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QUANTIFIERS UNDONE: REVERSING PREDICTABLE SPEECH ERRORS IN COMPREHENSION

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Abstract

Speakers predictably make errors during spontaneous speech. Listeners may identify such errors and repair the input, or their analysis of the input, accordingly. Two written questionnaire studies investigated error compensation mechanisms in sentences with doubled quantifiers such as *Many students often turn in their assignments late*. Results show a considerable number of undoubled interpretations for all items tested (though fewer for sentences containing doubled negation than for sentences containing *many-often*, *every-always* or *few-seldom*.) This evidence shows that the compositional form-meaning pairing supplied by the grammar is not the only systematic mapping between form and meaning. Implicit knowledge of the workings of the performance systems provides an additional mechanism for pairing sentence form and meaning. Alternate accounts of the data based on either a concord interpretation or an emphatic interpretation of the doubled quantifier don't explain why listeners fail to apprehend the 'extra meaning' added by the potentially redundant material only in limited circumstances.

1. Introduction

Speakers often make errors during the spontaneous production of speech (see Kawachi 2002 for references and for a comparison of the types of errors in spontaneous versus scripted speech). Listeners may well be able to identify an utterance as containing an error. The question is whether listeners then compensate for the error in interpreting the utterance. Some errors do not result in an ill-formed structure, but rather are the result of pairing the wrong form with the speaker's intended meaning. When a well-formed sentence is paired with an interpretation that does not result from compositional interpretation, we will refer to the interpretation as 'ungrammatical' on the assumption that the grammar regulates the pairing of form and meaning, though we recognize others adopt a narrower use of the term. We suggest that the utterances quoted above are instances of just such speech errors producing an ungrammatical form-meaning pairing. If listeners compensate for errors even in cases where the sentence structure is well-formed, error compensation may influence the

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"Many people often thought that you use whipped cream pie" (National Public Radio, discussion of clowns and pie throwing)

"Typically when I meet people I often ask people what they would talk about if this wasn't a job talk" (Introduction to a University of Massachusetts colloquium, 3-22-10)

"...and it might not require scientific research to infer that the majority of sarcasm one encounters is usually spoken." (Undergraduate paper, University of Massachusetts, Spring, 2010)

interpretation assigned to well-formed sentences that have completely sensible compositional interpretations supplied by the grammar. If so, it would suggest that the pairing of form and meaning encoded in the grammar is not the only systematic way of pairing form and meaning. Listeners can ‘read through’ errors made by speakers.

What is particularly interesting about such speech error mechanisms and their comprehension counterparts is what they imply about the various mechanisms for establishing a regular pairing between form and meaning. On most conceptions of linguistic theory, the grammar supplies a compositional mapping between form and meaning. If the present speculation is correct, an additional mechanism may exist: a systematic mapping between form and meaning which is defined by the grammar together with implicit knowledge of the speech production and comprehension systems.

In what follows, the impact of speech errors on comprehension and acceptability judgments will be explored. In Section 2, various general considerations together with the results of pilot studies will be used to explore the effects of speech errors on language comprehension. Two hypotheses are proposed. One (the Error Compensation Hypothesis) proposes that listeners compensate for speech errors by undoing the error, arriving at a repaired utterance. The other hypothesis (the Acceptable Ungrammaticality Hypothesis) claims that the repaired utterance can also be acceptable when the error is a common and predictable one and it is easy to repair, e.g., because the speaker's intent is clear. The results of experimental tests of the error compensation hypothesis are reported in Section 3. Section 4 returns to general issues of how acceptability and interpretation are influenced by the operation of the performance systems.

2. Error compensation and acceptable ungrammaticality hypotheses

Speakers often make local plural errors by incorrectly producing a plural verb when a singular subject contains a plural noun intervening between the head noun and the verb, as illustrated in (1a) (Bock & Cutting, 1992, for example). Listeners and readers apparently compensate for these ‘number attraction’ errors. Comprehension time penalties are systematically observed for number agreement violations but are reduced when the number agreement violation corresponds to the local plural errors made in language production (Pearlmutter, Garnsey & Bock, 1999, Wagers, Lau & Phillips, 2009, Staub, 2009, Steiner, 2009).

(1) The key to the cabinets...

- a. are in the drawer.
- b. is in the drawer.

In some cases, the ‘error’ actually sounds better than the grammatically predicted form, leading some investigators to wonder if perhaps local agreement is grammatical rather than a processing error (see Steiner, 2009, for discussion and evidence, in German, ultimately coming down on the side of a processing account). Although the grammar requires a verb to agree with the head of its subject, the local plural error sounds acceptable to some degree because it is familiar and the speaker's intended meaning can be reconstructed. Presumably

the identification of the error itself is inhibited so that it does not distract the listener from the speaker's message. Said very simply, an ungrammatical realization of an intended message can sound just fine in some instances.

Generalizing the properties of local plural errors, one might attribute such acceptability of ungrammatical utterances to two related hypotheses, the Error Compensation and Acceptable Ungrammaticality Hypotheses in (2).

(2) Error Compensation Hypothesis (ECH): Listeners and readers compensate for errors in the input.

Acceptable Ungrammaticality Hypothesis (AUH): Ungrammatical sentences may be acceptable if

- i. The form of an utterance is familiar; it sounds like something a native speaker has heard or might hear given systematic properties of the speech production system.
- ii. The intended meaning of the utterance is clear.
- iii. The utterance can readily be repaired (e.g., few operations are needed or there is lots of evidence for them).
- iv. The intended meaning is related to the form systematically (the grammar plus implicit knowledge of the workings of the processing system),

The ECH claims that if an error is detected in the input, a hearer at least attempts to compensate for it. This is not surprising if hearers are trying to recover the speaker's intent. However, not all repairs will result in acceptable utterances. Sometimes the repaired utterance simply sounds ill-formed, even if it is interpretable. The AUH attempts to specify when a repaired utterance will sound acceptable. It assumes hearers have intuitions (accurate or not) about natural speech errors and are willing to make accommodations for them under particular circumstances. One test of this hypothesis (reported in Frazier, 2008) tested just two items like (3) where an impersonal subject in the *if*-clause does not match the impersonal subject in the main clause. In (3a), an actual speech error, an NPR interviewer switches from impersonal *you* to impersonal *we* to avoid being offensive. As speaker-listeners, presumably we can recognize the intent behind the switch. The question is whether this leads to judgments of greater acceptability of (3a) than of (3b). In (3b), the switch seems improbable; it would only be motivated by the speaker going out of her way to **insult** the addressee.

- (3) a. If you think this is going to solve the terrible problems in Najaf, we're deluding ourselves.
- b. If we think this is going to solve the terrible problems in Najaf, you're deluding yourself.

In Frazier's (2008) acceptability judgment study (using a scale from 1-5, where 5 was perfectly acceptable), two examples like (3a) were rated 4.05, which was significantly higher than the b-forms (which received a mean rating of 3.37). We propose that a nonstandard sentence is judged more acceptable if a listener can implicitly identify a reason

why the speaker may have produced it, and thus that acceptability judgments are related to the likelihood of an utterance being produced by a competent speaker of the language.

Arregui et al. (2006) argued that mismatch ellipsis, where the form of an antecedent clause and the form of an ellipsis clause do not match syntactically, can be relatively acceptable, even though (on their assumptions) it is ungrammatical. The proposal predicts that a passive-active mismatch, involving a passive antecedent clause and active ellipsis clause (4a), should be more acceptable than an active-passive one (4b), since a speaker who is planning an ellipsis clause should be more likely to misremember a passive antecedent clause as active than an active antecedent clause as passive (see Mehler 1963 for evidence).

(4) a. The dessert was praised by the customer after the critic did already.

b. The customer praised the dessert after the appetizer was already.

In acceptability judgments, passive-active mismatches were indeed rated as more acceptable than active-passive mismatches.

AUH claims recognition of an intended meaning is essential in language comprehension. How important is the ability to confidently identify the meaning the speaker intended? In an informal probe of non-linguists' intuitions, the mismatch ellipsis examples in (5) were explored. In (5a) with a plausible scenario and a parallelism between *kitchen* and *bathroom* as objects of *clean*, the elided structure (*the bathroom was cleaned too*) was apprehended, as indicated by the response that this was a "poorly worded attempt to say the kitchen and the bathroom were cleaned."

(5) a. The janitor cleaned the kitchen and the bathroom was too.

b. The janitor cleaned the kitchen and the jacket was too.

By contrast, in (5b) where the scenario is unlikely, because janitors don't usually clean jackets, the elided structure wasn't apprehended, as indicated by the response that (5b) "doesn't mean anything." Experimental tests provide further evidence that ungrammatical forms are repaired only when the speaker's intent can be confidently inferred.

Garnham & Oakhill (1987) investigated the processing of sentences like those in (6). With the misleading continuation *The nurse had too*, people often gave incorrect answers to questions, suggesting that they interpreted *The nurse had too* as "The nurse had examined the child too."

(6) It had been a busy morning in the hospital. The elderly patient had been examined by the doctor. The child/nurse had too.

AUH does not predict that interpretation is sloppy or 'good enough' (Ferreira & Patson, 2007; see Frazier, 2008, for a critique). When the system relating form and intended meaning isn't the grammar alone, repairs of the ungrammatical form will be made only when the utterance is the likely form produced by the human production system with the intended meaning. In a case like (3b), where the subject mismatch was unmotivated, or an active-passive mismatch, where the change of voice is unlikely, the ungrammatical forms are rated as unacceptable (relative to the forms with motivated errors). Likewise, in (7)

(7) The table kicked the girl.

the sentence is an unlikely error if the intended meaning is '*the girl kicked the table*.' The reason is because normal production mechanisms favor conceptually accessible phrases, such as those that are given, human and imageable, and thus would not tend to anticipate *table* in an utterance like (7). In a pilot study, 10 undergraduates were asked to rate how likely various sentence forms (see below) are to be produced with a particular intended meaning (on a scale from 1=never to 5=very likely). Example (7) was always rated as "1/never" in terms of being a likely error given the intended meaning "The girl kicked the table." In a separate paraphrase selection pilot study with 10 different participants, all but one response indicated that the table was the agent of an event of kicking the girl. In short, comprehenders are not just treating sentences like word salad or normalizing them in an unsystematic fashion.

The research we present below concerns quantifiers. It is clear that speakers often blend two different ways of making a quantificational statement (see Coppock, 2006, Bock & Cutting, 1996 for discussion of blends in general, and Horn, 2009 for discussion of examples involving negation). For example, a speaker might comment on the large number of late assignments using an adverbial quantifier (*Students often turn in their assignments late*) or using a determiner quantifier (*Many students turn in their assignments late*). However, a speaker might erroneously blend the two sentence forms producing *Many students often turn in their assignments late*. How people understand such utterances is important, since in principle there is a grammatical interpretation where each quantifier adds its own force to the interpretation of the sentence, as well as the interpretation in which the doubled quantifier is undoubled. If listeners and readers compensate for common errors, then they may undouble the quantifiers. In the same pilot study just described, 10 participants were instructed to "Circle the paraphrase that fits best with your first interpretation, box the other paraphrase if it's also a possible interpretation. Don't deliberate."

(8) I miss not going to the gym.

A. I used to go to the gym but now I don't, but I miss going there.

B. I used to not go to the gym but now I do, and I miss not going.

(9) Many people often turn in their assignments late.

A. People often turn in their assignments late.

B. Many people often turn in their assignments late.

29 of 40 responses selected the single quantifier 'A' interpretation (under which the sentence is not paired with its compositional interpretation) as a possible interpretation; 21/40 responses selected the 'A' interpretation as their first interpretation. We submit that the 'A' interpretation is ungrammatical because, in choosing it, respondents violate Chomsky's principle of full interpretation, which bans extraneous symbols from the derivation of a sentence (Chomsky, 1996). Considering (9), a speaker or writer who does not intend to quantify separately over people and events might produce (9) as a syntactic blend.

The possibility that a writer might deliberately use two quantifiers for emphasis rather than unintentionally making a speech error by blending two formulations of a message will be taken up later, in Section 4. However, note that a reader who accepts the ‘A’ interpretation as an emphatic form would still be overlooking the compositional, doubly quantified, interpretation, in a way that is in line with the AUH, even though strictly speaking the sentence would be emphatic and reflect the speaker’s intention rather than being the result of a speech error.

In Section 3, we present two formal experiments designed to explore the phenomenon of quantifier undoubling further. Although the results of the pilot study discussed in connection with (8) and (9) are clear, suggesting that people readily assign the undoubled interpretation (as the first interpretation in half of the responses), the pilot study had several potential drawbacks: the subjects were undergraduates in an entry level linguistics course, and there were very few filler items.

3. Experiments on quantifier doubling

As noted previously, a speaker who intends to comment on the lax standards of students when it comes to turning in assignments on time might say *Students often turn in their assignments late* or *Many students turn in their assignments late*. Blending the two forms, would result in the sentence *Many students often turn in their assignments late*. The question is how people understand such sentences – as an ungrammatical blend with an undoubled meaning or as a sentence with a grammatical doubly quantified interpretation? The speech error compensation hypothesis claims that comprehenders will undo common speech errors and thus undo the quantifier doubling, resulting in an undoubled interpretation. To test the predictions of the compensation hypothesis, two experiments were conducted (the second being a replication of the first, with control items added).

3.1. For the first experiment, 16 sentences like those in (9) were constructed. Two paraphrases (one ‘grammatical,’ respecting the quantifier doubling, and one ‘ungrammatical’) were made for each one, as illustrated in (10).

(10) Many students often turn in their assignments late.

What did that mean?

- A.** The number of students who turn in their assignments late is large.
- B.** The number of students who frequently turn in their assignments late is large.

Four sentences contained *many* and *often*; four contained *every* and *always*; four contained double negation of various forms, e.g. (8), and four contained *few* and *seldom*. For convenience, we will refer to these as the ‘many,’ the ‘universal,’ the ‘negation,’ and the ‘few’ items, respectively. All items appear in the appendix. Each sentence was presented, together with the two paraphrases in the order shown in (10), on a computer screen to University of Massachusetts undergraduate students, who received extra course credit for participating. The subject pressed a key on a computer keyboard corresponding to one paraphrase to indicate the preferred interpretation of the sentence. Fifty subjects were tested

in individual half-hour sessions. Each received all 16 experimental sentences, intermixed with 56 sentences from other unrelated experiments, in individually-randomized orders.

The overall results are simple and rather surprising. Sixty-two percent of the time, subjects chose the ‘ungrammatical’ undoubled paraphrase (standard error of 2.6%). However, there were substantial differences among the four sets of items. Table 1 presents the mean percentages of undoubled paraphrase choices for each set of items.

The statistical significance of the differences among the proportions underlying these percentages was tested using a logistic mixed model analysis, with experimental subject and item intercepts as random factors and item set as the fixed factor (Jaeger, 2008). The item set factor was analyzed by ordering the four types from lowest to highest percentage choices of undoubled paraphrases, and comparing each level with the next higher level. Each contrast was significant, highly significant in the comparison of negation with universal ($z = 3.73$, $p < .001$) but significant at the $p < .03$ level or better in each other contrast. Despite these differences, we conclude that the preference for undoubled responses is markedly high, well above 50%, for all types of quantifiers except for negation, which we discuss below.

3.2. We claim that our subjects are overlooking the doubled quantifiers for reasons described by the ECH/AUH, rather than simply being insensitive to their presence. Experiment 2 tests this by moving one quantifier to the front of the sentence, where it seems to have a sharper preference to quantify over times than it does in its default post-subject position. Two forms of each of the 16 items were written. One, illustrated in (11a), was the same form used in the first experiment, and contained the blended form of the determiner quantifier and the adverbial quantifier, with the adverbial quantifier in its unmarked post-subject position. The other form, (11b), preposed the adverbial quantifier to initial position. In this position, the quantifier seems to more clearly quantify over times than over individuals and so doubling is expected to be less likely. Consequently, if our subjects were in fact responding in a sensitive fashion to the form of the sentence, we expected fewer undoubled interpretations in (11b) than (11a). To reduce variability, the second experiment tested only sentences containing *many* and *often* or *every* and *always*. All experimental sentences appear in the Appendix.

(11) a. Many students often turn in their assignments late.

b. Often many students turn in their assignments late.

What did that mean?

A. The number of students who turn in their assignments late is large.

B. The number of students who frequently turn in their assignments late is large.

Data were collected from 56 University of Massachusetts undergraduate students as described for the first experiment. Two counterbalanced groups of subjects were tested, so that each subject saw half of the items in each of the forms (11a and 11b), and each item was presented in each form to half the subjects. The 16 experimental items were randomly intermixed with 56 unrelated items from other experiments (a different 56 items than in the first experiment.) Because of an experimental error, the temporal quantifier *often* was

omitted from the (11a) versions of items 5 through 7.¹ These three items were omitted from data analysis.

The overall results were straightforward: 60% of the chosen interpretations of sentences like (11a) were the ‘ungrammatical’ undoubled paraphrase (standard error = 2.6%). A significantly (logistic regression test $z = 3.33$, $p < .001$) lower 48% of the interpretations of sentences like (11b), with the fronted quantifier, were the ‘ungrammatical’ undoubled one (standard error = 2.6%). An analysis that added the factor of item type (many-often vs. every-always) resulted in a nonsignificant effect of type and a nonsignificant interaction of type with whether the quantifier was fronted or not ($p > 0.6$).

The number of undoubled responses was substantial, nearly 50% even in the sentences with an initial adverb. The fronted quantifier does not have to quantify over times or events; a sentence like *Often students turn in their assignments late* can certainly be taken to quantify over individuals. When the initial adverb sentences, like (11b), were interpreted in this way, they would presumably be treated the same as the sentences like (11a) with the quantifier in post-subject position. The informative finding of Experiment 2 is that there were significantly more undoubled answers in the sentences with an adverb in the unmarked, post-subject, order than in the marked, fronted order. This shows that people do attend to the presence of both quantifiers, and take the sentence with the marked form to express non-redundant quantification. When it appears that both quantifiers are present because of a speech error (or ungrammatical emphasis) rather than because of the speaker’s intention to quantify separately over times and individuals, people are more likely to assign the sentence the ungrammatical interpretation that results from overlooking the doubled quantifiers

4. Possible consequences

In this section, we will first consider alternatives to our proposal that readers treat sentences with doubled quantifiers as errors and compensate for them. Specifically, we consider the possibility that doubled quantifiers might be treated as part of a concord system, as well as the possibility that the doubled quantifier is interpreted as being fully redundant but emphatic. We then turn to a consideration of possible implications of the quantifier doubling compensation hypothesis, followed by discussion of the AUH.

Imagine that the subjects we tested treated the doubled quantifiers as participating in an incipient concord system. This would presumably avoid the point we mentioned earlier, that the doubled quantifiers violate Chomsky’s principle of full interpretation, which bans extraneous symbols from the derivation of a sentence (Chomsky, 1996). The principle would be violated if, for example, a clause containing a transitive verb appeared with two internal arguments, e.g., *Josh kissed Mary, Sue*. In terms of interpretation, a totally redundant word or phrase presumably violates the principle and should be ungrammatical.²

¹Discussion with the undergraduate assistant who prepared the final script for the computer program suggested that she took the doubled quantifiers to be a writing error, and without realizing it, corrected them.

²In the present case, it may be more telling to cast Full Interpretation as a principle constraining the syntax-semantics interface, banning interpretations that skip constituents.

But concord is not redundancy but instead a reflex of a grammar containing a particular set of formal features which participate in a feature checking system.

Doubling in the form of a grammatical concord system is perhaps best known from examples involving negation, as in (12), where only one negative gets interpreted semantically. Indeed, Zeijlstra (ms) proposes the Flexible Formal Feature Hypothesis in (13) to explain how concord systems arise.

(12) He don't got no friends.

Intended interpretation: He doesn't have any friends.

(13) Flexible Formal Feature Hypothesis: Features are formal (they project as in concord languages) only if there is a substantial number of instances of doubling with respect to the feature in the input in first language acquisition.

The point of the Flexible Formal Feature Hypothesis, as we understand it, is to indicate how grammatical concord systems may come about. The child may hear double negatives with undoubled meanings and postulate formal features corresponding to the doubled constituent. We view this proposal as completely compatible with our own proposal. The difference is, in the cases handled by the Flexible Formal Feature Hypothesis, the undoubled meaning will come about due to grammatical mechanisms. This leads us to expect that the concord system will be general, based on sentence type, rather than applying differentially to different sentence tokens or to different utterances of the identical sentence. We argue below that the effects we have observed are not general, but depend on the properties of the individual sentence token. A second suggestive argument against the possibility that our results reflect concord is that the frequency of un-doubling was *least* in the negation conditions of Experiment 1, which is just the case where concord is most prevalent in some dialects of English. We suspect that our subjects' avoidance of the un-doubled interpretations of these sentences reflect instruction in prescriptive grammar that they received as children: "Don't say *He don't got no friends*."

If the experimental sentences were not interpreted as instances of concord, perhaps they were interpreted as being emphatic. Sometimes redundant information serves to emphasize the speaker's intended message, as in (14), where *the day after today* might be taken to emphasize how little time the speaker has to prepare, or as in (15) where *a man* provides inferable information that is highly relevant for conveying the adversative notion 'although a man' John defended women's rights.

(14) Tomorrow, the day after today, I must be ready to lecture for five hours.

(15) John, a man, has dedicated his life to defending women's rights.

Although redundancy may be taken to indicate emphasis in these examples, this interpretation may depend on specific details of the form of these sentences, e.g., the fact that the redundant information is expressed in a parenthetical. More typically, we believe that the listener or reader interprets material as fully redundant only as a last resort. In (16a),

for example, intuitions suggest that when *quickly* appears pre-verbally it may be interpreted as either a sentence level or a manner adverb, the latter interpretation perhaps being favored by the null context. But in (16b) one clearly avoids the redundant manner interpretation of *quickly*, interpreting the sentence as ‘without delay, Joshua read the book at a fast pace.’

(16a) Joshua quickly read the book.

(16b) Joshua quickly read the book quickly.

In (17) the listener or reader has the option of either interpreting the second *tomorrow* as a speech error or making the unusual move of shifting the reference time for the interpretation of *tomorrow* from the utterance time to tomorrow.

(17) Tomorrow I must go tomorrow.

The fact that the interpreter is willing to shift the reference time without any indication of a quotation suggests that the interpreter is trying to avoid redundancy by looking for the interpretive contribution of the second *tomorrow*. Reduplication as in (18) is another form of redundancy.

(18) Ernie wants a salad salad.

But even here the redundant information is adding meaning, namely, indicating that a prototypical member of the class is intended (see Ghomeshi et al., 2004).

In sum, if the adverbial quantifier in the sentences we examined is interpreted as emphatic, it must be explained why the interpreter isn’t looking for a way that the adverb adds to the interpretation of the sentence. Given a sentence like *Many students often turn in their assignments late*, the listener or reader may interpret the message to emphasize how common tardy assignments are. But why doesn’t the interpreter take the ‘emphatic’ reading where the speaker is emphasizing both that there are lots of offenders and lots of offenses for each?

We have provided reasons for believing that doubling in the cases we have discussed is a predictable type of speech error and the comprehension system compensates for the error. We turn now to more speculative discussion of doubling and other possible speech errors, and of the implications our observations may have for the human language comprehension system.

We would be surprised if the doubled form would survive in more formal registers; we suspect it would be edited out in such registers, spoken or written, if not by automatic self-monitoring then by conscious removal. This distinguishes real concord systems from the sort of compensation mechanism we propose. Indeed, in an impressive detailed survey of grammatical doubling, Barbiers et al. (2008, page 4) note:

If it is true that syntactic doubling phenomena are much more common and frequent in substandard varieties, this raises interesting questions about the differences between standard and substandard languages.

On the present view, the quantifier doubling compensation explored here is expected to be largely restricted to informal registers where compensation mechanisms may apply most freely. Indeed, the notion of formal registers may largely be defined with respect to the absence of a need for the listener to compensate for the speaker and, by hypothesis, listeners are least likely to make repairs in formal registers.

Which cases of doubling get grammaticized is an issue that goes far beyond the scope of our own study. If Zeijlstra is correct, the frequency of the input will play an important role. One can imagine that negation and tense are particularly frequent in the input, and thus negative concord or sequence of tense markers should be more likely to be grammaticized than less frequent forms of doubling, e.g., involving *few* and *seldom* (e.g., quantifier doubling in *Few people seldom speak five languages.*)

The speech error compensation hypothesis can be viewed as the underlying source of acceptable ungrammatical sentences. But, since compensation for errors doesn't necessarily entail acceptability of an ungrammatical sentence or interpretation, we cast the AUH as a separate hypothesis. The AUH clearly involves a wider set of syntactic blends than just doubling. These include the passive-active mismatches in ellipsis discussed in Section 1, and cases of conjoined IP antecedents for verb phrase ellipsis (see Frazier & Clifton, in press), for example. Acceptable ungrammaticality can extend beyond syntax to morphology. Confusion over which grammatical morpheme has been uttered seems to be common (e.g., writers can use *their* for *there* or *it's* for the possessive *its*, and readers can accept the error). Otero (1972) argued that Spanish (and also other Romance speaking) language users incorrectly accept ungrammatical sentences containing SE in examples like (20). As (19) shows, impersonal *se* requires singular agreement features on the verb. By contrast, reflexive/reciprocal *se* (20) requires the verb to agree with its postverbal subject, and thus the verb will be plural if the subject is. What Otero noticed was that Spanish speakers will use a plural verb form (grammatical for the reflexive/reciprocal) with an impersonal meaning.

(19) a. SE alquila apartamentos. ('Impersonal SE')

'PRO rent-sg. apartments.'

b. *SE alquilan apartamentos.

'PRO rent-pl. apartments.'

'PRO rents apartments'

(20) SE alquilan apartamentos. (Reflexive, Reciprocal SE)

'They rent apartments to themselves/each other'

We have tested this informally on native speakers of Spanish who first accept (19b) with an impersonal meaning and then laugh when they consciously think about the example and realize what they have done.

The hypothesis that listeners compensate for predictable speech errors has ramifications for interpretation, as just discussed, but also for acceptability, as captured by the AUH. The

AUH captures some of the ways in which the phenomenon is token-based. This is because the intended meaning of an utterance must be apparent in order for listeners to repair the utterance to the one intended by the speaker (see discussion of Garnham et al. above). Thus not every sentence of the same structural type will receive the same treatment.

Wellwood et al., 2009, studied illusions of grammaticality in sentences like “*More phonologists have gone to CUNY than I have.*” They showed the illusion was twice as likely with habitual predicates (*take swimming lessons*) as with episodic ones (*voted in this election*). In the acceptable ungrammaticality approach to doubled quantifiers urged here, generic/habitual predicates seem to provide a tempting alternative formulation of a single message (“*Kids often lie.*” vs. “*Many kids lie.*”) whereas episodic predicates do not (“*Yesterday in the principal’s office, kids often lied.*” vs. “*Yesterday in the principal’s office, many kids lied.*”). In episodic clauses, intuitions suggest that it is clear whether quantification is over individuals or over events/occasions. Thus, if the illusion is in part related to the process of quantifier doubling and undoubling explored here, then the Wellwood et al. data provide further evidence that compensation is a token-based phenomena, in this case one restricted by the type of predicate rather than being completely general to all instances of a given sentence type.

In short, the AUH approach to compensation mechanisms offers an account for why certain ungrammatical sentences or unlicensed interpretations are prevalent. They suggest the phenomena should be token based, and restricted to informal registers. The very same individuals may accept certain interpretations in colloquial language but reject them in formal settings. Quantifier undoubling, from this perspective, is tied to a much more general set of phenomena including mismatch ellipsis and other forms of acceptable ungrammaticality.

On this view, the grammar of a language may be quite restrictive and undergenerate the set of sentences or form-meaning pairings observed in actual language use. In this sense, the grammar may provide the core of ideal form-meaning pairs which satisfy all principles of the language system. Deviations from this ideal may be systematic and interesting. The pairings of form and meaning which arise in colloquial language may at times compete with the formal system, as in the case studied here.

Indeed, the two systems may interact. Under circumstances where the performance pairing (implicit knowledge of the performance systems plus grammar) sounds better than the strictly grammatical form, e.g., in attraction error examples discussed in the introduction, the mismatch between error and grammatical form may create a tension in the speaker. The result may be avoidance of those structures in formal settings, prescriptions, or eventual change of the grammatical system.

The importance of examining the ‘performance’ pairing of form and meaning is not restricted to the kinds of examples discussed so far. Presumably pragmatic strengthening of utterances is a regular part of language use. When terms regularly get strengthened, one can imagine the result being on a par with the compensation mechanisms discussed here. Such terms may take on the strengthened interpretation, expressions that are often used ironically may be

tagged in some way, and so forth. In short, a comprehension system which exploits both the grammar and other sources of knowledge may in some cases provide interpretations that go beyond those supplied by the grammar alone. Understanding language use and language change may depend on a fuller understanding of these mechanisms as well as understanding the shape of possible grammars.

Does the evidence we have presented in support of the quantifier undoubling in any sense challenge the claim that a formal grammar characterizes the implicit knowledge a speaker has of her language? We think not. In fact, just the opposite. The present account depends on there being a grammar to identify the need for compensation in the first place as well as the ambiguity observed for quantifier doubled sentences in the pilot studies discussed above. A system which directly used only the performance pairing of form and meaning (e.g., directly attributing *Many students often ...* a meaning where one quantifier does not contribute anything semantically) would miss the generalizations we have tried to establish, namely, that compensation takes place in particular registers, only in some tokens of a particular sentence type, but in a wide variety of utterances instantiating predictable speech errors. Thus, we view our proposal not as a challenge to the claim that language users exploit formal grammars but as evidence in support of it. Shifting attention to the existence of both a fully general generative system and interpretive regularities ultimately derived from implicit knowledge of how processing mechanisms deal with particular types of sentence tokens may lead to a more nuanced understanding of the rich interplay between semantic and pragmatic interpretation in actual language comprehension.

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Appendix

Materials used in Experiment 1

1. Many students often turn in their assignments late.

What did this mean to you? {The number of students who turn in their assignments late is large. The number of students who repeatedly turn in their assignments late is large.}

2. Many shopkeepers often mark down prices.

What did this mean to you? {The number of shopkeepers who mark down prices is large. The number of shopkeepers who repeatedly mark down prices is large.}

3. Many journalists often interview local authors.

What did this mean to you? {The number of journalists who interview authors is large. The number of journalists who repeatedly interview authors is large.}

4. British gardeners often fertilize plants in late spring.

What did this mean to you? {The number of British gardeners that fertilize plants in late spring is large. The number of British gardeners that repeatedly fertilize plants in late spring is large.}

5. Every teacher always repeats the main point of a class.

What did this mean to you? {All teachers repeat central points of a class. All teachers repeat central points in every class.}

6. Every customer always asks about a discount during summer shopping trips.

What did this mean to you? {All customers ask about a discount during summer shopping trips. All customers ask about a discount on every summer shopping trip.}

7. Every Dutch tourist always speaks English beautifully.

What did this mean to you? {Dutch tourists speak English beautifully. Dutch tourists speak English beautifully in every situation.}

8. Every accountant always checks the social security number of dependents.

What did this mean to you? {All accountants check the social security number of dependents. All accountants check the social security number of every dependent.}

9. No social studies teachers never go to see the principal.

What did this mean to you? {Social studies teachers don't go to see the principal. Every teacher sometimes goes to see the principal.}

10. Friends don't hardly ever criticize each other.

What did this mean to you? {Rarely do friends criticize each other. Often friends criticize each other.}

11. I miss not going to the gym.

What did this mean to you? {What I miss is going to the gym. What I miss is not going to the gym.}

12. Jane doubts Bill didn't go to Paris.

What did this mean to you? {Jane thinks Bill didn't go to Paris. Jane believes Bill went to Paris.}

13. Few Americans seldom speak three languages.

What did this mean to you? {The number of Americans who speak three languages is small. The number of Americans who speak three languages on only a few occasions is small.}

14. Few acquaintances seldom notice a slight social offense.

What did this mean to you? {The number of acquaintances who notice a slight social offense is small. The number of acquaintances who only occasionally notice a slight social offense is small.}

15. Few politicians seldom directly criticize their opponents.

What did this mean to you? {The number of politicians who criticize their opponents directly is small. The number of politicians who rarely criticize their opponents is small.}

16. Few announcers seldom make noticeable speech errors.

What did this mean to you? {The number of announcers that make noticeable speech errors is small. The number of announcers that rarely make noticeable speech errors is small.}

Materials used in Experiment 2

- 1 a. Many students often turn in their assignments late.

- 1b. Often many students turn in their assignments late.

What did that mean? {The number of students who turn in their assignments late is large. Frequently the number of students who turn in their assignments late is large.}

- 2a. Many shopkeepers often mark down prices.

- 2b. Often many shopkeepers mark down prices.

What did that mean? {The number of shopkeepers who mark down prices is large. Frequently the number of shopkeepers who mark down prices is large.}

- 3a. Many journalists often interview local authors.

- 3b. Often many journalists interview local authors.

What did that mean? {The number of journalists who interview local authors is large. Frequently the number of journalists who interview local authors is large.}

- 4a. Many British gardeners often fertilize plants in late spring.

- 4b. Often many British gardeners fertilize plants in late spring.

What did that mean? {The number of British gardeners who fertilize plants in late spring is large. Frequently the number of British gardeners who fertilize plants in late spring is large.}

- 5a. Many butchers prepare rack of lamb for the holidays. (* NOT USED)

- 5b. Often many butchers prepare rack of lamb for the holidays.

What did that mean? {The number of butchers who prepare rack of lamb for the holidays is large. Frequently the number of butchers who prepare rack of lamb for the holidays is large.}

- 6a. Many taxi drivers favor well-dressed customers. (* NOT USED)

6b. Often many taxi drivers favor well-dressed customers.

What did that mean? {The number of taxi drivers who favor well-dressed customers is large. Frequently the number of taxi drivers who favor well-dressed customers is large.}

7a. Many carpenters use cheap wood on professional jobs. (* NOT USED)

7b. Often many carpenters use cheap wood on professional jobs.

What did that mean? {The number of carpenters who use cheap wood on professional jobs is large. Frequently the number of carpenters who use cheap wood on professional jobs is large.}

8a. Many assistants often refuse to make coffee.

8b. Often many assistants refuse to make coffee.

What did that mean? {The number of assistants who refuse to make coffee is large. Frequently the number of assistants who refuse to make coffee is large.}

9a. Every teacher always repeats the main point of a class.

9b. Always every teacher repeats the main point of a class.

What did that mean? {The number of teachers who repeat main points is large. Frequently the number of teachers who repeat the main points of a class is large.}

10a. Every Dutch tourist always speaks English beautifully.

10b. Always every Dutch tourist speaks English beautifully.

What did that mean? {The number of Dutch tourists who speak English beautifully is large. Frequently the number of Dutch tourists who speak English beautifully is large.}

11a. Every customer always asks about a discount during summer shopping trips.

11b. Always every customer asks about a discount during summer shopping trips.

What did that mean? {The number of customers who ask about discounts is large. Frequently the number of customers who ask about discounts is large.}

12a. Every accountant always checks the social security number of dependents.

12b. Always every accountant checks the social security number of dependents.

What did that mean? {The number of accountants who check the social security numbers of dependents is large. Frequently the number of accountants who check the social security numbers of dependents is large.}

13a. Every salesman always compares his product to a competitor.

13b. Always every salesman compares his product to a competitor.

What did that mean? {The number of salesmen who compare their product to a competitor is large. Frequently the number of salesmen who compare their product to a competitor is large.}

14a. Every student always texts before class.

14b. Always every student texts before class.

What did that mean? {The number of students who text before class is large. Frequently the number of students who text before class is large.}

15a. Every priest always forgives sinners.

15b. Always every priest forgives sinners.

What did that mean? {The number of priests who forgive sinners is large. Frequently the number of priests who forgive sinners is large.}

What did that mean? {The number of priests who forgive sinners is large. The number of priests who frequently forgive sinners is large.} {The number of priests who forgive sinners is large.}

16a. Every athlete always runs to warm up.

16b. Always every athlete runs to warm up.

What did that mean? {The number of athletes who run to warm up is large. Frequently the number of athletes who run to warm up is large.}

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Table 1

Percentage Choices of Undoubled Paraphrases, by Item Set (with SE in Parentheses)

Item Set			
‘many’	‘universal’	‘negation’	‘few’
(many-often)	(every-always)	(no-never)	(few-seldom)
77	64	36	73
(3.2)	(3.7)	(3.7)	(3.5)