

Who Has More Furniture? Context Effects on the Quantification of Mass vs. Count Superordinate Nouns

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Abstract

In many languages, words in count syntax quantify over countable individuals (e.g., too many strings), while mass nouns often don't (e.g., too much string). Theories differ in how to characterize nouns that violate this pattern, such as object-mass nouns (e.g. furniture, clothing). These nouns exhibit mass syntax, but often quantify by number (Barner & Snedeker, 2005). On one hypothesis, the individuation of object-mass nouns is lexically specified (Bale & Barner, 2009). Another argues that, while count nouns always quantify by number, object-mass nouns have different quantification criteria depending on context (Rothstein, 2010), including function fulfillment (McCawley, 1975). We evaluated these hypotheses by comparing English quantity judgments for object-mass nouns to (1) superordinate count nouns, and (2) French judgments for translations of object-mass nouns. In each case, we found that object-mass nouns behaved like count nouns, and were no more susceptible to contextual effects. These findings support the idea that object-mass nouns specify individuation lexically.

Keywords: mass/count distinction; syntax-semantics interface; quantity judgment; individuation; cross-linguistic comparison.

Introduction

How does the syntax of a noun phrase impact its meaning? Many languages, including English, make a formal distinction between mass and count syntax. In English, count nouns (e.g., *cat* or *table*) can be pluralized and modified by cardinal numbers (*one*, *two*, *three*) or quasi-cardinal determiners (*several*, *many*). In contrast, mass nouns (e.g., *sand* or *water*) can't be pluralized without a change in meaning, cannot be modified by cardinal or quasi-cardinal expressions, and instead are modified by terms like *little* or *much* (Jespersen, 1909). While these grammatical properties of the mass-count distinction are widely agreed upon, its semantic interpretation remains less certain.

According to many prominent proposals, beginning with Quine (1960), but adopted with variations by many linguists (Bunt, 1985; Link, 1983, 1998; Barker, 1998) and

psycholinguists (Bloom, 1994, 1999; Gordon, 1985; Macnamara, 1972; Wisniewski et al., 1996), the mass-count distinction corresponds to a distinction in how nouns quantify over elements in their domain. According to Quine, count nouns, but not mass nouns, “possess built-in modes ... of dividing their reference” (p. 91). Consequently, the denotation of count nouns have *atomic minimal parts*, or individuals, i.e., members whose sub-portions do not count as instances of the noun (e.g., the leg of a table isn't a table). These individuals provide a basis for counting and comparison (e.g., having *more tables* means having more of these individuals). In contrast, mass nouns allow for “divisibility of reference” (Cheng, 1973), where any part or portion of a referent of a mass noun counts as an instance of the same mass noun (e.g., any sub-portion of sand is *sand*). As a result, there are no atomic minimal parts in the denotation of mass nouns¹, and therefore no individuals to count or compare.

Against this broad approach, others have argued that there isn't a perfect correspondence between divisibility and mass-count syntax. While there are many counterexamples, most critical to our present study is the fact that some mass nouns resist divisibility. For example, it is not the case that any part or portion of something labeled as *furniture* also counts as furniture (e.g., the cushion of a sofa is not furniture, it is a part of a piece of furniture). Similarly, other so-called “object-mass” nouns (Barner & Snedeker, 2005) like cutlery, luggage, clothing, etc. do not allow arbitrary divisibility (see also Erbach et al., 2021; Mihatsch, 2016).

Observations such as these led Gillon (1992, 1999) to conclude that, while count nouns are grammatically specified to denote a set with atomic minimal parts, the denotation of mass nouns is linguistically unspecified and relies on world knowledge. According to this hypothesis, mass nouns denote sets with minimal parts if there is observable evidence in the world that there are linguistically accessible atomic individuals in their denotation (Bunt, 1985; Gillon, 1992; 1999)². Chierchia (1998), in a related proposal, hypothesized that all mass nouns have minimal parts, but that only object-mass nouns have “stable” atoms like count nouns. Thus, the

¹ Another characteristic that distinguishes mass and count nouns in the Quinian proposal is that mass nouns allow for ‘cumulativity of reference’, where combining two referents of a mass noun results in an instance of the same mass noun (e.g., combining water results in water), whereas two referents of a count noun cannot be labeled by a singular noun.

² More recent theories have also encoded a distinction between object-mass nouns and substance-mass nouns in terms of the presence or absence of (stable) atomic parts (e.g., Rothstein, 2021; Sutton & Filip, 2018; Erbach & Schoenfeld, 2022).

denotation of object-mass nouns can be compared via counting. In contrast, the minimal parts of substance mass nouns are only vaguely specified and highly variable from context to context. According to Chierchia (1998), this lack of contextual “stability” makes it impossible to compare the denotation of substance-mass nouns via number.

To test these theories, Barner and Snedeker (2005) asked adults and 4-year-old children to make quantity judgments for items denoted by object-mass nouns (e.g., *furniture*, *jewelry*) that differed by number of individuals and summed volume. For example, in one condition, participants decided who had ‘more furniture’ between a character who had two large tables and two large chairs, and another who had a greater number of things, but that had a smaller summed volume - e.g., three small tables and three small chairs. Both children and adults preferred the character with the greater number of individuals over the character who had the greater volume. Critically, participants made similar judgments for count nouns (e.g., *shoes*), but based judgments on volume for substance-mass nouns (e.g., *toothpaste*). Further, these judgments were not based purely on the availability of discrete physical objects in the world (contra Gillon, 1992, 1999) or pluralities of atoms (contra Chierchia, 1998). When presented with items like stones or strings, participants based quantity judgments on number when the questions were phrased using count syntax (e.g., “Who has more strings?”) but on mass or volume when phrased with mass syntax (e.g., “Who has more string?”), despite the fact that physical things were salient in both contexts, and the number of atomic particles of string, stone, etc. was constant. Subsequent studies have replicated these findings in English and found similar results in other languages (Barner et al., 2009; Hacoen & Schaeffer, 2016; Inagaki, 2014; Lin & Schaeffer, 2018; Scontras et al., 2017; van Witteloostuijn, 2013; van Witteloostuijn & Schaeffer, 2014; Mohr & Agyepong, 2022), with novel mass and count nouns (Barner & Snedeker, 2006), and with event-denoting object-mass nouns (Barner et al., 2008; see Bale & Barner, 2018, for review).

Such results led to the proposal that individuation can be lexically specified in the case of mass nouns, but is grammatically obligatory in the case of count nouns (see Bale & Barner, 2009; Barner & Snedeker, 2005). For example, according to Bale and Barner (2009) the head of a count noun phrase is interpreted as a function that maps denotations without individuals to those with individuals, thereby forcing individuation (see also Borer, 2005), such that, e.g., “some stones” denotes a set of countable individuals. By contrast, the mass head is interpreted as an identity function that is identical to the interpretation of the root morpheme in mass syntax, such that, e.g., “some stone” does not individuate. By extension, when an individuated lexical root like *furniture* is used in mass syntax, it receives an individuated meaning. The idea that words like *furniture* specify individuation lexically is further corroborated with studies of languages that lack a

mass-count distinction altogether, such as Japanese (Barner et al., 2009; Inagaki & Barner, 2009) and Mandarin (Lin & Schaeffer, 2018; Liu, 2014), which found that speakers base quantity judgments on number for object-mass nouns despite the lack of count syntax in these languages.

Although this analysis of object-mass nouns explains a broad array of cross-linguistic and psycholinguistic findings, it produces in an asymmetry between mass and count nouns, such that count nouns receive a uniform semantics, whereas mass nouns do not. Given this, several proposals have sought to preserve symmetrical accounts by arguing that object-mass nouns may actually quantify continuous phenomena after all. On one such account, originally described by McCawley (1975), nouns like furniture do not denote sets of individuals, but instead the function that such things fulfill, such that furniture is quantified by the degree to which the function of furnishing is fulfilled. As an example, McCawley argues, “if Fred has 4 chairs, 3 magazine racks, 2 coffee tables, and 1 lamp, and I have 2 chairs, 1 desk, 1 bed, 1 sofa, and 1 table, my 6 pieces of furniture would constitute more furniture than Fred’s 10 pieces do.” (pg. 319). This is because “his” furniture better fulfills the function of “furnishing a space” compared to Fred’s (see also Prasada, 1999).

Similarly, Rothstein (2010, 2017) proposed that although the individuated reading of object-mass nouns is the most salient, this meaning is not lexically encoded and may shift contextually (see also Rothstein & Pires de Oliveira, 2020; Hampton & Winter, 2024). For example, in a context where two people are moving their furniture into a new place and John needs to move a grand piano, a large sofa, a double bed and a heavy wardrobe (4 pieces), while Bill needs to move four folding chairs, a small table, and a rolled-up mattress (6 pieces), people should judge that John has more furniture, hence basing their judgment on volume of furniture rather than number (Rothstein, 2017, pg. 122).

Previous research testing these ideas operationalized ‘function fulfillment’ as ‘variety in kinds’ - i.e., sets containing more kinds of items that better fulfill the category’s function. For example, Gordon and Rodman (2006) placed sets named by object-mass nouns in their functional contexts (e.g., sets of *furniture* in two rooms), and asked English-speaking adults and children to judge which had more furniture: a set that had fewer individuals but more variety in kinds or a set that was more numerous but less heterogeneous. They found that adults based judgments on function fulfillment (i.e., choosing the more heterogeneous set) 30% of the time, and that children did so 55% of the time³. In another study, Huang et al. (2022) directly tested context effects on quantification by asking Mandarin speakers to make quantity judgments for Mandarin translations of English object-mass nouns (which appear as bare nouns without grammatical markers). In a substance-focused context (e.g., two monsters grinding up and eating sets of objects), Mandarin speakers made quantity judgments

³ Unpublished data from Grimm and Levin (2012) report that adults made quantity judgments for object-mass nouns based on function-fulfillment more often than for count nouns. However, this

study compared sets with quantities that may not have been readily discriminable (e.g., 5 vs. 6), while providing much larger ratios in the number of kinds.

based on volume, but in an individual-focused context (e.g. two fairies competing to create sets of objects), they made quantity judgments based on the number of objects.

One question raised by such studies is whether they show that mass nouns are especially vulnerable to context effects, or if instead mass nouns might be lexically specified to individuate but also be sensitive to context in a way that is also true for nouns used in count syntax. For example, although Gordon and Rodman (2006) found that a function-oriented context made some adults base quantity judgments on function fulfillment for object-mass nouns, they also found the identical result for count nouns (e.g., *toys*, *buildings*). Similarly, although Huang et al. (2022) found that participants made judgments based on volume translations of English nouns like *furniture*, they did not test whether the same was equally true of words that are count nouns in English. Given this, context effects might be general to both mass and count nouns, and may not weaken the claim that certain nouns (e.g., object-mass nouns or count nouns) grammatically specify individuation. This is important, because on most accounts, evidence that pragmatic context can coerce a non-individuated meaning from a count noun would not lead to the abandonment of an individuated semantics for count nouns.

Given these considerations, we conducted two studies that sought to provide a stronger test of the contextual flexibility hypothesis by directly contrasting object-mass nouns with two different kinds of count nouns. In Experiment 1, we asked whether adult participants base quantity judgments on number or variety in contexts that support function fulfillment, and contrasted object-mass nouns to superordinate nouns used in count syntax (e.g., *tools*, *weapons*). In Experiment 2, we tested English and French speakers with words that are object-mass nouns in English, but that occur as count nouns in French (e.g., *furniture* vs. *meubles*). If individuation is grammatically specified for object-mass nouns, as it is for count nouns, then in both experiments there should be no significant differences due to syntax. In contrast, if mass syntax permits greater contextual flexibility than count syntax, then object-mass nouns should be more impacted by context than count nouns in both studies.

Experiment 1: English object-mass nouns and superordinate count nouns

Methods

All materials, analysis code and data can be found at [anonymized link]. A preregistration for both experiments can be found at [anonymized link].

Participants We tested 140 English speakers (90F, 45M, 5 Non-binary; $M_{age} = 37.84$ [18; 75]; $SD_{age} = 12.66$) on Prolific.co. All participants resided in the US and had English as a primary language. Nine additional participants were

excluded due to self-reported fluency in French (N=2), failed attention checks (N=4) or comprehension checks (N=3).

Materials & Procedure Participants completed a Truth-Value Judgment task with three characters: Blue Monster, Red Monster, and Penguin. Participants were first randomly assigned to either the Neutral Context (N=70) or the Function-Oriented Context (N=70). Context was manipulated by varying how the two sets of items were introduced (based on Huang et al., 2022). In the Function-Oriented Context, Penguin described a goal specific to the category before the items were introduced. For example, for *furniture*, Penguin said, “I just moved to a new house, and I need some furniture to furnish it. Blue Monster and Red Monster want to give me their furniture.” In the Neutral Context, a neutral sentence was used to introduce the category (e.g., “Blue Monster and Red Monster have some furniture.”).

On each trial, Blue Monster and Red Monster each had a set of items of the same category (e.g., *furniture*). One set had more individual pieces but fewer kinds of items, and the other set had fewer individuals but more kinds. The ratio of items and kinds was fixed across trials, such that one set had 10 individual pieces of the same kind, and the other set had 5 individual pieces of different kinds (Fig. 1) resulting in a 2:1 ratio in number, and a 5:1 ratio in kinds. Participants then heard a question (e.g., “Who has more furniture?”) and heard Penguin make a reply (e.g., “Blue Monster has more furniture than Red Monster.”) Participants then decided whether Penguin was ‘right’ or ‘wrong.’ There were 12 critical trials that tested 6 object-mass nouns (*furniture*, *clothing*, *sports equipment*, *luggage*, *cutlery*, *jewelry*) and 6 superordinate count nouns (*tools*, *weapons*, *instruments*, *vehicles*, *utensils*, *accessories*).

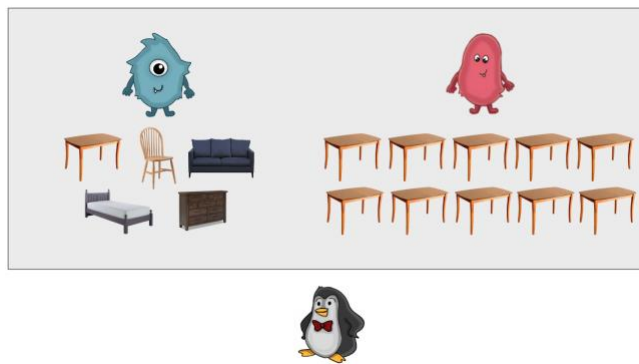


Figure 1. Example trial for ‘furniture’.

Participants also completed four comprehension trials and two attention check trials. These trials presented two singleton sets (e.g., “Blue Monster has a clock, and Red Monster has a bucket”) and Penguin judged which character had a particular item (e.g., “Who has a bucket?” / Penguin: “Red Monster has a bucket”). In comprehension trials, participants were asked to judge whether Penguin was ‘right’ or ‘wrong’. They succeeded in these trials if they answered

correctly based on the story presented. In attention checks, participants saw and heard additional instructions to choose either ‘right’ or ‘wrong’. The stipulated response was always opposite of what they would have answered if they followed the story. Participants had to select the response stipulated by the instruction to be considered successful. We excluded participants who failed any of the comprehension (N=3) or attention check trials (N=4). The location of comprehension and attention check trials was distributed evenly across the test trials. To ensure understanding of the task, at the beginning of the study, participants saw two practice trials structured like the comprehension trials. Participants had to pass both practice trials in two tries each in order to proceed.

Trial order was randomized between subjects. The basis of comparison in the critical trials were counterbalanced within each syntactic category (i.e., Penguin selected the Monster with more individual things as having ‘more’ on half of the statements, and selected the Monster with more kinds on the other half of the statements). We also counterbalanced the correct response for comprehension and attention check trials, and the location of the two sets (left/right).

Analysis On trials where Penguin judged that the Monster with a greater variety of items had ‘more’, participant responses were dummy coded as (1), consistent with function fulfillment, if they judged that Penguin was right, and coded as (0), consistent with number, if they answered that Penguin was wrong. On trials where Penguin judged that the Monster with greater number of individual items had ‘more’, responses were coded in the opposite manner.

To test whether syntax and context affected quantity judgment, we constructed Bayesian generalized linear mixed-effects models (GLMMs) with ‘binomial’ family and link function ‘logit’ using the package *brms* (Bürkner, 2017) to predict responses from Syntax (Mass/Count), Context (Function-Oriented/Neutral), and Syntax * Context interaction. We also included by-subject and by-item random intercepts, and used weakly informative normal priors for slope estimates. We calculated Bayes Factors (BFs) to compare models, and interpreted BFs based on thresholds proposed by Lee and Wagenmakers (2013).

Results & Discussion

We first fitted a uniformly informative Bayesian GLMM that predicted choice of the more heterogeneous set as having ‘more’ with only by-subject and by-item random intercepts, and then added Syntax and Context as main effects. Neither Syntax ($M_{\text{mass}} = 0.18$, $SD_{\text{mass}} = 0.39$; $M_{\text{count}} = 0.18$, $SD_{\text{count}} = 0.38$) nor Context ($M_{\text{function}} = 0.22$, $SD_{\text{function}} = 0.41$; $M_{\text{neutral}} = 0.14$, $SD_{\text{neutral}} = 0.35$) were significant predictors (Syntax: $\beta_{\text{mass}} = 0.23$, 95% CI = [-1.86; 2.43]; Context: $\beta_{\text{function}} = 1.28$, 95% CI = [-0.09; 2.63]) (Fig. 2). There was strong evidence supporting the null model with only random effects against the model with Syntax + Context main effects ($BF_{10} = 0.06$). Another model found that the Syntax * Context interaction was also not significant (Syntax: $\beta_{\text{mass}} = -0.13$, 95% CI = [-2.39; 2.14]; Context: $\beta_{\text{function}} = 1.02$, 95% CI = [-0.41; 2.42]; Syntax *

Context: $\beta_{\text{mass} \times \text{function}} = 0.51$, 95% CI = [-0.23; 1.29]). When comparing the interaction model with the model containing just main effects and the null model containing only random effects, there was strong evidence supporting the model with just the main effects ($BF_{10} = 0.07$), and very strong evidence supporting the null model ($BF_{10} < 0.01$).

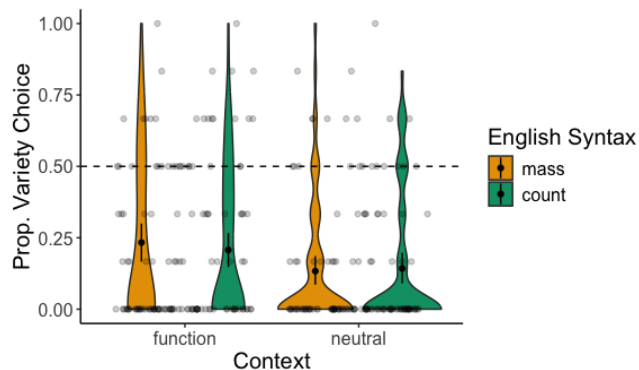


Figure 2. English speakers’ responses in Experiment 1.

Overall, even though all trials provided a greater ratio of kinds than number, participants rarely selected the more heterogeneous set as having ‘more’ ($M = 0.18$, $SD = 0.38$) and instead based most judgments on number (Fig. 2). Also, given our model outputs, participants did not make more judgments based on function fulfillment in contexts that explicitly emphasized function (relative to neutral contexts). And finally, they based quantity judgments on function fulfillment at similar rates for object-mass nouns and superordinate count nouns, in both contexts. These results cast doubt on the hypothesis that object-mass nouns are more susceptible to contextual effects than count nouns, but are compatible with the hypothesis that object-mass nouns specify individuation lexically.

Experiment 2: Object-mass nouns in English & French

Experiment 1 provided preliminary support for the hypothesis that object-mass nouns specify individuation just as strongly as count nouns with similar lexical meanings. In Experiment 2, we conducted a second test of this hypothesis, by investigating how French speakers interpret translations of English object-mass nouns, which in French occur in count syntax. We reasoned that if nouns used in mass syntax are more context sensitive than similar nouns used in count syntax, then French speakers should be more likely to quantify by number than English participants when context favors function fulfillment. Alternatively, if individuation of object-mass nouns is lexically specified, then French and English speakers should interpret quantity judgments similarly for items that are object-mass nouns in English, but count in French.

Methods

Participants We tested 140 French speakers (63F, 75M, 2 Non-binary; $M_{age} = 35.16$ [21; 69]; $SD_{age} = 10.69$) on Prolific. All participants had French as a primary language. An additional 10 participants were excluded due to failing attention checks ($N=2$) or comprehension checks ($N=8$). Because most participants (104 out of 140) rated themselves as proficient in English (at least 6/10 in speaking and/or comprehending English), we did not carry out an exclusion with this criterion. We reasoned that if there is an effect of syntax (i.e., mass vs. count nouns quantify differently, and/or differed in their sensitivity to contexts), then even if French speakers draw on their knowledge of English, this should not affect their responses for French count nouns. Participants were randomly assigned to either the Neutral Context ($N=70$) or the Function-Oriented Context ($N=70$). Data from French participants were compared to English data from Experiment 1.

Materials & Procedure Materials were identical to Experiment 1, but translated to French by two native French speakers. Audio was recorded by a third native French speaker. To equate the task with Experiment 1, we presented French participants with translations of both English object-mass and count nouns. However, due to space constraints, we only report results for English object-mass nouns, though data for superordinate count nouns (to be presented in a future paper) do not differ from mass nouns, and are compatible with other findings. Participants followed the same procedure as Experiment 1. The only difference was in the demographic questionnaire, where they were asked to confirm that French (not English) was their first language.

Analysis We used the same coding scheme and analysis approach as Experiment 1, but with Bayesian generalized linear mixed-effects models that predicted English and French participants' responses to English object-mass nouns (count in French). We included Language (English/French), Context (Function-Oriented/Neutral), and Language * Context interaction as fixed effects. Note that Language is a proxy for Syntax in these models, since we only analyzed nouns that were mass in English and count in French.

Results & Discussion

We first fitted a uniformly informative Bayesian GLMM that predicted participants' choice of the more heterogeneous set as having 'more' with just by-subject and by-item random intercepts, and then added Language and Context as main effects. Only Context was a significant predictor (Language: $\beta_{French} = 0.23$, 95% CI = [-0.34; 1.15]; Context: $\beta_{function} = 1.74$, 95%CI = [1.01; 2.53]). There was very strong evidence supporting the model with Language + Context main effects against both the null model and a *post hoc* model with only Language main effect ($BF_{10} > 30$). In another model including

an interaction effect of Language and Context, only the main effect of Context was significant (Language: $\beta_{French} = -0.07$, 95% CI = [-1.19; 1.04]; Context: $\beta_{function} = 1.30$, 95% CI = [0.20; 2.41]; Language * Context: $\beta_{French*function} = 0.89$, 95% CI = [-0.58; 2.42]). When comparing the interaction model with the model containing only the Language + Context main effects, there was moderate evidence supporting the model with just the main effects ($BF_{10} = 0.25$).

Overall, French participants, like English participants, preferred to base quantity judgments on number, and were less likely to select the more heterogeneous set as having 'more' in both contexts ($M = 0.21$, $SD = 0.41$; $M_{function} = 0.31$, $SD_{function} = 0.46$; $M_{neutral} = 0.11$, $SD_{neutral} = 0.32$) (Fig. 3)⁴. While there was an overall effect of Context, with the function-oriented context resulting in more quantification by function fulfillment, French speakers and English speakers were just as likely to be influenced by context, again suggesting no impact of mass-count syntax. Thus, as in Experiment 1, these results are compatible with the hypothesis that object-mass nouns, like count nouns, specify individuation grammatically.

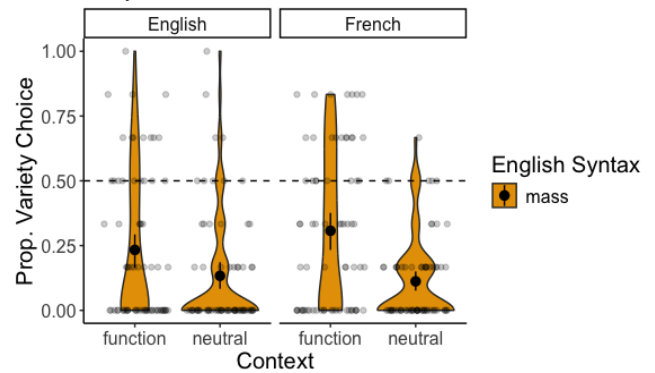


Figure 3. English speakers' responses from Experiment 1 and French speakers' responses in Experiment 2.

General Discussion

In two experiments, we quantify judgments for mass and count nouns in different contexts. We found three main results. First, both English and French speakers quantified overwhelmingly by number even when the ratio of kinds across two sets (5:1) was much greater than the ratio of individuals (2:1). Second, syntax did not affect quantification strategy when comparing English object-mass nouns with either English count superordinate nouns (Experiment 1) or French count nouns that had the same denotations (Experiment 2). These results replicated the findings from Rodman and Gordon (2006), with a larger sample size and across two languages. Finally, while there was some evidence that participants were more likely to quantify by number of kinds when nouns were presented in a function-oriented context, the effect was relatively small, and not significant when data from English speakers was analyzed separately. More critically, there was no significant difference in how

⁴ They also mostly made judgments based on the number of individuals for English superordinate count nouns ($M = 0.21$, $SD =$

0.41 ; $M_{function} = 0.32$, $SD_{function} = 0.47$; $M_{neutral} = 0.11$, $SD_{neutral} = 0.32$).

context affected quantification of English object-mass nouns relative to their French count noun translations, or English superordinate count nouns. This indicates that English object-mass nouns and equivalent count nouns are contextually flexible to similar extents, refining previous findings that focused only on object-mass nouns and therefore concluded that their quantification is uniquely context-dependent (e.g., Huang et al., 2022; Grimm & Levin, 2012).

These results suggest that, although context may sometimes inform how language users make quantity judgments (as per McCawley, 1975), participants nevertheless base judgments mostly on number for object-mass nouns and related count nouns. Also, to the extent that context does impact judgments, it does so equally for nouns used in mass and count syntax. Thus, we did not find evidence for the idea that object-mass nouns are more contextually flexible than equivalent count nouns (Rothstein, 2010). In fact, we did not find a context effect in the analysis with only English speakers, who saw both nouns in mass and count syntax (Experiment 1). Instead, our results are most compatible with the hypothesis that object-mass nouns, like count nouns, grammatically specify quantification according to number.

One important question that remains unanswered by this study and others in the literature is why some superordinate nouns that denote collections of individuals are expressed as mass nouns (e.g., *furniture*, *clothing*) while others are not (e.g., *vehicles*, *weapons*). One clue is that previous research has demonstrated psychological differences in how people reason about superordinate mass vs. count nouns (e.g., Bloom, 1990; Markman, 1985; Wisniewski et al., 1996). For example, Wisniewski et al. (1996) found that, compared to categories denoted by superordinate count nouns, adults judged that items belonging to the same category denoted by an object-mass noun (e.g., tables and chairs as *furniture*) were more likely to co-occur and participate in the same function. Adults were also faster to determine membership for exemplars denoted by object-mass nouns, but only for sentences with more than one kind of exemplar (e.g., “Tables and chairs are furniture”). Given this, one possibility is that when objects occur together and share a function, their labels are more likely to be acquired by children as mass nouns. Supporting this theory are previous studies with children (Gordon, 1985; Barner & McKeown, 2005) showing that when a novel word is presented in ambiguous syntax (e.g., “Look at the *garn*.”), the number of objects referred to impacts whether the noun is acquired as mass or count. For example, these studies find that when children hear “Look at the *garn*” while only one object is presented, then they infer that *garn* is a singular count noun and later pluralize it when referring to multiple objects of the same type. However, when the same sentence is presented with multiple objects, then children interpret *garn* as an object-mass noun, and do not pluralize it when referring to multiple objects. This correlation between plural/singular reference and nominal sub-categorization might help to explain why there are two subcategories of superordinate nouns. If potential referents of

superordinates like *furniture* tend to appear together in groups, then children would be more likely to assume that such nouns are mass. In contrast, if potential referents of superordinates like *weapons* often appear as single objects, then children would be more likely to assume that these nouns are count nouns.

Relatedly, future work should explore why some languages feature more object-mass nouns than others. If syntactic ambiguity makes children more likely to misclassify singular count nouns as mass nouns (as described above), then it may be that languages with morphosyntactic markers that are more ambiguous to perceive and interpret will be more prone to such parsing errors. Therefore, such languages might have more mass nouns compared to languages with more salient or perceptible morphosyntactic markers. For example, English often marks plural count terms with a single morpheme (e.g. “Look at the chairs”), while many determiners (e.g., *the*) are neutral regarding mass/count status. Previous studies have shown that infants’ ability to map English plural markers to the singular/plural distinction is still developing at about 24 months old (e.g., Kouider et al., 2006; Davies et al., 2017). Children’s difficulty in detecting and interpreting English plural morphological markers can lead to plural count nouns in English being misinterpreted as mass nouns that refer to groups of individuals, and thus acquired as object-mass nouns. Meanwhile, French marks plural information on both determiners and root nouns (e.g., “Regarde *les* chaises.”). Because plural information is more salient in French, it might be less likely that plural count nouns are mis-acquired as mass nouns, leading to fewer object-mass nouns in French compared to English (see Barner & Snedeker, 2005 for a similar discussion of this idea). More generally, further research exploring cross-linguistic differences in mass vs. count noun frequencies should make use of both corpus analysis (e.g., Erbach, 2020) and empirical studies to better understand how such differences arise.

Finally, in addition to understanding the question of how words might become object-mass nouns, future studies investigating the interface between mass/count syntax and semantics should also broaden the scope of words included in research on this question. For example, as noted by Barner et al. (2008), whereas superordinate object-mass nouns like *furniture* are somewhat rare and idiosyncratic, some languages such as English allow object-mass nouns to be freely generated via processes of nominalization from verbs that denote punctual events (e.g., *too much kicking / jumping*). Such cases allow additional ways to directly control lexical semantics while manipulating syntax (e.g., to compare *jumps* vs. *jumping*). While work in English has found no effects of syntax on such nouns, future studies should explore this and related phenomena from a cross-linguistic perspective, and in language acquisition.

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