I *hates* Mondays: ERP effects of emotion on person agreement

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Abstract

Recent evidence indicates that emotion influences the computation of agreement dependencies based on number or gender. In this event-related potentials study we examined the role of emotion in the processing of person information. Participants made grammatical judgements to sentences with positive, negative and neutral verbs that either matched or mismatched person features of a preceding pronominal subject. Emotion did not modulate P600 amplitude enhancements to agreement violations. Importantly, whereas enhanced LAN effects to all ungrammatical sentences were observed in a cluster of left fronto-central electrodes, only neutral verbs that violated person agreement elicited enhanced LAN amplitudes in a sub-cluster of left frontal electrodes. The narrow distribution of LAN effects to emotion verbs suggests that feature-checking operations dealing with the early detection of person agreement errors are less efficient when words signal affective biologically salient content. Our results favor lexicalist views arguing that lexical and conceptual information influences agreement.

Running head: Emotion effects on person agreement

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Introduction

Neurobiological and behavioral studies examining the interplay between language and emotion have shown that emotion has an impact on language at several levels (see Herbert, 2020; Hinojosa et al, 2020a, 2020b; Kissler, 2020; Van Berkum, 2020, for reviews), including vocabulary acquisition (Grosse et al., 2021; Nook et al., 2017), lexico-semantic processing in the native language (Kissler & Herbert, 2013; Méndez-Bértolo et al., 2011; Palazova et al., 2011) and in non-native languages (Chen et al., 2015; Opitz & Degner, 2012), or linguistic communicative contexts (Aguado et al., 2019; Schindler & Kissler, 2016; Schindler et al., 2019). Recently, emotional modulations during morpho-syntactic processes have been also observed. In this line, there is evidence pointing to a role of emotion in the processing of agreement dependencies between sentence constituents based on gender (Hinojosa et al., 2014a) or number (Martín-Loeches et al., 2012) features. In this work, we will extend prior research by examining the relationship between emotion and the processing of person agreement, a question that remains unexplored to the best of our knowledge.

Across languages, agreement is a pervasive phenomenon to codify structural links between two words in a sentence (e.g. determiners and nouns, nouns and verbs, …) by means of the variation of morphological categories that indicate person, number or gender features of verbs, nouns or adjectives (Acuña-Fariña, 2009; Corbett, 2006; Mancini et al. 2011a; Wechsler, 2009). Establishing agreement dependencies among sentence constituents involves displacing information about these features from the controller (e.g., a subject) to the target (e.g., a verb) (Mancini et al., 2013). Prior event-related potentials (ERPs) studies have observed enhanced amplitudes in two waves when agreement dependencies between sentence constituents are violated relative to correct sentences in grammaticality judgement tasks. An early left anterior negativity

(LAN) emerges between 300 ms and 500 ms at left frontal electrodes, which is thought to index the early identification of agreement errors (Gunter et al., 2000; Molinaro et al., 2011, 2015). Thereafter, reanalysis and repair operations that reflect efforts to integrate agreement mismatches into prior sentence contexts are indexed by a late posterior positivity (P600) that occurs approximately at 500 ms at centro-parietal scalp locations (Kuperberg, 2007; Osterhout and Holcomb, 1992). Of note, the amplitude of the P600 is sensitive not only to agreement errors but also to certain semantic-thematic aspects such as the violation of verb-argument relationships (Kim & Osterhaut, 2005), or animacy constraints between nouns and verbs (Nieuwland & Van Berkum, 2005). Several ERP studies have reported processing dissociations between number, gender and/or person features. These differences mainly consisted of enhanced P600 amplitudes for person relative to gender agreement violations, or gender relative to number agreement mismatches, as well as different LAN and P600 topographies for person vs number agreement errors (Alemán Bañón & Rothman, 2016; Barber & Carreiras, 2005; Mancini et al., 2011a; Nevins et al., 2007; Zawiszewski et al., 2016; but see Alemán Bañón et al., 2012, and Silva-Pereyra & Carreiras, 2007). Dissociations are thought to reflect a hierarchical typology in which person is at the top, followed by number and gender (Person > Number > Gender; Carminati, 2005; Greenberg, 1963). This privileged status comes from the fact that person occurs independently from gender and number in most languages (Carminati, 2005), and has greater cognitive salience (Harley & Ritter, 2002; Nevins et al., 2007). Also, it has been suggested that dissociations between some of these features may arise from differences in the anchoring requirements that are needed for their interpretation. Under this view, interpretation of number requires that the parser checks the specification of this feature against the nominal argument, whereas the

interpretation of person relies on the inspection of the association between arguments and speech participants' roles (Mancini et al., 2011a, 2014; Sigurdsson, 2004).

Of note, following a two dimensional conception of emotions (Russell, 2003) in which the affective space is represented by the dimensions of valence (from negative to positive) and arousal (from calmed to activated), several studies in Spanish have examined the interplay between emotion and agreement. Despite of the lack of effects in the P600 component, interactions have been observed in the LAN wave. In this sense, Martín-Loeches et al. (2012) reported that emotional features elicited enhanced LAN amplitudes following number agreement violations between nouns and negative adjectives (e.g., *La chica$_{sg}$ feas$_{pl}$ baila* / The ugly$_{pl}$ girl$_{sg}$ dances), which were not observed for neutral or positive adjectives. The authors concluded that the processing of agreement relations had higher costs in negative words. Subsequent studies have relied in the analyses of gender features. LAN modulations by emotion have been found for gender agreement errors in neutral (e.g. *El camarero$_{m}$ rubia$_{f}$* / The blonde$_{f}$ waiter$_{m)}$ relative to negative target adjectives following controller nouns in noun phrases (Hinojosa et al., 2014a). Similarly, LAN effects were observed only for neutral masked adjectives -but not for positive and negative masked adjectives- embedded within a sentence when preceding an unmasked neutral adjective containing a gender agreement mismatch with a noun (Jimenez-Ortega et al., 2017). This lack of LAN effects to gender agreement mismatches in emotional compared to neutral words have been related to a facilitated processing of agreement anomalies in sentence elements conveying biologically salient meaning (Hinojosa et al., 2014a). In contrast, Fraga et al. (2021) found enhanced LAN amplitudes to negative adjectives that violated gender agreement relations with preceding nouns, a result that was thought to reflect the difficulty of processing gender errors in negative words. Another set of studies failed to report

emotional modulations on gender agreement. In this sense, Díaz-Lago et al. (2015) found similar LAN effects to positive and neutral adjectives that violated gender agreement relations with their preceding controller nouns. In the same vein, subsequent studies examining gender agreement dependencies between controller nouns and target adjectives did not observe differences in the LAN amplitudes elicited by neutral and negative adjectives (Fraga et al., 2017, Exp. 1), by positive, neutral and negative adjectives (Fraga et al., 2017, Exp. 2), or by negative and positive adjectives (Padrón et al., 2020). Overall, it seems that emotional effects on agreement processing are likely, although evidence is still inconclusive. Divergent findings might be attributed to differences in the structural distance (local or distal position) between the agreement controller and the target (Alemán Bañón et al., 2012; Biondo et al., 2018) or the morphological markedness of the sentence constituents (Alemán Bañón & Rothman, 2019), as well as to individual differences in morphosyntactic processing (Fraga et al., 2021) (see Fraga, 2020, and Mancini et al., 2021 for further discussion).

Based on prior findings showing (1) processing dissociations possibly arising from the different sources of information accessed during the computation of gender (either syntactic or lexical information), number (conceptual information concerning the number of participants) and/or person (semantic and pragmatic information about discourse roles) agreement, and (2) emotional effects on number and gender agreement, it seems important to extend this line of research by examining the influence of emotional features on the processing of agreement dependencies that rely on person features. To this aim, we used as stimuli short sentences with pronominal subjects (e.g. *Yo*$_{1sg}$ / I$_{1sg}$), and negative (e.g. *Mentir* / To lie), positive (e.g. *Recompensar* / To reward), and neutral (e.g., *Coger* / To take) verbs that either agreed or disagreed in person features, while participants judged their grammatical acceptability. Our focus was on

those ERP components that have been typically associated with the computation of person agreement dependencies (LAN, P600). Higher amplitudes in the person disagreement relative to the person agreement condition were hypothesized in both LAN and P600 waves (Molinaro et al., 2015). Bearing in mind the results from studies on the interplay between emotion and gender or number agreement, predictions could be made as follow with respect to the interaction between emotion and person agreement. In line with those lexicalist approaches assuming interactions between different levels of linguistic representation during the computation of agreement relations (Adger & Smith, 2010; Wechsler, 2011), modulations in the LAN component should be expected if emotional features influence the processing of person agreement between sentence elements (Hinojosa et al., 2014a; Martín-Loeches et al., 2012). Alternatively, encapsulated views of agreement, such as the feature-copying model (Chomsky, 2001), assume that the computation of agreement dependencies is a purely syntactic-driven process that is unaffected by the semantics (e.g., emotional content) of controllers (e.g., a subject) and targets (e.g., a verb). Therefore, a lack of interaction between Emotion and Grammaticality in the LAN wave should be expected (Díaz-Lago et al., 2015; Fraga et al., 2017). Regarding the P600, we hypothesize a main effect of Grammaticality with no further modulations by Emotion (Hinojosa et al., 2014a; Fraga et al., 2017; Padrón et al., 2020). Encapsulated and lexicalist views would not make different predictions about this component since its amplitude is modulated by both lexico-semantic and syntactic information (Kuperberg et al., 2007).

Methods

Participants

Our sample size was determined based on an a priori power analysis using G*Power (Faul et al., 2007). Assuming a $\alpha = 0.05$ significance level, we estimated that a total sample size of 28 participants would provide 95% power to detect effects. (medium size effect d=0.5). Considering potential drop-outs, we recruited 32 participants to exceed the criterion. Of the 32 recruited participants two were excluded due to excessive artifacts in the recording. The remaining sample consisted of 30 native speakers of Spanish (20 females, 10 males), who participated in the study after providing informed consent. The age range of the participants was 18 to 29 (mean 21.7). All participants were right handed according to the Edinburgh Handedness Inventory (Oldfield, 1971). They had normal or corrected to normal vision, and reported no history of neurological or psychiatric impairment. Participants were students from the Complutense University of Madrid that received credit course. Ethical approval has been obtained from a local ethics committee.

Stimuli

We selected 80 positive, 80 negative and 80 neutral infinitive verbs. Most of these stimuli were selected from prior normative studies (Guasch et al., 2016; Hinojosa et al., 2016; Redondo et al., 2007; Stadhagen-González et al., 2017) using the emoFinder tool (Fraga et al., 2017). Additionally, concreteness, as well as arousal and valence scores for some verbs, were collected from 40 participants who did not participate in the ERP study (25 females, 15 males; Mean age = 22.3, SD = 4.87) in an on-line survey using a 9-point Likert scale (ranging from 1, highly abstract, very relaxing, very negative to 9, highly concrete, very activating, very positive). The results of repeated measures analyses of variance (ANOVA) and post-hoc comparisons indicated that all three emotion categories differed with respect to valence scores [$F(2,237)=1380.98$, $p<0.001$;

for all post-hoc analyses, $p<0.001$]. A main effect of arousal was also observed [$F(2,237)=135.35$, $p<0.001$]. Post-hoc analyses showed that positive and negative verbs did not differ in arousal scores ($p=0.41$) and had significantly higher arousal ratings than neutral verbs ($p<.0.001$, for both comparisons). Negative, positive and neutral verbs were matched for concreteness [$F(2,237)=0.95$, $p=0.39$], word length [letters, $F(2,237)=1.53$, $p=0.22$; syllables $F(2,237)=2.29$, $p=0.1$], and log frequency [$F(2,237)=0.38$, $p=0.69$] (EsPal; Duchón et al., 2013). Table 1 shows the three categories' means and standard errors for these variables, as well as the results of the statistical analyses.

Table 1

The verbs were used to create a total of 240 regular present tense sentences (see Appendix A). The length of all experimental sentences was 4 or 5 words and had either a Pronominal subject - Verb - Direct object (e.g. *Yo agredo al estudiante* / I attack the student) or a Pronominal subject - Verb - Prepositional phrase (e.g. *Tú oras en la iglesia* / You pray in church) structure. There were 80 sentences per condition (80 with a positive verb, 80 with a negative verb, 80 with a neutral verb). Each sentence included a 1_{st} or 2_{nd} person pronominal subject with its corresponding grammatical or ungrammatical verb. Hence, this resulted in two grammatical and two ungrammatical versions of each sentence (e.g., *Yo*$_{1sg}$ *canto*$_{1sg}$ *en la ducha* / I_{1sg} $sing_{1sg}$ in the shower and *Tú*$_{2nd}$ *cantas*$_{2nd}$ *en la ducha* / You_{2nd} $sing_{2nd}$ in the shower are grammatical sentences, whose ungrammatical versions are *Yo*$_{1st}$ *cantas*$_{2nd}$ *en la ducha* / I_{1st} $sing_{2nd}$ in the shower and *Tú*$_{2nd}$ *canto*$_{1st}$ *en la ducha*, You_{2nd} $sing_{1st}$ in the shower). Therefore, four lists were created so that each participant read only one of these versions of each sentence. Each

stimulus list also included a set of 72 filler sentences that consisted of half grammatical and half ungrammatical sentences displaying person agreement and disagreement between pronouns and verbs (3rd singular, 1st plural, 2nd plural, 3rd plural)[1]. Sentence order within each list was randomized. In total, each participant read 312 sentences. The within-participants design included two factors were entered in a 3 (Emotion: negative, neutral positive) x 2 (Grammaticality: correct, incorrect). The person features of the pronoun (1_{st} or 2_{nd} person) were not considered as an experimental condition.

Procedure

Participants performed the experimental task seated comfortably in an electrically shielded and sound-attenuated room. They were seated in front of a computer monitor, on which sentences were visually presented word by word. Words were displayed in black lower-case letters (with the exception of the first letter of each sentence that was displayed in upper-case letter) on a soft-grey background. Participants performed a grammatical judgement task. They were asked to assess the acceptability of each sentence by pressing one of two buttons with the middle and the index fingers. The assignment of correct and incorrect responses was counterbalanced across participants. Each trial began with a fixation point for 1000 ms, followed by a 100 ms blank screen. Thereafter, each word was presented for 300 ms, followed by a 300-ms blank screen. One second after the offset of the last word, a question mark indicated that participants had to judge the sentences for grammaticality (Hinojosa et al., 2014a; Martín-Loeches et al., 2012; Taylor-Clarke et al., 2002). The intertrial interval was 500 ms. The whole set

[1] As one reviewer noted, agreement errors always occurred following the sentence initial pronouns in both fillers and experimental sentences, which might have biased participants towards more word-pair based and less syntactically based processing.

of 312 words were randomly presented to each participants in 5 blocks. A 10 trials practice block was allowed before the beginning of the first experimental block.

Electroencephalographic (EEG) recording and analysis

EEG activity was recorded trough a 64-channels BrainAmp system. Sixty electrodes mounted in an Electro-Cap recording cap based on the International 10–10 System. All electrodes were referenced to the average activity of the two mastoids. The electrooculographic (EOG) activity was recorded using vertical and horizontal bipolar electrodes. These electrodes were placed at supra-infraorbital level of the left eye and on the outer canthus of both eyes, respectively. Impedances were kept below 5 KΩ for scalp and mastoids electrodes, and below10 KΩ for EOG electrodes. Recordings were amplified using BrainAmp amplifiers (BrainProducts, Munich, Germany), continuously digitized at a sample rate of 1000 Hz, and filtered online with a frequency band-pass of 0.01–100 Hz.

EEG data were analyzed with the EEGlab toolbox (Delorme & Makeig, 2004), a toolbox implemented in the Matlab environment (The MathWorks, Natick, MA). The signal was down-sampled to 500 Hz and down pass filtered with a low cut-off at 20 Hz. The continuous EEG was segmented time-locked to the target verb presentation (-200 ms to 800 ms). Data were baseline corrected (-200 ms). The ERP analyses included only epochs with correct responses. Epochs with recording channels exceeding $\pm$ 150 μV were removed. Subsequently, an independent components analysis (Makeig et al., 1997) was performed to eliminate the blink artifacts (Jung et al., 2000). Finally, epochs with artifacts were individually rejected with a visual inspection criterion. Following this procedure, we retained on average 29.67 (SD = 4.91) trials in the positive agreement, 30 (SD = 4.47) trials in positive disagreement, 28.87 (SD = 5.82) trials in

the negative agreement, 30.23 (SD = 6.31) trials in the negative disagreement, 29.1 (SD = 5.57) trials in the neutral agreement, and 28.6 (SD = 5.86) trials in the neutral disagreement conditions. Finally, grand-averages ERPs were calculated for each condition across participants.

The current study focused on the two ERP components that have been related to the processing of person agreement features, the LAN and the P600 (Hinojosa et al., 2003; Mancini et al., 2011a; Sylva-Pereira & Carreiras, 2007). Statistical differences between conditions in these waves were assessed following a nonparametric cluster-based random permutation analysis approach (Maris & Oostenveld,2007). This approach overrides the problem of a priori choosing a spatiotemporal window or electrodes by computing a mass univariate test in every channel-time pair. The mass univariate approach generates a large number of statistical comparisons, which increases the type 1 error. To counteract the increased probability of false positive results, the significant effects between conditions are not assessed in the spatiotemporal pairs individual level, but in the cluster level, formed as the sum of significant adjacent spatio-temporal statistical values. The significance of the cluster statistic is evaluated by comparing its value with the sampling distribution obtained by permutation tests that randomly shuffles the label of the data. The analytic steps were as follows. First, a mass univariate test was conducted at each time-electrode pair (a dependent-samples t-test for the Congruency contrast or a dependent F-test for the Emotion and interaction contrasts). Clusters were formed with the adjacent spatiotemporal points with p-values below 0.05. Cluster-level test statistic was calculated by taking the sum of all the individual statistics values within that cluster. Then, a null distribution was created by computing 1000 randomized cluster-level test statistics. Finally, the actually observed

cluster-level test statistics were compared against the null distribution and only clusters falling above the 95th percentile were considered significant ($p<0.05$).

Results

Performance

Behavioral data from two participants were not recorded due to technical issues. Therefore, we report data from 28 participants. As can be seen in Table 2, accuracy rates showed that participants were highly confident in performing grammaticality judgements. The results of a 3 x 2 repeated measures ANOVA with Emotion (negative, neutral, positive) and Grammaticality (correct, incorrect) as factors showed a trend toward statistical significance in Emotion [$F(2,54)=3.034$, $p=0.056$, $\eta_p^2=0.101$]. The results of post-hoc analyses with the Bonferroni correction revealed again a trend toward statistical significance suggesting lower accuracy rates in the neutral condition relative to the negative condition ($p=0.094$). Reaction times (RTs) across conditions are displayed in Table 2. Statistical analyses showed no significant main effects or interactions, which is in agreement with prior reports (Fraga et al., 2017; Sylvia-Pereira & Carreiras, 2007; Mancini et al., 2019; Martín-Loeches et al., 2012; but see Mancini et al., 2011b, and Zawiszewski et al., 2016).

Table 2

Event related potentials

LAN effects

Based on prior studies (Mancini et al., 2011a; Zawiszewski et al., 2016), differences between experimental conditions in the LAN component were assessed in the 300-500 ms time-window. As shown in Figure 1, the cluster-based analysis approach revealed a

more negative component in the disagreement compared to the agreement condition in a cluster of left frontal electrodes (FP1, AF3, F7, F5, F3, FC5, FC3, TP7, T7, C5, C3, CP3) between 360 ms and 460 ms ($p = 0.098$). The interaction between Emotion and Grammaticality was also examined in the LAN spatiotemporal window obtained by the previous cluster analysis. These theoretically-based post-hoc analyses showed different LAN effects in the three emotional conditions in a cluster formed by four frontal electrodes (FP1, AF3, F7, F5) ($p<0.05$) (Figure 1). Post-hoc Bonferroni pairwise comparisons revealed that differences between agreement and disagreement conditions were only statistically significant in the neutral emotional condition ($p<0.05$, Bonferroni corrected). Also, the results of post-hoc comparisons between negative, neutral and positive condition either in correct or incorrect grammatical conditions showed no significant effects. Finally, the statistical analysis of the main factor of Emotion did not reveal any cluster of differences between conditions.

Figure 1

P600 effects

We evaluated P600 effects in the 500-800 ms temporal-window (Fraga et al., 2021; Mancini et al., 2011b). As shown in Figure 2, the results of our statistical analyses revealed a P600 significant Grammaticality effect in a cluster of distributed electrodes (O2, O1, OZ, PZ, P4, CP4, P8, C4, TP8, T8, P7, P3, CP3, CPZ, CZ, FC4, TP7, C3, FCZ, FZ, F4, FC3, PO3, P1, POZ, P2, PO4, CP2, P6, CP6, C6, PO8, PO7, P5, CP5, CP1, C1, C2, FC2, FC6, FC1, F2, F6, F1, AF4) from 560 to 800 ms, with more positive values in the incorrect relative to the correct condition ($p<0.05$). The main effect of

Emotion and the interaction between Emotion and Grammaticality showed no significant clusters.

Figure 2

Discussion

We sought to understand the relations between emotional and person features during the processing of local agreement mismatches between pronominal subjects (controllers) and negative, neutral and positive verbs (targets). In agreement with the findings of prior studies (Barber & Carreiras, 2005; O'Rourke & van Petten, 2011; Silva-Pereyra & Carreiras, 2007), we observed enhanced LAN[2] responses for neutral verbs that violated person agreement dependencies with a preceding pronoun relative to the grammatically correct condition. Importantly, the central and novel finding of our study is the lack of LAN modulations in a subset of left frontal electrodes when person agreement errors occurred in verbs with negative and positive valence. Thus, our data suggests that LAN feature-checking operations dealing with the early detection of person agreement errors are less efficient when the target verb signals positive and negative biologically salient content. In a subsequent processing stage, the system becomes aware of this mismatch and enables repair and reanalysis operations in order to complete parsing, conceptual interpretation and referential processes needed for discourse understanding (Kempen, 1998). In particular, it has been suggested that

[2] Tanner and Van Hell (2014) have suggested that biphasic LAN-P600 effects to verb agreement mismatches could be a result of grand mean responses from N400 (related to lexico-semantic processes) and P600 components since some individuals depicted centrally scalp distributed waveforms in the LAN time-window. However, this possibility seems unlikely in the current study since our data-driven analyses showed that the interaction between Grammaticality and Emotion reached significance in a cluster of left-frontal electrodes. Also, Tanner and Van Hell examined individual differences in LAN/N400-P600 effects and followed a data-analysis approach based on a visual inspection of Regions of Interest that included a-priori selected electrodes. Of note, the size of our sample does not allow investigating individual differences as in Tanner and Van Hell's study, an issue that deserves further examination in future research.

repairing agreement violations entails the deletion of a feature specification and the insertion of a feature specification once that the parser realizes that features on the agreeing target are not consistent with the feature specification of the controller (Ackema & Neeleman, 2019). These additional computations are reflected in similar enhanced P600 amplitudes to person agreement errors in positive, negative and neutral verbs relative to grammatical sentences. Overall, our data is in line with prior research that has shown emotional modulations in number (Martín-Loeches et al., 2012) and gender (Hinojosa et al., 2014a; Jiménez-Ortega et al., 2017; Fraga et al., 2021) consistency checking during the establishment of agreement relations between sentence elements.

Prior eye-tracking and ERP evidence pointed to the existence of processing dissociations in the computation of person relative to number agreement (Biondo et al., 2018; Mancini et al., 2013; Zawiszewski et al., 2016), which suggest an independent representation of these features (Mancini et al., 2021; Rizzi & Cinque, 2016). These differences have been related to the higher cognitive salience of person (Nevins et a., 2007), to distinct interpretive properties related to feature-mapping options for person (e.g., the role of the subject in the discourse) and number (e.g., the cardinality of the subject, that is the number of entities that this sentence element entails) (Biondo et al., 2018; Mancini et al., 2017, 2021), or to different checking-for-agreement mechanisms (den Dikken et al., 2019). Although processing differences between person and gender features are less understood, it seems plausible to hypothesize that emotion could exert a different impact in the computation of person relative to both number or gender agreement relations. In this line, Martín-Loeches et al. (2012) observed higher processing costs for the detection of number agreement anomalies between nouns and negative adjectives, which is at odds with the less efficient detection of gender

(Hinojosa et al., 2014a) or person (current data) agreement mismatches in emotional words. Nonetheless, the use of pronominal subjects to control subject-verb agreement dependencies in the current study may at least partially account for similar emotional effects found for the processing of gender and person information. Pronouns are specified for both gender and person, while noun phrases (i.e., R-expressions) are specified for gender only. According to some theoretical views, differences in the processing of person compared to number or gender agreement features would be only observed when person agreement mismatches occur between verbs that have person information, and noun phrases that do not carry person specification (Ackema & Neeleman, 2013, 2019). Indeed, prior ERP studies that failed to report processing dissociations between person and number used agreement violations between pronominal subjects and verbs (Silva-Pereyra & Carreiras, 2007). Thus, the detection and repair of an unexpected person agreement form when the parser checks verbal features against the pronominal subject may share similar mechanisms with computations involved in the identification of gender disagreement between verbs and noun phrase subjects (as in Hinojosa et al., 2014a). These operations seem to be similarly affected by emotional features. Future studies should deal with a direct comparison of subject-verb person agreement mismatches using noun phrases (e.g. *John$_{3sg}$ shoot$_{2sg}$ the gun) and pronominal subjects (e.g. *He$_{3sg}$ shoot$_{2sg}$ the gun).

Models of sentence parsing (e.g., Bornkessel & Schlesewsky, 2013; Friederici, 2011; Hagoort & Indefrey, 2014; Vosse & Kempen, 2000) appear to be largely underspecified with respect to the impact that emotion may have during the establishment of different syntactic relations between sentence constituents. However, the finding that the emotional content of words is accessed during the computation of agreement dependencies based on person features has some implications for theoretical

models of agreement. Our results argue against a view in which agreement is purely syntactically-driven and encapsulated with respect to semantic, pragmatic or discourse features (Chomsky, 2014; Franck et al., 2006). Instead, our data favors lexicalist views, which assume that the syntactic parser is exposed to lexical, conceptual and referential external influences while computing agreement dependencies between sentence elements (Adger & Smith, 2010; Vigliocco & Hartsuiker, 2002; Wechsler, 2011). In this vein, some proposals with a particular focus on the processing of person features have emphasized the contribution of semantic-pragmatic and discourse information -related to the role of the participant in the speech event signaled by the verb argument's referent- while establishing agreement relations between sentence elements based on person information (Mancini et al., 2011, 2014). Thus, current evidence leaves open the possibility of modulatory effects by emotional features when assigning discourse participant roles (i.e., speaker, addressee, or non-participant) to interpret person information.

An important aspect that deserves further attention relates to the issue of how emotional features of words are involved in agreement processing in a broad sense. Some lexicalist accounts have claimed that agreement dependencies are computed through a cue-based retrieval mechanism for accessing and comparing information stored in memory from previously processed constituents (Lewis and Vasishth, 2005; Wager et al., 2009). According to this proposal, an agreement mismatch between a verb and its preceding subject engages a reanalysis process that makes use of several sources of information provided by the verb, such as agreement features (e.g., number or person) or structural cues (e.g., thematic roles). Under this logic, if emotional features behave as semantic cues that contribute to the processing of agreement violations, additional computation efforts to detect agreement errors could be expected when verbs

and their subjects disagree not only in person but also in emotional features. The observation of LAN effects at fronto-central and central electrodes to agreement mismatches in both positive and negative verbs preceded by rather neutral pronominal subjects is in partial agreement with this view. However, some cautious is needed since the narrower distribution of the LAN for emotion words relative to neutral words suggests that the detection of errors in neutral verbs which were preceded by emotionally congruent neutral pronominal subjects is more efficient and activates feature-checking mechanisms to a greater extend. Alternatively, the Unification model (Hagoort, 2003a; Haggort & Indefrey, 2014), assumes a parallel processing in which different sources of linguistic information, such as morphosyntactic or semantic, interact as soon as they become available. Of note, the results of prior studies suggest that the temporal course of the detection of agreement errors between 300 and 500 ms overlaps with the automatic engagement of attentional resources devoted to the processing of the emotional features of words (Hinojosa et al., 2014b; Kissler & Herbert, 2013). Thus, in line with the proposal by Hagoort (2003a), we suggest that the computation of agreement relationships would benefit from the privileged access to the emotional information of words, as reflected in the interaction between Emotion and Grammaticality found in the current study. Nonetheless, additional work is needed to further examine the mechanisms underlying emotional effects on agreement. In this sense, it would be relevant to directly compare agreement errors in verbs with emotional and non-emotional subjects. Also, the lack of main effects of Emotion in the pattern of ERPs suggests that task demands might be a critical aspect in the processing of emotional words embedded in sentences (see Hinojosa et al., 2014a for further discussion). Therefore, the comparison of the results elicited by grammaticality judgement and emotional categorization tasks might shed some light about how

emotional and morphosyntactic information interact during the processing of agreement. Finally, another productive approach to test parallel and interactive morphosyntactic and emotional effects might be the use of experimental paradigms that include double agreement and semantic violations (e.g., Hagoort, 2003b) in target emotional words.

In conclusion, the results of the present study indicate that prior interactions between word emotional content and the processing of agreement dependencies based on gender and number are also observed for person agreement relations between pronominal subjects and verbs. Our data show that the mechanism dealing with the early detection of agreement mismatches during structure building operations is less efficient in emotional compare to neutral words. This results suggests an advantage in processing emotional utterances containing agreement errors, which points to the need of a rapid communication of information that might be particularly relevant for individuals during communicative interactions. Our findings also highlight the importance of considering the contribution of emotional features when outlining neurobiological and psycholinguistic models of language. Future research within this domain should deal with open questions such as the direct comparison of emotional effects in the processing of number, gender and person agreement by means of double mismatches, the study of person agreement errors in feature distant (non-local) structural relations, or the impact of individual differences in morphosyntactic processing during the computation of person agreement.

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Figure Captions

Figure 1. LAN component. Topographies and grand-average ERP waveforms of the LAN component (collapsed for all electrodes forming the significant cluster). Top left: Topography of the subtraction of the incorrect minus the correct condition in the time window 360-460 ms. White points represent the significant electrodes that form part of the main effect of Grammaticality in the LAN cluster. Red circles illustrate the electrodes that integrate the significant cluster of the Grammaticality x Emotion interaction. Bottom right: Topographies and grand-averaged ERP waveforms (collapsed for all electrodes forming the significant cluster) of each of the Grammaticality conditions. (green star: cluster p-value <0.1). Left: Topographies and grand-averaged ERP waveforms of the agreement and disagreement conditions in each of the emotion conditions (red star: p-value <0.05).

Figure 2. P600 component. Topographies and grand-average ERP waveforms of the main effect of Grammaticality in the P600 component (collapsed for all electrodes forming the significant cluster). Left: Topography of the incorrect minus correct conditions averaged in the time window 560-800 ms. White circles represent the significant electrodes that form part of the main effect of Grammaticality in the P600 cluster. Right: Topographies and grand-averaged ERP waveforms (collapsed for all electrodes forming the significant cluster) of each of the Grammaticality conditions (red star: p-value <0.05).

Table 1.

Means (and SDs) of valence (1 = highly negative, 9 = highly positive), arousal (1 = highly relaxes, 9 = highly activated) No. of letters, No. of syllables, log frequency and concreteness (1 = highly abstract, 9 = highly concrete).

	Valence	Arousal	Letters	Syllables	Frequency	Concreteness
Negative	2.37 (0.52)	6.73 (1)	7.66 (1.61)	3.06 (0.68)	0.72 (0.55)	6.21 (1.44)
Positive	7.11 (0.66)	6.55 (0.66)	7.74 (1.58)	3.09 (0.75)	0.73 (0.55)	5.91 (1.36)
Neutral	5.06 (0.58)	4.86 (0.68)	7.31 (1.72)	2.88 (0.62)	0.66 (0.57)	6.05 (1.37)

Table 2.

Mean reaction times (RTs) and accuracy (ACC) (SEMs in parentheses)

	RT (ms)	**ACC**
Positive correct	410 ,8 (0,030)	96,8 (0,006)
Positive incorrect	426,3 (0,030)	95,8 (0,008)
Negative correct	420,2 (0,026)	96,5 (0,007)
Negative incorrect	429,1 (0,031)	96,3 (0,007)
Neutral correct	421,6 (0,032)	96,1 (0,007)
Neutral incorrect	428,6 (0,033)	93,8 (0,008)

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APPENDIX A. Grammatical versions of experimental sentences with their English translation. As an example, the ungrammatical versions of the first sentence with positive, negative and neutral verbs are provided.

Sentences with positive verbs

1. **Yo$_{1st}$ acierto$_{1st}$** el número / **Tú$_{2nd}$ aciertas$_{2nd}$** el número
   Tú$_{1st}$ aciertas$_{2nd}$ el número /**Tú$_{2nd}$ acierto$_{1st}$** el número

   I$_{1st}$ guess$_{1st}$ *the number /* ***You$_{2nd}$ guess$_{2nd}$*** *the number*
   I$_{1st}$ guess$_{2nd}$ *the number /* ***You$_{2nd}$ guess$_{1st}$*** *the number*

2. **Yo ovaciono** al músico / **Tú ovacionas** al músico

   I cheer *for the musician /* ***You cheer*** *for the musician*

3. **Yo comienzo** las clases / **Tú comienzas** las clases

   I start *classes /* ***You start*** *classes*

4. **Yo decido** entre las propuestas / **Tú decides** entre las propuestas

   I decide *among the proposals /* ***You decide*** *among the proposals*

5. **Yo reino** desde hace diez años / **Tú reinas** desde hace diez años

   I reign *for ten years /* ***You reign*** *for ten years*

6. **Yo activo** la alarma / **Tú activas** la alarma

   I set *the alarm /* ***You set*** *the alarm*

7. **Yo sonrío** al compañero **/ Tú sonríes** al compañero

   I smile *at the partner /* ***You smile*** *at the partner*

8. **Yo sorprendo** al ingeniero / **Tú sorprendes** al ingeniero

   I surprise *the engineer /* ***You surprise*** *the engineer*

9. **Yo enaltezco** al catedrático / **Tú enalteces** al catedrático

   I extol *the professor /* ***You extol*** *the professor*

10. **Yo triunfo** en la oposición / **Tú triunfas** en la oposición

    I triumph *in the opposition /* ***You triumph*** *in the opposition*

11. **Yo auxilio** al corredor / **Tú auxilias** al corredor

    I help *the runner /* ***You help*** *the runner*

12. **Yo honro** su labor / **Tú honras** su labor

    I honour *his labour /* ***You honour*** *his labor*

13. **Yo socorro** al joven / **Tú socorres** al joven

***I help** the youngster / **You help** the youngster*

14. **Yo felicito** a la pareja / **Tú felicitas** a la pareja

    ***I congratulate** the couple / **You congratulate** the couple*

15. **Yo protejo** las cosas / **Tú proteges** las cosas

    ***I protect** things / **You protect** things*

16. **Yo deseo** a la enfermera / **Tú deseas** a la enfermera

    ***I desire** the nurse / **You desire** the nurse*

17. **Yo enseño** la canción / **Tú enseñas** la canción

    ***I show** the song / **You show** the song*

18. **Yo otorgo** el poder / **Tú otorgas** el poder

    ***I give** the power / **You give** the power*

19. **Yo festejo** las navidades / **Tú festejas** las navidades

    ***I celebrate** Christmas / **You celebrate** Christmas*

20. **Yo viajo** a la playa / **Tú viajas** a la playa

    ***I travel** to the beach / **You travel** to the beach*

21. **Yo ligo** con un desconocido / **Tú ligas** con un desconocido

    ***I hook up** with a stranger / **You hook up** with a stranger*

22. **Yo beso** al chico / **Tú besas** al chico

    ***I kiss** the boy / **You kiss** the boy*

23. **Yo complazco** al presentador / **Tú complaces** al presentador

    ***I please** the presenter / **You please** the presenter*

24. **Yo defiendo** al peluquero / **Tú defiendes** al peluquero

    ***I defend** the hairdresser / **You defend** the hairdresser*

25. **Yo bailo** durante la noche / **Tú bailas** durante la noche

    ***I dance** through the night / **You dance** through the night*

26. **Yo acreciento** los ingresos / **Tú acrecientas** los ingresos

    ***I increase** income / **You increase** income*

27. **Yo fascino** al tribunal / **Tú fascinas** al tribunal

    ***I fascinate** the court / **You fascinate** the court*

28. **Yo sobrevivo** al secuestro / **Tú sobrevives** al secuestro

    ***I survive** the kidnapping / **You survive** the kidnapping*

29. **Yo salvo** al panadero / **Tú salvas** al panadero

***I save** the baker / **You save** the baker*

30. **Yo regalo** un collar / **Tú regalas** un collar

    ***I gift** a necklace / **You gift** a necklace*

31. **Yo ilusiono** al auditorio / **Tú ilusionas** al auditorio

    ***I delight** the audience / **You delight** the audience*

32. **Yo limpio** el edificio / **Tú limpias** el edificio

    ***I clean** the building / **You clean** the building*

33. **Yo entusiasmo** al grupo / **Tú entusiasmas** al grupo

    ***I enthuse** the group / **You enthuse** the group*

34. **Yo salto** la valla / **Tú saltas** la valla

    ***I jump** the fence / **You jump** the fence*

35. **Yo asombro** al público / **Tú asombras** al público

    ***I amaze** the public / **You amaze** the public*

36. **Yo río** en el espectáculo / **Tú ríes** en el espectáculo

    ***I laugh** at the show / **You laugh** at the show*

37. **Yo piropeo** a la animadora / **Tú piropeas** a la animadora

    ***I compliment** the cheerleader / **You compliment** the cheerleader*

38. **Yo homenajeo** al equipo / **Tú homenajeas** al equipo

    ***I honour** the team / **You honour** the team*

39. **Yo reformo** la cocina / **Tú reformas** la cocina

    ***I renovate** the kitchen / **You renovate** the kitchen*

40. **Yo pedaleo** por la montaña / **Tú pedaleas** por la montaña

    ***I pedal up** the mountain / **You pedal up** the mountain*

41. **Yo mejoro** las calificaciones / **Tú mejoras** las calificaciones

    ***I improve** the grades / **You improve** the grades*

42. **Yo canto** en la ducha / **Tú cantas** en la ducha

    ***I sing** in the shower / **You sing** in the shower*

43. **Yo renazco** después del accidente / **Tú renaces** después del accidente

    ***I reborn** after the accident / **You reborn** after the accident*

44. **Yo atraigo** todas las miradas / **Tú atraes** todas las miradas

    ***I attract** all eyes / **You attract** all eyes*

45. **Yo curo** a los animales / **Tú curas** a los animales

***I cure** the animals / **You cure** the animals*

46. **Yo alegro** las vacaciones / **Tú alegras** las vacaciones

    ***I brighten up** the holidays / **You brighten up** the holidays*

47. **Yo alimento** a los peces / **Tú alimentas** a los peces

    ***I feed** the fishes / **You feed** the fishes*

48. **Yo cobro** a final de mes / **Tú cobras** a final de mes

    ***I get paid** at the end of the month / **You get paid** at the end of the month*

49. **Yo reanimo** al paciente / **Tú reanimas** al paciente

    ***I revive** the patient / **You revive** the patient*

50. **Yo divierto** a unos amigos / **Tú diviertes** a unos amigos

    ***I amuse** some friends / **You amuse** some friends*

51. **Yo corro** en el parque / **Tú corres** en el parque

    ***I run** in the park / **You run** in the park*

52. **Yo aprendo** el temario / **Tú aprendes** el temario

    ***I learn** the content / **You learn** the content*

53. **Yo perfecciono** la fórmula matemática / **Tú perfeccionas** la fórmula matemática

    ***I perfect** the mathematical formula / **You perfect** the mathematical formula*

54. **Yo aclamo** al artista / **Tú aclamas** al artista

    ***I acclaim** the artist / **You acclaim** the artist*

55. **Yo rescato** al pájaro / **Tú rescatas** al pájaro

    ***I rescue** the bird / **You rescue** the bird*

56. **Yo enriquezco** la comida / **Tú enriqueces** la comida

    ***I enrich** the food / **You enrich** the food*

57. **Yo prospero** en la escuela / **Tú prosperas** en la escuela

    ***I prosper** in school / **You prosper** in school*

58. **Yo excito** su curiosidad / **Tú excitas** su curiosidad

    ***I excite** their curiosity / **You excite** their curiosity*

59. **Yo estimulo** su pensamiento / **Tú estimulas** su pensamiento

    ***I stimulate** their thinking / **You stimulate** their thinking*

60. **Yo sano** con una aspirina / **Tú sanas** con una aspirina

    ***I heal** with an aspirin / **You heal** with an aspirin*

61. **Yo seduzco** a la rubia / **Tú seduces** a la rubia

***I seduce** the blonde / **You seduce** the blonde*

62. **Yo coqueteo** con todos / **Tú coqueteas** con todos

    ***I flirt** with everybody / **You flirt** with everybody*

63. **Yo sobresalgo** en la asignatura / **Tú sobresales** en la asignatura

    ***I excel** in the subject / **You excel** in the subject*

64. **Yo enorgullezco** a la universidad / **Tú enorgulleces** a la universidad

    I make** the university **proud** / **You make** the university **proud

65. **Yo destaco** en el concurso / **Tú destacas** en el concurso

    ***I stand out** in the competition / **You stand out** in the competition*

66. **Yo recompenso** su esfuerzo / **Tú recompensas** su esfuerzo

    ***I reward** their effort / **You reward** their effort*

67. **Yo encanto** a la serpiente / **Tú encantas** a la serpiente

    ***I charm** the snake / **You charm** the snake*

68. **Yo celebro** el cumpleaños / **Tú celebras** el cumpleaños

    ***I celebrate** the birthday / **You celebrate** the birthday*

69. **Yo invento** la rueda / **Tú inventas** la rueda

    ***I invent** the wheel / **You invent** the wheel*

70. **Yo venzo** la competición / **Tú vences** la competición

    ***I beat** the competition / **You beat** the competition*

71. **Yo entretengo** a los invitados / **Tú entretienes** a los invitados

    ***I entertain** the guests / **You entertain** the guests*

72. **Yo negocio** con el empresario / **Tú negocias** con el empresario

    ***I negotiate** with the businessman / **You negotiate** with the businessman*

73. **Yo apruebo** el examen / **Tú apruebas** el examen

    ***I pass** the test / **You pass** the test*

74. **Yo flirteo** con el arquitecto / **Tú flirteas** con el arquitecto

    ***I flirt** with the architect / **You flirt** with the architect*

75. **Yo educo** sus modales / **Tú educas** sus modales

    ***I educate** their manners / **You educate** their manners*

76. **Yo recolecto** los guisantes / **Tú recolectas** los guisantes

    ***I pick** the peas / **You pick** the peas*

77. **Yo refuerzo** la pared / **Tú refuerzas** la pared

***I reinforce** the wall / **You reinforce** the wall*

78. **Yo premio** su actitud / **Tú premias** su actitud

    ***I reward** their attitude / **You reward** their attitude*

79. **Yo enamoro** al jurado / **Tú enamoras** al jurado

    ***I charm** the jury / **You charm** the jury*

80. **Yo aplaudo** en el concierto / **Tú aplaudes** en el concierto

    ***I clap** at the concert / **You clap** at the concer*

Sentences with negative verbs

1. **Yo$_{1st}$ ofendo$_{1st}$** al vendedor / **Tú$_{2nd}$ ofendes$_{2nd}$** al vendedor
   Yo$_{1st}$ ofendes$_{2nd}$ al vendedor / **Tú$_{2nd}$ ofendo$_{1st}$** al vendedor

   ***I$_{1st}$ offend$_{1st}$** the seller / **You$_{2nd}$ offend$_{2nd}$** the seller*
   ***I$_{1st}$ offend$_{2nd}$** the seller / **You$_{2nd}$ offend$_{1st}$** the seller*

2. **Yo aplasto** al insecto / **Tú aplastas** al insecto

   ***I squash** the insect / **You squash** the insect*

3. **Yo abandono** al perro / **Tú abandonas** al perro

   ***I abandon** the dog / **You abandon** the dog*

4. **Yo despedazo** el conejo / **Tú despedazas** el conejo

   ***I tear apart** the rabbit / **You tear apart** the rabbit*

5. **Yo detesto** a su madre / **Tú detestas** a su madre

   ***I detest** his mother / **You detest** his mother*

6. **Yo asfixio** a su marido / **Tú asfixias** a su marido

   ***I suffocate** her husband / **You suffocate** her husband*

7. **Yo condeno** su acción / **Tú condenas** su acción

   ***I condemn** their action / **You condemn** their action*

8. **Yo insulto** al rey / **Tú insultas** al rey

   ***I insult** the king / **You insult** the king*

9. **Yo peligro** en la carretera / **Tú peligras** en la carretera

   ***I am in danger** on the road / **You are in danger** on the road*

10. **Yo fastidio** la reunión / **Tú fastidias** la reunión

    ***I screw up** the meeting / **You screw up** the meeting*

11. **Yo encierro** al gato / **Tú encierras** al gato

    ***I lock up** the cat / **You lock up** the cat*

12. **Yo castigo** al niño / **Tú castigas** al niño

***I punish** the child / **You punish** the child*

13. **Yo atraco** a una mujer / **Tú atracas** a una mujer

    ***I rob** a woman / **You rob** a woman*

14. **Yo bombardeo** el colegio / **Tú bombardeas** el colegio

    ***I bomb** the school / **You bomb** the school*

15. **Yo lloro** con la película / **Tú lloras** con la película

    ***I cry** with the film / **You cry** with the film*

16. **Yo empeoré** la situación / **Tú empeoras** la situación

    I made** the situation **worse** / **You make** the situation **worse

17. **Yo enveneno** a los asistentes / **Tú envenenas** a los asistentes

    ***I poison** the attendants / **You poison** the attendants*

18. **Yo desentierro** la planta / **Tú desentierras** la planta

    ***I dig up** the plant / **You dig up** the plant*

19. **Yo enfermo** de un constipado / **Tú enfermas** de un constipado

    ***I'm sick** with a cold / **You're sick** with a cold*

20. **Yo violo** a la monja / **Tú violas** a la monja

    ***I rape** the nun / **You rape** the nun*

21. **Yo irrito** a la señora / **Tú irritas** a la señora

    ***I irritate** the lady / **You irritate** the lady*

22. **Yo mato** al político / **Tú matas** al político

    ***I kill** the politician / **You kill** the politician*

23. **Yo maldigo** su suerte / **Tú maldices** su suerte

    ***I curse** their luck / **You curse** their luck*

24. **Yo amenazo** al joven / **Tú amenazas** al joven

    ***I threaten** the youth / **You threaten** the youth*

25. **Yo estropeo** su ordenador / **Tú estropeas** su ordenador

    ***I mess up** their computer / **You mess up** their computer*

26. **Yo ahogo** a un amigo / **Tú ahogas** a un amigo

    ***I'm drowning** a friend / **You're drowning** a friend*

27. **Yo pego** al camarero / **Tú pegas** al camarero

    ***I hit** the bartender / **You hit** the bartender*

28. **Yo mutilo** al soldado / **Tú mutilas** al soldado

***I mutilate** the soldier / **You mutilate** the soldier*

29. **Yo asesino** al presidente / **Tú asesinas** al presidente

    ***I murder** the president / **You murder** the president*

30. **Yo lincho** al señor / **Tú linchas** al señor

    ***I lynch** the lord / **You lynch** the lord*

31. **Yo daño** al escaparate / **Tú dañas** al escaparate

    ***I damage** the showcase / **You damage** the showcase*

32. **Yo peleo** con el policía / **Tú peleas** con el policía

    ***I fight** with the policeman / **You fight** with the policeman*

33. **Yo disgusto** a la actriz / **Tú disgustas** a la actriz

    ***I displease** the actress / **You displease** the actress*

34. **Yo padezco** la gripe / **Tú padeces** la gripe

    ***I suffer** from the flu / **You suffer** from the flu*

35. **Yo ciego** al caballo / **Tú ciegas** al caballo

    ***I blind** the horse / **You blind** the horse*

36. **Yo contamino** el aire / **Tú contaminas** el aire

    ***I pollute** the air / **You pollute** the air*

37. **Yo acuchillo** al vecino / **Tú acuchillas** al vecino

    ***I stab** the neighbour / **You stab** the neighbour*

38. **Yo renuncio** al dinero / **Tú renuncias** al dinero

    ***I give up** the money / **You give up** the money*

39. **Yo fusilo** al general / **Tú fusilas** al general

    ***I shoot** the General / **You shoot** the General*

40. **Yo destruyo** su coche / **Tú destruyes** su coche

    ***I destroy** his car / **You destroy** his car*

41. **Yo agredo** al estudiante / **Tú agredes** al estudiante

    ***I assault** the student / **You assault** the student*

42. **Yo degrado** a la anciana / **Tú degradas** a la anciana

    ***I degrade** the old lady / **You degrade** the old lady*

43. **Yo horrorizo** a una amiga / **Tú horrorizas** a una amiga

    ***I horrify** a friend / **You horrify** a friend*

44. **Yo perjudico** su carrera profesional / **Tú perjudicas** su carrera profesional

***I harm** his career / **You harm** his career*

45. **Yo asalto** el banco / **Tú asaltas** el banco

    ***I rob** the bank / **You rob** the bank*

46. **Yo maltrato** a un novio / **Tú maltratas** a un novio

    ***I mistreat** a boyfriend / **You mistreat** a boyfriend*

47. **Yo sepulto** sus ilusiones / **Tú sepultas** sus ilusiones

    ***I bury** their illusions / **You bury** their illusions*

48. **Yo escupo** en la acera / **Tú escupes** en la acera

    ***I spit** on the pavement / **You spit** on the pavement*

49. **Yo asusto** al bebé / **Tú asustas** al bebé

    ***I scare** the baby / **You scare** the baby*

50. **Yo ataco** a los turistas / **Tú atacas** a los turistas

    ***I attack** the tourists / **You attack** the tourists*

51. **Yo torturo** a la niña / **Tú torturas** a la niña

    ***I torture** the child / **You torture** the child*

52. **Yo muero** de asombro / **Tú mueres** de asombro

    ***I die** of amazement / **You die** of amazement*

53. **Yo quemo** su casa / **Tú quemas** su casa

    ***I burn down** his house / **You burn down** his house*

54. **Yo traiciono** su confianza / **Tú traicionas** su confianza

    ***I betray** their trust / **You betray** their trust*

55. **Yo pierdo** los nervios / **Tú pierdes** los nervios

    ***I lose** my nerve / **You lose** your nerve*

56. **Yo critico** al médico / **Tú criticas** al médico

    ***I criticise** the doctor / **You criticise** the doctor*

57. **Yo amargo** la tarta / **Tú amargas** la tarta

    I make** the cake **bitter** / **You make** the cake **bitter

58. **Yo humillo** a unos compañeros / **Tú humillas** a unos compañeros

    ***I humiliate** colleagues / **You humiliate** colleagues*

59. **Yo odio** al examinador / **Tú odias** al examinador

    ***I hate** the examiner / **You hate** the examiner*

60. **Yo molesto** al campesino / **Tú molestas** al campesino

***I bother** the farmer / **You bother** the farmer*

61. **Yo sangro** por la herida / **Tú sangras** por la herida

    ***I bleed** from the wound / **You bleed** from the wound*

62. **Yo destrozo** la pared / **Tú destrozas** la pared

    ***I tear down** the wall / **You tear down** the wall*

63. **Yo desilusiono** al jefe / Tú desilusionas al jefe

    ***I disillusion** the boss / **You disillusion** the boss*

64. **Yo miento** en el trabajo / **Tú mientes** en el trabajo

    ***I lie** at work / **You lie** at work*

65. **Yo fracaso** en los estudios / **Tú fracasas** en los estudios

    ***I fail** in my studies / **You fail** in your studies*

66. **Yo golpeo** su cara / **Tú golpeas** su cara

    ***I hit** his face / **You hit** his face*

67. **Yo decepciono** al alcalde / **Tú decepcionas** al alcalde

    ***I disappoint** the mayor / **You disappoint** the mayor*

68. **Yo ejecuto** el programa / **Tú ejecutas** el programa

    ***I run** the programme / **You run** the programme*

69. **Yo disparo** a la diana / **Tú disparas** a la diana

    ***I shoot** at the bullseye / **You shoot** at the bullseye*

70. **Yo envidio** su belleza / **Tú envidias** su belleza

    ***I envy** her beauty / **You envy** her beauty*

71. **Yo degüello** la gallina / **Tú degüellas** la gallina

    ***I behead** the chicken / **You behead** the chicken*

72. **Yo oprimo** al becario / **Tú oprimes** al becario

    ***I oppress** the scholar / **You oppress** the scholar*

73. **Yo engaño** a una novia / **Tú engañas** a una novia

    ***I cheat on** a girlfriend / **You cheat on** a girlfriend*

74. **Yo ridiculizo** al alumno / **Tú ridiculizas** al alumno

    ***I ridicule** the student / **You ridicule** the student*

75. **Yo rompo** su moto / **Tú rompes** su moto

    ***I break** his motorbike / **You break** his motorbike*

76. **Yo impido** el suceso / **Tú impides** el suceso

I prevent *the occurrence /* ***You prevent*** *the occurrence*

77. **Yo desprecio** su trabajo / **Tú desprecias** su trabajo

    I despise *their work /* ***You despise*** *their work*

78. **Yo temo** su reacción / **Tú temes** su reacción

    I fear *their reaction /* ***You fear*** *their reaction*

79. **Yo hiero** su pierna / **Tú hieres** su pierna

    I hurt *his leg /* ***You hurt*** *his leg*

80. **Yo intimido** al abogado / **Tú intimidas** al abogado

    I bully *the lawyer /* ***You bully*** *the lawyer*

Sentences with a neutral verb

1. **Yo**$_{1st}$ **anoto**$_{1st}$ sus palabras / **Tú**$_{2nd}$ **anotas**$_{2nd}$ sus palabras
   Yo$_{1st}$ **anotas**$_{2nd}$ sus palabras /**Tú**$_{2nd}$ **anoto**$_{1st}$ sus palabras

   I$_{1st}$ ***write down***$_{1st}$ *their words /* ***You***$_{2nd}$ ***write down***$_{2nd}$ *their words*
   I$_{1st}$ ***write down***$_{2nd}$ *their words /* ***You***$_{2nd}$ ***write down***$_{1st}$ *sus palabras*

2. **Yo repruebo** su conducta / **Tú repruebas** su conducta

   I disapprove *of their behaviour /* ***You disapprove*** *of their behaviour*

3. **Yo hiervo** el agua / **Tú hierves** el agua

   I boil *the water /* ***You boil*** *the water*

4. **Yo remuevo** el café / **Tú remueves** el café

   I stir *the coffee /* ***You stir*** *the coffee*

5. **Yo tiro** el despertador / **Tú tiras** el despertador

   I throw out *the alarm clock /* ***You throw out*** *the alarm clock*

6. **Yo programo** el experimento / **Tú programas** el experimento

   I programme *the experiment /* ***You programme*** *the experiment*

7. **Yo tuerzo** el alambre / **Tú tuerces** el alambre

   I twist *the wire /* ***You twist*** *the wire*

8. **Yo sobreentiendo** su intención / **Tú sobreentiendes** su intención

   I over-understand *his intention /* ***You over-understand*** *his intention*

9. **Yo esbozo** un dibujo / **Tú esbozas** un dibujo

   I sketch *a drawing /* ***You sketch*** *a drawing*

10. **Yo aludo** el asunto / **Tú aludes** el asunto

    I allude *to the issue /* ***You allude*** *to the issue*

11. **Yo igualo** las cantidades / **Tú igualas** las cantidades

***I equalise** the quantities / **You equalise** the quantities*

12. **Yo enjuago** la esponja / **Tú enjuagas** la esponja

    ***I rinse** the sponge / **You rinse** the sponge*

13. **Yo corrijo** la redacción / **Tú corriges** la redacción

    ***I correct** the writing / **You correct** the writing*

14. **Yo caliento** el pollo / **Tú calientas** el pollo

    ***I heat up** the chicken / **You heat up** the chicken*

15. **Yo horneo** el bizcocho / **Tú horneas** el bizcocho

    ***I bake** the cake / **You bake** the cake*

16. **Yo acato** las órdenes / **Tú acatas** las órdenes

    ***I follow** orders / **You follow** orders*

17. **Yo pido** la cuenta / **Tú pides** la cuenta

    ***I ask for** the bill / **You ask for** the bill*

18. **Yo aplico** lo aprendido / **Tú aplicas** lo aprendido

    ***I apply** what I have learned / **You apply** what you have learned*

19. **Yo callo** a los niños / **Tú callas** a los niños

    ***I silence** the children / **You silence** the children*

20. **Yo cojo** las llaves / **Tú coges** las llaves

    ***I take** the keys / **You take** the keys*

21. **Yo friego** los platos / **Tú friegas** los platos

    ***I wash** the dishes / **You wash** the dishes*

22. **Yo reflejo** la luz / **Tú reflejas** la luz

    ***I reflect** the light / **You reflect** the light*

23. **Yo compadezco** a su familia / **Tú compadeces** a su familia

    ***I sympathise** with his family / **You sympathise** with his family*

24. **Yo reblandezco** las galletas / **Tú reblandeces** las galletas

    ***I soften** the biscuits / **You soften** the biscuits*

25. **Yo regreso** a casa / **Tú regresas** a casa

    ***I'm coming** home / **You're coming** home*

26. **Yo paro** el taxi / **Tú paras** el taxi

    ***I hail** the taxi / **You hail** the taxi*

27. **Yo devuelvo** la camiseta / **Tú devuelves** la camiseta

I give back *the T-shirt /* ***You give back*** *the T-shirt*

28. **Yo prometo** una copa / **Tú prometes** una copa

    I promise *a drink /* ***You promise*** *a drink*

29. **Yo envío** la carta / **Tú envías** la carta

    I send *the letter /* ***You send*** *the letter*

30. **Yo cuelgo** el teléfono / **Tú cuelgas** el teléfono

    I hang up *the phone /* ***You hang up*** *the phone*

31. **Yo enfrío** la leche / **Tú enfrías** la leche

    I cool *the milk /* ***You cool*** *the milk*

32. **Yo endurezco** la masa / **Tú endureces** la masa

    I stiffen *the dough /* ***You stiffen*** *the dough*

33. **Yo denomino** la lista / **Tú denominas** la lista

    I name *the list /* ***You name*** *the list*

34. **Yo empleo** el material / **Tú empleas** el material

    I use *the material /* ***You use*** *the material*

35. **Yo tiño** el vestido / **Tú tiñes** el vestido

    I dye *the dress /* ***You dye*** *the dress*

36. **Yo revuelvo** el cajón / **Tú revuelves** el cajón

    I rummage *through the drawer /* ***You rummage*** *through the drawer*

37. **Yo hallo** el tesoro / **Tú hallas** el tesoro

    I find *the treasure /* ***You find*** *the treasure*

38. **Yo lavo** el coche / **Tú lavas** el coche

    I wash *the car /* ***You wash*** *the car*

39. **Yo proveo** el almacén / **Tú provees** el almacén

    I supply *the warehouse /* ***You supply*** *the warehouse*

40. **Yo transijo** su impuntualidad / **Tú transiges** su impuntualidad

    I compromise on *their unpunctuality /* ***You compromise*** *on their unpunctuality*

41. **Yo sugiero** el plan / **Tú sugieres** el plan

    I suggest *the plan /* ***You suggest*** *the plan*

42. **Yo oro** en la iglesia / **Tú oras** en la iglesia

    I pray *in the church /* ***You pray*** *in the church*

43. **Yo envuelvo** el regalo / **Tú envuelves** el regalo

***I wrap** the present / **You wrap** the present*

44. **Yo espero** al tren / **Tú esperas** al tren

    I wait for the train / **You wait for** the train

45. **Yo figuro** en la obra / **Tú figuras** en la obra

    ***I appear** in the play / **You appear** in the play*

46. **Yo nombro** al encargado / **Tú nombras** al encargado

    ***I appoint** the manager / **You appoint** the manager*

47. **Yo conservo** la pelota / **Tú conservas** la pelota

    ***I keep** the ball / **You keep** the ball*

48. **Yo reverencio** al escritor / **Tú reverencias** al escritor

    ***I revere** the writer / **You revere** the writer*

49. **Yo discierno** los hechos / **Tú disciernes** los hechos

    ***I discern** the facts / **You discern** the facts*

50. **Yo atravieso** la puerta / **Tú atraviesas** la puerta

    ***I walk through** the door / **You walk through** the door*

51. **Yo encumbro** al actor / **Tú encumbras** al actor

    ***I praise** the actor / **You praise** the actor*

52. **Yo infiero** su respuesta / **Tú infieres** su respuesta

    ***I infer** their answer / **You infer** their answer*

53. **Yo obedezco** las normas / **Tú obedeces** las normas

    ***I obey** the rules / **You obey** the rules*

54. **Yo olvido** el tema / **Tú olvidas** el tema

    ***I forget** the issue / **You forget** the issue*

55. **Yo grapo** los folios / **Tú grapas** los folios

    ***I staple** the sheets of paper / **You staple** the sheets of paper*

56. **Yo tiento** a la suerte / **Tú tientas** a la suerte

    ***I tempt** fate / **You tempt** fate*

57. **Yo intercambio** los cromos / **Tú intercambias** los cromos

    ***I exchange** the stickers / **You exchange** the stickers*

58. **Yo oteo** el horizonte / **Tú oteas** el horizonte

    ***I scan** the horizon / **You scan** the horizon*

59. **Yo oscilo** entre las dos / **Tú oscilas** entre las dos

I oscillate *between the two /* ***You oscillate*** *between the two*

60. **Yo imprimo** el artículo / **Tú imprimes** el artículo

    I print *the paper /* ***You print*** *the paper*

61. **Yo poseo** el documento / **Tú posees** el documento

    I own *the document /* ***You own*** *the document*

62. **Yo revelo** la foto / **Tú revelo** la foto

    I develop *the photo /* ***You develop*** *the photo*

63. **Yo apago** la vela / **Tú apagas** la vela

    I blow out *the candle /* ***You blow out*** *the candle*

64. **Yo advierto** a los bomberos / **Tú adviertes** a los bomberos

    I warn *the fire brigade /* ***You warn*** *the fire brigade*

65. **Yo cito** al cliente / **Tú citas** al cliente

    I summon *the client /* ***You summon*** *the client*

66. **Yo reemplazo** las cajas / **Tú reemplazas** las cajas

    I replace *the boxes /* ***You replace*** *the boxes*

67. **Yo albergo** esperanzas / **Tú albergas** esperanzas

    I harbour *hopes /* ***You harbour*** *hopes*

68. **Yo necesito** el abrigo / **Tú necesitas** el abrigo

    I need *the coat /* ***You need*** *the coat*

69. **Yo firmo** el contrato / **Tú firmas** el contrato

    I sign *the contract /* ***You sign*** *the contract*

70. **Yo encuaderno** los apuntes / **Tú encuadernas** los apuntes

    I bind *the notes /* ***You bind*** *the notes*

71. **Yo respondo** la pregunta / **Tú respondes** la pregunta

    I answer *the question /* ***You answer*** *the question*

72. **Yo ruego** por un caramelo / **Tú ruegas** por un caramelo

    I beg *for a sweet /* ***You beg*** *for a sweet*

73. **Yo adorno** la habitación / **Tú adornas** la habitación

    I decorate *the room /* ***You decorate*** *the room*

74. **Yo tuesto** el pan / **Tú tuestas** el pan

    I toast *the bread /* ***You toast*** *the bread*

75. **Yo modulo** la voz / **Tú modulas** la voz

***I modulate** the voice / **You modulate** the voice*

76. **Yo comparo** los resultados / **Tú comparas** los resultados

    ***I compare** the results / **You compare** the results*

77. **Yo murmuro** en la habitación / **Tú murmuras** en la habitación

    ***I murmur** in the room / **You murmur** in the room*

78. **Yo engroso** la cuenta / **Tú engrosas** la cuenta

    ***I add** to the bill / **You add** to the bill*

79. **Yo cierro** la ventana / **Tú cierras** la ventana

    ***I close** the window / **You close** the window*

80. **Yo refiero** al profesor / **Tú refieres** al profesor

    ***I refer** to the teacher / **You refer** to the teacher*