

Definiteness agreement and the pragmatics of reference in the  
Maltese NP

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Abstract

Maltese noun phrases exhibit a form of ‘definiteness agreement’ between head noun and modifier. When the noun is definite, an adjectival modifier is often overtly marked as definite as well. However, the status of this phenomenon as a case of true morphosyntactic agreement has been disputed, given its apparent optionality. Not all definite NPs have modifiers which are overtly marked as definite. Some authors have argued that definiteness marking on the adjective is in fact pragmatically licensed. The present paper presents a corpus-based study of the distribution of adjectives with and without definite marking, and then tests the pragmatic licensing claim through a production study. Speakers were found to be more likely to use definite adjectives in referential noun phrases when the adjectives had a specifically contrastive function. This result is discussed in the context of both theoretical and psycholinguistic work on the pragmatics of referentiality.

*Keywords:* Reference, adjectives, noun phrase, Maltese

## 1 Introduction

Definiteness marking on NP-INTERNAL attributive adjectives in Maltese has received some attention in descriptive accounts of Maltese morphosyntax, and has often been cited as a case of ‘agreement’ (e.g. Schabert, 1976), based on examples such as those immediately below.

(1) *il-kelb*            *l-abjad*  
 DEF-dog.MSG   DEF-white.MSG  
 ‘the white dog’

(2) *id-dar*            *il-kbira*  
 DEF-house.FSg   DEF-big.FSg  
 ‘the big house’

Note that the adjective agrees with the noun in number and gender; these examples also suggest that noun and adjective agree on definiteness, a position that has also been endorsed, albeit with reservations, in more recent descriptive accounts (e.g. Borg & Azzopardi-Alexander, 1997). Nevertheless, there are reasons to doubt the correctness of a characterisation of definiteness agreement between head noun and adjective as a case of ‘true’ morphosyntactic agreement (see Fabri, 2001, for discussion). Indeed, Maltese contrasts with some other languages in this regard. In many Semitic languages, for example, definiteness agreement is obligatory, while in Maltese it appears to be optional.

Such optionality suggests that the definite article on the adjective serves a pragmatic function. This paper investigates this hypothesis experimentally, against the background of previous work on reference and the production and interpretation of definite, referential noun phrases. In the next section, we give an overview of the phenomena under consideration, comparing the Maltese case to data from other languages. We then place the issue of definiteness marking in a broader semantic/pragmatic and psycholinguistic context. Section 3 presents an investigation of the distribution of definite adjectives in Maltese NPs, followed by a production study in Section 4. Our results, summarised and discussed in Section 6 offer support to the hypothesis put forward by Fabri (2001), among others, that definiteness marking on adjectives in Maltese is primarily the result of pragmatic considerations,

and is especially in evidence where the adjective serves a contrastive function in referential contexts.

## 2 Definiteness marking and attributive adjectives in Maltese: For a pragmatic account

The present paper is concerned with post-nominal, NP-internal adjectives in Maltese of the kind exemplified in the previous section. It is worth noting that, in a limited number of cases, the Maltese NP allows prenominal adjectives, as shown below.

(3) *il-povra mara*  
 DEF-poor woman  
 ‘the unfortunate woman’

(4) *l-aħħar każ*  
 DEF-last case  
 ‘the last case’

The range of adjectives allowed prenominally is very limited, though it is also possible for adjectives to be moved to prenominal position for emphasis or irony (see Plank & Moravcsik, 1996, for a brief discussion). Some adjectives, such as *aħħar* ‘last/final’ in (4) only occur in prenominal position. In these cases, however, definiteness marking only occurs on the adjective, and the NP as a whole is understood as definite, giving rise to the possibility that the definite article has scope over the entire phrase (despite being a proclitic hosted on the adjective). In any case, these examples fall outside the scope of the present work since, as noted, they exclude overt definiteness ‘agreement’ between adjective and noun. The latter only occurs in the (far more frequent and unrestricted) case of postnominal adjectival modification.

The phenomenon of definiteness agreement is widely observed in Semitic languages, including Modern Standard Arabic and its varieties. For example, Kaye and Rosenhouse (2005) state that in Arabic dialects, ‘attributive adjectives are definite according with their nominal head’. This is illustrated in the following example, taken from Kaplan (1993).

- (5) *al-nisaaʔu al-jamiilaatu*  
 DEF-woman DEF-beautiful  
 ‘the beautiful women’

As in Arabic, adjectives in Modern Hebrew agree with their head noun in number, gender and definiteness. The latter is obligatory, with the *ha-* definite morpheme being attached to adjectives and demonstrative modifiers following a definite head noun (Berman, 2005, from which the following example is also taken):

- (6) *ha-kufsa ha-gdola ha-zot*  
 DEF-box DEF-big DEF-this  
 ‘this big box’

Definiteness agreement is also observed in non-Semitic languages. For example, a similar case obtains in Swedish, where attributive adjectives obligatorily agree with the noun in definiteness (example from Cooper, 1986):

- (7) *den gaml-a häst-en*  
 DEF old-DEF horse-DEF  
 ‘the old horse’

In fact, as shown in the example above and discussed by Dahl (2004), Swedish is an example of ‘over determination’, whereby the NP is overtly marked with a definite article (*den*), with definiteness additionally marked on both the adjective and the noun.

Like Arabic and Hebrew, Maltese is usually characterised as a Semitic language. Indeed, Modern Maltese evolved from a history of intensive language contact involving an Arabic stratum, a Romance (Sicilian, Italian) superstratum and an English adstratum (Brincat, 2011; Mifsud, 1995). However, where definiteness marking in the NP is concerned, Maltese differs from Arabic and Hebrew – and indeed from other languages where the evidence would suggest a case of ‘true’ morphosyntactic agreement – in that definiteness marking on the adjective appears to be ‘optional’. Thus, the adjective may or may not be marked as definite when it modifies a definite head noun, although definiteness marking is ruled out in case the head (and hence, the NP) is indefinite (similar observations are made by Kaye & Rosenouse, 2005, for Iraqi and Moroccan Arabic, where ‘either the noun or the attribute may be definite under certain conditions’; p. 300). This optionality is illustrated in (8) below, where the NP is equally felicitous when the adjective is marked as definite or indefinite.

- (8) *il-kelb*                      *(l-)abjad*  
 DEF-dog.MSG    (DEF-)white.MSG  
 ‘the white dog’

Borg and Azzopardi-Alexander (1997) suggest that this optionality may be age-related, stating that ‘when the noun is definite, the adjective too is preceded by the definite article [...] However many (younger) speakers tend to omit the definite article before the adjective and there are even contexts where the article before the adjective would not be acceptable’ [p. 71]. In a similar vein, Plank and Moravcsik (1996) suggest that there may be genre- or register-related constraints on explicit definiteness marking on adjectives, so that ‘spoken and journalistic Maltese are generally more reluctant than literary Maltese

to repeat the definite article with adjectives' (p. 187). While it is plausible that factors related to register, genre and language change (as reflected in age differences) influence the likelihood of overt definiteness marking, these proposals remain somewhat speculative, and require further research.

At first glance not all adjectives are intuitively felicitous when marked as definite. Borg and Azzopardi-Alexander (1997) give the following example, where the article on *grammatikali* 'grammatical/grammar-related' seems odd:

- (9) *l-istudju*            (?l-)grammatikali    mhux    faċli  
 DEF-study.MSG    (?DEF-)grammar    NEG    easy  
 the grammatical study/the study of grammar is not easy

However, these cases are debatable. On the one hand, it is clear that an adjective such as *grammatikali* would not by default receive definiteness marking. On the other hand, it is possible to identify pragmatic contexts in which such overt marking would arguably be the more felicitous choice. Suppose, for example, that (9) were uttered in a context where two published studies on definiteness were under discussion, one of which focussed on the grammar of definites, while the other focussed on their semantics. In such a scenario, the speaker would, by hypothesis, be quite likely to overtly mark the adjective as definite to distinguish the study in question from the other.<sup>1</sup>

Nevertheless, the point made by Borg and Azzopardi-Alexander is well-taken, insofar as certain adjectives do appear to evince a higher preference for definiteness marking than others, a view that is also supported by the results of the corpus study presented in Section

<sup>1</sup>Note that this interpretation of the phrase *l-istudju grammatikali* is clearly not the one intended by Borg and Azzopardi-Alexander (1997), whose example suggests a more generic interpretation along the lines of 'the study of grammar'.

3. Plank and Moravcsik (1996) observe that adjectives derived from proper names, such as *Amerikan* ‘American’ or *Għarbi* ‘Arabic’, resist such marking. This is broadly true (see Section 3 for some evidence), but once again, it is subject to pragmatic constraints, along the lines observed in connection with (9) above. A context in which one person needs to be singled out from others might well license the use of the definite article on the adjective *Amerikan* if this is a distinguishing property of the intended referent.

A less clear-cut case is presented by relational adjectives, such as *favurit* ‘favourite’ or *preferut* ‘preferred’. Semantically, such adjectives are considered relational because they combine with a head noun to form a ‘transitive’ common noun (that is, a noun with an argument position, often filled by a possessor; see for example Partee & Borschev, 1999). As a result, they restrict the options among possible referents, to some contextually available unique entity. (Thus, *John’s favourite painting* refers to some single painting). According to Plank and Moravcsik (1996), such adjectives in Maltese tend to eschew overt definiteness marking. This raises two questions: first, given that relational adjectives function share a crucial property with ‘inherently contrastive’ adjectives, why is overt definiteness marking highly likely with the latter, but unlikely with the former? In fact, it turns out that this characterisation is too restrictive. The adjective *favurit* is perfectly felicitous with overt definiteness marking, while *preferut* is less so, as shown in the examples below. It is possible that in the case of adjectives which are relational and/or inherently contrastive, definiteness marking is subject to lexical constraints.

- (10) *il-ktieb*                      *(il-)favurit*                      *(ta’ Ray)*  
 DEF-book.MSG    (DEF-)favourite.MSG    (of Ray)  
 Ray’s favourite book

| NOUN | ADJECTIVE |
|------|-----------|
| +DEF | +DEF      |
| +DEF | -DEF      |
| -DEF | -DEF      |

Table 1

*The distribution of definiteness marking on attributive adjectives in Maltese*

- (11) *il-ktieb*            (?*il-*)*preferut*            (*ta'* *Anna*)  
 DEF-book.MSG    (?DEF-)preferred.MSG    (by *Anna*)  
 Anna's preferred book

For those cases where overt definiteness marking on the adjective does appear to be optional, such as (8) above, Plank and Moravcsik (1996) suggest that the inclusion of the article on the adjective would serve a contrastive function (in example 8, contrasting this dog to some non-white dog), whereas an unmarked adjective in a definite noun phrase would denote a property that is part of the speaker's knowledge (but presumably not serving a contrastive function).

By way of a summary, Table 1 shows the distribution of definiteness marking on attributive adjectives in Maltese NPs (see Fabri, 2001, for a similar outline). Based on these facts, Fabri (2001), like Plank and Moravcsik (1996), argues that definiteness marking on adjectives is best explained, not as a morphosyntactic agreement phenomenon, but as a semantic or pragmatic effect. This position echoes observations made much earlier by Sutcliffe (1936) in a descriptive context. Sutcliffe's observations are worth citing more fully, for they anticipate some of the conclusions reached in the present paper on the basis of the

empirical study presented in Section 4:

An attributive adjective in agreement with a noun which is accompanied by the definite article itself takes the article only if the article is used with the noun to specify a particular object and moreover the adjective helps to identify the object named. (Sutcliffe, 1936, p.20).

The pragmatic function of overt definiteness marking on adjectives is the primary focus of the empirical work reported in the following sections. Before turning to an empirical account, it is worth putting this perspective in the context of experimental work on the pragmatics of reference.

### **2.1 The pragmatics of referentiality**

The position taken by Sutcliffe (1936), Fabri (2001) and to some extent Plank and Moravcsik (1996) echoes observations made in the vast literature on the semantics and pragmatics of definite, referential NPs (reviewed in Abbott, 2010, among others). Following the seminal work of Russell (1905), many accounts, whether they are couched in a dynamic semantic framework (e.g. Heim, 1982; Löbner, 1985; Chierchia, 1995, among many others) or take a more pragmatic stance (e.g. Strawson, 1950; Searle, 1969), adopt the position that definites carry presuppositions of uniqueness or identifiability, as well as ‘familiarity’, or at least recoverability from context.

Thus, a definite NP such as *the tall man* would indicate to the hearer that the speaker has some specific entity in mind and that furthermore, this entity is identifiable to the hearer, either from the foregoing conversational context, or from some other knowledge source in the common ground shared by the interlocutors (in the sense of Clark, 1996).

On a Gricean account (Grice, 1975), it follows that when speakers produce a description and intend it to refer to some entity – that is, to identify it for their interlocutor – the information included therein must serve a contrastive function (or at least, must have that as *one* of its intended functions; see Jordan, 2002, and the discussion immediately below).

The notion that the information in definites serves a contrastive function has been put to the test in a number of psycholinguistic studies on both reference resolution and production. Compelling evidence for the contrastive interpretation of modifiers comes from ‘visual world’ studies, in which participants are exposed to visual stimuli typically consisting of arrays of familiar objects, and their gaze is tracked as they resolve linguistic stimuli in context. One important finding is that listeners exhibit a point of disambiguation effect during comprehension, whereby information in a noun phrase (say, *the red book*), is used to incrementally circumscribe the visual scene, until sufficient information has been interpreted to identify the intended referent (Tanenhaus, Spivey-Knowlton, Eberhard, & Sedivy, 1995). Crucially, listeners resolve referential utterances containing modifiers, such as *the tall glass*, more efficiently in case the visual domain includes same-category distractors to which the modifier does not apply (for example, another glass, which is however not tall; Sedivy, Tanenhaus, Chambers, & Carlson, 1999). A related set of findings suggests that there are processing costs in comprehension associated with referential NPs in which modifiers are used ‘redundantly’, or non-contrastively. In such cases, listeners appear to be susceptible to a ‘referential garden path’ effect, whereby the use of a modifier is assumed to be relevant to the identification of a target referent, incurring additional processing costs in case it is not (Engelhardt, Bailey, & Ferreira, 2006; Engelhardt, Barış Demiral, & Ferreira, 2011).

From the speaker’s perspective, the situation appears to be slightly more complex.

An early psycholinguistic model by Olson (1970) was rooted in the Gricean notion that redundant information in a referential NP would violate the Quantity maxim, as it would convey more information than strictly required for identification. This of course assumes that identification is the primary function of such NPs. Thus, a speaker will only refer to *the red book* if there is another book which is not red (if there is no other book, then *the book* will suffice to identify a referent). This account turns out to be too restrictive, however: Speakers are known to overspecify and use modifiers even when they are not strictly required for identification (Pechmann, 1989; Engelhardt et al., 2006; Tarenskeen, Broersma, & Geurts, 2015), although it has been argued that in fact such ‘redundant’ uses also serve pragmatic functions (e.g. Jordan, 2002; Davies & Katsos, 2013; Rubio-Fernandez, 2016). Be that as it may, the inclusion of such ‘redundant’ information on the part of speakers may also be due to processing constraints, including the cognitive demands that would be incurred by weighing the informativeness of every modifier before it is selected, as well as the inherent salience of certain visual attributes, especially an object’s colour (e.g. Pechmann, 1989; Eikmeyer & Ahlsèn, 1996; Koolen, Gatt, Goudbeek, & Krahmer, 2011, among many others). The latter appears to be a central feature in the mental representation of certain objects (Wurm, Legge, Isenberg, & Luebker, 1993; Naor-Raz, Tarr, & Kersten, 2003) and has been argued to be more easily codable (that is, easier to perceive and encode linguistically) than relative or scalar attributes such as size (e.g. Belke & Meyer, 2002; Belke, 2006).

In summary, overspecification in the production of referential description does not imply that modifiers are used non-contrastively by speakers. Indeed, the opposite is true, as shown by empirical studies by Sedivy (2003) and Brown-Schmidt and Tanenhaus (2006).

The latter, for example, found that scalar adjectives (such as size modifiers) were more likely to be used by speakers to describe objects in situations where they had a contrastive function, *after* speakers had looked at a distractor object of a different size from the target referent.

## 2.2 Interim summary

The pragmatic and psycholinguistic literature suggests that one of the functions of modification in referential NPs is to single out an intended referent – whether it is visually co-present or otherwise accessible – from potential distractors. This has important consequences for the analysis of so-called definiteness agreement in the Maltese NP. Recall that according to the suggestion by Sutcliffe (1936), and as argued by Fabri (2001), definiteness marking on the Maltese adjective serves a pragmatic – specifically contrastive – function. As also suggested in the foregoing discussion, even in those cases where the adjective appears to resist definiteness marking (as in example 9 above), such marking can often be pragmatically licensed in those contexts where the modifier has a clearly contrastive function.

The hypothesis investigated in the remainder of this paper is that in case an attributive adjective serves to mark a contrast between an intended referential target and one or more distractors, the adjective is more likely to be marked as definite in agreement with the noun. If this is correct, then we should observe a greater likelihood for definite NPs exhibiting ‘agreement’ between noun and adjective in contexts where the NP singles out a target referent in the presence of distractors that have the same category as the referent (e.g. both are books), but are distinguished on the basis of a feature denoted by the adjective.

This hypothesis will be investigated through a production study presented in Section

4. First, however, we describe a corpus-based investigation of the distribution of definite adjectives in the Maltese NP.

### 3 The distribution of adjectives in definite NPs in Maltese

Before presenting the production experiment, this section describes a preliminary corpus-based investigation into the distribution of adjectives in definite NPs. The primary purpose is to gain some insight into the main semantic categories of adjectives featuring in such constructions, as well as to inform the selection of items for the experiment reported in the next section. A further aim is to shed further light on some of the lexical preferences noted in the literature discussed in the previous section, whereby some adjectives appear to resist definiteness marking.

#### 3.1 Data

The study was conducted on the Korpus Malti v3.0 (2016), a corpus of around 250 million tokens of Maltese in a variety of text types, distributed as part of the MLRS suite of linguistic tools (Gatt & Čéplö, 2013).<sup>2</sup> MLRS corpus texts are annotated with part of speech and are lemmatised.

The data was collected by searching for a part of speech sequence consisting of a definite noun followed by a definite adjective. In order to reduce the likelihood of false positives, search was restricted to definite NPs at the start of a sentence containing a definite adjective immediately following a definite noun.

A total of 10,789 noun phrases were retrieved, from which adjectives were extracted and lemmatised (that is, mapped to their base form in case they were plural or feminine

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<sup>2</sup>Available online at <http://mlrs.research.um.edu.mt>.

singular). There were 126 cases of superlative adjectives, mapping to 12 unique lemmas, which were excluded from the analysis, since adjectives in Maltese are always definite in their superlative form. The remaining 10,663 adjectives mapped to 63 distinct lemmas.

### 3.2 Distribution

The left panel of Table 2 shows the frequency distribution of the 20 most frequent lemmas identified in the corpus. Note that the last five items have a frequency of 1 in the sample.<sup>3</sup> Proportions are also indicated; these are estimated in the table over the total frequency of the twenty lemmas presented here, for ease of comparison with the figures on the right, which we turn to below.

The most frequent adjective occurring as a definite is *ieħor* ‘other’, followed by *ġdid* ‘new’ and *antik* ‘old’. These make up 8183 cases of the total. Indeed, the adjectives in the top 10 ranks constitute 8,313 cases, the lion’s share of the total sample, with a significant tail in the distribution consisting of adjectives that occur only once as definite. It is also worth noting that the adjectives in the top twenty include a sizable number of colour and scalar adjectives, a fact we will exploit in the experimental study in the next section.

The distribution of definite adjectives in the corpus gives rise to an interesting question, namely: *To what extent does a given adjective ‘prefer’ to occur in a definite NP with overt definiteness marking, thus displaying ‘agreement’ with the noun?* In other words, this question is concerned with the possibility that certain adjectives might actually have a greater tendency to occur as definite than others, as suggested in Section 2.

<sup>3</sup>The adjectives at ranks 15–20, which have a frequency of 1, were selected randomly, from among all the other adjectives with this frequency.

| RANK | LEMMA    | GLOSS     | DEFINITE  |            | INDEFINITE |            | FISHER-YATES TEST |            |
|------|----------|-----------|-----------|------------|------------|------------|-------------------|------------|
|      |          |           | FREQUENCY | PROPORTION | FREQUENCY  | PROPORTION | P-VALUE           | ODDS RATIO |
| 1    | iehor    | other     | 5826      | 69.89      | 11         | 0.48       | 0                 | 483.26     |
| 2    | ġdid     | new       | 2276      | 27.30      | 808        | 35.08      | 7.40E-13          | 0.69       |
| 3    | antik    | old       | 81        | 0.97       | 59         | 2.56       | 4.00E-08          | 0.37       |
| 4    | aħmar    | red       | 42        | 0.50       | 45         | 1.95       | 6.08E-10          | 0.25       |
| 5    | abjad    | white     | 28        | 0.34       | 38         | 1.65       | 2.19E-10          | 0.20       |
| 6    | aħħar    | last      | 18        | 0.22       | 4          | 0.17       | 1 ( <i>ns</i> )   | 1.24       |
| 8    | blu      | blue      | 13        | 0.16       | 11         | 0.48       | 9.93E-03          | 0.33       |
| 7    | aħdar    | green     | 13        | 0.16       | 34         | 1.48       | 1.43E-13          | 0.10       |
| 9    | isfar    | yellow    | 8         | 0.10       | 12         | 0.52       | 2.23E-04          | 0.18       |
| 10   | iswed    | black     | 8         | 0.10       | 39         | 1.69       | 4.54E-19          | 0.06       |
| 11   | għoli    | high      | 7         | 0.08       | 200        | 8.68       | 6.53E-125         | 0.01       |
| 12   | ħażin    | bad       | 5         | 0.06       | 100        | 4.34       | 1.89E-60          | 0.01       |
| 13   | baxx     | low       | 4         | 0.05       | 56         | 2.43       | 6.82E-33          | 0.02       |
| 14   | faċli    | easy      | 2         | 0.02       | 25         | 1.09       | 4.84E-15          | 0.02       |
| 15   | amerikan | american  | 1         | 0.01       | 746        | 32.39      | 0                 | 0.002      |
| 17   | ċar      | clear     | 1         | 0.01       | 48         | 2.08       | 3.31E-31          | 0.01       |
| 18   | ċiniż    | chinese   | 1         | 0.01       | 12         | 0.52       | 1.08E-07          | 0.02       |
| 19   | ċkejken  | small     | 1         | 0.01       | 21         | 0.91       | 1.80E-13          | 0.01       |
| 20   | diffiċli | difficult | 1         | 0.01       | 34         | 1.48       | 5.79E-22          | 0.01       |

Table 2

*Distribution of lemmas, sorted by frequency in constructions featuring definite adjectives.*

*Left panel: frequency and proportion of occurrences of the top twenty definites ( $N = 8,336$ ).*

*Middle panel: frequency and proportion of the same lemmas in indefinite constructions ( $N =$*

*2,303). Rightmost panel:  $p$ -values and odds ratios from a Fisher-Yates test comparing the*

*frequency of each lemma in definite and indefinite constructions, in the total sample.*

In order to investigate this further, the corpus analysis was extended by conducting a separate search for each of the twenty lemmas in Table 2, this time restricting the search to NPs at the start of sentence consisting of an overtly marked definite noun followed by an adjective *with no definiteness marking*. The query yielded 2,303 cases — significantly fewer than for definite adjectives<sup>4</sup> — with the distribution shown in the middle panel of Table 2.

Considering the proportions, it is clear that most of the adjectives tend to exhibit a preference for one or the other construction. In corpus studies inspired by the tenets of Construction Grammar, this is sometimes discussed in terms of a preference-repulsion dynamic: Given two constructions A and B, which are parallel save for one linguistically interesting variable (in this case, definiteness marking on the adjective), a lexical item may show a preference for occurring in A, but not in B (see Stefanowitsch & Gries, 2003, 2005, for discussion and several examples). Inspired by the work of Stefanowitsch and Gries (2003) on covarying collexeme analyses, we compared the frequency with which each lemma occurs with or without overt definiteness marking in the definite NPs in our sample, using a Fisher-Yates exact test. For a given lemma x, the test involves a comparison of the frequency of the lemma in overtly definite or non-definite contexts, with the corresponding frequencies of all other lemmas. For example, for the lemma *ieħor*, this comparison involves the following matrix:

|              | +DEF | -DEF |
|--------------|------|------|
| IEĦOR        | 5826 | 11   |
| OTHER LEMMAS | 2510 | 2292 |

<sup>4</sup>However, it should be borne in mind that this query was only for the 20 lemmas in Table 2, which were identified as occupying the top ranks.

The lower the  $p$ -value, the more significant the difference. A  $p$ -value of 0 simply indicates that the number obtained is lower than a pc can represent, hence 0 for all practical purposes. The odds ratio provides an estimate of the effect size and indicates the likelihood that an adjective occur with overt definiteness marking, relative to the likelihood that it occur without. For the above, the odds ratio is estimated as  $\frac{5826/2510}{11/2292} \approx 483$ , indicating that this adjective is more than 480 times more likely to receive overt definiteness marking in a definite NP, than to be unmarked for definiteness.

The following observations can be made from this analysis:

1. For a small subset of lemmas, there is a very dramatic preference for overt definiteness marking in definite NPs. This is especially true for *ieħor*, which is almost invariably used with definiteness marking, in constructions such as (12) below. In terms of the foregoing discussion, this is unsurprising, in view of the fact that *ieħor* is inherently contrastive.
2. Only one adjective seems to display no preference either way: the forms *aħħari/aħħarija/aħħrin*, mapped in the table to lemma *aħħar* ‘final/last/latest’, obtain a  $p$ -value of 1 (not significant) and an odds ratio around 0.
3. Many adjectives, while exhibiting a higher tendency for overt definiteness marking, do not show a dramatic preference, with odds ratios ranging from just above 0 to 1.5. One class where this is clearly the case is that of colour adjectives. Many evaluative denoting qualities such as good, bad or difficult, and scalar adjectives such as *għoli* ‘high’, are also in this group.
4. The two adjectives denoting nationalities, *amerikan* ‘american’ and *ċiniż* ‘chinese’,

appear to avoid definiteness marking for the most part, confirming the views of Plank and Moravcsik (1996) (but see the discussion in the previous section). Both occur only once with definite marking. The odds ratios near 0 in these cases are due to the very low frequency of the adjectives in the definite case (they occur only once), compared with the much higher frequency (especially in the case of *amerikan*) in the indefinite case.

- (12) *il-ġuvni*                      *l-ieħor*  
 DEF-young man    DEF-other.MSG  
 ‘the other young man’

### 3.3 Notional semantic categories

The adjectives in Table 2 seem to fall into certain semantic categories, for example, that of scalar adjectives (e.g. those denoting size or height) and colour adjectives. To investigate this further, the adjectives in the definite sample (including those with low frequencies, not included in Table 2) were further mapped to a small set of notional semantic categories, summarised in Table 3, which also indicates the proportion of individual lemmas belonging to each class in the sample.

The ‘miscellaneous’ class accounts for a significant proportion of adjectives, though this class groups together a diversity of cases, including *ieħor*, *ġenerali*, etc. Of the others, colour, evaluative and scalar adjectives are the most numerous. The slightly greater proportion of colour over scalar modifiers is consistent with the psycholinguistic finding that speakers tend to prefer mentioning colour attributes over size modifiers. However, it should be noted that corpus data alone is inconclusive in this regard, since the context in which these descriptions were produced is not available, and hence the referentiality of the NP

|   | SEMANTIC CLASS | PROPORTION |
|---|----------------|------------|
| 1 | COLOUR         | 15.87      |
| 2 | EVALUATIVE     | 14.29      |
| 3 | SCALAR         | 12.70      |
| 4 | AGE            | 7.94       |
| 5 | NATIONALITY    | 4.76       |
| 6 | MISC           | 44.44      |

Table 3

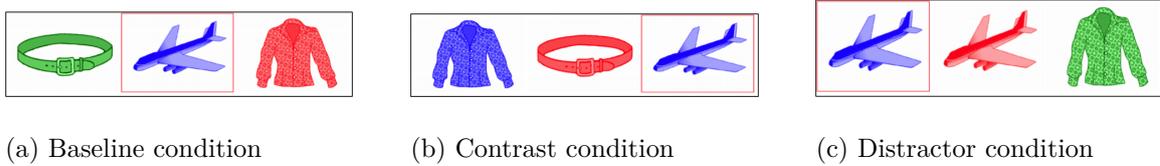
*Distribution of adjectives into notional semantic classes. Proportions indicate percentage of individual lemma types (N = 63)*

cannot be ascertained.

#### 4 An experimental study

Having identified some of the distributional characteristics of definite adjectives, the present section describes an experimental study whose purpose was to explicitly test the hypothesis outlined at the end of Section 2. Recall that the conclusion reached in that section, based on both theoretical and psycholinguistic work on the processing of referential NPs, was that producers would be more likely to mark an adjective as definite in a referential context if it served an explicitly contrastive function.

The present study sought to test this hypothesis through a production experiment. Participants were shown visual scenes in which they needed to refer to objects. The purpose



*Figure 1.* Examples of the three conditions used in the production experiment (figure best viewed in colour).

was explicitly to identify one of the objects using a description, such that a putative listener might be able to pick this target from among its distractors.

#### 4.1 Method

**4.1.1 Participants.** A total of 175 participants completed the experiment (age range: 17 – 68; mean age 35; 50% female). Participation was voluntary. All participants were self-rated native speakers of Maltese.

Data from 11 participants was omitted from analysis due to evidence of their having misunderstood the task. In some of these cases, participants invariably named the target object (e.g. as a ball) without any modification, giving rise to referential failure in some conditions (where the object could never be identified based on its category alone). In the others, participants interpreted the task in terms of a guessing game, giving clues (‘this is something you sit on’) rather than actual descriptions. This left 164 participants to be included in the analysis.

**4.1.2 Materials and design.** A set of 15 pictures of everyday objects were used in the study (hereafter, these are referred to as the experimental ‘items’). The items were obtained from a set of normed line drawings by Snodgrass and Vanderwart (1980), which

had been further manipulated to include more surface detail, including texture (Rossion & Pourtois, 2004). For the purposes of this study, three versions of each picture were created by the author in three different colours (blue, green and red).

Experimental materials consisted of simple grids with three pictures, corresponding to the three experimental conditions exemplified in Figure 1. In each picture, there was one designated target referent, which was surrounded by a red border to indicate it to participants, plus two distractor objects. The conditions were as follows:

1. *Baseline* condition (Figure 1a): The target referent was the only object of its type (e.g. an aeroplane) and all objects were of different colours. In this case, the target could be distinguished from the distractors using only a head noun (e.g. *l-ajruplan* ‘the aeroplane’). Its colour was also uniquely distinguishing, so that participants could identify the target using either a noun denoting its type, an adjective denoting its colour, or both.
2. *Contrast* condition (Figure 1b): The target referent was the only object of its type, but shared its colour with one other distractor object (e.g. the blouse in Figure 1b). The purpose of this condition was to test whether adjectives, if used, would be more likely to be definite given the same-colour distractor.
3. *Distractor* condition (Figure 1c): the target referent was of the same type as one other distractor, and was distinguishable from it only on the basis of colour. Hence, identifying descriptions needed to include the adjective.

Thus, the primary manipulation was the extent to which colour distinguished the target from the surrounding objects. Colour was chosen as the attribute of choice given

that it has been found to be highly preferred by speakers and hence is unlikely to be omitted when required. Indeed, previous work leads us to expect participants to include colour in a large proportion of their descriptions even in the baseline and contrast conditions. A further reason for using colour was that, in the corpus study, most lemmas occurring with over definiteness marking in definite NPs were colour adjectives, apart from the miscellaneous class.

For each of the 15 experimental items, a scenario was constructed corresponding to one of the three conditions. This is illustrated in Figure 1, where the same target (an aeroplane) is present in each case. During the experiment, participants saw five items in each condition, for a total of 15 experimental trials. Items and participants were randomly divided into 3 groups and rotated through a latin square, so that each participant saw each item exactly once, in only one condition, but a roughly equal number of participants saw each item in each condition. Target items were also randomly positioned in the grid, relative to their distractors.

**4.1.3 Procedure.** The experiment was conducted online, using an interface designed for the purpose. Participants were notified of the study through the author's social network and the University of Malta mailing list. On visiting the experiment page, they were first asked to rate their fluency in Maltese, and were subsequently given instructions. These specified that they would be seeing a series of 15 scenarios consisting of three objects, in each of which there would be one object surrounded by a red border. In each case, they needed to describe the target in order to answer the question *which object is in the red box?* However, they were instructed not to use spatial position (for example, describing the target as 'the one in the middle'). They were told that simple phrases would suffice as responses.



*Figure 2.* Screenshot of an experimental trial (baseline condition). The participant is required to type a description of the designated target in the space provided. The top panel shows the trial count (here, 1 out of 15). The bottom panel asks *Which object is in the red box*, and reminds participants not to use spatial position. (Figure best viewed in colour.)

Figure 2 shows a screenshot of an experimental trial.

**4.1.4 Data coding.** The descriptions collected from the 164 participants were coded as follows:

- Nouns were marked as definite or indefinite;
- The NP was marked as containing a colour adjective or not;
- If present, the syntactic form of the adjective was annotated as a post-modifier in case it was an adjective phrase post-modifying the head noun; or as ‘other’, in case a participant used a prepositional phrase (‘the aeroplane of a blue colour’) or a relative

clause ('the aeroplane which is blue'). Non-postmodifying adjectives accounted for less than 3.5% of the total number of descriptions.

## 4.2 Results

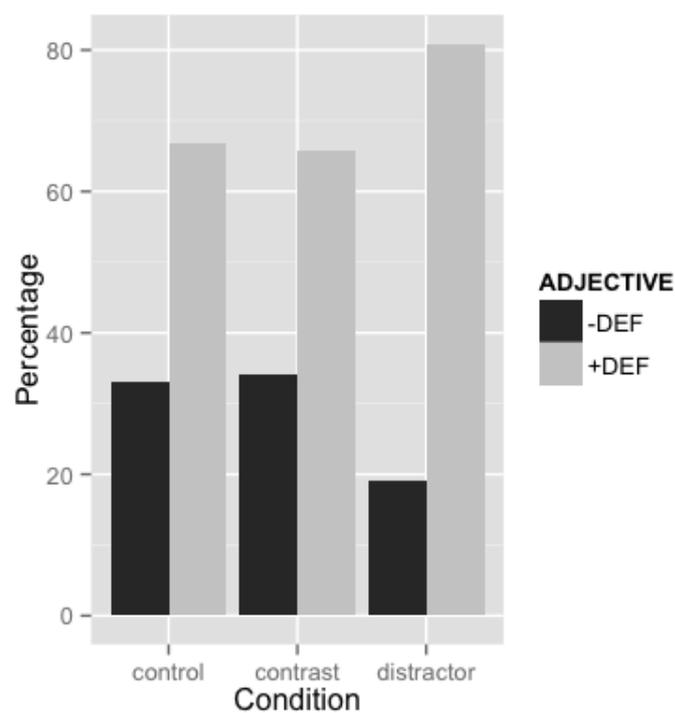
|      |         | BASELINE | CONTRAST | DISTRACTOR |
|------|---------|----------|----------|------------|
| -DEF | -COLOUR | 3.77     | 4.86     | 1.70       |
|      | +COLOUR | 35.97    | 35.36    | 33.74      |
| +DEF | -COLOUR | 17.50    | 17.86    | 1.09       |
|      | +COLOUR | 42.77    | 41.92    | 63.47      |

Table 4

*Percentage of descriptions which are  $\pm$ definite and contain a colour adjective (with or without definiteness marking), by condition. Legend:  $\pm$ DEF - whether the description is definite, irrespective of the definiteness of the adjective;  $\pm$ COLOUR - whether a colour adjective is used, irrespective of its syntactic position.*

Table 4 gives a breakdown of descriptions according to whether they were definite or indefinite, and according to whether they contained an adjective, by condition. Note that this table does not distinguish between the cases where an adjective is itself marked as definite or not. In each condition, the majority of descriptions contain a colour adjective and are definite. The predominance of colour adjectives is in line with previous work suggesting that this feature is highly preferred by participants in referential tasks, often being used when not required for identification (Pechmann, 1989; Belke & Meyer, 2002; Koolen et al., 2011). However, the predominance of colour adjectives is especially clear in the distractor

condition. This is expected, since here the adjective is required to distinguish the target referent from its distractors. In this condition too, there is a higher proportion of definite NPs. Overall, there is also a relatively high proportion of indefinite descriptions. This is frequently attested in reference production tasks, since participants in such experiments frequently write just enough information to satisfy the identification requirement imposed by the task.



*Figure 3.* Proportions of definite adjectives in definite descriptions, as a function of condition

In the remainder of the analysis, we focus exclusively on the definite NPs, that is, those NPs where the head noun was marked as definite and which, furthermore, contained an adjectival postmodifier ( $N = 1188$ ; 57% of all valid data). This is because we are mainly

interested in the likelihood of an adjective being marked as definite in agreement with the noun, as a function of condition.

Figure 3 displays the proportions of definite descriptions containing definite and indefinite adjectives, as a function of condition. Clearly, the majority of descriptions ‘agree’ with the noun when it is definite. Nevertheless, there is a discernible trend whereby the probability that the adjective is marked with a definite article is greater in the distractor condition (80.9%), compared with the contrast (66%) and baseline (67%) conditions.<sup>5</sup>

To test for the reliability of these trends, we use logit mixed effects models.<sup>6</sup> First, we are interested in whether condition exerts a reliable impact on the probability of using a definite adjective, overall. For this, we use a model comparison approach, comparing the goodness of fit of a baseline model containing no fixed effects (i.e. only an intercept) to a model including the fixed effect of condition. If the condition manipulation does indeed explain some of the probability of using definiteness marking on adjectives in definite NPs,

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<sup>5</sup>A proportion of around 81% might appear low, given the hypothesis that contrastiveness (especially with a same-type distractor) should make definiteness marking on the adjective more likely. Of course, the proportion does imply that there is a degree of optionality in the use of definiteness marking. However, the hypothesis is that contrastiveness *increases likelihood* of overt definiteness marking and this can only be ascertained relative to conditions where contrastiveness does not hold. As we shall see below, this turns out to be a statistically reliable trend.

<sup>6</sup>All mixed effects analyses were conducted using the R programming language. Models were constructed using the `lme4` library (Bates, Maechler, & Bolke, 2014), with goodness of fit statistics obtained using the `lmerTest` package (Kuznetsova, Brockhoff, & Christensen, 2014). During model fitting, we initially attempted to fit models with a full random effects structure, with random intercepts and slopes for participants and items (cf. Barr, Levy, Scheepers, & Tily, 2013). Where this led to problems of convergence, models were pruned by first omitting random slopes by items, then random intercepts by subjects.

the model with the fixed effect should have a significantly better goodness of fit than the baseline model. The comparison is summarised in Table 5, which describes each model and includes its Bayesian Information Criterion (BIC) to indicate goodness-of-fit. Model comparisons are based on log likelihood ratios (expressed as the model  $\chi^2$ ).

| MODEL    | FIXED EFFECTS    | BIC | MODEL $\chi^2$                |
|----------|------------------|-----|-------------------------------|
| Baseline | (intercept only) | 915 | –                             |
| Actual   | Condition        | 910 | 18.64* (relative to baseline) |

Table 5

*Model summary comparison: Baseline model versus model containing fixed effect of condition. Legend: \* indicates significantly better goodness of fit at  $p < .001$ .*

The model containing the fixed effect of condition has a marginally lower BIC, indicating a slightly better goodness of fit to the data. More importantly, the log likelihood test indicates that factoring in the fixed effect of condition explains the data significantly better than the baseline model. In short, this provides evidence that the distinction between the three conditions explains a significant proportion of the variation in the probability with which an adjective is overtly marked as definite, in a definite NP.

Next, we compared the different conditions using planned contrasts. For the purposes of this analysis, we coded condition using Helmert coding, which allows the comparison of different levels of a factor with subsequent levels. Here, we are particularly interested in the contrast between the distractor condition and the other two. A new logit mixed effects model was constructed, incorporating the Helmert-coded fixed effect. The converging model included random intercepts by participants and items.

The contrasts showed no significant difference in the likelihood of using a definite adjective between the contrast and the baseline conditions ( $z = 0.461$ ; *ns*). On the other hand, the comparison between the distractor condition and the other two conditions was highly significant ( $z = 6.005$ ;  $p < .001$ ;  $SE = 0.174$ ).

## 5 Summary

The following conclusions can be drawn from these results. First, Maltese speakers evince a tendency to overspecify their descriptions, using colour adjectives even when they are not required. This is indicated by the higher proportion of descriptions containing the adjective in Table 4 in all three conditions. Furthermore, adjectives also tend to be definite more often than indefinite, as shown in Figure 3.

However, the results also indicate that in those conditions where an adjective served a truly contrastive function, that is, where the target was to be distinguished from an object of the same type, participants were more likely to use an adjective. More importantly, when the analysis focussed on cases where participants did use such adjectival post-modifiers, the distractor condition significantly increased the likelihood of the adjective exhibiting definiteness marking and ‘agreeing’ with the head noun. The two conditions where the adjective had no true contrastive function, because a noun sufficed to distinguish the target, did not differ significantly from each other in the likelihood of use of definite marking on the adjective. Crucially, adjectives in these conditions were significantly *less* likely to be definite in definite NPs, compared to the distractor condition.

## 6 Conclusions

This paper addressed the issue of so-called definiteness agreement in the Maltese noun phrase, asking whether definiteness marking on the adjective can be explained on pragmatic grounds, based on the contrastiveness of the adjective in a referential context. The experimental outcomes suggest that this is indeed the case, as originally proposed by Sutcliffe (1936) and Fabri (2001). Although definite adjectives tend to predominate in referential descriptions in our experimental data, the statistical trend is clearly in line with the hypothesis that, where speakers need to contrast a referent to its distractors, a modifier will be marked to indicate this function.

This study restricted itself to colour adjectives, primarily because, as shown in previous psycholinguistic work and supported by the corpus study presented here, such adjectives tend to be widely used. This had a practical benefit in the present case, in that participants in the experiment were unlikely to omit an adjective when it was required (hence, underspecifying their referential NPs). In any case, the main question addressed was not whether participants would use such modifiers, but whether, when used, they would mark them explicitly for contrastiveness.

Nevertheless, the present study opens up avenues for future work. First, it is important to further investigate the possible restrictions on the semantic categories of adjectives that permit definiteness marking, along the lines suggested by Borg and Azzopardi-Alexander (1997) and Plank and Moravcsik (1996). While this paper has argued that, even in cases where adjectives do not seem to support such marking, pragmatic considerations can over-rule this tendency, this is still a matter that is open to empirical verification. Second,

the fact that Maltese has an apparently ‘optional’ definiteness marking mechanism within the NP makes it an extremely interesting candidate for further psycholinguistic investigation. Further work in this area will complement the growing body of psycholinguistic work on reference production, giving rise to a more nuanced view of the pragmatics of reference cross-linguistically.

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