



## Variable agreement with coordinate subjects is not a form of agreement attraction

Lap-Ching Keung, Adrian Staub\*

Department of Psychological and Brain Sciences, University of Massachusetts Amherst, USA



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### ABSTRACT

Agreement attraction (e.g., *\*The key to the cabinets are rusty*) is not attributable to the linear proximity between the local noun and verb (Franck, Vigliocco, & Nicol, 2002). However, agreement with a disjoined subject (e.g., *The horses or the clock is red*) is specifically sensitive to the number of the nearer noun (Haskell & MacDonald, 2005). The present study highlights other differences between the influence on agreement of a local noun in the classic attraction configuration and the nearer noun in a coordinate subject. Experiments using a two-alternative forced-choice paradigm and eyetracking during reading show, first, that a singular second conjunct tends to elicit a singular verb; this influence of a singular noun contrasts with the lack of effect from a singular attractor. Second, in comprehension a singular second conjunct both facilitates processing of an ungrammatical singular verb and inhibits processing of a grammatical plural verb. This symmetrical effect contrasts with the lack of an agreement attraction effect in comprehension of grammatical sentences. It is proposed that variable agreement with coordinate subjects should be given distinct theoretical treatment, relating these phenomena to the cross-linguistic phenomenon of closest conjunct agreement.

### Introduction

In English, subjects and verbs must agree in number: a singular noun in subject position (the *controller*) must co-occur with a singular verb (the *target*), and a plural subject must co-occur with a plural verb. However, speakers frequently produce errors like (1).

- (1) \*The key to the cabinets are rusty.

Much psycholinguistic work has investigated the factors underlying such errors. In (1), the presence of a plural local noun (*cabinets*, also called an *attractor*) intervening between the singular controller (*key*) and target (*be*) elicits plural verbs in production (e.g., Bock & Eberhard, 1993; Bock & Miller, 1991; Vigliocco, Hartsuiker, Jarema, & Kolk, 1996) and makes ungrammatical plural verbs less salient in comprehension (e.g., Pearlmutter, Garnsey, & Bock, 1999; Tanner, Nicol & Brehm, 2014; Wagers, Lau, & Philips, 2009).

A finding that has placed important constraints on explanations of this phenomenon is that attraction errors are not attributable to the linear proximity between the local noun and verb (e.g., Bock & Cutting, 1992; Franck, Vigliocco, & Nicol, 2002; Vigliocco & Nicol, 1998). Franck et al. (2002) showed that errors like (2a) occur more often than errors like (2b), despite the noun *canyons* being closer to the verb than

the noun *flights*.

- (2) a. \*The helicopter for the flights over the canyon are safe.  
b. \*The helicopter for the flight over the canyons are safe.

This finding has been interpreted as supporting the conclusion that only hierarchical structure, not linear order, plays a role in agreement computation.

There is, however, at least one circumstance in which a noun that is linearly close to the verb does tend to determine agreement in English: when the noun is part of a disjoined subject. In production experiments, Haskell and MacDonald (2005) found that a verb occurring before a disjoined subject almost always agrees with the first disjunct (e.g., *Are the horses or the clock red?*), but a verb occurring after a disjoined subject usually agrees with the second disjunct (e.g., *The horses or the clock is red*). This tendency to agree with the nearer noun in a disjunction, in controlled psycholinguistic experiments, is consistent with both rating studies (Peterson, 1986) and prescriptive advice frequently offered to writers of English (e.g., Fowler & Aaron, 2007).

Why might the number of a nearby noun exert a clear influence on verb number when the subject is a disjunction, but not when the subject is in the classic attraction configuration, in which the attractors are embedded in post-modifiers of the controller noun? Haskell and

\* Corresponding author at: Department of Psychological and Brain Sciences, University of Massachusetts Amherst, 430 Tobin Hall, 135 Hicks Way, Amherst, MA 01003, USA.

E-mail addresses: [lkeung@psych.umass.edu](mailto:lkeung@psych.umass.edu) (L.-C. Keung), [astaub@psych.umass.edu](mailto:astaub@psych.umass.edu) (A. Staub).

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MacDonald (2005) suggested that linear order does play a role in computing number agreement in general, but that an observable effect of linear order appears with disjointed subjects because the two nouns are not hierarchically distinct. They proposed that the influence of syntactic hierarchy is stronger than the influence of linear order, making the latter effect difficult to detect in the classic attraction configuration, in which there are hierarchical differences between the potential attractor nouns. They argued that speakers must have access to linear order information at the time that agreement is computed, and that their findings favor language production models in which there is no strict separation between a stage at which hierarchical relations between elements are established, and a stage at which elements are linearized (e.g., Pickering, Branigan, & McLean, 2002).

However, Haskell and MacDonald (2005) also considered another possibility, namely that agreement with disjunctions, or with coordinate subjects more generally, is “a special case that is handled differently than cases of ‘ordinary’ agreement” (p. 901). This alternative interpretation is theoretically important: If the linear order effect that emerges with disjunctions is idiosyncratic, arising because of the structure of coordination, or because of how number is represented in coordinate phrases, then this effect would not implicate a role for linear order in computing number agreement in general. Instead, it would require a detailed and specific theory of how agreement is accomplished when the subject is a coordinate phrase.

In fact, the ‘special’ status of agreement with coordinate noun phrases, both disjunctions and conjunctions, has been very widely noted in the theoretical literature (e.g., Corbett, 2006). One goal has been to account for the influence of the semantic or ‘notional’ number of the subject. Conjoined subjects typically receive plural agreement, as in (3a), but can receive singular agreement when the phrase is interpreted as denoting a single entity (3b; e.g., Lorimor, 2007; Lorimor, Adams, & Middleton, 2018; Lorimor, Jackson, Spalek, & van Hell, 2016):

- (3) a. The dog and cat are sleeping in the kitchen.  
 b. The wind and rain is making this drive rather difficult.

A second goal, however, has been to account for precisely the phenomenon highlighted by Haskell and MacDonald (2005): the tendency for the verb to agree with the linearly closer noun phrase. While agreement with the nearer noun phrase has been most evident in English in the case of disjunction, cross-linguistically it is widely attested with conjunctions as well. This pattern, which occurs not only for number, but also for person, gender, and other features, is known as *closest conjunct agreement* (CCA). CCA has presented a puzzle for syntactic theories of agreement (e.g., Nevins & Weisser, in press), which do not straightforwardly account for effects of linear order.

The present study takes up the question of whether number agreement with coordinate subjects in English does behave as a ‘special’ case, in a manner that extends beyond the demonstration of linear order effects on agreement with disjunctions. Haskell and MacDonald’s (2005) inference that linear order plays a role in agreement in general relies on the assumption that the nearer noun in a coordinate subject and a local noun in the classic attraction configuration influence agreement by means of similar underlying mechanisms. Here, we ask whether the influence of the nearer noun in a coordinate subject is, in fact, empirically similar to the influence of the local noun in the classic attraction configuration.

The remainder of this introduction proceeds as follows. First, we review the psycholinguistic literature that has investigated the role of linear order in agreement. Then, we discuss the cross-linguistic phenomenon of CCA and describe theoretical accounts of CCA in the linguistic literature. Finally, we motivate the present experiments.

### Linear effects on agreement

One intuitive explanation (e.g., Quirk, Greenbaum, Leech, & Svartvik, 1972) for classic agreement attraction emphasizes the linear –

and therefore temporal – proximity between the local noun and target; a verb may sometimes agree with a non-subject noun when this noun and the verb are active close together in time. This explanation predicts more attraction errors when the local noun is linearly next to the target, like *canyons* in (2b), than when it is linearly more distant, like *flights* in (2a). However, Franck et al. (2002) obtained the opposite pattern: The local noun more distant from the target is the stronger attractor. Indeed, in their experiments, there was *only* an influence of the more distant attractor; there was no influence whatsoever of the number of the proximate noun. They argued that the strength of the attraction effect is determined by the hierarchical distance between the local noun and controller, in terms of the number of syntactic nodes that intervene. Because the first local noun is less deeply embedded in the subject phrase than the second one is, making it structurally closer to the controller noun, it is the stronger attractor. The claim that the depth of syntactic embedding determines a noun’s potency as an attractor has been formalized in the Marking and Morphing model (Eberhard, Cutting, & Bock, 2005).

Franck et al.’s (2002) results do not directly arbitrate between an account emphasizing hierarchical distance between the local noun and controller and one emphasizing linear distance between these elements. Gillespie and Pearlmutter (2011, 2013) replicated the Franck et al. (2002) findings, but presented evidence suggesting that it may be the linear, rather than hierarchical, distance between the first local noun and controller that explains its potency as an attractor. There is consensus, however, that the distance between a local noun and target does not determine the strength of the attraction effect in the classic attraction configuration.

While there is some evidence of linear proximity effects on agreement in other structural configurations (e.g., in Basque, where the verb agrees with both a preverbal subject and object; Santesteban, Pickering, & Branigan, 2013), the clearest evidence that linear distance between a noun and target plays a role in agreement computation comes from Haskell and MacDonald (2005), who tested for linear order effects by having participants produce questions with disjointed subjects in which the two disjuncts differed in number. In one experiment, they elicited questions with subject-auxiliary inversion (e.g., *Are the horses or the clock red?*) while in another, they elicited embedded questions in which the verb comes after the subject (e.g., *Can you tell me if the horses or the clock is red?*) A plural proximate noun induced a plural verb over 90% of the time, whether the verb preceded the subject or followed it. A singular proximate noun induced a singular verb over 90% of the time when the verb preceded the subject, and 72% of the time when it followed the subject. In sum, speakers showed a very strong tendency to agree with the nearer disjunct, qualified by a somewhat weaker, but still strong, tendency to produce singular agreement when the verb followed a singular second disjunct.<sup>1</sup>

Haskell and MacDonald (2005) suggested that though hierarchical relations are primary in the agreement computation process, linear proximity between a noun and the agreement target plays an observable role when the effect of hierarchy is neutralized. They assumed a syntactic representation for disjunction in which the two nouns are hierarchically equidistant from the verb and can be reversed without a change in hierarchical relations. We discuss this representational assumption in the next section.

### Agreement with coordinate subjects

Agreement with coordinate subjects has been much discussed within theoretical linguistics, precisely because of the role of linear

<sup>1</sup> Interestingly, this pattern mirrors prescriptive advice. Fowler and Aaron (2007) regard a singular verb as ‘awkward’ following a plural-or-singular disjunction, and advise writers to reverse the order of the disjuncts and use a plural verb.

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