Pluractional Demonstrations*

Robert Henderson ♣ The University of Arizona

Abstract

This paper develops a novel formal semantics for ideophones that can account for their meaning and compositional properties. The proposal extends recent work on iconicity in sign languages by Davidson (2015), whose demonstration-based framework provides a formal foundation for the semantics of ideophones that captures the difference between descriptive meaning and depictive meaning, the kind of meaning ideophones traffic in. After providing a demonstration-based account of the basic ideophone construction in the Mayan language Tseltal, the paper then shows how the demonstration-based account can be used to analyze pluractionality in the ideophone domain. In particular, through case studies on Tseltal and Upper Necaxa Totonanc (Totonacan), I show that there are two previously unrecognized types of ideophonic pluractionality, and that their properties support the demonstration-based account. The first, which I call "demonstration-external pluractionality", involves a speaker using an ideophone to do a plurality of demonstrations that characterize a plurality of events. The second kind of ideophonic pluractionality, which I call a "demonstration-internal pluractionality", is much more similar to pluractionality in the verbal domain, and involves special morphology that derives ideophone stems that can only be used to demonstrate plural events. Finally, I use the contrast between these two types of pluractionality in the ideophone domain to clarify the line between the iconic and non-iconic aspects of the semantics of ideophones.

Keywords: ideophones, pluractionality, iconicity, demonstrations, Mayan, Totonacan

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1 Introduction

The term *ideophone* is used to pick out a distinguished class of words in a language that specialize in depicting sensory imagery (Dingemanse 2011: p. 25; 2012). While the expressions considered in this work fit the definition, ideophones are often easier to point at than define. For this reason, consider the following example of the ideophone *tsok'* in Tseltal (Mayan).[1]

(1) pura ch'il-bil-Ø, tsok' x-chi-Ø ta mantekat
just fried-PERF-B3 IDF:sound.start.to.fry NT-say-B3 P lard
'it just gets fried, it goes «tsok'» in the lard' (Pérez González 2012: p. 162)

First, according to the definition, ideophones must pattern together as a class separate from the rest of the lexicon. It is this that allows us to talk about ideophones as a distinguished lexical category. The class of words to which the ideophone *tsok'* in (1) belongs is clearly morphosyntactically distinguished. To begin, *tsok'* is a bare CVC root complement of a verb in (1). This is impossible for all other kinds of roots in the language, which would at least have to bear some kind of inflection here. Moreover, bare ideophone roots like *tsok'* can only appear in this syntactic frame. Their distribution is thus more restricted than other roots in the language. In fact, we are able to define the ideophones roots of Tseltal as precisely those that appear as underived CVC complements to the verb *chi* 'say'.

The second property of ideophones, according to the definition, is that they have a distinctive semantics in virtue of presenting sensory imagery via depiction. The ideophone *tsok'* in (1) fits this semantic profile along both dimensions. First, the ideophone in (1) evokes the sound of the event, which is the most common kind of sensory imagery depicted, only followed by movement, and then visual patterns (see Kilian-Hatz 1999: p. 35–41 and Akita 2009: p. 20–32). Second, there is a persistent intuition in the literature that expressions like *tsok'* do not describe events of perceiving the sound of something hitting hot oil, but instead either perform the sound of something hitting hot oil or invite the hearer to imagine experiencing the sound of something hitting hot oil (Dingemanse 2011; Kita 1997; Nuckolls 1995). While it is hard to pin down the exact nature of depiction, which is precisely one of the goals of this work, there are already hints of the contrast in (1) where the speaker presents the same event in two ways. The first clause describes what happened, namely it got fried, while the second uses a quotative construction

[1] Note that because English does not have the same range of ideophones as the languages discussed here, I will not be translating them into English in example translations. Instead, I will be using the untranslated ideophone marked off in French quotes.

to perform what that particular event was like, namely like *tsok'*.

The literature on the formal semantics of ideophones is scarce. This is, I think, due to two challenges: (i) it is not at all clear how to formalize the distinction between descriptive meaning, which is at the heart of truth-conditional semantics, and depictive meaning, which ideophones seem to traffic in, and (ii) the idiosyncratic specificity of ideophone meaning and their restricted (morpho)syntactic distribution presents obstacles for doing formal lexical semantics. In particular, by avoiding modification and appearing as arguments to only a small class of verbs, it is difficult to isolate their meaning and to determine their type through comparison in minimal pairs across various constructions. The goal of this paper is to address both of these problems, and in doing so, begin to develop a formal semantics of ideophones that can account for their meaning and compositional properties.

To address the first problem, I propose an analysis of ideophones that extends recent work in Davidson 2015, which provides a novel unified account of quotation and a variety of iconic phenomena in sign languages in terms of *demonstrations*—a special type of communicative event that stands in a similarity relation with the event demonstrated.[2] The demonstration-based framework will provide a formal foundation for the semantics of ideophones that can capture the difference between description and depiction. Addressing the second problem is more complex because it means exploring the range of ideophone meaning and making comparisons to the meanings of expressions from more well-known categories. While pluractional meaning is often idiosyncratic, many ideophones clearly have pluractional semantics (i.e., they make reference to plural events). Since the typology of pluractional meaning is fairly well understood (Hofherr & Laca 2012; Wood 2007, among many others), it provides exactly the hook into problem that we need. We can group ideophones by the variety of pluractionality they exhibit, and then provide templates that generalize over particular items to capture this aspect of ideophone meaning.

Along these lines, this paper shows through case studies on two Mesoamerican languages, Tseltal (Mayan) and Upper Necaxa Totonac (Totonacan), that there are two broad types of ideophonic pluractionality and that their form supports the demonstration-based analysis. The first, which I call "demonstration-external plu-

[2]It is important to note that there is some debate how unified a treatment we want for various iconic phenomena in sign language. For instance, Davidson 2015 gives both classifier predicates and role shift a unified treatment in terms of demonstrations, but there are other views. Schlenker to appear(a),(b) argues, contra Davidson 2015, that role shift should be kept separate from classifier predicates and treated as "supermonstrous", involving context-shifting operators that leave open the possibility for non-quotational behavior. I do not mean to take a stand on the data from sign languages. Instead, because ideophones crosslinguistically are often restricted to quotative environments, I focus on the Davidson 2015 account of *be like*-quotation, whose form I believe opens up a way to analyze the iconic and conventionalized properties of ideophones.

ractionality", involves a speaker using an ideophone to do a plurality of demonstrations that characterize a plurality of events. The existence of this kind of ideophonic pluractionality will following neatly from the fact that demonstrations are merely events, which themselves can be plural and have a spatiotemporal profile. Thus, they should be able to depict a second plural event with the same spatiotemporal profile. The second kind of ideophonic pluractionality, which I call a "demonstration-internal pluractionality", is much more similar to pluractionality in the verbal domain. A central piece of my analysis is that ideophones are, at their core, event-denoting. They get their depictive semantics in virtue of appearing in ideophone constructions. This means that one expects to find morphology that derives ideophones stems that denote only plural events. The result is that when one of these derived pluractional ideophones is used in a demonstration, even an atomic demonstration, it will necessarily depict a plural event.

The primary goals of this paper are to motivate a demonstration-based account of ideophones, and to illustrate its power by using it to uncover two previously unnoticed types of ideophonic pluractionality. In doing this, though, the paper opens up a research program in comparing attested varieties of verbal pluractionality with ideophonic pluractionality. We can ask whether we find the same kinds of pluractionality in the ideophone domain that we see in the verbal domain, as well as whether those types are equally well represented across the demonstration-internal / demonstration-external divide. The final section of this paper will assess the prospects of this research program by taking a broader look at pluractional ideophones we see across the two case-study languages.

With this backdrop, the paper is structured as follows. First, section 2 introduces the very idea of pluractionality and pluractional ideophones. The demonstration-based account of quotation (Davidson 2015), which forms the foundation of the proposed treatment of ideophones, is presented in section 3. Davidson's analysis is extended to Tseltal (TZH, Mayan) ideophones in section 4, while section 5 provides an account of demonstration-external pluractionality through a case study of pluractional ideophones in Tseltal. We then consider demonstration-internal pluractionality in section 6 through a case study of such ideophones in Upper Necaxa Totonac (TKU, Totonacan). Section 7 defends the particular boundary between iconic and conventionalized content drawn in the previous sections. In this section I also consider how the account I develop compares to an alternative that treats ideophones as more thoroughly iconic. The final section, namely section 8, concludes.

2 Pluractionality and pluractional ideophones

Before providing a detailed formal treatment of pluractional ideophones, I first want to introduce the very idea of pluractionality and show that ideophones can have pluractional semantics. Pluractionality, very broadly, is a grammatical category expressing plural reference to events (Cusic 1981; Newman 1990; Wood 2007: among others). For instance, partial reduplication in Kaqchikel and total reduplication in Karitiana derives verbs that cannot be satisfied in single-event scenarios.

(2) Kaqchikel (Henderson 2012)

Xe'in-tz'et-**etz'a** ri sanïk.
INFL-see-RED the ant
'I glanced at the ants repeatedly.'
False if I just looked at them once.

(3) Karitiana (Müller & Sanchez-Mendes 2007: ex. 19)

Õwã naka-kot-**kot** sypomp opokakosypi.
kid 3.DECL-break.NFUT-RED two.OBL egg
'The kid broke two eggs.'
False if the eggs broke simultaneously.

These derivations are often called pluractionals or pluractional morphology. The task then is to find pluractional morphology in the ideophone domain. Sections 4-6 present two case studies from the Mesoamerican languages Tseltal and Upper Necaxa Totonac, and so I will focus on those language here. I am confident, though, that pluractional ideophones are extremely common crosslinguistically.

First, note that there are examples of ideophones that are true in single-event scenarios. They provide the base case against which the derived pluractional forms can be identified. For instance, it is implausible for trees to fall more than once, and so most naturally the ideophone in (4-a) characterizes the sound of single tree-falling events.

(4) Tseltal

a. t'or x-chi-Ø i x-bajt-Ø
IDF:wood.sound NT-say-B3 ICP ICP-go-B3
'When a tree goes down it goes «t'or».' Pérez González 2012: p. 164

b. teme t'ul x-chi-Ø k'oyel=e
if IDF:droplet.form NT-say-B3 arrive.there=ENC

‘if it arrives in the form of a droplet (lit. saying «t’ul»)’ Pérez González 2012: p. 163

(5) Upper Necaxa Totonac

a. patʃ maka-wán
IDF:sound.small.stone.fall hand-say
‘The pebble falls «patʃ».’ Beck 2008: ex. 16a

b. te̯ːɬ ik-ta-wiːɬ kaː-sʾewĩ̯wĩ̯ ã̯ntsá
IDF:sound.hit.ground 1SG.SUBJ-INCH-sit PLC-cool here
‘«te̯ːɬ» I plopped myself down here where it’s cool.’ Beck 2008: ex. 15a

In Tseltal, one type of pluractional ideophone is formed via total reduplication of the ideophone. As with Karitiana verbal reduplication in (3), the reduplicated ideophone has a pluractional reading—it rules out single-event scenarios, as the translation shows.

(6) Tseltal

a. x-t’oj-t’on-Ø, t’oj-toj-toj x-chi-Ø
NT-IDF:wood.sound-EXPR3 IDF:wood.sound-RED-RED NT-say-B3
‘The sound of hollow wood every little bit goes «t’ojt’ojt’oj».’ Pérez González 2012: p. 166

b. x-puj-pon-Ø ya j-pas-tik klabar tabla
NT-IDF:hollow.sound-EXPR3-B3 ICP a1p-do-PL hit table
aw-il-Ø te t’en-t’en-t’en x-chi-Ø
A2-see-B3 COMP IDF:sound.hit.table-RED-RED NT-say-B3
aw-il-Ø=e
A2-see-B3=ENC
‘It sounds like giving blows to a hollow object, it’s like when we hit a table, see how it goes «t’ent’ent’en».’ Pérez González 2012: p. 189

The situation in Upper Necaxa Totonac is interesting in that there are two reduplicative templates for pluractional ideophones. First, as in Tseltal, full reduplication can be used with ideophones to mark pluractionality, as the following examples show.

(7) Upper Necaxa Totonac

a. patʃ-patʃ ta-maka-wán
IDF:sound.small.stone.fall-RED 3PL.SUBJ-hand-say
'The pebbles fall «patʃpatʃ».' Beck 2008: ex. 16b

b. mat tɛ̰ːɬ-tɛ̰ːɬ liːtaːtiːtáː tsamáː misín
QTV IDF:sound.hit.ground-RED bounce.on.bottom this jaguar
'the jaguar bounced around on its rear end' (going «tɛ̰ːɬtɛ̰ːɬ») Beck 2008: ex. 15b

Second, there is a partial reduplication process (-CV) that also derives pluractional ideophones. Beck 2008: p. 14 cites the following examples.

(8) Upper Necaxa Totonac
a. kʊ̰ʃkʊ̰ʃ 'kocking on something'
kʊ̰ʃʊ̰ʃʊ̰ 'tapping quickly on something'
b. lam 'fire flaring up'
lamama 'coals glowing red'
c. teʃeteʃe '(sound) water coming out in bursts'
teʃeʃe '(sound) water rushing out of a pipe'

Upper Necaxa Totonac -CV ideophone reduplication looks like the Kaqchikel partial reduplication in (2) for verbal pluractionality. We thus see in the ideophone domain similar morphological resources for marking pluractionality that we see in the verbal domain, namely total and partial reduplication.

The fact that Upper Necaxa Totonac has two different morphological processes for marking pluractionality raises the question of whether they also mark a meaning difference. This appears to be the case. For instance, the total reduplication of *kʊ̰ʃ* in (8-a) characterizes a plural knocking event, while the partial reduplication of the same ideophone characterizes events of a similar type, but which have been "minimized" in various ways. That is, the knockings become tappings and they must occur in rapid succession (i.e., they must take up less time). While exploring the exact nature of this meaning difference will have to wait for future work, the fact that we observe a difference already suggests that the semantics of pluractional ideophones is not uniform. In fact, section 6 is devoted to showing that the contrast between totally reduplicated ideophones in Upper Necaxa Totonac (and in Tsetal for that matter), and partially reduplicated ideophones exemplifies a deep contrast between two kinds of ideophone pluractionality—namely demonstration-external and demonstration-internal pluractionality.

Before providing an analysis of these two kinds of pluractional ideophones in sections 5-6, we first need an account of ideophones themselves. The next section

between begins this process by introducing the demonstration-based analysis of quotation in Davidson 2015, which is then extended to ideophones in section 4. Once this theory of ideophones is in place, it will be clear how it predicts the two broad classes of pluractional ideophones we find exemplified by the totally reduplicated ideophones in Tsetal (and Upper Necaxa Totonac) on one hand, and the partially reduplicated ideophones in Upper Necaxa Totonac on the other.

3 Demonstration-based theory of quotation

When thinking about direct quotation, we usually think about verbatim quotation where the act of quotation concerns the words used. For instance, suppose Mary says (9).

(9) I play guitar.

Mary can then be quoted as in (10), where the words used alone ensure that the quotation is true.

(10) Mary was like "I play guitar".

While this is maybe the most salient case, it is well known that *be like*-quotation can be felicitously used to replicate a variety of aspects of an event (Clark & Gerrig 1990; Davidson 2015, among others). For instance, words can be used to "quote" an agent's behavior or inner monologue, even if those particular words are not used, as shown in (11) where the the quotative sentence is judged true even though the cat never uttered the quoted words.

(11) My cat meows loudly and paces around its food bowl.

a. My cat was like "feed me!" Davidson 2015: ex. 21

Example (11) shows that *be like*-quotation can be used to express more than just the words uttered in a speech event. In fact, looking broader, we see that *be like*-quotation can be used to report, or perform seemingly arbitrary aspects of an event, including mental states (11), which we have seen, but also facial expressions (12) or intonation (13).

(12) John says, while pouting, I'll never get into SALT.
Speaker A: Did you hear John say he'll never get into SALT?
Speaker B: Yeah, he was all like :(

(13) John says, in a whiny voice, I'll never get into SALT.
Speaker A: Did you hear John say he'll never get into SALT?

Speaker B: Yeah, he was all like "[in a whiny voice] My paper won't get in."

Davidson's 2015 proposal, following earlier work by Clark & Gerrig (1990), is to say that verbatim quotation is merely a special case of what we see in (11)-(13). The theory that unites them says that all quotation involves the performance or demonstration of an event. One can demonstrate or perform an event by performing the words that occur in it—i.e., verbatim quotation—but one can also perform all sorts of aspects of the event, including intonations, facial expressions, thoughts, etc. The downside to this kind of theory is that, as we will see, we have to radically underspecify the truth conditions for quotative sentences. But, given facts like (11)-(13), as well as those we see in the previous literature (e.g., Clark & Gerrig 1990), this might just be a bullet we have to bite.

In this vein, the present work can be seen as further supporting the demonstration-based theory of quotation. In particular, I show that demonstrations, as they are formally conceived in Davidson 2015, are exactly what we need to understand how ideophones *depict* instead of *describe*, which was one of our starting puzzles. This is true, even though I will argue that using an ideophone does not amount to direct quotation (that is, they are distinct phenomena). To see this, though, I first need to present the details of Davidson's 2015 theory.

The core idea in Davidson 2015 is that there is a distinguished subset of events, namely a class of events with communicative intent she calls *demonstrations*.[3] Davidson 2015 gives demonstrations their own type δ, and while not formalized, the intended interpretation is that δ is a subtype of ϵ—the type of events. This could be implemented in some variety of lambda calculus with subtyping, like $\mathtt{F}_{<}$ (see Retoré 2014) or TCL (see Asher 2011). I do not take this route because I do not need all the power these systems provide, and the resulting models become fairly complicated. I will instead work with a more familiar many-sorted type logic. The trade off, of course, is that I will need additional quantifiers, relations, etc. over new types, but I believe that the result is manageable.

With the previous discussion in mind, the backdrop for the account is lax many-sorted type logic (e.g., Väänänen 2014) Lax just means that (i) we do not require domains for sorts to be disjoint, and (ii) equality (and only equality) is type agnostic—e.g., $\sigma = \sigma'$ is a formula even if σ and σ' are terms with different types. Below are the highlights of the setup that are necessary for understanding the analysis. Appendix A gathers the entire formal system, including all definitions and abbreviations, in one place.

[3] Note that while this section is heavily based on Davidson's work, I have altered some things and made assumptions about the domains of events, demonstrations, and linguistic expressions that she might not agree with. When it's clear that I have diverged from her work, I note it in the text.

The domain of individuals of type e is the powerset of a designated set of entities IN minus the empty set: $D_e = \wp^+(\mathsf{IN}) = \wp(\mathsf{IN}) \setminus \emptyset$. In addition to the domain of individuals, I additionally assume, following Bach 1986; Hinrichs 1985; Link 1998, structured domains of events and times. The domain of events of type ϵ is the powerset of a designated set of events EV minus the empty set: $D_\epsilon = \wp^+(\mathsf{EV}) = \wp(\mathsf{EV}) \setminus \emptyset$. The domain of times of type τ is the powerset of a designated set of times TM minus the empty set, and is additionally partially ordered by $\prec$ (temporal precedence): $D_\tau = \wp^+(\mathsf{TM}) = \wp(\mathsf{TM}) \setminus \emptyset$. Finally, following Davidson 2015, we add the novel domain of demonstrations of type δ, which is the powerset of a designated set $\mathsf{DM} \subset \mathsf{EV}$ minus the empty set: $D_\delta = \wp^+(\mathsf{DM}) = \wp(\mathsf{DM}) \setminus \emptyset$. Note that the domain of demonstrations is a subset of the domain of events. I want to think of demonstrations as merely events of communication under a particular guise that allows certain constructions, like *be like*-quotatives or ideophone constructions, to extract their communicative intent.

Atomic individuals and atomic events are the singleton sets in $\wp^+(\mathsf{IN})$, $\wp^+(\mathsf{EV})$, $\wp^+(\mathsf{DM})$ respectively; they are identified by a predicate ATOM (which I'll apply to individuals, events, and demonstrations disambiguated by context). The "part of" relation $\leq$ over individuals / events / times / demonstrations (disambiguated context) is set inclusion over $\wp^+(\mathsf{IN})$ / $\wp^+(\mathsf{EV})$ / $\wp^+(\mathsf{TM})$ / $\wp^+(\mathsf{DM})$: $a \leq b$ iff $a \subseteq b$. Finally, the sum operation $\oplus$ (disambiguated by context) is set union over $\wp^+(\mathsf{IN})$ / $\wp^+(\mathsf{EV})$ / $\wp^+(\mathsf{TM})$ / $\wp^+(\mathsf{DM})$: $a \oplus b := a \cup b$.

As is common, events are connected to the domains of individuals and times via θ-role and trace functions. θ-roles are partial functions from the domain of events to the domain of individuals, that is, functions of type ϵe. The fact that we have a special type for the domain of demonstrations means that we need θ-role functions to take demonstrations to their participants, namely functions of type δe. Because the domain of demonstrations is a subset of the domain of events, for each role θ of type ϵe, I assume there is a role θ' of type δe that agrees with θ on all demonstration events. More formally, I impose the requirement that for all x_ϵ, y_δ, and θ, if $x_\epsilon = y_\delta$, then $\theta_{\epsilon e}(x_\epsilon) = \theta_{\delta e}(y_\delta)$. The only trace function I will be using is the temporal trace function τ, which is a sum-homomorphism from events to times. I assume that all theta-role functions are cumulatively closed by default, suppressing the common $*$-notation.

While the inclusion of a special subset of demonstration events is a new idea, it is not much of a conceptual leap. The last domain of entities we need, which is less standard, is a domain of linguistic entities. Essentially, we want to be able to say that the quoted words in a verbatim *be like*-quotation and the the ideophone in an ideophone construction are actually expressions that denote linguistic objects, objects that might themselves have a denotation, syntactic category, phonological form, etc. In particular, I follow Potts 2007 by including a domain

(disjoint from all others) of linguistic entities of type μ. Potts 2007 takes linguistic entities to be triples, but for simplicity's sake, I treat linguistic objects as pairs—$\langle$`string`, SEMANTIC REPRESENTATION$\rangle$. We can think of this as reifying in the model the translation function mapping natural language expressions (here strings) to their semantic representations. Thus, while the natural language expression `woman` is translated to a lambda term denoting the particular function in (14), the quoted natural language expression "`woman`" is translated as a logical constant of type μ whose denotation is the pair of the unquoted string and it's denotation, as shown in (15). Note that I write expressions of type μ in sans serif.

(14) a. $\texttt{woman} \rightsquigarrow \lambda x_e[\textsc{woman}(x)]$
b. $[\![\lambda x_e[\textsc{woman}(x)]]\!]^g =$ the function F with domain D_e such that for all $d \in D_e$, $F(d) = [\![\textsc{woman}(x)]\!]^{g[d/x]}$

(15) a. "`woman`" $\rightsquigarrow \mathsf{woman}_\mu$
b. $[\![\mathsf{woman}_\mu]\!] = \langle \texttt{woman}, \lambda x_e[\textsc{woman}(x)]\rangle$

I use ⌞bottom corners⌟ in the object language to access the semantic content of a linguistic object via the meaning postulate in (16), which requires of all admissible models that the interpretation of $\ulcorner \mathsf{M} \urcorner$, for any expression M of type μ, be the interpretation of the second projection of the interpretation of M.

(16) For all expressions M of type μ and N of any type,
$[\![\ulcorner \mathsf{M} \urcorner]\!] = [\![N]\!] \Leftrightarrow \pi_2([\![\mathsf{M}]\!]) = N$

The interpretation of $\ulcorner \mathsf{woman}_\mu \urcorner$ in (17) illustrates how the biconditional in (16) is used to extract the semantic representation of a linguistic object.

(17) $[\![\ulcorner \mathsf{woman}_\mu \urcorner]\!] = [\![\lambda x_e[\textsc{woman}(x)]]\!] \Leftrightarrow$
$\pi_2([\![\mathsf{woman}_\mu]\!]) = \lambda x_e[\textsc{woman}(x)] \Leftrightarrow$
$\pi_2(\langle \texttt{woman}, \lambda x_e[\textsc{woman}(x)]\rangle) = \lambda x_e[\textsc{woman}(x)] \Leftrightarrow$
$\lambda x_e[\textsc{woman}(x)] = \lambda x_e[\textsc{woman}(x)]$

It is now possible to give an account of *be like*-quotation. I focus on cases like (10) where the demonstration is made via a linguistic expression (as opposed to examples like (12) where non-linguistic content is used in the demonstration). This is because it is more similar to case of ideophones, which always involve a linguistic expression. I will call these quotational demonstrations, which will be contrasted with ideophone demonstrations throughout the remainder of this work. Davidson 2015 treats the quoted expression in a quotational demonstration like "I play guitar" in (10) as denoting demonstrations—i.e., entities of type δ—namely a demonstration involving the words "I play guitar". While I think this is essen-

tially correct, I propose to unpack this representation slightly. In particular, I do not believe the words used in a demonstration should be identified with that demonstration itself. Instead, the words used are the theme of the relevant demonstration event. That is, I will say that quoting an expression like "I play guitar" means creating a demonstration d that has the words $\mathsf{I\ play\ guitar}_{\mu}$ as theme, namely $\textsc{th}_{\delta}(d) = \mathsf{I\ play\ guitar}_{\mu}$. Recall that demonstrations are just a subtype of event, and so can have themes. Moreover, being events of communication, it makes sense that demonstration events could have a linguistic object as a theme, as in Potts 2007.

We can now treat quotational demonstration using an operator like (18). The DEMO relation, which as in Davidson 2015 holds between d and e just in case d reproduces aspects of e, is meant to capture the loose connection between what is said in a *be like*-quotation and the demonstrated event. Like Davidson 2015, I take *like* to instantiate the `Q-DEMO` operator in English, though we will see that it can also be null.

(18) `like / Q-DEMO` $\rightsquigarrow \lambda d \lambda e[\textsc{demo}(d, e)]$

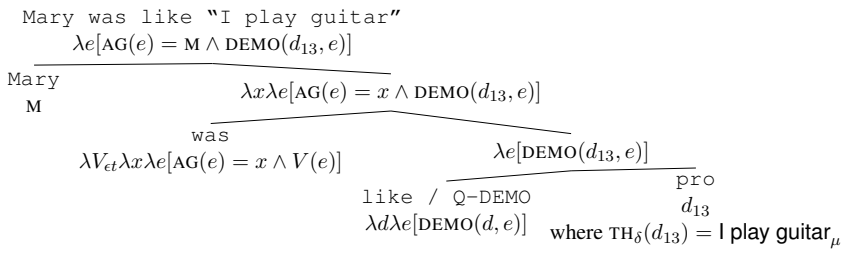
In a canonical case of verbatim quotation like (9)-(10), the demonstration event stands in the DEMO relation with the quoted event in virtue of words used. In particular, the theme of the demonstration event is precisely the linguistic object uttered in the demonstrated event. But, as we have seen in examples like (11), a demonstration event might have a linguistic object as a theme that does not play a direct role in the demonstrated event. That said, such a demonstration event might still reproduce aspects of the demonstrated event well enough to stand in the DEMO relation.

If (18) is at the heart of *be like*-quotation, it raises the question of how the demonstration argument is saturated. I will assume that it is done so indexically. That is, there is a *pro* in the representation that picks out the demonstration contemporaneous with the speech event. Something similar is seen in performatives, like (19), where *hereby* or its null counterpart appears to refer to the ongoing speech event whose words both constitute and report the promise (e.g., Eckardt 2012).

(19) I (hereby) promise to play guitar.

Finally, the "be" in *be like*-quotation, following Davidson 2015, is a light verb introducing the external argument—namely the agent of the event being demonstrated.

Putting it together we can compositionally derive the meaning of expressions like *Mary was like "I play guitar"* as follows:



After existential closure we get the following translation for *Mary was like "I play guitar"*.

(20) $\exists e[\text{AG}(e) = \text{M} \wedge \text{DEMO}(d_{13}, e)]$, where $\text{TH}_\delta(d_{13}) =$ I play guitar$_\mu$

Example (20) is true just in case in case there is an event e whose agent is Mary and the current demonstration event, whose theme is the linguistic entity I play guitar, reproduces aspects of e. As discussed above, the particular relationship between the *be like*-quotation and what it quotes can be quite loose. In this case, because the demonstration event, which must reproduce aspects of e, has the linguistic object I play guitar as its theme, a speaker might reasonably (defeasibly) infer that e is a speaking event in which I play guitar is uttered. This inference must be defeasible, though (see example (11)).

To see how this analysis extends to other constructions that can be used to perform quotation, consider *say*, which we can treat as adding an additional requirement that the demonstrated event is one of saying.

(21) a. *Mary said "feed me".*
b. $\exists e[\text{AG}(e) = \text{M} \wedge \text{DEMO}(d_{13}, e) \wedge \text{SAY}(e)]$, where $\text{TH}_\delta(d_{13}) =$ feed me$_\mu$

The lexical content of the verb *say* further restricts the kind of events that d_{13} is able to faithful demonstrate to those that involve a event of saying. This correctly accounts for the fact that (21) cannot be used to report the cat's behavior in (11) (supposing the cat's name is Mary). It is more restrictive than *be like*-quotation.[4]

While there is much more to say about standard and *be like*-quotation, I merely

[4] One might worry that without a *like*, there is nothing to compose with the demonstration event. I believe that there is a covert *like* in examples like (21), which can be observed in naturally occurring examples.

(i) . . . and then she said like "I did study abroad, but aside from that, I did home stays several times and stuff." (Rimer, Mori & Poulton 2014: p. 633)

(ii) He said like, "They're talking, everything's going to be fine, just calm down." (Davies 2008)

want to lay out a basic demonstration-based account of quotation in the style of Davidson 2015. This basic account serves two purposes. First, it motivates the formal resources we need for an account of ideophones, but in a more familiar semantic domain. Second, one of the central arguments of this work is that quoting and using ideophones are similar, but not equivalent. By having this basic account of the semantics of *be like*-quotation we will be able to more easily see how it differs from the semantics of ideophones, even though the latter is also demonstration-based.

4 Ideophones in Tseltal

This section extends the demonstration-based account of quotation presented in the previous section to provide what is meant to be a general account of ideophones, though the focus will be on a case study of ideophones in Tseltal. The analysis presented in this section then sets up a prediction that is investigated in the next section, namely that one should be able to make multiple demonstrations with an ideophone to demonstrate a plural event. The following section is devoted to understanding the properties of demonstration-external pluractionality, but first we consider the base-case of non-pluractional ideophones in Tseltal.

Recall that the basic ideophone construction in Tseltal looks like (22).

(22) pura ch'il-bil-Ø, tsok' x-chi-Ø ta mantekat
just fried-PERF-B3 IDF:sound.start.to.fry NT-say-B3 P lard
'just fried, it goes «tsok'» in the lard' (Pérez González 2012: p. 162)

It has two core properties: (i) there is a bare (uninflected) root / stem, namely *tsok'*, and (ii) the root is embedded under the reported speech predicate, namely *chi*. We consider each of these in turn.

The fact that the ideophone in (22) is a bare stem raises the question of how well-integrated ideophones are into the rest of the grammar. That is, are they merely unanalyzable iconic strings, or are ideophone roots / stems on par with roots and stems of other lexical categories? More concretely, is the ideophone «tsok'» in Tseltal more like the verb *sizzle* in English or the imitative string *tssssss*. I will show that the former is the case. They are not merely imitative sounds, but linguistic objects in the fullest sense, namely strings with a (morpho)syntactic category and semantic representation. The fact that ideophones are bona fide linguistic objects argues in favor of the position taken in this work that they deserve a compositional semantic treatment, just like other expressions in the language. While the following discussion requires a detailed discussion of Mayan morphology, the result has important consequences for the theory of ideophones that this work develops. In

particular, I propose in this section that using an ideophone requires more than just quoting an ideophone stem. Instead, I argue that the basic ideophone construction includes an ideophone demonstration operator that syntactically selects for stems of the appropriate category, while semantically requiring that those stems denote an event-predicate. This position is harder to maintain if ideophones are merely sound-symbolic strings that the speaker utters, and so I must argue against this possibility.

To begin, it is important to note that Mayan languages make a categorical distinction between roots of a particular category, which are always of the form CVC, and derived stems of that category. For example, one often finds that CVC roots of category X can occur in certain morphosyntactic configurations that derived stems of category X cannot. I will show that Tseltal ideophones are organized along this root/stem paradigm exactly like other lexical categories in the language—i.e., nouns, verbs, adjectives.

First, we find CVC ideophones—ideophone roots—that are specialized as such. That is, they appear in the basic ideophone construction, but cannot be inflected as if they were a root of another category. For instance, *tsok'* in (22) is clearly a CVC ideophone, but it cannot be used as if it were a root of another category, which I have exemplified in (23) for the category transitive verb.

(23) *ya j-**tsok'**-Ø te chenek'=e.
ICP A1-fried-B3 DET bean=ENC
Reading sought: 'I'm going to fry the beans.' (Pérez González 2012: p. 162)

This fact establishes that there is a category "ideophone" because there are CVC ideophone roots that correspond to stems of no other category. We can now ask whether the ideophone category is like other, more familiar categories like verbs.

First note that Tseltal has explicitly derived ideophone stems. That is, just as with more familiar lexical categories there are ways to form an ideophone stem from a root of a category. For instance, there is a derivation *-u* / *-i* (phonologically conditioned) that turns positional roots like (24) and transitive verbs like (25) into ideophones.

(24) Chep-**u** x-chi-Ø ta j-jol.
POS:filled.bag.thrown.down-IDF NT-say-B3 P A3-head
(Being hit will a filled bag), it went «chepu» on my head. (Pérez González 2012: p. 166)

(25) Lek-Ø xan teme ay-Ø orita jax-**u** x-chi-Ø
good-B3 again if exist-B3 quickly VT:scratch-IDF NT-say-B3

k'axel.
DIR:passing
'It's much better if it slips by rapidly going «jaxu»' (Pérez González 2012: p. 167)

Crucially, you cannot use these roots in the basic ideophone construction without first deriving them. For instance, (26) is ungrammatical. The root $\sqrt{chep}$ is just not an ideophone root.

(26) *__Chep__ x-chi-Ø ta j-jol.
POS:filled.bag.thrown.down NT-say-B3 P A3-head
Reading sought: (Being hit will a filled bag), it went «chep» on my head.

What this shows is that Tseltal ideophones are not just atomic, unanalyzable expressions, but belong to an abstract grammatical category into which other expressions can be derived.

Second, as is common with other lexical categories, there are a non-trivial number of roots that are polycategorial. Consider $\sqrt{jik'}$. Unlike $\sqrt{chep}$ it can appear underived in the basic ideophone construction, as in (27). But in contrast to other root ideophones, like $\sqrt{tsok'}$ in (23), it can be inflected as a transitive verb without derivation, as in (28).

(27) __jik'__ x-chi-on=nax ta jik'ubajel jun-jun-ajk'
IDF:inhale/choke NT-say-B2=just P hiccup one-one-moment
You went «jik'» by the hiccup repeatedly (Pérez González 2012: p. 163)

(28) ya j-__jik'__-Ø j-mats'
ICP A1-TV:inhale/choke-B3 A1-pozol
I choked on my pozol. (Pérez González 2012: p. 163)

Polycategoricity, which is common in the root systems of Mayan languages, provides a final argument that ideophone roots are like roots of any other category.

Summarizing, what we find is that (i) there is a distinct class of ideophone stems that occur in the basic ideophone construction (some of which are CVC root ideophones), (ii) there are ways of deriving ideophone stems from roots of other categories, and (iii) some roots belong simultaneously to the class of ideophone stems as well as others (usually a transitive verb). These morphosyntactic facts not only provide evidence about the structure of the basic ideophone construction, but they place strong constraints on the space of possible semantic accounts of ideophones.

First, the fact that one cannot use arbitrary roots in the basic ideophone construction shows that ideophones cannot be reduced to quotation. The reason is that

practically anything can be quoted—e.g., "The monster was like *chakatubatz'a*" or "The monster was like *grrrrrr*". If ideophones were mere quotations of an event, that is, the event made a sound that roughly corresponds to the sound of the root in question, then why can't one say (26), even though one can quote the root as in (29)? The answer must be that *chep* is simply not an ideophone stem and so cannot occur in the basic ideophone construction, which must be kept separate from the quotation construction.

(29) "chep" x-chi-Ø te alal=e.
POS:filled.bag.thrown.down NT-say-B3 DET baby=ENC
The baby said "chep". (Jaime Pérez González, p.c.)

Given that making a demonstration by way of an ideophone is not mere quotation, whatever differentiates ideophone demonstrations and quotational demonstrations is part of the compositional semantics.

Second, the fact that there are derived ideophone stems provides an additional argument against an analysis of ideophones as mere quotation. I know of no language that requires certain expressions to be morphologically marked in order to be quoted. Instead, the existence of ideophones derived by *-u* / *-i* is more consistent with a theory that posits an operator in the ideophone construction that selects stems of the appropriate class. The basic ideophone construction would then be just like more familiar constructions that require a particular class of stems. For example, the ideophone construction, which involves the verb *chi* and an ideophone stem, would be parallel to the progressive construction in English, which involves the verb *to be* and a gerund stem.

Finally, the fact that the ideophone derivation *-u* / *-i* preferentially targets verbs, combined with the fact that polycategorial ideophone roots tend to be verbs suggests a deep connection between verbs and ideophones. Ideally our theory should explain why it is easy to move between verbal meanings and ideophone meanings. My proposal treats ideophones as, at their core, event-denoting. This would make sense of the fact that ideophones and verbs are closely connected morphologically in Tseltal as the latter are canonically event-denoting.

I now provide an account of ideophones that not only captures their semantic properties, but accords with these morphosyntactic facts. We have seen that, morphologically, there is a close connection between ideophones and verbs. For this reason, I will be treating ideophone stems, like verbal stems, to be neo-davidsonian predicates of events—e.g., $\lambda e[V(e)]$. What this means is that is the restricted distribution of ideophone roots must not be due to semantic considerations, but must instead be a fact about morphosyntax. It is not too troubling that felicity in the ideophone construction depends on formal, not denotational properties. For instance,

it seems completely arbitrary which ideophone roots are polycategorial. Certain roots just resist zero derivation into one category or another, which is a pervasive fact about morphology.

In line with a morphological framework like Distributed Morphology (Embick & Noyer 2001; Halle & Marantz 1993, inter alia), I propose that there are two v categories—v_{tv} and v_{id}—which derive transitive verb stems and ideophone stems respectively. These two category-defining heads will interact with the three kinds of roots we have discussed shown in (30) in a way that captures their distribution as ideophones.

(30) a. $\sqrt{}$jik' *ideophone / verb root*
b. $\sqrt{}$tsok' *ideophone root*
c. $\sqrt{}$k'oj *transitive verb root*

First, polycategorial roots like $\sqrt{jik'}$ combine equally well with both of these heads to produce stems of the appropriate category, where v_{tv} and v_{id} are associated in the morphology by the zero-allomorph via Vocabulary Insertion, as illustrated below.

(31) a. VI($\sqrt{jik'}^\frown v_{tv}$) = *jik'*
b. VI($\sqrt{jik'}^\frown v_{id}$) = *jik'*

Second, roots like $\sqrt{tsok'}$, which cannot be zero-derived into transitive verbs will simply be ineffable with v_{tv}. That is, VI yields no output. This accounts for the fact that specialized ideophone roots cannot be inflected as verbs.

(32) a. VI($\sqrt{tsok'}^\frown v_{tv}$) = Ø
b. VI($\sqrt{tsok'}^\frown v_{id}$) = *tsok'*

Finally, for transitive verb roots like $\sqrt{k'oj}$, which can be explicitly derived into ideophone stems, I assume the VI rule associates v_{id} with a non-zero exponent, namely the ideophone stem suffix *-u* / *-i*.

(33) a. VI($\sqrt{k'oj}^\frown v_{tv}$) = *k'oj*
b. VI($\sqrt{k'oj}^\frown v_{id}$) = *k'oji*

The primary role of v_{id} is to constrain which stems can occur in the basic ideophone construction, but one might wonder whether deriving a root into an ideophone stem has a semantic effect. The answer is yes, though, the particular meaning difference might be not able to be compositionally derived. For instance, the positional root *chep*, when derived into a positional stative predicate, denotes events of individuals in a particular physical configuration, while the ideophone stem *chepu* denotes events of sound emission—the sound of being hit by objects

in such a configuration. Similarly, the transitive verb stem *jik'* denotes events of an agent inhaling a theme, while the ideophone stem *jik'* denotes events of sound emission—the sound of inhaling. This is unsurprising. Expressions derivationally related to the same root often have similar, though not necessarily transparently related meanings. Consider, for instance, the English verb *appear* and its related nouns *appearance* and *apparition*, which all have related, though unpredictable meanings. In sum, I'll take ideophone stems—i.e., expressions derived by v_{id}—to be predicates of events, and usually (though not always) events of sound emission. How the meaning of a derived ideophone is related to meaning of its root is most likely otherwise unpredictable.

The final core aspect of the analysis is an operator IDEO−DEMO. This operator selects for ideophone stems in the syntax, and in the semantics relates a demonstration and event.[5]

(34) $\texttt{IDEO−DEMO} \rightsquigarrow \lambda d \lambda e [\textsc{struc-sim}_{\llcorner \textsc{th}_\delta(d) \lrcorner}(d, e)]$

In this way, IDEO−DEMO behaves like the operator Q−DEMO in quotative constructions that relates demonstrations and events, as shown in (35) (repeated from (18)).

(35) $\texttt{Q−DEMO} \rightsquigarrow \lambda d \lambda e [\textsc{demo}(d, e)]$

Instead of quotational demonstrations, though, the IDEO-DEMO operator employs a different kind of relation between events and demonstrations, which must be kept formally distinct because quotation permits a wider variety of interpretations than an ideophone demonstration. The present account captures this difference in terms of whether the demonstration and event argument have to stand in the DEMO relation or $\textsc{struc-sim}_{\llcorner \textsc{th}_\delta(d) \lrcorner}$ relation. Recall that, following Davidson 2015, the DEMO relation is meant to be radically underspecified, which is meant to mirror the fact that one can use a *be-like*-quotation to demonstrate a wide variety of events. In contrast, the use of ideophones to depict an event is much more constrained. Not only can just a subset of verbs form ideophone stems, but the events depicted by means of the ideophone must satisfy the relevant aspects of its lexical content. For instance, using *jik'* as an ideophone means depicting events with an inhaling sound, and only those events. With this in mind, we can begin to unpack $\textsc{struc-sim}_{\llcorner \textsc{th}_\delta(d) \lrcorner}$. I say begin because the next section on demonstration-external pluractionality fleshes out the account to more faithfully address the meaning of pluractional ideophones.

[5] While syntax is not the focus of this work, there are a variety of ways to implement selection. For instance, the indexical *pro* in demonstration constructions could inherent its syntactic category from a linguistic object that occurs in it.

The core idea underlying the STRUC-SIM$_{\llcorner \text{TH}_\delta(d) \lrcorner}$ relation is that the utterance of an ideophone as a linguistic object is meant to stand for an event that satisfies the predicate that the ideophone stem denotes. That is, the demonstration event is meant to be structurally similar to the demonstrated event, where "structurally similar" at this first pass means just similar cardinality. Example (36) provides the meaning of STRUC-SIM$_{\llcorner \text{TH}_\delta(d) \lrcorner}$.[6]

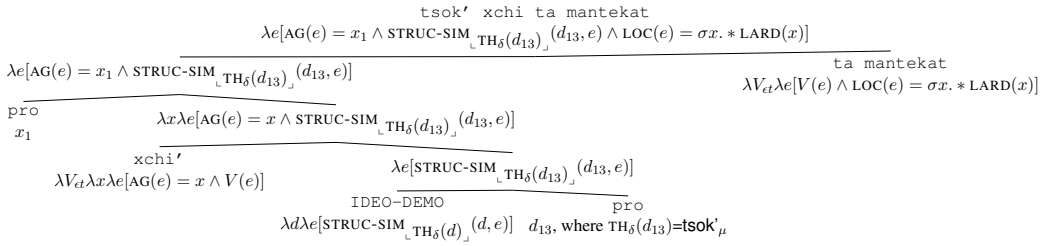
(36) STRUC-SIM$_{\llcorner \text{TH}_\delta(d) \lrcorner}(d, e)$ iff there is a set P meeting the following conditions:

a. $\mathbf{partition}(\text{P}, e)$

b. $\forall e' \in \text{P}[\llcorner \text{TH}_\delta(d) \lrcorner(e')]$

c. $\exists e' \leq e[\text{ATOM}(e') \wedge \llcorner u \lrcorner(e')] \rightarrow \forall e' \in \text{P}[\text{ATOM}(e')]$ to be amended in (43)

d. $|\mathbf{atoms}(d)| = |\text{P}|$



After existential closure of the event argument, we get the following truth conditions, which are generated compositionally in a manner similar to quotation, as shown in the tree above.

(37) $\exists e[\text{AG}(e) = x_1 \wedge \text{STRUC-SIM}_{\llcorner \text{TH}_\delta(d_{13}) \lrcorner}(d_{13}, e) \wedge \mathbf{loc}(e) = \sigma x.\text{LARD}(x)]$

[6]The following defines partitions for sum-individuals and a useful abbreviation to refer to the atomic parts of a sum-individual, as used in (36).

(i) $\mathbf{partition}(\text{P}, x)$ iff

a. $\bigoplus \text{P} = x$

b. $\forall x(x \in \text{P} \rightarrow \neg\exists y(y \in \text{P} \wedge O(x, y)))$

'P partitions x iff the elements of P sum to x and no elements of P overlap.

(ii) $\mathbf{atoms}(x) := \{x' | x' \leq x \wedge \text{ATOM}(x')\}$

'The set of atomic parts of x'

This is true just in case: (i) there is an event e that takes place in the lard whose participant is x_1 (the particular individual will be given by the context / variable assignment), (ii) the current demonstration event d_{13} has as its theme the linguistic object tsok', and (iii) this demonstration event is structurally similar to e. Here structural similarity is easily satisfied. Because d_{13} is atomic, e must be partitionable into a single event (the trivial partition) that satisfies $\llcorner \text{TH}(d_{13}) \lrcorner = \llcorner \text{tsok'} \lrcorner = \lambda e[\text{TSOK'}(e)]$, namely e must be an event of frying sound emission. Less formally, (37) requires that there be an event of frying sound emission that took place in the lard that is presented via the utterance of the word *tsok'*. These are precisely the truth-conditions of (22).

With this demonstration-based account of ideophones in hand, we have a handle on how it is that ideophones seem to depict events instead of describing them. Essentially, using an ideophone means using the utterance of that ideophone to stand for an event that would otherwise satisfy the ideophone (as an event predicate). This immediately predicts that we should be able to utter such a linguistic object more than once, and in doing do, demonstrate a plurality of events. The next section is devoted to precisely this phenomenon, which I call "demonstration-external pluractionality". While the analysis proposed in this section accounts for demonstration-external pluractionality in its basic form, to capture the richness of the phenomenon I will have to slightly expand the notion of structural similarity to include temporal information. As we will see, though, such an extension is empirically motivated and makes correct predictions about pluractionality in the ideophone domain.

5 Demonstration-external pluractionality in Tseltal

Now that we have a basic account of ideophones, we can now begin to examine their rich pluractional semantics. The first kind of ideophonic pluractionality I consider in this section is what I call "demonstration-external" pluractionality. The idea is that speakers can make multiple demonstrations using the same ideophone stem to demonstrate a plurality of events. In this case reference to plural events is external to any single demonstration event, which is contrasted against demonstration-internal pluractionality in the following section where a single demonstration is used to demonstrate an event-plurality.

As shown in the following example from Tseltal, one can totally reduplicate an ideophone to demonstrate a plurality of events.

(38) ja'-Ø te **kan**-kon-Ø, **kan** [pause] **kan** [pause]
FOC-B3 SUB IDF:sound.wood/drum-**C**$_1$**on**-B3 IDF [pause] IDF [pause]

kan x-chi-Ø=e
IDF NT-say-B3=ENC
'When it knocks, it goes «kan» [pause] «kan» [pause] «kan».' Pérez González 2012: p. 242

While we will see that such pluractional demonstrations are quite complex, the basic facts follow immediately under the account of ideophones I have proposed. I propose that when a speaker says *"kan kan kan"* she makes a plural demonstration d_4 with the usual part-whole structure, where each atomic demonstration in d_4 has as its theme the ideophone in question.

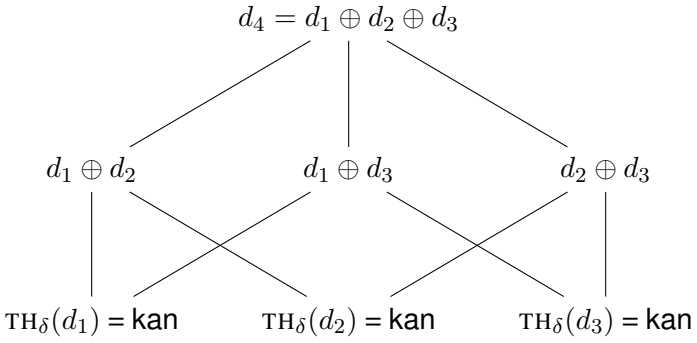


Figure 1: A plural demonstration event

An ideophone demonstration like this would yield the following predicate of events after composing with the Q−DEMO operator. Note that because theta roles are cumulatively closed, d_4 stands in the theme relation with the linguistic object kan in virtue of its atomic parts standing in that relation. This is parallel to how three events of knocking on the same rock sums to an event with that rock as a theme.

(39) $\lambda e[\text{STRUC-SIM}_{\llcorner \text{TH}_\delta(d_4) \lrcorner}(d_4, e)]$

An event e satisfies (39) just in case the theme of d_4 is the linguistic object kan and $\text{STRUC-SIM}_{\llcorner \text{TH}_\delta(d_4) \lrcorner}(d_4, e)$ holds between d_4 and e. The latter condition is satisfied just in case e can be partitioned into as many $\llcorner \text{TH}_\delta(d_4) \lrcorner = \llcorner \text{kan} \lrcorner = \lambda e[\text{KAN}(e)]$ events—i.e., knocking events—as there are atoms in d_4. That is, the pluractional demonstration in (38) faithfully demonstrates an event just in case it is an event of three knockings.

These are not exactly the truth conditions of the ideophone demonstration in

(38), but they provide a lower bound until we update the meaning of STRUC-SIM in (43). More importantly, though, they illustrate how the view of ideophones developed here naturally extends to cases of pluractionality via reduplication. If in an ideophone demonstration the utterance of the ideophone as a linguistic object is meant to stand for an event that satisfies the predicate that linguistic object denotes, then uttering multiple instances of that ideophone in a single complex demonstration should demonstrate pluractional events. I now want to refine the meaning of STRUC-SIM to account for other properties of demonstration-external pluractionality.

First, it is not true that demonstrating an event by uttering an ideophone three times requires that event to be of cardinality three. Instead, the cardinality must be at least three. The third condition in (40) shows the relevant change, namely e is structurally similar to d if there is partition of e that has no fewer cells than d has atomic parts.

(40) STRUC-SIM$_{\llcorner \text{TH}_\delta(d) \lrcorner}(d, e)$ iff there is a set P meeting the following conditions:

a. PARTITION(P, e)
b. $\forall e' \in \text{P}[\llcorner \text{TH}_\delta(d) \lrcorner(e')]$
c. $|\mathbf{atoms}(d)| \leq |\text{P}|$

The second property of demonstration-external pluractionality that we must account for is much more interesting, requiring greater changes to the notion of structural similarity. In particular, the manner of reduplication in a demonstration-external pluractional utterance iconically reproduces the temporal properties of the event-plurality. This can be shown via the assertion of the (rough) equivalence between kinds of reduplicated ideophones, and kinds of bona fide derived pluractional verbs, which must be event predicates. In examples (41) and (42), speakers use ideophone demonstrations to provide the truth condition for verbal pluractional constructions that, crucially, involve the same root.

(41) ja'-Ø te **kan**-kon-Ø, **kan** [pause] **kan** [pause]
FOC-B3 SUB IDF:sound.wood/drum-**C**$_1$**on**-B3 IDF [pause] IDF [pause]
kan x-chi-Ø=e
IDF NT-say-B3=ENC
'When it knocks [lit. kankon], it goes «kan» [pause] «kan» [pause] «kan».' Pérez González 2012: p. 242

(42) ja'-Ø x-**chak'**-lajan-Ø te bay
FOC-B3 NT-IDF:sound.horse.hoofs-lajan-B3 DET where

chak'chak'chak' x-chi-Ø=e
IDF.IDF.IDF NT-say-B3=ENC
'It's the sound of trotting horses when it goes «chak'»«chak'»«chak'»

The point is that IDF IDF IDF demonstrates events with a different temporal character than IDF [pause] IDF [pause] IDF. In particular, IDF IDF IDF demonstrates events that can fall in the extension of a pluractional predicate derived by *-C_1on*, while IDF [pause] IDF [pause] IDF demonstrates events that can fall in the extension of a pluractional predicate derived by *-lajan*. These facts show that for a demonstration event to be structurally similar to a second event, the demonstration event must not only have a similar cardinality, but also a similar temporal profile.

While the definition of structural similarity must be extended to account for this behavior, the close connection between verbal pluractional constructions and pluractional ideophones is predicted under a demonstration-based account of ideophones. Demonstrations, which mediate the iconic link between the ideophone and the depicted event, are merely events themselves. As such, they have temporal structure. Moreover, in this theory, a demonstration via an ideophone root is supposed to "stand for" an event satisfying the event-predicate underlying the ideophone. The temporality of the ideophone construction is built in, and so it follows that one could make a plurality of demonstrations to depict a plurality of events, and the temporal structure of the plurality of demonstrations, which it inherently has, would then have to match the temporal structure of the depicted event plurality. All that we have to do to account for the observed behavior is to make the demonstrated event sensitive to the inherent temporal structure of the demonstration event. I do this by adding a temporal similarity condition—TEMP-SIM—to the meaning of STRUC-SIM as follows, which is the final definition.

(43) $\text{STRUC-SIM}_{\llcorner \text{TH}_\delta(d) \lrcorner}(d, e)$ iff there is a set P meeting the following conditions:

a. $\text{PARTITION}(\text{P}, e)$
b. $\forall e' \in \text{P}[\llcorner \text{TH}_\delta(d) \lrcorner(e')]$
c. $|\mathbf{atoms}(d)| \leq |\text{P}|$
d. $\text{TEMP-SIM}(\text{P}, \mathbf{atoms}(d))$

Because the demonstration is allowed to be of a smaller cardinality than the partition, we cannot define temporal similarity by requiring some isomorphism between P and $\mathbf{atoms}(d)$. Instead, temporal similarity will be enforced by requiring structure-preserving mappings to hold between the atomic parts of the demonstration event and initial phases of the event demonstrated. Example (44) provides the first ingredient, which is the definition of initial subset. In particular, P' is an initial

subset of P just in case it is a subset of P and there is no event in P and not in P' that precedes any event in P'.

(44) $P' \subseteq_{\mathbf{init}} P$ iff

a. $P' \subseteq P$

b. $\forall e[e \in P' \rightarrow \neg\exists e'[e' \in P \setminus P' \wedge \tau(e') \prec \tau(e)]]$

We can now define temporal similarity as follows, where P is temporally similar to D just in case for every initial subset P' of the same cardinality of D, there is a one-to-one function mapping temporally adjacent events in D to events in P' that have the same amount of downtime between them.[7]

(45) TEMP-SIM(P, D) iff for all $P' \subseteq_\tau P$ such that $|P'| = |D|$, there is an injection $f : D \rightarrow P'$ satisfying:

a. $\forall d, d' \in D[\text{ADJACENT}_D(d, d') \rightarrow$
$\mathbf{downtime}(d, d') = \mathbf{downtime}(f(d), f(d'))$

The TEMP-SIM condition is used to require that plural demonstrations can only be used to demonstrate events whose initial segments can be chopped into parts where adjacent events have similar downtimes to adjacent atomic demonstrations. Essentially, TEMP-SIM(P, D) requires that when we look at the beginning of P, we see a copy of D in terms of temporal structure. Note that TEMP-SIM(P, D) has some properties we want for dealing with ideophones. First, as mentioned above, the condition allows P to be of greater cardinality than D, which is necessary when a smaller number of demonstrations is used to demonstrate a larger number of events. Second, the condition is vacuously satisfied if D is of cardinality 1. This is required for when an atomic demonstration demonstrates an atomic event. We still want to say in that case that they (trivially) have a similar temporal structure. Finally, the resulting truth conditions are appropriately weak. In particular, just as the number of ideophone demonstrations sets a lower bound for the number of events demonstrated, the temporal structure of those demonstrations sets a lower bound for the temporal structure of the events demonstrated. When a speaker depicts an event e using IDF [pause] IDF [pause] IDF, the listener knows, as an entailment, that the initial subsequence of e must have the structure e' [pause] e'' [pause] e'''. She then reasons (defeasibly) that if these three events do not exhaust e, then subsequent events in e are similarly structured in time.

Returning to the final definition of STRUC-SIM in (43), I want to show now that the analysis now accounts for the rough equivalence of certain pluractional

[7] The definition of the predicate ADJACENT and the function **downtime** are provided in the appendix.

ideophones and pluractional verbs, as illustrated in (41) and (42). In example (38) the speaker asserts the (rough) equivalence of the pluractional description *kan-C_1on* and the ideophonic depiction *kan* [pause] *kan* [pause] *kan*. Following the description in Pérez González 2012, I will take the pluractional morpheme *–C_1on* to derive predicates of events whose minimal parts are all separated by a temporal interval of a fixed, contextually given, length n. In particular, *–C_1on* is translated as a function that takes a V and returns the characteristic function of plural V-ing events whose atomic parts are linearly ordered in time with an interval of length n between temporally adjacent atoms.[8]

(46) $\texttt{C}_1\texttt{on} \rightsquigarrow \lambda V_{et} \lambda e[\neg \textsc{atom}(e) \wedge *V(e) \wedge \textsc{linear.order}_n(e)]$

What we now need to show, given (41), is that events satisfying the predicate denoted by *kanC_1on* are approximately those that the ideophone demonstration *kan* [pause] *kan* [pause] *kan* faithfully demonstrates, and vice versa. An ideophone demonstration of this form would yield the predicate of events in (47).

(47) $\lambda e[\textsc{struc-sim}_{\llcorner \textsc{th}_\delta(d_4) \lrcorner}(d_4, e)]$

An event e satisfies (47) just in case $\textsc{struc-sim}_{\llcorner \textsc{th}_\delta(d_4) \lrcorner}(d_4, e)$ holds. Because the theme of d_4 is the linguistic object kan, this condition requires that e can be partitioned into at least as many knocking events as there are atoms in d_4, and the initial elements of the partition and the atoms in d_4 are similarly structured in time. In particular, all adjacent demonstrations via kan must be mapped to two knocking events with the same amount of downtime.

We can now ask whether one such an event would satisfy the pluractional predicate *kanC_1on* given in (48).

(48) $\texttt{kanC}_1\texttt{on} \rightsquigarrow \lambda e[\neg \textsc{atom}(e) \wedge *\textsc{kan}(e) \wedge \textsc{linear.order}_n(e)]$

As we want, the first two conditions are immediately satisfied. An event that satisfies (47) must have at least three atomic parts and be a knocking event—i.e., a predicate that satisfies KAN. The third condition also holds given two assumptions, which is why I must say that certain pluractional verbs and pluractional ideophones are only roughly equivalent. First, for the entailment to hold, the length of the pauses between d_1, d_2, and d_3 in the demonstration d_4 must be the same as the contextually salient length n. It seems like a natural assumption in most contexts, though, that the speaker would demonstrate using the contextually relevant inter-

[8] The appendix provides the definition of the predicate LINEAR.ORDER as well as parameterized versions like that in (46).

val.[9] Second, for the entailment to hold, either the number of events in the demonstration are the same as the number of events in e, or the temporal homogeneity assumption holds. That is, the entire event e is similarly structured to the initial segment that allows TEMP-SIM(P, d_4) to be satisfied. As discussed surrounding the definition of TEMP-SIM, this is going to be a natural assumption in most situations. The result is that is events that can be demonstrated by *kan* [pause] *kan* [pause] *kan* are roughly those that satisfy the derived pluractional verb *kan*C_1*on*.

Reasoning in the other direction is actually even easier. We can conclude that an event satisfying the pluractional predicate in (48) will also satisfy the predicate in (47), and thus be properly demonstrated by a plural demonstration of the form *kan* [pause] *kan* [pause] *kan*, just in case the length of the pauses in the demonstration event are equal to the contextually salient length n. As discussed above, this is a natural assumption in most contexts, and so the analysis captures the paraphrasability of pluractional verbs and pluractional demonstrations as illustrated in (38).

While the analysis works for verbs derived by the pluractional -C_1*on*, it can be easily extended to other pluractionals like -*lajan* in (42). As long as the events that satisfy the derived pluractional verb can be identified in virtue of their temporal profile, then they can also be demonstrated via a pluractional ideophone. The account thus not only captures the truth conditions of plural ideophone demonstrations, but we also capture a deep connection between pluractionality and ideophones. Just as one can derive an ideophone root (or verb root) into a pluractional verb stem that denotes a plurality of events, one can take that same root, derive it into an ideophone stem, and then use it repeatedly to demonstrate the kind of event that would fall in the extension of the pluractional. We thus find that natural languages have two distinct ways to make reference to plural events—either through plural event predication or demonstration-external pluractional demonstrations. I have further shown that these two routes can converge when the pluractional denotes plural events that have a particular, conventionalized temporal profile, as in (41)-(42). In the next section I introduce a third way to make reference to plural events in the ideophone domain. As we will see, it involves ideophone stems that have denotations similar to pluractional verbs.

6 Demonstration-internal pluractionality in Upper Necaxa Totonac

In the previous two sections I extended the analysis of *be like*-quotation in Davidson 2015 to the ideophone domain and illustrated how this account handles the fact

[9] Or perhaps we might want to think of the demonstration itself, in virtue of being more informative concerning the interval in question, as setting it.

that one can repeatedly use an ideophone to depict a plural event, which I dubbed demonstration-external pluractionality. In this section I will show that languages with rich ideophone systems can have other types of pluractional ideophone constructions. In particular, I am interested in cases where there is dedicated derivational morphology that creates ideophone stems that can only depict plural events. That is, an atomic demonstration using one of these derived ideophones will still necessarily depict a plural event. I will call this kind of pluractionality, where a single demonstration depicts a plural event, demonstration-internal pluractionality. As we will see, demonstration-internal pluractional lies in-between demonstration-external pluractionality like that discussed in the previous section and bona fide verbal pluractionality. In particular, the relevant ideophone stems will be like pluractional verbs, denoting plural events. What separates them from pluractional verbs is that, as ideophones, they can be used in the course of a demonstration in the basic ideophone construction, but in virtue of their pluractional semantics, will always demonstrate plural events.

First, note that UNT has what looks like demonstration-external pluractionality in Tseltal.[10] One finds pairs of sentences where demonstrating using the ideophone more than once means demonstrating a plural event.

(49) Upper Necaxa Totonac

a. patʃ maka-wán
IDF:sound.small.stone.fall hand-say
'The pebble falls «patʃ».' Beck 2008: ex. 16a

b. patʃ-patʃ ta-maka-wán
IDF:sound.small.stone.fall-RED 3PL.SUBJ-hand-say
'The pebbles fall «patʃ»«patʃ».' Beck 2008: ex. 16b

(50) Upper Necaxa Totonac

a. te̲ːɬ ik-ta-wiːɬ kaː-s'ewí̲wi̲ a̲ntsá
IDF:sound.hit.ground 1SG.SUBJ-INCH-sit PLC-cool here
'«te̲ːɬ» I plopped myself down here where it's cool.' Beck 2008: ex.

[10] I do not want to definitively claim that total reduplication in Upper Necaxa Totonac is demonstration-external pluractionality because I do not have enough data to determine this. It might also be a demonstration-internal pluractional like the CV-derivation considered here. We would need to know whether each reduplicant in the total reduplication construction stands alone as a separate demonstration as we see in Tseltal. In particular, we would need to know whether total reduplication is completely productive and whether one can pause between each reduplicant to depict pauses between demonstrated events. Crucially, no part of the argument hinges on total reduplication being a demonstration-external pluractional ideophone construction. The point is that we can identify some species of pluractionality different from what we see in Tseltal, here exemplified by CV-reduplication.

15a

b. mat tę̃ːɬ-tę̃ːɬ liːtaːtiːtáː tsamáː misíń
QTV IDF:sound.hit.ground-RED bounce.on.bottom this jaguar
'the jaguar bounced around on its rear end' (going «tę̃ːɬ»«tę̃ːɬ»)
Beck 2008: ex. 15b

In addition to this, though, UNT has a second way to form ideophones that depict pluractional events, namely through final -CV reduplication.[11]

(51) xalalala maka-wan tʃiwíʃ
IDF:sound.hot.stone.crackle hand-say stone
'The stones went «xalalala» (crackling with heat).' Beck 2008: ex. 18a

(52) tsanana kin-a̱'a-wán taʃkát
IDF:sound.buzzing 1OBJ-eat-say wild.bee
'The bee went «tsanana» in my ear.' Beck 2008: ex. 18b

Example (53-c) presents a few pairs of ideophones that illustrate a semantic difference between -CV reduplicated ideophones and their plain or completely reduplicated counterparts. In all cases we have pluractional semantics, but -CV reduplicated ideophones appear to depict events whose repetitions comes more rapidly are are "minimized" relative to their non-CV-reduplicated counterparts.

(53) a. lam 'fire flaring up'
lamama 'coals glowing red'
b. kʊ̱ʃkʊ̱ʃ 'knocking on something'
kʊ̱ʃʊ̱ʃʊ̱ 'tapping quickly on something'
c. teʃeteʃe '(sound) water coming out in bursts'
teʃeʃe '(sound) water rushing out of a pipe' Beck 2008: p. 14

While interesting from the perspective of the the theory of pluractionality, the exact semantic contribution of -CV reduplication is not our focus. Instead, the facts in (51)-(53-c) raise the question of whether -CV reduplication and total reduplication in the ideophone domain have a unified account. The previous section defended the proposal that total reduplication in Tseltal, demonstration-external pluractionality, was essentially iconic. Each utterance of the ideophone stem was meant to stand for an event that would satisfy the event predicate denoted by the stem. At first pass, then, we might analyze -CV reduplication in Upper Necaxa Totonac as essentially iconic in the same way. Each -CV reduplicant would cor-

[11] While one usually finds simple -CV reduplication (sometime with a root copy-vowel), there are cases like (51) with multiple copies. The possibility of multiple -CV reduplication is discussed in section 7.

respond to its own demonstration of an event satisfying the event predicate the ideophone stem denotes. Additionally, we might say that the reason why CV-reduplicated ideophones in Upper Necaxa Totonac depict events with rapid repetitions and "minimized" events is also an iconic effect. In particular, in virtue of being affixal, these -CV reduplicants are necessarily temporally adjacent and "smaller" than the root itself. I think we can reject this kind of analysis, though. The data instead support treating CV-derived ideophones as a unique kind of pluractionality in the ideophone domain, separate from demonstration-external pluractionality. In particular, we will see that -CV reduplication in Upper Necaxa Totonac has undergone significant grammaticalization, which argues for treating its pluractional effect in the descriptive semantics rather than through the iconic, demonstration-based component.

The first problem for treating partial reduplication in a purely iconic fashion concerns the productivity of the construction. As Beck 2008: p. 12 notes, full reduplication is more productive than partial reduplication (though that latter is still quite productive). That is, one finds ideophone stems that do have a partially reduplicated counterpart. Additionally, one finds CV-derived ideophone stems that have no corresponding root. For instance, we have ideophones like *spa̲ta̲ta̲* 'viscous substance oozing' (Beck 2011: p. 547), but no ideophone **spa̲t* or **spa̲tspa̲t*. These facts make -CV reduplication look much more grammaticalized that total reduplication in Tseltal, which is completely productive and never obligatory. Instead, -CV reduplication in Upper Necaxa Totonac looks like derivational morphology. It is common to find lexical gaps systems of derivation, as well as frozen derived forms whose bases no longer exist in the language.

While this morphological argument is telling, the second, and primary problem for a purely iconic account of partial reduplication is semantic. In particular, the semantic effect of -CV reduplication in Upper Necaxa Totonac ideophones is clearly conventionalized in ways that it is not in Tseltal. In Tseltal, one can always predict the meaning of a reduplicated ideophone from the meaning of the ideophone root. Totally reduplication always means depicting a plurality of events of the kind a non-reduplicated ideophone would depict. In Upper Necaxa Totonac, though, one finds a large number of CV-reduplicated ideophones that seem to have no transparent semantic relationship to ideophones that share the same root. As Beck 2008: p. 14 notes, the two forms appear to be unique lexemes in that one could not predict the meaning of one reduplicated ideophone from the meaning of the other.

(54) a. *pampam* 'large bird flying'
b. *pamama* 'smoke billowing from a building' Beck 2011: p. 471

(55) a. *ʃa̲xʃa̲x* 'dirt, sand, or dust striking a surface'

b. *ʃa̰xa̰xa̰* ‘heavy rain falling’ Beck 2011: p. 692

(56) a. *xilixili* ‘horse galloping and rearing’

b. *xilili* ‘roaring (plane, rushing water, thunder)’ Beck 2008: ex. 20b

These facts rule out a purely iconic account. We don’t want to say that there is an ideophone root *pam* that can be reduplicated in two ways—as in (54-a) and (54-b)—to depict event-pluralities in its extension with two different temporal profiles. The reason is that (54-a) and (54-b) depict plural events of completely different characters. Instead, I propose to treat -CV reduplication as derivational, which has a partially uniform semantic effect (i.e., pluractionality), but is also sometimes idiosyncratic, as the semantic effect of derivation often is. The idea is that just like one finds an overt instantiation of a morpheme v_{id} that derives ideophone stems in Tseltal (e.g., derived ideophones like in (24) and (24) above), Upper Necaxa Totonac would have an ideophone derivation whose phonological reflex is -CV reduplication. While similar to the Tseltal derivation *-i* / *-u*, the proposal is that the -CV derivation in Upper Necaxa Totonac would also have pluractional semantics. That is, instead of returning a simple event predicate that can be used in an ideophone demonstration (as we see in Tseltal), the -CV derivation derives an ideophone stem that is a predicate of plural events. Example (57) gives a preliminary translation emphasizing the pluractional effect of derivation by -CV reduplication.

(57) $\text{CV}_{v_{id}} \rightsquigarrow \lambda V_{\epsilon t} \lambda e [*V(e) \wedge \neg \text{ATOM}(e)]$ (preliminary)

While (57) is not a fully fleshed out account of the pluractional, it captures the two core features of the derivation that interest us here.[12] First, in virtue of its syntactic category, $\text{CV}_{v_{id}}$ derives ideophone stems—expressions restricted to occur in the basic ideophone construction(s) of Upper Necaxa Totonac. Second, in the semantics, $\text{CV}_{v_{id}}$ derives predicates of plural events. This will have the crucial effect on the behavior of CV-derived ideophone stems that leads to demonstration-internal pluractionality when used in a demonstration. In particular, a speaker will only be able to demonstrate plural events with CV-derived ideophones, even in an atomic demonstration. We can see how this works compositionally by considering example (58) again, repeated from (51).

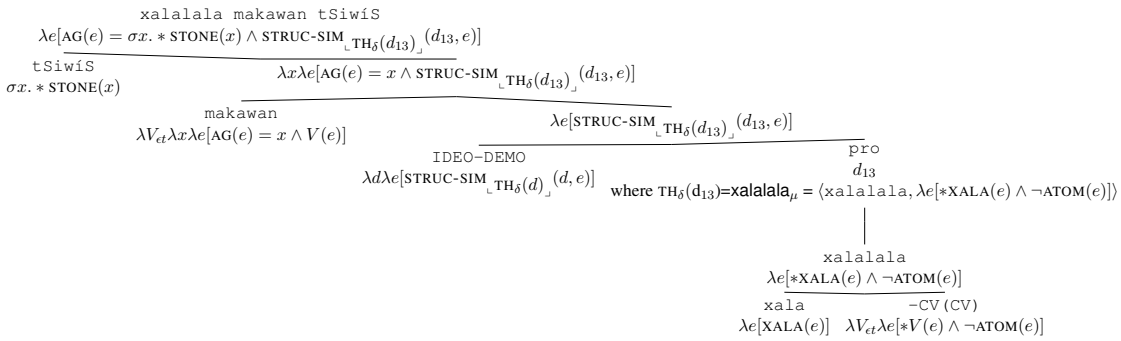
(58) xalalala maka-wan tʃiwíʃ

IDF:sound.hot.stone.crackle hand-say stone

‘The stones went « xalalala » (crackling with heat).’ Beck 2008: ex. 18a

[12] While there is not enough data to give a confident account of the species of pluractionality at hand, from the attested examples this looks like a kind of event-internal pluractional (see Wood 2007; Henderson 2016).

I assume that as in Tseltal, Upper Necaxa Totonac has a IDEO−DEMO operator that itself selects for ideophone stems and is itself constrained to occur in quotative environments, like under the predicate *makawan* 'say'.[13]



(59) $\exists e[\text{AG}(e) = \sigma x. * \text{STONE}(x) \wedge \text{STRUC-SIM}_{\llcorner \text{TH}_\delta(d_{13}) \lrcorner}(d_{13}, e)]$

Because we are interested in composition inside the ideophone stem, I have shown in detail how the ideophone enters the derivation. The root $\sqrt{xala}$ composes with the ideophone stem deriving suffix -CV, which has a pluractional effect in the descriptive semantics.[14] The resulting event predicate denotes plural events of crackling sound emission. That is, any event satisfying the predicate denoted by *xala*-CV but be decomposable into at least two crackle events. The result of quoting the ideophone stem, as discussed around example (15), is a linguistic object that can be the theme of a demonstration that composes with the ideophone demonstration operator. The important thing to note is that when this linguistic object is fed as a parameter to the STRUC-SIM operator, what is extracted for the calculation of structural similarity is the pluractional predicate.

The resulting bottom-line truth conditions for (58) are given in (59). This formula is true just in case there is an event e, whose agent is the stones, such that d_{13} is a demonstration via xalalala and d_{13} is structurally similar to e. The latter condition is the crucial one. Given that d_{13} is an atomic demonstration, the condition is satisfied just in case e can be partitioned (trivially) into a single event that satisfies $\llcorner \text{TH}_\delta(d_{13}) \lrcorner = \llcorner$xalalala$\lrcorner = \lambda e[* \text{XALA}(e) \wedge \neg \text{ATOM}(e)]$. But given that this is a predicate of plural events, e must be a pluractional event. The re-

[13] Note here that I'm representing optional additional reduplicants in the morphology. I am also open to the idea this that takes place under quotation as an additional, iconic phonetic modification like we have English forms like "It was *looooong*." As described by Beck 2008, additional reduplicants are optional and cannot change the lexeme at hand, unlike the initial -CV reduplicant.

[14] The abstract root $\sqrt{xala}$ also appears to underlie the semantically related nominal *xalanát* 'ember, coal'(Beck 2011: p. 154).

sult is that even when the speaker makes a single demonstration by uttering xalala she will be demonstrating an event of plural character. Unlike other ideophones, there is just no way to demonstrate atomic events with a -CV derived ideophone stem. This is different from what we saw in Tseltal where the same ideophone stem was uttered multiple times to demonstrate a pluractional event and once to demonstrate an event of singular character. It is precisely this contrast that distinguishes demonstration-internal and demonstration-external pluractionality.

7 The iconic / conventionalized boundary

The previous sections have developed a novel theory of the semantics of ideophones built on the demonstration-based framework of Davidson 2015. I have shown that ideophones can be given a compositional semantic treatment in this framework that can make sense of iconic aspects of their meaning, while still drawing connections between the semantics of ideophones and the semantics of more familiar expressions like verbs. I then showed that this account of ideophones allowed us to diagnose, and then account for two previously unrecognized kinds of pluractionality in the ideophone domain. In this way, the analysis has shown that the tools of formal semantics can be profitably used to explore the meaning of natural language expressions, like ideophones, that straddle the boundary between conventionalized descriptive semantics and the domain of iconic meaning.

In building such an account, though, I have necessarily drawn a particular line between what is treated as iconic and what is treated as conventionalized. In this section I want to defend how I have bundled various aspects of the meaning of ideophones into the iconic and non-iconic meaning dimensions. While I think that we can empirically determine how to draw a boundary between the iconic and non-iconic aspects of ideophones, I want to emphasize that the particular boundaries we draw are going to be language dependent, and almost certainly fuzzy. There will be aspects of the syntax and semantics of ideophones in some languages that are in the process of grammaticalization, and so moving from the iconic to the conventional domain. In these cases drawing a hard line may be difficult. That said, I believe that the heuristics I have used in constructing the analysis of ideophones in Tseltal and Upper Nexaca Totonac will be applicable crosslinguistically to probe the boundary between what is conventionalized and what is not in an ideophone system.

The account that I have proposed treats the meaning of ideophone constructions as fairly conventionalized. The claim is that at the heart of all ideophone constructions in Tseltal and Upper Necaxa Totonac is the operator in (60), which conventionalizes their meaning in two ways. The first is at a shallower compositional level, but it is the fact that `IDEO-DEMO` has a demonstration argument that conventionally restricts ideophones to occurring in quotative constructions, that is,

environments that provide a demonstration that can saturate its argument of type δ. Second, the STRUC-SIM relation conventionally extracts information about the demonstration to restrict the kinds of events the ideophone predicate denotes. That is, the fact that, in Tseltal, uttering an ideophone multiple times and with a particular temporal profile restricts the kinds of events demonstrated is a conventional aspect of the ideophone construction.

(60) $\texttt{IDEO-DEMO} \rightsquigarrow \lambda d \lambda e [\textsc{struc-sim}_{\llcorner \textsc{th}_\delta(d) \lrcorner}(d, e)]$

One might wonder whether we want to bake into the semantics these aspects of ideophone meaning when we have the option to potentially handle them in some purely iconic dimension. In particular, let's consider an alternative theory that has neither of the two properties discussed above. In this alterative theory, ideophones would be purely iconic modifications of the event description. They would not enter the derivation in a compositional manner and their particular meaning would follow from extra-grammatical iconic principles of interpretation.

Let's now consider how such a purely iconic approach compares to the analysis developed in previous sections, which differs in making use of demonstration events and (partially) conventionalizing how demonstrations are mapped to truth conditions in the ideophone construction. We start with the type difference. Consider the fact that in Tseltal (and many other languages), ideophones only occur as complements of a predicate that otherwise introduces quotations. The demonstration-based account relates the restricted distribution of ideophones to their iconic semantics. At the heart of the basic ideophone construction is a demonstration of type δ and the IDEO-DEMO operator of type $\langle \delta, \epsilon t \rangle$. If, following Davidson 2015, quotation constructions in general involve demonstrations, we understand why ideophones are restricted to exactly those contexts in language after language. In contrast, a purely iconic approach would have nothing to say about the restricted distribution of ideophones in comparison to other iconic modifications, like gesture. We find cross-linguistically that gesture can be used to quite freely to alter or precisify non-iconic language, and it is not restricted to quotation environments. This observation shows that simply cannot treat ideophones via some kind of undifferentiated extra-grammatical iconic modification. In this work I have chosen to restrict the distribution of ideophones using the type system, though other choices are possible. The important point in the restricted distribution of ideophones we have evidence that the way their meaning is added to larger expressions is compositional and conventionalized.

While composition matters, the most important differences between the account of ideophones developed here and a purely iconic approach are semantic. In particular, they concern the boundary between iconic and conventionalized as-

pects of ideophone meaning. Recall that in the demonstration-based account, while the demonstration event is iconically linked to the demonstrated event, that link is (partially) mediated by the IDEO–DEMO operator, which has a conventionalized semantic contribution. This means that, as discussed above, the fact that total reduplication in Tseltal marks pluractionality is conventionalized, even though it is extracted from an iconic demonstration event. This provides an important point of contrast with a purely iconic approach. The point of such an approach is that ideophone meaning should be determined by purely iconic factors, namely language independent mappings between form and meaning. For instance, such an approach predicts that total reduplication should have the same semantic effect crosslinguistically—plural event reference—and furthermore, that any category expressed in the ideophone domain should have the same form across languages. This is what it means to be iconic. What we actually find, though, is a disassociation between form and meaning that is predicted under an account like that presented in this work where ideophones involve conventionalized relationships between demonstrations and the event predicates that ideophone denote.[15]

To begin illustrating the disassociation, first consider the fact that we find cases where total reduplication indicates something other than pluractionality. For instance, the Korean ideophone system has total reduplication that at first pass looks similar to what we see in Tseltal. Total reduplication can mark pluractionality, and increasing the reduplicants marks more repetitions.

(61) t'ak 'a short, fast and big bang'
  a. t'ak-t'ak 'a few bangs'
  b. t'ak-t'ak-t'ak 'lots of bangs' Sien 1997: p.110; 206

But complete reduplication, contrary to the expectations of a purely iconic account, can mark other grammatical categories like durativity depending on the ideophone at hand.

(62) a. tuŋsil 'floating'
  b. tuŋsil-tuŋsil 'floating continuously' Sien 1997: p.199; 206

Note that there is no problem in conceiving of a pluractional event in which something floats, then sinks to the ground and floats again. This is just not what (62-b) means. A purely iconic account has trouble with these kind of data in Korean, as well as the crosslinguistic comparison with Tseltal or Upper Necaxa Totonac.

[15]The discussion of this disassociation is focused on reduplication because this is most relevant, but it can be reproduced in other domains. For instance, see Dingemanse et al. 2016 for evidence that purportedly iconic ideophone stems do not contain enough information to extract their semantic properties.

Iconic meaning is meant to be determined in a transparent language independent manner, but here is seems that one just has to know that in Tseltal total reduplication in the ideophone domain always marks pluractionality no matter the ideophone in question, while in Korean it marks either pluractionality or durativity depending on the lexical semantics of the expression at hand.

This is just one example, but we could easily produce others. We find that reduplication in the ideophone domain does tend to mark the same set of familiar semantic categories—pluractionality, distributivity, durativity, intensity—there is not the morphological uniformity one would expect if reduplication in the ideophone domain were a purely iconic phenomenon. Instead, the data support an analysis like the one developed in this work where there is an iconic component to ideophone use, namely the demonstration event in which the ideophone is uttered, but languages may conventionalize, though the IDEO−DEMO operator how aspects of the demonstration are converted into truth conditions. The result is that we need determine on a language by language basis what aspects of an ideophone demonstration have been grammaticized into the basic ideophone construction and what aspects belong to the general iconic repertoire of the language. Only the former should be built into the truth conditions of the IDEO−DEMO operator.

To illustrate how we might decide to differentiate the iconic and conventionalized components of an ideophone demonstration, I would like return to Tseltal. I have argued that the fact that total reduplication indicates pluractionality is conventionalized in Tseltal. In particular, the IDEO−DEMO is sensitive to a situation in which the speaker utters an ideophone multiple times in a complex demonstration, converting that plural demonstration into a predicate of plural events. One piece of evidence for building this into the semantics of the basic ideophone construction is that while ideophones have verb-like semantics, and many ideophone roots can even be zero-derived into verbs, one cannot totally reduplicate verbs to mark pluractionality (unlike in French Sign Language as shown in Kuhn & Aristodemo 2015). By reifying sensitivity to plural demonstrations into meaning of the basic ideophone construction, we make sense of the fact that this effect is only seen in the ideophone domain.

In contrast, other kinds of demonstration-based modifications cross the ideophone / verb boundary. For instance, Pérez González 2012 discusses how certain pluractional derivations in the verbal domain are accompanied by gestures that emphasize the structure of the repetitions that form the plural event at issue. Crucially, we also see these gestures applied in the ideophone domain (Pérez González, p.c.). This suggests that gestural content can be used to make cross-categorial iconic modifications of event predicates. It's these kinds of modifications that I propose should be handled either extra-grammatically, or by less grammaticalized means. The core idea is that precisely because such modifiers are not restricted to

ideophones, we know that they should not be part of the conventional meaning of IDEO-DEMO, and so not part of the conventional meaning of the basic ideophone construction.

While we would like a full account of such gestural modifications, they illustrate an analytical technique even without a complete formal treatment. When analyzing an ideophone system, as a first pass we should build into the semantics of the basic ideophone construction just those demonstration-based modifications that are restricted to ideophones. Other kinds of modifications that apply more generally can be attributed to a broader system of iconic modification.

8 Conclusion

The goal of this work has been to motivate a compositional semantics of ideophones that (i) respects their iconic character while (ii) relating their meaning to more familiar, non-iconic semantic phenomena.

In line with the first half of this goal, I have shown that we can make sense of the intuition that ideophones have depictive instead of descriptive content by treating them in the demonstration-based framework of Davidson 2015, first developed to account for *be like*-quotation and iconic phenomena in sign languages. Crucially, though, as I argued in section 7, the demonstration-based approach does not over iconicize the semantics of ideophones. Instead, the formal system allows us to easily extract descriptive content in a conventional way from an otherwise iconic demonstration event. Moreover, as needed, the addition of demonstrations to the type system allows us to semantically restrict the distribution ideophones to quotative contexts, which we independently take to involve demonstrations.

In line with the second half of our core goal, I have shown that this semantics allows us to diagnose two kinds of ideophonic pluractionality, and whose account closely tracks previous work on pluractionality. In particular, pluractionality is usually taken to involve plural event reference, and I have shown that ideophone pluractionality can be empirically divided into two cases by considering how plural event reference comes about. The first kind, demonstration-external pluractionality, involves plural demonstrations (which are themselves simply plural events). The second kind, demonstration-internal pluractionality, involves derived ideophones stems that denote plural events in terms of their lexical semantics, and so can only be used to demonstrate events with a plural character.

While this article already covers broad empirical ground, I believe that there are many outstanding empirical issues of great interest. My hope is that this work lays the formal foundation for exploring them. First, there is a large literature on varieties of pluractionality. We can now ask whether we find all the same kinds of plural event reference we see in the event domain in the demonstration domain—

e.g., do we find event-external pluractional ideophone derivations to complement the apparent event-internal pluractional ideophone derivation in Upper Necaxa Totonac? Second, my account of the two kinds of ideophone pluractionality is based on the idea that languages have a variety of ways of (compositionally) using ideophones to depict plural events. We can now ask whether languages have ideophone systems that conventionally extract from a demonstration other aspects of event structure beyond plurality. One exciting possible answer is the durative / punctual contrast. Alto Perené (Arawak) has a ideophone-deriving affix *-(V)k* which derives ideophones that characterize punctual (non-durative) events (Mihas 2012).

(63) a. kori 'gulp'
b. korik 'take a gulp'

(64) a. tsapo 'pour (liquid)'
b. tsapok 'splash (liquid) once'

(65) a. cheki 'cut'
b. chekik 'make a cut'

While more investigation is needed, it seems like we want to say that *-(V)k* syntactically derives an ideophone stem and semantically derives a predicate of punctual events, and thus can only be used in the language's ideophone construction(s) to depict events with that particular structure. The result would be an aspectually flavored version of the phenomenon we see in Upper Necaxa Totonac with demonstration-internal pluractionality. It would be interesting to explore the space of eventive properties that become conventionalized in ideophone systems. It is this exploration that will allow us to develop a typology of IDEO-DEMO operators and to refine their formal treatment.

Finally, while I have developed an account of ideophones using a demonstration-based framework. This is not the only kind of account that can be persued. Focusing on sign language phenomena, previous work by Schlenker, Lamberton & Santoro (2013) and Kuhn & Aristodemo (2015) has developed the theory of $\mathbf{Icon}^{\Phi}_{P}$ predicates to modal iconic modification. In particular, an $\mathbf{Icon}^{\Phi}_{P}$-predicate is a predicate whose extension is (partially) determined by the phonetic form of Φ of P as it is uttered. It seems that an $\mathbf{Icon}^{\Phi}_{P}$ account of ideophones will be similar to my demonstration-based account insofar as the mapping from Φ to a particular extension is permitted to be conventionalized. The one core difference is that the present account is committed to the existence of demonstrations. This results in a richer ontology, but perhaps the formal treatment becomes cleaner. In particular, mapping demonstration events to (general) events that share structural properties is easy because they are fundamentally the same kind of entities with spatial, temporal, thematic traces, etc. In contrast, mapping phonetic forms to events that are

structurally similar seems conceptually more fraught and technically more difficult because I do think we want to admit phonetic forms into the model. Schlenker to appear(a),(b) presents a variation on an $\mathbf{Icon}^{\Phi}_{P}$-style account in a situation semantics framework that gets around this problem of having phonetic forms in the model. Because everything is a situation in these frameworks, and situations are extremely fine-grained, we can zoom in on the situation containing just the words uttered in some speech act. The properties of this situation can then be used to constrain the meaning of some other expression. I think it would be interesting in future work to see if these two theories and the demonstration-based theory are formally equivalent modulo ontological / type differences. I strongly expect they are, though ontological and compositional differences between theories are contentful and so future work could decide what framework is best for capturing iconic modifications across signed and spoken languages.

In addition to exploring formal differences between the demonstration-based and other approaches to iconicity, it would be profitable to return to the data that motivated the latter theories. In particular, future work should do a deep comparison of the behavior of ideophones, and pluractional ideophones in particular, to the behavior of iconic representations of plural events in sign languages (e.g., Kuhn & Aristodemo 2015). While I believe that iconic pluractional verbal modification in sign languages is different from either demonstration-internal or demonstration-external pluractionality, a detailed comparison should further illuminate the boundary between truly iconic and non-iconic properties of the ideophone constructions crosslinguistically, and especially within pluractional ideophone constructions.

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A The Formal System in Brief + Definitions and Abbreviations

The backdrop for the account is lax many-sorted type logic. Lax just means (i) we do not require domains for sorts to be disjoint, and (ii) equality (and only equality) is type agnostic—e.g., $\sigma = \sigma'$ is a formula even if σ and σ' are terms with different types. Following are highlights of the setup:

The domain of individuals of type e is the powerset of a designated set of entities IN minus the empty set: $D_e = \wp^+(\mathsf{IN}) = \wp(\mathsf{IN}) \setminus \emptyset$. The domain of events of type ϵ is the powerset of a designated set of events EV minus the empty set: $D_\epsilon = \wp^+(\mathsf{EV}) = \wp(\mathsf{EV}) \setminus \emptyset$. The domain of times of type τ is the powerset of a designated set of times (temporal intervals) TM minus the empty set, and is additionally ordered by an irreflexive, asymmetric, transitive relation $\prec$ (temporal precedence) Krifka 1998: $D_\tau = \wp^+(\mathsf{TM}) = \wp(\mathsf{TM}) \setminus \emptyset$. The domain of demonstrations of type δ is a proper subset of the domain of events: $D_\delta \subset D_\epsilon$. Disjoint

from all other domains) is the domain of well-formed linguistic entities of type μ. I treat linguistic objects as pairs—$\langle$`string`, SEMANTIC REPRESENTATION$\rangle$. We can think of this a reifying in the model the translation function mapping natural language expressions (here strings) to their semantic representations. I use $\llcorner$bottom corners$\lrcorner$ in the object language to access the semantic content of a linguistic object via the equality in (66).

(66) For all expressions M of type μ and N of any type,
$[\![\llcorner \mathsf{M} \lrcorner]\!] = [\![N]\!] \Leftrightarrow \pi_2([\![\mathsf{M}]\!]) = N$

Atomic individuals and atomic events are the singleton sets in $\wp^+(\mathsf{IN})$, $\wp^+(\mathsf{EV})$, $\wp^+(\mathsf{DM})$ respectively; they are identified by a predicate ATOM (which I'll apply to individuals, events, and demonstrations disambiguated by context). The "part of" relation $\leq$ over individuals / events / times / demonstrations (disambiguated context) is set inclusion over $\wp^+(\mathsf{IN})$ / $\wp^+(\mathsf{EV})$ / $\wp^+(\mathsf{TM})$ / $\wp^+(\mathsf{DM})$: $a \leq b$ iff $a \subseteq b$. The sum operation $\oplus$ (disambiguated by context) is set union over $\wp^+(\mathsf{IN})$ / $\wp^+(\mathsf{EV})$ / $\wp^+(\mathsf{TM})$ / $\wp^+(\mathsf{DM})$: $a \oplus b := a \cup b$. Standard θ-roles are functions of type ϵe from events (type ϵ) to individuals (type e), e.g., TH is the theme role, AG is the agent role, etc. Because the domain of demonstrations is a subset of the domain of events, for each role θ of type ϵe, I assume there is a role θ' of type δe that agrees with θ on all demonstration events—x_ϵ, y_δ, and θ, if $x_\epsilon = y_\delta$, then $\theta_{\epsilon e}(x_\epsilon) = \theta_{\delta e}(y_\delta)$. I assume all theta-role functions are cumulatively closed, suppressing $**$-notation. The temporal trace function τ is a sum-homomorphism from events to times, while $\mathbf{len}$ is a measure-function from $D_\tau \cup \emptyset$ to the natural numbers representing their lengths, where $\mathbf{len}(\emptyset) = 0$.

(67) $\mathbf{atoms}(x) := \{x' | x' \leq x \wedge \text{ATOM}(x)\}$
'The set of atomic parts of x'

(68) $O(x, y)$ iff $\exists z[z \leq x \wedge x \leq y]$
'Two entities overlap just in case they share a part.'

(69) $\text{ADJACENT}_X(e, e')$ iff
a. $\neg O(e, e')$
b. $\neg \exists e'' \in X[\tau(e) \prec \tau(e'') \prec \tau(e') \vee \tau(e') \prec \tau(e'') \prec \tau(e)]$

(70) $\text{LINEAR-ORDER}(E)$ iff $\forall e', e'' \in E[e' \neq e'' \rightarrow \neg O(\tau(e'), \tau(e''))]$
'E is linearly ordered set of events just in case none of its (distinct) members have overlapping runtimes.'

(71) $\text{LINEAR-ORDER}(e)$ iff $\text{LINEAR-ORDER}(\mathbf{atoms}(e))$
'e is linearly ordered just in case none of its (distinct) atomic parts have overlapping runtimes.'

(72) $\mathbf{downtime}(e, e') :=$

a. $\emptyset$ if $O(\tau(e), \tau(e'))$, else

b. $\bigoplus \{t \in D_\tau | \tau(e) \prec t \prec \tau(e') \vee \tau(e') \prec t \prec \tau(e)\}$
'the contiguous temporal interval between e and e'.'

(73) LINEAR-ORDER$_n(e)$ iff

a. LINEAR-ORDER(e)

b. $\forall e', e'' \in \mathbf{atoms}(e)[\text{ADJACENT}(e', e'') \rightarrow$
$\mathbf{len}(\mathbf{downtime}(e', e'')) = n]$
'e is linearly ordered and adjacent elements in the order are separated by an interval of length n'

(74) PARTITION(P, x) iff

a. $\bigoplus \text{P} = x$

b. $\forall x(x \in \text{P} \rightarrow \neg\exists y(y \in \text{P} \wedge O(x, y)))$
'P partitions x iff the elements of P sum to x and no elements of P overlap.