Variable Telicity in Consumption Verbs

J. Adolfo Hermosillo
jadolfoh@stanford.edu
LINGUIST 245B

June 8th, 2021

1 Introduction

Experimental work in the study of telicity continously appears to find that certain predicates deviate from theoretic constraints that suggest telicity is only true of events that an undergo a maximal culmination (van Hout, 1998; Ogiela 2014; Anderson, 2017). The purpose of this study is to explore how telicity can vary in a subset of incremental theme verbs: consumption verbs. We propose that these verbs have a telic meaning but a number of factors can contribute to a relaxation of its culmination entailments. Through a truth-value judgement task, we explore how event progression and object maximality relate to variable telicity. The study preregistration can be found here: https://osf.io/598ft

2 Telicity

Lexical aspect is property of events that describes boundedness. An expression is telic if it has a a logical endoping, and atelic otherwise (Krifka, 1989). For example, the predicate *build a sandcastle* is telic, it has a logical endpoint, that is, when *the sandcastle* has been fully erected. On the other hand, the predicate *push a cart* is atelic; Unless otherwise specified, the action can continue indefinitely. Time adverbial diagnostics are useful in determining whether an expression is telic or atelic (Vandler, 1957; Dowty, 1979). The *in X time* test, for example, only allows for felicitous readings of sentences with telic predicates as in 1(a) but it does not allow for such readings in sentences with atelic predicates as in 2(a). In contrast, the *for X time* test only allows for felicitous readings of sentences with atelic predicates as in 2(b) but it does not allow for such readings in sentences with telic predicates as in 1(b).

1. a) Qwan built a sandcastle in 40 minutes.
   b)*Qwan built a sandcastle for 40 minutes.
2. a) Fatima pushed a cart in 40 minutes.
   b) Fatima pushed a cart in 40 minutes.

Telicity, however, goes beyond just the meaning of a verb. Krifka (1989) suggests that even for telic verbs, telicity can vary depending on the type of its direct object. Of interest are quantized and cumulative objects. Quantized objects, like count nouns or nouns with cardinal quantifiers, are objects whose subparts are not equivalent to the whole. For example, a subpart of *the sandcastle* is

not equivalent to *the sandcastle* nor the subparts of *three books* or *an apple* are equivalent to their respective whole. Cumulative objects, like mass nouns or bare plurals, are objects whose subparts are essentially equivalent to the whole. For example, a subpart of *rice* is equivalent to *rice*, just as a subpart of *houses* is equivalent to *houses* (in the sense that an unknown number of houses is still houses). Generally, when the direct object of a predicate is quantized, the resulting construction is telic; on the contrary, when the direct object of the predicate is cumulative, the resulting construction is atelic.

3 Experimental Approaches to Telicity

Comparing children's and adults' interpretations have often been the focus of experimental work that seeks investigates how different factors may influence the interpretations of culminating events. van Hout (1998) studied telicity calculations in quantity-sensitive verbs with resultative particles (e.g., *eat up*/*drink up*) and quantized objects in English and Dutch. Results suggest that resultative particles facilitate children's interpretation of telicity at earlier ages, but most surprising is that both children and adults distinguish event boundedness when resultative particles are present in discourse. Similar results for partitive verbs and quantized direct objects have been replicated in children and adults by Schulz & Penner (2002) for English and German.

Ogiela et al. (2014) examined how quantity sensitive verbs (e.g., eat, drink), when combined with resultative particles (i.e.,'up'), and different determiner types influenced the interpretation of telic predicates.They propose that telicity could be further infered from the following three independent components: whether the direct object carries information about quantity (quantized vs nonquantized DPs), whether a verb carries information about quantity (quantity sensitive vs. quantity insensitive verbs), and whether a predicate contains a resultative particle. According to theoretical constraints, predicates composed of quantity sensitive verbs, quantized objects, and resultative particles should yield telic predicates and require a maximal culmination. Their results suggested otherwise. The interpretation of telic predicates is variable and does not require a maximal culmination.They attributed this incongruity to a possible partitive, atelic meaning in verbs like *eat* and *drink*.

Based on findings from Syrett et al. (2010) that suggest that standards for gradable predicates can be shifted depending on whether felicitous test cases have previously appeared in an experiment, Anderson (2017) investigated how experimental context, as a proxy for discourse, influenced children's and adult's calculation of telicity in predicates with quantity sensitive verbs and quantized objects from two different classes: strictly telic class (e.g., *build* or *fix*)and variably telic class (eg., *eat* or *drink*). Strictly Telic predicates are predicates whose telicity depends on a maximal degree of completion and more often align with the homomorphic notions of incremental themes (Dowty, 1991). Incremental theme verbs describe events where that hold an incremental relation with a direct object, that is, as the event progress so does an incremental change in the direct object. For example, in the event of building a house, as the event of building progresses so does the construction of the house. Variably Telic predicates, are predicates whose telicity is related to a non-maximal degree of completion, and while they technically have incremental theme verbs, the homomorphism falls short. Anderson found that event ordering only had significant effect in children, and while children do not differentiate between a Strictly Telic class and Variably Telic class, they do attend to context to determine adult-like telicity. Specific to adult language, Anderson found that adults differentiated and grouped predicates into either a Strictly Telic or a Variably Telic class. Adults significantly required a maximal culmination for Strictly telic verbs like *build* or *fix* but a non-maximal culmination was sufficient for Variably telic verbs like *eat* or *drink*.

4 Degree Achievements and IT verbs

The concept of the incremental theme has motivated work on degree achievements, a class of verbs where verbs are derived from gradable adjectives (e.g., *wide* and *widen*). Hay et al. (1999) suggest that in incremental theme verbs, the actual incremental theme is not exactly the argument of the verb, but rather a property of the argument. For example, in a telic predicate like *mow the lawn*, it is the area of the lawn and not the lawn itself what is in fact the incremental theme. They relate the notion of properties of the argument to the scalar structure associated with the base adjective of degree achievements. Kennedy & Levin (2007) extend on Hay et al. and posit that telicity in degree achievements is better accounted for when we consider the calculation of a standard of comparison, scalar semantics, and the meaning of adjectives as measure of change functions rather than a pure measure function, as previously done in Hay et al. Following this account, to calculate the telicity of a degree achievement we need to take into account 1) whether the base adjective has a minimum or maximum standard of comparison, 2) whether the base adjective has a lower/upper and open/closed scale, and 3) that their meaning measures whether there is a change rather than the dimension of the change. Even when incremental theme verbs do not lexicalize a measure of change, Kennedy Levin propose that this analysis could prove helpful in determining variable telicity as the measure of change is introduced compositionally by the direct objects.

5 Hypothesis

As consumption verbs continue to challenge theoretic explanations of telicity, many questions can arise. Among them: Are consumption verbs telic or atelic? Our hypothesis is that consumption verb predicates have a non-partitive telic meaning but a number of factors can contribute to a relaxation of its culmination entailments. In order to understand variable patterns, we relate variable telicity to two components of Kennedy and Levin (2007) analyis of DAs: measures of change and scalar semantics.

First, we propose that the extent to which an event has progressed has an effect on the interpretation of telicity. Our first prediction is that the closer an event is to a maximal culmination, the less likely it is for a predicate that describes that event to be interpreted as telic. In other words, sentences that describe incomplete events closer to a logical endpoint are more likely to be interpreted as true even if the logical endpoint has not been reached, the culmination entailments will be relaxed the closer the event progression is to a maximal culmination.

Second, we propose that the direct objects of consumption verbs lexicalize a scale which can compositionally affect the interpretation of telicity. More specifically, there are two types of scales direct objects can lexicalize: an upper closed scale or a lower closed scale. An object has an upper closed scale if it is perceived to be maximally consumable, like a cup of coffee. These objects would behave similar to adjectives like *straight*, which describe objects that must be *completely straight*. On the other hand, an object that has has a lower closed scale is perceived to be partially consumable, like a chicken wing. These objects would behave similar to adjectives like *wet* or *bent*, which can describe things that can be *partially* or *completely wet* or *bent*. We will refer to this property of an object as object maximality. Our second prediction is that predicates will be interpreted as telic more often when they have a maximal quantized direct object than when they have a non-maximal quantized direct object. That is, culmination entailments will be relaxed more for predicates with non-maximal quantized direct objects than for those with maximal quantized direct objects.

6 Method

6.1 Participants

We recruited a total of one hundred and eighty participants via prolific (N=180, 167 after exclusion). In order to participate, participants needed to be L1 English speakers from the United States. They were exposed to a 16 trial truth-value judgement task that took on average 2.6 minutes to complete. Participants could optionally provide demographic information, comments about the stimuli, and general comments about the experiment. We compensated participants for their participation at an adjusted rate of $15/hr.

6.2 Materials

Linguistic stimuli: A total of 8 sentences were used. The sentences consisted of the following form: Andy *verb in past tense* the *direct object* . We chose two consumption verbs, eat and drink, and four direct objects for each verb. For each verb, 2 food items were maximal, and 2 were non-maximal in the context of the experiment. For the verb eat we used *banana*, and *cookie* as maximal DOs, and *apple* and *wing* as non-maximal DOs. For the verb drink, we used *coffee* and *tea* as maximal DOs, and *soda* and *whiskey* as non-maximal.

Visual stimuli: We photographed the 8 food items through 6 different levels of the consumption event for total of 48 pictures. The food items for the verb *eat* on a plate were placed on a plate. The food items for the verb *drink* were either in a mug (*coffee* and *tea*) or a glass (*soda* and *whiskey*). The pictures were taken from angles that made it clear that the event had undergone some noticeable change. The levels are described below.

1. Level 0: An event that has not started.
2. Level 1: An event where a minimal amount of the DO (direct object) has been consumed.
3. Level 2: An event where half the DO has been consumed.
4. Level 3: An event that is a middle point between level 2 and level 4
5. Level 4: An event where a minimal consumable amount of the DO is left.
6. Level 5: An event where the DO has been consumed to a maximal amount.

In the context of the experiment, *banana* was non-maximal as it was presented as a peeled banana. For *drink* objects, *whiskey* and *coke* were non-maximal in the sense that they were presented with ice cubes, unlike *coffee* or *tea*, which were presented just as liquid in a mug.

6.3 Procedure

The study was administered online through Prolific. Participants were asked to judge 16 sentences that described an event depicted in pairs of pictures. For each trial, participants were shown a pair of images and a sentence. The image on the left represented the starting point of an event and the image on the right represented the ending point of such event. For all trials, the image on the left depicted an intact object, and the image on the left depicted one of four conditions:

1. Control condition: an intact object (level 0).
2. Baseline condition: an object consumed to a maximal degree (level 5).

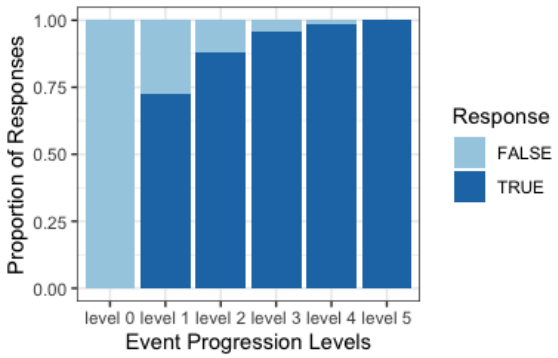

Figure 1: Proportion of responses by event progression levels

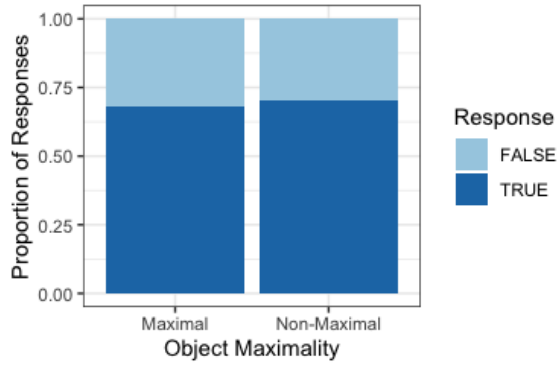

Figure 2: Proportion of responses by object maximality

3. Critical condition: an incomplete event (levels 1-4).

4. Filler condition: an incomplete event from (levels 1-4).

The control condition was used for exclusion purposes. The baseline condition was used to determine that participants understood the task. Since these two conditions were designed to always hold FALSE and TRUE respectively, the data for any participant that failed to answer correctly was not included in the analysis (After the exclusion of participants based on control items, 3 out of 4 participants who answered FALSE in baseline conditions expressed confusion in the comments post-experiment, so we decided to also exclude that data from the analysis). The objects for the baseline condition were the same objects that were shown in the critical condition, and the objects in the control condition were the same objects that were shown in the filler condition. Fillers were used to have a balanced design. Experimental materials, data, and analysis scripts can be found here: https://github.com/adolfohermosillo/variable_telicity .

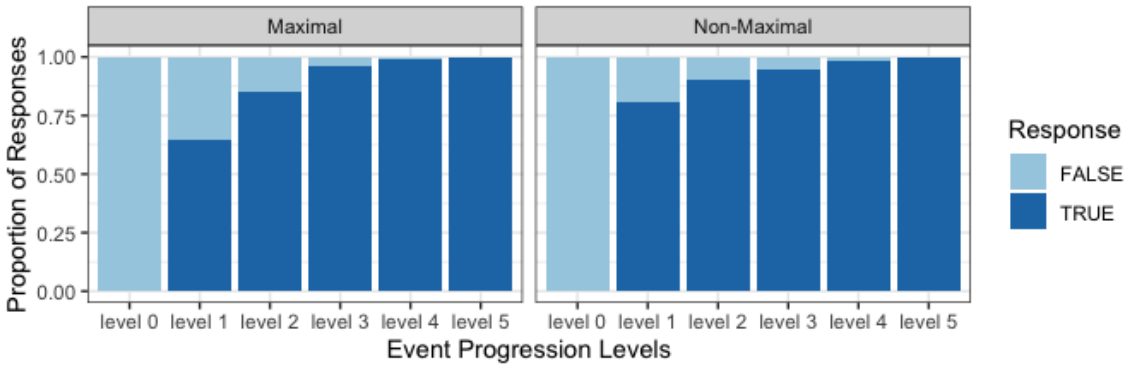

Figure 3: Proportion of responses for Maximal and non-maximal objects by event progression levels

7 Results

Proportion of responses to truth value judgments after exclusions are shown in Figure 1 and Figure 2. In Figure 1, we can observe proportion of response by event progression. In Figure 2, we can observe proportion of responses by object maximality. The main questions are the following: Do verbs of consumption require maximal culminations? Do event progression and object maximality have an effect on whether participants accept sentences in non-maximal culminations? From Figure 1 and 2 we can see that the proportion of accepted sentences is greater than that of rejected sentences. Further, from figure 1 we can observe that as the event progresses, participants are more likely to accept sentences. We also see that responses for levels 0 and level 5 are categorical. From figure 2 we can also see that there is a slight difference for maximal and non-maximal objects, such that the proportion of acceptance for sentences with non-maximal objects is slightly greater than for maximal-objects. To address the questions above and verify the statistical significance of these observations, we conducted a mixed effects logistic regression model with a random effects structure. Our model predicted truth value judgments from fixed effects of event progression, a 4 level integer that represents the extent to which an event has progressed; object maximality, a binary variable that represents whether an object can be consumed completely in the context of the design; and the interaction between these two predictors. Both predictors were centered around the mean. The random effects structure justified by the design included by-participant random intercepts. We observed a main effect of event progression such that speakers were more likely to accept sentences as the event progression unfolded (β = 1.6098 , SE =0.2721 , p $<$ 0.0001). We did not observe a main effect of of object maximality (β = -0.4848 , SE=0.4706, p = 0.303). However, we did observe a significant interaction between the two predictors (β =-1.2400, SE= 0.4697, p $<$ 0.009). Simple effects analysis revealed that the interaction was driven by the event progression effect being smaller in the non-maximal condition (β = 0.9898 , SE=0.2587, p $<$ 0.001) than in the maximal-condition (β = 2.2298 , SE=0.4375, p $<$ 0.0001). In figure 3, we can observe a visual representation of this interaction in Figure 3.

8 Discussion

In this experiment, we related measures of change and scalar semantics to variable telicity in consumption verbs. We proposed that consumption verbs had a non-partitive telic meaning but its culmination entailments could be relaxed by the extent to which an event had progressed and the whether the object was maximal. We conducted a mixed-effects logistic regression model to address the predictions relevant to our hypothesis, specifically for incomplete events. We found that one of our predictions was borne out. Sentences describing incomplete events tend to be accepted more as the event progress. If we link the rejection of a sentence in an non-maximal culmination to a telic interpretation, our results suggest telic interpretations are less likely to occur as the event progresses. Our prediction that object maximality would relate to variable telicty was not born out. Nonetheless, we do find that the effect of event progression is smaller for non-maximal objects. If consumption verbs had a telic meaning, the effect of event progression could be explained as just another instance of a pragmatic slack (Lasersohn, 1999). That is, we as humans, tend to speak vaguely, close enough to the truth for practical purposes. For a particular event, the closer we get to the truth, the more likely we are to accept it even when it is logically false. If consumption verbs had a partitive atelic meaning, we would have expected to find no significant difference with respect to event progression, and a higher proportion of TRUE responses in levels 1-4.

Whether consumption verbs have a telic or an atelic meaning is still inconclusive. One possible explanation is that speakers can have different meanings for these verbs, some may have a non-partitive, telic meaning that requires events to reach a maximal culmination, while others have a partitive, atelic meaning that does not require events to reach a maximal culmination, similar to what Ogiela et al (2014) propose. Future work would involve a deeper analysis that looks at social variables and try to explain whether this is indeed the case.

References

Anderson, C. (2017) "Contextual Factors in Children's Calculation of Telicity", *BUCLD 41*, 18-31.

Dowty, David R. 1991. Thematic proto-roles and argument selection. *Language* 67:547– 619.

Dowty, David R. 1979. Word meaning and Montague grammar. Number 7 in Synthese Language Library. Dordrecht: Reidel.

Hay, J., Kennedy, C., & Levin, B. (1999). Scalar structure underlies telicity in degree achievements. In *Proceedings of SALT 9*, 127–144.

van Hout, A. (1998). The role of direct objects and particles in learning telicity in Dutch and English. In *BUCLD 22 Proceedings*, eds. A. Geenhill et al., 397-408. Somerville, MA: Cascadilla.

Kennedy, C., & Levin, B. (2008). Measure of change: The adjectival core of degree achievements.

Krifka, M. (1989). Nominal reference, temporal constitution, and quantification in event semantics. In R. Bartsch, J. v. Benthem, & P. v. E. Boas (Eds.), *Semantics and contextual expression* (pp. 75–115). Dortrecht, the Netherlands: Foris.

Lasersohn, P. (1999). Pragmatic halos. *Language*, 522-551.

Ogiela, D., Schmitt, C., & Casby, M. (2014) "Interpretation of Verb Phrase Telicity: Sensitivity to Verb Type and Determiner Type", *Journal of Speech, Language, and Hearing Research* 57, 865–875.

Schulz, P., Penner, Z. (2002). How you can eat the apple and have it too: Evidence from the acquisition of telicity in German. In *Proceedings of the GALA 2001 conference on language acquisition* (pp. 239-246).

Syrett, K., Kennedy, C., & Lidz, J. (2009). Meaning and context in children's understanding of gradable adjectives. *Journal of Semantics* 27(1). 1–35.

Vendler, Z. (1957). Verbs and times. *The philosophical review* 66(2). 143–160.