Investigating the pragmatic factors licensing *but*

Alison English

Department of Linguistics, Rutgers University – New Brunswick

Senior Honors Thesis

Advisors: Dr. Peter Alrenga and Dr. Kristen Syrett

March 31, 2023

Acknowledgements

I would like to start by thanking all the people who helped make this thesis what it is today. Firstly, a huge thank you to my advisors Dr. Peter Alrenga and Dr. Kristen Syrett for their support, encouragement, and patience throughout this project. I had very little research experience at the start of this process and they both dedicated a vast amount of time to teaching me the right way to go about performing research and writing a scientific research paper. I have gained many skills and knowledge from their guidance in this project and I am so grateful for it.

I would also like to thank Kyle Parrish for the work he did in performing the data analysis and Lab Coordinator Nayantara Das, without whom I would not have been able to run my studies. I would not have my results without the work each of them did, and so thank you both for your assistance on my thesis.

When I began college I had no idea what I wanted to major in, so I would like to thank the Rutgers Linguistics Department for teaching me about how interesting language is. I have loved all of my linguistics classes and am still so excited to learn more.

Finally, I would like to thank my friends and family. My friends, who supported me and listened to me discuss far more linguistics than I think they would prefer. As well as Shivani Rawat in particular, who has far more research experience than me and gave me advice throughout and reassured me during some of the more stressful parts of the process. A huge thank you to my family, who have supported me before this project even started and have been so, so excited for me as my thesis progressed. An extra thank you to my mom in particular who was prepared to drive me to a conference in Canada I was presenting at when my flight got snowed out. All of your support has been invaluable and I am immensely grateful to have had it for this project.

Abstract

Speakers typically judge *John was tall, **but** Bill was **short*** to be acceptable. In contrast, *John was tall, **but** Bill was **tall*** is found to be odd, and *John was tall, **and** Bill was **tall*** preferred instead. This difference indicates that *but* adds an element of contrast that *and* does not, thereby limiting the circumstances in which its use is deemed acceptable. Previous research has shown that a *but*-licensing contrast can be established either by the choice of terms on either side of *but* (e.g., *tall* vs. *short*, *all* vs. *none*) (Toosarvandani, 2014), or by reference to a context that sets up certain expectations (Toosarvandani, 2014). There are also additional claims about which quantificational elements may participate in the contrast, and the order in which contrasting elements can appear based on their monotonicity. While speaker intuitions have driven these judgments, to date we lack systematic empirical evidence substantiating these claims. In this research, we conducted a set of acceptability judgment studies (Likert scale ratings and forced choice tasks) in which English speakers provided judgments about sentences with *but*. We find that while participants do prefer contrasting quantificational elements to have opposite monotonicity, the presence of a context supporting the appearance of quantifiers of the same monotonicity improves acceptability slightly. In addition, participants are sensitive to the order of contrasting quantificational elements, preferring a <weak, strong> order without upward-bounding *only*; however, when the dispreferred <strong, weak> reverse order obtains, the presence of *only* is preferred in connection with the weak element occurring second, which we take to signal the role of upper-bounded pragmatic implicatures in the absence of *only*. Taken together, the experimental results support previous claims about the pragmatic factors licensing the appearance of *but*, which should be investigated further.

1. Introduction

a*nd* and *but* are both conjunctions with the same truth-conditional meaning. Despite these similarities *but* cannot be used in all the circumstances *and* can, and speakers typically report clear judgments about where *but* is acceptable. Consider (1) and (2) below (from Toosarvandani, 2014):

(1) John was tall, {and, but} Bill was short.

(2) John was tall, {and, ?but} Bill was tall.

While listeners find both *and* and *but* acceptable in (1), only *and* is considered acceptable in (2). This difference seems to indicate that *but* differs from *and* in that it presupposes an element of contrast between its two conjuncts. As a result, *but* is felicitous in a more limited set of circumstances than *and*.

In (1) this contrast arises semantically, entirely from the meanings of the antonyms *tall* and *short* (Toosarvandani, 2014). This use of *but* is known as the *semantic oppositional* use. Opposition need not be between adjectives that are antonyms. Quantifiers can also participate in the contrast. While quantifiers do not have antonyms, they can contrast in terms of their monotonicity (something discussed below). When contrast in quantifier monotonicity does not occur, as in (3), *and* is preferred, but when it does occur, as in (4), *but* is preferred (Horn, 2001).

(3) All of the juniors, {and, ?but} many of the seniors registered for classes.

(4) No juniors, {?and, but} many seniors registered for classes.

Interestingly, semantic opposition between antonyms or quantifiers is not the only way for a contrast licensing *but* to arise. It is also possible for a contrast to occur through situational expectations (Toosarvandani, 2014), as highlighted in (5) and (6).

(5) It was sunny, {and, but} John brought an umbrella.

(6) It was raining, {and, ?but} John brought an umbrella.

People have background assumptions about behavior in certain weather conditions and when people carry umbrellas (i.e. people try to avoid getting wet when it is raining; people tend not to bring umbrellas when they know they will not need them). In (5) the description of the weather in the first conjunct sets up an expectation that an umbrella is unnecessary (through interaction with the background assumptions), so the assertion that John brought an umbrella in the second conjunct is unexpected, and *but* is licensed. In (6) the first conjunct *It was raining* creates the expectation that an umbrella may be necessary, and so it is not unexpected that John will bring an umbrella, and *but* is infelicitous. This use, in which contrast arises from the interaction of literal meaning and context, has been classified as the *counterexpectational* use of *but* (Toosarvandani, 2014).

Toosarvandani (2014) attempted to account for the uses of *but* by appealing to the idea of the Question Under Discussion (QUD). Roberts informally defines a QUD as the immediate question two or more speakers have agreed (by virtue of discussing that particular question instead of any alternative question) to attempt to answer through their shared discussion (1996). More formally, a QUD is a set of propositions that can act as a possible partial answer to the immediate question being discussed (Roberts, 1996). Thus the QUD *Who has a cat?* is represented by the set of propositions *x has a cat* for any relevant individual *x*. Each of these propositions constitutes a partial answer because if the full answer is that three people have cats, then the proposition *John has a cat* only provides part of the full answer. A polar question, like *Does John have a cat?* has a QUD represented by the set containing the proposition *John has a cat* or *John does not have a cat* (whichever is true). Toosarvandani argues that a "*but* sentence presupposes that each conjunct stands in an implicational relation to an answer in the QUD" (p.

27) where a proposition in the QUD is implied by the first conjunct and a (same or different) proposition in the QUD is implied to be negated by the second conjunct.

In the semantic opposition case of (1) the QUD is *who is tall?* where the propositions in the QUD are *x is tall* for anyone relevant to the current discussion. Thus if John and Bill are both relevant, the propositions *John is tall* and *Bill is tall* are both in the QUD. The first conjunct *John is tall* implies the proposition *John is tall*, while the second conjunct, *Bill is short*, implies that *Bill is not tall*. Since the first conjunct implies a proposition in the QUD and the second conjunct implies the negation of a proposition in the QUD, the use of *but* is licensed.

In a counterexpectation case such as (5) the QUD is *was it raining?* where the proposition in the QUD is *it was not raining*. The first conjunct *It was sunny* weakly implies this proposition, because it is possible for the implication to be false (it can be simultaneously rainy and sunny), but in most cases if it is sunny it is not raining, so a weak implication exists. The second conjunct *John brought an umbrella* weakly implies that *it is not the case that it was not raining* (or more simply *it was raining*), because given background knowledge on typical human behavior, people usually bring umbrellas when it is raining (but this is again weakly implied since it is possible to bring an umbrella when it is not raining). Since the first conjunct implies the proposition *it was not raining* while the second conjunct implies this proposition is not the case, the use of *but* is licensed.

This variety of factors licensing *but* raises questions about the meaning of *but*, and the way it interacts with and relies on lexical semantics of terms appearing in the conjuncts and pragmatic information from the context. While the contrasts in the examples above appear clear, it is also the case that in each of these instances, there appear to be ways to manipulate the background contexts of the dispreferred sentences in order to increase the felicity of *but*. This

manipulation could bring a dispreferred *but* sentence that does not fall under Toosarvandani's semantic opposition use of *but* more in line with the counterexpectation use of *but*, which may increase the sentence's felicity. If this is the case, then pragmatics appears to play more of a role than previously assumed in the licensing of *but*. To date, we lack systematic evidence probing these factors. This research intends to fill this gap.

Above, we mentioned that there are two main uses of *but*: a semantic oppositional use and a counterexpectational use. While the contrast in adjective antonyms may be easy to grasp, the contrast in quantifier monotonicity deserves additional explanation.

Glanzberg defines quantifiers as "properties of properties" (2006, p. 796), which he modified from Frege's second-level concepts (1879). We can thus explain what a quantifier refers to through set theory, where quantifiers are sets of sets of individuals (Glanzberg, 2006). For example, if LINGUISTS is defined as the set of all linguists, and P is a variable referring to sets of individuals, then the quantifier *all of the linguists* will denote the set {P: LINGUISTS is a subset of P}. Sentence (7) will then be true if the set denoted by its VP, {x: x went to the conference}, belongs to denotation of *all of the linguists*, or in other words, if LINGUISTS is a subset of {x : x went to the conference}.

(7) All of the linguists went to the conference.

This also allows us to define *none of the linguists* as: {P: there is no intersection between LINGUISTS and P} (ie. no individuals are part of both sets LINGUISTS and P). Similarly, *several of the linguists* would be defined as: {P: the intersection between LINGUISTS and P contains at least three individuals} (ie. there are at least three individuals in both the sets of LINGUISTS and P).

An aspect of quantifier meaning related to set membership is monotonicity. Determiners also share this property. Barwise and Cooper (1981) define this property as follows:

(8) a. A **quantifier Q** is MONOTONE INCREASING (mon ↑) if for any set x ∈ Q , Q also contains all the *supersets* of x.

b. A **quantifier Q** is MONOTONE DECREASING (mon ↓) if for any set x ∈ Q , Q also contains all the *subsets* of x.

c. A **determiner D** is monotone increasing (decreasing) if it always gives rise to monotone increasing (decreasing) quantifiers (p. 184-185)

We can demonstrate monotonicity with a quantifier such as *several* (in the quantificational expression in subject position), which is *upwards monotonic* with its VP argument. Take examples (9a-c) below. Consider that all pencils are writing utensils (that is, writing utensils are in a superset relation with pencils), and that all mechanical pencils are members of the set of pencils (that is, mechanical pencils are in a subset relation with pencils).

(9a) Several people brought pencils.

(9b) Several people brought writing utensils.

(9c) Several people brought mechanical pencils.

Thus, if (9a) is true, then (9b) must necessarily be true. However, (9c) does not follow from the truth of (9a), because since there are multiple types of pencils (mechanical, wooden #2, etc.) people could have brought. The quantifier *several people* thus licenses an inference from a given set of individuals (the pencil-buyers) to a more general superset (the writing utensil-buyers), but not to a more specific subset (the mechanical pencil-buyers). This makes *several people* upward monotonic.

We can contrast *several* with a quantifier like *no*, which is *downward monotonic* on its VP argument:

(10a) No person brought a pencil.

(10b) No person brought a writing utensil.

(10c) No person brought a mechanical pencil.

Unlike with (9), if (10a) is true, we cannot determine whether or not (10b) is true. This is because pencils are just one type of writing utensil. Just because no one brought a pencil does not mean that no one brought a pen, or a crayon, or a Sharpie. However, if (10a) is true then (10c) must necessarily be true, because mechanical pencils are a type of pencil: if no pencils were brought, then it must be true that no mechanical pencils were brought. The quantifier *no person* thus licenses an inference from a given set of individuals (the pencil-buyers) to a more specific subset (the mechanical pencil-buyers), but not to a more general superset (the writing utensil-buyers). This makes *no person* downward monotonic.

With this understanding of quantifier monotonicity, we can return to sentences with *but*. When a sentence features two conjuncts, each with a quantifier, and they both have the same monotonicity (either both upward or both downward), as in (3) (*all*, *many*), there is no contrast in the direction of the inferences. Thus, *and* is the preferred conjunction (Horn, 2001). However, when the conjuncts feature quantifiers of opposite monotonicity (one upward, one downward), as in (4) (*no*, *many*), *but* is the preferred conjunction (Horn, 2001).

Barwise & Cooper claimed that the order of the two conjuncts does not matter: as long as two quantifiers have the same monotonicity then either version of the sentence with *but* will be equally unacceptable (1981). Given how the order of the adjectival predicate conjuncts in (1) and

(2) does not seem to change their acceptability, one might anticipate that quantifiers would behave the same way.

Zhong & Collins (2021) argued that this is not the case and investigated sentences like (11) and (12), which contain two quantifiers of the same monotonicity. In the case of (11) and (12) *many* and *all* are both upward monotonic. They conducted two acceptability judgment tasks with native English speakers and found that participants prefer (11), where the weak quantifier precedes the strong quantifier.

(11) **Many**$_{W}$ of the pragmatists, but **all**$_{S}$ of the phoneticians attended the keynote.

(12) #**All**$_{S}$ of the phoneticians, but **many**$_{W}$ of the pragmatists attended the keynote.

A quantifier A is stronger than another quantifier B when quantifier A asymmetrically entails quantifier B (Horn, 2001). If *many pragmatists* attended the keynote, it could be the case that some number of pragmatists did not, hence *all pragmatists* is not entailed. If *all pragmatists* attended the keynote, then it must be the case that *many pragmatists* did. Thus *all* is a stronger quantifier than *many*.

Milsark (1977) used existential constructions as a diagnostic for strong and weak quantifiers. Weak quantificational expressions, such as *many gnomes* in (13a), can appear in this construction and have the sentence remain grammatical, while strong quantificational expressions, such as *all the gnomes* in (13b) cannot.

(13) a. There are many gnomes in the garden.

b. *There are all the gnomes in the garden.

Milsark explains that (13a) is acceptable while (13b) is not because weak quantifiers, like *many* in (13a), refer to an amount independent of the total, while strong quantifiers, like *all* in (13b), refer to a number based on the total (1977). (13a) is true if there are around ten gnomes in the

garden, regardless of whether the total number of existing gnomes is 15 or 1,000 (Milsark, 1977). In contrast, (13b) is only true if the number of gnomes in the garden is the same as the total number of existing gnomes (Milsark, 1977).

Zhong & Collins (2021) explain that the effect of quantifier order arises due to the calculation of scalar implicatures, which is one type of pragmatic strengthening. If a speaker asserts (14), they can be understood as allowing the inferences in (15):

(14) Many of the pragmatists attended the keynote.

(15) It is not the case that all of the pragmatists attended the keynote.

This inference takes place because of the Gricean Maxim of Quantity (Grice 1991), which maintains that a cooperative speaker should be as informative as possible. Thus, if a speaker asserts (14), they either know that the stronger statement with *all* does not hold (see (15)), or are not in a position to assert anything stronger, and so a listener is invited to calculate the implicature in (15). Scalar implicatures of this sort rely on lexical scales order in terms of strength, or entailment (Horn, 2001). Lexical scales are groups of words that have essentially the same meaning, but vary in strength (Horn, 2001). For example, *cool*, *cold*, and *freezing* all denote a low temperature, at varying levels of strength (where something being freezing asymmetrically entails that it is cold) (Horn, 2001). Like how scalar implicature allows a use of *many* to be interpreted as *many but not all* in (14), scalar implicature allows a use of *cold* to be understood by a listener as *cold but not freezing*, because *freezing* is an available alternative that the speaker is not using (Grice, 1991, Horn, 2001).

Thus when a speaker asserts (11) featuring the weaker scalar term *many* in the first conjunct, they are inviting a *not all* inference. This creates a semantic contrast with the scalar term *all* in the second conjunct (*not all* vs. *all*). Zhong & Collins claim that when *all* comes first,

as in (12), listeners do not begin by calculating the scalar implicature and do not arrive at a contrast, making (12) sound worse than (11) (2021).

Quantifiers are not the only types of words that can be ordered on a scale. Gradable adjectives can be ordered on a lexical scale based on strength, too (Horn, 2001). Consider *good – great – excellent*. The preference for the weaker term appearing first holds with scalar adjectives as well (Zhong & Collins, 2021). See (16) and (17):

(16) John was **tall**$_{w}$, but Liam was **towering**$_{s}$.

(17) #Liam was **towering**$_{s}$, but John was **tall**$_{w}$.

Interestingly, (17) seems to improve when *only* is present modifying the weaker adjective, as in (18), which Zhong & Collins' research does not address.

(18) Liam was **towering**$_{w}$, but John was **only tall**$_{s}$.

Why would this contrast hold? We can hypothesize that the reason *only* is improving (18) is because *only* imposes an upper bound. For example, *only tall* might mean, "and not anything more." Modification by *only* effectively does the same thing as a pragmatic scalar implicature, by signaling to the listener that nothing more holds (Barner et al., 2011). The difference is that when *only* is used, the upper bound is added semantically (by virtue of the meaning of *only*), and the listener must do less work to calculate the speaker's intended meaning. When *only* is present the exclusion of alternatives becomes part of the semantics of the utterance, making it mandatory (Barner et al., 2011). Thus, the *semantic opposition* use of *but* should be more available to a listener in a sentence with *only* (where the alternatives must be excluded), as opposed to sentences without *only* (where the exclusion of alternatives is only pragmatically implicated).

All of the examples thus far have been presented without any kind of supporting conversational discourse. However, when utterances are delivered by speakers in the real world,

they are not delivered in a void. There is always some sort of context present. Since context can give rise to expectations, this means that the presence of an explicit context could allow for the *counterexpectational* use of *but*, even in cases where there is no semantic opposition and the use of *but* seems infelicitous.

Recall (1), repeated below:

(1) John was tall, {and, but} Bill was short.

Toosarvandani provides an example context for (1) in which the presence of a context does not create an expectation: if one is a contestant on a game show with the task of guessing people's height and their heights are unrelated to each other, then an utterance of *John was tall* creates no expectation of Bill's height, making (1) remain exclusively a semantic opposition use of *but*. However, we can modify this example so that, on the gameshow, the first two people are always the same height, either both tall or both short. If this were the case, then an utterance of *John was tall* would create the expectation that *Bill was tall* based on the background knowledge we have about the way the game show functions. Thus when the second conjunct is *Bill was short*, it denies this expectation allowing for this to also be a counterexpectation use of *but*.

We can also add a context to a sentence that previously has neither use of *but* and was unacceptable. Take, for example, (2) from above, repeated here.

(2) John was tall, {and, ?but} Bill was tall.

We can provide a context that may support the use of *but* in this sentence, as in (19), followed by (2').

(19) A department store was looking for a tall and a short model to showcase their clothes. An agency sent two models, John and Bill, however when they arrived the department store found that

(2') John was **tall**, but Bill was **tall (too)**.

In this case, one could perhaps follow with (2'), because the context in (19) gives rise to the expectation that of the two models, one will be tall and one will be short. When the first conjunct provides the information that *John was tall* we thus expect for the second model to be short. This expectation is denied by the second conjunct *Bill was tall*, which allows for the counterexpectational use of *but*, and seems to improve (2).

Not everyone may necessarily find (2') acceptable, however it seems more acceptable than (2), particularly when (2') is said with a certain high prosody on the second *tall* and with contrastive focus on *Bill*. The inclusion of the word *too* or *also* at the end of the sentence also seems to make it more acceptable, through emphasizing the second conjunct. This increased emphasis indicates that the second conjunct is significant, which could be due to the fact that it was unexpected. Thus using *too* in (2') indicates to a listener that the speaker believes Bill being tall to be a significant utterance because it is not the expected outcome given (19), making it clearer that they are using the counterexpectation use of *but*[1].

I have reviewed the two main uses where *but* is licensed:

(a) the *semantic opposition use* with (i) adjective antonyms from the same scale, (ii) quantifiers of either different monotonicity, or (iii) quantifiers of the same monotonicity where the weak quantifier precedes the strong one

(b) the *counterexpectation use*, which seems to be able to override the absence of (a), and is driven by contextual information in the preceding discourse.

Thus, there are both lexical semantic and pragmatic conditions licensing *but*.

[1] A sentence like: *Yes John is tall, but Bill is tall (as well)*, would function similarly to (2') where *too* is present. The presence of *yes* and *as well* would further emphasize the contrast by serving as propositional anaphora and linking back to a context, which indicates that the speaker believes a contrast to be present (even if the listener may not know the context). The sentence is thus more acceptable because the existence of a contrast is more available to a listener.

These uses where *but* is licensed led us to develop the following two research questions about whether certain pragmatic factors can license *but*: (a) Does the manipulation of context highlight the counterexpectation use and facilitate appearance of *but* even when the preferred semantic contrast in quantifier monotonicity is not upheld? and (b) Does the appearance of *only* facilitate a contrast in sentences where pragmatic implicature calculation is more costly, serving to make the sentence more acceptable? To address these questions, we conducted three experiments. The first and third experiments were implemented in Qualtrics surveys and the second experiment was implemented in Prolific. All three were run online.

The first is an acceptability task designed to elicit baseline ratings for key sentences with *and* and *but* on a 5-point Likert scale. Two experiments were folded into this first experiment, with trials presented in randomized order. Experiment 1a probed the *counterexceptional* use and sought to determine if a supporting discourse context can license the use of *but* with sentences where the quantifiers are of the same or opposite monotonicity. Experiment 1b probed the *semantic opposition* use and sought to provide further evidence for the preference of a <weak, strong> order of scalar items, and to determine if modification of the weak scalar term by *only* improves acceptability of sentences where the scalar adjectives are presented in a <strong, weak> order. Based on these initial findings, we then modified our stimuli, and focused solely on sentences with *but*, not *and*.

We then conducted a second experiment, in which returned to the contexts from Experiment 1a and attempted to better highlight expectations. As before, Experiment 2a focused on the *counterexceptional* use and 2b focused on the *semantic opposition* use. This time, however, instead of acceptability ratings, participants were asked to select which of two versions of a sentence they thought sounded better in a binary forced choice task. Finally, in Experiment

3, we conducted the same experiment (again with Experiments 3a and 3b folded in), but without any supporting contexts, in order to provide a baseline for assessing judgments in Experiment 2.

2. Experiment 1

2.1. Participants

94 undergraduate students from Rutgers University – New Brunswick participated. They received extra credit in a linguistics or cognitive science course in exchange for participation. Each reported English as their native language.

2.2. Materials

Each trial had the same structure: there was a 3-4-sentence lead-in, followed by the target sentence. There was one between-subjects factor for both Experiments 1a and 1b, whether the conjunction appearing in the target sentence was *and* or *but*. There were then two separate within-subjects factors for each experiment. For Experiment 1a, which probed the *counterexpectation* use of *but*, these were (a) whether the quantifiers had opposite or the same monotonicity (e.g., opposite: *most, very few*; same: *most, many*) (with opposite predicted to be better), and (b) whether the lead-in was a context that was neutral, or one that was 'relevant' and set up expectations about amounts, which the target sentence could potentially pick up on. For Experiment 1b, which probed the *semantic opposition* use of *but*, these were (a) whether the ordering of the scalar items was <weak, strong> or <strong, weak> (with <weak, strong> predicted to be preferred), and (b) whether *only* was present as a modifier for the weak scalar item (providing a semantic upper bound). Thus, each experiment had a 2 (between) x 2 (within) x 2 (within) design.

Given all of these factors, we fed the items into a Latin square design, with 8 lists combining both experiments. There were 12 items for Experiment 1a and 16 for Experiment 1b.

The materials for Experiments 1a and 1b acted as filler items for each other in a fully randomized presentation. Two comprehension check items also appeared in the experiment (one perfectly acceptable and the other unacceptable). The full set of stimuli is presented in Appendix A (1a and comprehension checks) and Appendix B (1b).

Every target sentence was in the same form. The name in subject position referred to the main character from the preceding discourse context, and the nouns in argument position in the target sentence were also mentioned. The verb was in active voice, past tense. All contexts for Experiment 1a were approximately the same length, and the two different context versions had the same first and last sentence. The last sentence led into the target sentence, with a verb of observation or reporting. The sentences in the middle were used to manipulate expectations in the 'relevant' context. For Experiment 1b items, there was only a brief lead-in to the target sentence, so that the structure of the trial was comparable to that of Experiment 1a, since the items were randomized together.

A sample item for Experiment 1a is provided in (20) (with neutral and relevant versions), with the four versions of the target sentence presented in (21).

(20)

a. Neutral context

Juan is a manager at a pottery shop. His seasoned staff knew that the cups and vases were popular items. During the day on Tuesday, an employee taught a pottery class. Afterwards, Juan looked in the kiln and reported the following:

b. Relevant context

Juan is a manager at a pottery shop. His seasoned staff knew that if cups were baked in the kiln with vases, the pottery would break. During the day on Tuesday, a brand new employee loaded the kiln. Afterwards, Juan looked in the kiln and reported the following:

(21) a. Most of the cups, {and/but} very few of the vases were in the kiln. (opposite)

b. Most of the cups, {and/but} many of the vases were in the kiln. (same)

A sample item for Experiment 1b is provided in (22), including the four versions of the target sentence.

(22) Madelyn went to the diner with her friend. Afterwards, Madelyn was asked how it was. She replied:

a. The coffee is (only) okay, {and/but} the pie is excellent. <weak, strong>

b. The pie is excellent, {and/but} the coffee is (only) okay. <strong, weak>

2.3. Procedure

Participants took the survey on a computer or smart device at a location of their choosing. The complete instructions are in Appendix D. Participants were instructed to read the context carefully, then rate the acceptability of the target sentence on a 5-Point Likert Scale (1: not at all acceptable … 5: perfectly acceptable). Questions were presented on the screen one at a time. Participants could move to the next question only after they rated the sentence; they could not skip items. They could not go back once they had moved on to the next question.

2.4. Predictions

We generated the following predictions. For Experiment 1a, we predicted that sentences with opposite quantifier monotonicity, such as (21a), might be rated higher (at least for *but*) and that the 'relevant' context, such as (20b), might improve the acceptability of sentences with *but*,

particularly for sentences with the same quantifier monotonicity, such as (21b). These findings would be consistent with previous studies, and highlight the role of a supporting pragmatic context. For Experiment 1b, we predicted that sentences with the <weak, strong> order, such as (22a), would yield higher ratings, and that *only* would improve acceptability of sentences with *but* when scalar terms were presented in a <strong, weak> order, such as (22b). If this were the case, it would support the hypothesis that having a semantic indicator of an upper bound makes it easier for a listener to arrive at the *not x* interpretation of the word (quantifier, adjectival predicate, etc.), thereby licensing the use of semantic oppositional *but*.

2.5. Results and Discussion

2.5.1. Experiment 1a

The results of Experiment 1a are presented in Figure 1.

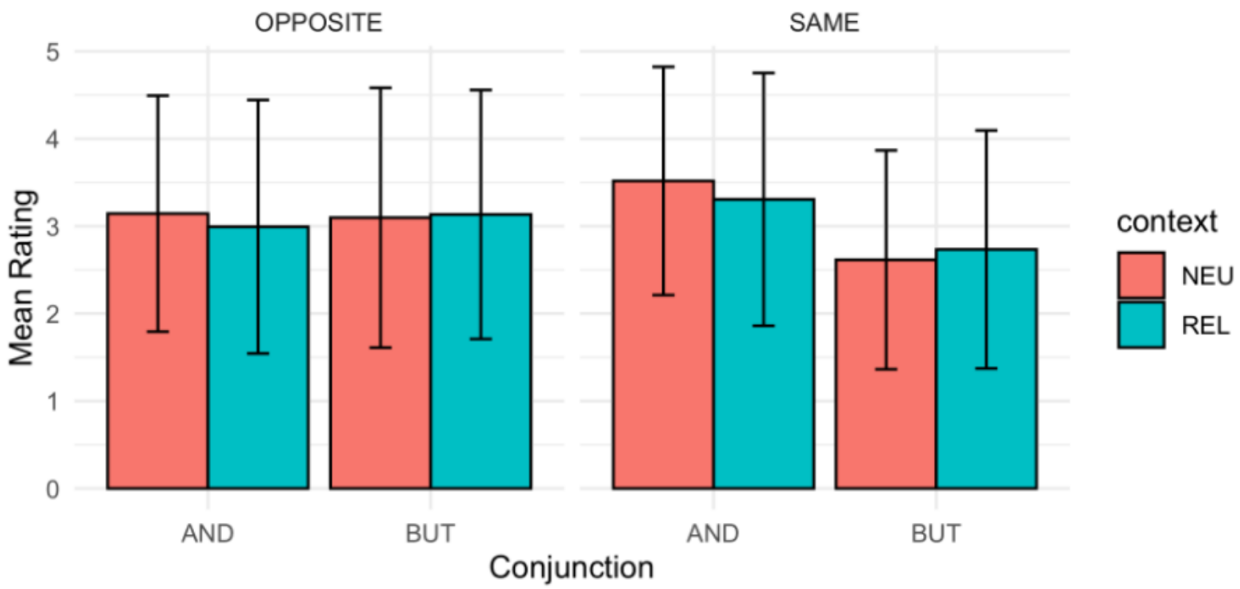

Figure 1. Experiment 1a results across three conditions: conjunction (*and/but*), monotonicity (opposite/same), and context (neutral/relevant)

The error bars were calculated using ±1 standard deviation from the mean and represent the mean ratings of the test items, by conjunction, monotonicity, and context. The differences between the means were not significant, and there were no main effects or interactions.

In reflecting on these results, it seems judgements were extremely subtle, and since none of these sentences were entirely ungrammatical, the participants did not use the endpoints of the scale. Note, however, that the opposite monotonicity ratings were comparable for sentences with *and* and *but*, regardless of context, and the lowest trend in ratings is for the sentences with *but* where the quantifiers had the same monotonicity, in line with the background reviewed earlier. However, in these cases, context did not play a role.

The results of Experiment 1b are presented in Figure 2.

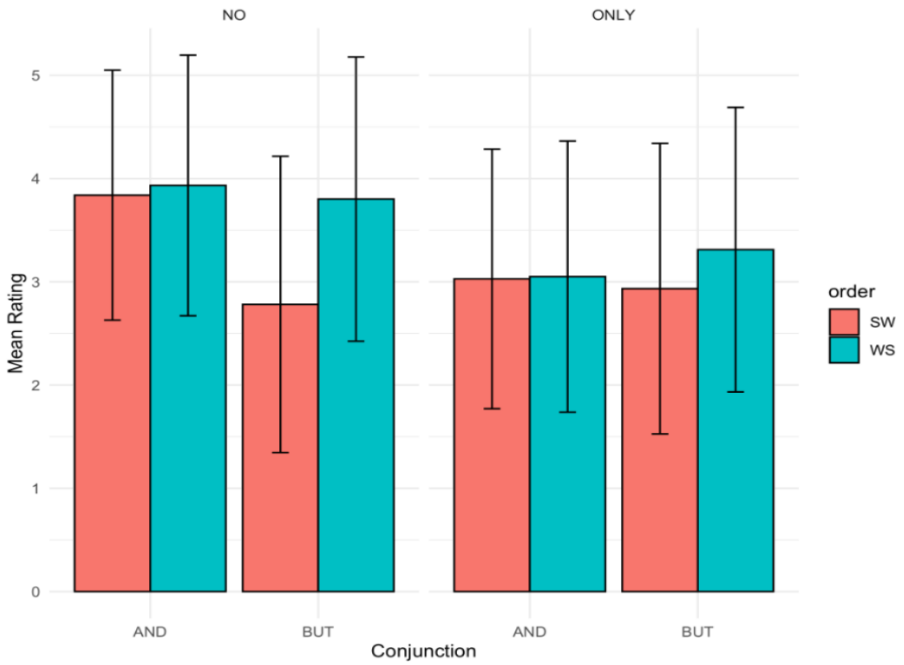

Figure 2. Experiment 1b results across three conditions: conjunction (*and/but*), scalar order (weak/strong first), and *only* (absent indicated by 'no'/present indicated by 'only')

The error bars were calculated using ± 1 standard deviation from the mean and represent the mean ratings of the test items, by conjunction, scalar ordering, and the presence or absence of

only. The differences between the means were not significant. However, note without *only* modifying the weak item, the lowest rating was found with sentences featuring *but* in the <strong, weak> order—which is precisely what was predicted. Sentences with *only* were all comparable, and revealed that *only* actually seemed to decrease ratings for sentences with *and* [2]. When we conducted this experiment, we expected results for sentences with *and* to be the same regardless of ordering or the presence or absence of *only*, so these findings are somewhat surprising. These trends may provide a basis for future research, to determine if some factor impacts judgments of sentences with *and*. Once again, we suspect the lack of significant differences may be in part due to these pragmatic judgements being very subtle.

3. Experiments 2 and 3

3.1. Participants

For Experiment 2, 62 participants were recruited off of the Prolific platform. They were each paid $3 for their participation. For Experiment 3, 38 undergraduate students from Rutgers University – New Brunswick received extra credit in a linguistics or cognitive science course in exchange for participation. Each reported English as their native language.

3.2. Materials and Procedure

For Experiments 2 and 3, we focused only on sentences with *but*, and therefore had a simpler design, which did not necessitate Latin squaring. Because the ratings in Experiment 1 were so subtle, in these experiments we explicitly asked participants in Experiments 2 and 3 to choose the version of the target sentences they thought was better.

[2] *and* sentences without *only* score similarly whether the order is <strong, weak> or <weak, strong>. We hypothesize that this is because *and* is acceptable in both orders, while *but* is not, so the order would not affect the acceptability of the use of *and*.

Experiments 2 and 3 were therefore presented as a binary forced choice task[3]. On each screen, participants read the context (as before) and this time, were asked to select which of two sentence versions they thought sounded better. The same restrictions as in Experiment 1 about answering and moving on applied to Experiments 2 and 3. We also generated the same set of predictions, this time relativized to a choice between two items.

For Experiment 2, we kept the same items from Experiment 1b, but altered the items from 1a. Returning to the judgments and the stimuli, we realized that the contexts of the Experiment 1 sentences needed to be revised. This is because not all of the contexts created as much of an expectation about quantities as we had intended. For example, in (20), the context suggests that the issue is that the combination of vases with cups in the kiln is a problem. However, we sought instead to have the context contrast the amount of each, as illustrated in the revised version of (20) shown in (23), with the two target sentence options presented in (24). The full set of stimuli for Experiment 3a is presented in Appendix C.

(23)

a. Neutral context

Juan is a manager at a pottery shop. His seasoned staff know him to be an attentive boss. He doesn't just manage the shop: He checks to make sure they complete their responsibilities every day. During the day on Tuesday, a new employee loaded the kiln.

[3] Other potential modifications we did not use include presenting the stimuli orally and varying the presentation of the context to allow participants to enter the context more fully. The former would likely have an effect, because then we would be able to control the prosody the participants hear rather than relying upon participants to implicitly assign prosody themselves, likely making the dispreferred sentences more acceptable. The latter would probably not have an effect, because any engagement with the context should be enough for it to affect participants' interpretation of the target sentence.

b. Relevant context

Juan is a manager at a pottery shop. His seasoned staff know that he has rules about loading the kiln after the day's classes: Put ***as many of the cups*** *in as possible, and be careful to put in* ***only a handful of vases*** *at most. During the day on Tuesday, a new employee who had been making mistakes all week loaded the kiln.*

Afterwards, Juan looked in the kiln and reported the following:

(24) a. Most of the cups, but many of the vases were in the kiln.

b. Most of the cups, but very few of the vases were in the kiln.

For Experiment 3, the materials and procedure were the same as in Experiment 2, with the exception that all of the contexts preceding the target sentences were removed, and participants were simply asked to choose between which of two sentences sounded better. In this way, Experiment 3 provides an important baseline for the previous experiments, in particular Experiment 2, since participants are asked to choose between two minimally different versions of the same target sentence, in the absence of any preceding context.

We therefore predicted, as in Experiment 1, that in Experiments 2a and 3a sentences with opposite quantifier monotonicity, such as (24b), would be selected over sentences with same quantifier monotonicity, such as (24a). We predicted that in Experiment 2a, preference for sentences with same quantifier monotonicity would increase when the target sentence is prefaced with a relevant context, such as (23b).

We also predicted that in Experiments 2b and 3b, participants would not want (or need) the presence of *only* modifying the weak items for sentences featuring the <weak, strong> order

(such as (22a)), but they would be more likely to prefer the presence of *only* with sentences in the <strong, weak> scalar order (such as (22b)), since *only* provides a semantically-induced upper bound, which improved the appearance of *but* in these sentences by giving rise to a *semantic contrast*. To preview the results, this is precisely what we found.

3.3. Results and Discussion

3.3.1. Experiment 2a and 3a

The results of Experiment 2a and 3a are presented side by side in Figure 3.

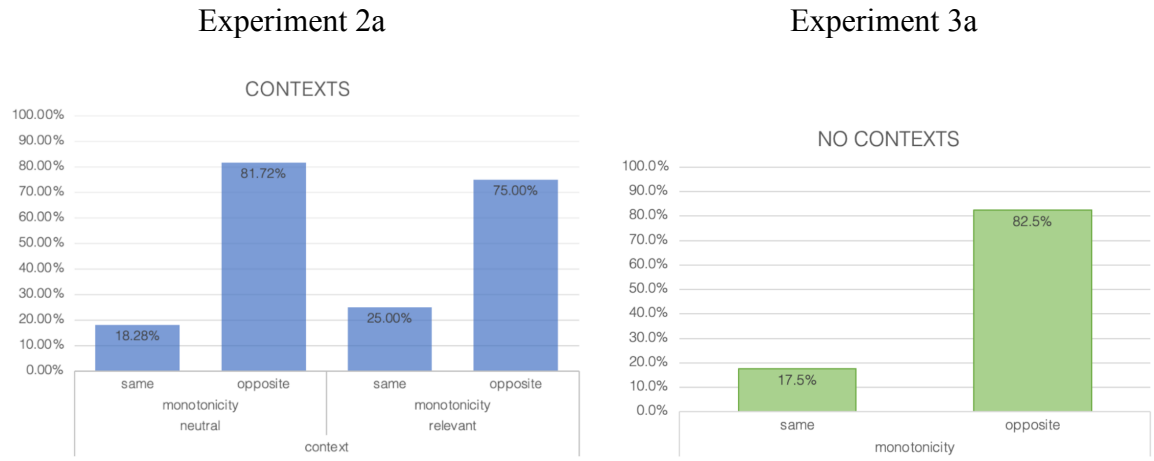

Figure 3. Experiment 2a and 3a results comparing two conditions: monotonicity (same or opposite), and context (neutral/relevant) and for 2a, whether the context was neutral or the revised 'relevant' context

The results of Experiment 2a and 3a combined demonstrate that across two different versions of the same experiment, participants preferred the sentence version in which the quantifiers in the two conjuncts have opposite monotonicity. This pattern held regardless of whether there was (2a) or was not (3a) a preceding context. However, the preference for the version with the same monotonicity increased slightly with a relevant context that supported the counterexpectation use, as shown in the results for Experiment 2a. The preference for the 'opposite' monotonicity in sentences with a neutral preceding context (2a, left) and those that had no preceding context (2b)

were comparable. Relative to the percentage of selection of 'same' monotonicity in both (17-18%), the percentage selection when the context supported the counterexpectation use (2a, right) was higher.

We also observed item variability among the test items. While for each test item the opposite monotonicity quantifier version was preferred, there were several instances where the same monotonicity version was selected more than expected. This pattern occurred with the pairs <plenty, excess/not an excess>, <three, 55,000/only 40,000>, and <every one, some/not even one>. The same monotonicity version was selected nearly as often as the opposite monotonicity version for the first two pairs. Interestingly, while this did occur for the test items with <every one, some/not even one>, this pattern did not occur for the similar test items <every one, several/not even one>. This variability may provide a basis for future research, to determine if some factor of these quantifiers or quantifier pairs improves *but's* use in the same monotonicity condition.

3.3.2. Experiment 2b and 3b

The results of Experiment 2b and 3b are presented side by side in Figure 4.

Experiment 2b Experiment 3b

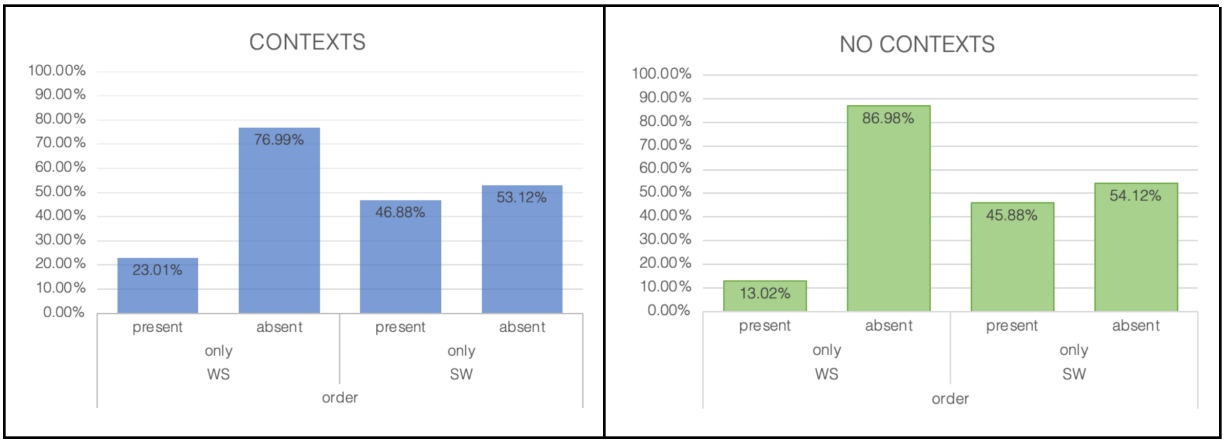

Figure 4. Experiment 2b and 3b results comparing two conditions: scalar order (WS or SW), and within each, whether *only* was present or absent

The results of Experiment 2b and 3b demonstrate that participants prefer *only* to be absent in sentences with a <weak, strong> order. This is to be expected, since, as we said, participants are most likely calculating an upper bounded implicature with the weak conjunct, and the implicit negation of the stronger item stands in contrast with the explicitly stated stronger item in the subsequent conjunct. Therefore *only* is unnecessary and redundant. Still, there is a slight preference for *only* when there is a context present. Recall that the contexts presented in Experiment 2b were 'filler' in that they did not provide any relevant information other than to give a lead-in to the sentence. Nevertheless, this information appears to be enough to influence the interpretation of these sentences.

When the participants encounter the dispreferred <strong, weak> order, they are much more likely to prefer *only*, precisely as we predicted. In these instances, *only* gives the weak item an explicit, semantic upper bound, allowing it to stand in contrast to the strong element in the first conjunct[4]. As a result, the semantic opposition use of *but* is licensed.

3. General Discussion

We began this paper by demonstrating that *but* diverges from another conjunct *and*, in having a more limited range of environments in which its use is felicitous. We reviewed two conditions licensing its usage: a *semantic contrast* between the quantifiers or scalar items participating in the conjunction and further, a preference for their ordering (<weak, strong> preferred over <strong, weak>). We also reviewed a *counterexpectation* use of *but* that is licensed by setting up situational expectations in the context to which the appearance of a sentence with *but* is linked. These two uses, and the observation that they have been

[4] We hypothesize that the reason many participants still selected sentences without *only* in a <strong, weak> order is that they may have still calculated the scalar implicature on the weak conjunct, making *only* redundant.

underexplored and that there could be exceptions to them, led us to ask (a) if the appearance of *only* could semantically facilitate a contrast in sentences where pragmatic implicature calculation is more costly and *but* is marginally acceptable, and (b) whether manipulation of the context could highlight the counterexpectation use and facilitate appearance of *but* even when the preferred semantic contrast in quantifier monotonicity is not upheld. Targeting adjectives in (a) and quantifiers in (b) allowed us to investigate a range of lexical items participating in sentences with *but*, and also manipulate both monotonicity and scalar order. We hypothesized that manipulation of the discourse context could promote counterexpectation use, and thus highlight the contribution of pragmatics, while the introduction of *only* with the weaker conjunct could give rise to opposition, and thus highlight the contribution of semantics in these sentences, and therefore the contribution of pragmatic implicatures in sentences without *only*. In both sets of studies, then, we sought to pinpoint the contribution of pragmatics to the licensing of the conjunction *but*.

We found that the presence of *only* is preferred in a <strong, weak> order, while its absence is preferred in a <weak, strong> order. This supports our hypothesis since in a <weak, strong> order, participants are already calculating the implicature on their own making *only* redundant. However, they are less likely to calculate the implicature when presented with a <strong, weak> order, so the inclusion of *only* is preferred, as it semantically induces an upper bound. This allows for the licensing of the semantic opposition use of *but*.

We also found, consistent with prior research, that *but* is preferred in sentences with quantifiers of opposite monotonicity, and sentences with the same monotonicity were preferred slightly more often when a relevant context was present. This pattern supports our hypothesis that creating an expectation within the context where the second conjunct denies this expectation

can license the counterexpectation use of *but,* even if the conjuncts of the sentence share the same monotonicity.

Overall, these results show that pragmatic factors play a role in the licensing of *but*[5], and they do so by allowing the utterance to meet the conditions of either a semantic opposition or counterexpectation use of *but*. Future studies should explore why the presence of *only might* decrease the acceptability of *and* sentences, as well as why *but* is selected as the preferred conjunction more frequently in certain same monotonicity quantifier pairs, such as <plenty, excess>. Research into these topics will help further the understanding of when these conjunctions are licensed.

[5] Although, we hypothesize that in languages where the contrast in *but* is semantic (like American Sign Language), pragmatic factors would likely be less necessary, because just using *but* in those languages semantically indicates a contrast, while in a language like English, using *but* indicates a contrast should be present, but relies on other factors to give rise to the contrast itself.

References

Barner, D., Brooks, N., & Bale, A. (2011). Accessing the unsaid: The role of scalar alternatives in children's pragmatic inference. *Cognition*, 118(1), 87–96. https://doi.org/10.1016/j.cognition.2010.10.010

Barwise, J., & Cooper, R. (1981). Generalized Quantifiers and Natural Language. *Linguistics and Philosophy*, 4(2), 159–219. https://doi.org/10.1007/BF00350139

Frege, G. (1879). *Begriffsschrift, eine der arithmetischen nachgebildete Formelsprache des reinen Denkens* (Halle: Nebert). References are to the translation as "Begriffsschrift, a Formal Language, Modeled upon that of Arithmetic, for Pure Thought" by S. Bauer-Mengelberg in van Heijenoort (1967).

Glanzberg, M. (2006). Quantifiers*. In E. Lepore and B. Smith (Eds.), The Oxford Handbook of Philosophy of Language, 794-821. https://michaelglanzberg.org/wp-content/uploads/2018/05/handbookfinal-15ds7lh-1.pdf

Grice, P. (1991). Logic and Conversation. In *Studies in the Way of Words* 22-40. Harvard University Press.

Horn, L. R. (2001). *A Natural History of Negation* (The David Hume Series: Philosophy and Cognitive Science Reissues). Stanford, CA: CSLI Publications. (Original work published 1989)

Milsark, G. (1977). Toward an Explanation of Certain Peculiarities of the Existential Construction in English. In J. Gutiérrez-Rexach (Ed.), *Semantics Critical Concepts in Linguistics Volume III Noun Phrase Classes* (pp. 40-65). Routledge. https://books.google.com/books?hl=en&lr=&id=zTCs1cUsjxkC&oi=fnd&pg=PA40&ots=V6Q9l0utAr&sig=GYZhgoPBye19c2rcyrEF7EzA-6w#v=onepage&q&f=false

Roberts, C. (1996). Information Structure in Discourse: Towards an Integrated Formal Theory of Pragmatics. *Working Papers in Linguistics: Papers in Semantics, (49),* 91-136. https://linguistics.osu.edu/sites/default/files/workingpapers/osu_wpl_49.pdf

Toosarvandani, M. (2014). Contrast and the structure of discourse. *Semantics and Pragmatics*, 7, 1–57. https://doi.org/10.3765/sp.7.4

Zhong, J. C., & Collins, J. N. (2021). A QUD-Based Theory of Quantifier Conjunction with *but*. In *Proceedings of the 38th West Coast Conference on Formal Linguistics*, ed. Rachel Soo et al., 493-503. Somerville, MA: Cascadilla Proceedings Project.

Appendix A: Experiment 1a Stimuli

1.

Relevant: *Juan is a manager at a pottery shop. His seasoned staff knew that if cups were baked in the kiln with vases, the pottery would break. During the day on Tuesday, a brand new employee loaded the kiln. Afterwards, Juan looked in the kiln and reported the following:*

Neutral: *Juan is a manager at a pottery shop. His seasoned staff knew that the cups and vases were popular items. During the day on Tuesday, an employee taught a pottery class. Afterwards, Juan looked in the kiln and reported the following:*

(a) Most of the cups, {and/but} many of the vases were in the kiln.

(b) Most of the cups, {and/but} very few of the vases were in the kiln.

2.

Relevant: *The Goldberg family just bought a new washing machine. Naomi knew that if casual clothes and delicate clothes were put in together, the delicate clothes would be damaged. Saturday night, she watched her son load the new washing machine. Afterwards Naomi looked in the washing machine and reported the following:*

Neutral: *The Goldberg family just bought a new washing machine. Naomi knew that she had to wash casual clothes and delicate clothes. Saturday night she asked her son to buy more laundry detergent. Afterwards Naomi looked in the washing machine and reported the following:*

(a) Most of the casual clothes, {and/but} many of the delicate clothes were in the washing machine.

(b) Most of the casual clothes, {and/but} very few of the delicate clothes were in the washing machine.

3.

Relevant: *Maribel invited her friends and family to her birthday party. Her family always ruined her parties. She hoped they wouldn't come. After the party she reported the following:*

Neutral: *Maribel invited her friends and family to her birthday party. She bought a new dress for the occasion. She hoped she could find a pineapple upside down cake. After the party she reported the following:*

(a) All of my friends, {and/but} most of my family came to my birthday party.

(b) All of my friends, {and/but} none of my family came to my birthday party.

4.

Relevant: *Dimitri's colleagues and clients were invited to his retirement party. His clients were very rude. He hoped they wouldn't attend. After the party he reported the following:*

Neutral: *Dimitri's colleagues and clients were invited to his retirement party. The party was on the last Friday in July. He hoped there would be a pinata. After the party he reported the following:*

(a) All of my colleagues, {and/but} most of my clients came to my retirement party.

(b) All of my colleagues, {and/but} none of my clients came to my retirement party.

5.

Relevant: *Mei owned a bakery. She sent her new employee to buy flour and sugar. The bakery would have to temporarily close if they ran out of ingredients. After they returned Mei reported that:*

Neutral: *Mei owned a bakery. She sent her new employee out for their break. She made a wedding cake with flour sugar. After they returned Mei reported that:*

(a) Too much flour, {and/but} just enough sugar was in the pantry.

(b) Too much flour, {and/but} too little sugar was in the pantry.

6.

Relevant: *It was Harold's first day working at the pool. He was in charge of adding water and chlorine to the pool. The pool couldn't open if the proportions were wrong. The manager checked the pool and reported that:*

Neutral: *It was Harold's first day working at the pool. He was in charge of swimming lessons. The pool was filled with water and chlorine. The manager checked the pool and reported that:*

(a) Too much water, {and/but} just enough chlorine was in the pool.

(b) Too much water, {and/but} too little chlorine was in the pool.

7.

Relevant: *Jordan wanted to join a scavenger hunt. They needed a team of ten to join. They invited their classmates and their camp friends to join their team. After the event, they reported:*

Neutral: *Jordan wanted to join a scavenger hunt. They needed to find items in nature. They invited their classmates and their camp friends to the scavenger hunt. After the event, they reported:*

(a) Three of my classmates, {and/but} one of my camp friends came to the scavenger hunt.

(b) Three of my classmates, {and/but} only one of my camp friends came to the scavenger hunt.

8.

Relevant: *Pranav wants to start a business pet sitting for dog owners and cat owners. He wanted at least ten pets signed up by the end of the week. He advertised his business with signs around the neighborhood. At the end of the week, he checked his email and reported that:*

Neutral: *Pranav wants to start a business pet sitting for dog owners and cat owners. He went to the pet store to buy toys. He checked the fence in his backyard for holes. At the end of the week, he checked his email and reported that:*

(a) Three dog owners, {and/but} one cat owner signed up.

(b) Three dog owners, {and/but} only one cat owner signed up.

9.

Relevant: *Suzanne was out shopping. Her daughter's birthday was that day. She had promised to get cookies or doughnuts. She looked in the bakery's display case and remarked that:*

Neutral: *Suzanne was out shopping. Her daughter was meeting her that afternoon. She went to a bakery that had good cookies and doughnuts. In the bakery's display case, she reported that:*

(a) None of the cookies, {and/but} few of the doughnuts were there.

(b) None of the cookies, {and/but} several of the doughnuts were there.

10.

Relevant: *Alex went to the store. Their next semester of college started the next day. Alex wanted to buy folders and notebooks. In the school supply section, they reported that:*

Neutral: *Alex went to the store. Their meeting with their friends wasn't for another hour. Alex decided to browse the folders and notebooks. In the school supply section, they reported that:*

(a) None of the folders, {and/but} few of the notebooks were on the shelf

(b) None of the folders, {and/but} several of the notebooks were on the shelf.

11.

Relevant: *Sophie was a mechanic. She had trouble fixing things that involved water. She was called to an amusement park known for its roller coasters and flume rides. At the amusement park Sophie reported that:*

Neutral: *Sophie was a mechanic. She could go to the amusement park on her day off. The amusement park had roller coasters and flume rides. At the amusement park Sophie reported that:*

(a) Every one of the rollercoasters, {and/but} some of the flume rides broke.

(b) Every one of the rollercoasters, {and/but} not even one of the flume rides broke.

12.

Relevant: *Misha worked at a theater that showed comedies and tragedies. They knew the theater would have to close if the plays sold poorly. Misha sold tickets. In the theater's sales record Misha reported that:*

Neutral: *Misha worked at a theater that showed comedies and tragedies. They knew tragedies and comedies were the most popular plays. Misha sold concessions. In the theater's sales record Misha reported that:*

(a) Every one of the tragedies, {and/but} some of the comedies at the theater sold out.

(b) Every one of the tragedies, {and/but} not even one of the comedies at the theater sold out.

Comprehension Checks

Acceptable:

Carmen was purchasing yearbooks for her daughter. The order form asked for her child's grade level. Carmen's daughter was in 6th grade. In the form, she indicated the following:

My child is in 6th grade.

Unacceptable:

Roger and his daughter were buying pies for Thanksgiving. The supermarket had apple, cherry, strawberry rhubarb, and banana cream pies. Roger asked his daughter which one she liked best. His daughter responded:

The one with fruit is my favorite.

Appendix B: Experiment 1b, 2b, 3b Stimuli

1. *Madelyn went to the diner with her friend. Afterwards, Madelyn was asked how it was. She replied:*

   (a) The coffee is (only) okay, {and/but} the pie is excellent.

   (b) The pie is excellent, {and/but} the coffee is (only) okay.

2. *Makoto went to the museum. There were several informational posters on the walls. One poster said:*

   (a) Pandas are (only) rare, {and/but} dinosaurs are extinct.

   (b) Dinosaurs are extinct, {and/but} pandas are (only) rare.

3. *Emily went to a neighborhood yard sale on Saturday. She founds some great pieces of clothing and accessories. When her friend asked about the items she brought back, she said that:*

   (a) The dress was (only) cheap, {and/but} the belt was free.

   (b) The belt was free, {and/but} the dress was (only) cheap.

4. *Martin worked at a post office. When he went home, his husband asked him how work was. Martin told him that:*

   (a) Yesterday was (only) tiring, {and/but} today was exhausting.

   (b) Today was exhausting, {and/but} yesterday was (only) tiring.

5. *Avery was on the phone with their younger sibling. They were discussing high school. Avery said that:*

   (a) The first day of school was (only) memorable, {and/but} graduation was unforgettable.

   (b) Graduation was unforgettable, {and/but} the first day of school was (only) memorable.

6. *Zaid was at the thrift store. He found some clothes he liked. When he tried them on he found:*

   (a) The shirts were (only) snug, {and/but} the pants were tight.

   (b) The pants were tight, {and/but} the shirts were (only) snug.

7. *Aisha took her pets to daycare for the first time. Afterwards, her friend asked her how it was for them. She replied that:*

   (a) Her cat was (only) content, {and/but} her dog was happy.

   (b) Her dog was happy, {and/but} her cat was (only) content.

8. *Javier is an artist who does landscapes. He had only finished a new painting. When he took a closer look, his assessment was that:*

   (a) The sky was (only) good, {and/but} the ocean was perfect.

   (b) The ocean was perfect, {and/but} the sky was (only) good.

9. *Shruti went to an archaeology exhibit. She went to hear a speaker discuss a display. The speaker said that:*

   (a) The pottery was (only) old, {and/but} the fossils were ancient.

   (b) The fossils were ancient, {and/but} the pottery was (only) old.

10. *Sam loves to build things. He was given a lego set for the first time. He opened it and noticed that:*

   (a) The lego people were (only) small, {and/but} the lego accessories were tiny.

   (b) The lego accessories were tiny, {and/but} the lego people were (only) small.

11. *Gareth moved to a new neighborhood. He took a close look at his next door neighbor's house. His assessment was that:*

   (a) The garage was (only) ugly, {and/but} the paint job was hideous.

(b) The paint job was hideous, {and/but} the garage was (only) ugly.

12. *Ruby was a weather forecaster for the news. She did the weather report every weekday. On Monday, Ruby said that:*

(a) A hurricane is (only) possible, {and/but} rain is certain.

(b) Rain is certain, {and/but} a hurricane is (only) possible.

13. *Giovanni is a college student. Another student asked what he thought about a course. Giovanni told them that:*

(a) The homework was (only) difficult, {and/but} the exam was impossible.

(b) The exam was impossible, {and/but} the homework was (only) difficult.

14. *Ivy went to the pool right during Memorial Day weekend in May. The next day her friend asked her about how the pool was. Ivy told her that:*

(a) The day was (only) cool, {and/but} the water was cold.

(b) The water was cold, {and/but} the day was (only) cool.

15. *Gunter decided to have some leftover pie after Thanksgiving. He put a slice in the microwave. When he took it out he noticed that:*

(a) The crust was (only) warm, {and/but} the filling was hot.

(b) The filling was hot, {and/but} the crust was (only) warm.

16. *Liv read two of the novels being considered for the book club. Her friend asked her how they were. She considered carefully, and responded that:*

(a) The mystery novel was (only) bad, {and/but} the biography was awful.

(b) The biography was awful, {and/but} the mystery novel was (only) bad.

Appendix C: Experiment 3a Stimuli

1.

Relevant: *Juan is a manager at a pottery shop. His seasoned staff know that he has rules about loading the kiln after the day's classes: Put as many of the cups in as possible, and be careful to put in only a handful of vases at most. During the day on Tuesday, a new employee who had been making mistakes all week loaded the kiln. Afterwards, Juan looked in the kiln and reported the following:*

Neutral: *Juan is a manager at a pottery shop. His seasoned staff know him to be an attentive boss. He doesn't just manage the shop: He checks to make sure they complete their responsibilities every day. During the day on Tuesday, a new employee loaded the kiln. Afterwards, Juan looked in the kiln and reported the following:*

(a) Most of the cups, but many of the vases were in the kiln.

(b) Most of the cups, but very few of the vases were in the kiln.

2.

Relevant: *The Goldberg family just bought a new washing machine. Naomi Goldberg has told her teenage daughter that while there is no limit on casual clothes going in a load, she must be very careful to only put in a small number of delicate items. Her daughter rarely listens carefully. Saturday night Naomi asked her daughter to do a load of laundry. Afterwards Naomi looked in the washing machine and reported the following:*

Neutral: *The Goldberg family just bought a new washing machine. Naomi Goldberg is a mom who wants her teenage daughter to become more responsible. Her daughter isn't enthusiastic about this goal, but she'll comply. Saturday night Naomi asked her daughter to do a load of laundry. Afterwards Naomi looked in the washing machine and reported the following:*

(a) Most of the casual clothes, but many of the delicate clothes were in the washing machine

(b) Most of the casual clothes, but very few of the delicate clothes were in the washing machine.

3.

Relevant: *Maribel was having a birthday party to celebrate turning 30. She told her therapist that she adored her friends and wanted as many of them to come as possible. However, her family caused her anxiety and always ruined everything, so she hoped they didn't show up at all. After the party she reported the following:*

Neutral: *Maribel was having a birthday party to celebrate turning 30. She told her therapist this was a big number, and while she was nervous, she was going to approach it as best she could. She bought a new red dress for the occasion, and ordered a pineapple upside down cake. After the party she reported the following:*

(a) All of my friends, but most of my family came to my birthday party.

(b) All of my friends, but none of my family came to my birthday party.

4.

Relevant: *Dimitri was finally retiring after 30 years of service to his company. His co-workers were throwing him a retirement party. He loved his colleagues and wanted to see as many of them there as possible. However, his clients were rude, so he hoped they wouldn't attend at all. After the party he reported the following:*

Neutral: *Dimitri was finally retiring after 30 years of service to his company. His co-workers were throwing him a retirement party. The party was on the last Friday in July, which was supposed to be sunny and warm. He hoped there would be a piñata, plenty of chips and guacamole, and good music. After the party he reported the following:*

(a) All of my colleagues, but most of my clients came to my retirement party.

(b) All of my colleagues, but none of my clients came to my retirement party.

5.

Relevant: *Mei is a member of the local PTA. She needed to bake some cookies and brownies for an upcoming event at the elementary school. While she was at work, she asked her husband to do the grocery shopping to make sure they were well stocked with ingredients. She told him to make sure there were at least 3-4 bags of sugar, and that 1-2 bags of all-purpose flour would be sufficient. Her husband was not used to shopping for baking supplies. Upon her return home from work, Mei checked the pantry and noticed that:*

Neutral: *Mei is a member of the local PTA. She needed to bake some cookies and brownies for an upcoming event at the elementary school. While she was at work, called her husband to get his opinion on which of her famous cookies she should bake. That way she would be ready to start when she got home from work. The only question left, then, was whether she needed to go shopping for ingredients. Upon her return home from work, Mei checked the pantry and noticed that:*

(a) Plenty of sugar, but an excess amount of flour, was in the pantry.

(b) Plenty of sugar, but not an excess amount of flour, was in the pantry.

6.

Relevant: *It was Harold's first day as a lifeguard working at the pool. He was in charge of lots of things, including monitoring the proportions of water and chlorine in the pool. There were strict safety guidelines. His supervisor told him to add at least two bottles of chlorine to keep the water clean, and to fill the pool with no more than 45,000 gallons of water. Harold is not so good with big measurements. After his shift, his supervisor checked the pool and reported that:*

Neutral: *It was Harold's first day as a lifeguard working at the pool. He was in charge of responsibilities like teaching swimming lessons, removing the bugs from the water, and cleaning off the deck chairs. He also had to help adjust the chlorine and water in the pool to keep it sanitary for the swimmers. Harold had been waiting for years to take on this new role. After his shift, his supervisor checked the pool and reported that:*

(a) Three bottles of chlorine, but 55,000 gallons of water, were in the pool.

(b) Three bottles of chlorine, but only 40,000 gallons of water, were in the pool.

7.

Relevant: *Jordan had an idea for a fun summer activity: he was going to organize a scavenger hunt. He figured he needed 5-6 people to join; otherwise, it wouldn't be a success. He sent out a group text to his classmates and camp friends, inviting them all to participate. He predicted that he could probably get at least three classmates to come, and doubted whether even one of his camp friends would show up. The day of the event, he showed up and reported that:*

Neutral: *Jordan had an idea for a fun summer activity: he was going to organize a scavenger hunt. He enjoyed coming up with creative ideas and had been waiting for this for a long time. He sent out a group text to his classmates and camp friends, inviting them to participate. He knew they would be just as excited as he was to participate. The day of the event, he showed up and reported that:*

(a) Three of my classmates, but two of my camp friends came to the scavenger hunt.

(b) Three of my classmates, but only two of my camp friends came to the scavenger hunt.

8.

Relevant: *Pranav wants to start a business pet sitting for dog owners and cat owners. He advertised his business with signs around his neighborhood. While Pranav had seen plenty of*

people walking dogs who could be potential customers, he had only seen a handful of cats in his neighborhood, so he doubted whether any cat owners would even be interested. At the end of the week, he checked his email and reported that:

Neutral: *Pranav wants to start a business pet sitting for dog owners and cat owners. He advertised his business with signs around his neighborhood. He prepared for his new business by going to the pet store and buying toys for both cats and dogs. He was excited to get started. At the end of the week, he checked his email and reported that:*

(a) Three dog owners, but one cat owner signed up.

(b) Three dog owners, but only one cat owner signed up.

9.

Relevant: *Suzanne was out shopping for her daughter's birthday. Her daughter was meeting her later that afternoon. Suzanne thought she'd pick up a treat. Suzanne stopped at a nearby bakery. While the bakery was famous for its cookies, hardly anyone knew that they also made doughnuts, so she expected there would be a wide variety of doughnuts to choose from. She looked in the bakery's display case and remarked that:*

Neutral: *Suzanne was out shopping for her daughter's birthday. Her daughter was meeting her later that afternoon. Suzanne stopped at a nearby bakery. She had heard that they made good cookies and that their doughnuts were always fresh.She looked in the bakery's display case and remarked that:*

(a) None of the cookies, but very few of the doughnuts, were available.

(b) None of the cookies, but quite a few of the doughnuts, were available.

10.

Relevant: *Alex's next semester of college started on Wednesday. On Tuesday, they went to the office supply store to buy notebooks and folders. Alex had noticed that almost all of their classmates brought notebooks to class. They had never seen any other student carrying a folder with them, so they figured this was an unpopular item to buy and there would still be a good selection. In the school supply section of the store, they reported that:*

Neutral: *Alex's next semester of college started on Wednesday. On Tuesday, they went to the office supply store to buy notebooks and folders. The store was having a sale, so it was a good time to go. Alex knew that it was important to have items like notebooks and folders to help them stay organized, so those were on his list. In the school supply section of the store, they reported that:*

(a) Hardly any notebooks, but very few folders, were left to purchase.

(b) Hardly any notebooks, but quite a few folders, were left to purchase.

11.

Relevant: *Sophie was a mechanic. She was called to an amusement park known for its roller coasters and flume rides to make some repairs. From past experience, Sophie remembered that the roller coasters were old and were always breaking down. However, the flume rides were manufactured by a high quality company and hardly ever had any problems in past years. She figured she could focus her efforts on the roller coaster rides. At the amusement park Sophie reported that:*

Neutral: *Sophie was a mechanic. She was called to an amusement park known for its roller coasters and flume rides to make some repairs. She didn't like going to amusement parks herself. She just focused on her work. From past experience, Sophie knew how to repair both kinds of*

rides, and she was confident that she could do the job correctly, no matter which rides required her expertise. At the amusement park Sophie reported that:

(a) Every one of the roller coasters, but some of the flume rides, needed repairs.

(b) Every one of the roller coasters, but not even one of the flume rides, needed repairs.

12.

Relevant: *Misha worked at a theater that showed comedies and tragedies. One of her job duties was to keep track of ticket sales. Misha knew that the comedies were always extremely popular, while the tragedies were typically very poorly attended, which made her think the ticket sales for tragedies would be low this week. At the end of the week, Misha updated the theater's sales record and reported that:*

Neutral: *Misha worked at a theater that showed comedies and tragedies. One of her job duties was to handle the ticket sales. That week, the theater was showing a full schedule of both comedies and tragedies. The theater goers would have a great selection to choose from, and the online ratings of the shows were likely to be very positive after all the shows had run. At the end of the week, Misha updated the theater's sales record and reported that:*

(a) Every one of the comedies, but several of the tragedies, sold out this week.

(b) Every one of the comedies, but not even one of the tragedies, sold out this week.

Appendix D: Experiment Instructions

Experiment 1 Instructions:

This is a study about how we use language to describe situations.

In this study, you will be presented with a number of 'trials.' Each trial will have the same structure:

You will read a brief lead-in paragraph.

You will then read a statement provided by someone described in the context.

You will then rate the statement on a scale of 1-5 based on how acceptable you find it.

Please note that we are not asking you to evaluate the *truth* of the sentence. The sentences will always be true.

Rather, we are interested in whether or not the statement itself is an *acceptable* way to describe the situation. In other words, is it ok to say it that way? Would you say it that way, or think it sounded odd if someone else did?

For example, imagine that someone showed you a picture of their new pet (a dog), and they introduced it as a "furry four-legged creature who licks a lot." This is perhaps a true statement, but maybe not an acceptable one.

Likewise, imagine if you know someone who has read the entire Harry Potter series, which is a set of 7 books. While it would be true for them to say, "I have read four Harry Potters books" it would not be the most acceptable thing to say.

Thus, for each of the following items, first read the brief introduction, then rate the sentence that follows on a scale of acceptability:

1: not at all acceptable...5: perfectly acceptable

Are you ready? Let's begin!

Experiment 2 Instructions:

This is a study about how we use language to describe situations.

In this study, you will be presented with a number of 'trials.' Each trial will have the same structure:

You will read a very brief lead-in paragraph.

You will then see two similar statements, which are supposed to have been provided by someone in the context.

You will choose which one of the two you prefer, given what you read.

Important note: We don't know what happened in the actual scenario! Each statement is plausibly true. We want to know which one *sounds* more natural to you.

We are not asking you to evaluate the truth or accuracy of the sentences, because there is no way of knowing this.

Rather, we are interested in knowing which statement sounds more natural to you.

Simply read the passage, then read and compare the two sentences, make your selection, then move on to the next item.

Are you ready? Let's begin!

Experiment 3 Instructions:

This is a study about how we use language to describe situations.

In this study, you will be presented with a number of 'trials.' Each trial will have the same structure:

You will see two similar statements.

You will choose which one of the two that sounds more natural.

Important note: We don't know what happened in the actual scenario! Each statement is plausibly true. We want to know which one *sounds* more natural to you.

We are not asking you to evaluate the truth or accuracy of the sentences, because there is no way of knowing this.

Rather, we are interested in knowing which statement sounds more natural to you.

Simply read and compare the two sentences, make your selection, then move on to the next item.

Are you ready? Let's begin!