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# The interplay of semantic and grammatical gender features in the production of [dative-accusative] clitic clusters

*(Work in progress)*

*Introduction*

One of the most debated issue in the current psycholinguistic research concerns the selection of grammatical features. In a language such as Italian, gender is one of the most interesting features, because, on the one hand, it is often independent from semantico-conceptual factors, whereas on the other hand, it is often morphophonologically marked.

Thus, gender may allow us to investigate the processing mechanisms at the level where grammatical features are retrieved.

The picture-word interference paradigm has been extensively used to address questions relative to gender selection.

In his seminal paper, Schriefers (1993) had Dutch speakers producing noun phrases (NPs) (e.g., *De rode auto* 'the red car') in response to colored pictures with superimposed words, which they were required to ignore. These words could be gender-congruent or gender-incongruent with respect to the picture name.

Schriefers (1993) found a clear congruency effect: participants produced NPs faster in the gender congruent than in the gender incongruent condition.

Since then the gender congruency effect has been replicated in many experiments in various languages (Dutch: La Heij et al., 1998; Schriefers; 1993; Schiller & Caramazza, 2003; German: Schiller & Caramazza, 2003; Croatian: Costa, Federenko, Kovacic, & Caramazza, in press). However, the effect appeared to be language specific: it has been found for Germanic and Slavic languages but not for Romance languages (Italian: Miozzo & Caramazza, 1999; Miozzo, Costa, & Caramazza, 2002; Spanish: Costa, Sebastian-Galles, Miozzo, & Caramazza, 1999; Miozzo et al., 2002: Catalan: Costa et al., 1999; French: Alario & Caramazza, 2002). Caramazza et al. (2001; see also Costa et al., 1999, and Miozzo & Caramazza, 1999) have proposed that the relevant distinction between the languages that show a congruency effect and the languages that do not show such an effect is whether determiner selection only depends on the grammatical features of the NP ("early selection" languages) or whether it also depends on the phonological context in which the determiner is to be produced ("late selection" languages). For instance, the form of the masculine definite article in Italian depends not only on grammatical properties such as gender and number, but also on the onset of the word that follows it (e.g., *il tavolo* 'the table', *lo scoiattolo* 'the squirrel'). This hypothesis is augmented by the further assumption that the gender-congruency arises where specific determiner forms are selected. Indeed, there is a growing body of evidence showing that the gender-congruency effect is only visible when the gender-marked form has a morphophonological reflex. By contrast, no gender-congruency effect has been observed when the target form and the distracter form, although different at an abstract level, have the same morphophonological reflex (as is the case of the plural article *Die* 'The [pl]' in German, that is used for both masculine and feminine nouns. See Schiller & Caramazza 2003, and, for related evidence, Janssen & Caramazza, 2003; Schriefers et al., 2002).

The reasoning goes as follows. In "late selection" languages, by the time a determiner form can be selected, the activation of the distracter lexical node would have dissipated along with the activation of its gender feature, leaving little opportunity for significant activation of competing determiner forms.

This study extends in an important way the research on gender selection in two different respects:

1. It aims at investigating the issue of gender retrieval in the presence of a minimal context (see below);

2. It focuses on Italian, a late-selection language where the gender-congruency effect has never been observed in [Det-N] production.

With respect to the first issue, the question is what happens when multiple grammatical features have to be realized – and ordered! - in a minimal utterance. With respect to the second issue, the question is whether it is possible to shed light on gender processing in Italian by using utterance frames other than [Det-N].

In the present study, the focus is on Italian enclitic [dative-accusative] clusters (e.g., *glielo* 'to him/her- it [m]', *gliela* 'to him/her- it [f]'). These clusters have to be produced in response to a proper name and a pictured object, where the proper name indicates the dative gender and the object indicates the accusative gender. These clusters should be preceded by the imperative *porta* 'bring', thus yielding utterances such as *portaglielo* and *portagliela* 'bring to him/her it [m]' and 'bring to him/her it [f]' respectively.

Two differences between the dative and the accusative of these clusters have to be emphasized:

(a)     The <u>dative</u> is marked for <u>semantic gender</u> (i.e., it depends on the sex of the participant involved) and its morphological realization <u>does not vary as a function of gender</u>;

(b)     The <u>accusative</u> is marked for <u>grammatical gender</u> and its morphological realization <u>varies as a function of gender</u>.

In this experimental context, gender-congruency effect means faster RTs when the accusative and the dative pronouns share their gender feature as opposed to when they do not. The necessary precondition to observe such an effect is that, no matter the source – semantic or grammatical – of the gender feature, same-gender features facilitate and different-gender features interfere with gender processing.

The reason for this is that, for distracter forms to be good competitors, they must share the property under investigation with the target. Thus, there is no reason to believe that number manipulation of the distracters may differentially affect the production of gender-marked forms. In the same way, distracters varying in concreteness or frequency are not expected to differentially affect target gender selection although they have an effect overall.

In this respect, grammatical and semantic gender represents a marginal case: although they are both named "gender" they convey different properties, grammatical in the first case, semantic in the latter case. In order for an interplay between these two variables to take place, there must be a level at which they are allowed to interact.

The situation is complicated by the fact that the dative form under investigation does not vary with respect to morphophonology. Thus, if an interaction between dative and accusative forms has to be observed, it should probably be due to the dative affecting the accusative form and not vice versa. This is because the dative form may prime *lo* or *la* depending on its gender, whereas the accusative form may only prime *glie*, no matter what its gender is.

Thus, by manipulating the gender of dative and accusative clitics , it is possible to shed light on the relative importance of abstract features and different morphophonological realizations in the context of the interplay between semantic and grammatical gender features.

*Materials and Methods*

Thirty-two pictures (half with masculine, half with feminine names) were selected. The two sets were controlled for graphemic length (mean, f: 6.3, m: 6.4), number of syllables (mean, f: 2.5, m: 2.6) and frequency of occurrence (mean, f: 27, m: 45), as reported in Bortolini et al. (1971).

Four blocks were constructed. Each picture appeared four times (once per block) in four different conditions (2 experimental, 2 filler conditions). As to the experimental conditions, (a) once with a semantically feminine (*Eva* or *Lisa*) and (b) once with a semantically masculine proper name (*Remo* or *Ugo*); as to the filler conditions, (c) once with the first person singular (*Io* 'I') and (d) once with the first person plural (*Noi* 'We') personal pronoun.

Nouns and pronouns were written in capitals (Arial 30 pt) and were inserted in identical frames as those of the pictures. Two lists were constructed. The respective position of pictures and words was varied so that pictures appearing on the left in List 1, appeared on the right in List 2. There was an equal number of left and right pictures in each list. Participants were randomly assigned to one of the two lists. Block presentation was counterbalanced across participants according to a Latin-Square design. Two different within-block randomizations were used.

Trials were randomized with the following constraints: (a) pictures with names of the same gender were not to appear on more than three consecutive trials; (b) the same cluster was not to be produced for more than three consecutive trials; (c) there was no semantic, phonological, or associative relationship between the names of pictures in consecutive trials.

Participants were instructed to produce the second person singular of the imperative of the verb *portare* 'to bring' (*Porta!* 'Bring!') preceded by (a) the dative clitic pronoun corresponding to the word (proper name or pronoun) and (b) the object clitic pronoun corresponding to the gender of the picture. In clitic clusters, the form of the dative pronouns involved were *-me-*, *-ce-*, *-glie-* for the first singular, the first plural, and the third singular person respectively. The object clitic was *lo* 'it [m]' if the pictured name was masculine, *la* 'it [f]' if it was feminine. Thus, the response-set was constituted by 6 possible answers: *Portamelo* 'Bring it [m] to me', *Portacelo* 'Bring it [m] to us', *Portaglielo* 'Bring it [m] to him/her' for masculine pictured objects, and *Portamela* 'Bring it [f] to me', *Portacela* 'Bring it [f] to us', *Portagliela* 'Bring it [f] to him/her' for feminine pictured objects. Two out of the six combinations were possible answers in the experimental trials (those with third person singular dative): *Portaglielo* 'Bring it [m] to him/her' and *Portagliela* 'Bring it [f] to him/her'. Note that whereas the dative clitic was always *-glie-* independently of the semantic gender (f or m) of the proper name, the form of the object clitic was different depending on the grammatical gender of the pictured name.

Filler trials (i.e., *-me-* and *–ce-* trials) were introduced in order to vary the dative form, to make sure that participants did not respond without attending to the proper name. If the dative form had always been *–glie-*, participants could have responded by only looking at the pictured object.

A different set of pictures (N = 24) was used in a practice session before the experiment proper. These pictures were combined with the same proper names and pronouns as in the experimental blocks. Eight additional pictures were used in warm-up trials (N = 8) at the beginning of each block. They were always combined with first singular or plural dative pronouns.

*Procedure*

Participants were tested individually in a quiet testing room. They were seated at a distance of about 60 cm. from the computer screen. The experiment started with a familiarization task, in which participants were asked to name the whole set of pictures. When participants produced a name other than the target response they were corrected. Such instances were very rare.

Participants then performed a practice block, after which the experiment proper - in four blocks - began. The practice block was constructed in the same way as the experimental blocks. At the beginning of each trial, a question mark appeared in the center of the computer screen. As soon as participants pressed the space bar, the question mark disappeared and was replaced by a cross-air for 500 ms. After 200 ms of blank screen, the two frames (one with the picture, one with the noun or the proper name) appeared. Frames were shown for unlimited exposure, and were removed as soon as participants responded, or after 2000 ms had elapsed. Stimulus presentation was controlled by the program Psyscope (Cohen, MacWhinney, Flatt & Provost, 1993). Response latencies were measured by means of a voice key. Instructions emphasized response speed and accuracy. The experimenter recorded the erroneous responses manually.

*Participants*

Sixteen particpants, students at the University of Pisa, took part in the experiment. They were paid for their participation.

*Statistical Analysis*

Verbal dysfluencies, responses different from the target, failures to trigger the voice key, and outliers – responses exceeding a participant's mean by three standard deviations – were scored as errors. Errors were removed from the analysis of latencies and were submitted to a separate analysis. A repeated-measures Anova was performed with participants' and items' means as dependent measures. Three variables were considered: <u>Pictured Object Grammatical Gender</u> (f *vs.* m), <u>Dative Semantic Gender</u> (f *vs.* m) and <u>Object Position</u> (left *vs.* right). These variables were treated as within-subject variables with one exception: in F2 analysis, Pictured Object Grammatical Gender was treated as a between-subject variable. In the F2 analysis of latencies, errors were replaced by each participant's mean for each condition. F and p values will be reported only when significant by both participants and items.

*Results*

Discarded data accounted for 7% of the total responses. In addition, one subject was excluded because his mean RT exceeded by more than three standard deviations the mean subjects' latency.

No significant difference emerged from the analysis of errors.

In the analysis of the response latencies, the only effect, consistently significant by both participants and items was a three-way interaction Pictured Object Grammatical Gender * Dative Semantic Gender * Object Position (F1 (1,14) = 7.3, p = .016; F2 (1,30) = 8.7, p = .006), showing that the gender-congruency effect varies as a function of object gender and object position. Duncan post-hoc analysis showed that the gender-congruency effect is limited to feminine objects occurring on the right (p = .005 and p = .001, by participants and by items analysis respectively). That is, feminine objects occurring on the right were responded to faster when they appear with a gender-congruent (873 ±203) as opposed to incongruent (952 ±250) dative proper name. By contrast, for feminine objects occurring on the left, there was no difference depending on dative gender (congruent 910 ±233 *vs*. incongruent 911 ±216, p > .1). For masculine objects, RTs did not vary significantly depending on the dative proper name, neither when they occur on the left (congruent 945 ±233 *vs*. incongruent 929 ±261, p > .1) nor on the right (congruent 923 ±227 *vs*. incongruent 942 ±217, p > .1. See Figure 1).[1]
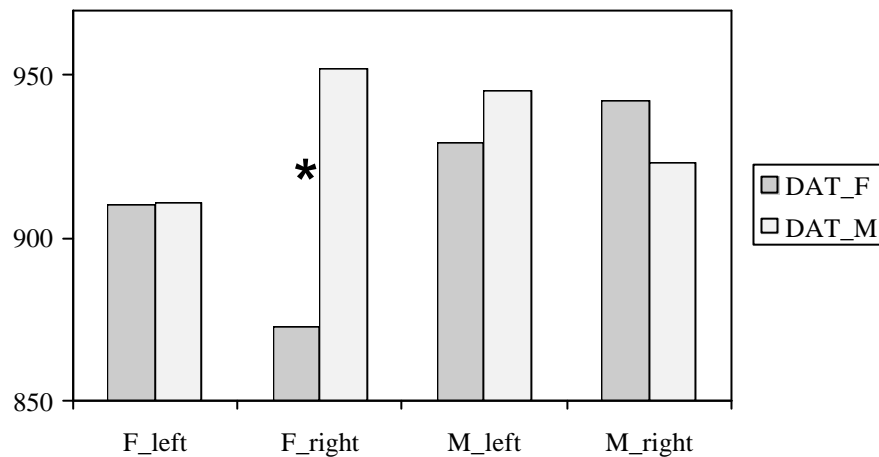


Figure 1. Participants' performance as a function of Object Gender, Object Position, Dative Gender.

*Discussion*

The main finding of the present study was a significant three-way interaction Pictured Object Grammatical Gender * Dative Semantic Gender * Object Position.

This interaction shows that feminine objects occurring on the right are responded to faster in the congruency as opposed to the incongruency condition.

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[1] There was also a trend (significant by participants (F1 (1,14) = 8.7, p = .01) but not by items (F2 (1,30) = 3.1, p = .09)) for feminine pictures to be responded to faster than masculine pictures (f: 912 ±227 *vs*. m: 935 ±234). The main effect was probably triggered by the fast performance on feminine right objects in the congruent condition. The analysis of participants' performance on filler trials lends some support to this hypothesis, since masculine nouns were responded to as fast as feminine nouns (f: 888 ±238 *vs*. m: 889 ±214; all p > .1).

In this discussion, I will try to account for the modification of the gender congruency effect as a function of (a) the respective positions of the pictured object and the proper name; (b) the object gender.

In order to account for the role played by position (point (a)), we need two reasonable assumptions: 1. by default eye fixation starts on the left and proceeds to the right; 2. a given gender feature sends activation to all the forms in the response set it is compatible with.

Thus, when the proper name is on the left, besides sending activation to the *–glie-* form, it would enhance the activation level of the target object (congruency condition) or of the competitor (incongruency condition).

Since the amount of activation of the competitor will be higher in the case of incongruency than in the case of congruency, selection will be more difficult.

When the pictured object is on the left, besides sending activation to the target object clitic (*lo* or *la*) it would also enhance the activation level of *–glie-*, in both the congruent and incongruent conditions. On the other hand, the right proper name would fail to prime (congruency)/interfere with (incongruency) the selection of the object form, since, by the time the proper name sends activation to the target object or to the competitor object form, the selection process of the object form would have already been completed.

In this scenario, whereas the left proper name provides the basis for the gender-congruency effect to take place, the left pictured object does not provide such a basis.

This account rests on the assumption that competition is between alternative forms, not between abstract features. If competition occurred at an abstract level, position would not modulate participants' performance. This is because in the congruency condition the same abstract gender feature ([f] or [m]) would receive an additional amount of activation from the other clitic form in the utterance, whereas in the incongruency condition both abstract gender features ([f] and [m]) would be activated. Thus, when the object and the dative share their gender features, no matter what their respective positions are, RTs should be slower in the incongruency with respect to the congruency condition. Indeed, there is now converging evidence on the interpretation of the gender congruency effect as reflecting competition between forms rather than abstract features (Schiller & Caramazza 2003; Janssen & Caramazza, 2003; Schriefers et al., 2002).

Some support to this hypothesis comes from the analysis of participants' performance on filler trials. Results showed a main effect of Dative Pronoun: $F1 (1,14) = 6.1$, $p < .026$; $F2 (1,30) = 12.5$, $p < .001$, showing that *-me-* trials ($870 \pm 214$) were responded to faster than *-ce-* trials ($907 \pm 237$. See Figure 2).
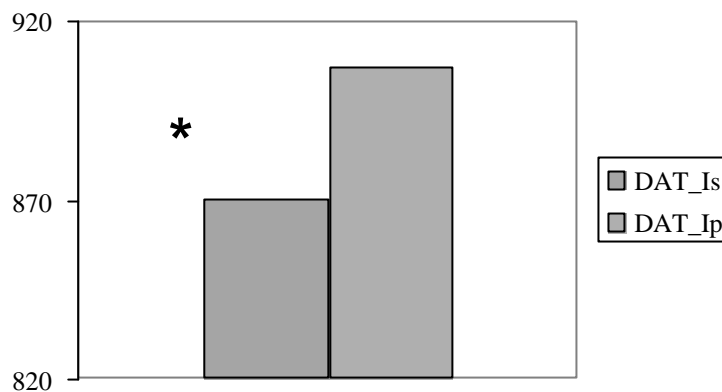
Figure 2. Participants' performance on filler trials as a function of Dative Pronoun.

Since, in this case, the dative form changes depending on the given cue, the main effect of Dative Pronoun should not be modulated by its relative position. This is indeed the case: there was no effect of interaction between Dative Pronoun * Object Position and/or * Pictured Object, showing that the effect of the Pronoun holds no matter what is the position and/or the gender of the object.[2]

With respect to the point (b) - failure to observe a gender-congruency effect with masculine objects - some sort of asymmetry between the masculine and the feminine gender must be acknowledged. This is not as unreasonable as it might appear at first sight, since masculine is the default gender in Italian. Moreover, even feminine nouns may occasionally be compatible with masculine forms. This happens when speakers want to refer to two objects - one of which is masculine and the other is feminine- by a single pronominal form. In this case, the masculine plural form (e.g., *li* 'them [m]', *questi* 'these [m]', *quelli* 'those' [m]) is used. The same holds true with plural adjectives. On the other hand, masculine nouns can never be compatible with feminine forms.

Thus, one possibility is that the masculine object target form is insensitive to the activation level of the competitor form. This hypothesis is supported by recent findings on clitic production within the picture-word interference paradigm (Finocchiaro & Caramazza, 2004). In this study, the authors manipulated the respective gender of single and duplicated pictured objects and distracters. Participants were asked to produce a given verb in the first person singular form preceded by the accusative clitic corresponding to the pictured object(s). Indeed, RTs were faster when the picture and the distracter shared their gender feature than when they did not. Duncan post-hoc analysis revealed that the gender congruency effect was limited to feminine objects.

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[2] The main effect of Dative Pronoun on filler trials may be accounted for in two different ways. It may reflect: (a) a frequency effect, *me* being more frequent than *ce* (3286 *vs.* 418 according the Barcellona frequency lexicon); (b) a number-congruency effect. Since all the pictured objects are singular, *me*-trials always coincide with number-congruent trials, whereas *ce*-trials always coincide with number-incongruent trials. Thus, the activation level of the *me* form would be always higher than the activation level of the *ce* form. Whatever the merits of these arguments are, the point is that the main effect of Dative Pronoun (*me* vs. *ce*) is not position dependent.

It must be noted, however, that in Finocchiaro & Caramazza (2004) proclitics (i.e., clitics occurring *before* the verb) were investigated. Previous experiments with the same paradigm but different materials and design failed to show any effect of gender-congruency with enclitics (Finocchiaro & Caramazza, in press).

On the basis of recent findings showing that the gender-congruency effect disappears when affixes are involved (Costa et al., 2003; Schiller & Caramazza, 2003), we speculated that proclitics behave like autonomous words, whereas enclitics behave like affixes (for the linguistic arguments in favor of the enclitic-proclitic asymmetry, see Benincà & Cinque, 1993).

One could, however, envisage a major problem with this account. Since enclitics - like affixes - are insensitive to activation levels of alternative forms, one would predict a failure to observe an accusative-dative congruency effect with enclitics. Quite on the contrary, we did observe such an effect. How can this finding be reconciled with previous reports on enclitics and proclitics?

One possibility is that methodological differences across studies as well as intrinsic differences between Verb-Clitic and Clitic-Clitic clusters may be responsible of the discrepancy.

In Finocchiaro & Caramazza (in press) the verb varied on each trial and only one clitic – the accusative corresponding to the picture gender – was to be produced. In the present study, participants always produced the same verb with a dative-accusative cluster. Since the verb is always the same, participants did not need to process it trial by trial. In some sense, there was no verb processing. To the extent that this is true, there was no basis for the treatment of clitics as affixes.

Besides these considerations, what really makes the difference is that, whereas in the picture-word interference paradigm, the distracter activates forms that are *not to be produced*, in the present study the form corresponding to the dative *had to be produced*. This means that the accusative and the dative forms must be respectively ordered in order for production to take place. This introduces an additional potential locus for the dative-accusative congruency effect: the mapping stage from a number of forms to their respective position in a string. In this scenario, results on enclitics within the picture-word interference study are not necessarily in contradiction with the present results. One may hold that enclitics – as well as affixes – are insensitive to the activation level of competitors, even though they exhibit congruency effects at the level of insertion in a slot position within a production frame. Eventually, this possibility might be extended to affixes as well. There is some evidence in this respect: preliminary results in our laboratory showed a sort of number-congruency effect between the verbal ending and the clitic within an experimental design similar to that of the present experiment.

What this ultimately boils down to is that what holds for the selection of isolated linguistic elements does not automatically hold for the selection of the same elements in context. Even the selection of grammatical features may reveal additional aspects when multiple grammatical features of a given type have to be mapped on a linearly ordered string. This mapping stage may eventually be responsible of the congruency effects observed for enclitics (and perhaps affixes). This observation suggests in turn that processing is incremental: that is, linguistic elements are not processed in a strictly serial order, as processing of the second unit may start well before processing of the first one has been completed.

*Conclusions*

The aim of the present study was to shed light on the interplay between semantic gender and grammatical gender in the selection of multiple forms in Italian. Results showed that participants are faster when the dative and the accusative of the cluster to be produced share their gender feature than when they do not. What is remarkable here is that such a gender-congruency effect reflects the interplay between different gender sources: semantic in the case of the dative, grammatical in the case of the accusative. This in turn suggests that there is a level in the processing where the source of the gender feature for gender-marked forms does not play any role.

However, such a gender-congruency effect appears to be modulated by both the gender and the position of the pictured object: that is, it holds only when feminine pictured objects occur on the right of the dative name.

These restrictions to the visibility of the dative-accusative congruency effect have been interpreted as reflecting (a) an asymmetry between the masculine and the feminine gender extending beyond the clitic case in Italian; (b) a difference between dative and accusative clitics as far as morphophonological marking is concerned.

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