Sensitivity to Morphosyntactic Violations of Gender Agreement in L2 Urdu: A Study of Pashto and Balochi Speakers

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Abstract

This study tests the predictions of two approaches against Universal Grammar for L2 acquisition of uninterpretable functional features in adult interlanguage grammars: representational deficit hypothesis maintains that adult L2 learners can never acquire features absent in their L1, suggesting that fossilization is inevitable (Hawkins & Franceschina 2004, Franceschina 2005), while full transfer/full access hypothesis claims that L2 uninterpretable functional features are initially transferred from the L1 and remain acquirable in adults (White et al. 2004, Leung 2005). To test these hypotheses, this study examines whether adult native speakers of less gender-sensitive languages such as Pashto/Balochi can acquire gender concord in an L2 like Urdu. The study investigates the Pashto and Balochi speakers' online sensitivity to gender agreement violations in their L2 Urdu. A total of 90 participants participated in this study, including 30 L2 speakers of Balochi, 30 L2 speakers of Pashto, and 30 native Urdu speakers who served as the control group. The speeded grammaticality judgment task was used for this study. The findings reveal participants were sensitive to morphosyntactic gender agreement violations in L2 Urdu. While L1 background did not significantly affect overall responses in the participant analysis, the item analysis showed significant group differences and interaction effects, indicating L1 influence on judgments for specific items.

Keywords: Language Processing, Grammaticality Judgment, L1 Transfer.

Introduction

This study examines the sensitivity of adult Pashto and Balochi speakers to gender agreement violations in their L2, Urdu. This investigation addressed key hypotheses in L2 acquisition the Representational Deficit Hypothesis (RDH) (Hawkins & Franceschina 2004, Franceschina 2005), and Full Transfer/Full Access Hypothesis (FT/FA) (White et al. 2004, Leung 2005) with a specific focus on how L1 (Pashto/Balochi) impacts the processing of L2 grammatical features such as gender agreement. The study's findings strongly support the Full Transfer/Full Access Hypothesis, as both Pashto and Balochi speakers demonstrated sensitivity to morphosyntactic violations in L2 Urdu, even though gender agreement is either absent or only partially present in their L1.

The Full Transfer Full Access Hypothesis (Schwartz & Sprouse, 1994, 1996; see White, 2003, p. 67) posits that the initial state in second language (L2) acquisition mirrors the learner's first language (L1) grammar. At this stage, learners incorporate their entire L1 grammar, excluding specific lexical items and phonetic expressions. However, when learners encounter challenges in accommodating the properties of the L2 input, they draw on it.

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Universal Grammar (UG) resources to better analyze L2 input, they employ UG options, such as new parameter settings, functional categories, and feature values, which are not present in their L1 grammar. This process of analysis often results in interlanguage grammars that differ from native speaker grammars but remain UG-constrained. It is important to note that the hypothesis focuses on the initial state, with gradual restructuring of the learner's grammar occurring throughout development. Schwartz and Sprouse (1994) studied the developmental stages of a native Turkish speaker acquiring German as an L2. In the initial stage, they observed a full transfer of the L1 grammar to the learner's L2 grammar. In subsequent stages, as the learner encountered difficulties with L2 input properties, they relied on UG to restructure the transferred grammar. This restructuring produced non-target-like structures that were distinct from both the L1 and L2 grammars but still UG-constrained. The Representational Deficit Hypothesis (RDH) suggests that an individual's first language (L1) significantly influences the process of acquiring a second language (L2) (Hawkins & Liszka, 2003). Specifically, if certain abstract grammatical features, such as person, number, or tense, are not expressed through morphological inflections in the L1, learners may struggle to correctly use these inflections in the L2. The central idea of RDH is that learners lack the syntactic structures needed to represent features absent in their L1. As a result, they may find it challenging to understand or accurately produce related morphosyntactic forms in the L2. Instead, learners may rely on their L1 grammar as a way to approximate the missing structures.

This study supports the Full Transfer Full Access Hypothesis, revealing significant differences in response times and sensitivity to gender agreement violations among Urdu, Pashto, and Balochi speakers. Urdu speakers, as the control group, responded fastest, while Pashto and Balochi speakers showed slower response times, reflecting varying L1 influences on L2 processing. Across all groups, responses to violations were slower than to non-violations, consistent with prior research on the complexity of syntactic rule processing. The item-level analysis highlighted L1-specific sensitivity patterns, emphasizing the role of L1 transfer in L2 acquisition. These findings underscore the interaction between L1 grammar and universal grammar in shaping interlanguage development.

Literature Review

There is a fair amount of psycholinguistic literature on agreement processing. The research has focused mainly on gender agreement in different languages: English lacks grammatical gender specification on nouns, the research has been carried out in Italian (Vigliocco & Franck 1999), French (Vigliocco & Franck 1999), and Spanish (Vigliocco et al., 1999, Sagarra & Herschensohn, 2010). Another type is number agreement: English (Bock & Miller 1991; Bock & Cutting 1992; Bock & Eberhard 1993; Vigliocco et al., 1996; Vigliocco & Nicol, 1998), Spanish (Vigliocco et al., 1996; Anto´n-Me´ndez, 1996), Italian (Vigliocco et al., 1995), French (Vigliocco et al., 1996), and Dutch (Vigliocco et al. 1996; Hartsuiker et al., 2001).

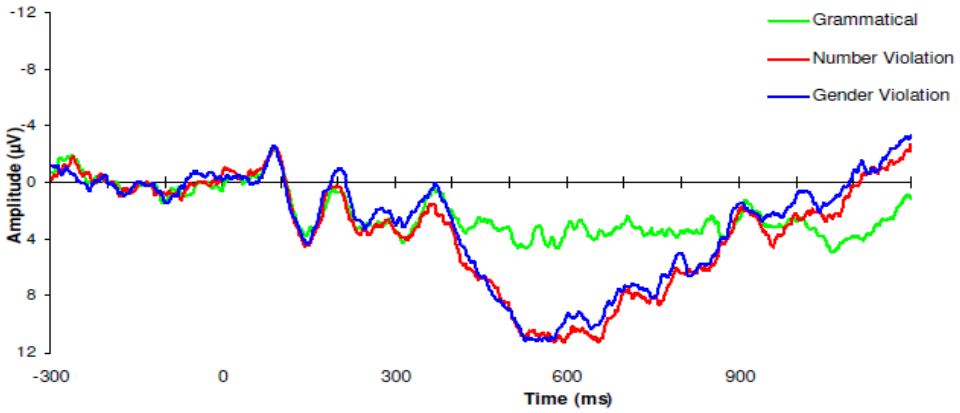
Neuroimaging

Foucart and Frenck-Mestre (2011) investigated the effect of proficiency and similarity between L1 and L2 on grammatical gender processing in L2. They designed three experiments to examine gender agreement violations within the determiner phrase (DP), between the determiner and the noun, the postposed adjective and the noun and the proposed adjective and the noun. They compared the performance of German advanced learners of French to that of French native controls. The results showed a similar P600 effect for native and non-native speakers for agreement

violations when agreement rules where similar in L1 and L2 (depending on proficiency), whereas no effect was found for L2 learners when agreement rules varied across languages. They suggest that syntactic processing in L2 is affected by the similarity of syntactic rules in L1 and L2.

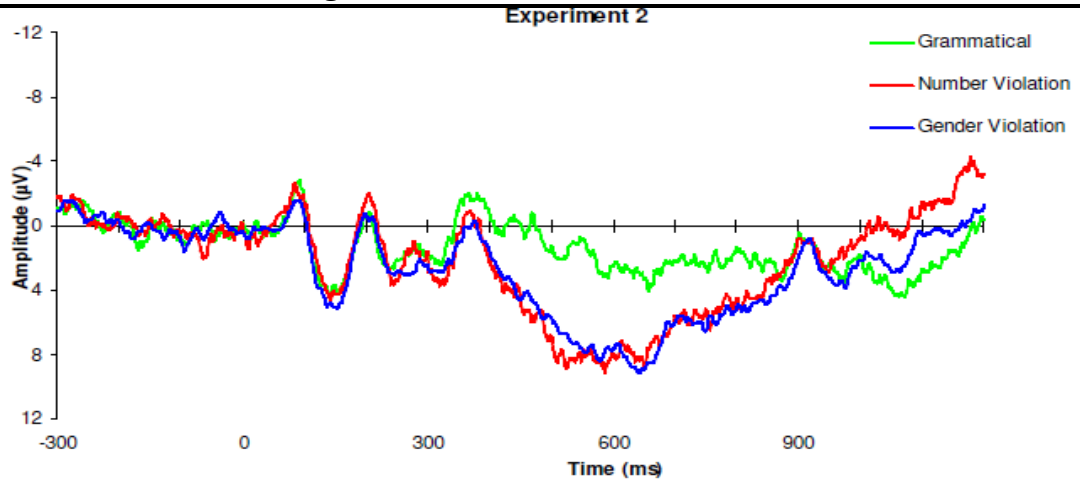
Bañón Alemán José (2010) used the ERP technique to investigate the syntactic agreement processing at the electrophysiological level. They examined whether the parser is sensitive to the structural distance between the agreeing elements and whether different agreement categories (number, gender) are processed similarly. They conducted 3 experiments. The results showed number and gender agreement violations yielded a similar P600, a positive wave between 400 and 900ms peaking at 600ms.

Figure 1: Experiment 1, ERP Responses to Grammatical Sentences, Number Agreement Violations, and Gender Agreement Violations



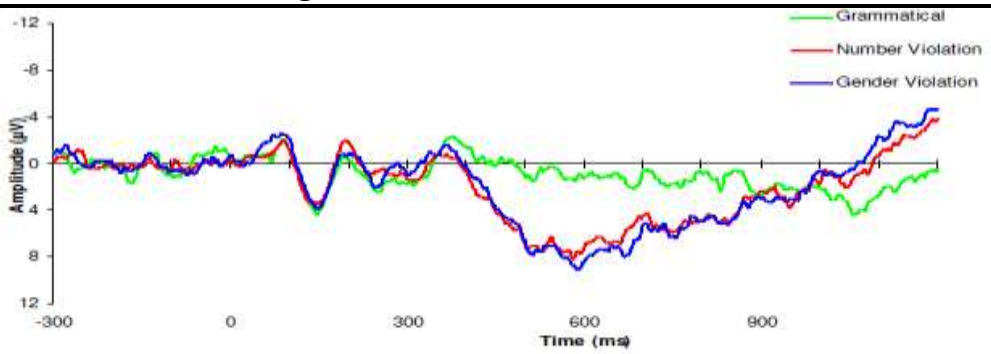
Source: Bañón, 2010.

Figure 2: Experiment 2, ERP Responses to Grammatical Sentences, Number Agreement Violations, and Gender Agreement Violations



Source: Bañón, 2010.

Figure 3: Experiment 3, ERP Responses to Grammatical Sentences, Number Agreement Violations, and Gender Agreement Violations



Source: Bañón, 2010.

They didn't find any difference in P600 amplitude for violations that were established across a syntactic phrase versus violations established within the same phrase. Keeping in view the results, they suggested that agreement is computed in a homogenous way regardless of the agreement category involved and of the syntactic distance between the agreeing elements.

Silva et al. (2007) also used the ERP technique to study the two morphological features person and number agreement. Event-related potentials (ERPs) were collected from Spanish speakers while they read sentences in which either Person Disagreement (PD), Number Disagreement (ND), or both Person and Number Disagreement (NPD) relationships were used. ND, PD and NPD all elicited an anterior negativity (AN) and P600 pattern. While the three disagreement conditions elicited larger P600 amplitudes than the agreement condition. They didn't find any difference between the processing of number and person. These results opposed the Feature Hierarchy hypothesis, which suggests different nominal agreement features have different degrees of cognitive strength (e.g., Person>Number).

Midgley et al. (2007) used electrophysiological technique to study the gender agreement transfer in early language learners while sentence processing. The study was based on the assumption proposed by RHM, Kroll and Stewart, (1994) that beginning L2 learners maintain lexical links from L2 to L1 items. They suggested that if this assumption is true then in a in a sentence context these learners should show sensitivity to L1 gender. It simply means that a French L1 speaker should retain gender information for an English word in an English sentence context. For instance, French possessive determiners are gender marked and must agree with the gender of the noun they modify and not the gender of the anaphoric referent (e.g. English).

Robert a vendu sa voiture sur internet. *(French)*

Robert sold his car on the internet. (English)

The material was consisted of sentences contained critical items whose preceding possessive determiners (his, her) did not agree in gender with the gender of the L1 translation of the critical items. In a comprehension task they used the RSVP (Rapid series visual processing) technique to present the experimental material in English. The critical items were composed of 40 items with

masculine translations e.g. book, fish, wine – le livre, le poisson, le vin and 40 items with feminine translations e.g. apple, mouth, shoe – la pomme, la bouche, la chaussure.14 L1 French participants performed in the experiment. The experiment consisted of two conditions.

Condition 1: Mary dropped her apple on the floor (ok)

Condition 2: Paul dropped his apple on the floor (Perceived violation)

The results provided evidence for the influence of L1 gender on l2 processing. The experiment showed that L2 items whose gender did not agree in an L1 translation with the L2 possessive determiner showed greater positivity in a 400ms to 700ms time window. They argued that any detected gender agreement violation could resemble a P600, known to be sensitive to gender violation in monolinguals. However, the distribution of these P600-like effects was not consistent with that of a P600 to monolingual gender agreement violations with a posterior distribution.

Gao et al. (2023) investigated how second-language (L2) morphological processing compares to first-language (L1) processing in adult Chinese-English bilinguals. Participants performed a morphological priming lexical decision task involving derivational morphology, which exists in both Chinese and English, while their brain activity was recorded using electrophysiological measures and functional near-infrared spectroscopy (fNIRS).The fNIRS results showed distinct neural activity patterns for morphological and semantic priming in the left fronto-temporal network. Compared to L2 English, L1 Chinese elicited greater activation in the left prefrontal cortex during morphological parsing. Early-stage lexical processing revealed differences in the degree of morphological processing between L1 and L2, as evidenced by the early left anterior negativity (ELAN) effect. Despite these differences, both L1 and L2 shared similar early and late structural parsing processes (P250 and 300–500 ms negativity).These findings support the unified competition model of bilingual development, suggesting that bilinguals rely primarily on L1 neural mechanisms to process and represent L2 morphology.

Eye-tracking

Dahan et al. (2000) used eye tracking to investigate how prenominal gender marking affects the listeners to recognize spoken words. French-speaking adults were presented with scenes containing objects with names that shared phonological onsets but differed in grammatical gender (e.g., vase, ‘vase[m],’ vache, ‘cow[f]’). Participants heard gender-informative commands (e.g., Cliquez sur le[m/singular] vase) as well as gender-uninformative commands (e.g., Cliquez sur les[neutral/plural] vases, ‘Click on the vases’). The results showed that Listeners responded more rapidly to nouns preceded by a gender-informative singular article (la[f], le[m]) than to nouns preceded by a gender-ambiguous plural article (les[neut.]). Moreover, the gender-marked article eliminated interference from the phonological competitor. These findings were interpreted as evidence that gender-marked articles affect lexical access directly, by limiting the set of neighboring candidates considered as possible referents. Eye-tracking studies investigating the cohort effect showed that on hearing the first few phonemes of a noun, the listeners are more likely to look at a target picture or a cohort competitor that share a phonological onset; while hearing more speech information listeners increasingly shift to the target picture. Dahan et al. proposed that the presence of a prenominal gender marker might guide listeners to the target with less false predictions to competitor objects. Koch et al. (2021) studied how native German speakers and Dutch-speaking L2 learners of German use verb morphology to predict subject number during sentence processing. Using a visual-world eye-tracking task, participants matched pictures of action scenes to sentences where verb suffixes indicated grammatical number. Both groups showed significant predictive processing, with native speakers responding faster than learners. Faster

predictions correlated with higher working memory, and interviews confirmed that participants consciously used the verb form as a predictive cue. This highlights the role of working memory and awareness in predictive sentence processing.

Online Language Processing

Lew-Williams and Fernald (2010) conducted three online processing experiments to investigate how adult second language (L2) learners of Spanish process gender information during online comprehension, comparing their performance with that of native Spanish-speaking adults and young children acquiring Spanish as their first language (L1). Their primary question was whether the ability to use gender-marked articles (such as *la* and *el*) as predictive cues in incremental processing is more challenging for adult L2 learners than for native speakers and children learning Spanish as L1. The study also explored how both native and non-native Spanish-speaking adults utilize gender-marked articles in sentences with newly-learned object names, as opposed to familiar words, to control for prior exposure to the target nouns.In the three experiments, native Spanish-speaking adults were able to use gender-marked articles to quickly establish reference, even though these articles had never been paired with novel nouns before. However, adult L2 learners of Spanish only used gender-marked articles as predictive cues in specific contexts. When listening to sentences with familiar nouns, L2 learners did not adopt the target referent more quickly when the article was informative compared to when it was not. Furthermore, after learning new nouns, L2 speakers did not rely on gender-marked articles to establish reference unless these articles had consistently co-occurred with the new target nouns throughout the experiment. These findings suggest that adult L2 learners face difficulties in using gender-marked articles to establish reference, supporting previous research that has highlighted the challenges L2 learners experience with grammatical gender (Lew-Williams & Fernald, 2010). Requena and Berry (2021) examined how learning a second language (L2) affects the processing of morphosyntactic variation in one's native language (L1). They compared Spanish monolinguals with Spanish speakers proficient in English, an L2 with fixed pronoun positions, using a self-paced reading experiment. While monolinguals showed consistent comprehension preferences aligning with natural production patterns, bilinguals displayed reduced sensitivity to clitic pronoun positions in Spanish. The findings suggest that learning an L2 without such variation may diminish reliance on those features in the L1, supporting an experience-based, shared-syntax approach to language processing.

Second Language Acquisition (SLA)

Alarcón (2011) investigated the understanding of Spanish grammatical gender in both comprehension and production by comparing second language (L2) learners with native Spanish speakers. The study was based on the assumption that errors in gender agreement in interlanguage production could indicate a lack of native-like representation in the learner's grammar, which might be due to maturational constraints. If this were the case, adult English-speaking learners of Spanish would struggle to fully acquire gender, while native Spanish speakers would be able to acquire it completely. Lardiere's (2007) results of comprehension and production tasks showed that both advanced L2 learners and native speakers possess gender in their underlying grammars. The errors made by L2 learners in oral production were attributed to difficulties in the surface realization of gender, or the "mapping problem", and were also linked to the age at which they were first exposed to Spanish. These errors were viewed as stemming from performance issues, rather than from a lack of competence in gender knowledge. Alarcón (2011) suggested that adult learners, who are exposed to the language later in life, are more likely to experience deficits in

gender agreement computation compared to those who acquire the language from birth. Therefore, while maturational constraints may influence gender agreement performance, they do not affect its representation in L2 acquisition. Wu and Juffs (2022) investigated how the morphological structure of a first language (L1) influences second language (L2) morphological awareness. Comparing native English speakers with Turkish (agglutinative) and Chinese (isolating) L1 speakers, they found that L1 type significantly impacted L2 performance. Turkish speakers outperformed Chinese speakers and even native English speakers in specific tasks, highlighting the role of L1 experience in shaping L2 morphological knowledge and informing theories on bilingual lexicon representation.

Typological Differences: Gender Constructions in Pashto, Balochi, and Urdu

Gender Agreement in Pashto

- *Verbs:* In Pashto, verbs agree in gender and number with the subject. Certain nouns differ in gender classification compared to Urdu, leading to agreement mismatches.

Pashto: Dewaal mane photoo ladydely dy	Urdu: Dewaar par tasveer lagi hai
The picture has been hung on the wall.	The picture is hanging on the wall.

- *Adjectives:* Adjectives in Pashto agree in gender and number with the nouns they modify, unlike Urdu, where some noun-adjective agreements differ. For example:

Pashto: Daa nazan uguud dy	Urdu: Ye nazm lambi hai
This is a long poem.	This is a long poem."

- *Possessive Pronouns*: Pashto possessive pronouns (e.g., *zama*, *sata*) are gender-neutral, whereas Urdu distinguishes gender (e.g., *mera* for masculine, *meri* for feminine). Example:

Pashto: Daa kitaab zama dy	Urdu: Ye kitaab meri hai
This book is mine.	This book is mine.

- *Genitives:* The genitive marker *de* in Pashto is invariant, unlike Urdu, which reflects the gender of the possessed noun. For Example:

Pashto: Daa de fikar khabara da	Urdu: Ye pareshani ki baat hai
It’s something to worry about.	It’s something to worry about.

Urdu genitive markers are gender sensitive, while Pashto is genitive maker (de) is invariant and it does not reflect the gender of possessed noun. Pashto has gender agreement in verbs, adjectives, and some other grammatical elements but this system is partially aligned with Urdu. For instance, Verbs and adjectives agree in gender and number with their nouns, however, gender agreement of certain nouns diverges between the two languages. This results in mismatches such as nouns that are masculine in Urdu are feminine in Pashto and vice versa. Unlike Urdu, Pashto lacks gender distinction in possessive pronouns. We can say that Pashto is partially gender sensitive language, because it does not have gender agreement in many contexts, and some aspects like possessives are gender neutral.

Gender Agreement in Balochi

- *Verbs and Adjectives:* Gender agreement is often neutralized in Balochi; the same form is used for masculine and feminine contexts.

Balochi: Mana samjh atka
I understood

Urdu: Main samjh gaya/samajh gai
I understood

- *Possessive Pronouns:* Balochi uses a single possessive form (*mani*) for both masculine and feminine contexts.

Balochi: Aa mani sangat aa
This is my friend

Urdu: Ye mera/meri dost hai
This is my friend

- *Genitives:* Similar to Pashto, Balochi genitive markers are invariant and do not reflect gender.

Balochi: Dar butki aa
The door is open

Urdu: Darwaza khula hai
The door is open

Based on above examples, we cannot say that Balochi language lacks gender agreement however, it is partially gender sensitive or less gender sensitive as compared to Urdu. It has limited gender agreement in specific contexts. Although Balochi retains gender agreement in pronouns and occasionally in some other forms, it generally lacks gender distinction in verbs, adjectives and nouns. Therefore we can say that it is less gender specific in its grammar.
Let's have some examples of gender in Balochi language. Nouns in Balochi have both masculine and feminine gender which may influence the selection of verb, pronoun and adjectives. For instance, verb agreement with the subject, for masculine: Man kitab newisht (I wrote a book) vs for a feminine: ma kitab newishtang (I wrote a book). For pronouns, *Iš (He) and Iša (she), for Adjectives, shap* zârak (Handsome boy), shap zârang (a beautiful girl). Overall, Balochi is less gender sensitive language.

Gender Agreement in Urdu

Urdu, like Pashto and Balochi, features gender as a grammatical category. However, it is more rigid in its application of gender distinctions. Key aspects of gender construction in Urdu include:
Verb Agreement: Verbs in Urdu agree with the gender and number of the subject or object, depending on the sentence structure.
Adjective Agreement: Adjectives in Urdu must agree with the gender of the nouns they modify.

Usne khat likha hai
He has written a letter

Usne kahani likhi hai
She has written a story

Lambi kahani (long story, feminine)

Lamba qissa (long tale, masculine)

Possessive Pronouns: Urdu has gendered possessive pronouns that agree with the possessed noun.
Genitive Markers: Genitive markers in Urdu are gender-sensitive. For example:

Mera ghar (my house, masculine)

Meri kitaab (my book, feminine)

Uska ghar (his house, masculine)

Uski kitaab (her book, feminine)

Urdu's adherence to strict gender agreement contrasts with Pashto's partial gender sensitivity and Balochi's relative lack of gender distinctions in many contexts. While Urdu requires agreement at multiple grammatical levels, Pashto and Balochi often use invariant forms, particularly for

possessive pronouns and genitive markers. This distinction highlights Urdu's greater grammatical rigidity in gender construction.

Table 1: Typological Differences in Gender Constructions

Feature	Pashto	Balochi	Urdu
Verbs	Agree in gender and number with subject	Gender-neutral for masculine/feminine	Agree in gender and number with subject
Adjectives	Agree with gender of noun	Gender-neutral	Agree with gender of noun
Possessive Pronouns	Gender-neutral (*zama*, *sata*)	Gender-neutral (*mani*)	Gender-specific (*mera*, *meri*)
Genitives	Invariant (*de*)	Invariant	Gender-specific (*ka*, *ki*)

Table1 highlights how Pashto and Balochi exhibit simpler or neutralized gender systems compared to Urdu's more complex gender distinctions.

Materials: 32 sets of 8 sentences representing the 4 critical conditions (i.e. agreement and number non-violations/violations) and 4 pseudo-fillers. The 4 pseudo-fillers in each set contain two other kinds of error: semantic violations to prevent participants from developing a response strategy to the material; word order violations which prevents participants from developing a response strategy to make grammaticality judgments.
Independent variables: (1) Participant groups: These are Pashto and Balochi L1 speakers and a control group of native Urdu speakers; (2) Experimental conditions: Number violation/non violation, agreement violation/non violation and filler item conditions were presented.
Dependent variable: Time latency of the speeded grammaticality judgment.
Constants: (1) Material distribution: An equal number of items for each condition and the number of related sentences in each experimental set were controlled via pseudo-randomization; (2) All participants must be post-pubescent and below 60 years old; (3) Experiments was carried out in silent locations with no distractions;
Methodology: The speeded grammaticality judgment was done via rapid serial visual presentation (RSVP). This entails presenting each word of the sentence on a computer screen in quick succession. A total of 90 participants took part in this study, including 30 L2 speakers of Balochi, 30 L2 speakers of Pashto, and 30 native Urdu speakers who served as the control group. Participants have response buttons which they used to indicate the (un)grammaticality of the ensuing sentence as early as possible.

Hypotheses

1) If L1 has no influence on L2 morphosyntactic processing, we would expect less sensitivity to agreement violations in all L2 speakers relative to native speakers. Native Urdu speakers served as control group for this experiment.
2) If L1 transfer affects L2 morphosyntactic processing, then (a) given that Pashto is less sensitive to gender distinctions compared to Urdu, Pashto speakers are expected to show lower sensitivity to agreement violations than Urdu speakers, whose L1 exhibits rich gender distinctions.
3) If the gender system in L1 contrasts with that of L2, participants are likely to apply L1 gender rules to L2 contexts.

Results

Response Time

Table 2: Mean Reaction Time (ms) of Participants across Gender Agreement conditions

Condition	Urdu (Control)	Pashto (L2	Balochi (L2)
Gender Agreement	1022 (411)	1266 (367)	1323 (361)
Gender Agreement Violation	1034 (381)	1272 (464)	1347 (388)

Table 2 shows reaction times of participants in milliseconds for two conditions (gender agreement and gender agreement violations). The standard deviation is shown in parenthesis.

Urdu (Control group): Urdu native speakers responded significantly faster than Pashto and Balochi L2 learners in both conditions (gender agreement and gender agreement violation). The mean reaction times were 1022 ms for gender agreement and 1034 ms for violations, with low variability, reflecting efficient processing of gender features.

Pashto L2 speakers: Pashto speakers took longer time to respond than the control group. It reflects the additional cognitive load associated with processing gender agreement in L2 Urdu. Their mean reaction times were 1266 ms for agreement and 1272 ms for violations. It shows their sensitivity to gender agreement violations but slower processing speed.

Balochi L2 speakers: Balochi speakers showed slowest reaction times among the group. It indicates that they have greater difficulty in processing gender agreement in L2 Urdu. Their reaction times were 1323 ms for gender agreement and 1367ms for violations. It suggests that gender agreement violations in L2 Urdu posed more challenge for this group.

Overall, reaction time for gender agreement violations were slightly longer for all groups as compared to gender agreement. It reveals the increased cognitive effort required to detect and process grammatical violations involving violations gender agreement. The slower response time of Pashto and Balochi speakers as compared to Urdu control group supports the hypothesis that L1 background influences sensitivity to morphosyntactic agreement and its violations.

T-test for Gender Agreement Condition

Urdu vs Pashto Speakers: $t1 (58) = -6.701$, $P < 0.01$

Urdu speakers responded faster in than Pashto speakers in Gender Agreement Condition.

Urdu vs. Balochi Speakers: $t1 (58) = -5.871$, $p < 0.01$

Urdu speakers responded faster than Balochi speakers in Gender Agreement condition.

Pashto vs. Balochi Speakers: $t1 (58) = -2.337$, $p < 0.05$

Pashto speakers responded faster than Balochi speakers in Gender Agreement Condition

T-test for Gender Agreement Violation Condition

Urdu vs Pashto Speakers: $t1 (58) = -7.043$, $p < 0.01$

Urdu speakers responded faster than Pashto speakers in gender agreement violation condition.

Urdu vs. Balochi Speakers: $t1 (58) = -6.521$, $p < 0.01$

Urdu speakers responded faster than Balochi speakers in gender agreement violation condition.

Pashto vs. Balochi Speakers: $t1 (58) = -2.486$, $p < 0.05$

Pashto speakers responded faster than Balochi speakers in gender agreement violation condition.

T-test results indicate that Urdu speakers consistently responded faster than both Pashto and Balochi speakers in both gender agreement and gender agreement violation conditions, reflecting their native proficiency. Pashto speakers outperformed Balochi speakers, suggesting that L1 influences impact the processing of gender agreement in L2. These findings highlight the role of

L1 transfer and its effect on response times in L2 syntactic processing. The t-test results reveal that native Urdu speakers are more adept at processing gender agreement features compared to Pashto and Balochi speakers, due to Urdu's more complex and pervasive system of gender agreement. While Pashto and Balochi have partial or neutralized gender systems, their L2 processing of gender agreement violations in Urdu was slower, particularly in Balochi speakers, whose L1 features fewer gender distinctions. These results support the idea that L1 transfer plays a significant role in L2 learners' ability to process grammatical features such as gender agreement. Furthermore, the findings suggest that typological differences in gender constructions between the L1 and L2 can impact learners' sensitivity to morphosyntactic violations, highlighting the interaction between linguistic typology and cognitive processing in L2 acquisition. These results collectively suggest that while all L2 groups exhibit sensitivity to gender agreement, native Urdu speakers process these features faster, with notable differences in response times between Pashto and Balochi speakers.

Repeated Measures ANOVA
Main Effect of Violation
F1 (1, 88) = 80.031, P < 0.01
F2 (1, 109) = 30.133, P < 0.01

Main Effect of L1 Group
F1 (2, 88) = 12.025, p > 0.01
F2 (2, 109) = 15.457, P < 0.01

Interaction of Violation and Group
F1 (2, 88) = 3.005, P > 0.05
F2 (2, 109) = 3.34, P < 0.05

Analysis

Main Effect of Violation

Participant Analysis (F1 (1, 88) = 80.031, P < 0.01)

The main effect of violation (grammatical vs. ungrammatical) is significant in participant analysis. This means that participants are highly sensitive to morphosyntactic violations in gender agreement. There is clear dissimilarity in how they judged grammatical and ungrammatical sentences in this study. The p-value is less than 0.01 which indicates effect on participants' judgments.

Item Analysis (F2 (1, 109) = 30.133, P < 0.01)

The main effect of violation is significant in the item analysis, with a strong effect. This suggests that items contributed significantly to the overall grammaticality judgment. Essentially, the items with violations were judged as ungrammatical, and the grammatical items were judged as correct.

Main effect of L1 Group

Participant Analysis F1 (2, 88) = 12.025, p > 0.01

As the p-value is greater than 0.001 this indicates that the main effect of L1 group is not significant in the participant analysis. Which means that there are no significant differences in how participants from different L1 backgrounds (Pashto, Balochi, Urdu) responded to the

grammaticality judgment tasks. While, there could be some differences in how different groups reacted to violations, these differences are not large enough to reach a statistical significance in the participant analysis.

Item Analysis F2 (2, 109) = 15.457, P < 0.01

The p-value is less than 0.001 which means that the main effect of L1 group is significant in the item analysis. It suggests that the items were rated differently across different L1 groups (Pashto, Balochi, and Urdu). Which means that certain items were judged more severely, or more moderately depending on the L1 background of the participants. The significant p-value indicates a clear difference in how different groups rated the same items, which is likely to reflect L1 transfer effects.

Interaction of Violation and Group

Participant Analysis F1 (2, 88) = 3.005, P > 0.05

The p-value is less than 0.005 which means the interaction between grammatical violations and L1 groups is not statistically significant in the participant analysis. It suggests that, the effect of violation type on judgment was not influences by L1 background of the participants in a meaningful way. The groups did not show significantly different patterns of judgment in response to grammatical or ungrammatical sentences.

Item Analysis F2 (2, 109) = 3.34, P < 0.05

The p-value is less than 0.005 which means the interaction between violation type and L1 group is significant in the item analysis. It indicates that the grammaticality judgment patterns diverge across the three L1 groups (Pashto, Balochi and Urdu). It reflects group specific differences indicating that l1 speakers have different sensitivities to morphosyntactic violations based on their linguistic background. For instance, Pashto and Balochi speakers might react differently to certain grammatical violations as compared to Urdu speakers.

Discussion

The result of the Main Effect of L1 Group in participant analysis (F1 (2, 88) = 12.025, p > 0.01) indicates that there are no significant differences in how participants from different L1 backgrounds (Pashto, Balochi, Urdu) responded to the grammaticality judgment tasks. Since the p-value is greater than 0.01, it suggests that the variation in responses across the three groups was not statistically significant. When considering this result in the context of typological differences, it's important to note that the grammatical structures and gender systems in Pashto, Balochi, and Urdu vary significantly, as described earlier. However, the lack of significant differences across L1 groups in participant analysis might suggest several key things: *Cross-Linguistic Influence:* Even though Pashto, Balochi, and Urdu have typologically distinct gender systems, adult learners from these language backgrounds may still be capable of acquiring L2 Urdu gender agreement in similar ways. This could imply that the L2 learners, regardless of their L1, may be using common strategies to process and deal with gender agreement violations in L2 Urdu. This is consistent with the idea that grammatical structures, even when different across languages, may not necessarily lead to significant differences in processing if the learners have achieved a certain level of proficiency in the second language. *Cognitive Processing Factors:* The results could also reflect that cognitive processing mechanisms, such as attention to agreement violations, are similar across the L1 groups, which could counteract the influence of typological differences. The learners might

rely on similar cognitive strategies for processing morphosyntactic violations regardless of their L1 background. This could be particularly true if the learners have similar levels of proficiency in their L2, which may mitigate any substantial differences. *Universal Features in L2 Acquisition:* Another explanation could be that all participants, regardless of their L1, are sensitive to universal aspects of L2 grammar. This suggests that certain features, such as gender agreement violations, might be processed in a similar way across languages, reducing the effect of typological differences between the L1s. If these features are universally relevant in L2 acquisition, learners may process them similarly, leading to no significant differences across the groups in the participant analysis. *Learning Experience and Proficiency:* Since the participants in each group are likely at a comparable level of proficiency in L2 Urdu, their ability to process grammatical violations might be more similar than expected, despite differences in their L1 grammar. The results may reflect the learners' overall exposure to the language, as well as their maturity in acquiring L2 grammar. This might lead to a convergence in their responses to the grammaticality judgment tasks, making it harder to distinguish their reactions based on typological differences.

In sum, while typological differences between Pashto, Balochi, and Urdu do exist, these differences may not be significant enough to cause meaningful variation in how participants from these language backgrounds process grammaticality violations in L2 Urdu. The lack of significant differences could be attributed to the cognitive and linguistic factors that shape L2 learners' sensitivity to grammatical rules, as well as their level of proficiency and experience with the target language.

Conclusion

The findings of this study provide evidence for the Full Transfer/Full Access hypothesis, as adult Pashto and Balochi speakers demonstrated sensitivity to morphosyntactic gender agreement violations in L2 Urdu, a feature either absent or partially present in their L1. This suggests that uninterpretable functional features, such as gender concord, can be acquired in adulthood. While overall responses did not show significant differences across L1 groups in the participant analysis, the item analysis revealed significant group differences and interaction effects, indicating that L1 background influenced judgments for specific items. These results highlight the role of L1 transfer and processing strategies in shaping L2 learners' sensitivity to grammatical violations, supporting the notion that acquisition of L2 features is influenced by both linguistic and cognitive factors.

Recommendations

Further Research: Future studies could explore proficiency effects in L2 gender agreement acquisition. A more detailed investigation of cross-linguistic influence in other grammatical domains (e.g., verb conjugation, case marking) could further illuminate the interaction between L1 and L2 in adult learners.

Pedagogical Implications: Language teaching programs could benefit from these findings by incorporating L1 transfer awareness in the teaching of morphosyntactic features in L2s. Since L1 influences the processing of L2 features, teachers can better support learners by emphasizing areas where transfer is likely to occur.

Broader Implications: This study adds to the growing body of research on adult second language acquisition and provides evidence against the claim of fossilization (as suggested by the Representational Deficit Hypothesis). It supports the view that adults can indeed acquire morphosyntactic features that are absent in their L1, provided that these features are accessible within the structure of Universal Grammar.

In conclusion, the results of this study underscore the complex relationship between L1 background, cognitive processing, and L2 grammar acquisition. The findings provide new insights into how gender agreement in an L2 is acquired by adult learners and emphasize the role of L1 transfer in shaping the acquisition process.

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