 45). This term emphasizes the idea that traumatic events can give people new purpose and strength, pushing them to find ways to cope with complex challenges beyond their capabilities. This kind of thinking makes it possible to find and realize what makes life worth living and, in the process, inspires people to live lives they are proud of.

Some studies provide an approach according to which the conceptualization of post-traumatic development is considered in terms of the dialectical unity of the processes of post-traumatic stress disorder (PTSD) and post-traumatic growth (PTG). The results of the study indicate that the process of personality development is paradoxical, irreversible, and hardly predictable. In the dialectical perspective, the attractor of change is not the content of temporary forms (such as trauma, success, and flow) but the stabilization of their change: thesis-antithesis-synthesis. Compared to PTG, the result of PTD is a systemic transition to a new (not better or positive) identity. PTSD and PTG are minor cycles within the primary PTD cycle (Lushyn & Sukhenko, 2021). The authors concluded that from the point of view of the presented model:

1. A traumatic event can be a prerequisite for irreversible personality changes.
2. The post-traumatic process is ambiguous and manifests itself in a flow of relatively positive and negative transitional forms.
3. One of the manifestations is the experience of a complete dead end or blocking of the facilitation process.
4. People may demonstrate sensitivity to random events and the rhythm of their change.

Some researchers also argue that PTG should be understood and evaluated regarding personality change. This view suggests that PTG means personality changes of great depth and significance (Jayawickreme & Blackie, 2020). As long as we define a personality as an open psychosocial system that communicates with the environment for its self-recovery and self-development, development itself can be

understood as a process of constant, spontaneous realization of the potential of the personality system in the form of emergent properties.

Research shows that sharing information with a person or group can help them feel more "normal" about their feelings and experiences (Richardson, 2016). Other researchers argue that for proper growth to occur, both growth cognition and growth action must occur (Hobfoll et al., 2007). In another study, the authors state: "Only when people were deeply engaged in transforming cognitive growth processes into growth actions did we find positive benefits in post-traumatic growth." (Hensonetal, 2021, p. 54).

Thus, the literature review revealed that PTG is related to the ability to express and talk through emotions, as well as to reflect on one's thoughts about traumatic events.

In this article, we focus on emotive and metacognitive processes.

Emotivity is the subject of psycholinguistic research and means both a linguistic embodiment of emotivity and a linguistic category where emotions are expressed verbally. Shabat-Savka associates emotivity with the realization of the speaker's intention, in particular, the speaker's desire to convey their emotive state or to react to what they see, verbalizing it through units of different language levels – lexical and grammatical (Shabat-Savka, 2014). Shynkaruk interprets the term emotivity both in a narrow and broad sense. According to the researcher, in the narrow sense, emotivity correlates with expressive emotive vocabulary or is identified with connotation. In contrast, in the broad sense, it covers all linguistic means that express emotions, i.e., it is realized by units of different language levels (Shynkaruk, 2011).

This understanding of emotivity suggests that its functions are closely related to socio-emotive competence, which is defined as a person's cognitive and behavioral ability to perceive and express emotions, as well as to understand and use emotions in different situations (Mayer et al., 1993). Social and emotive competence covers five critical skills for developing cognitive, emotive, and behavioral abilities: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (Bridgeland et al., 2013). Some have concluded that socio-emotive competence is one of the factors that influence PTG, and a high level of it can enhance post-traumatic adaptive functioning and contribute to the development of PTG (Thomas et al., 2020). Studies compared COVID-19 adolescents' emotive competence during and after isolation and found that increased social-emotive competence promoted PTG in adolescents (Tang et al., 2022).

Therefore, the role of emotivity in the development of PTG is a promising area of research and can shed light on understanding the conditions and factors that contribute to the development of PTG.

In general, there are few psycholinguistic studies of trauma and its consequences. The first study of pandemic narratives markers of traumatic experience showed there are markers of time, depersonalization, and affective processes. The psychological marker of affective processes indicates immersion in the traumatic event. It emerges in the manifestation of negative emotions through the words "bad", "problems", "critical", and "difficult" (Kostruba, 2021). The second study studied the

use of language in the narratives of Holodomor survivors as psycholinguistic markers of psychological trauma and post-traumatic stress disorder (Zasiekina, 2020). Researchers investigated the psycholinguistic structure of autobiographical and traumatic narratives representing positive emotive and stressful traumatic life events. The results showed that there are significant differences between the pronoun "they" as an external agent of the sentence and the psychological categories of negative emotions and anxiety in traumatic and autobiographical narratives. The frequency of these categories is higher in traumatic narratives than in autobiographical narratives. The main theoretical conclusion of this study is that traumatic memory can be studied using psycholinguistic markers represented by sentence structures and psychologically significant categories of traumatic narratives (Zasiekina et al., 2019). The third study investigated the linguistic markers of the manifestation in modern non-institutional military poetry discourse of the consequences of combat stress experienced by Ukrainian army personnel during hostilities. This study focuses on an integrated approach that combines pragmatic and cognitive approaches within the discourse analysis framework. The analysis of military poetic discourse has shown that combat stress manifests in the poetry of military personnel in the form of signs of an emotive and psychological state that demonstrate post-traumatic stress disorder. To protect the psyche from the destructive effects of a psycho-traumatic situation, servicemen use such a self-regulation strategy as engaging in artistic creativity, in which poetry acts as a form of social and psychological rehabilitation (Khraban, 2021).

The fourth study focused explicitly on PTG. Based on the theoretical and methodological assumptions of Pennebaker's differential emotion model and McAdams' narrative identity model, the autobiographical sequences (word means = 1095) of 40 patients with mixed cancer were codified. The authors found that 26% used words with both positive and negative emotions, 37% used more words with positive emotions, and the other 37% used more words with negative emotions. Surprisingly, only memories with more negative emotions correlated with linguistic measures of cognitive change ($r = .82$) (i.e., true PTG). In contrast, memories with more positive emotions did not correlate with linguistic measures of cognitive and emotive processes. These results emphasized the crucial role of cognitive processes in facilitating the authentic PTG process (Scrignaro et al., 2012).

The predominant theoretical models of PTG are fundamentally cognitive. However, a few studies have examined the relationship of PTG to metacognitive beliefs, self-focused attention, and trauma-related attitudes toward the world and self. There is evidence that these cognitive constructs can influence the development of PTG (Marqueses et al., 2022).

Tedeschi notes that for PTG to occur, a traumatic event must challenge existing positive cognitive schemas by overturning a person's assumptions that the world is a fair place where people can predict and control what happens, that most people are inherently good, that the person has value, and that the world makes sense. Questioning these beliefs or attitudes leads a person to a cognitive state of trying to understand what happened and the nature of the world and themselves. In other

words, these traumatized people engage in a cognitive struggle to restore their cognitive functions and schemas about the world and themselves (Tedeschi et al., 2018). A *person's metacognitive beliefs* are defined as beliefs about their thought processes. Such beliefs reflect a metacognitive way of processing information when thoughts are not mere descriptions but mental events that deserve consideration (Wells, 2000). A metacognitive way of thinking allows individuals to take a more critical stance on their cognitive capacities and may help facilitate PTG. For example, metacognition may allow traumatized individuals to compare different versions of themselves from "before" and "after" the traumatic event, a thought process that may allow them to recognize their own PTG (Taku et al., 2012, p. 415).

A characteristic feature of metacognitive processes is that they are both cognitive and regulatory (Balashov, 2020). They determine the individual's knowledge of their cognitive processes and activity, as well as perform the functions of control, regulation, and organization of metacognitive processes of a person in achieving specific learning goals.

### Research Questions and Hypotheses

This study will address three research questions.

RQ1: What are the indicators of post-traumatic growth in student youth after one year of war in Ukraine?

RQ2: What is the role of emotive and metacognitive processes in the post-traumatic growth of student youth?

RQ3: What is the relation between cognitive reappraisal, emotivity, emotive regulation, and emotive flexibility and the PTG in groups of students during the war?

Based on the previous discussion, we formulated three hypotheses in this study.

**Hypothesis 1.** We hypothesize that the suppression of emotive expression and feelings has a negative correlation with students' PTG;

**Hypothesis 2.** Cognitive reappraisal of one's thoughts about the traumatic event has a positive correlation with students' PTG;

**Hypothesis 3**. Psychological flexibility mediates the relationship between emotive expression and cognitive reappraisal with students' PTG.

## Method

The study was conducted in the format of an online survey using the Google Forms tool, and the survey period covered the period from December 2022 to February 2023.

For the current data analysis, four methods were used, namely: Gross Emotive Regulation Questionnaire (ERQ), the Hayes Emotive Flexibility Scale (AAQ-II), the Post Traumatic Growth Inventory (PTGI), and the Changes in Outlook Questionnaire (CiOQ).

The ERQ (Emotion Regulation Questionnaire) was developed based on the process model of emotive regulation and is aimed at diagnosing two emotive regulation strategies – cognitive reappraisal and expressive suppression. The first subscale of the questionnaire – cognitive reappraisal – corresponds to what we reasonably call "metacognitive processes" in theory; the second subscale – expressive suppression – serves as an empirical indicator of the emotive process in posttraumatic personality growth. Our study used the Ukrainian version of the questionnaire. The internal validity coefficient of this questionnaire version is αERQ = .81 for both subscales.

The Hayes EmotiveFlexibility Scale (AAQ-II) is taken from the Acceptance&Action Questionnaire (AAQ-II), developed by Bond, F. W. et al. (2011). According to its provisions, psychological flexibility means the willingness to experience and not interfere with undesirable personal experiences, fully connecting with the present moment to pursue one's goals and values. This questionnaire is designed to measure the level of experience avoidance and psychological flexibility of the individual, which, in the context of our study, is an indicator of emotive processes in posttraumatic growth. The AAQ-II showed good internal consistency with Cronbach'sα coefficient in 9 samples between .89-.95. It also demonstrated an acceptable test-retest reliability (r = 0.85) in three weeks. The AAQ-II had good convergent validity with another measure of psychological flexibility (CompACT) (r= - .65)(Shyroka et al., 2021).

In addition to the unit on emotive and metacognitive processes, our study also included two questionnaires to assess and analyze the characteristics of posttraumatic growth.

The Posttraumatic Growth Inventory (PTGI) (Tedeschi & Calhoun, 1996) measures a general index of posttraumatic growth based on data on five subscale factors: attitudes toward others (relationships with others), new opportunities, personal strength, spiritual changes, and appreciation of life. Retest reliability is high (Pearson's correlation coefficient is .71). The study used the Ukrainian questionnaire developed by Novak and Gukovsky.

The Change in Outlook Questionnaire (CiOQ) supplements the previous questionnaire. The analysis of the factor structure of the questionnaire showed that a two-factor model best describes the scales included in the questionnaire: positive and negative changes after a traumatic experience (Joseph et al., 2005). The internal reliability indicators for the Ukrainian-language version of the questionnaire are high: Cronbach'sα coefficient - .79; Spearman-Brown's coefficient - .71; Guttman's coefficient - .71. (Zubrovskyi, 2018).

For the mathematical analysis of the data, we used the point-biserial correlation coefficient, which is suitable for working with dichotomous and interval scales. In our study, the gender scale was dichotomous; all other scales were interval scales, respectively. When interpreting the correlation coefficient, we were guided by the recommendations proposed by Cohen, according to which: .00 - .10 – insignificant; .10 - .30 – small; .30 - .50 – medium; .50 - 1.00 – large. At the same time, we did not consider the results below .3 when analyzing and interpreting the data.

The participants of the study were 1st and 2nd-year students of the National University of Ostroh Academy who expressed a desire to take part in the survey. The total number of students surveyed was 206 (average age=17.6 years; range=16–24 years).

To collect primary data, the researcher used a purposive sampling technique and considered the students' course of study. The rest of the demographical and other types of information (such as sex or gender, region of residence ) was not crucial when forming the sample but were taken into account during the analysis of the obtained data. To ensure privacy, respondents filled in the online Google form without collecting any personal data. We did not apply to the Ethics Committee for the approval of the research procedure; however, we explained in detail to the participants their rights, how the obtained information would be used, and guaranteed the confidentiality and anonymity of their data. The participants of the study gave their voluntary consent to participate in the study and did not receive any remuneration or any other material incentives for this.

Among the students surveyed, the vast majority were 17 years old (58.3%); more than 34% of students were 18 years old; 4.9% of students were 19 years old; 2 respondents were 20 years old, as well as one person aged 16 and 24.

More than 78.5% of the surveyed students indicated their gender as female, and the remaining 21.5% as male. 89% of students are in their first year of study, and over 10% are in their second year. Among the surveyed students were representatives of various specialties, namely Psychology, Roman and Germanic languages, Law, Economic Cybernetics, Public Health, Primary Education, Computer Science, Finance and Credit, Management, Journalism, National Security, DATA Marketing and Analytics, International Relations, and Political Science.

The studied students came from different regions of Ukraine. The largest share of 55.8% was from the Rivne region, followed by 17% from Khmelnytskyi, 7.3% from Volyn, 4.9% from Zhytomyr, and 2.9% from Ternopil. Five people were from the Lviv Oblasts, and three were from Kyiv and Dnipropetrovsk Oblasts. The remaining respondents in the number of 1–2 people (0.5–1% each), were from other regions of Ukraine, such as Sumy, Kherson, Mykolaiv, Cherkasy, Chernihiv, Vinnytsia, Donetsk, Ivano-Frankivsk, and Poltava Oblasts.

Most people surveyed kept their residences the same after the start of a full-scale Russian invasion of Ukraine (89.8%). At the same time, some became internally displaced within Ukraine (6.8%) or moved abroad (3.4%). At the same time, most student respondents do not plan to move soon (82.5%) or have not decided on their position on this issue (13.6%).

# Results

The data obtained during the survey were processed qualitatively and quantitatively using computer versions of Microsoft Excel 2021 and SPSS 22.0 for Windows 10.

## Level and Features of PTG

Our research has shown that the majority of respondents, after a year of full-scale war in Ukraine, have a high (50%) or medium (33%) level of PTG (Mean=59.1). The scores on the individual scales of the questionnaire are presented in Table 1.

Table 1
*The Level of PTG of Students (%, n=206)*

| Scales | Levels | | |
|---|---|---|---|
| | high | medium | low |
| New opportunities | 49 | 29 | 22 |
| Attitude towards others | 30 | 39 | 32 |
| Personality strength | 32 | 50 | 19 |
| Spiritual changes | 21 | 38 | 41 |
| Increasing the value of life | 46 | 33 | 21 |
| *Overall PTG score* | *50* | *33* | *17* |

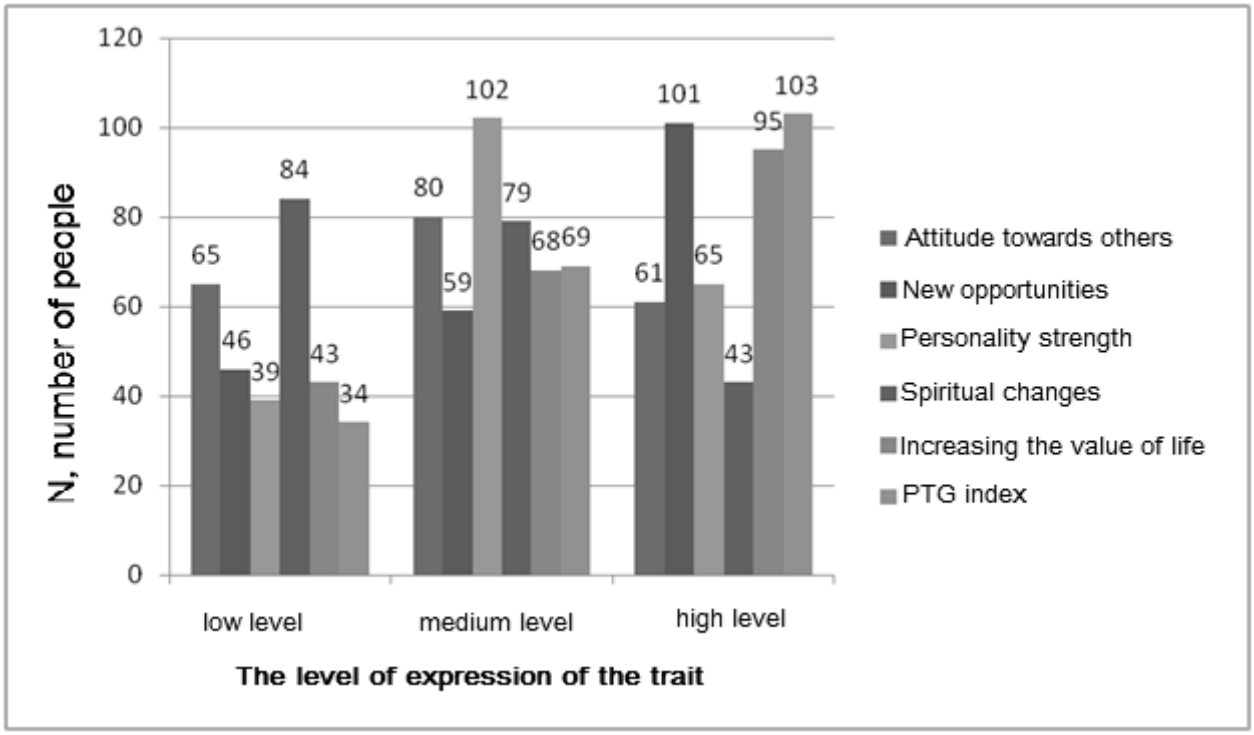
As we can see, the most significant number of people with high and medium scores were found on the scales of “new opportunities”,“personality strength”, and “increasing the value of life”. It indicates positive changes in students’ perception of their self, the emergence of new opportunities, an increase in personal strength, and a sense of inner integrity. Changes in self-perception are a relatively common consequence of the destruction of basic ideas about the world, which is entirely consistent with the social and cognitive theory of trauma (Janoff-Bulman, 1998). In particular, significant life challenges, such as war, can produce a growing sense that a person coped with a test for their strength and resilience. After weighing up everything that has happened, a person can realize that they have experienced the worst and that now there are unlikely to be situations in their life that they are unable to cope with. A third of the respondents changed their attitude towards others and began to value the existence of certain relationships in their lives and clearly understand who their true friends are.

The smallest percentage of students with high scores was on the “spiritual changes” scale (21%). Experiences related to this growth area reflect an increased sense of meaning and purpose in life, more satisfaction, and clarity in answering fundamental existential questions. Probably, such changes are more typical for the older age group.

Figure 1 shows the distribution of respondents by the scales of the Post Traumatic Growth Inventory according to the levels of expression of the studied characteristics.

Figure 1

*Distribution of Respondents by the Scales of the Post Traumatic Growth Inventory According to the Levels of Expression of the Studied Characteristics*




Regarding changes in personal attitudes as a result of PTG, the majority of respondents reported positive changes (59.2%), and slightly less reported negative changes (39.8%). Two people stated that the same number of both positive and negative changes occurred in their lives.

The second task of the empirical study was to find out the role of emotive and metacognitive processes in the PTG of students.

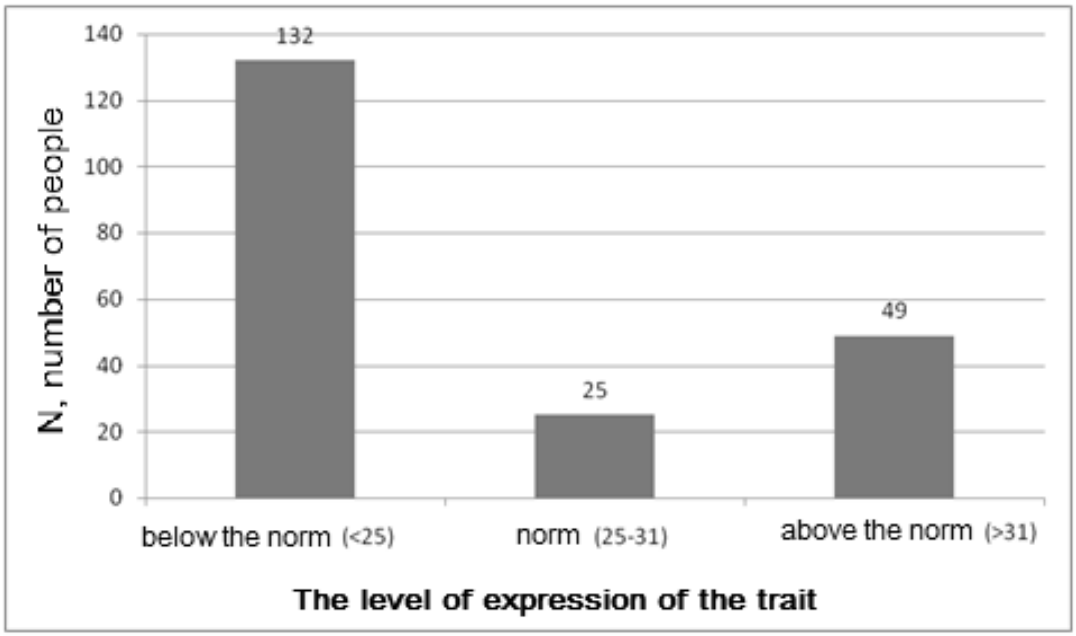
**Emotive Processes**

On the emotive suppression scale, the mean value of the sample is 15.73, which corresponds to a low level of use of this emotive regulation strategy. This type of emotive regulation occurred in only 3% of the respondents. The data obtained indicate that most students under study express their feelings and emotions verbally or non-verbally. We consider this to be a positive aspect since, without the ability to share their emotions and experiences, a person can become depressed and feel lost and lonely.

The average value of the emotive flexibility indicator in the sample of respondents is 21.6, which corresponds to a score below the norm according to the questionnaire (Figure 1). According to the methodology, the average score (31 points) indicates mental health. Accordingly, a score below 25 indicates the likelihood of depression, mental disorder, and poor quality of life. Thus, 64.1% of respondents have scores below the conditional norm, and 23.8% have above-norm

scores. At the same time, 12.1% of the survey respondents are in the range between 25 and 31 points.

Figure 2
*Distribution of Respondents According to the Conditional Norm of the Emotive Flexibility Questionnaire (AAQ-II)*




**Metacognitive Processes**

According to the cognitive reappraisal scale, the average value of the sample is 27.95, which corresponds to the average level of use of this emotive regulation strategy. Cognitive reappraisal involves changing thoughts caused by a situation and changing the assessment of the ability to cope with a given situation, including it in a broader context, which in the adaptive case leads to an increase or decrease in the intensity of the current emotion or its replacement with another emotion. The frequency with which this type occurs among the sample is 94.7%, making it the dominant way of emotive regulation compared to suppressing expression.

**Correlation Analysis of Data**

The use of the point-biserial correlation coefficient suggests that there is a medium-strength relationship between cognitive reappraisal and suppression of expression (R=.325), attitude toward others (R=.395), and new opportunities (R=.404), personality strength (R=.405), spiritual changes (R=.334), increasing the value of life (R=.342), positive changes in attitudes (R=.451), and overall PTG index (R=.443).

In addition, the point-biserial correlation coefficient demonstrates a strong relationship between emotive inflexibility and negative changes in attitudes (R=.546), between positive changes and attitudes towards others (R=.623) and new opportunities (R=.563), personality strength (R=.547), increasing the value of life (R=.667), and the overall PTG index (R=.679).

All empirical values of the point-biserial correlation coefficient are presented in Table 1.

Table 1

*An Inter-item Correlation Matrix with Empirical Values of the Point-biserial CorAnrelation Coefficient, R*

| | Cognitive reappraisal | Expression suppression | Emotive inflexibility | Attitude to others | New oport. | Pers. str. | Sp. changes | Incr. value of life | PTG index | Neg. changes | Pos. changes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cognitive reappraisal | 1 | .325 | .065 | .395 | .404 | .405 | .334 | .342 | .443 | -.165 | .451 |
| Expression suppression | | 1 | .126 | -.019 | .096 | .09 | .053 | .028 | .049 | .093 | .105 |
| Emotive inflexibility | | | 1 | .126 | .07 | -.006 | .13 | .103 | .098 | .546 | .016 |
| Attitude towards others | | | | | .699 | .663 | .637 | .694 | .903 | -.097 | .623 |
| New opportunities | | | | | 1 | .823 | .598 | .702 | .899 | -.058 | .563 |
| Personality strength | | | | | | 1 | .552 | .674 | .868 | -.095 | .547 |
| Spiritual changes | | | | | | | 1 | .59 | .736 | -.043 | .503 |
| Increasing the value of life | | | | | | | | 1 | .839 | -.04 | .667 |
| PTG index | | | | | | | | | 1 | -.085 | .679 |
| Negative changes | | | | | | | | | | 1 | -.101 |
| Positive changes | | | | | | | | | | | 1 |

**Analysis of Gender Differences in the Expression of Specific Traits**

The data analysis revealed some insignificant differences between gender and some variables, which can be considered features that require further study. The Mann-Whitney U test was used for possible statistical differences in the studied indicators by gender (Table 2). We justified this criterion by the impossibility of applying the parametric Student's T-test for independent samples due to the discrepancy between the distributions of the group of men (n=44) and women (n=162) to the law of normal distribution. Since at least one of the study groups presented has a small size (n<50), the Shapiro-Wilk test was used to check the normality of the distribution, as well as additional analysis of such indicators as mean, median, kurtosis, skewness, and standard error of skewness and kurtosis.

Table 2
*Results of the Mann-Whitney U Test for Individual Scales in the Group of Men and Women*

| | | Cognitive reappraisal | Emotive inflexibility | Attitude to others | New opportuniti | Persolaity strenght | Spiritual changes | Incr. value of life | PTG index | Positive changes |
|---|---|---|---|---|---|---|---|---|---|---|
| aver age | *man (n=44)* | 82.07 | 86.91 | 88.38 | 87.03 | 9.84 | 83.95 | 7.25 | 82.9 | 76.42 |
| rank | *women (n=162,* | 109.32 | 108.01 | 107.61 | 107.97 | 106.94 | 108.81 | 112.53 | 109.1 | 11.85 |
| Mann–Whitney U | | 2621.000 | 2834.000 | 2898.500 | 2839.500 | 3007.000 | 2704.000 | 2101.000 | 2657.50 | 2372.500 |
| Wilcoxon | | 3611.000 | 3824.000 | 3888.500 | 3829.500 | 3997.000 | 3694.000 | 3091.000 | 3647.50 | 3362.500 |
| Z | | -2.693 | -2.083 | -1.899 | -2.069 | -1.592 | -2.471 | -4.192 | -2.586 | -3.401 |
| Asymptotic significance (2-sided). *p* | | .007 | .037 | .058 | .039 | .111 | .013 | .000 | .010 | .001 |
| Effect size. *r* | | -.188 | -.145 | -.132 | -.144 | -.111 | -.172 | -.292 | -.180 | -.237 |

The presented data indicate that there is no significant difference between the group of men and women in the indicators of "attitude towards others" (U=2898.5; Z=-1.899; p=.058) and "personality strength" (U=3007.0; Z=-1.592; p=.111). At the same time, the results of the Mann-Whitney U-test indicate the existence of a statistically significant difference between the group of men and women in terms of cognitive reappraisal (U=2621; Z=-2.693; p=.007), emotive inflexibility (U=2834; Z=-2.083; p=.037), "new opportunities" (U=2839.5; Z=-2.069; p=.039), "spiritual changes" (U=2704; Z=-2.471; p=.013), "increasing the value of life" (U=2101; Z=-

4.192; p=.000), PTG index (U=2657.5; Z=-2.586; p=.010) and positive life changes (U=2372.5; Z=-3.401; p=.001). In particular, women demonstrated slightly higher scores on these scales.

We can explain this result by associating it with greater women's involvement and general societal processes in Ukrainian society. As we can see from Table 2, women demonstrated higher indicators of emotional inflexibility compared to men, which indicates a more direct and immediate expression of one's emotions. Furthermore, although detecting gender differences was not the goal of our study, this aspect can provide a new outlook on understanding the conditions and factors of PTG.

The data suggest that our hypothesis was partially confirmed. In particular, we found no connection between expression suppression and PTG. At the same time, we found that emotive inflexibility is associated with negative life changes, and we also recorded links between cognitive reappraisal and PTG with all its components

# Discussion

Results in this research correlate with other studies. In particular, intentional thinking can influence PTG and is generally associated with higher levels of PTG after trauma (Henson et al., 2021). Continuous cognitive processing through intentional thinking signaled higher levels of growth over time (Taku et al., 2009).

Some studies investigating PTG in children who have lost one or both parents to COVID-19 showed that PTG is related to several factors, one of which was intentional reflection, talking through emotions related to traumatic experiences (Gray et al., 2022; Ikizer et al., 2021). A study explicitly conducted among American medical students during the COVID-19 pandemic provided exciting data on PTG. These future physicians often directly cared for patients with COVID-19, engaged in building a supportive social network, used cognitive flexibility or demonstrated other ways to volunteer and serve others. These behaviors indicated higher levels of PTG in students throughout the COVID-19 pandemic (Luo et al., 2022).

A study involving 176 college students found that individuals who desire to be in touch with their emotions and memories show higher levels of PTG (Kashdan & Kane, 2011). The study also found that higher levels of distress combined with a low resistance to the experience of avoiding one's own emotions resulted in the highest PTG scores. Thus, this evidence proves that emotive and metacognitive processes improve the PTG.

As known, emotive regulation typically involves reducing negative affect by engaging (e.g., reappraisal) or disengaging (e.g., distraction) with emotive content. Analysis of the latent growth curve showed that an increase in the choice of reappraisal from low to high intensity of the subjective stimulus predicted a higher PTG (Orejuela-Dávila et al., 2019). Research examining the relationship between emotive regulation and PTG shows that strategies that involve dealing with emotive stimuli, such as reappraisal, can influence PTG by helping people extract meaning from their traumatic experiences (Larsen & Berenbaum, 2015). The strategy of reappraisal, which focuses on

interacting with and changing the meaning of emotive content, has been consistently associated with PTG. However, recent research supports a more nuanced, context-dependent view. Specifically, reappraisal seems to be preferred when dealing with low-intensity traumatic events, and focus/distraction is preferred for dealing with high-intensity difficult emotions (Taubman-Ben-Ari et al., 2021).

A recent Ukrainian study on the psychological factors of mental resilience of young spouses during the war showed that young people in the sixth month of the war can cope and recover from stressful and traumatic events due to high levels of emotive flexibility and the regulatory strategy of cognitive reappraisal (Author & Mykolaychuk, 2023).

The results suggest that cognitive reappraisal of negative stimuli after a traumatic event may be a critical factor in PTG.

# Conclusion

Thus, the study made it possible to find out that after one year of full-scale war in Ukraine, student youth shows PTG. The analysis of the results of the empirical study showed that the average PTG indicators among the surveyed youth are high. It indicates positive changes in how students perceive themselves, the emergence of new opportunities, increased personal strength, and a sense of inner integrity.

We assumed that the PTG of students would be associated with emotive and metacognitive processes. This hypothesis was partially confirmed. In particular, we did not find a relation between emotive expression and PTG. At the same time, we found a relation between expression suppression and cognitive reappraisal, as well as significant relations between cognitive reappraisal and PTG with all its components. The findings suggest that cognitive reappraisal of negative stimuli (and possibly of one's emotive reactions to traumatic events) may be a critical factor in PTG, helping young people to make sense of their traumatic experiences. In this case, it is essential to consider the intensity of emotions.

Traumatic events lead many people to be more emotionally expressive in order to talk about their emotional reactions caused by a specific event. Talking about one's emotions is closely related to cognitive processing of traumatic experiences, which may serve as a facilitating factor for PTG, helping young people make sense of their traumatic experiences. However, the correlation between suppression of expression and cognitive reappraisal, as well as the absence of such correlation between expression and PTG, can be explained by the functionalling of mental defense mechanisms. Under challenging circumstances, emotions can blunt, while cognitive and metacognitive processes become activated.

Our attempt to analyze the role of emotive and metacognitive processes in the PTG of students during the war indicates the need for further psycholinguistic research in this area, using the narrative method with further analysis of emotive vocabulary peculiarities of word combinations. In particular, it could be beneficial to search for linguistic markers of PTG or consider a cognitive approach in combination

with ethno- and linguistic-cultural approaches. Thus, it will make it possible to reveal the national and cultural characteristics of PTG and contribute to the development of effective programs to overcome PTSD and facilitate PTG.

The benefits of PTG seem promising and give hope to those who have experienced traumatic events. Some studies show results that indicate not only the long-term benefits of PTG but also an increase in these benefits over time. Therefore, a separate promising area for our further research is monitoring PTG among students during their studies at universities.

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## Disclosure Statement

No potential conflict of interest was reported by the authors.

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# Investigating Multilingualism and its Association with Executive Functioning: An Exploratory Study Comparing Bilingual, Trilingual and Quadrilingual College Students in India

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**Abstract.** Multilingualism has both advantages and disadvantages. Past research has highlighted this dichotomy by exploring the impact of linguistic ability on individuals' executive functioning. This study explores the relationship between individuals' linguistic ability (number of languages spoken) and their executive functioning, specifically, working memory – measured using the Corsi Block-Tapping task (Mueller, 2011a), inhibitory control – measured using the Go/No-Go task (Mueller, 2011b) and problem solving – measured using the Tower of London task (Mueller, 2011c) among a total of 91 bilingual, trilingual and quadrilingual Indian colleges students. Results from a Kruskal Wallis test indicated non-significant results for problem solving among the three groups. However, significant differences were found between groups for working memory ($p$ = .050) (particularly between bilinguals and quadrilinguals, and trilinguals and quadrilinguals) and inhibitory control ($p$ = .020) (particularly between trilinguals and quadrilinguals). The mixed results indicate a need for further research in this domain within the vast and diverse population of India.

***Keywords:*** *bilingualism, trilingualism, quadrilingualism, working memory, inhibitory control, problem solving, Indian population.*

**Раджан Ґаріма, Патіл Нянада. Вивчення багатомовності та її зв'язку з екзекутивною функцією: Експериментальне дослідження з порівняння двомовних, тримовних та чотиримовних студентів коледжів у Індії.**

**Анотація.** Багатомовність має як переваги, так і недоліки. Попередні дослідження висвітлили цю дихотомію, вивчаючи вплив лінгвістичних здібностей на виконавчу діяльність людини. У цьому дослідженні вивчається зв'язок між мовною здатністю індивідів (кількістю мов, якими вони володіють) та їхньою екзекутивною функцією, зокрема, робочою пам'яттю, вимірюваною за допомогою тесту Corsi Block-Tapping (Mueller, 2011a), інгібіторним контролем, вимірюваним за допомогою тесту Go/No-Go (Mueller, 2011b), та вирішенням проблем, вимірюваним за допомогою тесту "Лондонський Тауер" (Mueller, 2011c), серед студентів індійських коледжів, які володіють двома, трьома, або чотирма мовами. Результати тесту Краскала Волліса засвідчили незначні відмінності у вирішенні проблем між трьома групами. Однак були виявлені значні відмінності між групами щодо робочої пам'яті (p = .050) (особливо між двомовними і чотиримовними, а також тримовними і чотиримовними) та інгібіторного контролю (p = .020) (особливо між тримовними і

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чотиримовними). Змішані результати вказують на потребу в подальших дослідженнях у цій галузі серед численного та розмаїтого населення Індії.

***Ключові слова:*** *двомовність, тримовність, чотиримовність, робоча пам'ять, інгібіторний контроль, вирішення проблем, населення Індії.*

# Introduction
# Literature Review

## Explaining Multilingualism

Multilingualism is having 'fluency in multiple languages'. Research on multilinguals has highlighted advantages and disadvantages of learning and speaking multiple languages (Anton et al., 2019; Bialystok & Craik, 2010; Dick et al., 2019: Espi-Sanchis, & Cockcroft, 2021: Lehtonen et al., 2019; Slot & Suchodoletz, 2018).

## Effects of Multilingualism on Executive Functioning

An enhancement in executive functioning skills is the biggest advantage highlighted by researchers. The existing studies focus on understanding the relationship between number of languages spoken and executive functioning using two broad approaches – through linguistic and non-linguistic based tasks (Czapka et al., 2019). Multilinguals (those who speak more than one language) have been shown to perform better at various non-linguistic cognitive tasks which involve skills like attentional control (Bialystok, 2008), response inhibition (Poarch & Hell, 2012b), task switching (Barac & Bialystok, 2012) and working memory (Oschwald, et al., 2018). However, they perform at par or sometimes worse than their monolingual (those who speak one language) counterparts on linguistic tasks (Bialystok, 2009; Slot & Suchodoletz, 2018). Multilinguals also commit greater errors during rapid retrieval of lexical knowledge (Bialystok & Craik, 2010). Therefore, we can conclude that multilinguals experience both pros and cons.

Researchers have proposed a theory to explain this dichotomy, known as the cross-language interference hypothesis. The theory argues that multilinguals have to ignore interferences from one language while speaking in another. These cross-language interference demands provide life-long training for executive functioning tasks (Oschwald, et al., 2018). The learning and actively speaking multiple languages provides individuals with sustained training resulting in enhanced executive functioning. Therefore, one could say that the number of languages spoken by an individual is directly proportionate to their executive functioning skills. By this logic, one would expect to find higher cognitive skills among trilinguals than bilinguals; among quadrilinguals than trilinguals and so on. However, research has shown that such is not the case (Schroeder & Marian, 2016). A study found that trilinguals (those who speak three languages) share the similar advantages as bilinguals (those who speak two languages) (Poarch & Hell,

2012a). Hence, many more factors impact the relationship between multilingualism and executive functioning.

## Factors Affecting the Impact of Multilingualism on Executive Functioning

Research into other factors such as cultural background (Bialystok and Barac, 2012; Treffers-Daller et al., 2020), age at which the languages were learned (Boumeester et al., 2019), socioeconomic status (Bialystok and Calvo, 2014), educational level, similarity and dissimilarity of the languages learned and proficiency in each language (Poarch, 2018; Espi-Sanchis, & Cockcroft, 2021) show that impact the relationship between multilingualism and executive functions.

***Effect of Similarity of Languages.*** Researchers investigating the effects of similarity or dissimilarity of the languages spoken are yet to find a clear answer. Barac & Bialystok (2012) found that similar languages allow for better performance in lexical tasks. It seems to enhance rapid recall abilities of the individuals (Oschwald et. al., 2018) but not always (Polczynska et. al., 2016).

***Proficiency in the Language.*** Similar to most data presented previously, there is ambiguity present in the existing literature (Achaa-Amankwaa et al., 2023; Filippi et al., 2021). Certain studies have found that proficiency in the second language does not have influence the relationship (Matilda, Selin & James, 2021; Oschwald et al., 2018), while other research have found contrary results (Antoniuo et al., 2016; Bialystok & Majumder, 1998; Fernandez et al., 2013). Some studies also say that the relationship is moderated by proficiency (Poarch & Hell, 2012). Furthermore, studies examining the neural networks of language too have found activation in different areas across different proficiency levels (Briellmann et al., 2004; Chung-Fat-Yim et al., n.d.). Thus, most studies attempt to control this variable (Mehrani & Zabihi, 2017) in order to make generalized conclusions.

## Bilingualism vs Trilingualism

Many studied have attempted to show the differences between trilinguals and bilinguals. Some studies report that bilinguals and trilinguals share the same advantages (Poarch & Hell, 2012a), while other suggest several differences (Schroeder and Marian, 2016). A study suggested that certain cognitive skills are better for bilinguals, while trilinguals exceed in others (Schroeder & Marian, 2016). Thus, having separate frameworks to understand the two populations will be beneficial in understanding the similarities and differences between them.

## Quadrilingualism

Most of the research examining this relationship has been conducted in Western countries. Studies on quadrilinguals are very few and tend to combine trilinguals and quadrilinguals into one group – labelled as multilinguals (those who speak multiple languages) (Antoniuo et al.,2016; Cockcroft et al., 2019; Czapka & Festman, 2021;

Limber & Buchweitz, 2014; Reyes, 2013; Simonis, 2018). This failure to distinguish between the two as separate groups pose a problem when analysing and generalizing the data collected due to within group variations.

Although, a bilingual and trilingual advantage has been seen in most studies, the same cannot be seen among quadrilinguals in the existing literature. Quadrilinguals perform poorly on symmetry span tasks (King, 2020) and inhibitory control (Matilda et al., 2021). Therefore, we cannot use the same framework for bilinguals, trilinguals and quadrilinguals. We also cannot conclude that speaking multiple languages is better than speaking one or vice-a-versa.

## Understanding Executive Functioning

Executive functions are top-down mental processes essential in carrying out automatic processing and instinctual behaviour. They play a vital role in physical and mental health, cognitive skills and social behaviour. Task-switching, working memory and inhibitory control are the three key elements of executive functioning (Diamond, 2013). Other higher-order executive functions – problem-solving, logical reasoning and decision making – are built from these core components (Diamond, 2013).

Executive functioning develops throughout one's lifespan. It develops rapidly among children and slows down with age. The components of executive functioning are stable and grow simultaneously (at different rates) (Miyake & Friedman, 2013). They can be enhanced through training and practice. Individual experiences makes studying these variables extremely difficult. Stress, physical health, emotional state, social and environmental factors all affect an individuals' executive functions (Diamond, 2013).

## Theories of Executive Functioning

Executive functioning as a whole has been attempted to be studied under various theoretical frameworks. Early theories attempted to study the various components of executive functioning individually (Broadbent, 1958; Posner & Snyder, 1975), as a whole (Baddeley et al., 1996) and through the lens of neuropsychology (Garcia-Madruga et al., 2016). However, modern day theories combine the two approaches and view executive functioning as a whole, still divide and study the various components as separate yet correlated elements (Diamond, 2013; Miyake & Friedman, 2013).

## Relevance of Executive Functioning

Executive functioning are skills that individuals are constantly using in their everyday life. For example, when in a crowded space, one is able to focus on the video on their phone because they are exercising inhibitory control, which is they are not only focusing on the video but also ignoring interfering information coming in the form of noise from their surroundings. Executive functioning is very useful and acts

as an important predictor of multiple things, such as several psychological disorders (Diamond, 2005), poor health (Miller et al., 2011), decreased productivity (Bailey, 2007), lack of socio-emotional regulation (Denson et al., 2011) and academics (Borella et al., 2010). Thus, executive functioning plays a crucial role in the lives of both school and university students.

## Gaps in Literature

Past research has shown multiple advantages as well as disadvantages of being multilingual (used collectively for all bilinguals, trilinguals, quadrilinguals and so on) (Antoniou, 2018; Bialystok, 2008; Dick et al., 2019: Espi-Sanchis, & Cockcroft, 2021; Lehtonen et al., 2019; Oschwald et al., 2018; Poarch & Hell, 2012a; Slot & Suchodoletz, 2018 and more). Although such studies have been replicated in various cultures, it is still unclear as to what pro and cons multilinguals experience and why they experience them. Moreover, very few studies have been conducted in an Indian context (Bialystok & Majumder, 1998; Chan & Rao, 2022; Daga & Rajan, 2023; Iyer & Venkatesan, 2021; Rafeekh et al., 2021). Additionally, the differences in group size, language groups, populations, and methodologies have resulted in inconclusive and contradictory findings. This raises the question that maybe factors other than individuals' linguistic ability may impact the executive functioning of multilingual individuals.

## Rationale for the Current Study

The current study attempts to study one such factor – number of languages spoken. The study follows the rationale that a higher number of languages spoken and its cross-language interference demands provide life-long training resulting in differences in executive functioning. According to the 2021 India Census, there is a total of over 19,500 languages and dialects spoken in India. The report further states that over 31 crore Indians are bilinguals and over eight and a half crore are trilinguals. With such a vast variety of languages as well as a large population, the Indian population is an understudied group with a lot to offer.

## Current Study

The current study aims to add onto existing literature by exploring the relationship between executive functioning and bilingual, trilingual and quadrilingual college students in India. The study explores executive functioning skills of individuals through non-linguistic tasks only.

*Research Question*. Does the number of languages an individual speaks have an effect on an individual's executive functioning, particularly inhibitory control, working memory and problem solving?

*Hypothesis.* There would be significant differences between bilingual, trilingual and quadrilinguals individuals on executive functioning tasks.

# Methodology

## Participants

The sample size consisted of 91 participants (Bilinguals = 30, Trilinguals = 31, Quadrilinguals = 30). The sample was composed of more females than males (Females = 66 (72.5%), Males = 24 (27.5%)). The sample consisted of individuals aged between 18 to 22 years. The mean age of participants was 19.7 years (Bilinguals Mean $_{age}$ = 19.8, Trilinguals Mean $_{age}$ = 19.5 and Quadrilingual Mean $_{age}$ = 19.8). Participants were recruited using a google form (circulated via email across all batches within FLAME University, and through posters placed across the university campus), thus a convenience sampling method was employed. The participants were informed about the true purpose of the study to ensure for informed consent. The participants had the option to withdraw their consent at any time during the study without any consequences.

Table 1
*Descriptive Statistics*

| Group | Bilingual | | Trilingual | | Quadrilingual | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Male | 6 | 20 | 6 | 19.35 | 11 | 36.67 |
| Female | 24 | 80 | 24 | 77.42 | 18 | 60 |
| Other | 0 | 0 | 0 | 0 | 1 | 3.33 |
| Total | 30 | 32.97 | 31 | 34.07 | 30 | 32.97 |

*Note*. N = 91 (N =/> 30 participants in each language group)

Anonymity of the participants was maintained. The minimum criteria for inclusion included a minimum age limit of 18 years old and a basic high school education (completed 10$^{th}$ Grade). No participant was excluded on the basis of their race, gender, caste, socio-economic status or a particular language spoken by them. No compensation, monetary or otherwise, was given to the participants.

## Measures

The recruitment form collected other demographic data such as age, gender, educational background and number of languages spoken proficiency (reading and writing) and fluency (speaking) in each language. The study measured three variables of executive functioning. All participants completed three cognitive tasks; 1. The Corsi Block task – Working memory, 2. The Go/No-Go task – Inhibitory control, and 3. The Tower of London task – Problem solving. All three tasks were run on PEBL – Psychology Experiment Building Language.

***The Corsi Block Taping Task (Corsi, 1972).*** The Corsi Block Tapping Task is used to measure visuospatial working memory (Orsini, 1994). Participants are presented with nine squares that appear in randomized positions on the screen at each trial that sequentially light up. The participant is expected to replicate the sequence. Being a power test, it increases in difficulty. The trials begin with a sequence of two blocks and go on till a sequence of nine blocks. A correct trial is one wherein the participant correctly replicates the sequence. After every two correct trials, the number of blocks in the sequence increase. However, after two failed trials, the task ends. The task has high test-retest reliability (Paula, Malloy-Diniz & Romano-Silva, 2016). Furthermore, a study found that results between a traditional and digital version of the test were also consistent (Siddi et al., 2020).

***The Go/No-Go Task (Gordon & Caramazza, 1982).*** The Go/No-Go task measure inhibitory control. Participants are presented with a target stimulus and a distractor stimulus. They must click a button whenever they see the target stimulus and avoid pressing it when the distractor stimulus is shown. A correct trial occurs every time the participant correctly clicks the button for the target stimulus and correctly avoids clicking the button for the distractor stimulus. However, if the participant fails to do so, an incorrect trial occurs. There are two rounds in the task. In the second round, the distractor stimulus and the target stimulus are swapped, further increasing the test difficulty. The test has strong test-retest reliability and a modest convergent validity when compared to other measures of inhibitory control (Langencker et al., 2007).

***The Tower of London Task (Berg & Byrd, 2002).*** The Tower of London task measures problem solving. In the task participants are presented with a diagram that shows 3 columns and up to 3 coloured discs. The participants are required to replicate the position of the discs shown by moving the discs in a fixed number of moves. This requires the participants to plan their moves ahead of time. A correct trial occurs when the participant is able to replicate the given diagram correctly. The participant gets only one chance per trial. The task has great internal validity and a satisfactory split-half reliability (Kaller, Unterrainer & Stahl, 2012; Kostering et al., 2015).

## Procedure

Following development of a research design, approval from the FLAME University IRB was sought. After attaining the approval for the study, participants were recruited and called to the Computer Lab at the FLAME University campus. Participants were then quickly re-briefed about the study and asked if they had any questions. The researcher clarified and answered all question before administrating the tasks. A small debriefing was also carried out after the completion of the three tasks. Following this, the participants were also asked if they would like to know the results of the study. If they said yes, they were asked to leave their contact details with the researcher. No compulsion was made for the same. The participants were free to leave after this.

# Results and Analysis

## Data analysis

The data collected was quantitative in nature. Three different tasks were administered using PEBL, a digital software, – The Corsi-Block Tapping task for working memory (Mueller, 2011a), the Go/No Go task (Mueller, 2011b) for Inhibitory control, and the Tower of London task (Mueller, 2011c) for problem-solving were selected as measures. Only the PI and the Co-PI had access to the Google drive wherein data was stored. The collected data was then analysed using SPSS version 25.0.

After checking for normality and descriptive statistics, the data was found to be not normally distributed.

## Results

The Kolmogorov-Smirnov Lilliefors (K-S Lilliefors) test indicated that the data collected deviated significantly from normal. Hence, non-parametric equivalents of One way ANOVA and Tukey's Post Hoc Test, which were the Kruskal Wallis test and the Dunn-Bonferroni post hoc test analysis, were conducted. Levene's test revealed homogeneity of variance between the three groups across all variables.

## Corsi Block-Taping Task (Mueller, 2011a) – Working Memory

The K-S Lilliefors test indicated that the data for memory span deviated significantly from normal ($D(91) = .163$, $p > .01$). Although, Levene's test of homogeneity of variance was not significant ($F(2.88), = .363$, $p = .697$) indicating equality of variance across the three language groups for all the selected variable (Correctness or Total Correct Trials and Memory span).

There was a statistically significant difference between the total number of correct trials between the three language groups ($H(2) = 6.163$, $p = .046$), with a mean rank of 41.18 for Bilinguals, 41.37 for Trilinguals and 55.60 for Quadrilinguals. Post hoc tests indicated significant differences between Bilinguals and Quadrilinguals ($p = .031$) and Trilinguals and Quadrilinguals ($p = .032$). Differences between Trilinguals and Bilinguals were not statistically significant.

Similarly, a statistically significant difference between the memory spans of the three language groups was found ($H(2) = 5.976$, $p = .050$), with a mean rank of 41.4 for Bilinguals, 41.29 for Trilinguals and 55.47 for Quadrilinguals. Post hoc tests indicated significant differences between Bilinguals and Quadrilinguals ($p = .035$) and Trilinguals and Quadrilinguals ($p = .033$). Differences between Trilinguals and Bilinguals were not statistically significant. Lastly, the effect size for both total number of correct trails and memory span is medium highlighting the significance of the difference between the two variables has practical implications.

Table 2
*Chi-square Values for Corsi Block-Taping Task (Mueller, 2011a)*

| Variable | Language Group | N | Mean | SD | Mean Rank | Kruskal-Wallis Chi-square | Sig. | Eta Squared (η2) |
|---|---|---|---|---|---|---|---|---|
| Block Span | Bilingual | 0 | 6.10 | 1.47 | 45.12 | 4.378 | .112 | .027 |
| | Trilingual | 1 | 5.81 | 1.23 | 39.85 | | | |
| | Quadrilingual | 0 | 6.37 | 1.56 | 53.23 | | | |
| | Total | 1 | 6.09 | 1.43 | | | | |
| Total Score | Bilingual | 0 | 54.37 | 24.54 | 43.05 | 5.231 | .073 | .068 |
| | Trilingual | 1 | 51.39 | 21.44 | 40.32 | | | |
| | Quadrilingual | 0 | 61.80 | 24.05 | 54.82 | | | |
| | Total | 1 | 55.80 | 23.52 | | | | |
| Total Correct Trials | Bilingual | 0 | 8.50 | 1.87 | 41.18 | 6.163 | .046 | .079 |
| | Trilingual | 1 | 8.55 | 1.67 | 41.37 | | | |
| | Quadrilingual | 0 | 9.20 | 2.37 | 55.60 | | | |
| | Total | 1 | 8.75 | 1.99 | | | | |
| Memory Span | Bilingual | 0 | 5.23 | 0.98 | 41.4 | 5.976 | .050 | .077 |
| | Trilingual | 1 | 5.27 | 0.84 | 41.29 | | | |
| | Quadrilingual | 0 | 5.60 | 1.18 | 55.47 | | | |
| | Total | 1 | 5.37 | 1.01 | | | | |

*Note.* **p* <.05, η2 = .01 indicates a small effect; η2 = .06 indicates a medium effect; η2 = .14 indicates a large effect size

**The Go/No-Go Task (Mueller, 2011b) – Inhibitory Control**

Similar to the data for memory span, the K-S Lilliefors test indicated that the correctness (total correct trials) data deviated significantly from normal (D(91) = .180, $p > .01$). Although, data for commission error did not deviate from normal (D(91) = .101, p = .022). Additionally, Levene's test of homogeneity of variance was not significant (F(2.88), = 2.900, $p = .060$) indicating equality of variance across the three language groups for all the selected variable (Correctness or Total Correct trials, Total Error). Levene's test of homogeneity of variance was significant (F(2.88), = 5.121, $p = .008$) indicating inequality of variance across the three language groups for omission error.

There was a statistically significant difference between the number of total correct trials and total error between the three language groups (H(2) = 7.874, $p = .020$), with a mean rank of 45.48 for Bilinguals, 36.94 for Trilinguals and 55.88 for Quadrilinguals for total correct trials and 46.52 for Bilinguals, 55.06 for Trilinguals and 36.12 for Quadrilinguals for total errors. Post hoc tests indicated significant differences between Trilinguals and Quadrilinguals ($p = .005$). Differences between Trilinguals and Bilinguals and Bilinguals and Quadrilinguals were not statistically significant.

Similarly, a statistically significant difference between the omission errors of the three language groups was found (H(2) = 9.970, $p = .007$), with a mean rank of 53.22 for Bilinguals, 50.60 for Trilinguals and 36.12 for Quadrilinguals. Post hoc tests indicated significant differences between Bilinguals and Quadrilinguals ($p = .011$) and Trilinguals and Quadrilinguals ($p = .004$). Differences between Trilinguals and Bilinguals were not statistically significant. Additionally, there was no statistically significant difference between the commission errors of the three language groups was found. Lastly, the effect size for all variable is large indicating a high validity and showcasing the practical importance of the findings.

Table 3
*Chi-square values for The Go/No-Go task (Mueller, 2011b)*

| Variable | Language Group | N | Mean | SD | Mean Rank | Kruskal-Wallis Chi-square | Sig. | Eta Squared (η2) |
|---|---|---|---|---|---|---|---|---|
| Total Correct | Bilingual | 0 | 298.40 | 11.60 | 45.48 | 7.874 | .020 | .067 |
| | Trilingual | 1 | 288.03 | 31.91 | 36.94 | | | |
| | Quadrilingual | 0 | 301.93 | 13.32 | 55.88 | | | |
| | Total | 1 | 296.03 | 21.80 | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bilingual | 0 | 21.60 | 11.60 | 46.52 | | | |
| Total Errors | Trilingual | 1 | 31.97 | 31.91 | 55.06 | 7.874 | .020 | .098 |
| | Quadrilingual | 0 | 18.07 | 13.32 | 36.12 | | | |
| | Total | 1 | 23.97 | 21.80 | | | | |
| | Bilingual | 0 | 4.07 | 5.82 | 53.22 | | | |
| Omission Error | Trilingual | 1 | 10.23 | 27.01 | 50.60 | 9.970 | .007 | .121 |
| | Quadrilingual | 0 | 1.83 | 3.98 | 36.12 | | | |
| | Total | 1 | 5.43 | 16.49 | | | | |
| | Bilingual | 0 | 17.53 | 8.13 | 44.72 | | | |
| Commission Error | Trilingual | 1 | 21.74 | 10.70 | 54.37 | 5.528 | .063 | .072 |
| | Quadrilingual | 0 | 16.17 | 10.70 | 38.63 | | | |
| | Total | 1 | 18.52 | 10.10 | | | | |

*Note.* **p* <.05, η2 = .01 indicates a small effect; η2 =.06 indicates a medium effect; η2 = .14 indicates a large effect size

**The Tower of London Task (Mueller, 2011c) – Problem Solving**

Lastly, similar to the data for the previous two tasks, the K-S Lilliefors test indicated that the correctness (success out of 12 trials) data deviated significantly from normal (D(91) = .124, $p > .01$). Additionally, Levene's test of homogeneity of variance was also not significant (F(2.88), = 0.347, $p = .708$) indicating equality of variance across the three language groups for all the selected variables (Correctness or Success out of 12 trials).

There was no statistically significant difference between any of the measures of problem-solving as measured by the Tower of London task (Mueller, 2011c) between the three language groups. The effect size across variable is small indicating low practical implications and replicability of the results in similar future studies.

Table 4
*Chi-square Values for The Tower of London Task (Mueller, 2011c)*

| Variable | Language Group | N | Mean | SD | Mean Rank | Kruskal-Wallis Chi-square | Sig. | Eta Squared (η2) |
|---|---|---|---|---|---|---|---|---|
| Success: Out of 12 Trials | Bilingual | 30 | 7.10 | 2.38 | 44.17 | 2.104 | .349 | .001 |
| | Trilingual | 31 | 6.87 | 2.93 | 42.37 | | | |
| | Quadrilingual | 30 | 7.73 | 2.48 | 51.58 | | | |
| | Total | 91 | 7.23 | 2.61 | | | | |
| Total Score: Out of 36 | Bilingual | 30 | 21.00 | 7.09 | 43.18 | 2.415 | .299 | .038 |
| | Trilingual | 31 | 20.61 | 8.79 | 42.84 | | | |
| | Quadrilingual | 30 | 23.30 | 7.43 | 52.08 | | | |
| | Total | 91 | 21.59 | 7.81 | | | | |
| Total Time | Bilingual | 30 | 262.77 | 105.90 | 43.08 | .562 | .755 | .017 |
| | Trilingual | 31 | 288.18 | 131.97 | 47.02 | | | |
| | Quadrilingual | 30 | 278.01 | 106.43 | 47.87 | | | |
| | Total | 91 | 276.45 | 114.80 | | | | |

*Note.* **p* <.05, η2 = .01 indicates a small effect; η2 = .06 indicates a medium effect; η2 = .14 indicates a large effect size.

# Discussion

Results from earlier studies examining the relationship between language and executive functioning have been ambiguous. It is still unclear as to what extent does linguistic ability influence their executive functions. By examining the relationship between number of languages spoken and executive functioning, specifically working memory, inhibitory control and problem solving in the context of Indian bilinguals, trilinguals, and quadrilinguals, this study aimed to close gaps in the existing literature.

The results from Kruskal Wallis test demonstrated a significant difference in working memory ($p$ = .050) and inhibitory control ($p$ = .020) between the three language groups. Differences were found particularly between quadrilinguals and the other two language groups and not among bilinguals and trilinguals. Interestingly, there were no significant findings for problem solving amongst the three language groups. Therefore, the findings reflect the dichotomy as found in past literature. It shows that multilingualism has significant effects, especially among an Indian population. Although the extent to which it influences executive functioning still

remain ambiguous, as does the reasoning behind the same, the findings of this research help us to understand this complex relationship and the role of culture a little bit better.

**Results of the Corsi Block Tapping task (Mueller, 2011a)**

The results indicated that Quadrilinguals outperformed both bilinguals and trilinguals. Additionally, a statistically significant difference was not obtained between bilinguals and trilinguals. Past literature comparing the results of bilinguals and trilinguals on working memory have also found insignificant differences between the two groups (Bialystok, 2008; Poarch & Hell, 2012). The current data, on the contrary, suggests that bilinguals may have outperformed trilinguals (Mean Rank $_{Bilingual}$ = 41.40, Mean Rank $_{Trilingual}$ = 41.29). This corroborates the findings of the study done by Iyer and Venkatesan (2021) on Indian Children. Therefore, we can infer that while a bilingual advantage has been seen in the past, trilinguals do not experience an enhancement in working memory as a result to the third language. However, quadrilinguals do exercise this advantage and outperform both bilinguals and trilinguals in working memory tasks.

**Results of the Go/No-Go Task (Mueller, 2011b)**

The results of the Go/No-Go task (Mueller, 2011b), too showed that Quadrilinguals outperformed the other two groups. Similarly, differences in the scores between bilinguals and trilinguals were not statistically significant. These findings corroborate the findings of two past studies (Poarch & Hell, 2012; Schroeder & Marian, 2016). On the other hand, contrary information was presented by Hsu (2014) stating that trilinguals and bilinguals were indeed different from each other. These variations are hypothesized to be attributed to task difficulty or overload of demand in the attentional control areas of the mind.

**Results of the Tower of London Task (Mueller, 2011c)**

Unlike the other two tasks, the Tower of London task (Mueller, 2011c), results revealed that there were no statistically significant differences between the three language groups. This indicates that the number of languages spoken by an individual did not have much influence over the individuals' problem-solving skills. Research about the relationship between an individual's linguistic ability and non-linguistic problem solving skills has not been explored in depth as most studies tend to focus on the primary measures of executive functioning, such as working memory (Antoniuo et al., 2016; Iyer & Venkatesan, 2021; King, 2020; Mehrani & Zabihi, 2017; Reyes, 2013), attentional control (Bialystok, 2008; Bialystok, Barac, Blaye & Poulin-Dubois, 2010; Hsu, 2014; Limber & Buchweitz, 2014; Poarch & Hell, 2012a), inhibition (Bialystok & Craik, 2010; Hsu, 2014; Matilda et al., 2021; Mehrani &

Zabihi, 2017; Miyake et al., 2000; Oschwald, et al., 2018; Poarch & Hell, 2012; Poarch et al., 2018) as well as linguistic tasks (Barac & Bialystok, 2012; Bialystok & Craik, 2010; Limber & Buchweitz, 2014; Oschwald et.al., 2018), and not on complex measures of executive functioning, such as problem solving. Although, the few studies that have been done, state that the bilinguals are better at problem solving than their monolingual peers (Bialystok & Majumder, 1998).

Furthermore, being a secondary measure of executive functioning, problem solving is a combination of working memory and inhibitory control. It is, therefore surprising to see that although differences were observed for both its primary variables, and yet differences were not found for problem solving. This indicates one of two things, first, problem solving is a much more complex task and factors beyond the number of languages an individual speaks affect it; or second, the Tower of London task lacks criterion validity (Phillips, 1999).

## Overall Discussion

Past literature studying the effects of quadrilingualism, are limited in many ways. Firstly, studies that have been able to find and conduct experiments on quadrilingual participants are very few in number (Catalano, 2018). Furthermore, most papers that discuss multilingualism tend to group trilinguals and quadrilinguals together in order to create a large enough sample size (Kown, et al., 2021; Pfenninger, 2014). These corrections make the conclusions made by such studies not generalizable to either of the two groups – trilinguals or quadrilinguals. The current study not just makes a clear distinction between the two language groups but also reveals that while the difference between bilinguals and trilinguals is not that vast, knowing a fourth language might result in a significant difference.

Moreover, emphasis on the kind of tasks used and the demands of the particular task must also be taken into account. The Go/No-Go task has been used by several studies to understand the relationship between language and executive functioning (Fernandez et al, 2013). However, working memory has usually been explored through linguistic tasks, such as word recall tasks. As the current study wanted to see the influence of language on non-linguistic tasks, the Corsi-Block Tapping task (Mueller, 2011a) was used. Different tasks, although they measure the same variable, have varying demands in the amount of cognitive control required to finish the task (Poarch, 2018). Therefore, while the current study's results were not significant for the Tower of London task (Mueller, 2011c), using another task of problems solving, such as Remote Associates task (Mednick, 1968) may have yielded different results.

As one of the rationales behind the relationship of language and executive functioning is that learning multiple languages results in an increased cognitive load providing training opportunities for the executive functioning, the kind of task used to measure the said executive function plays a crucial role. Two tasks, although measuring the same variable, having two different demands from the individuals is an

internal variable that should be accounted for. The study done by Poarch (2018) found significant results for the Flanker task present across different language groups, but not for the Stroop task or Go/No-Go Task. Similarly, although the Go/No-Go task (Gordon & Caramazza, 1982) is used to measure the same variable, it partially also measures task switching, as in the second set of the 180 trials, the target and foiled stimulus are swapped, thereby resulting in an increased demand of cognitive control from the participants.

Past studies have also found that being a fluent speaker versus a learner of a language too has varying effects on one's cognitive capabilities (Chung-Fat-Yim et al., n.d; Pfenninger, 2014; Poarch & Hell, 2012a; Schroeder & Marian, 2016). Thus, distinguishing between learners versus fluent speakers of a language should also be accounted for through proficiency checks. Additionally, the rationale that cross-language interferences enhance task-switching and attentional control requires the individual to have good proficiency within the languages. If these cross-language interference are not enough, there would lesser training and hence lesser cognitive advantages experienced.

Although, the current study did record proficiency levels, it was unable to control for the same due to time restrictions. Furthermore, FLAME University (from where the participants were recruited from) makes it compulsory to take two language courses for all students in their first-year of study. This could be another factor that might have influenced the results of the study.

Other factors, such as different individual upbringings, early experiences with the language, patterns of language use, and other lifestyle elements also play a vital role in the development of executive functioning skills among people (Poarch, 2018). Environmental factors such as individual stress levels, sleep deprivation, loneliness are all confounding variables that influence an individual's executive functioning (Diamond, 2013). The current study was not able to control for these, due to lack of time and resources, which may have affected the results.

## Implications of the Study

Despite the restrictions, the results of the study were able to highlight a significant benefit experienced by quadrilingual individuals. The results can be used to encourage school students to learn more languages. As the study was done amongst an Indian population, students should be motivated to not just take up the foreign language classes offered but to also familiarize themselves with their own regional languages. This encouragement from an early age will help them gain a more balanced proficiency in all the languages that they speak, which may translate into higher executive functioning in their adult life.

Furthermore, schools could introduce a multilingual education system in the classroom. Such a system can be an effective approach to foster academic success and intellectual development in addition to promoting language diversity. However, it

is also vital to take into account practical factors like the accessibility of resources (well-trained teachers, and resource materials), student's choices and demands as well as future economic value of the languages.

## Strengths and Limitations of the Study

Most of the studies that have been previously conducted studies have sampled participants from European or American populations. Very few studies have been done on Indian populations (Iyer & Venkatesan, 2021; Daga & Rajan, 2023). The current study is one among a handful to explore the relationship of language and executive functioning using Indian languages as well as on a sample recruited from an Indian population. This study adds onto the existing literature by expanding on previous research. Moreover, very few studies have studied quadrilingual populations. Given the prevalence of multiple languages in India, the present research was able to investigate on quadrilingual individuals as well. While the study was able to yield a few significant results, there are a few limitations to the research as well.

***Data Collection for Number of Languages Spoken.*** The data concerning number of languages spoken as well as the proficiency in each of the language spoken was collect using a self-report survey. No other scales or tests, were used to recheck this information. This ambiguity in level of proficiency could be one of the variables that may have led to the observed results. Future research studies should focus on checking these values using language proficiency tests.

***Unable to Control for Similarity of Languages, Proficiency in Language, as well as Age of Language Acquisition.*** There was vast variation in the different languages the participants reported. These language differences as well as the age at which they were acquired may have impacted the results. Past research has shown that similarity of languages and age of acquisition play an important role. Therefore, ensuring that all participants speak the same languages as well as ensuring that they were learned around the same age will help avoid ambiguity within the results. Due to the lack of time and resources the present study was unable to check for the same.

### Future Directions

### Choosing a More Random and Diverse Sample

The current study recruited participants from only one university due to lack of resources and time. Future studies should, hence, try to get a diverse sample with individuals from all age groups. India is a large country with a population of over one million people (Worldometer, 2023) that come from various cultural backgrounds. With such a large population, researchers should aim to gain a diverse and large sample size to be able to generalize the results. Moreover, studies involving quadrilinguals should be emphasized, wherein they are not being clubbed together with trilinguals.

### Understanding and Exploring the Various Measures of One Variable

Lastly, although various tasks claim to measure the same variable, literature has reported differences in the results found when two different tasks are used to measure the same variable (Barac & Bialystok, 2012; Calva & Bialystok, 2014). Thus, future studies should account for such differences.

## Conclusions

In conclusion, although assessing multilingualism can be difficult due to the wide range of environmental and situational (house, education, work environment, neighbourhood and locality) and, individual (proficiency of languages spoken, utilization of languages in everyday life, age at which the language was learned etc.) factors, such differences in language experiences are the reasons that necessitates for more focused research on how multilinguals not only differ from monolinguals but also from other multilinguals.

## Disclosure Statement

No potential conflict of interest was reported by the authors.

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# The Effects of Private Speech on the Speaking Proficiency of Young Jordanian English as a Foreign Language Students[1]

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**Abstract.** This research examined how private speech affects the speaking ability competency in young Jordanian EFL (English as a Foreign Language) students. The mixed-methods research gathered quantitative and qualitative data from 50 Jordanian EFL students aged 10–12. Pre- and post-tests of speaking skill mastery provided quantitative data, and observations and semi-structured interviews were also conducted to provide qualitative data. Private speech exercises significantly improved participants' speaking skills. Private speech improved participants' fluency, accuracy, and complexity. The qualitative data also showed that private speech helped individuals speak English with confidence and less nervousness. The research reveals that private speech exercises might help young Jordanian EFL students improve their speaking skills. EFL instructors and curriculum designers in Jordan may want to include private speech exercises to improve students' speaking and language abilities. Private speech activities should be studied in additional circumstances and age ranges.

***Keywords:*** private speech, speaking fluency, EFL students, accuracy.

**Рабабаг Лукман, Альмваджех Мотасім, Аль-Хавальдег Нісрін Наджі, Аль-Шбул Отман Халід, Бані Амер Мамун Ісса Фалаг, Дакамсіг Нусайба. Уплив внутрішнього мовлення на розмовні навички молодших йорданських учнів, які вивчають англійську мову як іноземну.**

**Анотація.** Це дослідження спрямовано на вивчення того, як внутрішнє мовлення впливає на мовленнєву компетенцію молодших йорданських учнів, які вивчають англійську мову як іноземну. За допомогою змішаних методів дослідження було зібрано кількісні та якісні дані від 50 йорданських учнів, які вивчають англійську мову як іноземну, у віці 10–12 років. Кількісні дані отримано за допомогою пре- та пост-тестування навичок говоріння, а для отримання якісних даних проведено спостереження та напівструктуровані інтерв'ю. Вправи з тренування внутрішнього мовлення значно покращили мовленнєві навички учасників. Учні покращили плавність, точність і

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складність висловлень внутрішнього мовлення. Якісні дані також показали, що внутрішнє мовлення допомогало учасникам говорити англійською з більшою впевненістю та меншим хвилюванням. Дослідження виявило, що згадані вправи зможуть допомогти йорданським учням, які вивчають англійську мову як іноземну, покращити свої навички говоріння. Учителі англійської мови та розробники навчальних програм в Йорданії можуть включити вправи на розвиток внутрішнього мовлення, щоб покращити мовленнєві навички учнів. Мовленнєву діяльність слід вивчати в різних контекстах та з учнями різних вікових діапазонів.

***Ключові слова:*** *внутрішнє мовлення, швидкість мовлення, учні, які вивчають англійську мову як іноземну, точність.*

# Introduction

Young learners, particularly those from non-English-speaking nations like Jordan, find EFL difficult (Rababah, 2022). EFL learners must learn to speak fluently, correctly, and properly in order to communicate. Due to fear, lack of confidence, and little real-world experience, many EFL learners struggle with speaking. Private speech-self-talk-can help with these issues. Whispering, mouthing, or thinking aloud may regulate behavior, solve issues, or communicate feelings. Private speech gives language learners a secure and supportive space to practice and enhance their speaking abilities. Most research on private speech and language acquisition has examined its effects on cognitive and metacognitive processes (Vygotsky, 1962; Kormos & Kontra, 2008). Few research papers have explored its influence on speaking skill competency, notably among Jordanian young EFL learners. This study addresses this gap by examining the following research question:

Does private speech affect speaking skills among young Jordanian EFL students? If so, how does it do that?

The research seeks to examine how private speech might improve speaking abilities in Jordanian young EFL learners. The results may help EFL instructors and curriculum designers improve students' speaking and language skills. This research addresses young Jordanian EFL students' inadequate speaking practice owing to nervousness, lack of confidence, and lack of realistic communication contexts. Jordan, where English is taught as a foreign language, has this issue (Al-Abdallat and Al-Khawaldeh, 2018). Thus, many EFL students struggle to develop real-life speaking skills. Thus, the study investigates private speech as a tool for teaching Jordanian EFL students speaking skills.

This research may help design effective educational ways to improve speaking skills in young Jordanian EFL students. The research examines how private speech affects speaking competency to inform language instructors and curriculum designers. The results may help develop language training materials and activities that use private speech to improve oral output and communication. The research may also assist EFL instructors and learners understand the potential advantages of private speaking in language acquisition, especially in environments where learners have limited exposure to realistic communicative situations. The study's relevance is its potential to improve young EFL learners' language and communication abilities in Jordan and in comparable environments.

## Theoretical framework

This research uses Vygotsky's sociocultural theory, the Input-Interaction-Output (IIO) model, and the Comprehensible Output Hypothesis. Vygotsky's sociocultural theory states that language and social interaction are essential to cognitive development. This hypothesis states that private speech helps cognitive growth by regulating and addressing problems. Private speech may help language learners control and improve their speech. Gass and Selinker (2008) explain that language acquisition comprises linguistic input, processing via interaction, and output. Private speaking allows learners to practice language production in a low-stakes setting, improving productivity.

According to Swain (1985), language learners must create intelligible output to improve. Private speech gives learners a secure and supportive setting to practice and enhance their speaking abilities, resulting in intelligible output. These theoretical approaches show that private speech might help young Jordanian EFL students build speaking skills. Private speech exercises may help learners manage their language output, improve their speaking abilities, and build English confidence and competence.

Private speech has been studied in language development, specifically cognitive and metacognitive processes. Few studies have examined its impact on Jordanian young EFL learners' speaking skills. This literature review covers contemporary private speech and language acquisition research. Private speech for cognitive self-regulation was initially suggested by Vygotsky (1962), who stated that private speech lets people plan and regulate their behaviors and emotions. Several studies have supported Vygotsky's theory that private speech improves cognitive and metacognitive processes like attention, memory, and problem-solving (Winsler et al., 2000; Lin, 2001).

Private speech helps EFL learners build speaking abilities. Kormos and Kontra (2008) discovered that EFL learners who participated in private speech activities had better fluency and accuracy than a control group. Private speech exercises enhanced speaking complexity and accuracy for Taiwanese EFL learners, according to Lin (2004). Recent studies have supported the use of private speech to teach EFL learners speaking skills. Kim and Han (2019) discovered that Korean EFL learners who did private speech exercises had better-speaking fluency and accuracy than a control group. Jiang et al. (2020) also found that Chinese EFL learners who practiced private speech increased their accuracy and complexity. Little Jordanian research has examined how private speech affects young EFL learners' speaking skills. Our research concurs with Al-Abdallat and Al-Khawaldeh (2018) in proving that Jordanian EFL learners who participated in private speech activities had higher speaking fluency and confidence than a control group. These results illustrate that private speech helps young Jordanian EFL learners improve their speaking skills. The research demonstrates that private speech may help EFL learners, notably Jordanian youth, build speaking abilities. Private speech exercises may help learners manage

their language output, improve their speaking abilities, and build English confidence and competence.

While there have been some studies on the effectiveness of private speech in developing speaking skills among EFL learners, including young Jordanian learners (Abu Rabia and Sabah, 2018), there is still a gap in the literature on the specific effect of private speech on speaking skill proficiency among young Jordanians. Few studies have examined private speech, but those that have used different age ranges, subject fields, and study methods. Few studies have examined how private communication affects fluency, accuracy, complexity, and pronunciation. This research distinguishes out by examining how private interaction affects young Jordanian EFL learners' speaking skills. The methodology and age range of participants distinguish this study from others in its subject.

# Methodology

## Participants

Participants were drawn from two private schools in Amman, Jordan, and consisted of fifty young Jordanian students learning English as a foreign language. These students ranged in age from 10 to 12 years old. In order to gather data for the research, two different instruments were employed. The first instrument was a speaking assignment, in which students were required to give a brief presentation in English on a subject that was already recognizable to them. The speaking activity was monitored and recorded for later review. The second tool that was used was an observation checklist (see Appendix A), and its purpose was to keep track of the many kinds of private speech that students utilized while they were doing the speaking job.

## Procedure

The procedure for this investigation consisted of two separate parts. Learners were given a pre-test at the beginning of the process to evaluate the level of their competency in speaking skills. The pre-test included a speaking activity that was identical to the one that was utilized in the second phase of the evaluation. Learners were given a short training session on private speech after the pre-test was completed. This session covered what private speech is as well as how it may be used to govern and monitor the learners' speech output. Learners were given the identical speaking task that was used in the pre-test during the second part of the evaluation process; however, an observation checklist was added to the task in order to capture the learners' usage of private speech. Recordings of the speaking activities were made for later review. Learners were given a post-test at the end of the second phase to evaluate how proficient they were in their speaking skills.

The data that was gathered from the speaking tasks and the observation checklists were analyzed using descriptive statistics, such as means and standard

deviations, in order to establish the frequency of private speech used by learners as well as the kinds of private speech that were utilized. In addition, a correlation analysis was carried out to investigate the connection between private speech and the level of competency in speaking skills. In this study, the role of private speech in speaking skill competency was investigated via the use of a multiple regression analysis, with consideration given to other characteristics such as age, gender, and previous English language proficiency.

It is important to note that the research adhered to all of the established ethical norms and received the participants' as well as their parents' or legal guardians' informed consent. It was made clear to the participants that they were free to leave the experiment at any point and that doing so would not have any adverse effects on their status. Every piece of information that was gathered was kept private and unidentified.

# Results

The study included pre-and post-tests. The pre-test included the same speaking exercise as the second phase. Students received personalized voice instruction after the pre-test. The second phase included an observation checklist to track students' private communication. Speeches were recorded for further review. Descriptive statistics like means and standard deviations were employed to determine learners' private speech frequency and types. Private communication and speaking abilities were correlated using a correlation analysis. A multiple regression study examined how private communication affects speaking ability competence, taking into account age, gender, and English language proficiency.

## Speaking Task

According to the findings of the pre-test, the mean score for speaking skill competency was 45.6 (standard deviation = 6.2), out of a possible 60 points. Post-test results showed an improvement in speaking skill competency, with the mean score reaching 51.8 (standard deviation equal to 7.1) out of a possible 60 points. It was determined that there was a statistically significant difference between the mean scores on the pre-test and the post-test ($t = 7.42$, $p < .001$).

Table 1
*Descriptive Statistics for Pre-Test and Post-Test Scores for Speaking Skill Proficiency*

| | N | Mean | SD |
|---|---|---|---|
| Pre-Test | 50 | 45.6 | 6.2 |
| Post-Test | 50 | 51.8 | 7.1 |

*Note:* N = sample size, SD = standard deviation.

As shown in Table 1, the mean score for speaking skill proficiency increased from 45.6 (SD = 6.2) on the pre-test to 51.8 (SD = 7.1) on the post-test. This difference was statistically significant, $t(49) = 7.42$, $p < .001$. The table above compares pre- and post-test results on tests of oral communication competence. The participants' mean pre-test score for speaking proficiency was 45.6 out of a possible 60, with a standard deviation of 6.2. The post-intervention mean score was 51.8/60 (with a standard deviation of 7.1) suggesting an improvement. An uptick in favorable feedback shows that the intervention, which included private communication, has had a good impact on the young speakers. There was also some pre- and post-intervention fluctuation in individuals' speaking skill competency levels, as shown by the standard deviation scores. Overall, the results imply that teaching young students EFL via private speech may be an effective technique for improving their competency in the language.

**Observations Checklist**

The findings of the observation checklist revealed that students engaged in a variety of forms of private speech while carrying out the speaking assignment. These forms of private speech included self-instruction, self-motivation, and self-regulation. The following examples demonstrate each of the three private discussion activities identified in the study:

1. Self-instruction includes stating, "Okay, first I'll introduce the topic, then I'll provide examples to support my points, and finally, I'll conclude by summarizing my main ideas." This student uses self-instruction to complete the speaking assignment. By verbalizing their strategy, they are arranging their thoughts and clarifying the sequence in which they should execute it.

2. Example of self-motivation: "You Got This! Take a few deep breaths and talk confidently. Remember that you've prepared and can give this". The pupil in this situation self-motivates before speaking to create confidence. Constructive self-talk reduces anxiety and boosts self-confidence.

3. Self-Regulation: "Remain focused on your main points." "If you go off track, get back on track and keep going". A student uses self-regulation to stay on track throughout this speaking assignment. They actively regulate their conduct and keep their words ordered by verbally reminding themselves to adhere to their goal. These examples show how students support their speaking assignments with different private speech styles. The capacity to instruct, organize, motivate, and self-regulate oneself increases self-confidence. The findings show that the learners used self-instruction ($M = 2.81$, $SD = 1.14$) as their most common form of private speech, followed by self-motivation ($M = 1.88$, $SD = .92$) and self-regulation ($M = 1.72$), respectively.

The average and standard deviation scores for the three categories of confidential speech used by the young EFL students in the speaking assignment are shown in Table 2. Students chose self-instruction for private speaking, scoring 2.81

with a standard deviation of 1.14. The students used their existing knowledge to guide them through the speaking practice.

Table 2
*Types of Private Speech Used by Learners During the Speaking Task*

| Type of Private Speech | Mean Score | Standard Deviation |
|---|---|---|
| Self-Instruction | 2.81 | 1.14 |
| Self-Motivation | 1.88 | .92 |
| Self-Regulation | 1.72 | .89 |

Self-Motivation in private communication had mean scores of 1.88 and standard deviations of .92. The oral presentation was sustained by students' motivation. Last but not least, self-regulation was the third most common form of private communication, with a mean score of 1.72 and a standard deviation of .89. This suggests that students used some type of self-monitoring in order to keep their performance in check throughout the oral presentation. The results imply that giving young EFL students more chances for individual communication would improve their fluency in the language. The results of the research demonstrate that EFL students may use internal dialogue to better control, monitor, and direct their performance in public speaking situations. Thus, in order to help their students become more confident public speakers, EFL educators should think about including more possibilities for private communication in their lessons.

**Analysis of Correlation**

The analysis of correlation revealed a substantial positive link between the usage of private speech and speaking skill competency among young EFL learners ($r = .62$, $p < .001$) in the population under study. This suggests that students who used private speech more often throughout the speaking assignment displayed better levels of speaking ability than those students who utilized private speech less frequently during the speaking task.

Table 3
*Correlation Between Private Speech and Speaking Skill Proficiency*

| | Speaking Skill Proficiency |
|---|---|
| Private Speech | .62** |
| | (.000) |

*Note:* ** $p < .01$ (2-tailed).

As shown in Table 3, there was a significant positive correlation between private speech and speaking skill proficiency among the participants ($r = .62$, $p < .001$). The participants' level of confidence in public speaking is shown to be correlated with their level of private talking in Table 3. The findings indicate a statistically significant positive relationship between one's level of private communication and their level of competency in public speaking ($r = .62$, $p < .01$). The results show that the young EFL learners' degree of performance in the speaking test is strongly correlated with their use of private communication during the activity.

The observed association between private speech and speaking skill competency is not likely to have happened by coincidence, as shown by the p-value of.000, which is statistically significant at the .01 level. Therefore, it may be inferred that greater levels of competency in the speaking task are positively correlated with the usage of private speech among young EFL learners. Findings indicate that promoting private communication during speaking activities in EFL courses may be an effective method for enhancing young learners' ability in using English in social situations.

**Multiple Regression Analysis**

The results of the multiple regression analysis revealed that the amount of time spent in the private speech was a significant predictor of speaking skill competency (=.55, $p < .001$) when other characteristics, such as age, gender, and previous English language proficiency were controlled for.

Table 4
*Multiple Regression Analysis for Predictors of Speaking Skill Proficiency*

| **Predictor** | **Beta** | **t** | **Sig.** |
|---|---|---|---|
| Private Speech | .55 | 6.74 | <.001 |
| Age | -.15 | -1.74 | .088 |
| Gender | .01 | .10 | .920 |
| Prior English Proficiency | .26 | 3.02 | .004 |

*Note:* $R2 = .52$, $F(4.45) = 13.98$, $p < .001$

As shown in Table 4, private speech was a significant predictor of speaking skill proficiency ($\beta = .55$, $p < .001$) after controlling for other factors such as age, gender, and prior English language proficiency. The multiple regression analysis accounted for 52% of the variance in speaking skill proficiency. The table seems like it presents the findings of a multiple regression study, which investigates the connections between numerous predictors and a final output. In this scenario, competency in public speaking is the outcome variable, whereas private speech, age, gender, and previous English proficiency are predictor factors.

The findings suggest that private speech is the most reliable indicator of public speaking competence (beta =.55). Positive values for the beta coefficient imply a

strong positive association between the predictor and outcome variables, whereas negative values suggest a strong negative relationship. A positive beta coefficient of.55 indicates a favorable relationship between the amount of time spent speaking privately and the quality of one's spoken language skills. The t-value of 6.74 between confidential conversation and public speaking competence is statistically significant ($p<.001$). This suggests that the correlation between private and public communication is more than coincidental, lending credence to the assumption that the former is a significant predictor of the latter. Age, gender, and level of English competence going in are the other predictors. Although not statistically significant at the.05 level ($p =.088$), the negative (-.15) beta coefficient for age suggests that higher ages are related to lower levels of competency in speaking skills. There is no discernible gender gap in terms of speaking ability, as shown by the beta coefficient for gender being extremely tiny (.01) and not statistically significant ($p =.920$). As a conclusion, the beta coefficient for previous English proficiency is.26, showing that greater levels of past English proficiency are connected with higher levels of speaking skill competence. This correlation is statistically significant at the.01 level ($p =.004$), lending further credence to the concept that fluency in English is a good indicator of future success in the language.

These findings imply that private speech is a significant predictor of speaking skill competency among young EFL learners and that past English ability might also play an essential role in shaping speaking skill development. There does not seem to be a correlation between age or gender and proficiency in this group. The findings of the research indicate that the usage of private speech is positively connected with speaking skill competence among young Jordanian EFL learners. Furthermore, the results of the study imply that chances for private speech should be included in EFL classes in order to improve speaking skill proficiency among young learners.

# Discussion

According to the results of this research, having private speech seems to have a substantial and favorable influence on the level of speaking ability competency among young Jordanian EFL learners. After the participants were allowed to engage in private speech while doing the speaking task, the results of the pre- and post-speaking tests revealed a statistically significant increase in the speaking skill competency of the participants. This conclusion is in line with findings from prior research (Vygotsky, 1962) that have established the advantages of private speaking in promoting language acquisition.

The data from the observations also revealed that students who used a greater amount of private speech while doing the speaking task displayed better levels of speaking competency as compared to students who used a lesser amount of private speech. This result lends credence to the proposition advanced by Lantolf and Thorne (2006), which states that private speech may function as an efficient instrument for fostering language acquisition and growth. This study found that ESL learners engage

in internal discourse for the sake of learning, inspiration, and control. Teachers should promote private conversation during speaking activities to help pupils learn a language. This study also supports private speaking as a method for language progress. These results are very important for EFL studies because they provide credence to the concept of confidential communication. Future research might examine the impact of private speaking on pupils of diverse ages, ethnic backgrounds, and linguistic abilities, as well as on the development of skills like listening and writing.

This study highlights the importance of one's inner monologue in helping young Jordanian EFL students improve their public speaking skills. The findings suggest that EFL teachers would do well to include opportunities for private speech into their pedagogy in order to better facilitate their students' language learning and growth. The findings show that EFL teachers should include private speech into their instruction.

## Conclusions

In conclusion, this research examined if private speech affected young Jordanian EFL learners' competency and how, generally, it did this. The research found that young EFL students' private communication and public speaking skills are strongly connected. Students who had more private speech s throughout the speaking assignment scored higher in speaking ability than those who had less.

The research also identified the different forms of private speech that were utilized by young EFL learners while they were doing the speaking task, as well as the frequency with which these forms were employed. The use of self-instruction as a kind of private speech was shown to be the most prevalent, followed by instances of self-motivation and self-regulation. Based on these results, it seems that providing young students with more chances for private speech in EFL courses may help them become more proficient in their speaking skills.

This study makes a significant contribution to the body of previous research on the importance of private speech to language acquisition and development. The results give evidence to support the usefulness of private speech in fostering language acquisition, and they indicate that instructors of English to speakers of other languages may benefit from including chances for private speech in their teaching approaches.

The research had a few limitations, the most notable of which were the limited sample size and the fact that just one speaking activity was used to evaluate participants' level of expertise in their speaking skills. In addition, it is possible that the findings of the research cannot be extrapolated to demographics or circumstances other than young Jordanian EFL students. This work has significant ramifications for English as a Foreign Language (EFL) research because it paves the way for further investigation into the efficacy of private speech training in the context of language acquisition in various domains, with learners of varying ages and from a variety of linguistic backgrounds. In further study, it may also be possible to evaluate the

influence of a variety of pedagogical approaches that include the use of private speech in EFL classes.

This research emphasizes the significance of private speech in fostering language acquisition and growth among young people who are learning English as a foreign language. According to the results, it would be beneficial for instructors of English as a foreign language to include chances for private speech in their teaching methods so that their students may improve their speaking ability competency. The suggestions for further research in this area and the consequences of EFL teaching techniques are presented in the last section of the paper.

## Disclosure Statement

No potential conflict of interest was reported by the authors.

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# The Relationship Between Bilingual Language Control and Language Dominance: An Empirical Study of Visual Language Perception

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**Abstract**. Bilingual visual perception is an under-researched area in psycholinguistics and has yielded contradictory results regarding language control. Two theories were developed to account for visual language perception in bilinguals – the Inhibitory Control model (Green, 1986) and the Bilingual Interactive Activation model (Grainger and Dijkstra, 1992). Even though these two accounts have opposite predictions for asymmetrical language control (different for the bilingual's L1 and L2), most research up to date found evidence only for symmetrical control (Macizo et al., 2012; Orfanidou and Summer, 2005). This study aims to investigate the influence of language dominance on the visual language perception of bilinguals and providing evidence for the accountability of the models mentioned above. Thirty-one Hungarian-English bilinguals were recruited for this study. Participants' language dominance was operationalized by a complex score using the Bilingual Language Profile questionnaire (Birdsong et al., 2012). The bilingual lexical decision task was used to investigate the differences in the cognitive processing of the two languages. Target stimuli were carefully matched for their visual and linguistic features to eliminate the potential confounding influences on their perception during task performance. For unbalanced, L1 dominant bilinguals, asymmetrical, dominance-related switching cost was observed, indicating the relevance of the Inhibitory Control model. Faster L2 processing correlated with a richer history of L2-associated experiences and more balanced bilingualism. However, no correlations were found with the frequency of language use, language attitudes, and only weak correlations were observed with language proficiency. The current research proposes a methodological framework for measuring the influence of linguistic background on language switching cost that could ensure comparability between further studies.

***Keywords:*** *bilingual, language control, switching cost, language background, visual perception, language dominance.*

**Ревнюк Володимир, Батий Сільвія. Зв'язок між двомовним мовним контролем і мовним домінуванням: емпіричне дослідження візуального сприйняття мови.**

**Анотація.** У статті здійснено теоретичне та практичне дослідження проблеми двомовного візуального сприйняття, яка недостатньо досліджена у психолінгвістиці та має суперечливі результати у контексті контролю мови. Проаналізовано дві теорії щодо візуального контролю мови двомовними людьми – модель інгібіторного контролю (Green, 1986) і модель двомовної інтерактивної активації (Grainger & Dijkstra, 1992). Хоча ці дві моделі мають протилежні

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прогнози стосовно асиметричного контролю мови, пізніші дослідження мають докази лише стосовно симетричного контролю (Macizo et al., 2012; Orfanidou & Summer, 2005). Метою статті є дослідження впливу мовного домінування на візуальне сприйняття мови двомовцями та доведення релевантності однієї із вищезгаданих моделей. Для практичного дослідження залучено угорсько-англійських двомовців. Діагностування мовного домінування учасників здійснено за допомогою опитувальника двомовного мовного профілю (Birdsong et al., 2012). Для дослідження відмінностей у когнітивній обробці мов використано завдання двомовного лексичного вибору. Щоб усунути потенційні додаткові впливи під час виконання завдання, використано цільові стимули, подібні за їхніми візуальними та лінгвістичними характеристиками. Виявлено, що для незбалансованих двомовців з домінуючою першою мовою, властива асиметрична, домінантно-направлена тривалість переключення, що доводить відповідність моделі інгібіторного контролю. Також виявлено, що триваліша історія другої мови і більш збалансована двомовність, корелює з її швидшою обробкою. Однак, не було виявлено жодних кореляцій із частотою використання мови, ставленням до мови і лише слабкі кореляції спостерігалися з рівнем володіння мовою. У дослідженні запропоновано методологічну основу для вимірювання впливу мовного досвіду на тривалість переключення мови, яка може бути використана для подальших досліджень.

***Ключові слова:*** *двомовний, мовний контроль, тривалість переключення, мовний досвід, візуальне сприйняття, мовне домінування.*

# Introduction

As a result of the multilingual turn (May, 2014), bi- and multilingualism is seen more as the norm rather than the exception in many domains. Consequently, understanding bilingual processing is imperative, and the topic has been attracting increased attention from scholars. In psycholinguistic and neurolinguistic research, it has been well established that bilingual language users' languages are always active in their cognitive system, even when using only one language. This parallel activation is present both in perception (e.g., de Bot & Schreuder, 1993; Grosjean, 1997; Hermans et al., 1998; Kroll & Stewart, 1994; Smith, 1997) and in production (Costa & Santesteban, 2004; de Bot and Bátyi, 2022; Kroll et al., 2006), and several factors have been suggested to influence the levels of language activation, such as language proficiency, the context of the acquisition, etc. (Heredia, 1997; Kroll et al., 2006; Pavlenko, 2004). Cross-linguistic influence (CLI) is constantly present in bilingual processing, and one would expect a high number of errors and a heavy cost associated with bilingualism due to these interferences; however, bilinguals are good at activating and selecting the intended language at will. This is possible because they developed a system of cognitive control that is used to negotiate the competition between their known languages (Grainger & Dijkstra, 1992; Green, 1986). Several models have been developed to account for this control, and the present study aims at testing the most influential ones in bilingual visual perception. Empirical research in this area is still scarce, and as Borragan et al. (2018) note, language inhibition during bilingual comprehension is less consistent and less understood than bilingual production.

The Interactive Activation (IA) model (McClelland & Rumelhart, 1981) was originally designed to explain the mechanism of language perception of monolinguals.

Later, the IA theory was extended into the Bilingual Interactive Activation (BIA) model (Dijkstra and van Heuven, 1998; Grainger & Dijkstra, 1992; van Heuven et al., 1998) to account for the language perception of bilinguals. According to the BIA, language control is achieved by developing and manipulating the 'language nodes' – an extra representational level in the mental lexicon that connects all representations belonging to one language. Activation or inhibition of these language nodes corresponds to the activation or inhibition of the entire vocabulary of one or another language. The variety of activities on the level of language nodes is called the 'language control mechanism', which is dynamic and varies among individuals as it depends on factors such as the frequency of language use and language proficiency.

An alternative account of language control in perception was an extension of the Inhibitory Control (IC) model (Green, 1986, 1998). According to this model, using a language requires the activation of the so-called 'cognitive task schema' (Norman & Shallice, 1986; Shallice, 1988). Similarly to language nodes, in this model, separate task schemas are developed for each of the known languages, and language control is achieved by activating and inhibiting task schemas. While originally being developed for language production, the IC model could also be a viable account of language perception (Green, 1998). With the help of language tags attached to each word in the bilingual mental lexicon, the language of the perceived words is identified, and the task schema activates the corresponding language while inhibiting the irrelevant language.

Generally, the two models are functionally equivalent (Green 1998) as they both presuppose the same combination of activation and inhibition processes in the core of language control. However, the predictions for differences in language control of the more dominant language (L1) and less dominant language (L2) are the opposite. According to the IC model, it is expected that more active representations from the dominant L1 would require stronger inhibition during language control while controlling the already less active L2 would be less effortful. Contrastingly, the BIA model indicates that a stronger inhibition is being applied to L2, while better proficiency and richer experience (higher activity) with the dominant language result in less effortful control. Recent bilingual language control studies attempted to validate one of these models by empirical research.

The bilingual lexical decision task was developed to measure the language inhibition *direction* predicted by the models mentioned above. In this task, participants are instructed to decide whether the presented strings of letters are words or non-words. Subsequent stimuli belong to the same language (*repetition trials*, e.g., L1–L1) or different languages (*switch trials*, e.g., L2–L1). The difference in reaction times between repetition and switch trials in one language is called the *switching cost,* and it reflects how much inhibition is being applied to L1 and L2. Higher switching cost for a particular language means that it has to be inhibited more when using another language and requires more effort to reactivate it. To date, only a few studies have addressed the question of switching cost in bilingual recognition. Research measuring switching cost in perception mainly reported symmetrical switching cost, namely similar strength of inhibition for bilinguals' known languages (Macizo et al.,

2012; Orfanidou & Sumner, 2005; Thomas & Allport, 2000; von Studnitz & Green, 1997, 2002). The IC and BIA models both predict that such an outcome is possible, yet it does not specify which account corresponds to the real-life bilingual language processing.

What becomes clear from previous studies is that the research methodology had some limitations in terms of stimuli design and the exploration of the linguistic background of bilingual participants. Reynolds et al. (2016), in their thorough review of research methodology, highlighted inconsistencies with features of the used stimuli and their order of presentation, which were taken into account in the design of later studies (e. g. the present study). For example, Mosca and de Bot (2017) conducted a carefully controlled lexical decision experiment in which English-Dutch bilinguals were tested. They found that switching cost was asymmetrical and significantly higher for L1, which served as evidence for the relevance of the IC model.

The definition of participants' language dominance is another important factor in language control studies, which has not been receiving enough attention, considering its significance. For a long time, language control mechanism research only investigated the participants' relative proficiencies in the two languages (e. g. von Studnitz & Green, 1997). However, it has been argued that the cognitive organization of languages is heavily influenced by a variety of language-related background factors (e.g., Kaushanskaya et al., 2020; Luk & Bialystok, 2013) and some positive development in recognition of the importance of these factors has already been made (e.g., Mosca & de Bot, 2017). Nonetheless, the question of the influence of various linguistic backgrounds has not been studied explicitly yet.

To date, there is still no final consensus on what should be included in the definition of language dominance (Gollan et al., 2012; Kaushanskaya et al., 2020; Luk & Bialystok, 2013; Sheng et al., 2014). Some general agreement has been achieved on several components of linguistic background: age of language acquisition, exposure to the language at the time of inquiry, the length of exposure to languages and estimated levels of language proficiency. Considering these factors, standardized models of linguistic background measurement were developed in order to facilitate the comparability among studies. One of the first such systems widely used in bilingual research is the Language Experience and Proficiency Questionnaire (LEAP-Q) (Marian et al., 2007). It is designed to collect data on bilinguals' language competence, acquisition, and exposure with 18 questions of varying complexity. It gives a broad picture of individual experiences with their second language, with relevant data on L1, but in relation to language control studies, it has one but significant flaw. As was highlighted by Birdsong et al. (2012), the LEAP-Q was not designed to provide a measure of language dominance. The data collected via LEAP-Q provide a lot of important information on bilinguals' experiences with L2, but the measurement of language dominance is supposed to include an equal comparison of participants' L1 and L2.

Therefore, a new system has been explicitly designed to solve the aforementioned problem – the Bilingual Language Profile (BLP) questionnaire (Birdsong et al., 2012). Within this system, the authors organized a clear-cut separation of questions into four paired sets of factors for each of the studied

languages: language history, language use (current, not former), language proficiency, and language attitudes. Even though the factors have different numbers of questions, they are also given different weighting to ensure the same amount of influence on the final language dominance score. Additionally, avoiding the open-ended questions, the BLP questionnaire provides the most detailed and systematic approach, specifically designed to evaluate language dominance.

## The Current Study

The main aim of this study is to investigate the mechanism of bilingual language control in perception within a new context of linguistically distant languages (Hungarian and English), with special attention to the evaluation and analysis of the relation with language dominance. Hungarian-English bilingual perception was previously studied regarding the homograph effect (Navracsics & Sáry, 2013; Ihász et al., 2023), and longer RTs were found for L1; however, RTs for non-homograph real words showed no difference, suggesting symmetric language control.

The main goal of the present study is to find out which model is more viable to account for the mechanism of language control.

The questions of the research are as follows:

RQ1. Is there a language switching cost during language control in perception for unbalanced bilinguals?
RQ2. Is switching cost asymmetry dominance-related (in line with the IC model) or dominance-reversed (in line with the BIA model)?
RQ3. What is the relation between language dominance and switching cost mechanism?

The hypotheses of the research are based on previous studies:

(1) It is expected that even in the case of linguistically distant languages, in which words could potentially initiate earlier and faster language recognition, switching cost should be present, as the language control mechanism seems to rely on additional extra-linguistic control mechanisms (Green, 1998; Orfanidou & Sumner, 2005; Thomas & Allport, 2000).
(2) Considering that asymmetrical switching cost for language perception is expected, in line with former studies (Jackson et al., 2004; Mosca & de Bot, 2017), they should be dominance-related, as predicted by the IC model.
(3) Language dominance that has an effect on various aspects of language use (e.g., Bullock et al., 2006; Filippi et al., 2012) should definitely influence language switching cost. Except for overall language dominance, which should have positive correlations with switching cost (the higher the dominance in one of the languages – the higher the switching cost), it is also expected that specific elements of linguistic background: language history, and language use, would have significant influence on the reaction times and switching cost.

Consequently, from the hypothesized answers to the questions, the observations of this research would signify the Inhibitory Control model as the more suitable model to account for language control in perception.

# Method

Thirty-one bilingual participants took part in this research. All participants were native speakers of Hungarian who have acquired English after the age of 7. The average age of participants was 24.32 (SD=6.68). The participants performed a lexical decision task and were administered the Bilingual Language Profile questionnaire (Birdsong et al. 2012). In the following, the instruments of the study will be described.

## Instruments

A *bilingual lexical decision* experiment was used in this research, in which participants were asked to decide whether the presented string of letters was a word or a pseudoword. The list of stimuli consisted of 28 real words and 28 pseudowords. The list of real words included 14 English and 14 Hungarian words – all were nouns denoting real concrete objects. No word had its translation included in the list, and not a single word was a cognate. All words were matched for word frequency ($t=.88$, $p>.05$). Information about English word frequencies (M=7.85, SD=2.84) was derived from the British National Corpus (BNC) (https://www.english-corpora.org/bnc/) and data on Hungarian word frequencies (M=6.87, SD=3.03) was derived from the Hungarian corpus developed by Language Technology Research Group (http://corpus.nytud.hu/cgi-bin/mnszgyak). English (M= 5.57, SD= 0.52) and Hungarian (M= 5, SD= .55) words were matched for orthographic length, ensuring no significant difference between the two languages ($t= 2.83$, $p>0.05$). Pseudowords were created by changing the sub-syllabic elements of the real words selected for this study. Pseudowords had the same orthographic length as their real-word counterparts. Language-specific symbols (such as á, ű, ó) were not used for words or pseudowords. The list of all stimuli used in the experiment is available in Appendix A.

All items were presented in the centre of a 15-inch computer screen set to 1,366 × 768 pixel resolution, and were seen from a distance of approximately 40 – 80 cm. Words and pseudowords were presented in white uppercase letters against a black background. The software PsyToolkit was used (Stoet, 2010, 2017) for data collection.

## Bilingual Language Profile Questionnaire

The BLP questionnaire consisting of 48 questions in total was used, inquiring about relevant personal information and linguistic background data of both languages on language history, language use, language proficiency, and language attitudes. In the BLP, numerical values are assigned to each element of background, and their sum constitutes the value of the total linguistic background for a language. Language dominance is calculated as the difference in total linguistic backgrounds of L1 and L2. Therefore, better language balance is associated with lower scores of language

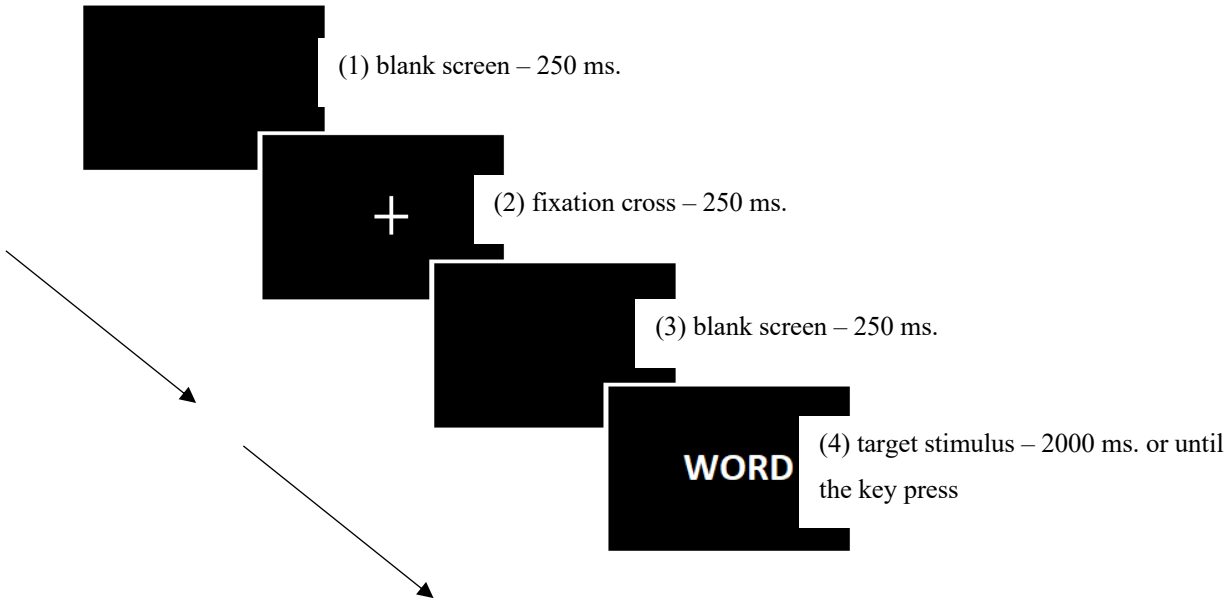
dominance, and stronger language imbalance would be associated with higher language dominance scores. Every set of bilingual linguistic backgrounds was individually weighted so, for example, the influence of language use cannot outweigh the influence of language performance (for more details, see https://sites.la.utexas.edu/bilingual/).

## Procedure

Participants were tested individually in a quiet room; they received oral instructions from the principal investigator and written instructions on the computer screen. The whole session consisted of a practice session and a main session of the lexical decision tasks. All participants were instructed to react as quickly and correctly as possible.

In the lexical decision task, the reaction times were measured as the time between the display of the stimulus on the screen and the pressing of one of the response buttons. As can be seen in Figure 1, a trial consisted of: (1) a blank screen for 250 ms; (2) a fixation cross for 250 ms; (3) a blank screen for 250 ms; (4) a target stimulus for 2000 ms.

Figure 1
*Example of Lexical Decision Task Trial*




Participants were instructed to decide whether the presented strings of letters were real or non-sense words by pressing one of two buttons on the left or right sides of the keyboard. The task consisted of 336 trials in total. One-third of the trials (112) were non-sense words, and the remaining trials were real English (112) and real Hungarian (112) words. Participants were instructed that the language to which words belonged was irrelevant to the task.

Only one item was displayed at the time. To exclude the effects of backwards inhibition (influence of trial order on the reaction times) on switch trials, all trials were organized in 4-item chunks (84 chunks in total for 336 trials) (for a review on backward inhibition, see Koch et al., 2010). Every chunk consisted of 3 repetition trials at the beginning and one switch trial at the end. The whole test consisted of 252 repetition trials and 84 switch trials.

There were two types of chunks in the test: full-word chunks that included only real words and partial-word chunks that included both words and pseudowords.

In full-word chunks, the first three trials belonged to the same language, while the last one was a switch to another language (e.g., L1 word – L1 word – L1 word – L2 word = LOVAG – SZOBOR – LABDA – CARROT (Knight – Statue – Ball in Hungarian)).

In partial-word chunks, different types of trials (words and pseudowords) and both languages (L1 and L2) were included. Because of this, there were two groups of partial-word chunks:

• With the first three trials being real words from the same language and the last one being a pseudoword of any language (e.g., L1 word – L1 word – L1 word – L1 pseudoword = LOVAG – SZOBOR – LABDA – KALUG (Knight – Statue – Ball in Hungarian));

• With the first three trials being pseudowords from the same language and the last one being a real word from any language (e.g. L1 pseudoword – L1 pseudoword – L1 pseudoword – L2 word = KALUG – SZOTOL – PILLVE – RAZOR).

In order to counterbalance and limit the possible priming effect, for full-word chunks and two groups of partial-word chunks, each word was seen only once in each chunk position. If two items (e.g., pencil-onion-X-X) had occurred together in a chunk, this item combination was not repeated. Additionally, their derived pseudowords (e.g., menvil-uniein-X-X) were never presented together within a chunk. Real words and pseudowords derived from them (e.g., pencil-X-X-menvil) never occurred in the same chunk. Moreover, a given item was never seen within the following five trials, and the same type of chunk never occurred more than twice in a row. Because of these constraints, the order of the trials was unpredictable.

Four lists of the tasks were created for testing. In order to perform the appropriate comparison of the switching cost, only the last two elements of a chunk were analyzed, leading to the same number of repetition and switch trials under analysis (84 repetition and 84 switch trials per task list).

Each participant was administered with one list only. The language of instructions for the task was English. Before the main experiment, participants did a practice session of 24 trials, and these practice items were not included in the data analysis.

**Result Analysis Procedure**

The data for the reaction times analysis was organized as follows. Each participant has finished one trial block of 336 trials, but the research design presupposed that only 50% of these trials (168) could be analyzed. The data on each

trial included the reaction time, answer status (correct/incorrect), and trial characteristics. Trial characteristics were combinations of 4 trial variables that could take two values each:

- Language of the stimulus: L1 or L2 (language of the original word for pseudoword stimuli);
- Type of the stimulus: Word or Pseudoword;
- Trial type: Repetition (e.g., L1 word – L1 pseudoword) or Switch (e.g., L1 word – L2 pseudoword) (relates only to the *language* of the previous trial, not the type);
- Response Priming: Response Repetition (e.g., L1 word – L2 word) or Response Change (e.g., L1 word – L1 pseudoword) (relates only to the *type* of the previous trial, not the language).

Each trial had a condition that was a combination of different values of 4 variables (e.g., L1-Word-Repetition- Response Repetition trial). The target conditions of trials for analysis included real word trials primed by real words of both languages and both trial types. Reaction times and switching cost were compared using t-test analysis.

In the correlation analysis, reaction times and switching cost for both languages were included as dependent variables, while the independent variables were: proficiency, use, history, and attitudes for each language; total linguistic background for each language; language dominance score (difference in total linguistic backgrounds for the two languages); differences in proficiency, use, history and attitudes for the two languages (for in-depth analysis of the influence of language dominance).

# Results

## BLP Questionnaire Analysis

This section presents the participants' language background in the L1 and L2 as measured by the BLP. As shown in Table 1, on average, participants were L1-dominant bilinguals, as their Hungarian score was significantly higher than the English score in all domains.

Table 1
*Participants' Linguistic Background Data*

| | *L1 (Hungarian)* | | *L2 (English)* | | *Significance* |
|---|---|---|---|---|---|
| *Language History* | M=45.58 | SD=5.37 | M=13.53 | SD=6.53 | p<.001 |
| *Language Use* | M=34.42 | SD=6.85 | M=19.90 | SD=6.97 | p<.001 |

| | | | | | |
|---|---|---|---|---|---|
| *Language Proficiency* | M=52.06 | SD=4.83 | M=44.81 | SD=7.55 | p<.001 |
| *Language Attitude* | M=46.86 | SD=12.29 | M=38.22 | SD=11.31 | p<.01 |
| *Total Language Background* | M=178.93 | SD=20.18 | M=116.47 | SD=22.94 | p<.001 |

Two participants had negative BLP language dominance values, which meant that they were L2 dominant at the moment of testing. However their language balance value was under 30 points, which indicates that they are relatively balanced bilinguals. In total, 6 participants could be considered relatively balanced bilinguals.

**Lexical Decision Accuracy Analysis**

This section presents the accuracy of the participant's performance in the lexical decision task. On average, participants' mean accuracy was 93.95%.

Within the lexical decision task paradigm, to answer the research questions, we need to analyze the difference in the accuracy of reactions to stimuli in language repetition and language switch conditions, which were real words of one language, primed by other real words. The analysis revealed that the difference in the accuracy of reactions between repetition and switch trials was significant for both L1 ($t(30) = 4.79$, $p<.001$) and L2 ($t(30) = 5$, $p<.001$) words (Table 2), meaning that participants reacted more accurately to repetition trials in both languages.

Table 2
*Participants' Accuracy Rates (Words Primed by Words, Within Language Comparison)*

| | M | SD | Significance |
|---|---|---|---|
| L1 repetition | 99.88% | .64 | p<.001 |
| L1 switch | 94.8% | 5.78 | |
| L2 repetition | 95.22% | 0 | p<.001 |
| L2 switch | 91.94% | 8.99 | |

**Lexical Decision Reaction Times Analysis**

The same pairs of stimuli were involved in the reaction times analysis as in the accuracy analysis. The analysis of the reaction times to word trials in response

repetition condition revealed that the difference between language repetition and language switch trials was significant only for L1 (t (30) = 4.68, p<.001) but not for L2 (p>.05) words (Table 3). It means that while reactions to L1 words in the language repetition condition were significantly faster than in the language switch condition, reactions to the same two types of trials in L2 were similarly fast.

Table 3
*Participants' Reaction Times (Words Primed by Words, Within Language Comparison)*

| Compared conditions | M | SD | Significance |
|---|---|---|---|
| L1 repetition | 512.95 | 59.15 | p<.001 |
| L1 switch | 557.4 | 79.87 | |
| L2 repetition | 588.23 | 62.3 | p>.05 |
| L2 switch | 573.71 | 83.62 | |

**Switching Cost Analysis**

Previously, it was found that the switching cost was significant only for one language, but it is still unclear whether the switching cost for two languages differed significantly from each other. In order to investigate that, we have calculated the switching cost as the difference between reaction times in language switch and repetition conditions (Table 4). Additionally, if the average reaction times in the switch condition were faster than for the repetition condition, then the switching cost for such participants would be negative. On average, participants' switching cost for L1 words in the response repetition condition was significantly higher (M=44.45) than for L2 words (M= -14.52) in the response repetition condition (t (30) = 5.18, p<.001). This indicates that asymmetrical, dominance-related switching cost, i.e., it takes more time to reactivate the dominant L1.

Table 4
*Participants' Mean Language Switching Cost*

| | L1 | L2 |
|---|---|---|
| Language repetition | 512.95 | 588.23 |
| Language switch | 557.4 | 573.71 |
| Switching cost | 44.45*** | -14.52 |

*Note:* p< .001***, p< .01**, p< .05*, p< .05

## Correlations of RT with Linguistic Background

In order to find out which linguistic background component is associated with language control, correlation analyses were conducted between the BLP questionnaire data and the lexical decision task data (reaction times and switching cost included). The analyses revealed significant correlations with L2 language history. Richer L2 language history was associated with reduced RTs to L1 words in language repetition condition ($r(29) = -.37$, $p<.05$), L2 words in language repetition condition ($r(29) = -.40$, $p<.05$) and L2 words in language switch condition ($r(29) = -.46$, $p<.01$) (Table 5). No other significant correlations were observed.

Table 5
*Correlations of RTs with Language Background*

| | Language history | | Language use | | Language proficiency | | Language attitudes | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| L1 repetition | -.3 | -.37* | .01 | -.04 | -.15 | -.12 | .04 | .09 |
| L1 switch | -.11 | -.2 | .05 | -.05 | -.07 | -.21 | -.03 | .01 |
| L2 repetition | .05 | -.4* | .23 | -.22 | .18 | -.28 | .33 | -.13 |
| L2 switch | -.05 | -.46** | .26 | -.26 | .07 | -.31 | .21 | -.18 |
| L1 switching cost | .17 | .11 | .07 | -.02 | .06 | -.18 | -.09 | -.09 |
| L2 switching cost | -.16 | -.29 | .16 | -.16 | -.11 | -.17 | -.06 | -.15 |

*Note:* p< .001***, p< .01**, p< .05*, p< .05

Further analysis revealed that a *richer* (with higher associated values) L2 total language background was associated with reduced RTs to L2 words in the language switch condition ($r(29) = -.4$, $p<.01$). Additionally, it was found that increased L1 language dominance was associated with slower RTs to L2 words in the language repetition condition ($r(29) = .41$, $p<.05$) and L2 words in the language switch condition ($r(29) = .38$, $p<.05$) (Table 6).

Table 6
*Correlations of Reaction Times with Language Background and Dominance*

| | Total language Background | | Language Dominance |
|---|---|---|---|
| | L1 | L2 | |
| L1 Repetition | -.09 | -.11 | .02 |

| | | | |
|---|---|---|---|
| L1 Switch | -.05 | -.13 | .06 |
| L2 Repetition | .33 | -.34 | .41* |
| L2 Switch | .22 | -.4* | .38* |
| L1 Switching cost | .03 | -.08 | .07 |
| L2 Switching cost | -.05 | -.26 | .14 |

*Note:* p< .001***, p< .01**, p< .05*, p< .05

In the analysis of correlations between the task performance and differences in linguistic backgrounds of the two languages, we found that increased imbalance in language history between L1 and L2 led to slower RTs to L2 words in language repetition condition (r (29) = .38, p<.05) and L2 words in language switch condition (r (29) = .36, p<.05). However, it was additionally found that unlike with separate values of L1 and L2 proficiency, the increased imbalance in language proficiency had a significant positive correlation (led to slower reactions) with reaction times to L2 words in language repetition condition (r (29) = .38, p<.05) (Table 7).

Table 7
*Correlations of Reaction Times with Differences in Language History, Use, Proficiency, and Attitudes*

| | Language history difference | Language use difference | Language proficiency difference | Language attitudes difference |
|---|---|---|---|---|
| L1 Repetition | .11 | .03 | .02 | -.03 |
| L1 Switch | .09 | .05 | .16 | -.03 |
| L2 Repetition | .38* | .23 | .38* | .31 |
| L2 Switch | .36* | .26 | .33 | .26 |
| L1 Switching cost | .02 | .05 | .21 | -.01 |
| L2 Switching cost | .14 | .16 | .09 | .05 |

Note: p< .001***, p< .01**, p< .05*, p< .05)

# Discussion and Conclusions

Most of the earlier research on language control in bilingual visual language perception reported symmetrical switching cost for the two languages, meaning that they did not differ significantly (Orfanidou & Sumner, 2005; Thomas & Allport, 2000; von Studnitz & Green, 1997). While these studies were crucial contributions to the understanding of the mechanism of language control, they did not specify which theoretical model, the IC or BIA, is a more viable account of language control (Mosca & de Bot, 2017; Reynolds et al., 2016). According to the BIA model, the inhibition of the less active L2 is stronger than the inhibition of the more active L1, while the opposite is predicted by the IC model. Both models predict the possibility for symmetrical switching cost, but only for balanced bilinguals, with similar activity levels for both languages that they know. The experiments reporting symmetrical switching cost indicated using the sample of unbalanced bilinguals, meaning that their findings challenge the validity of both models simultaneously. Language-specific features of the stimuli as an explanation for these inconsistencies were reported to have insignificant influence on task performance (Orfanidou & Sumner, 2005; Reynolds et al., 2016).

Only two research reported asymmetrical switching cost in perceptions: the study by Jackson et al. (2004) that used a different perception task, and the study by Mosca and de Bot (2017) that included a more frequently used lexical decision task. The uniqueness of the latter study was that participants' dominance in L1 was reported not only for language proficiency but also for length of language acquisition and daily language use. Also, the study included language non-specific stimuli, matched for their length and frequency of use in languages, with carefully controlled order of stimuli presentation. With such minimalized effects of potential confounding variables, asymmetrical, dominance-related switching cost was observed, validating the IC theory of language control.

This study aimed at investigating bilingual language control system in visual recognition in a different language context with careful methodological organization. More precisely, the goal was to find out which language control model, the Bilingual Interactive Activation or Inhibitory Control, is more viable to account for the mechanism of language control. Since the predictions of both models heavily rely on the presence of the dominant language, this study included language dominance as a main factor. In order to answer the three research questions of the study ((1) whether there is a switching cost during language control in perception for unbalanced bilinguals; (2) whether switching cost asymmetry is dominance-related (in line with IC model) or dominance-reversed (in line with BIA model); and (3) what is the relationship between language dominance and switching cost mechanism)) 31 Hungarian-English bilinguals were recruited. The Bilingual Language Profile questionnaire was adapted, and a bilingual lexical decision task was developed to gather the relevant data.

According to the results, the RT difference between repetition and switch trials was significant only for L1 words but not for L2 – i.e., significant switching cost was present only for L1, which should be considered a partial confirmation of the first hypothesis. The comparison of switching cost revealed that they differed significantly, which means that asymmetrical switching cost was observed. The observed asymmetrical switching cost was higher for the more dominant language of the participants. Even though the average reaction times to L1 words were faster, the difference in the reaction times in language repetition and switch conditions for L1 were higher than for L2. The obtained results replicate the findings by Mosca and de Bot (2017), validating the IC model of language control in visual language perception, in line with our second hypothesis.

In addition to investigating the relevance of language control models, this study was also aimed at investigating the influence of individual linguistic background variables and language dominance on language control, which is the novelty of this research. As was mentioned before, mostly unbalanced, L1-dominant bilinguals participated in this study. Their L1 (Hungarian) linguistic background was less diverse than their L2 (English). It was hypothesized that language dominance, daily language use, language learning, and language history are associated with language control mechanism – i.e., the mentioned components of linguistic background should have significant correlations with LDT task performance. The hypothesis was partially confirmed. The reactions to L2 words were faster among people who studied and used L2 for longer. The reactions to L2 words were faster among people who are more balanced bilinguals. No correlations were observed with language attitudes and language use, which partially contradicts our hypothesis, as language use was expected to correlate with LDT performance. The absence of any significant correlations means that the performance of participants who used L2 more and less often was quite similar, as well as the performance of participants with better and worse attitudes to L2.

Neither L1 nor L2 language proficiencies had any significant correlations with LDT performance, but we have found a significant, positive correlation between language proficiency difference and RTs to L2 words in language repetition condition. Our finding means that bilinguals with more balanced language proficiencies tended to perform faster in LDT (in the case of L2 word stimuli). This finding once again signifies that analyses of bilingualism have to separately consider the differences between the L1 and L2 experiences. A more detailed investigation of language dominance might provide further insights into the investigation of language control mechanism.

In general, the results of this study show stronger inhibition of bilinguals' more dominant language in accordance with the Inhibitory Control model (Green, 1986, 1998). The novelty of the current study lies in the careful methodological considerations that helped to answer the research question promptly. First of all, shortcomings of previous studies have been addressed when designing the stimuli and the procedure of the lexical decision task. Secondly, special attention was paid to the detailed exploration of participants' linguistic backgrounds by using the BLP. The

revised approach evaluating of participants' language dominance and linguistic backgrounds was operationalized as a continuous and not as a dichotomous variable that would have obscured crucial elements of bilingualism. Such an approach was adopted for the first time in language control studies. It helped us explain the obtained results, i.e., longer and richer L2 history and more balanced language proficiency lead to faster reactions. Consequently, the current research proposes a methodological framework for measuring the influence of linguistic backgrounds on language switching cost.

## Disclosure Statement

No potential conflict of interest was reported by the authors.

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# Appendix

**The list of the used stimuli:**

English Words: CANOE, CARROT, RAZOR, CANNON, ONION, CANDLE, BARREL, TOWEL, RULER, HAMMER, ARROW, PENCIL, BASKET, ORANGE.

Hungarian Words: SAROK, GALAMB, LOVAG, HARANG, KOCKA, MAJOM, GOMBA, MEDVE, KALAP, ALMA, LABDA, RUHA, MACSKA, SZOBOR.
(Translations of the Hungarian words in the corresponding order: Corner/heel, pigeon, knight, bell, cube, monkey, mushroom, bear, hat, apple, ball, clothes, cat, sculpture)

English Pseudowords: TAMBER, ARRAX, RAKAR, BARRIT, BANBLE, CAPEA, URAIRS, UNEIN, CANGIN, MENVIL, BARRAT, ROMER, BAMRET, TAMEL

Hungarian Pseudowords: MOROK, LOCSKA, GOMAR, LOTUR, GAZONG, KALUG, MAJAT, TOHA, PILLVE, TARANG, PURDA, FURKA, SZOTOL, ALKA

# The Effect of the Nature of the Adversative Relations on the Online Processing of *But*-Sentences

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**Abstract.** The purpose of the study was to extend the knowledge about two different types of adversative relations. The study pertaining to the principles of the Connective Integration Model (Millis & Just, 1994) included two experiments to examine the effect of two types of *but*-sentences (type 1 and type 2) in connective and non-connective versions on reading comprehension and recall performance. Reading comprehension was measured by clause 2 reading times, response times to comprehension questions and answer accuracy, while recall performance was measured via probe recognition times and accuracy in probe answers. The results of Experiment 1 indicated that the connective versions led to faster clause 2 reading times, faster answer latencies and greater answer accuracy than did the non-connective versions. Experiment 1 also showed that the semantic constraints related to the two types of *but*-sentences had an impact on reading speed and comprehension, since it was found that type 1 *but*-sentences were associated with faster clause 2 reading times, answer latencies and higher answer accuracy than were type 2 *but*-sentences in the non-connective versions versus the connective versions, and that type 2 *but*-sentences were read faster than were type 1 *but*-sentences in the connective versions. The results of Experiment 2 only indicated greater accuracy in probe answers in the type 1 versus the type 2 *but*-sentences in the connective and non-connective versions.

***Keywords:*** *adversative relations, but-sentences, connectives, Connective Integration Model.*

**Цілімос Марія, Озубко Джейсон. Вплив сутності протиставних відношень на онлайн-обробку речень з *but.***

**Анотація**. Метою дослідження було розширити знання про два різні типи протиставних відношень. Дослідження, що ґрунтується на принципах конективної інтеграційної моделі (Millis & Just, 1994), включало два експерименти для вивчення впливу двох типів протиставних речень (тип 1 і тип 2) у сполучниковій і безсполучниковій версіях на розуміння прочитаного і здатність до запам'ятовування. Розуміння прочитаного вимірювали за часом читання пункту 2, часом відповіді на запитання на розуміння та точністю відповідей, тоді як продуктивність пригадування вимірювали за часом розпізнавання тесту та точністю відповідей на тест. Результати експерименту 1 показали, що версії зі зв'язкою призводять до швидшого часу читання пункту 2, менших затримок у відповідях і більшої точності відповідей порівняно з версіями без зв'язки. Експеримент 1 також показав, що семантичні обмеження, пов'язані з двома типами безсполучникових речень, впливають на швидкість читання і розуміння, оскільки було виявлено, що безсполучникові речення типу 1 асоціюються зі швидшим часом читання пункту 2, меншою

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затримкою відповіді і вищою точністю відповіді, ніж безсполучникові речення типу 2 у безсполучникових варіантах порівняно з сполучниковими варіантами, і що безсполучникові речення типу 2 читаються швидше, ніж безсполучникові речення типу 1 у сполучникових варіантах. Результати експерименту 2 свідчать лише про більшу точність відповідей на запитання у сполучникових реченнях типу 1 порівняно з безсполучниковими реченнями типу 2 у сполучникових і безсполучникових версіях.

***Ключові слова:*** *протиставні відношення, речення з but, конектори, конективна інтеграційна модель.*

# Introduction

A small number of studies (Asr & Demberg, 2020; Caron, 1988; Cevasco, 2009; Haberlandt, 1982; Kleijn et al., 2019; Murray, 1994, 1997; Golding et al., 1994) have examined the effect of the connective *but* on online and offline processing. Special attention has been paid to the facilitative role of the connective in the integration of two adjacent clauses into a common representation and its positive impact on reading comprehension.

More specifically, Murray (1994) showed that the adversative connectives (yet, but, however, nevertheless) were associated with faster reading times in the connective versions than they were in the non-connective versions compared to the additive and causal connectives. Haberlandt (1982) showed that target sentences beginning with adversative connectives (but, yet, instead, however, nevertheless), as well as the first phrase following them, were read faster when the connective was present. In spoken discourse, Cevasco (2009) found that the presence of the connective *but* facilitated the establishment of causal inferences amongst spoken statements, and that the participants were also able to respond faster in a judgement task. Kleijn et al. (2019) showed that the presence of contrasting connectives facilitated the comprehension of difficult texts, while Golding et al. (1994) measured the reading times of the second clause, as well as the recall performance, when the connective *but* was either present or absent. The *but*-sentences were also manipulated across levels of relatedness (low, medium and high). The results of Golding et al.'s study revealed that the reading times for the second clause were faster across all levels of relatedness when the connective *but* was present versus when it was absent. Murray's (1997) study in support of the continuity hypothesis showed that, when the adversative connectives were placed inappropriately in a sentence, they caused longer reading times and lower ratings of coherence compared to additive and causal connectives. Caron et al. (1988) found that the recall performance for *but*-sentences was poor compared to the recall performance for *because* sentences; the explanation that was given was that the *but*-sentences induced inferential processes that did not lead to the same establishment of coherence between the two clauses as the *because* sentences did.

There does appear to be only one study that has examined *but*-sentences in terms of their fine-grained semantic relations. Asr and Demberg (2020) only compared the inferred interpretations generated by *but*-sentences to those generated by *although* sentences, however, via a series of experimental methods different than those in the

current study, and found that *but*-sentences that expressed a violated expectation relationship were rated as being less coherent and took more time to read than did *but*-sentences that were consistent with a contrastive relationship.

The present study narrowed the focus to the semantic constraints related to two types of *but*-sentences; specifically, the study examined whether the version (connective or non-connective) or the type of *but*-sentences (type 1 or type 2) had an effect on reading comprehension and recall performance.

Type 1 concerns *but*-sentences in which clause 1 is semantically opposite to clause 2 in response to a specific attribute (semantic opposition; Lakoff, 1971). For example, in the sentence *Mary eats sweets but John eats chips*, the representation in clause 1 entails a situation that is semantically different from the situation represented in clause 2 in the sense that Mary eats a type of food (sweets) that is different from the type of food (chips) that John eats. Type 2 concerns *but*-sentences in which clause 2 violates the expectation deduced from the content of clause 1 (denial of expectation; Lakoff, 1971). This expectation is derived from the reader's world knowledge; for example, in the sentence *Mary eats sweets but she is fit*, the content of clause 1 triggers the expectation that, since Mary eats sweets, she is not fit. This inferred expectation contradicts the information conveyed by clause 2.

In type 1 *but*-sentences, the adversative coherent relations between the two clauses is established on the surface or text level because the two semantically different propositions are stated explicitly without leaving any room for implications (Spooren, 1989). By contrast, implication is an inherent characteristic of type 2 *but*-sentences. An inference is first invited based on the content of clause 1, which is then contrasted with the information in clause 2. The contrasting relationships expressed by type 2 *but*-sentences are due to the mismatch between the information in clause 2 and the expectations generated by the information in clause 1; therefore, this type is related to high semantic constraints (Murray, 1994). By contrast, it could be argued that type 1 *but*-sentences are associated with low semantic constraints because the contrasting relationships in this type are due to the two semantically different attributes of two entities.

The purpose of the present study was to test the Connective Integration Model (Millis & Just, 1994) on the fine-grained differences between type 1 and type 2 *but*-sentences in connective and non-connective versions. Based on the principles in this model, we hypothesised that:

(1) The presence of the connective *but* will facilitate the integration of the representations of the two clauses into a common, coherent representation at the end of clause 2; (2) the presence of the connective *but* will alert the readers that there is a semantic adversative relationship between the two clauses; and (3) when there is no connective, the reader will need to use more cognitive resources to integrate the two clauses.

Specifically, in Experiment 1, it was expected that the presence of the connective *but* would prompt the reader, after reading clause 1, that the postconnective clause had a contrasting relationship with clause 1; thus, its presence would facilitate the integration of the two clauses into a common representation.

Therefore, clause 2 would be read more quickly when the connective *but* was present than when it was absent. Similarly, the response times to comprehension questions would be shorter and the answer accuracy would be greater in the presence of the connective *but* than in its absence.

According to the Reactivation Hypothesis generated by the Connective Integration Model (Millis & Just, 1994) we hypothesised that (1) when the connective *but* is present, the mental representation of clause 1 will be set aside in the working memory until the reader finishes reading clause 2, which is the point at which clause 1 will be reactivated and integrated with clause 2; and (2) the information in clause 1 will be activated to a higher degree in the presence of the connective at the end of clause 2.

Accordingly, in Experiment 2, it was expected that, when the two clauses were joined by *but*, the reader would perform better in terms of retrieving information from clause 1 after they had finished reading clause 2. Thus, probe recognition times would also be quicker as well as the accuracy of the probe answers would be higher in the connective versions than they would in the non-connective versions.

The two experiments were conducted with the aim of examining the two underlying assumptions of the study, which were (1) the presence of the connective *but* would contribute to the facilitation of the integration processes and to the establishment of coherence between the two adjacent clauses; and (2) the inferences generated during and after reading regarding the two different adversative relations would be constructed independently of the presence or absence of the connective *but*.

**Ethics and Consent**

This project has been reviewed by, and received ethics clearance through, the Ethics Committee of the Faculty of Arts and Social Sciences at the University of Zurich.

# Experiment 1
# Method

The 2 x 2 factorial design: This experiment was a self-paced reading task on the clause level, and was designed to examine the effect of two independent variables, each with two levels, on reading comprehension. The first independent variable was the version (connective and non-connective), and the second independent variable was the type of *but*-sentences (type 1 and type 2); therefore, there were four conditions:

(1) type 1 *but*-sentence, connective,
(2) type 1 *but*-sentence, non-connective,
(3) type 2 *but*-sentence, connective, and
(4) type 2 *but*-sentence, non-connective.

The dependent variables were the clause 2 reading times, response times to comprehension questions and the answer accuracy.

## Procedure

At the beginning of the experiment, the participants were told that they were going to read sentences about Ben and Liv, who were both 17 years of age and were friends. A picture that depicted Ben and Liv accompanied the short text. The participants read the instructions stating that each sentence consisted of two parts and that, after they had read the first part, they would be required to press the spacebar to continue with the second part. The participants were told that, after they had read the second part of the sentence, they would have to press spacebar to continue with a comprehension question that needed to be answered 'yes' or 'no' as quickly as possible on the keyboard. The participants were told to proceed with the comprehension question after they had understood the two parts of the *but*-sentence. Two practice tasks were provided for the participants. Each part of the sentence was presented in the middle of the computer screen.

The interval between tapping the spacebar at the end of clause 2 and the start of the comprehension question was defined as the clause 2 reading time, and the interval between tapping the spacebar at the end of the comprehension question and the start of the new sentence was defined as the response time to the comprehension question. The answer accuracy was measured by the proportion of the correct answers versus the proportion of incorrect answers to the comprehension questions.

## Materials

Forty-eight within-subject *but*-sentence stimuli were constructed, as follows:

(1) 12 *but*-sentences for the condition type 1 *but*-sentence, connective,
(2) 12 *but*-sentences for the condition type 1 *but*-sentence, non-connective,
(3) 12 *but*-sentences for the condition type 2 *but*-sentence, connective, and
(4) 12 *but*-sentences for the condition type 2 *but*-sentence, non-connective.

In the connective version, clause 1 and clause 2 were linked by the connective *but*. In the non-connective version, the *but*-sentence consisted of two clauses separated by a full stop. In half of the type 1 *but*-sentences, the content of clause 1concerned the entity Ben and the content of clause 2 concerned the entity Liv; the other half the content of clause 1 concerned the entity Liv and the content of clause 2 concerned the entity Ben. In half of the type 2 *but*-sentences, the content of clause 1 concerned the entity Ben; the other half of the content of clause 2 concerned the entity Liv. In both type 1 and type 2 *but*-sentences, half of the comprehension questions concerned the content of clause 1 and half concerned the content of clause 2, while half of them required a 'yes' response and half required a 'no' response. The stimuli *but*-sentences were presented in random order for each subject.

## Fillers

Twenty-four filler sentences were also included. These sentences consisted of two clauses linked by a range of conjunctions (and, because, while, so) and were followed by a comprehension question. The fillers were included in order to ensure that the results were not due to the fact that the subjects adopted a specific strategy after reading sentences that denoted contrast. In addition, the comprehension questions following the fillers were included with the aim of ensuring that the subjects paid attention to the sentences. Half of the comprehension questions concerned the entity Ben and half concerned the entity Liv, while half of the comprehension questions required a 'yes' response and half required a 'no' response.

## Participants

Sixty participants, who were sufficiently proficient in English to complete the task, were recruited. The participants, whose ages ranged from 19 to 27, were recruited via the Prolific platform and received reimbursement (£3) for their participation, and the experiment was conducted online on Pavlovia. The participants were given unlimited time to complete the task, with most of them requiring an approximate maximum time of 20 minutes. After completing the task, the participants were debriefed and dismissed.

## Construction of Sentences

The construction of the type 1 and type 2 *but*-sentences was consistent in order to minimise variability that could have affected the reading speed, as well as the comprehension time (Table 1). Therefore, the following factors were controlled during the construction of the *but*-sentences:

(1) The number of words and syllables did not increase or decrease sharply across clause 1 and clause 2. Clause 1 was equal in length to clause 2 in terms of the number of words. In addition, the number of syllables in clause 1 was either the same as the number of syllables in clause 2 or differed by one syllable or a maximum of two syllables. The number of words ranged from three to seven, and the number of syllables from three to ten;

(2) no negated forms were used;

(3) the frequency of the words was similar across the two clauses, with around 46% of the total number of the words being medium to high frequency and around 54% being low frequency (BNC, 2007);

(4) the syntax in type 1 and type 2 *but*-sentences was kept consistent; that is, the type 1 *but*-sentences consisted of two clauses, each with its own subject and verb phrase. The type 2 *but*-sentences consisted of clause 1, which had its own subject and verb phrase and clause 2, which consisted of a pronoun referring back to the subject of clause 1, and a verb phrase: Hence, clause 2 and clause 1 were coreferential; and

(5) the two clauses in both types of *but*-sentences were in the present tense.

Table 1
*Examples of Type 1 and Type 2 But-Sentences*

| Version | Example of type 1 *but*-sentences | |
|---|---|---|
| connective | Ben takes things easy but | Liv is often worried. |
| non-connective | Ben wears black clothes. | Liv loves the colours. |
| | Example of type 2 *but*-sentences | |
| connective | Liv hates getting up in the morning but | she always arrives at school on time. |
| non-connective | Ben speaks very little. | He has strong opinions. |

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## Results and Discussion

The first experiment was designed to answer the question of whether the version (connective and non-connective version) or the type of *but*-sentences (type 1 and type 2) had an effect on clause 2 reading times and on the answer times for the comprehension questions. The clause 2 reading times, as well as the answer times, were measured using a two-way analysis of variance (ANOVA) test with the version and the type of the *but*-sentences as the two independent variables, each with two levels. The outliers were removed from the clause 2 RT dataset, which accounted for 2% of the entire dataset, as well as from the dataset of the answer times, which accounted for 5.5% of the complete dataset.

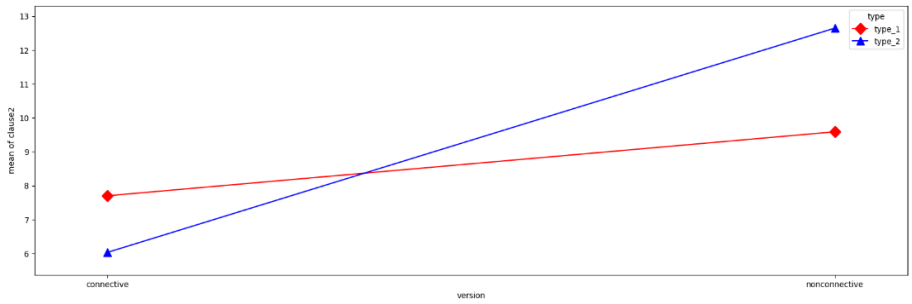
The results revealed a statistically significant difference in clause 2 reading times yielded by the version ($F(1.2814) = 162.09$, $p < .05$ with a medium effect size ($\eta^2 = 0.05$). The mean clause 2 RTs were faster in the connective versions ($\bar{x} = 6.86$) than they were in the non-connective versions ($\bar{x} = 11.13$) (Table 2). There were no statistically significant differences between type 1 and type 2 *but*-sentences ($p = .20$).

Table 2
*Mean Clause 2 RT and Standard Deviation as a Function of the Version*

| Version | Mean | Std |
|---|---|---|
| connective | 6.864193 | 7.799564 |
| non-connective | 11.126398 | 9.994639 |

The ANOVA test also revealed that there was an interaction effect ($F(1, 2814) = 49.89$, $p < .05$ with a small effect size ($\eta^2 = 0.02$) between the version and the type on the clause 2 reading times.

Figure 2
*Interaction Effect of Version and Type on Clause 2 RT*




In the interaction plot (Figure 1), it can be seen that the impact of the version on the clause 2 reading time was dependent on the level of the type of *but*-sentence. Specifically, the clause 2 reading times were faster ($\bar{x}$ = 6.03) for type 2 *but*-sentences than they were for type 1 ($\bar{x}$ = 7.70) sentences in the connective versions, while the clause 2 reading times were slower for type 2 ($\bar{x}$ = 12.65) *but*-sentences than they were for type 1 ($\bar{x}$ = 9.59) in the non-connective versions (Figure 2, Table 3).

Figure 3
*Mean clause 2 RT as a function of the interaction between version and type*

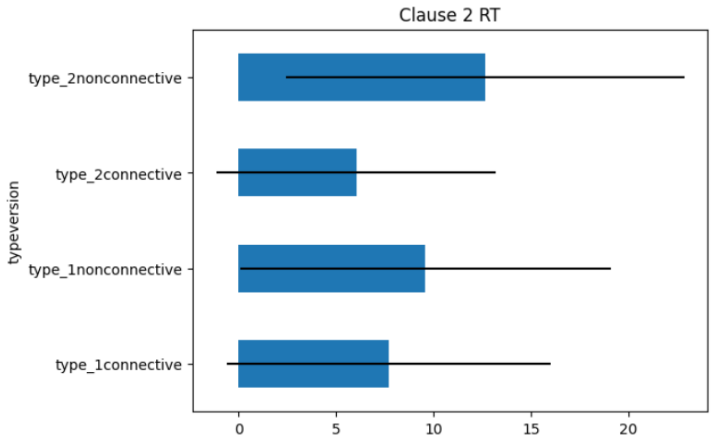



Table 4
*Mean Clause 2 RT and Standard Deviation as a Function of the Interaction Between Version and Type*

| type_ version | Mean | Std |
|---|---|---|
| type2_nonconnective | 12.645757 | 10.222953 |
| type2_connective | 6.031398 | 7.182848 |
| type1_connective | 7.700542 | 8.294651 |
| type1_nonconnective | 9.587503 | 9.520885 |

Tukey's honest significance difference (HSD) test for multiple comparisons revealed that the mean value for the clause 2 RT was significantly different for type 1 connective and type 2 connective sentences ($p$ = .002, 95% C.I. = [-28857, -0.4526]), as well as for type 1 non-connective and type 2 non-connective sentences ($p$ = .00, 95% C.I. = [1.8416, 4.2749]).

The results of Experiment 1 also indicated that there was a statistically significant difference in the answer times for the comprehension questions according to the type (F(1.2715) = 11.21, $p$ < .05), with an extremely small effect size ($\eta^2$ = .004) and a statistically significant difference being yielded by the version (F(1, 2715) = 14.22, $p$ < .05, with an extremely small effect size ($\eta^2$ = .005).

The mean answer times were faster for the type 1 *but*-sentences ($\bar{x}$ = 15.47) than they were for type 2 *but*-sentences ($\bar{x}$ =16.74) (Table 4), as well as for the connective ($\bar{x}$ = 15.38) versus the non-connective versions ($\bar{x}$ = 16.81) (Table 5).

Table 5
*Answer Latencies as a Function of the Type*

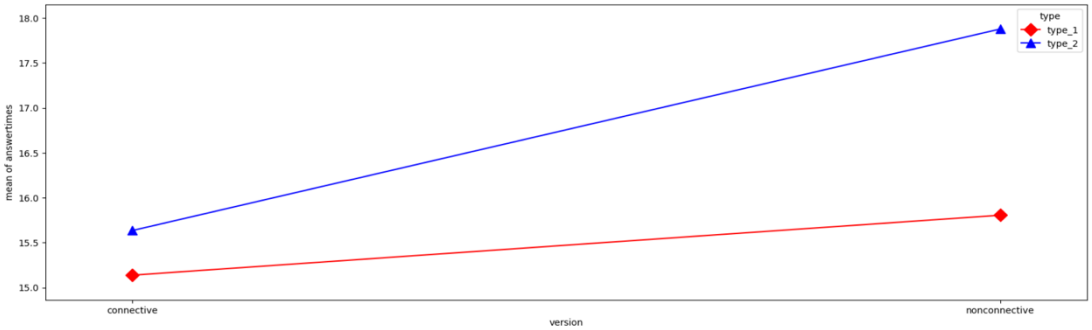
| Type | Mean | Std |
|---|---|---|
| Type1 | 15.470915 | 9.696686 |
| Type2 | 16.741879 | 10.272189 |

Table 6
*Answer Latencies as a Function of the Version*

| Version | Mean | Std |
|---|---|---|
| connective | 15.383018 | 9.823375 |
| non-connective | 16.816069 | 10.131569 |

An interaction effect of the version and type on the answer times for comprehension questions was found (F(1.2715) = 4.26, $p$ < .05), albeit with a negligible effect size ($\eta^2$ = .002) (Figure 3).

Figure 3
*Interaction Effect of Version and Type on Answer Latencies*



Specifically, the response times for the comprehension questions were faster ($\bar{x}$ = 15.81) for type 1 *but*-sentences than they were for type 2 sentences ($\bar{x}$ = 17.88) in the non-connective versions (Figure 4, Table 6).

Figure 4
*Mean Answer Latencies as a Function of the Interaction Between Version and Type*

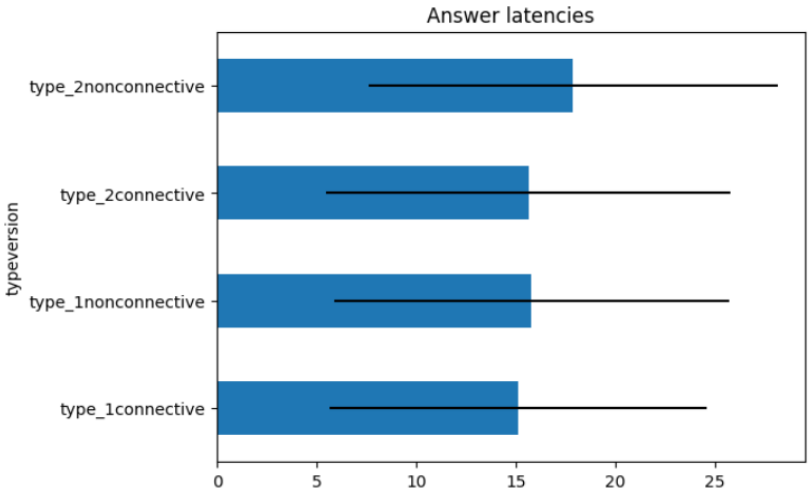



Table 6
*Mean Answer Latencies and Standard Deviation as a Function of the Interaction Between Version and Type*

| Type_ version | Mean | Std |
|---|---|---|
| type1_ connective | 15.138366 | 9.480403 |
| type1_ non-connective | 15.805388 | 9.905064 |
| type2_ connective | 15.634919 | 10.165320 |
| type2_ non-connective | 17.877438 | 10.264927 |

Tukey's HSD test for multiple comparisons revealed that the mean value for the answer latencies differed significantly between type 1 non-connective and type 2 non-connective sentences ($p$ = .0008, 95% C.I. = [.6784, 3.4657]), while the mean value for the answer latencies between type 1 connective and type 2 connective did not differ significantly ($p$ = .8).

The percentage for the correct answers was higher (51%) for the connective versions than it was for the non-connective versions (49%). The percentage for the correct answers was higher for the condition type 1_non-connective sentences (27%) than was the percentage for the condition type 2_non-connective sentences (22%). Accordingly, the percentage for the incorrect answers was higher for the condition type 2_connective sentences (34%) than it was for the condition type 1_connective sentences (9%) (Table 7). A chi-square for homogeneity test was performed to assess whether the four groups (type 1_connective, type 1_non-connective, type 2_connective and type 2_non-connective) had the same distribution regarding the

variable of answer accuracy. It was found that there was a significant relationship between the answer accuracy and the group (type 1_connective, type 1_ non-connective, type 2_ connective and type 2 _non-connective), $X^2(3, N = 2744) = 122.59$, $p < .05$, although the Cramer's V of .2 indicated a weak association between the answer accuracy and the group. This result is in agreement with the result of the ANOVA test, namely that there is an interaction effect between the version and the type on response times to comprehension questions, and that the readers comprehended type 1 better than they did type 2 *but*-sentences in the non-connective versions.

Table 7
*Percentages of Correct and Incorrect Answers Across the Four Groups (type 1_connective, type 1_non-connective, type 2_connective, type 2_non-connective*

| Answer accuracy | type 1_ connective | type 1_ non-connective | type 2_ connective | type 2_ non-connective |
|---|---|---|---|---|
| correct | .275398 | .269686 | .23623 | .218686 |
| incorrect | .095563 | .119454 | .341297 | .443686 |

The results of Experiment 1 supported our hypothesis that the readers would need less time to read a *but*-sentence in the connective versions than they would in the non-connective versions. The faster reading times for clause 2 in the connective versions could be explained by the facilitative role of the connective *but*, since it alerts the reader to the contrastive relationship that clause 2 has with clause 1. The contribution of the connective *but* to the better integration of the representation in clause 2 with the representation in clause 1 at the end of clause 2 can also be confirmed by the faster answer latencies in the connective compared to the non-connective versions. The results of Experiment 1 also supported our hypothesis that the connective versions were associated with greater answer accuracy. The results of Experiment 1 did not confirm the study's underlying assumption that the version of *but*-sentence would have an impact on reading speed independently of the type, since it was found that the impact of the version on clause 2 reading times was dependent on the level of the type of the *but*-sentence. Specifically, it was found that, in the connective versions, a reader read the postconnective clause faster when the *but*-sentence was type 2. By contrast, Experiment 1 showed that, in the non-connective versions, the postconnective clause was read faster when the *but*-sentence was type 1; moreover, the readers responded faster to comprehension questions in the condition type 1_non-connective than they did in the condition type 2_non-connective. This was also shown in the higher accuracy in the responses to the comprehension questions in the condition type 1_non-connective. Finally, the results of Experiment 1 brought to light a new finding, that is, the type of the *but*-sentence has an impact on the reading comprehension, since it was found that type 1 *but*-sentences were associated with faster answer latencies.

# Experiment 2
# Method

The 2 x 2 factorial design: This experiment was a self-paced reading task on the clause level, and was designed to examine the effect of two independent variables, each with two levels, on recall performance. The first independent variable was the version (connective and non-connective), and the second independent variable was the type of *but*-sentences (type 1 and type 2); therefore, there were four conditions:

(1) type 1 *but*-sentence, connective,
(2) type 1 *but*-sentence, non-connective,
(3) type 2 *but*-sentence, connective, and
(4) type 2 *but*-sentence, non-connective.

The dependent variables were the probe recognition times and the accuracy of the answers to the probe questions.

## Procedure

At the beginning of the experiment, the participants were told that they were going to read sentences about Ben and Liv who were both 17 years of age and were friends. A picture depicting Ben and Liv accompanied the short text. The participants read the instructions stating that each sentence consisted of two parts and that, after they had read the first part, they would be required to press the spacebar to continue with the second part. The participants were told that, after they had read the second part of the sentence, they would need to press the spacebar to continue to the next screen on which a word would appear; they would be required to judge whether this word had appeared in the sentence they had read. The participants were told to proceed with the next screen after they had understood the two parts of the *but*-sentence clearly, and were asked to answer 'yes' or 'no' on the keyboard as quickly as possible. The participants were told that they needed to press the spacebar to continue with the next sentence. Two practice tasks were provided for the participants. Each part of the sentence was presented in the middle of the computer screen.

The interval between tapping the spacebar at the end of the probe question and the start of the new sentence was defined as the response time to the probe question.

## Materials

Forty-eight within-subjects stimuli *but*-sentences were constructed, as follows:

(1) 12 *but*-sentences for the condition type 1 *but*-sentence, connective,
(2) 12 *but*-sentences for the condition type 1 *but*-sentence, non-connective,
(3) 12 *but*-sentences for the condition type 2 *but*-sentence, connective, and
(4) 12 *but*-sentences for the condition type 2 *but*-sentence, non-connective.

In the connective version, clause 1 and clause 2 were linked by the connective *but*. In the non-connective version, the *but*-sentence consisted of two clauses that were separated by a full stop. In half of the type 1 *but*-sentences, the content of clause 1 concerned the entity Ben and the content of clause 2 concerned the entity Liv; in the other half, the content of clause 1 concerned the entity Liv and the content of clause 2 concerned the entity Ben. In half of the type 2 *but*-sentences, the content of clause 1 concerned the entity Ben; in the other half of the content of clause 2, the entity was Liv. In both type 1 and type 2 *but*-sentences, half of the probe questions required a 'yes' response and half required a 'no' response. In type 1 *but*-sentences, all the probe words were verbs, while twelve of the probe words were verbs and twelve were nouns or adjectives in type 2 *but*-sentences in order to ensure that the readers did not develop a strategy for identifying patterns. The stimuli *but*-sentences were presented in random order for each subject.

### Fillers

Twenty-four filler sentences were also included. These sentences consisted of two clauses that were linked by a range of conjunctions (and, because, while, so), and were followed by a probe question. The fillers were included in order to ensure that the results were not due to the subjects adopting a specific strategy after reading sentences that denoted contrast. Half of the probe questions required a 'yes' response and half required a 'no' response. Twelve of the probe words were verbs and twelve were nouns or adjectives.

The same factors as in Experiment 1 were controlled in the construction of the type 1 and type 2 *but*-sentences.

### Participants

Sixty participants, who were sufficiently proficient in English to complete the task, were recruited. The participants, whose ages ranged from 19 to 27, were recruited via the platform Prolific, and received reimbursement (£3) for their participation. The experiment was conducted online on Pavlovia. The participants were given unlimited time to complete the task, with most of them taking an approximate maximum time of 20 minutes to do so. After completing the task, the participants were debriefed and dismissed.

## Results and Discussion

The second experiment was designed to answer the question of whether the version (connective or non-connective version) or the type of *but*-sentences (type 1 and type 2) had an effect on the reactivation of the content in clause 1, and particularly on the recall of specific words extracted from clause 1. The probe recognition times were measured using a two-way analysis of variance (ANOVA)

test with the version and the type of the *but*-sentences as the two independent variables, each with two levels. The outliers were removed from the dataset of the probe recognition times, which accounted for 2% of the entire dataset.

The results revealed that there was no statistically significant difference in the probe recognition times between the connective and non-connective versions ($p = .35$) or between type 1 and type 2 *but*-sentences ($p = .07$). Furthermore, an interaction effect of the version and the type on the probe recognition times was not found ($p = .12$). The results of Experiment 2 did not support our hypothesis that the reader would be able to recall information from clause 1 faster when the connective *but* was present than when it was absent.

However, our hypothesis that the accuracy of the probe answers would be greater in the connective versions was confirmed because the percentage of correct answers was indeed higher (51%) in the connective versions than it was in the non-connective versions (49%). Furthermore, the percentage of incorrect answers was higher in the condition type 2_connective (38%) than was the percentage in the condition type 1_connective (19%), as well as in the condition type 2_non-connective (25%) in comparison to the condition type 1_ non-connective (18%) (Table 8).

A chi-square for homogeneity test was performed to assess whether the four groups (type 1_connective, type 1_non-connective, type 2_connective and type 2_non-connective) had the same distribution regarding the variable of probe accuracy. It was found that there was a significant relationship between the answer accuracy and the group (type 1_connective, type 1_non-connective, type 2_connective and type 2_non-connective), $X^2(3, N = 2828) = 22.77$, $p < .05$, although the Cramer's V of .09 indicated a very weak association between the answer accuracy and the group type.

Table 8
*Percentages of Correct and Incorrect Answers Across the Four Groups (type 1_connective, type 1_non-connective, type 2_connective, type 2_non-connective*

| Answer accuracy | type 1_connective | type 1_non-connective | type 2_connective | type 2_non-connective |
|---|---|---|---|---|
| correct | .25593 | .255164 | .23795 | .250956 |
| incorrect | .187793 | .183099 | .375587 | .253521 |

This result supports the Reactivation Hypothesis in the Connective Integration Model (Millis & Just, 1994) because, in the connective versions, the activation level of the content of clause 1 was increased at the end of clause 2 and, when the reader finished reading a sentence, they were able to recall the content of clause 1 better in the presence of the connective than they were in its absence. This result also provides insights into the relationships of the semantic relations in *but*-sentences and recall performance. It appeared that the readers made more mistakes in retrieving information from clause 1 when the *but*-sentence was type 2 in both versions. This result could possibly be explained by the fact that this type of *but*-sentences is

associated with high semantic constraints, which means that the reader is engaged in a more complex inferential process than they are in type 1 sentences in order to establish that the semantic relationship between the two adjacent clauses is that of denial of expectation.

# General Discussion

The results of Experiment 1 were consistent with those in previous studies (Asr & Demberg, 2020; Cevasco, 2009; Golding et al., 1994; Haberlandt, 1982; Kleijn et al., 2019; Murray, 1994), which found that the presence of the connective *but* had a positive effect on reading speed. Our hypothesis was based on the principle of the Connective Integration Model (Millis & Just, 1994), according to which the presence of the connective *but* prompts the reader that the relationship that clause 2 has with clause 1 is contrastive, and thus tells the reader how to interpret the two statements (Murray, 1994; Millis & Just, 1994). This prompt for the readers caused them to read the postconnective clause quickly. By contrast, the reading times for clause 2 were slower in the absence of the connective; this endorses the principle of the Connective Integration Model (Millis & Just, 1994), which states that the reader needs more time to link the information in clause 2 to the information in clause 1 when the connective is absent; in other words, the reader needs more time to comprehend the contrast between the two clauses.

Even though the results of Experiment 1 did not show that the constraints associated with the two types of *but*-sentences had a main effect on clause 2 reading times, it was found that there was an interaction effect between the version and the type. Specifically, type 2 *but*-sentences led to faster clause 2 reading times than did type 1 *but*-sentences in the connective versions. A possible explanation for this result is the underlying semantic relationship between clause 1 and clause 2 in type 2 *but*-sentences. After the readers read the first clause, they generated expectations stemming from their world knowledge (Noordman & Vonk, 1992; Graesser et al., 2001); these expectations allowed them to make causal connections between the events or situations in clause 1 and those in clause 2 (Haberlandt, 1982; Verhagen, 2000; Rudolph, 1996). For example, in the sentence *Maria eats sweets, but she is fit*, the information given in clause 1, *Maria eats sweets*, prompts the reader to hypothesise that, since Maria eats sweets, she is not fit. Previous studies have shown that sentences that express causal relationships led to faster reading times in the presence of the connective (Sanders, 2005, Fletcher et al., 1994). Therefore, this causal relationship that is concealed by the semantic relationship of denial of expectation may explain why the type 2 *but*-sentences in the connective versions were read faster than were the type 1 *but*-sentences. Another explanation could be that the linguistic device of anaphora in type 2 *but*-sentences had a positive effect on reading speed since, in the sentence *Maria eats sweets, but she is fit*, the linkage of the pronoun *she* to its referent *Maria* could facilitate the reading speed, whereas in type 1 *but*-sentences, such as in the example *Maria eats sweets but John eats chips*,

the shift in the subject, with the subject in clause 1 (Maria) being different from the one in clause 2 (John), could have led to poorer performances (Murray, 1997).

Of interest, type 1 *but*-sentences led to faster clause 2 reading times than did type 2 *but*-sentences in the non-connective versions. This result could be explained by the fact that a type 1 *but*-sentence consists of two clauses that represent two separate entities in semantic opposition to each other. For example, regardless of whether the sentence *George is tall but John is short* contains the connective *but* or not, it is cognitively represented as consisting of two entities that are contrasted to each other because of the semantic opposition of the word *tall* and the word *short*. In other words, it would appear that the connective *but* does not have a facilitative role in type 1 *but*-sentences, since the contrasting relationship between the two clauses in this type is due to the semantic opposition of the content in clause 1 to the content in clause 2 (Spooren, 1989). Finally, the longer reading times for clause 2 in type 2 *but*-sentences in the non-connective versions can be attributed to the fact that, when the connective *but* is absent, the reader needs more time to match the expectations generated by the content in clause 1 to the information in clause 2, which denies these expectations (Spooren, 1989; Graesser et al., 2001). An attempt to draw a backward causal inference by searching for an expectation derived from the reader's world knowledge and that is opposed to reality appears to slow down the integration process more than does an attempt to establish a relationship of semantic opposition between two entities (Graesser et al., 2001; Broek et al., 1994).

The answer times for the comprehension questions were faster and the answer accuracy was greater when the connective *but* was present. This result supports the principles of the Connective Integration Model (Millis & Just, 1994), which state that the presence of the connective is associated with a better integration of the representation in clause 1 with the representation in clause 2 into a common representation at the end of clause 2.

A new finding of the present study was that the type of *but*-sentence had a main effect on the answer latencies; in particular, the study showed that the readers answered the comprehension questions faster when the *but*-sentence was type 1 than they did when it was type 2. This result adds a new perspective to the discourse analysis of *but*-sentences; that is, the association of *but*-sentences that expressed semantic opposition led to a better integration of the two adjacent clauses than did *but*-sentences that expressed denial of expectation.

Another finding of this study was the effect of the interaction of the version and the type on the response times to the comprehension questions. The results of Experiment 1 showed that the readers read type 1 *but*-sentences faster than they read type 2 *but*-sentences when the connective was absent. These results could be explained by the inferential processes involved during and after reading *but*-sentences with low and high semantic constraints, with the reader attempting to establish the semantic relationship between the two adjacent clauses. The mean difference in the clause 2 reading times and answer latencies yielded by the interaction of the version and the type of the *but*-sentence indicated that inferences were made during and after reading (Noordman, Vonk, Kempff). During the reading of the first clause, the

context pertaining to the situation or event described in it was established, which allowed the reader to generate expectations. In type 1 *but*-sentences, a context pertaining to a specific entity and a specific characteristic of the entity was established. The information in the subsequent clause concerned another entity and a characteristic that was in semantic contrast to the characteristic of the entity in clause 1, although the two characteristics belonged to the same broader semantic category. For example, in the sentence *George is tall but John is short*, the words tall and short form a semantic contrast, but they both constitute two different levels of the same variable or semantic category, namely height. By contrast, the expectations generated by the context in clause 1 in type 2 *but*-sentences do not map onto the information in clause 2; thus, the reader needs to link the information in the two clauses. Consequently, the reader requires more time to integrate them (Thorndyke, 1976). Considering the assumption of the Connective Integration Model (Millis & Just, 1994), which states that the integration of the two clauses occurs while clause 2 is being read when the connective is absent provides a better understanding of why the unified context that was inferred during the reading of clause 2 in a type 1 *but*-sentence in the non-connective versions led to faster answer times for comprehension questions, to faster clause 2 reading times and to greater answer accuracy.

The results of Experiment 2 indicated an association between the connective version and good recall performance; this supports the Reactivation Hypothesis, which states that the presence of the connective increases the activation level of clause 1 at the end of clause 2. However, this result is not consistent with the findings of the study conducted by Golding et al. (1994), which showed that recall was not affected by the presence of the connective *but*. An interesting finding in Experiment 2 was that the type of the *but*-sentence had an impact on the readers' ability to recall information from clause 1 correctly. The results revealed that type 2 *but*-sentences led to the readers making more mistakes in recall than did type 1 *but*-sentences in the connective and non-connective versions.

This study has demonstrated that it is not only the connective or non-connective versions, but also the types of *but*-sentences, together with their semantic constraints, which may affect the reading and recall performances. It appears that the research has only investigated the effect of different connectives on reading comprehension and recall performance. Further research on the subtypes of one connective would help to advance our knowledge about aspects of discourse analysis that have not been investigated thus far.

## Data Availability Statement

The data analysis as well as the stimuli sentences underlying this article are available in the Open Science Framework repository, at https://osf.io/sc2e8/?view_only=ff1ac 9ffb5ee4dddbfe0e6aba0322c2a

The experimental (anonymous) data cannot be stored in a repository since in the Consent letter, given prior to the experiments, the participants agreed that their data

would be used only for the purposes of the current study and that in no way will identify them in any papers or reports written about the research. The participants also agreed that their data would be destroyed three months after the experiments.

The study was preregistered on 13.03.23 prior to the conduct of the experiments in the Open Science Framework repository, at https://doi.org/10.17605/OSF.IO/CG6QT

## Disclosure Statement

No potential conflict of interest was reported by the authors.

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# Unambiguous Definition of Ambiguous Loss: Exploring Conceptual Boundaries of Physical and Psychological Types Through Content Analysis

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**Abstract.** The article aims to extend our understanding of physical and psychological types of ambiguous loss through a systematic review based on content and psycholinguistic analysis. The study encompassed articles aligned with ambiguous loss published between 2019-2023, retrieved from PsycINFO, Web of Science (WoS), and Scopus. To eliminate the bias in the literature review, the study extracted published articles, dissertations, book chapters, and preprints with titles containing the search term "ambiguous loss". Two reviewers (the first and the third authors worked independently) examined titles and abstracts and identified papers highlighting physical (n=34) or psychological (n=23) types of ambiguous loss. The physical type results from physical absence of meaningful persons (e.g. abducted, missing, adopted), while the psychological type results from psychological absence of meaningful persons (e.g. dementia, mental illness, addiction). The study applies the conceptual and relational content analysis of Leximancer (version 4.5) to develop three cluster maps and lists of concepts separately for physical and psychological types and all selected papers published between 2019–2023. The results show that the physical type primarily encompasses situations related to adoption, potentially leading to the ambiguous loss experienced by both biological parents and children when facing forced separation. Psychological type includes parents of children with disabilities, shaken baby syndrome, and caregivers of individuals with brain injuries and cancer. The present study indicates that the conceptual boundaries between physical and psychological types of ambiguous loss are not only expanding but also erasing, giving way to new applications in settings such as the COVID-19 pandemic, organ donor families, and sexual and gender minority.

***Keywords:*** *ambiguous loss, physical type, psychological type, content analysis, cluster map, concept list.*

**Засєкіна Лариса, Абрахам Андреа, Засєкін Сергій. Однозначне визначення невизначеної втрати: дослідження концептуальних меж фізичних та психологічних типів за допомогою контент-аналізу.**

**Анотація**. Мета статті – здійснити теоретичне й емпіричне вивчення фізичного і психологічного типів невизначної втрати шляхом систематичного огляду літератури з контент аналізом. До систематичного огляду літератури увійшли публікації з предметом

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дослідження невизначеної втрати за період 2019–2023 рр., які проіндексовані в базах PsycINFO, Web of Science (WoS) та Scopus. Для збереження об'єктивності результатів огляду літератури, в дослідженні були відібрані опубліковані статті, дисертації, розділи книг і препринти з назвами, що містять пошуковий термін "невизначена втрата". Два дослідника (перший і третій автори працювали незалежно) проаналізували заголовки та анотації і визначили публікації, що висвітлюють фізичний (n=34) або психологічний (n=23) типи невизначених втрат. Фізичний тип є наслідком фізичної відсутності потенційно живих значущих осіб (наприклад, викрадення, зникнення безвісти, усиновлення), тоді як психологічний тип є наслідком психологічної відсутності за фізичної присутності значущих осіб (наприклад, деменція, психічні захворювання, залежність). У дослідженні застосовано концептуальний та реляційний контент-аналіз Leximancer (версія 4.5) для розробки трьох кластерних карт та списків понять окремо для фізичного та психологічного типів невизначеної втрати і корпусу всіх відібраних статей, опублікованих у перод 2019–2023 рр. Результати дослідження свідчать про те, що фізичний тип, передусім, охоплює ситуації, пов'язані з прийомним усиновленням, що потенційно призводить до невизначеної втрати, яку переживають як біологічні батьки, так і діти, коли стикаються з вимушеною сепарацією. До психологічного типу належать батьки дітей з інвалідністю, синдромом черепно-мозкової травми немовляти, а також особи, які здійснюють догляд за пацієнтами з травмами мозку й онкологічними захворюваннями. Результати дослідження свідчать про те, що концептуальні межі між фізичним і психологічним типами невизначної втрати не лише розширюються, але й стираються, поступаючись місцем новому типові невзиначної втрати та новими контекстами його застосуванням, зокрема у контекстах пандемії COVID-19, сім'ї донорів органів, сексуальних та гендерних меншин.

***Ключові слова:*** *невизначена втрата, фізичний тип, психологічний тип, контент-аналіз, кластерна карта, список концептів.*

# Introduction

As armed conflicts continue to arise globally, there has been a renewed interest in the concept of ambiguous loss as a form of bereavement that lacks a clear resolution. Boss (2004), who introduced this concept through her own research and clinical practice, defined ambiguous loss as "a situation of unclear loss resulting from not knowing whether a loved one is dead or alive, absent or present" (p. 554). Boss's initial study of the concept of "psychologically absent" fathers within intact families has shown a perceived mismatch between psychological absence and physical presence in the veterans' families and later in the families of veterans with dementia (Boss, 1977; Boss, 1999).

In contrast to more conventional and obvious forms of loss, such as death or separation, where the loss is distinctly defined, ambiguous loss is characterised by uncertainty and the absence of closure. One of the critical distinctions of ambiguous loss compared to definite loss lies in the ambivalence experienced by individuals. In ambiguous loss, individuals frequently oscillate between feelings of helplessness and moments of hope. This polarisation impedes their emotional stabilisation and causes frozen sadness (Boss, 2009).

Notwithstanding that a significant portion of research comprises qualitative studies, there are a few quantitative data indicating comorbidity of ambiguous loss with prolonged grief, the need for closure, depression, anxiety, PTSD, and

somatisation (Testoni et al., 2020; Renner et al., 2021; Zaksh et al., 2019). Additionally, ambiguous loss defects environmental mastery as a critical component of psychological well-being, undermining faith in the world as a structured, predictable, and controllable environment (Boss, 2019; Comtesse et al., 2023).

Boss and Yeats (2014) define two types of ambiguous loss: physical and psychological. Physical ambiguous loss occurs when a person is physically absent but psychologically present in somebody's life. These scenarios often involve individuals who disappeared due to military deployment and captivity, natural disasters, kidnapping, terrorism, missing bodies, incarceration, suicide, migration, forced separation and adoption, divorce, or other circumstances where their fate is uncertain. Psychological ambiguous loss occurs when a person is physically present but psychologically absent. Examples include situations where a loved one is suffering from conditions like terminal diseases, coma, dementia, Parkinson's disease, brain injury, autism, or severe mental illness, resulting in a changed or diminished relationship. Recent findings suggest that the frequency of visits with affected patients, tolerance to uncertainty, and beliefs that the patients are psychologically present might reduce the experience of ambiguous loss in caregivers (Zaksh et al., 2019).

Boss and Yeats (2014) associate the psychological type with unresolved grief, homesickness (related to immigration or migration), addictions, hoarding disorder, and preoccupation with lost persons. Coping with both types of ambiguous loss can be challenging because it lacks the spiritual rituals and social support accompanying more clearly defined losses. In this context, there is a shift from research approaches focusing on the individual dimension of ambiguous loss to ethnographic methodologies and sociocultural scopes in recent papers. The latter connect ambiguous loss with social grieving practices by applying ideas of Foulcauldian Discourse Analysis and the concept of disenfranchised grief (Boss, 2023; Knight & Gitterman, 2019; Robins, 2016; Suzuki, 2022; Testoni et al., 2023; Thøgersen & Glintborg, 2022).

Foulcauldian Discourse Analysis reveals how disappeared persons are aligned with politically violent discourse practices in specific social settings (Robin, 2016). From this perspective, social justice and community-oriented interventions are essential healing instruments for trauma resulting from ambiguous loss and the completion of the grieving process. Reparing and restorative discourse practices also construct new meanings for the concrete community and shape its identity. Involving individuals, their families and communities in reinstalling social justice and truth provides a psychosocial map for developing shared resilience after traumas and ambiguous losses (Boss, 2023; Herman, 2003). The absence of acknowledgement for ambiguous loss increases the probability of being marginalised, thereby compromising the resilience and capacity of bereaved individuals to progress in their lives (Knight & Gitterman, 2019; Testoni et al., 2023; Thøgersen & Glintborg, 2022).

Several recent studies suggest new contexts for exploring ambiguous loss based on current discourse practices, new social phenomena, and paradigm changes in modern societies. These include ambiguous loss in family caregivers of individuals

with cancer (Weiss et al., 2023) and Down syndrome (Jeter & Turns, 2022), ambiguous loss experienced by sexual minority (LGBTQIA+) populations (Anderson & McGuire, 2021; Darrow et al., 2022; Germany et al., 2022; Sánchez-Ferrer et al., 2023); ambiguous loss in organ donor families (Aviles et al., 2023); and ambiguous loss in different segments of the population during the COVID-19 pandemic (Craw & Bevan, 2022). These studies indicate a significant increase in the application of the concept in various social settings and circumstances, leading to the diffusion of the previously defined two types of ambiguous loss. Aviles et al. (2023) point out that a third type of ambiguous loss is emerging, illustrating it on new decision-making settings by organ donor families. In this context, the family may experience emotional challenges as they mitigate the complexities of knowing that their loved one's organs are contributing to the life of someone else. The ambiguity lies in the fact that, while the physical presence of the donor is gone, elements of their biological existence persist in another person. The emerging third type underscores the need to understand the conceptual boundaries of existing physical and psychological types of ambiguous loss and their potential to encompass new applications.

To our knowledge, there are no systematic reviews on ambiguous loss based on content analysis of the literature for 2019–2023. Therefore, the article aims to extend our understanding of physical and psychological types of ambiguous loss through a systematic review based on content and psycholinguistic analysis.

The study addresses the following research questions:

RQ1: What are the main cluster maps and concept lists describing the psychological and physical types of ambiguous loss?

RQ2: What has been the ambiguous loss research's key focus in the past five years?

# Method

This study encompassed articles aligned with ambiguous loss published between 2019–2023, retrieved from PsycINFO, Web of Science (WoS), and Scopus. These databases were selected based on their significant coverage of psychological, social-scientific and philosophical literature and accessibility for the researchers. To eliminate the bias in the literature review, the study extracted published articles, dissertations, book chapters, and preprints with titles containing the search term "ambiguous loss". Given the diverse settings of ambiguous loss research, our inclusion criteria thus centred on papers placing ambiguous loss as the key focus of their studies. The inclusion criteria were as follows: (1) inclusion of "ambiguous loss" in the title; (2) inclusion of only English articles; (3) published between 2019–2023; and (4) ambiguous loss being the dominant focus throughout the abstract. In addition, we have included a five known papers on ambiguous loss available on Research4Life. Research4Life is an initiative that provides institutions in lower-income countries with online access to academic and professional peer-reviewed

content to improve teaching, research and policymaking in health and other life, physical and social sciences.

In the PsycINFO database, 156 research articles were identified; in Scopus, 51 research articles were found, while 58 studies were detected in the WoS database (n=265). Two reviewers (the first and the third authors worked independently) examined titles and abstracts to remove irrelevant material and eliminate duplicate articles. Eventually, they identified 68 papers describing physical (n=34) or psychological (n=23) types of ambiguous loss and imported them into the Covidence software. After analysing full-text articles, some abstracts (n=11) were excluded with reasons for not containing the dominant focus on ambiguous loss throughout the abstract. The two reviewers discussed all discrepancies. The next stage was reviewing the full texts. At this stage, two authors have reviewed the full-text papers and justified the final inclusion of 57 papers.

Figure 1
*Search and Review Strategy Flow Diagram*

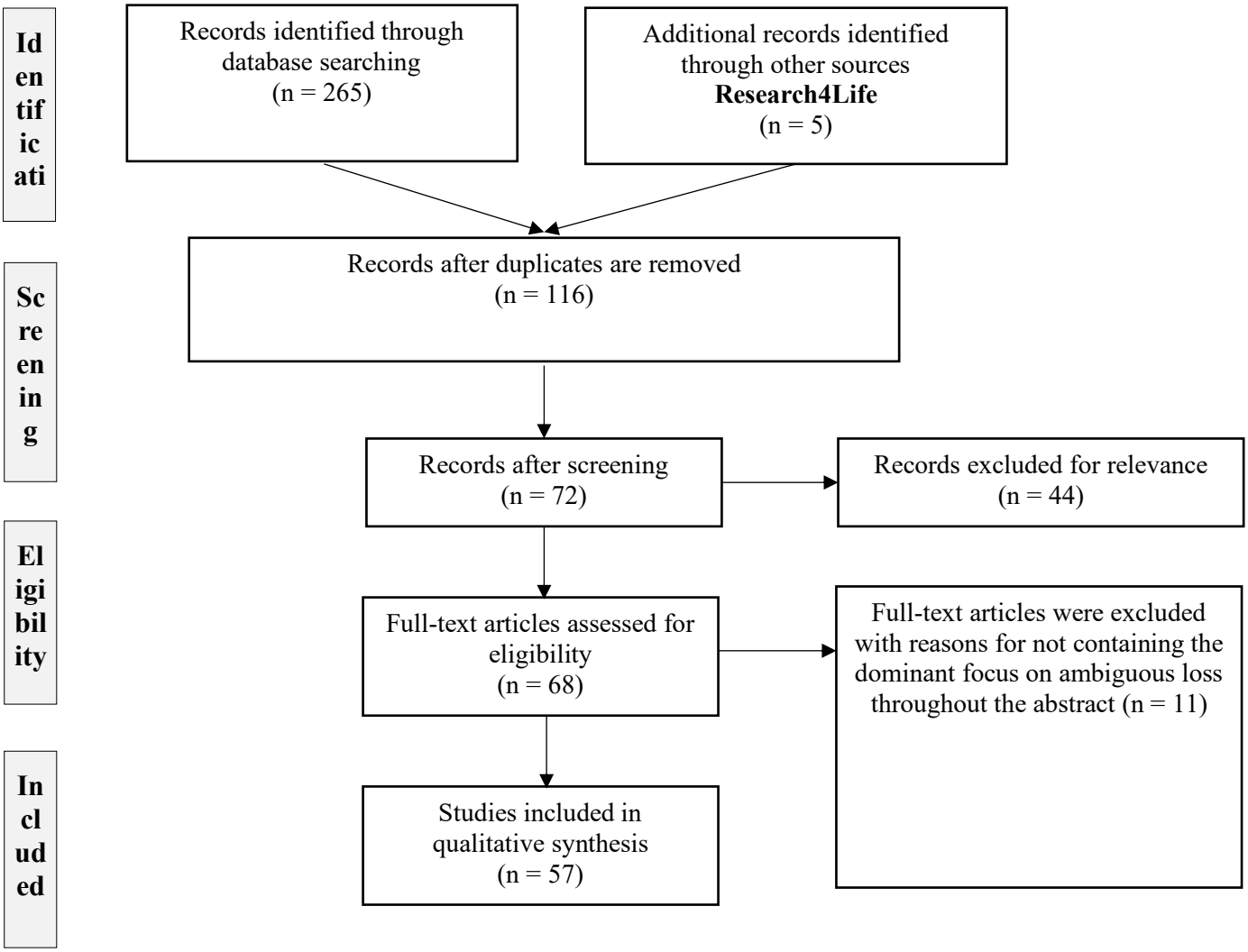

Figure 1 illustrates a step-by-step procedure of the literature search and selection process. The extracted data from the selected studies were then entered into a pre-designed protocol form, summarising the core methodological aspects (research aims, study design, measures, participants) and the results and significant findings of the reviewed studies. Screening and selection of studies were conducted by the first and the third authors. Fifty-seven studies met all eligibility criteria (for PRISMA 2020 flowchart, see Figure 1) (Page et al., 2021).

The study applies Leximancer (version 4.5) as a software tool for content analysis based on word frequency and co-occurrence of data to develop cluster maps and conceptual lists of the texts (Biroscak et al., 2017). Lexomancer performs two types of content analysis: conceptual analysis, measuring the frequency of concepts, and relational analysis, assessing how such identified concepts are related.

The cluster map and concept lists extended our understanding of the conceptual boundaries of psychological and physical types of ambiguous loss. The cluster map and concept list for ambiguous loss of the physical type are illustrated in Figure 2.

Following the procedure described by Fan & Lyu (2021) for preparing the papers' abstracts for analysis, functional words (such as "of", "and", "but", and "not") and general terms commonly used in abstracts (such as "objectives", "methods", "participants", "results", "findings", and "conclusion") were excluded. Data from quantitative analysis irrelevant to cluster maps and concept lists was also excluded. All acronyms, besides PTSD, were replaced with their full names.

# Results

The study applied the visualisation of cluster maps and rank-ordered concept lists to enhance our understanding of conceptual and relational content analysis results.

Figure 2 illustrates four themes: loss (ranked 1), family (ranked 2), adoption (ranked 3), and significance (ranked 4). The theme "loss" is represented by a concept list, including health on one side and grief on the other side. Additionally, ambiguous loss is viewed more as a process than a result or consequence, being experienced as prolonged or continuous grief lasting over time. The theme "family" is closely related to the concept of young people and children from the theme "loss" and introduces the relevant concepts of people belonging to one family setting.

The theme "adoption" aligns with previous themes and indicates foster adoption as the physical type of ambiguous loss. The theme "significant" emphasises the importance of providing social support for people experiencing ambiguous loss in the form of prolonged grief.

Therefore, the results of the content analysis of abstracts encompassing the physical type of ambiguous loss indicate a tendency to explore ambiguous loss by family members in the context of forced adoption and missing young adults and children.

Figure 2

*The Cluster Map and Concept List in Leximancer for Articles with the Physical Type of Ambiguous Loss (N=34)*


Figure 3 moves on to discuss the main focus of the abstracts, highlighting the psychological type of ambiguous loss.

Figure 3

*The Cluster Map and Concept List in Leximancer for Articles with the Psychological Type of Ambiguous Loss (N=23)*

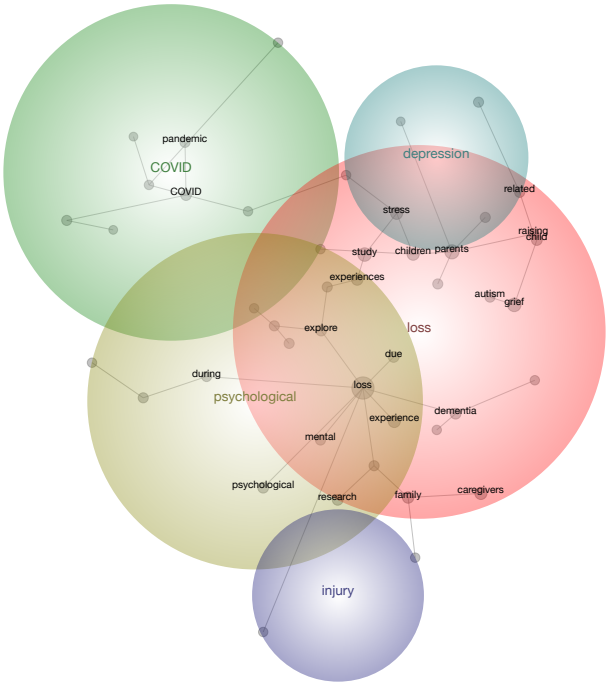

Figure 3 illustrates five themes: loss (ranked 1), psychological (ranked 2), Covid (ranked 3), depression (ranked 4), and injury (ranked 5). The theme "loss" is represented by the subjects experiencing ambiguous loss. Similar to the conceptual map of the psychological type of ambiguous loss, the concept list includes people raising children, parents, caregivers, and children. Ambiguous loss is again viewed as prolonged grief experienced by families. However, the concept list is extended by mental conditions such as autism and dementia.

Compared to the physical type, a separate theme related to the COVID-19 pandemic is emerging. The theme "psychological" expresses the mental burden of experiencing ambiguous loss. Similar to the physical type, ambiguous loss is again viewed as a lasting process. The psychological aspect of ambiguous loss is also extended to the theme of "depression" as a result of continuous stress and prolonged grief. The theme "injury" expresses several studies examining ambiguous loss in the context of physical injury, focusing on brain injury in particular.

The cluster map and concept list for all abstracts (n=57) published in 2019–2023 are illustrated in Figure 4.

Figure 4

*The Cluster Map and Concept List in Leximancer for Articles with the Physical and Psychological Types of Ambiguous Loss (N=57)*

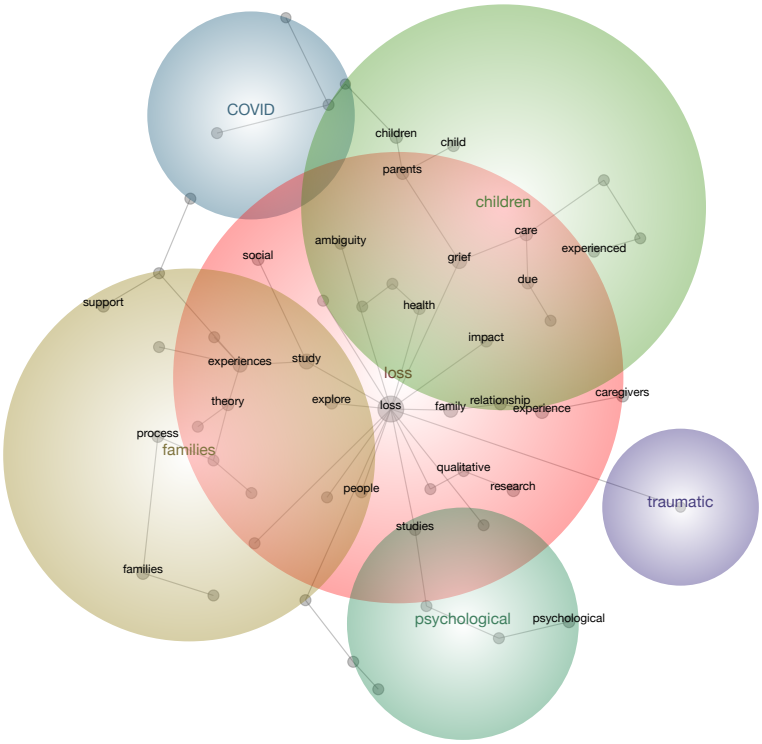


Figure 4 illustrates six themes: loss (ranked 1), children (ranked 2), families (ranked 3), psychological (ranked 4), COVID (ranked 5), and traumatic (ranked 6). The theme "loss" is represented by concepts closely related to other themes and

includes the processes of prolonged grief and the procedural (chronic) experience of ambiguous loss. Additionally, ambiguous loss is operationalised through key concepts: grief and traumatic stress, which have a detrimental impact on an individual's mental health. The cluster map and concept list demonstrate the social dimension of ambiguous loss, which includes families and the social environment. Subjects experiencing ambiguous loss, similar to previous conceptual maps of ambiguous loss, include mostly parents, children and caregivers. The separate theme "COVID pandemic" is still essential and overlaps with the themes "loss" and "children", indicating relations to the concepts of parents and children and the care system.

# Discussion

The continual expansion of diverse environments where ambiguous loss may manifest contributes to broadening this phenomenon's conceptual boundaries. Recent studies investigating ambiguous loss have reported inconsistent findings regarding its typology within the previously established physical or psychological types. As outlined in the literature review, some studies propose the potential for differentiating a third type of ambiguous loss, aligned with decision-making in situations of organ donation and creating a new meaning for losing a loved one (Aviles et al., 2023).

The first question in this study aimed to determine the main cluster maps and concept lists describing the psychological and physical types of ambiguous loss. The findings indicate that both types involve circumstances experienced by family members, predominantly parents, children, and caregivers. A comparison of the findings with previous studies confirms that the experience of ambiguous loss has "a family face" and is related to the contextual model of family stress (Boss, 1979; Boss, 1999). A significant result emerged, revealing that the physical type primarily encompasses circumstances related to adoption, potentially leading to the ambiguous loss experienced by both biological parents and children when facing forced separation. In comparison to previous studies on ambiguous loss in families with intermittent father absence and with former or active duty soldiers, there is a noticeable shift in the recent literature toward family settings and forced separation, aligned with political violence, migration, and deportation (Kor et al., 2023; Landers et al., 2023; Renner et al., 2021; Roetto, 2023; Simpson et al., 2023).

Another noteworthy finding in the psychological type is the theme "COVID", which is also related to the theme "family", representing parents and children. However, the most relevant type of ambiguous loss is connected with the absence of resolution and closure of loss when families were forbidden to perform religious and traditional rituals, including funerals, due to lockdown restrictions (Testoni et al., 2021). Several articles indicate experiencing unprecedented changes during the COVID-19 pandemic, focusing more on

ambiguity and stress than on ambiguous loss (Craw & Bevan, 2022; Governale et al., 2023; Weaver et al., 2022). Therefore, ambiguous loss is not viewed as an unclear loss resulting from not knowing whether a loved one is dead or alive, but as an unclear loss resulting from not being able to perform traditional spiritual rituals to take leave of loved ones on deathbed and funerals and complete the grieving process (Suzuki, 2022; Testoni et al., 2021).

Consistent with the previous literature, this research found that ambiguous loss is a continuous trauma and prolonged grief which is comorbid with depression and associated with an ongoing process. It is in line with the theory of ambiguous loss introduced by Boss and Yeats (2014), underlining the chronicity and complexities of ambiguous loss symptoms. The results representing the psychological type also corroborate the findings of a great deal of the previous work in ambiguous loss of caregivers of individuals with dementia, autism, Down syndrome, and other mental conditions. However, in contrast to earlier findings, ambiguous loss in parents of children with disabilities, sudden infant syndrome, shaken baby syndrome, and caregivers of individuals with brain injuries and cancer is examined (Flores, 2021; Leach, 2021; Mahat-Shamir, 2022; Powell & Sorenson, 2022; Weiss et al., 2023).

According to the second research question, the main themes of ambiguous loss in the past five years have been revealed. Our results confirm that the primary focus in recent papers is on ongoing loss; however, several articles indicate a wide range of related settings, namely educators supporting students during the Covid pandemic, and experience of sexual and gender minorities (Craw & Bevan, 2022; Darrow et al., 2022; Nam & Jiang, 2021). Anderson and McGuire (2021) point out new aspects of ambiguous loss emerging in transgender youth losing their relationship with a religious community and God.

Notwithstanding the introduction of a new tool, ALI+, by Comtesse et al. (2023), for assessing ambiguous loss and increased instances of its application, ambiguous loss is viewed as an umbrella term for two related concepts, namely traumatic stress and prolonged grief, which are represented in Figure 4 as separate themes. Therefore, the core content of the concept of “ambiguous loss” is yet related to ongoing trauma and grief. This study supports evidence from previous observations on the primary role of family, community, and social support in developing resilience on the path to healing. The lack of this support is highlighted as the disenfranchised grief in recent papers (Testoni et al., 2023; Thøgersen & Glintborg, 2022).

The present study raises the possibility that the conceptual boundaries between physical and psychological aspects of ambiguous loss are expanding and erasing, giving way to new settings for applying this concept. Table 1 illustrates modified settings for physical and psychological types of ambiguous loss suggested by Boss and Yeats (2014) based on the current systematic review with content analysis.

Table 1
*Types of Ambiguous Loss in Papers Published Between 2019–2023*

| Leaving without good bye (physical type) | Good-bye without leaving (psychological type) | Being not able to say good bye (mixed type) |
|---|---|---|
| Physical absence with psychological presence | Psychological absence with physical presence | Physical absence with psychological absence and presence |
| War (missing solders, civilians);<br>Natural disasters (missing persons);<br>Kidnapping, hostage-taking, terrorism;<br>Desertion, mysterious disappearing;<br>Missing body (murder, plane crash, lost at sea);<br>Incarceration;<br>Suicide;<br>Immigration, migration, expartriate;<br>Adoption;<br>Foster care;<br>Divorce;<br>Work relocation;<br>Military deployment;<br>Young adults leaving home;<br>Elderly mate or a child moving to the new facility.<br>Miscarriage;<br>Infertility. | Dementia, Parkinson's, Brain injury;<br>Coma;<br>Chronic mental illness;<br>Depression;<br>Unresolved grief;<br>Homesickness;<br>Immigration, migration;<br>Addictions: drugs, alcohol, gambling;<br>Hoarding disorder;<br>Preoccupation with lost person's work;<br>Obsession with computer games, Internet, TV;<br>Autism. | Not being able to perform traditional spiritual rituals to take leave of loved ones on deathbed and funerals during the COVID pandemic;<br>Losing relationship with a religious community and God by transgender individuals;<br>Difficulties in creating a new meaning of loss through organ donations.<br>. |

# Conclusions

The primary objective of the current project was to conduct a systematic review with content analysis to examine the conceptual boundaries of physical and psychological types of ambiguous loss in recent literature. This study has identified three separate cluster maps and concept lists for physical and psychological types and ambiguity loss of both types highlighted in papers published in the last five years. The results show that the physical type primarily encompasses situations related to

adoption, potentially leading to the ambiguous loss experienced by both biological parents and children when facing forced separation. Psychological type includes parents of children with disabilities, sudden infant death and shaken baby syndromes, and caregivers of individuals with brain injuries and cancer.

The present study indicates that the conceptual boundaries between physical and psychological types of ambiguous loss are not only expanding but also erasing, giving way to new applications in settings such as the COVID-19 pandemic, organ donor families, and sexual and gender minority. The current data highlight the importance of social settings, including family and community support, for healing ambiguous loss and creating new meaning for a psychologically or physically lost loved one. This study has also provided a deeper insight into ambiguous loss as an umbrella concept linking continued psychotrauma and grieving processes, which require spiritual and religious support. The analysis has extended our knowledge of contexts where ambiguous loss might occur.

The major limitation of this study is the five-year period for systematic literature review, which, however, gives fresh insights into physical, psychological, and emerging new types of ambiguous loss. More quantitative data on ambiguous loss would help us establish a greater degree of accuracy regarding its effects on mental health symptoms in different vulnerable groups.

## Data Availability Statement

The data that support the findings of this study are openly available in Mendeley Data: Zasiekina, Larysa; Zasiekin, Serhii (2023), "Ambiguous loss_abstracts_2019–2023", Mendeley Data, V1, https://doi.org/ 10.17632/dscy8m4g37.1

## Disclosure Statement

No potential conflict of interest was reported by the authors.

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# BOOK REVIEW

## Stoyanova, J. (2021). Problemi na psiholingvistikata [Problems of Psycholinguistics]. Sofia University Press. Pp. 576, ISBN 9786197433517

**Hristo Kyuchukov** [a]

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Juliana Stojanova's main scientific interest is the acquisition of Bulgarian as a first language – with an emphasis on the early stages, and this is well shown in her last monograph published in 2021 by the Sofia University Press.

The content of the proposed monograph follows the topic of the course in psycholinguistics, which the author offers as a part of the mandatory curriculum of bachelor's and master's students in the "Speech Therapy" degree program and as an elective course for bachelors and masters of philology at Sofia University "St. Kliment Ohridski". The course has been repeatedly updated to reflect not only the latest developments in psycholinguistics around the world but also the author's own research in the acquisition of the Bulgarian language. Thus, the monograph turns from a textbook for students and doctoral students in the humanities engaged in the scientific field of psycholinguistics into a guide for all interested in the issues involved.

The first part of the book (Chapters 1–3) discusses topics from general psycholinguistics. The second part, dedicated to developmental psycholinguistics (Chapters 4 to 19), describes and analyses the early acquisition of Bulgarian. This part is based on the research of language ontogenesis, which the book's author has been conducting for about 35 years.

Chapter 1 is an introduction to the main problems in psycholinguistics. For psycholinguistics, language is not only an abstract symbolic system but also a mental construct related to memory, thinking, communication, and socio-cultural activities. The most important moments in the history of psycholinguistics are traced. Some theoretical issues which have been discussed since the 50s are presented: redundancy as a property of all natural languages, the frequency of language entities and the experiments for eliciting verbal associations. Attention is paid to memory and the biological foundations of language.

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Chapters 2 and 3 briefly outline (based on the example of Bulgarian) the most essential characteristics of language units and structures (phonology, morphology, lexis, semantics, syntax, discourse and text) to help readers who do not have philological education to understand the content of native speakers' language competence. The linguistic perspective is closely intertwined with the psycholinguistic one. The chapters overview the most influential theories on the organisation of the mental lexicon and lexical access, some sentence analysis models, the role of inferences, the scheme and scenario in the processing of discourse information, and, finally, the speech production hypotheses. Chapter 4 begins with an introduction to the problems of developmental psycholinguistics, raising the main theoretical and methodological issues that aim to explain the processes of language acquisition in early childhood.

Chapter 5 is dedicated to the pre-linguistic development, which prepares the beginning of speech in the second year of children's life: it describes the perception of speech, the appearance of babbling, the communicative and the cognitive development.

Chapter 6 considers the early stages of language acquisition defined according to the number of words in children's utterances – one-word-, two-word-, and three-word-stage. In Chapter 7, multi-word combinations in children's speech production are analysed. Special attention is paid to the omission of grammatical words and morphemes – a phenomenon known as telegraphic speech. This Chapter also deals with the individual variations between children according to the rate (early vs. late talkers) and acquisition style (referential vs. expressive style).

The emphasis in Chapter 8 is on the forms and structures specific for the Bulgarian Child Directed Speech, and the role these linguistic means play in promoting language development.

Chapter 9 begins with the presentation of some theoretical approaches to the mastering of phonological contrasts, the transition between babbling and the first words, and the representation of words in mental lexicon. This Chapter provides detailed information about the development of the Bulgarian phonemic system: the acquisition of segmental and supra-segmental structure of Bulgarian words, as well as the interrelationship between phonology, morpho-phonemic alternations and derivational morphology in the ontogeny of language.

Chapter 10 is devoted to the mastery of vocabulary. The connection between words and concepts, the formation of the early vocabulary, the cases of meaning discrepancy between the standard and children's words, and the creation of occasionalisms are the main topics discussed in this Chapter.

The early development of Bulgarian morphology is traced in Chapters 11 to 14. The mastery of nouns, adjectives, and numerals with their respective grammatical categories for gender, number, and definiteness, as well as the appearance of vocatives (by nouns) and comparative forms (by adjectives), is considered in detail in Chapter 11. Chapter 12 analyses the development of different types of pronouns and the problem of mastering the deictic category of person.

Chapter 13 regards the development of verb conjugation, the acquisition of the Bulgarian temporal-aspectual system and the difficulties in mastering the deictic notion of time. It also traces the appearance of non-witness forms, reflexive verbs, and imperatives.

The acquisition of grammatical words (adverbs, prepositions, conjunctions, particles) is studied in Chapter 14. It also addresses the problem of overgeneralisation.

The mastery of the Bulgarian clause is outlined in Chapter 15. Different ways of expressing syntactic dependence in children's utterances are delineated: gender and number agreement within the NP, agreement in person and number within the VP, prepositional relations, apposition, case marking in some pronouns, and word order rules.

Chapter 16 discusses the process of adding complexity within the clauses: marking of negation, use of reflexives, passives, and impersonal constructions.

The development of phrasal and sentential coordination, as well as the process of acquisition of different types of complex sentences, are considered in Chapter 17. The first steps in creating discourse competence are set in the same Chapter.

Chapter 18 is devoted to communicative-pragmatic development, describing the mastery of basic speech acts and their expression through indicative, imperative, permissive and interrogative utterances. This Chapter also sheds light on some socialisation aspects through language up to the age of three.

The last Chapter discusses one of the most important theoretical questions in psycholinguistics: the role metalinguistic knowledge plays in language development. The Bulgarian data on early language awareness confirm that metalinguistic competence as part of the feedback and control system develops simultaneously with language competence.

Like any science, psycholinguistics does not provide ultimate answers to any issues it deals with. It only sets a broad scientific field – still relatively unexplored.

The monograph may interest students, doctoral students and specialists in the humanities (philologists, psychologists, speech therapists, pedagogues) who have to do with psycholinguistics, and especially those who are engaged in language development. The book is also a valuable read for people specialising in human medicine. Parents who are looking for answers to questions about their children's mastery of Bulgarian can also find something for themselves in this book.

# CALENDAR

PSYCHOLINGUISTIC RESEARCH EVENTS

***II International Conference on Verbal Humor - CIHV***
**Host institution:** University of Alicante, Spain
**Deadline for submitting abstracts**: March 31, 2024
**Location:** Alicante, Spain
**Start Date:** 16th October, 2024
**Contact:** Esther Linares Bernabéu
**E-mail:** eslinares93@gmail.com
**URL:** https://griale.dfelg.ua.es/cihv2024/

***International Word Processing Conference – WoProc 2024***
**Host institution:** Faculty of Philosophy, University of Belgrade
**Deadline for submitting abstracts**: June 15, 2024
**Location:** Belgrade, Serbia
**Start Date:** 4th June, 2024
**Contact:** Dušica Filipović Đurđević
**E-mail:** dusica.djurdjevic@f.bg.ac.rs
**URL:** https://moproc2024.net/

***Child Language Symposium – CLS***
**Host institution:** Newcastle University, UK
**Deadline for submitting abstracts**: February 16, 2024
**Location:** Newcastle, United Kingdom
**Start Date:** 9th July, 2024
**Contact:** Vic Knowland
**E-mail:** cls2024@newcastle.ac.uk
**URL:** https://blogs.ncl.ac.uk/cls2024/

***11th Novi Sad Workshop on Psycholinguistic, Neurolinguistic and Clinical Linguistic Research – PNCLR11***
**Host institution:** University of Novi Sad
**Deadline for submitting abstracts**: February 10, 2024
**Location:** Novi Sad, Serbia
**Start Date:** 20th April, 2024
**Contact:** Nina Ilić
**E-mail:** nina.ilic@ff.uns.ac.rs
**URL:** https://www.ff.uns.ac.rs/sr/nauka/konferencije/konferencije-u-organizaciji-filozofskog-fakulteta/psycholinguistic-neurolinguistic-and-clinical-linguistic-research-pnclr

***Heritage Language Research Through the Lens of Psycho-/Neurolinguistics and Individual Differences***
**Host institution:** Adam Mickiewicz University Poznañ
**Deadline for submitting abstracts**: 1 February, 2024
**Location:** Poznań, Poland
**Start Date:** 12th September, 2024
**Contact:** Onur Özsoy
**E-mail:** oezsoy@leibniz-zas.de
**URL:** https://icl2024poznan.pl/

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