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Phenomena of gender attraction in Polish*

1. Introduction

The selection and use of grammatical features - such as gender and number - in producing sentences involve two different aspects.

One is related to the way in which a given feature is selected and assigned to all the elements that need the feature. This aspect is involved in signaling agreement within simple NPs, within a sentence (*e.g.*, Noun-Verb agreement) or even across sentences (e.g., agreement between nouns and anaphoric pronouns). For instance, in an Italian simple Det-Adj-Noun Phrase, gender and number features must be inserted in multiple positions. Specifically, they surface on the noun as well as on the determiner and on the adjective (cf. *il bicchiere colorato* 'the colored [m-s] glass [m-s]', *i bicchieri colorati* 'the colored [m-p] glasses [m-p]', *la bottiglia colorata* 'the colored [f-s] bottle [f-s]', *le bottiglie colorate* 'the colored [f-p] bottles [f-p]'). The realization of number and gender agreement may be implemented with a mechanism of feature coindexing or copying from the noun to the determiner and to the adjective.

The other aspect concerns how it is possible to keep distinct features that are set independently for different elements.

It is crucial when dealing with complex NPs (e.g., *il fiore e la pianta* 'the flower [m] and the plant' [f]) and sentences. Indeed, sentences comprise elements with different syntactic functions that can be marked for different feature values (e.g., a grammatically singular feminine subject acting upon a grammatically plural masculine object: *la tigre divora i cani* 'the tiger [f, s] devours the dogs [m, pl]').

* For all academic purposes, the experiment was conceived in Italy by the first author. CF took also care of doing the analyses and writing the whole paper. AC ran the experiment in Poland and helped in the selection of materials and in shaping the experimental design to the Polish gender system.

The fragment completion paradigm has been one of the most influential paradigms in dealing with both these aspects (e.g., Bock, Eberhard, & Cutting, 1992; Bock, Nicol, & Cutting, 1999; Vigliocco, Butterworth, & Semenza, 1995; Vigliocco, Butterworth, & Garrett, 1996a; Vigliocco, Hartsuiker, Jarema, & Kolk, 1996b; Thornton & MacDonald, 2003; Haskell & MacDonald, 2003).

In this paradigm, people are asked to complete sentence fragments (preambles) requiring target elements (e.g., verbs or pronouns) that have to agree with the subject in the preamble. By manipulating the properties of the grammatical subject of the fragment and of a local noun (if present), it is possible to study how agreement is realized and what are the factors by which it is conditioned.

For instance, it has been repeatedly shown that local nouns differently marked from the subject with respect to number (e.g., *the actor* [subject: singular] *in the soap operas* [local noun: plural]) may attract verbs towards wrong agreement.

This finding has been usually interpreted as a difficulty in assigning the correct agreement source to the verb (that is, in deciding which one, between the two nouns, is the verb subject).

However, it is not clear if the phenomenon is limited to the case in which the conflicting elements belong to the same structure with which the verb has to agree.

Indeed, the local noun belongs to the same agreement-controlling structure as the subject noun. In fact, the subject NP is composed by a head-NP controlling agreement (the subject) and a modifier-NP (the local noun). Thus, the phenomenon of attraction may reflect a difficulty, at the decision level, in establishing which one, between the two NPs (Head or Modifier) assigns its value to the common NP-controlling structure and, as a consequence, to the verb.

Hartsuiker et al. (2001) have recently shown that attraction effects may not be restricted to sentences in which the number mismatching information is embedded within the subject. In a set of experiments conducted in Dutch, they reported that direct-object NPs exert an attraction effect as well, although a smaller one than subject modifier NPs (Experiments 1a, 1b). Moreover, direct-object pronouns exert an attraction effect about as strong as that observed with nouns, unless the pronoun is explicitly case-marked (Experiment 2). In such circumstances no attraction effect obtains. The authors interpreted these findings as revealing that the number of phrasal

nodes intervening between attractor and subject head noun determines the strength of attraction effects.

However, as pointed out by the authors themselves, it is difficult to exactly localize the effects observed within the production system. Indeed, the task used involves a comprehension part as well, since participants first need to attend to the sentence preamble before performing the production task. The most obvious effect to be attributed to comprehension factors is the effect of morphophonological ambiguity. Clearly, unambiguous case-marking is beneficial to the comprehension system in determining syntactic function (McDonald, 1987). A misidentification of syntactic function thus seems more likely when case-marking is ambiguous.

The objective of this study is two-fold: (1) to explore contextual influences in the case of elements that do not belong to the same controlling structure in a paradigm that is supposed to minimize comprehension factors; (2) to extend the research to the gender feature. For this reason, we conducted our experiment in Polish, a language in which verbs may be marked for gender as well as number. Since gender, differently from number, is a grammatical feature intrinsic to a given lexical item (see Corbett, 1991; 2000), it could be not affected by contextual influences.

We asked participants to mark the gender feature on *two different items* – a verb and a pronoun - that were not in agreement relation: the pronoun corresponded to the direct object of the verb, whereas the verb had to agree in number with its subject. Subjects could be feminine or masculine, as indicated by a male or a female stick figure. The object to be pronominalized was pictorially represented. The verb appeared in an unmarked form before the picture. Since Polish is a Pro-drop language, participants were asked to omit the subject. Thus, subject gender had to appear only as a suffix to the verb. The question is whether or not contextual influences on gender agreement extend beyond the boundary of the same controlling structure when comprehension factors - in the absence of preambles to be attended to - are minimized.

2. The Experiment: Gender Attraction effects in the production of Polish [V+ pro] sentences

2.1. Introduction

In this experiment we manipulated the gender of the verb - past, III sing., feminine/masculine (e.g., *widziała* 'She saw' *vs. widział* 'He saw') - and the gender of the object pronoun – feminine, masculine or neuter (*ją* 'it [f]', *go* 'it [m]', *je*'it [n]') -. We chose the indicative past because verb gender marking is mandatory for this verb form.

If attraction effects (1) may also involve gender-marked pronouns and (2) may obtain even if pronouns are unambiguously case-marked, participants are expected to be faster and more accurate when subjects and objects are marked for the same gender than when they are marked for different genders. Indeed, if gender-marking on the verb may be influenced by gender features other than the ones of its subject, the problem arises only when there are contextual elements bearing mismatching gender information. On the other hand, when subject and object share their gender feature, the preconditions for attraction are not met.

Since the subject may be feminine or masculine, and the object may be feminine, masculine or neuter, an attraction effect may not be observed with neuter objects. This is because, in this condition, the object always carries mismatching gender information with respect to the subject. Thus, an interaction between subject and pronoun gender may only be triggered by the presence of feminine and masculine pronouns.

An important caveat about masculine pronouns is in order here. There are two alternative forms for the masculine accusative pronoun: *jego* and *go*. Participants were requested to use *go* in order to avoid any phonological overlap with the neuter form (*je*). However, the situation is complicated by the fact that *go* is also a non-standard neuter form.

Moreover, the same forms (*jego* and *go*) are used for the genitive and the accusative case for masculine. Although it is not clear how syncretic factors of this type may affect the visibility, the direction and/or the amount of the effects to be observed, it is important to remark that masculine pronouns present with a problematic paradigm that may hamper the interpretation of the results.

For this reason, we are inclined to lend more credit to the results obtained with feminine object pronouns, as the accusative feminine form *ją* is unambiguously marked for gender and case and is in a 1:1 relation with the corresponding syntactic function (i.e., no alternative forms are available).

2.2. Method

Forty-eight pictures were selected, sixteen from each gender class (feminine, masculine, neuter).

In addition, 8 verbs were selected. Each verb was paired to six pictures (2 from each gender class). Verbs were presented in the third person singular of the perfective present. This form was selected for two reasons: 1. it is gender unmarked; 2. it allows for a relative transparent formation of the target form. Verbs were presented in capitals (Arial 32).

Each picture was presented twice, once with a feminine stick figure, once with a masculine stick figure. The sex of stick figures indicates the sex of the subject that in turn determines gender agreement on the verb form.

Pictures were divided in two blocks. A given picture appeared once per block. Stimuli were randomized within blocks with the following constraints: (1) there was no semantic, phonological, or associative relation between consecutive trials; (2) there was a maximum of three consecutive pictures showing items from the same gender class.

Block order was counterbalanced by participants. In addition, four within-block randomisations were used, thus yielding a total of 8 possible presentation orders, counterbalanced by-participants.

An additional set of 21 pictures were selected. They were used as warm-up stimuli at the beginning of each block (N =4) or in the 22-trial- practice session (N =17). For warm-up stimuli and practice trials, an additional set of 9 verbs was used.

Participants were instructed to read the verb silently and to produce it in the correct form - according to the gender of the stick figure – followed by the personal pronoun - in the accusative case - corresponding to the gender of the pictured noun.

Thus, the response set was constituted by the following combinations: feminine verb-feminine pronoun (e.g., *widziała ją* 'She saw it [f]'), masculine verb- masculine pronoun (e.g., *widział go* 'He saw it [m]'), feminine verb- masculine pronoun (e.g.,

widziała go 'She saw it [m]'), feminine verb - neuter pronoun (*e.g., widziała je* 'She saw it [n]'), masculine verb-feminine pronoun (e.g., *widział ją* 'He saw it [f]'), masculine verb-neuter pronoun (*e.g., widział je* 'He saw it [n]').

2.3. Procedure

Participants were tested individually in a testing room and seated at a distance of about 60 cm. from the computer screen.

The experiment started with a naming task aimed at familiarizing participants with the pictures and their names. When participants produced a name other than the expected one they were corrected. Such instances were very rare.

Participants then performed a long practice block, after which the experiment proper began.

Instructions emphasized response speed and accuracy.

At the beginning of each trial, a question mark appeared in the center of the computer screen. The question mark disappeared as soon as participants pressed the space bar. Then, the verb appeared for 1000 ms and was immediately replaced by the picture. Pictures were removed as soon as participants responded or after 3000 ms. had elapsed – whichever came first. Stimulus presentation was controlled by the Psyscope program (Cohen, MacWhinney & Flatt 1993). Response latencies were measured by means of a voice key. The experimenter recorded the responses manually.

2.4. Participants

Sixteen Polish speakers, students at the Adam Mickiewicz University of Poznań, took part in the experiment.

2.5. Analyses

Verbal dysfluencies, responses different from the target, failures to record, outliers – latencies above 3000 ms, below 300 ms, or exceeding each participant's individual mean by more than 3 s.d. – were scored as errors. Errors were removed from RTs analyses and were submitted to separate analyses. The variables under consideration for error rates and latencies analyses were: verb gender (feminine *vs.* masculine) and object

gender (feminine *vs.* masculine *vs.* neuter). These variables were always treated as within-subject variables in both F1 and F2 analyses.

2.6. Results

Discarded data accounted for 18%. Error analyses revealed a significant effect of verb gender (F1 (1,15) = 6, p = .03; F2 (1,45) = 8.8, p = .005), indicating that people made more errors on masculine verbs than on feminine verbs (participants' mean: 2.4 [±2] *vs.* : 3.4 [±2.4]).

Planned comparisons revealed that the difference between feminine and masculine verbs was marginal or plainly not significant within each object gender class (for feminine objects: error means = 1.8 [±1.9] *vs.* 2.8 [±2.4]; T1 = -2, p = .07; T2 = -1.7, p = .1; for masculine objects: error means = 2.8 [±1.9] *vs.* 3.4 [±2.4]; T1 = -.1.2, p = .2; T2 = -1.5, p = .16; for neuter objects: error means = 2.6 [±2.1] *vs.* 3.8 [±2.3]; T1 = -1.8, p = .09; T2 = -1.9, p = .07).

There also was a trend towards an effect of object gender, marginal by participants (F1 (1,15) = 3.4, p = .09), not significant by items (F2 (2,45) = 1.8, p > .1). This effect means that feminine objects tend to elicit, on average, less errors (2.3 [±2.2]) than masculine (3 [±2.1]) and neuter objects (3.2 [±2.2]).

RTs analyses confirmed the main effect of verb gender, significant by-participants, very close to significance by-items (F1 (1,15) = 6.3, p = .02; F2 (1,45) = 3.7, p = .06), showing that feminine-verb-trials elicited faster RTs with respect to masculine-verb-trials (1082 [±233] *vs.* 1138 [±255]).

Planned comparisons within each object gender class revealed no significant effect of verb gender for masculine (feminine verbs: 1078 [±210], masculine verbs: 1132 [±235]; T1 = -1.6, p = p = n.s; T2 = -.9, p = n.s) and neuter objects (feminine verbs: 1100 [±237], masculine verbs: 1156 [±262]; T1 = -1.2, p = n.s; T2 = -1.6, p = n.s). For feminine objects, the contrast between feminine (1070 [±262]) and masculine verbs (1125 [±282]) is significant by-participants, not significant by-items (T1 = -3.8, p = .002; T2 = -.1, p = n.s. See Table 1).

No other significant effect was observed, neither in the error nor in the RT analysis.

	VERB GENDER	
PRONOUN GENDER	F	M
F	1020 (±262)	1125 (±282)
ERROR %	11.3%	17.6%
M	1078 (±210)	1132 (±235)
ERROR %	17.1%	21.5%
N	1100 (±237)	1156 (±262)
ERROR %	16.4%	24%

Table 1. Participants' mean latencies and error rates depending on verb and pronoun gender. Standard deviations are in brackets.

2.7. Discussion

The main finding of the present study was an effect of verb gender, meaning that feminine verbs associated to a better performance (both in terms of error rates and latencies) with respect to masculine verbs.

Planned comparisons, however, revealed that the effect is significant for feminine objects only. That is, feminine verbs elicited significantly more accurate and faster responses with respect to masculine verbs only when the object pronoun was feminine as well.

This finding is in line with the hypothesis of attraction: the presence of contextual objects carrying mismatching gender information with respect to the subject may attract the verb to the wrong agreement.

Our results replicate Hartsuiker et al. (2001) results to the extent that they support the view that contextual effects are not restricted to the case in which the mismatching information is embedded within the subject and is carried by a noun. In addition, they extend the possibility for object attraction from the number feature to the gender feature.

However, differently from Hartsuiker et al. (2001), the attraction effect observed here obtained even if feminine pronouns are unambiguously marked for case.

This divergence is not surprising. In the fragment completion task (used in the study by Hartsuiker et al. 2001) people may take advantage from explicit case marking in the

sentence preamble for keeping distinct the subject head noun and the attracter. That is, the presence of unambiguous affixes may help the correct *comprehension* of the preamble. This possibility, however, is not available in this paradigm, where no preambles were used. Thus, our results showed that pronouns may exert an attraction effect even when they are unambiguously marked, provided that comprehension factors are minimized.

The results observed with masculine and neuter pronouns deserve some comments.

In the case of neuter pronouns, the preconditions for attraction are not met, since the subject is always differently marked for gender (it can be masculine or feminine). Thus, we would have expected no difference depending on the subject's gender. Nevertheless, there is a trend (though not significant) for feminine verbs to elicit less errors and faster latencies than masculine verbs.

The same trend is observed with masculine pronouns.

To begin with, any account in terms of morphophonological complexity would have predicted the reverse pattern: since feminine verb forms are always derived from the corresponding masculine forms, they should be more difficult.

Why, then, are feminine verbs easier than masculine verbs overall? And why is there no attraction with masculine pronouns?

As anticipated in the Introduction to the experiment, the paradigm of the masculine pronouns presents with some syncretic forms. In particular, the masculine form to be produced (*go*) may also be used as a non-standard neuter form. These characteristics of the Polish pronoun system along with the experimental requirements may have represented uncontrolled spurious factors.

For this reason, we were more inclined to trust on the results with feminine pronouns than on the results for masculine and neuter pronouns.

Nevertheless, the confusability of masculine and neuter paradigms allows for a very tentative speculation of the data for neuter pronouns.

Accordingly, the mere presence of a masculine subject would enhance this confusability, ultimately leading to a better performance with feminine verbs. In other words, it would be a sort of "reverse attraction", where the attracter is the subject and the attracted element is the object: neuter objects would be attracted towards the subject gender more often when the subject is marked for masculine – because of syncretic

phenomena – than when the subject is marked for feminine. The assumption behind this idea is that the more similar two elements are, the more difficult to keep them distinct – and the stronger the amount of attraction.

We are aware of the fact that such a hypothesis cannot account for the data for masculine pronouns. Unfortunately, we do not have any explanation for the failure to get any attraction effect with masculine pronouns. Though the presence of syncretic phenomena in the paradigm of masculine pronouns may have contributed to this finding, we are unable to characterize the possible relation between the paradigm's morphophonology and the null effect of attraction.

Follow-up research should address the possibility for attraction effects with masculine gender-marked elements (maybe different types of pronouns) by using forms that are unambiguously marked for gender and case and that are in a 1:1 relation with a given syntactic function (i.e., when no alternative forms are available for a given function). If we are right in attributing the results for feminine pronouns to attraction effect, the possibility for attraction should obtain for masculine pronouns as well provided that syncretic phenomena are controlled for.

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