Published in final edited form as:

Discourse Process. 2013 January 1; 50(8): . doi:10.1080/0163853X.2013.850604.

Partition if You Must: Evidence for a No Extra Times Principle

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Abstract

Plural phrases are open to many interpretations in English, where cumulative interpretations of noun and verb phrases are possible without any disambiguating morphology. A sentence like *Every week, the high school kids went to the movies or the ballgame* might involve quantifying over multiple occurrences of a single scenario, in which subsets of the kids do different things, or it might involve quantifying over distinct scenarios, in which all of the kids do one thing or all of them do the other. In the present work and related earlier work (Harris et al., 2013), we pursue the No Extra Times principle that favors interpretations where a phrase is construed as describing a single event taking place during a given time period. In two written interpretation studies, we found that participants more often interpret indeterminate sentences with disjunctive predicates by partitioning the set of individuals rather than partitioning the predicate to denote distinct scenarios or times. We conclude by offering some speculations about why partitioning the eventuality denoted by the verb phrase into multiple times is more costly than partitioning the entities denoted by its subject noun phrase into multiple sets.

Keywords

No Extra Times principle; processing plurals; partitioning sets; quantification; language comprehension; conceptual defaults

The genius of language is that we as speakers may say so little and convey so much. Speakers count on listeners to make similar assumptions to the ones they make and to rely on similar defaults in the absence of evidence about what's intended. Reliance on unstated assumptions is so pervasive that the assumptions are difficult to identify. Indeed it may be that the more fundamental and pervasive the assumptions are, the more difficult they are to identify.

Let's assume that discourse entities are introduced by determiner phrases (DPs) and that times, or temporal intervals, are introduced by tense and by adverbials, at least in English. In the present paper, we will be concerned with the conceptual defaults concerning how these discourse entities and times are understood during language interpretation. If our hunch is right that such defaults govern normal language interpretation, then it is important to understand what the defaults are, and what gives rise to them.

One such default that has been experimentally studied concerns the conditions under which conjoined DPs and plural DPs are treated as referring to a group as a whole vs. as individuals (or sets or sums of individuals). Numerous researchers have shown that comprehenders find it easier to refer to the group as a whole (with a plural pronoun) than to refer to individuals within the group (Eschenbach et al., 1989; Garrod & Sanford, 1982; Koh

& Clifton, 2002; Moxey et al., 2004). For instance, Koh et al. (2008) showed that following a sentence like *Jerry and Lisa entered the opera house*, subjects are faster to read *They looked around* than *He looked around*. Others have shown that this preference can be overcome, at least in part, by assigning different properties to the referents of a plural or conjoined DP. Such differentiation between the referents facilitates their individuation, making it more likely to treat the referents separately (Koh et al, 2008; Patson & Warren, 2011). Patson and Warren (2011), for example, showed that asserting different properties of the individuals introduced in a plural noun phrase (e.g., *Two trainers, one new and one experienced*) increased the likelihood that readers would take a following verb (e.g., *wrestled*) to be reciprocal, requiring that the entities introduced in the plural noun phrase be represented as distinct individuals.

Another much-studied default comes from the ‘mental model’ literature (Johnson-Laird, 1983). In comprehending a discourse, readers apparently default to interpret it as describing a single episode (perhaps extended in time), opposed to distinct episodes separated in time (Zwaan, 1996). This results in disrupted reading when the topic shifts between sections of a discourse, indicating a shift to a distinct episode, although the disruption can be reduced or eliminated by marking the shift by a temporal adverbial (Bestgen & Vonk, 2000). Conversely, if a discourse introduces a large temporal boundary (e.g., *in an hour* vs. *in a minute*), readers tend to report (via event boundary ratings) that a new event is taking place, and these event boundaries affect reading times and the resolution of later anaphors (Speer and Zaks, 2005). Distinct episodes are presumably represented as distinct mental models, and thus these reading time effects may be related to the observed difficulty in reasoning about multiple distinct mental representations of scenarios as compared to a single, integrated representation (Johnson-Laird, 1983; Johnson-Laird, Byrne, & Schaeken, 1992).

The present paper investigates a possibly-related default, first proposed by Majewski (2006, in preparation) and dubbed “No Extra Times” (NET). It appears in (1).

(1) No Extra Times: A sentence describes a single occasion (unless there is evidence to the contrary).

Majewski was investigating the interpretation of reciprocals and noted that a sentence like (2a) will be understood to describe a single occasion, even though doing so makes it impossible for the entities in (2b) to satisfy a strong reciprocal relation in which each sat next to each other one.

(2) a. The four players sat next to each other on the bench.
b. A B C D

If listeners and readers were willing to postulate additional times, then it might be imagined that each player would sit next to each other player on some occasion. But that is not what Majewski found that listeners and readers do: they preferred to interpret sentences like (2) as referring to a single occasion, in which each player sat next to some other player. Following Majewski, we suggest that it is conceptually simpler to construct a mental representation of a single situation or occasion than to construct a mental representation of multiple occasions. In the General Discussion, we explore some of the possible reasons why the conceptual cost of constructing representations of multiple occasions is greater than other costs, such as partitioning a set of individuals into subsets. But for now, we suggest that the preference for

‘no extra times’ reflects the increase in conceptual cost of positing multiple distinct events or occasions as opposed to a single occasion.

In investigating a different constraint on how sentences involving quantification over plural noun phrases are interpreted, Frazier, Clifton and Stolterfoht (2008) provided a sort of indirect evidence for the NET principle (as well as providing evidence about how people interpret sets that are introduced by plural noun phrases). They compared the interpretation of sentences like (3a) and (3b), which differ in whether the predicate adjective is a maximum standard adjective like *clean*, which has a fixed standard (most of the way to 100% clean is a well-defined notion), or a minimum standard adjective like *dirty* (which requires only a non-zero amount of dirtiness, while the notion of 100% dirty is not well-defined).

- (3) a. The dishes were mostly clean.
b. The dishes were mostly dirty.

They asked people whether *mostly* modified a degree (how clean each individual dish was) or a quantity (how many of the dishes were clean), and found that maximum standard sentences like (3a) received a majority of degree interpretations while minimum standard adjectives (3b) received a majority of quantity interpretations. They proposed that *mostly* is more likely to modify the known degree that is characteristic of maximum standard adjectives than the unknown degree characteristic of minimum standard adjectives. What is relevant to the present focus on NET is the fact that Frazier et al. (2008) did not find the multiple occasions interpretation (‘Most of the time, the dishes were clean/dirty’), which is discouraged by NET, salient enough to include as a response option, and no subject indicated a desire to have such an option.

Harris, Clifton and Frazier (2013) directly investigated the interpretation of sentences, such as (4), that could have partitions involving either individuals or times.

- (4) The army is mostly in the capitol.

Most of the army might be in the capitol (partitioning the army) or the army might be in the capitol most of the time. The NET principle predicts that the latter interpretation, which posits multiple times, would be chosen infrequently. Harris et al. provided evidence for this prediction, showing off-line preferences for the former interpretation and on-line disruption of reading times when a temporarily-ambiguous sentence was later disambiguated to the latter, multiple times, interpretation.

As noted above, common defaults that are shared by speaker and listener may be indispensable to rapid communication. By assuming that a listener is likely to assume that a single occasion is under discussion unless there is evidence to the contrary, the speaker may avoid having to spell out in great detail precisely the situation or situations under discussion. The listener too may assume that if multiple occasions are intended, the speaker will provide evidence to that effect. Making the default one that minimizes the times, temporal intervals or occasions that must be postulated has the further advantage of using a conceptually cheap default – one that minimizes the representational and memory resources needed to understand utterances and discourses.

We think it is important to understand the range of cases where NET applies, and to securely pit it against various kinds of alternative possible interpretations because we suspect it is

places a fundamental ‘constraint’ on the operation of the human language system. Specifically, in the experiments reported below, we studied the interpretation of sentences containing a plural DP subject and a verb phrase that are open to at least two distinct interpretations. Consider (5):

(5) Every day, the high school kids went to the movies or the ballgame.¹

Such a sentence is indeterminate with respect to the number of types of occasions under discussion (the kind of occasion that happens on ‘every day’). It can refer to a single type of occasion in which the individuals denoted by the plural DP subject (‘the high school kids’) engage in distinct activities, some going to the movies and some going to the ballgame. Alternatively, it can refer to multiple types of occasions in which the individuals engage as a group in the distinct activities, all of them going to the movies or all of them going to the ballgame on a given day. Following NET, we anticipate that there is a conceptual cost of partitioning the activities into distinct occasions, and that this cost is greater than any cost of partitioning the set of individual actors. This will result in a preference for the single-occasion interpretation. In the General Discussion, we return to the question of why partitioning occasions might be more costly than partitioning sets of individuals.

Experiment 1

Methods

Forty-eight University of Massachusetts undergraduate students received extra course credit for completing a sentence interpretation questionnaire. Sixteen sentences like those in (6) were constructed, and presented, one at a time on a computer screen. The sentences began with a temporal expression such as *Every day* or *Most years*, followed by a plural subject and a predicate that contained either disjoined (6a) or conjoined (6b) phrases, and ended with a prepositional phrase. (For convenience, Table 1 presents an example of the sentences and questions used in both experiments. All sentences appear in the Appendix). A participant read the sentence and pressed a key on a computer keyboard to indicate comprehension. The sentence was followed by a three-choice interpretation question as in (7). One choice (7a) corresponded to a partition of the individuals introduced by the plural subject, one (7b) partitioned over times, and one (7c) indicated that all individuals introduced by the subject engaged in both of the activities described.

(6) a. Every day the students go to the gym or the cafeteria for the first period.

b. Every day the students go to the gym and the cafeteria for the first period.

(7) What did that mean?

a. Some go to the gym, some go to the cafeteria.

b. All go to the gym one day, to the cafeteria the next.

c. All go to both the gym and the cafeteria.

¹As in this example, the sentences in the experiments to be reported all began with a phrase that quantified over occasions – e.g., *Every day*, *Most days*. Because of this, they could all be viewed as being about multiple times or occasions. However, we assume that our subjects took the sentences to be about single vs. multiple *types* of occasions, quantified over instances of the type or types of occasions under consideration.

The sentences of interest contained the disjunction *or*, as in (6a). They are ambiguous between partitioning individuals (such that they describe a single type of event, in which some individuals did one thing and others another thing, on a given day), or partitioning over times (such that they described all the individuals done one type of activity on some occasions, and another type of activity on other occasions). Following NET, we expected a preponderance of (7a), partition-over-individuals, interpretations.

In addition, the experiment contained ‘Conjoined’ sentences like (6b). Such sentences largely lack the ambiguity of the (6a) ‘Disjoined’ sentences: the conjunction ‘and’ does not provide the opportunity to partition over either individuals or occasions. We included these sentences simply to ensure that our subjects were reading carefully and honoring the constraints of English, which should be reflected in a preponderance of choices of the ‘both’ interpretation of (7c). (To the extent that our subjects failed to understand the conjunction as intended, NET would predict a preference for the partition-over-individuals interpretation as compared to the partition-over-times interpretation.)

The experimental sentences were counterbalanced across two lists, so that each subject saw 8 Conjoined and 8 Disjoined sentences, with half the subjects seeing each sentence in one form and half the subjects seeing that sentence in the other form. Following six practice items, these 16 sentences were presented, in individually randomly interleaved fashion, with 39 unrelated sentences that required interpretation and 60 unrelated sentences that required an acceptability judgment.

Results and Discussion

The results are presented in Table 2. They are straightforward. Following the Conjoined (6b) examples, participants overwhelmingly chose the ‘all-both’ answer, (7c) (278/384 responses), indicating generally accurate comprehension. By contrast, with Disjoined predicates (6a), participants typically chose the partition over individuals (7a), and only 43 responses indicated a multiple times interpretation (7b). A logistic linear mixed model analysis (Jaeger, 2008), with random subject and item slopes, indicated that there were significantly more ‘all-both’ answers for the Conjoined than the Disjoined sentences (estimated effect = -2.64 , $SE = 0.30$, $z = 8.90$, $p < .001$).

More relevant to the test of NET, when participants did not choose the “both” interpretation, they strongly preferred the partition-over-individuals interpretation, choosing it 85% of the time for the Disjoined sentences and 81% of the time for the Conjoined sentences. These choice proportions did not differ significantly between Conjunction and Disjunction sentences (Estimated effect = 0.26 , $SE = 0.17$, $z = 1.52$, $p > 0.12$). The estimate of the intercept in log-odds terms (with sum coding of the conditions factor) was 1.81 ($SE = 0.24$, $z = 7.44$, $p < .001$), indicating that the mean proportion was greater than 0.5.

The results of Experiment 1 seem to support the prediction of NET that readers will avoid a multiple times interpretation, even at the cost of partitioning the set of individuals introduced by the subject. This tendency was even apparent for the Conjoined sentences, which do not actually support partitioning. On the rare occasions when readers nonetheless partitioned over something, they strongly preferred partitioning over individuals. There is one potential concern, however, emanating from the particular paraphrases tested in Experiment 1. The partition over times paraphrases were superficially more different from the test sentences than were the partition over individuals paraphrases. The former introduce terms like “one day” and “the next” and contain an elliptical second clause. It is possible that some participants were not very motivated and paid little attention to the interpretation task. They might simply scan the paraphrases to find one superficially most similar to the

sentence just read, and thus choose the partition-over-individuals option, (6a). Experiment 2 dealt with this concern.

Experiment 2

Methods

Experiment 2 was essentially a replication of Experiment 1, obtaining interpretations of the same 16 sentences used in Experiment 1 (this time randomly combined with 83 unrelated sentences presented for interpretation or acceptability rating). There were two differences. One was that the paraphrases were altered to make them equally distant from the test sentence in the partition over individuals and partition over times paraphrases. The paraphrases were altered so that the partition over individuals contained *Some of them X and some of them Y* whereas the multiple times paraphrase read *Some days all of them X and some days all of them Y*, as shown in (8) (see also Table 1).

(8) What did that mean?

- a. Some of them go to the gym, some of them go to the cafeteria
- b. Some days they all go to the gym, some days they all go to the cafeteria.
- c. All go to both the gym and the cafeteria every day.

The second difference from Experiment 1 is that the plausibility of the alternative “individuals” (8a) and “times” (8b) answers in isolation was assessed. It is possible that the bias toward choosing the partition-over-individuals answer observed in Experiment 1 reflected the higher independent plausibility of that statement, compared to the partition-over-times statement. Thirty-two sentences were derived from the paraphrases illustrated in (8) by substituting substantive noun phrases for the pronouns and restoring the temporal expression that began the sentences in the main experiment. An example appears in (9).

- (9) a. Every day some of the students go to the gym, some of the students go to the cafeteria.
- b. Some days the students all go to the gym, some days the students all go to the cafeteria.

Plausibility ratings were gathered using Amazon’s Mechanical Turk (<https://requester.mturk.com/>). Forty ‘workers’ (restricted to native speakers of English, over 18 years of age) each rated 16 sentences on a 7-point plausibility scale, ranging from “very implausible” to “perfectly plausible.” The 32 sentences were divided into two counterbalanced lists, with half the items quantifying over individuals (8a) and half quantifying over times (8b). The 16 sentences in a list were combined with four ‘catch’ sentences, two highly implausible and two blandly plausible, to identify careless ‘workers.’ Eight ‘workers’ provided anomalous ratings of at least one of these four items, and were eliminated from data analysis.

Each ‘worker’ rated these 20 sentences, which were presented in individually-randomized order. The difference in mean ratings (‘individual’ answers minus ‘times’ answers) for each item were used as a linear predictor of choice probability in the analysis of the probability of choosing the partition-over-individuals interpretation, given that the ‘both’ interpretation was not chosen.

Results and Discussion

The data appear in Table 3. The pattern of the data is quite similar to that observed in Experiment 1. The probability of choosing the “Both” alternative is very similar, and while the probability of choosing the “Indiv” interpretation is not as high as in Experiment 1, it is well above 50% (by over three standard errors).

The data were analyzed using logistic mixed models, initially not including the rated plausibility data. The probability of choosing the “Both” paraphrase was analyzed with condition as the fixed effect and subject and item slopes as random effects. The difference between conditions (Disjunction vs Conjunction) was highly significant ($z = 9.36$, $p < .001$). A similar analysis was conducted on the probability of choosing the “Individual” interpretation given that “Both” was not chosen. The difference between the Conjunction and Disjunction conditions was nonsignificant ($z < 1$). With sum coding of the Condition factor, the intercept was significantly greater than 50% (log odds ratio 0.81, $SE = 0.29$, $z = 2.80$, $p < .01$).

The two possible answers (illustrated in 9) did differ in plausibility. The mean plausibility of the quantification over individuals answer was 6.02 ($SE = 0.07$) while the mean plausibility of the quantification over times answer was only 4.87 ($SE = 0.10$). This appears to be of concern in interpreting the interpretation data presented in Table 3. However, the item-by-item difference in rated plausibility (with a mean of 1.24 and a SD of 0.65) did not correlate significantly with the proportion of choosing the quantification over individual (vs. times) interpretation, given that the “both” answer was not chosen ($r = 0.007$). A scatterplot of the relation between the probability of choosing the partition-by-individuals interpretation against the difference in rated plausibility between the by-individuals and by-times answers (separately for the Disjunction and the Conjunction sentences) appears in Figure 1. While there is a substantial range of difference in plausibility, it is clearly not related to the probability of choosing the by-individuals interpretation (which is quite consistently above 0.5). Further, comparison of logistic linear mixed models that did or did not contain plausibility difference as a linear fixed effect indicated that adding that effect did not significantly improve the model fit ($p > .75$ by a chi-square model comparison test). In sum, although the quantification-over-individuals answers were more plausible in isolation than the quantification-over-times answers, this did not seem to be the source of the preference for the quantification over individuals interpretation of the sentences in Experiment 2.

In summary, as in Experiment 1, the Conjoined predicate sentences overwhelmingly received ‘all-both’ interpretations. The Disjoined predicate sentences received partition over individuals interpretations twice as often as multiple times interpretations. This reflected the same preference as in Experiment 1, though it was apparently not as strong in Experiment 2 as in Experiment 1. The results of Experiment 2 show that the appearance of a preference for partitioning individuals is not due only to the greater superficial similarity of the by-individual answer to the initial sentence (which might have been the case in Experiment 1) or to the greater plausibility of the by-individual answers. In line with the predictions of NET, the results of Experiments 1 and 2 support the idea that readers will avoid postulating multiple times, even if it means partitioning the set of individuals introduced by a DP.

General Discussion

As emphasized in the introduction, NET seems to be a far-reaching default that guides interpretations in a variety of circumstances. The question is why postulating additional times, intervals or occasions should be more difficult than postulating new sets of individuals (subsets of an existing set) by partitioning an already available set. In the Introduction, we claimed NET is an economy principle: a simpler representation is possible

if a sentence is taken to describe only one occasion than if it describes multiple occasions. But there are several possible ways to understand the preference for partitioning over individuals rather than over occasions. One possibility concerns the identification conditions on individuals vs. times, temporal intervals or occasions. Different temporal intervals are probably identified in terms of what happens during the interval, not in terms of actual time elapsed. For example, (10) describes a single occasion, despite the fact that it is extended in time. Introducing multiple occasions requires acknowledging the need to differentiate them in terms of their contents. In contrast, distinct individuals often can be identified independently of the properties predicated of them in some sentence, and the individuals often persist across time. In this sense, a given individual can correspond to an entity that is part of our pre-existing conceptual structure, independent of representing a particular sentence.

(10) The riot went on for hours.²

It is also possible that the difference could be traced back to considerations of informativeness. Many of the constraints that emanate from real world properties of entities and activities are limiting and helpful if applied to a single occasion, but cease to limit the possibilities once multiple occasions are considered. For example, if construed as one occasion "The man carried ___" permits only things weighing less than, say, two hundred pounds in the position of the blank. However, if multiple occasions are envisioned, then the blank might be filled by the sum of the weights carried on an unknown number of occasions, and thus the nature of the subject and the verb stops being as predictive as it is given a single occasion. This consideration may be related to our observation that the quantification-over-individuals sentences were rated as more plausible than the quantification-over-occasions sentences. We constructed our sentences to be plausible under the single-occasion interpretation, since this was more constraining than plausibility under the multiple-occasion interpretation. However, the fact that plausibility ratings did not predict the frequency of choosing the different answers indicates that plausibility is not the source of our observed interpretation preferences.

A third possibility relates the dispreference for interpreting a sentence in terms of multiple occasions to phenomena that have been observed in the mental model literature (Johnson-Laird, 1983; Zwaan & Rapp, 2006). There seems to be a cognitive cost in constructing multiple mental models of a text: syllogisms are more difficult to solve when they correspond to multiple mental models (Johnson-Laird, Byrne, & Schaeken, 1992), spatial problems are more difficult to solve mentally when multiple alternative representations of a problem are possible (Johnson-Laird, 1983), etc. To the extent that a mental model can be considered to be a representation of a collection of entities and their relations during one (possibly extended) time interval, representing multiple intervals or occasions would require constructing multiple mental models. This could discourage the multiple-occasion interpretation of ambiguous sentences.

²We suspect that the story is more complicated than simply saying that distinct temporal intervals must be differentiated in terms of their identification conditions. Note that plural DPs can introduce multiple temporal discourse entities, as in (i) under the interpretation that some days are warm and some days are cold. This interpretation is preferred to one in which each given day had a warm interval and a freezing interval (not an implausible interpretation to a New Englander).

i. The days were above 60 degrees or below freezing.

The preference indicates that despite denoting intervals, *the days* is treated as referring to individuals, and like other plural DPs will be partitioned into subsets in preference to postulating multiple temporal intervals for each day.

To be sure, partitioning a set of individuals is not done without cost. Research discussed in the Introduction indicates that readers tend to treat the referents of a plural noun phrase as a set or collective, preferring (e.g.) to use a pronoun to refer to the entire set rather than referring to its members individually ((Eschenbach et al., 1989; Garrod & Sanford, 1982; Koh & Clifton, 2002; Moxey et al., 2004). However, as also discussed earlier, this bias can be mitigated by providing information that differentiates the individuals in the set (Koh et al, 2008; Patson & Warren, 2011). The materials used in of the present experiments can be viewed as implicitly providing a way to differentiate among subsets of the individuals referred to in the plural noun phrase. The disjunctive predicates we used posit two different activities (e.g., in (6), going to the gym, going to the cafeteria) that could be engaged in by two different subsets of individuals, which could facilitate partitioning the individuals. However, as noted in the Introduction, this sort of implicit introduction of sets or implicit partitioning of sets seems to happen even in the processing of rather simple sentences and discourses, not just in the more elaborate materials needed to pit extra times against extra partitions of sets of individuals.

The extent to which interpretive defaults play a role in natural discourse is an open question. It may be the case that, in the interest of economy, identification of events or occasions is frequently left implicit in discourse. Interpretation is then guided by a large range of interpretive defaults involving the interpretation of tense, NET, and adverbial markers of continuity and discontinuity (cf. Bestgen & Vonk, 2000; Speer & Zacks, 2005). It may be that when such an implicit decision is made by honoring NET, comprehension of following parts of the discourse will be disrupted if it turns out that the later discourse refers to multiple occasions. Conversely, when an earlier part of a discourse explicitly introduces multiple occasions, it is possible (but not certain) that comprehension of a sentence that ambiguously permits partitioning over occasions or over times will be harder than when the earlier discourse instead had introduced multiple individuals. Questions such as these must be left for future investigation.

The reason for the avoidance of multiple times must remain speculative. The present work is focused on showing that avoiding interpretation in terms of multiple times is in fact the case, not on why it is the case. We submit that how language comprehenders partition sets into subsets and what defaults they use in interpreting discourse is an interesting piece of the language comprehension problem. The better we understand this piece, the more likely we are to sort out what work the grammar per se must do in constraining the interpretation process. NET may be a very small piece of this puzzle, but we think it is a fundamental one.

Acknowledgments

This project was supported in part by Grant Number HD18708 from NICHD to the University of Massachusetts. The contents of this paper are solely the responsibility of the authors and do not necessarily represent the official views of NICHD or NIH. We would like to thank Shayne Solggett, Jennifer Dimiyan, Adina Galili, Brittany McArdle, and Brittany Stepton for assistance in collecting and analyzing the data reported here.

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Appendix

Sentences used in Experiments 1 and 2.

1. Every day the students go to the gym and/or the cafeteria for the first period.
2. Most days the teachers cover math and/or reading in the morning.
3. Every morning the employees work as receptionists and/or as secretaries for two hours.
4. Generally counselors check in with the girls and/or the boys for home-room.
5. Usually the workers cover the days and/or the evenings during the week.
6. Most years at the summer theater the actors do training exercises and/or rehearse every week.
7. Every evening the security crew walk the perimeter and/or take the dogs out for a half hour
8. Most semesters students play a sport and/or take music class when they want to have fun.
9. Most days the tour guides show the entrance and/or the gardens when visitors come.
10. Every weekday the translators study and/or help the judge before court opens.

11. Many days the museum cleaners wash windows and/or wash the floor for the first hour.
12. Most nights the guards make their rounds and/or play poker for an hour.
13. Every day the campers swim and/or canoe early in the morning.
14. Most weeks the visitors sit in on class and/or tour the campus before the official lecture.
15. Every afternoon the cooking staff cut vegetables and/or prepare sauces before the restaurant opens.
16. Every weekend the taxi drivers circle the park and/or sit at Grand Central in mid-afternoon.

Highlights

- Readers avoid postulating multiple times or occasions without evidence.
- Readers will partition plural sets rather than postulate new times or occasions

Figure 1. Proportion of “by individuals” responses vs. difference in rated plausibility of “by individuals” and “by times” answers, Experiment 2 (separately for Disjunction and Conjunction sentences)

Table 1

Example of materials used in Experiments 1 and 2

Comprehension Sentences: Experiments 1 and 2		
Disjunction sentence	Conjunction sentence	
Every day the students go to the gym or the cafeteria for the first period.	Every day the students go to the gym and the cafeteria for the first period.	
Test Sentences: Experiment 1		
Partition-over-individuals	Partition-over-times	All-both
Some go to the gym, Some go to the cafeteria.	All go to the gym one day, To the cafeteria the next.	All go to both the gym and the cafeteria.
Test Sentences: Experiment 2		
Partition-over-individuals	Partition-over-times	All-both
Some of them go to the gym, some of them go to the cafeteria	Some days they all go to the gym, some days they all go to the cafeteria.	All go to both the gym and the cafeteria every day.

Table 2

The frequencies of partition over individuals “Individuals”; 7a); partition over times “Times”; (7b), and “Both”; (7c) answers, the proportion of “Both” responses, and the proportion of “Individuals” responses given that “Both” was not chosen (together with standard errors of proportions)

Condition	Individual	Times	Both	pr(Both)	pr(Indiv NotBoth)
Disjunction	238	43	103	.27 (.02)	0.85 (0.02)
Conjunction	86	20	278	.72 (.02)	0.81 (0.04)

Table 3

The frequencies of partition over individuals “Individuals”; 8a); partition over times “Times”; (8b), and “Both”; (8c) answers, the proportion of “Both” responses, and the proportion of “Individual” responses given that “Both” was not chosen (together with standard errors of proportions)

Condition	Individuals	Times	Both	pr(Both)	pr(Indiv NotBoth)
Disjunction	180	95	109	.28 (.02)	0.65 (0.03)
Conjunction	67	31	286	.75 (.02)	0.68 (0.05)