



Forms and features: The role of syncretism in number agreement attraction

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ABSTRACT

Many experiments have studied attraction errors in number agreement (e.g. ‘The key to the cabinets were rusty’). It has been noted that singular heads with plural dependents (attractors) trigger larger attraction effects than plural heads with singular attractors, and that in languages with morphological case, morphologically ambiguous attractors trigger larger effects (accusative plural forms coinciding with nominative plural were compared to unambiguous case forms). In Russian, the nominative plural forms of some nouns coincide not only with their accusative plural forms but also with the genitive singular. In one production and two comprehension experiments, such genitive singular forms were found to trigger larger attraction effects than morphologically unambiguous genitive plural forms. Accusative plural forms coinciding with the nominative plural were shown to be the most effective attractors. These results have implications for different models of attraction and for other discussions in morphology concerning ambiguity processing, different approaches to syncretism and the problem of lexical insertion.

Introduction

Much work has been devoted to so-called attraction errors in subject–verb agreement, as in (1a). In (1a) the verb agrees not with the head of the subject NP *key* but with a dependent NP *cabinets* (I will hereafter call such NPs *attractors*).

- (1) a. **The key to the cabinets were rusty.*
b. **The key to the cabinet were rusty.*

Across languages, such errors in number agreement have been shown to arise more frequently than errors of the type exhibited in (1b), where no attraction is possible (e.g. Bock & Miller, 1991; Eberhard, Cutting, & Bock, 2005; Franck, Lassi, Frauenfelder, & Rizzi, 2006; Franck, Vigliocco, & Nicol, 2002; Hartsuiker, Schriefers, Bock, & Kikstra 2003; Solomon & Pearlmutter, 2004; Staub, 2009; Staub, 2010; Vigliocco, Butterworth, & Garrett, 1996; Vigliocco, Butterworth, & Semenza, 1995). In comprehension experiments, attraction errors have been demonstrated to trigger more grammaticality judgment mistakes and to provoke less pronounced effects in reading time and EEG studies than other agreement errors (e.g. Clifton, Frazier, & Deevy, 1999; Dillon, Mishler, Sloggett, & Phillips, 2013; Pearlmutter, Garnsey, & Bock, 1999; Tanner, Nicol, & Brehm, 2014; Wagers, Lau, & Phillips, 2009). Attraction has also been observed in gender agreement, although it is studied much less frequently (e.g. Badecker & Kuminiak, 2007; Franck,

Vigliocco, Anton-Mendez, Collina, & Frauenfelder, 2008; Slioussar & Malko, 2016; Vigliocco & Franck, 1999).

Two major approaches to agreement attraction can be identified in the literature: representational and retrieval approaches. According to the representational approach (e.g. Brehm & Bock, 2013; Eberhard et al., 2005; Franck et al., 2002; Nicol, Forster, & Veres, 1997; Staub, 2009; Staub, 2010; Vigliocco & Nicol 1998), agreement attraction takes place because the mental representation of the subject NP’s number feature is faulty or ambiguous. Some authors assume that the number feature can “percolate” from the embedded NP to the subject NP, which normally receives its features from its head. Others, relying primarily on the Marking and Morphing model suggested by Eberhard et al. (2005), argue that the number value of the subject NP is a continuum, i.e. it can be more or less plural. The more plural the subject NP, the higher the possibility of choosing a plural verb. This plurality depends on properties of the subject NP as a whole and of its head, such as collectivity, distributivity etc.

The retrieval approach (e.g. Badecker & Kuminiak, 2007; Dillon et al., 2013; Solomon & Pearlmutter, 2004; Wagers et al., 2009) claims that the number feature on the subject NP is always represented unambiguously and correctly and attraction errors arise when the subject NP is accessed to determine the number of the agreeing verb because several nouns are simultaneously active. The authors adopting this approach typically assume that the agreement controller is found via cue-based retrieval (Lewis & Vasishth, 2005; McElree, 2006): we query

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the memory with a set of cues (e.g. “number: plural”, “case: nominative”, etc.) and select an element that matches the maximum number of cues. This process is not error-free, and a wrong element can sometimes be retrieved; in cases of attraction errors, the attractor NP is retrieved instead of the subject NP.

Many characteristics of attraction errors have been examined in the literature, so here I will focus on the one directly relevant for this study. In the languages with morphological case marking, syncretism has been found to play an important role in attraction. Consider, for example, German, which inflects nouns, adjectives, articles and pronouns into four cases: nominative, genitive, dative and accusative. When plural, many nouns have the same forms in all four cases or only the dative plural differs from the other forms. However, the case is always visible on the definite article, which has the forms *die*, *der*, *den* and *die*, respectively. All of these forms are morphologically ambiguous, or syncretic: *die* is used in the nominative and accusative plural as well as in the nominative and accusative singular with feminine nouns; *der* is used in the genitive plural, genitive singular with feminine nouns and nominative singular with masculine nouns; etc. Hartsuiker et al. (2003) found that the number of attraction errors was much higher when, due to syncretism, the form of the attractor coincided with nominative plural, like in the German example (2a), as opposed to (2b).

(2) a.	<i>die</i>	<i>Stellungnahme</i>	<i>gegen</i>	<i>die</i>	<i>Demonstrationen</i> ¹
	the _{NOM.SG}	position	against	the _{ACC.PL(=NOM.PL)}	demonstrations
b.	<i>die</i>	<i>Stellungnahme</i>	<i>zu</i>	<i>den</i>	<i>Demonstrationen</i>
	the _{NOM.SG}	position	on	the _{DAT.PL(≠NOM.PL)}	demonstrations

A similar observation was made for Slovak gender agreement (Badecker & Kuminiak, 2007): to produce a significant effect, an attractor should look like a nominative subject. Notably, the syncretism factor has never been examined separately from number: in (2a), the attractor is plural and morphologically ambiguous with nominative plural, and in (2b), it is plural and not ambiguous. In the present study relying on Russian, I added to this comparison attractors that are singular but syncretic with nominative plural in order to identify the independent influence of syncretism in attraction.

The present study

I report three experiments studying subject–predicate number agreement in Russian. Experiment 1 aimed to elicit agreement errors in production. Experiment 2 used the speeded grammaticality judgement method to examine which agreement errors tend to be overlooked more often in comprehension. Experiment 3 provided more information on comprehension using the self-paced reading method; it analyzed how subject-verb agreement (including agreement errors) is processed online.

Let me outline the properties of Russian nominal inflection that are relevant for the present study. Russian nouns are inflected into six cases and two numbers. They may have different sets of inflections depending on their gender, animacy and stem type. Several examples are provided in Table 1.

Two patterns of syncretism will be crucial for the present study. First, the accusative usually coincides with the nominative in inanimate nouns and with the genitive in animate nouns; this is true for all Russian nouns in plural and for the majority of nouns in singular (the two feminine nouns in Table 1 illustrate an exception). Second, in the paradigms of *vilka* ‘fork_F’ and *koška* ‘cat_F’, the genitive singular coincides with the nominative plural. In the case of the inanimate *vilka*, the same form is also used in the accusative plural. This second type of syncretism is less widespread and is found in a group of nouns that do not have any other properties in common (e.g. being animate or inanimate, belonging to a particular

grammatical gender or inflectional class etc.).

Most previous production and comprehension studies of number agreement attraction found the following asymmetry: attraction effects were much larger when the head was singular and the attractor was plural, as in (1a) above, than in the opposite configuration, as in (3). To explain this asymmetry, the singular feature is usually argued to be unmarked in some sense, which makes singular attractors less effective (e.g. Bock & Miller, 1991; Eberhard et al., 2005; Vigliocco et al., 1995).²

(3) **The keys to the cabinet was rusty.*

Several experiments, however, did not reveal this pattern: for example, Franck et al. (2002) found it in English but not in French. Crucially, though, Lorimor, Bock, Zalkind, Sheyman, and Beard (2008) observed this pattern in a production study on Russian. Therefore, although examples with plural heads were included in the present study to have a full picture, I did not expect to find any significant attraction effects in such sentences, independent of the characteristics of the dependent nouns. Foreshadowing the results, this expectation was confirmed. It was therefore not crucial that the present study could not include plural dependent nouns syncretic with nominative singular (no Russian nouns have such forms).

The different types of noun phrases used as stimuli in the present

study are exemplified in (4a-d)–(5a-d). In addition to indicating the number and case for all nouns, for singular heads in (4a-d), I show whether their dependent nouns are syncretic with nominative plural, and for plural heads in (5a-d), I show whether their dependents are syncretic with nominative singular.

(4) a.	<i>ssylka</i>	<i>na</i>	<i>dokument</i>
	reference _{NOM.SG}	to	article _{ACC.SG(≠NOM.PL)}
b.	<i>ssylka</i>	<i>na</i>	<i>dokumenty</i>
	reference _{NOM.SG}	to	article _{ACC.PL(=NOM.PL)}
c.	<i>material</i>	<i>dlja</i>	<i>stat'i</i>
	material _{NOM.SG}	for	article _{GEN.SG(=NOM.PL)}
d.	<i>material</i>	<i>dlja</i>	<i>statej</i>
	material _{NOM.SG}	for	article _{GEN.PL(≠NOM.PL)}
(5) a.	<i>ssylki</i>	<i>na</i>	<i>dokument</i>
	reference _{NOM.PL}	to	article _{ACC.SG(=NOM.SG)}
b.	<i>ssylki</i>	<i>na</i>	<i>dokumenty</i>
	reference _{NOM.PL}	to	article _{ACC.PL(≠NOM.SG)}
c.	<i>materialy</i>	<i>dlja</i>	<i>stat'i</i>
	material _{NOM.PL}	for	article _{GEN.SG(=NOM.SG)}
d.	<i>materialy</i>	<i>dlja</i>	<i>statej</i>
	material _{NOM.PL}	for	article _{GEN.PL(≠NOM.SG)}

The factors manipulated in these examples are the number of the head and the dependent noun and the syncretism of the latter. I used only inanimate nouns because animate ones do not have plural forms syncretic with the nominative plural. Syncretism depends on case: in (4a-b) and (5a-b), the potential attractor is accusative, while in (4c-d) and (5c-d), it is genitive. This dependency cannot be avoided; in singular, only genitive forms can be syncretic with the nominative plural, and in plural, only accusative forms can be. However, this dependency does not seem problematic in the present design. If we take singular heads and treat the number and case of the dependent noun as factors, their interaction gives us syncretism. In

¹ The preposition *gegen* requires accusative, so the glosses show that *die* is an accusative form that coincides with nominative plural, unlike the dative plural *den* in (2b).

² This explanation is not uncontroversial: for example, some authors claim that the features of the head rather than of the attractor are of principal importance (Slioussar & Malko, 2016), but the present study does not bear on this question.

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