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DO SERIAL VERB CONSTRUCTIONS DESCRIBE SINGLE EVENTS? A STUDY OF CO-SPEECH GESTURES IN AVATIME

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Serial verb constructions have often been said to refer to single conceptual events. However, evidence to support this claim has been elusive. This article introduces co-speech gestures as a new way of investigating the relationship. The alignment patterns of gestures with serial verb constructions and other complex clauses were compared in Avatime (Ka-Togo, Kwa, Niger-Congo). Serial verb constructions tended to occur with single gestures overlapping the entire construction. In contrast, other complex clauses were more likely to be accompanied by distinct gestures overlapping individual verbs. This pattern of alignment suggests that serial verb constructions are in fact used to describe single events.*

Keywords: serial verb constructions, event representation, semantics, gesture, Avatime

1. INTRODUCTION. Serial verb constructions (SVCs) are often said to refer to single conceptual events. In fact, this property is commonly listed as one of their defining features (e.g. Aikhenvald 2006, Comrie 1995) and is sometimes singled out as the primary feature from which others are derived (e.g. Bisang 2009, Durie 1997). This connection between SVCs and single events is, however, not without its problems. For instance, some propose an opposing view, whereby SVCs refer to multiple events, in contrast to single lexical verbs (Pawley 1987, 2011) or coverbs (Baker & Harvey 2010). However, the more fundamental issue has been the lack of clarity regarding what it means for a construction to refer to a single event and how one could test it (e.g. Crowley 2002, Foley 2010, Pawley 2011, Senft 2008).

This article contributes toward a solution to this issue with the introduction and trial of a new method, which uses the alignment of co-speech gestures to investigate conceptual event structure. Co-speech gestures are movements people make while speaking. They are produced frequently and often unconsciously. Since gestures visually express aspects of the conceptual message, they provide a window onto conceptual representations (e.g. Casasanto 2013, McNeill 1992). In addition, while they are temporally and semantically tightly connected to speech, they are produced independently from it (e.g. de Ruiter 2000, Kita & Özyürek 2003). This makes them an excellent tool for investigating the event structures referred to by different syntactic constructions. Specifically, constructions referring to multiple events should occur with multiple separate event gestures, while those relating to single events should only occur with single event gestures.

The alignment of gestures with SVCs and other multiverbal constructions was tested in the serializing language Avatime (Ka-Togo, Kwa, Niger-Congo). While other multiverbal constructions frequently occurred with multiple event gestures, SVCs never did. This strongly suggests that Avatime SVCs are indeed used to refer to single events.

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Such a finding not only is relevant for SVCs, but also has broader implications for understanding and investigating relationships between conceptual and linguistic event structure. In the remainder of this section I briefly introduce the Avatime language, SVCs and the previous attempts to evaluate their event structure, and co-speech gestures, before discussing the hypotheses for the present study.

1.1. BRIEF INTRODUCTION TO AVATIME. Avatime [avatiˈme] (ISO 639-3) is a member of the Ka family of Ghana-Togo Mountain languages within the Kwa branch of Niger-Congo. It is spoken by approximately 15,000 people living in eight villages in the Volta region of Ghana. The current study is based on data collected in the village of Vane during 2010 and 2011. This section provides a brief summary of the main structural features of Avatime to assist the reader with interpreting the examples and discussion. For more detailed grammatical information, see Defina 2009 or van Putten 2014, and the references therein.

Avatime is a tonal language with three tone levels—low (à), high (a), and extra high (á)—and some use of contour tones (â or ã). There are nine vowels [i, ɪ <ɨ>, e, ɛ, a, ɔ, o, u <ɔ̄>, u], which participate in a system of advanced tongue root vowel harmony. Avatime is a noun class language with seven genders, with six consisting of a singular and plural noun class pair and one being used for mass nouns. Noun class and number are indicated by a prefix on the noun. Verbs are obligatorily marked with aspect/mood prefixes, which also agree with the person or noun class of their subject. It is common to omit lexical subjects. There is no object marking on the verb, and object omission is rare, though possible. Each clause must contain one and only one full finite inflection for subject agreement, aspect, mood, and polarity. Constituent order is strictly SVO (subject-verb-object). The only way to deviate from this is to use a focus or left-dislocating construction. Like many other Kwa languages, Avatime makes frequent use of SVCs.

1.2. WHAT ARE SVCs? SVCs are syntactic constructions where multiple verbs occur in a single clause with no coordination or subordination (e.g. Aikhenvald 2006, Comrie 1995, Crowley 2002, Durie 1997). There is considerable crosslinguistic variation in the properties of constructions referred to as SVCs. This has led some researchers to view SVCs as a fuzzy category, with individual constructions showing familial resemblance to a prototypical exemplar (e.g. Aikhenvald 2006, Foley 2010). Others have taken a restrictive approach and proposed creating narrower definitions of SVCs (e.g. Baker 1989, Haspelmath 2016). Avatime SVCs largely conform to both the crosslinguistic prototype and narrower definitions such as Haspelmath's (2016). Since the present article focuses on Avatime alone, I take a strongly language-specific approach and define SVCs by the properties that distinguish them as a distinct construction type within the ecology of Avatime.

Avatime SVCs are, thus, characterized by the following properties:

- (i) They consist of at least two verbs, with longer sequences of up to four verbs attested.
- (ii) Only the first verb is fully inflected for aspect, mood, polarity, and subject agreement. The mood and polarity value must be shared by all verbs. Aspect is also shared by all verbs, with one exception: the recurrent aspect, indicating repeated or recurring actions, can be independently marked on subsequent verbs in SVCs describing sequential actions.
- (iii) There is no marking of subordination or coordination.
- (iv) The subject must be a shared argument of all verbs, and objects can be optionally shared.

- (v) There is a distinct set of agreement markers, glossed serial verb marker (SVM), used only with SVCs. These markers are optional and agree with the subject, aspect, or mood of the clause.¹ They largely are truncated forms of the standard agreement markers.

Examples of Avatime SVCs are shown in 1–3.²

- (1) lě be-dzi e-mu-i
then C₁PL.PFV-return SVM.C₁PL.PFV-ascend-CM
'Then they climbed up again.' (Avatime-history_110905_BB_02:00)³
- (2) tɔ bià-plo a-ɲwùna=mè kɪ ɔ-nùvɔ=ɛ
PURP C₁PL.POT-wash C₃PL-face=DEF give C₁SG-child=DEF
'In order for them to wash the child's face.' (Midwifery_110901_AB_06:16)
- (3) bɛ́-ɛ-bɔ lɪ-fɪflɪ-nɛ é-nywà é-kpɛ
C₁PL.PROG-mold C₃SG-type.of.porridge-DEF SVM.PROG-throw SVM.PROG-put
é-kɪ ɔ-kà-tsi-e
SVM.PROG-give C₁SG-father-old-DEF
'They were molding the porridge, throwing it to the old man.'
(Folktale_110406_QM_03:26)

These three examples are typical of the three subtypes that may be distinguished among Avatime SVCs. The first consists primarily of constructions where the first verb modifies the action described with the second, as in example 1. The second consists primarily of constructions where one verb introduces a new argument, for instance a benefactive as introduced by the *kɪ* 'give' verb in example 2. The third is used for sequential actions such as the molding and throwing in example 3. These subtypes may be analyzed as nuclear cosubordination, core cosubordination, and core coordination, respectively, within the role-and-reference grammar framework (Foley & Van Valin 1984, Van Valin 2005). For further information regarding the structure and properties of Avatime SVCs, including a discussion of the subtypes and their analysis, see the description in Defina 2016.

1.3. SVCs AND EVENTS. Many researchers have claimed a connection between SVCs and single events (e.g. Aikhenvald 2006, Bisang 2009, Comrie 1995, Durie 1997). However, attempts to investigate this connection have suffered from the notorious difficulties concerning the relations between linguistic constructions and event representations, with many expressing dissatisfaction with the methods previously applied (e.g. Crowley 2002, Foley 2010, Senft 2008). Previous evaluations of whether SVCs refer to single events have relied on five methods: intuition, translation, intonation, cultural restrictions, and the scope of temporal modifiers. I discuss these in turn below.

The most common approach is to use a consultant's or the linguist's own intuitions about what constitutes a single event (Crowley 2002, van Staden & Reesink 2008). Relying on the linguist's intuitions can be problematic, since they may not be sufficiently

¹ This optionality appears to be linked to their ongoing disappearance from the language, as, while older speakers use them frequently, younger speakers use them very rarely, if at all.

² Abbreviations used in glosses are as follows: 1: first person, 2: second person, C_X: noun class x, CLM: clause-linkage marker, CM: clause marker, COMP: complementizer, DEF: definite, INDEF: indefinite, INF: infinitive, IT: itive, LOC: locative, OBJ: object, PFV: perfective, PL: plural, POT: potential, PROG: progressive, PURP: purposive, REL: relative clause marker, SG: singular, SVC: serial verb construction, SVM: serial verb construction agreement marker.

³ The source of each example is provided as (Text-Name_Date-Recorded(YMMDD)_Speaker-Reference_Time(MM:SS))

familiar with the language and culture in question. More generally, relying on intuitions is essentially problematic since deciding whether something constitutes a single—possibly complex—event or a collection of separate events is notoriously difficult, with people often having different intuitions for the same facts (e.g. Casati & Varzi 2008, Foley 2010, Pawley & Lane 1998, Schultze-Berndt 2000:36–37, Schwartz 2008).

Another commonly used approach relies on translation (van Staden & Reesink 2008). Here a construction is said to refer to a single event if it can be translated into another language—typically English—using a single clause with a single finite verb. A more nuanced version, as employed by Baker and Harvey (2010), compares semantic structures of SVCs with those of single lexical verbs across many languages. In both cases, the core assumption is that single events in one language can be equated with single lexical verbs in another language. This is problematic for several reasons. First, we know languages differ in the concepts they lexicalize in verbs (e.g. Jackendoff 1990, Talmy 1985). So the results may differ depending on which language(s) are chosen for reference. Even within individual languages, the equation of single events with verbs is problematic. For while some have suggested such an equation (e.g. Barsalou 1992, Croft 1990, Folli & Harley 2006, Parsons 1990), it has not been shown. There are also many who argue that single lexical verbs can refer to multiple events, for instance the little *v* analyses where causative verbs like *feed* are said to refer to distinct events of causing and eating (e.g. Hale & Keyser 1993, Pustejovsky 1991). At the very least, assuming an equation between verbs and events makes the discussion of whether particular linguistic constructions refer to single conceptual events circular (Givón 1991, Pawley 2011).

The third method, first employed by Givón (1991), uses pauses as evidence for the event structure of SVCs. Givón took Goldman-Eisler's (1968) finding that speakers pause when they are encoding the next unit of speech and concluded that pauses in speech could be used as an indication of conceptual event boundaries. He examined three serializing languages of Papua New Guinea—Kalam, Tairora, and Tok Pisin—and found that the rate of pauses within SVCs was not distinguishable from the rate of pauses within single words. He concluded from this that SVCs must refer to single events. While this method is a great improvement over previous methods, it is also not without its problems. First, it requires painstaking phonetic analysis, so very few researchers have utilized it properly (Crowley 2002). There have also been doubts as to whether intonation units can demonstrate a noncircular relationship between syntax and event structure (Pawley 2011, Himmelmann 2013). Indeed, Himmelmann's (2013) recent study of intonation in a collection of texts across a range of serializing and nonserializing languages found that single intonational units at times included multiple clauses and events. He concluded from this that intonation units relate more to information structure than to either clause or event structure.

The fourth method for evaluating whether a construction refers to a single conceptual event focuses on cultural restrictions on the description of events (e.g. Bruce 1988, Diller 2006, Durie 1997, Enfield 2002). The productivity of SVCs is limited by cultural notions of what constitutes a typical event. For instance, Bruce (1988:29) found that it was possible to use an SVC to describe the commonly combined actions of climbing a tree and searching for insects in Alambak (Papuan), but not to describe the combination of climbing a tree and seeing the stars, which informants pointed out could be seen perfectly well from the ground. Researchers using this approach argue that since SVCs are limited by local cultural notions of legitimate event types, they must be restricted to refer to single—culturally legitimate—event units. This method has the virtue of not

lying on an assumed connection between linguistic structure and conceptual event structure. However, while it does show clear restrictions on the compatibility of the actions described by SVCs, it does not show that these combined actions are necessarily conceptualized as single events.

Finally, recent work by Bohnemeyer and colleagues (2007, 2011) has introduced a new test of whether a construction refers to a single event: the macro-event property. Constructions are said to have the macro-event property if temporal modifiers scope over the whole construction. In contrast, constructions that allow multiple temporal modifiers with independent scope are said to refer to different macro-events. This temporal-scope unit corresponds to the unit of the core in role-and-reference grammar (Bohnemeyer & Van Valin 2009). This criterion neatly captures the idea that single events should form a single coherent unit of space-time (e.g. Quine 1985, Zacks & Tversky 2001). It is not yet clear, however, to what extent it reflects cognitive event representations rather than linguistic structure (Bohnemeyer et al. 2007).

The results of these five methods do not always align. For instance, Baker and Harvey (2010) and Givón (1991) both set out to test whether SVCs referred to single events in two different crosslinguistic samples. Baker and Harvey used the translation method and concluded that SVCs refer to multiple events, while Givón used intonation and concluded that they refer to single events. Even when applied to a single language by the same researcher, the five methods can yield different results. For instance, in Avatime, intuition, intonation, and cultural restrictions point toward all SVCs referring to single events: there are cultural restrictions on the actions that can be combined using SVCs (Defina 2016), and they appear to occur within single intonational units and refer to single events. But SVCs describing sequential actions cannot be translated into English using a single verb, as illustrated by example 3. These sequential-action SVCs also do not have the macro-event property since they can be modified by independent temporal modifiers, as in example 4 (Defina 2016).

- (4) kivòe mà-dò Gbàdzemè à-ba ǾvanǾ òmonò
 yesterday 1SG.PFV-move.from Gbadzeme SVM. 1SG.PFV-come Vane today
 ‘Yesterday I left Gbadzeme, today I came to Vane.’ (Elicitation_100712_AB)

While there are specific issues with each method, a central problem lies in the vagueness of the term *single event* and what it means to refer to one. The issue of event individuation has been much discussed among linguists, philosophers, and psychologists alike (e.g. Casati & Varzi 1996, Davidson 1996 [1969], Parsons 1990, Shipley & Zacks 2008). The question most relevant for SVCs is when a collection of actions constitutes a single event unit versus a collection of multiple events. Recent work by Zacks and colleagues helps shed light on this issue. In one study, they compared segmentations of events at different levels of granularity, confirming that the boundaries of finer-level events aligned with those of coarser-level events (Zacks, Tversky, & Iyer 2001). This alignment supports the idea that events are segmented hierarchically, with each event containing subevents and itself being a part of a larger event. For instance, *crossing the road* is made up of the subevents of *checking for oncoming cars*, *stepping down off the curb*, and so forth and can itself be a subevent in the larger event unit of *walking to work*. Moreover, subsequent neurophysiological studies suggest that people attend to multiple levels in this hierarchy simultaneously (e.g. Sharp & Donaldson 2007, Zacks, Braver, et al. 2001, Zacks et al. 2006). This makes the distinction between single and multiple events essentially problematic. For while there are clearly some collections of actions that do not constitute single events—such as Apollo 11 landing on the moon and me eating breakfast this morning—the vast majority of single events have a dual nature

in that they may also be seen as a collection of subevents. The distinction between single versus multiple events is thus more a matter of perspective and which level of the hierarchy one is focusing on at a particular time. The act of reference then takes on an important role as the point of choosing which level of the event hierarchy to focus on and the way of communicating that choice to your addressee. This is not a new idea and was a large part of Levelt's (1989) foundational account of the conceptual message and the processes underlying speech production. So, in order to investigate whether an SVC refers to a single event, we need to investigate the event structure of the conceptual message that this particular SVC is expressing. This is what Givón (1991) aimed to achieve with his investigation of pause placement in SVCs. However, recent work on the nature of co-speech gestures suggests that they may be a more informative and suitable tool.

1.4. CO-SPEECH GESTURES: A WINDOW ONTO THINKING FOR SPEAKING. Co-speech gestures are meaningful visible movements of the hand, body, or face produced in connection with speech (Kendon 1986, 2004, McNeill 1992). They are tightly connected to speech, and the two are often claimed to work together to form a single, complex, meaningful utterance (e.g. Enfield 2009, Kendon 2004, McNeill 1992). Among the types of gestures that have been distinguished, it is the **ICONIC** gestures that are of interest for the present study. These are the gestures that imagistically represent some part of the semantics of the utterance (McNeill 1992), and so may express aspects of the event.

Gestures typically consist of four phases: a **PREPARATION**, where the articulators are moved into position for the gesture; a **STROKE**, the main movement of the gesture; an optional **HOLD** phase, where the articulators are held still, generally immediately before or after the stroke; and a **RETRACTION**, where the articulators move back into a neutral or rest position (Kendon 2004, McNeill 1992). The strokes of iconic gestures are produced with a close temporal connection to their spoken affiliates (e.g. Butterworth & Beattie 1978, Kendon 1972, Krauss et al. 1996, McNeill 1985, 1992, Morrel-Samuels & Krauss 1992, Nobe 2000). This synchrony is maintained even when the speech is disfluent (Mayberry & Jaques 2000). One of the ways this is done is via the use of pre- or post-stroke holds that delay or extend the stroke of a gesture when the speech speeds ahead or lags behind gesture articulation (de Ruiter 2000, Kita 1990, McNeill 1992).

This temporal alignment with speech is one of the reasons why gestures are frequently likened to intonation (e.g. Kendon 1980, McNeill 1992). Some have even suggested that gesture and intonation are isomorphic (e.g. Hübler 2007). If so, using gestures to study event segmentation would be equivalent to using intonational units. But recent research suggests that while gestures and intonation are tightly connected, the relationship is more complex. Several connections have been established. For instance, the peaks of gestural strokes tend to coincide with pitch-accented syllables (Esteve-Gibert & Prieto 2013, Loehr 2012). Also, whole gestural phrases—a stroke combined with its preparation, hold, and retraction—are loosely correlated with intermediate phrases (Loehr 2012). Intermediate phrases are a type of intonational unit smaller than the intonational phrase. They are bounded by pitch accents and interword junctures rather than the boundary tones and utterance-final pauses that separate full intonational phrases. There are, however, also several places of divergence. For instance, no correlations have been found at the level of gestural phases—such as the strokes as used in this study—or at the level of intonational phrases—as used in previous intonational studies of SVCs. The documented correlations in fact suggest that multiple gestural strokes could occur within single intonational phrases since these can have multiple pitch accents and intermediate phrases (Ladd 1996). Of course, not all of these strokes would necessarily relate to the event.

Some may relate to an object or have a more deictic or pragmatic function, and it is here that the extra semantic information available in gesture becomes incredibly valuable. In sum, both intonation and gesture relate to speech and so tend to align to a large extent. They do not align perfectly, however, suggesting that they relate to speech independently. Gestural units may then provide different information from that of intonational units, and their semantic information provides the added benefit of allowing the investigation to focus on units relating to events.⁴

In addition, while gestures are indeed produced in tight connection to speech, mounting evidence suggests they are produced separately. For instance, several studies have found that they can encode semantics not included in the spoken utterance (Goldin-Meadow 2003, Kita & Özyürek 2003). In fact, times when children produce gestures and speech representing different information have been identified as prime indicators of readiness to learn (e.g. Goldin-Meadow 2003, Pine et al. 2004). For example, Pine and colleagues' (2004) study examined children's explanations during a balancing task. Approximately one third of the children produced mismatching gestures and speech at the beginning of the session, for instance, producing gestures describing the relative weight of each side of the beam, but talking about the need to place the middle of the beam on the fulcrum. They found that these children were the ones who benefited most from instruction and showed the most improvement by the end of the session. Goldin-Meadow (2003) has suggested that these mismatches indicate the children are beginning to entertain new concepts and explanations that they are not yet able to verbalize, demonstrating a dual conceptualization stage in between shifting from one way of understanding to another. These mismatches also show that the encodings of conceptual representations into gesture and speech deviate at a very early stage of production. The likely relationship between speech and gesture production is diagrammed in Figure 1.

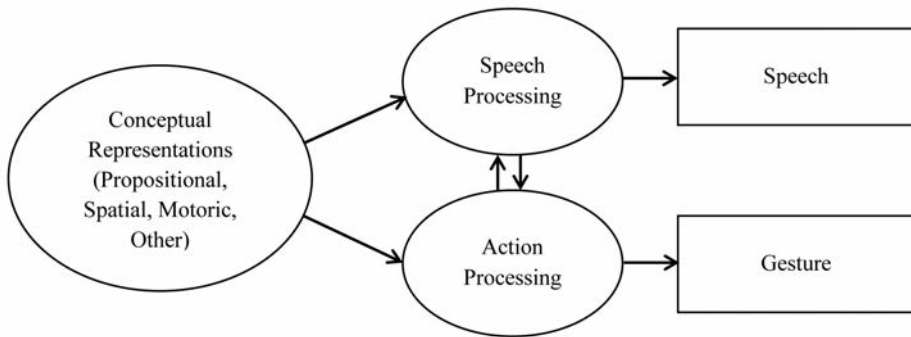


FIGURE 1. Diagram of likely relations between speech and gesture-production processes, adapted from Chu and Kita (2009).

⁴ As one referee noted, the syntactic relationship between the verbs in SVCs may encourage a more unified representation where the SVC is articulated as a single unit and thus consistently mapped to a single unit for both prosody and gesture. My thanks for this observation. It is certainly possible and in line with the general view that SVCs form single units. To evaluate this possibility, one would need to analyze both the intonational and gestural patterns occurring with SVCs across a range of languages. The present investigation of gestures in Avatime and the ongoing project by Nikolaus Himmelmann and colleagues investigating prosodic patterns in a range of Austronesian languages are steps in this direction, but further investigation of both gestures and prosody within the same set of languages is needed. In any case, the present study is informative as a first step in testing the relationship between SVCs and gestural units in one serializing language and establishing whether this relationship is in line with the single-event hypothesis. Also, whether this relationship derives from being articulated as a single unit or more directly through meaning, it would still suggest an association between SVCs and single units in how the event is conceptualized during speaking.

This relationship between gesture, speech, and conceptual message is what makes co-speech gestures such an excellent tool for investigating preverbal conceptual messages and THINKING FOR SPEAKING (Slobin 1987, 1996),⁵ and more and more studies are utilizing them for this purpose (e.g. Casasanto & Jasmin 2012, Goldin-Meadow 2006, Goldin-Meadow & Beilock 2010, Gullberg 2011, McNeill & Duncan 2000). Of particular note for this study, several researchers have claimed that the level of cohesion during conceptualization is shown by whether a complex idea is expressed with a single gesture or broken up into multiple gestures (e.g. Kita & Özyürek 2003, McNeill & Duncan 2000). For example, Kita and Özyürek (2003) studied the gestures occurring with descriptions of a motion event by speakers of English, Japanese, and Turkish. While English speakers typically expressed a rolling manner and downward path in a single clause using a verb-plus-satellite combination like *roll down*, Japanese and Turkish speakers expressed them with different verbs in separate clauses, as in *descended the hill while rolling*. Speakers of all three languages frequently produced gestures conflating manner and path, reflecting their simultaneity in the stimulus event. However, while these were often the only gestures English speakers produced, Japanese and Turkish speakers tended to combine them with additional separate gestures for manner or path. Kita and Özyürek argued that Japanese and Turkish speakers were led to encode manner and path separately by the way they packaged the information syntactically. In a later study, they found that English speakers could be induced to produce separate manner and path gestures by asking them to describe the event using separate manner and path verbs in multiple clauses (Kita et al. 2007). This shows that the gestural patterns were indeed reflective of particular linguistic encoding choices rather than more long-term habitual encoding strategies.

1.5. HYPOTHESIS. This study uses the alignment of co-speech gestures to test the hypothesis that Avatime SVCs refer to single events, in contrast to other types of complex clauses. Focusing on the alignment rather than the semantics of the gestures has two benefits. First, it avoids problems caused by the tendency for gestures to express only some aspects of situations. Second, the measurement of temporal alignment is simpler and less subjective than that of gestural semantics, which means this method is more likely to be generally usable. Since the strokes of iconic gestures are produced in synchrony with the speech they relate to, the way iconic gestures relating to events—hereafter referred to simply as **EVENT GESTURES**—overlap with speech can be used as a way of investigating conceptual event structures of particular syntactic construction types. There are two relevant patterns of event gesture–speech alignment: **SINGLE EVENT GESTURE IN TOTAL OVERLAP** and **MULTIPLE EVENT GESTURES**. If a single event gesture is produced in overlap with all verbs in a construction, it suggests the verbs refer to a single event in the conceptual message. In contrast, if there are separate event gestures overlapping with different verbs within a construction, it suggests the verbs refer to different events in the conceptual message and so the whole construction is viewed as referring to a combination of multiple events. It is, of course, also possible that there will be no event gestures overlapping a construction, or one event gesture that does not overlap all verbs. Neither of these situations provides definitive information about the

⁵ Note that this does not assume the preverbal conceptual message to be a fully formed coherent unit before gesture and speech production begins. Indeed, the conceptual message appears to be formed incrementally in parallel with speech and gesture production (see Norcliffe & Konopka 2015). Whatever information is available at the conceptual message level would then be sent to both gesture and speech production systems in an incremental fashion.

event structure of the construction, since not all events are gestured and sometimes a gesture is not completely aligned with the spoken correlate. So if there is only one event gesture and it does not overlap all verbs, it could have a narrow reference to one subevent or it could refer to an overarching event and be slightly out of alignment. In some cases the gestural semantics can help identify the latter of these two possibilities. The specific predictions for this study are thus that: (i) single event gestures overlapping multiple verbs will occur with Avatime SVCs, but not with other complex clauses, and (ii) separate distinct event gestures overlapping individual verbs will occur with other complex clauses, but not with SVCs.

2. METHOD.

2.1. DATA. Four native speakers of Avatime—three women and one man—aged sixty-five to eighty-five were invited to tell a story or describe how something was done. The resulting narratives and procedural descriptions totaled forty-two minutes and forty-nine seconds and contained 646 utterances, where utterances were taken to be semantically and syntactically cohesive stretches of speech between pauses. To encourage naturalistic performances there was always an audience of native Avatime listeners present. These listeners were often familiar with some aspects of what they were being told, but never with the details. There was no mention of gesture before or during the recordings. All monologues were video and audio recorded. Table 1 summarizes the details of the monologues used.

TYPE	TOPIC	LENGTH	# OF UTTERANCES
Procedural	Rice farming	7 min, 5 sec	92
Procedural	Midwifery	7 min, 46 sec	192
Narrative	Folktale: Why they sacrifice rams at funerals	7 min, 38 sec	149
Narrative	Avatime migration history	20 min, 20 sec	213

TABLE 1. The topic, length, and number of utterances contained in the four recordings used for this study.

2.2. CODING. All of the monologues were transcribed in Avatime and translated into English with the aid of native Avatime speakers also fluent in English. They were then glossed, before further syntactic and gestural coding. All annotation and coding were done using ELAN (Wittenberg et al. 2009).

Instances of SVCs and other multiverbal constructions were noted and coded as either SVC or OTHER COMPLEX. The distinctions between other complex constructions were collapsed in the main analysis, but are discussed later in §3.2. Utterances consisting of only one clause with a single verb were coded as SIMPLE, and those without a finite verb were coded as NONFINITE.

All iconic gestures relating to the event were tagged. These are gestures that imagistically represent some part of the described event. Gestures relating only to objects or locations were not included. For instance, a gesture produced with both hands flat and palm down starting in front of the chest and moving to the sides would be included if it occurred in a description of a flattening- or smoothing-type event. The same gesture would not be included if the speaker was describing a flat object. It was also noted to which verbs, if any, the gesture was semantically related.

The gestural phases—preparation, stroke, hold, and retraction—were identified by examining the video frame by frame. Strokes were identified, following McNeill (1992) and Kendon (2004), as the meaningful part of the gesture, where the most effort is, and where the articulator is tensed. Following Kendon (2004), complex strokes were allowed—for instance, a set of quick repeated movements to convey shaking an object was annotated as a single stroke.

The type of overlap was then determined by what speech overlapped with the stroke plus any post-stroke hold of a gesture. If it overlapped all verb roots in the construction, it was coded as *SINGLE TOTAL OVERLAP*. If there was one gesture and it overlapped with at least one, but not all, verb roots, it was coded as *SINGLE PARTIAL OVERLAP*. If no verb roots overlapped the gestural stroke plus hold, it was coded as *NOT ON THE VERB*. If there were multiple distinct strokes within a construction, the overlap was coded as *MULTIPLE*. Finally, if there were no event gestures, the overlap was coded as *NO GESTURE*.

A couple of examples will help to clarify the coding. For instance, in example 5 the speaker uses an SVC.⁶ She also produces a gesture relating to both verbs: moving both of her hands forward and down to represent the act of separating out a serving of porridge and putting it down (see Figure 2). The duration of the stroke is indicated by a line below the Avatime text. Since there is only one event gesture and it overlaps with both verb roots, it is coded as *SINGLE TOTALLY OVERLAPPING*.

- (5) lě a-ya=le e-dù=i
 then C₁SG.PFV-separate=C₃SG.OBJ SVM.C₁SG.PFV-put.on.flat.surface=CM
 ‘Then she shared it (the porridge) out.’ (lit. ‘separated it put it down’)
 (Folkstory_110406_QM_01:14)



FIGURE 2. Screenshot of the gesture in example 5. The speaker moves both of her hands forward and down while describing how the woman separates individual servings of porridge and puts them down.

A single utterance may combine more than one clause type. For instance, one or both clauses in a coordinated construction may themselves be complex. In these cases, embedded SVCs and other complex constructions are also noted. If any event gestures occur during this complex utterance, they are annotated with respect first to the lowest-level clause and then to the higher-level units. For instance, in example 6, an SVC *bedzi ba kèdea* ‘they returned-came back’ is coordinated with a simple clause *bena- batɔ bena ðkùtɔɛ* ‘they reached- some (of them) reached some place’. There were two event gestures produced. The first is a gesture with the left hand, flat and palm down, moving from the left side to the space in front of the speaker’s body. It relates to the ‘coming’

⁶ Videos of the gesture examples discussed in this article can be found in the online supplementary materials at <http://muse.jhu.edu/article/637152>, with the exception of examples 7, 12, and 13, since the speaker has not released this text for the public.

motion and possibly also the ‘returning’ aspect, especially as previous gestures have represented motion away from the body. It overlaps all verbs in the SVC *bedzi ba kèdea* ‘they returned-came back’. The second event gesture is also produced with the left hand: flat and palm down, the hand moves from in front of the speaker’s chest down toward his lap, relating to the ‘reaching’ event. It overlaps with the first attempt at the second part of the conjoined clause *bena* ‘they reached’ and the beginning of the rephrasing to add the explicit subject. The SVC has a single event gesture overlapping both verbs so it is coded as single totally overlapping. The simple clause has a single event gesture overlapping its single verb, not counting the repeat in the self-repair. However, since simple single verb clauses were not the focus of this study, embedded simple clauses such as this one were not separately noted. Nevertheless, this gesture is still relevant for the overarching coordinate construction, which is coded as having MULTIPLE GESTURES, with an event gesture on each component.

- (6) *ńte* *mè sị* *lě* *be-dzi* *ba* *kè-de-a*
 LOC:like.that inside COMP and C₁PL.PFV-return come C₆SG-back-DEF
lě *bè-na* *ba-tɔ* *bè-na* *ɔ̃-kù-tɔ=ɛ*
 and C₁PL.PFV-reach C₁PL-INDEF C₁PL.PFV-reach C₂SG-place-INDEF=CM
 ‘So they came back and some (of them) reached some place.’

(Avatime-history_110905_BB_11:10)

2.3. RELIABILITY. In order to check the reliability of the coding, a randomly selected subsection of the data was independently coded by a second coder. In cases of disagreement the initial coding was maintained. Two minutes were randomly selected from each text (18.7% of the total data), and independent coders coded both the syntax and the gesture. The second coder for the syntax was Saskia van Putten, a linguist also working on Avatime, and the second coder for the gestures was Emanuela Campisi, a linguist with extensive gesture-coding experience. For the syntax, a simple comparison between the two codings showed a high degree of convergence, Cohen’s kappa = 0.90. Since the coding of gestural phases is notoriously variable (Nobe 2000), a direct comparison of the phase boundaries was not attempted. Rather, the type of overlap was compared so that two codings were treated as the same if they yielded the same type of overlap with the syntactic construction. The convergence rate for types of gestural overlap was Cohen’s kappa = 0.61. According to the commonly cited table created by Landis and Koch (1977), this is substantial convergence. Still, it is worth considering the nature of the divergences in more detail. Consultation with the second gesture-coder showed that 87% of the differences were due to disagreements about whether a gesture was iconic as opposed to deictic or pragmatic. The distinction between these types of gestures is known to be difficult (Kendon 2004:103–4). For instance, it can often be hard to determine whether a gesture accompanying a motion event is better treated as a deictic indication of the goal of motion or as an iconic referring to the path of motion. The initial coding had more of a tendency to analyze borderline gestures as iconic rather than deictic or pragmatic. Including additional noniconic gestures in the analysis should not pose a risk of a false confirmation of the hypothesis. Since noniconic gestures may not relate specifically to the ‘event’ element in the utterance, they may have different alignment patterns. Thus, including them could reduce the strength of the predicted alignment pattern but not falsely confirm it. Only 7% of the divergences in the coding were due to differences in the timing of the stroke or hold of a gesture.

3. RESULTS. The total numbers of SVCs and other complex constructions and simple and nonfinite utterances are listed in Table 2, along with the numbers of each kind of

gestural overlap for each construction type. Further discussion focuses on the single totally overlapping and multiple gestures for SVCs and other complex constructions. It is, however, informative to first briefly consider the full picture. Here one can see that SVCs make up a substantial proportion of the utterances in the sample (18%), though the various other complex constructions are much more frequent as a whole. Event gestures also appear to occur disproportionately frequently with SVCs—in 64% of cases—as compared to other construction types—44% for other complex constructions and 33% for simple clauses.

	SVC	OTHER COMPLEX	SIMPLE	NONFINITE	TOTALS
SINGLE TOTAL OVERLAP	60	13	84	N/A	157
SINGLE PARTIAL OVERLAP	31	93	N/A	N/A	124
MULTIPLE	0	55	1	1	57
NOT ON VERB	4	3	8	2	17
NO GESTURE	53	209	191	21	474
TOTALS	148	373	284	24	829

TABLE 2. The number of each kind of gestural overlap occurring with each type of utterance in the data set.

Single total overlap: a single event gesture that overlaps all verb roots. Single partial overlap: a single event gesture that overlaps some of the verb roots. Multiple: multiple event gestures that overlap the utterance. Not on verb: a single event gesture that does not overlap any verb roots.

No gesture: no iconic gestures relating to the event during that utterance.

3.1. COMPARISON OF SVCs WITH OTHER COMPLEX CONSTRUCTIONS. As predicted according to the single-event hypothesis, SVCs frequently occurred with single totally overlapping gestures but never with multiple gestures. In contrast, other complex constructions frequently occurred with multiple gestures but only rarely with single totally overlapping gestures. This difference in alignment patterns was statistically significant. First, the gestural-alignment patterns of the individual speakers were compared to determine if there were significant differences between them, which there were not: $\chi^2(3, N = 128) = 1.63, p = 0.65$. Second, the alignment patterns across the two text types (narrative versus procedural) were compared to test for any differences between the text types. It is possible, for instance, that the gestures in the narratives, particularly the folk story, may have been more stylized than in the procedural texts. However, no significant difference was found between the two text types: $\chi^2(1, N = 128) = 0.90, p = 0.34$. Finally, since neither speaker nor text type had a significant effect on the type of gesture overlap, a 2×2 chi-square test could be used to test the relationship of clause and gesture-overlap type, which was indeed significant: $\chi^2(1, N = 128) = 85.09, p < 0.001$. Figure 3 shows the distributions observed.

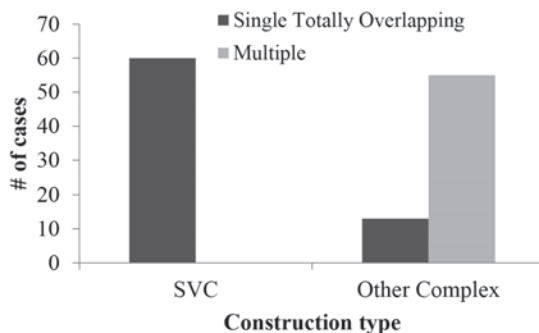


FIGURE 3. The number of single totally overlapping and multiple gestures occurring with SVCs and other complex clauses. The difference between SVCs and other complex clause types is significant.

As discussed in §1.5, single partially overlapping gestures can generally tell us little about the event conceptualization since they can arise from multiple scenarios. It is worth noting, however, that six of the thirty-one event gestures partially overlapping with SVCs were clearly semantically related to both verbs, whereas none of the ninety-three event gestures partially overlapping with other complex utterances were. This provides further evidence supporting the single-event conceptualization for SVCs.

3.2. A CLOSER LOOK WITHIN EACH CATEGORY. The hypothesis concerned the difference between SVCs and other complex clause types in general. However, neither SVCs nor the other complex clauses are homogenous categories. Thus, in this section, I examine the various subtypes to determine whether the gestural-alignment patterns are consistent within each category. There were too few cases to perform a statistical comparison among the subtypes, so I discuss them qualitatively here. I begin with the SVCs, and then move on to the other complex clauses.

Within the SVCs, there is one subtype that stands out for potentially referring to multiple events. These are the SVCs referring to sequential actions, since they can be paraphrased with coordinate clauses in Avatime, are translated using two clauses in English, and do not have the macro-event property (Defina 2016). There were only seven of this type of SVCs in the present data set. Three of these occurred with a single totally overlapping gesture, as in 7, and none occurred with multiple gestures. This suggests that these sequential-action SVCs tend to pattern like other Avatime SVCs and also refer to single conceptual events. Thus, even though these constructions allow multiple temporal modifiers and are translated into English with multiple clauses, Avatime speakers appear to focus on the larger event unifying these subevents—in the case of example 7, the event of gathering the rice to a central location.

(7) kɔ bɛ-halì eh halì a-mụ-nà ɛ-manò ní
 so C₁PL.PFV-collect eh collect C₃PL-rice-DEF SVM.C₁PL.PFV-bring LOC
 eh ke-p... eh ní ke-tsripe-à mɛ ní ð-nyɔ-nò mɛ
 eh C₆SG-h... eh LOC C₆SG-clearing-DEF inside LOC C₂SG-farm-DEF inside
 ‘So they collect the rice bring it to eh ho- to the clearing in the farm.’
 (Rice-farming_100613_EN_05:26)

The other complex constructions consist of coordinated clauses and of subordinate clauses joined as adjuncts, complements, or relative clauses. They also include nonfinite complement constructions where the matrix verb takes a nonfinite verb phrase as a complement. The numbers of single totally overlapping and multiple gestures for each of these construction types are shown in Table 3. I discuss them in further detail in turn below.

	SINGLE TOTALLY OVERLAPPING GESTURE	MULTIPLE GESTURES
ADJUNCT	0	28
COMPLEMENT	1	4
RELATIVE	3	7
COORDINATE	2	15
NONFINITE COMPLEMENT	7	1

TABLE 3. The number of single totally overlapping and multiple gestures occurring with each type of other complex construction.

First, the adjunct constructions conform exactly to the pattern predicted for the other complex constructions: they occur with multiple gestures, but not single totally overlapping ones. For instance, the adjunct construction in example 8 has three event ges-

tures. The first is on the verb *dzi* ‘return’, which is cut short before the utterance is rephrased. The second gesture overlaps the whole rephrased matrix clause. The speaker spreads both hands out and around from in front of his torso to his sides, in reference to the spreading out and dividing of the Avatime people into the various towns. The final gesture occurs in the temporal adjunct clause introduced by the clause-linkage marker *xé* and overlaps with the verb *kj* ‘give’; it is a short thrust of the hands away from the speaker in reference to the giving action.

- (8) *kæ* *kui-dzi-* *bɛ-lè* *e-ku* *te* *petee*
 so 1PL.PFV-return C₁PL.PFV-share SVM.C₁PL.PFV-enter like.that all
pɔ-ɛ *xé* *àblé ké* *bɛ-kj* *ɨ-mà-nɛ* *è-nyi-nà*
 finish-CM CLM now same C₁PL.PFV-give C₂PL-TOWN-DEF C₃PL-name-DEF
 ‘So we return—they divided throughout, before they gave the towns
 names.’ (Avatime-History_110905_BB_11:45)

The complement, relative, and coordinate constructions all trend toward this pattern as well. They often occur with multiple gestures, where one event gesture overlaps the verb in the matrix clause and another overlaps the verb in the subordinate or coordinate clause. An example of this can be seen in the coordinated clauses shown in example 6 in §2.2. However, these construction types also sometimes occurred with single event gestures overlapping both verbs. These exceptional cases are discussed below.

The data included only one complement construction with a single totally overlapping gesture, shown in example 9. Here the speaker is describing a baby’s birth and produces a single event gesture overlapping all verbs in the complement construction ‘God helped me to deliver her like this’. Her hands form a V-shape with the fingers of both hands touching at the bottom. She moves this V-shape slowly from in front of her stomach down and toward her left, coming to rest on her left thigh. This gesture appears to relate to the delivery of the baby rather than the help from God, yet it is timed over the whole complement construction. This gesture is on the border between iconic and pragmatic. Thus one possible explanation for the unusual timing is that it is in fact a pragmatic gesture and does not refer specifically to the birthing event after all.

- (9) *li-po-lè* *gi* *ma-pò* *Pearl=i* *mawu-ye a-kò=me*
 C₃SG-time-DEF REL 1SG.PFV-birth Pearl=CM God-DEF C₁SG.PFV-take=1SG.OBJ
a-pɔnɔ *sɨ* *me-bu=ye* *ple* *te*
 SVM.C₁SG.PFV-help COMP 1SG.PFV-remove=C₁SG.OBJ descend like.this
 ‘When I brought forth Pearl, God helped me to deliver her like this.’
 (Midwifery_110901_AB_04:40)

There were two coordinate clauses with single totally overlapping gestures, both produced by the same speaker. At eighty-five, he is the oldest speaker in this data set, has a rather slow gestural style, and also tends to produce a lot of coordinate constructions. It is possible that these single overlapping event gestures are a part of his particular style. An example can be seen in 10. The speaker’s right hand starts on his lap and moves up to trace a large arc to his right side, ending near his head (see Figure 10). It remains there, relaxed, until the next stroke a couple of clauses later. Here the gesture seems to focus on the higher-order event of moving from one place to another, while the speech describes the subevents of getting up or leaving and then moving up to the new location. Alternatively, the gesture may represent the second subevent only, even though it also overlaps with the rising verb.

- (10) *lě* *li-kj* *bɛ-yɔ* *xé* *bɛ-trɛ* *e-mu* *ní*
 then C₃SG.PFV-give C₁PL.PFV-rise CLM C₁PL.PFV-go SVM.C₁PL.PFV-ascend LOC
 ‘Then that forced them to rise and move up to-’
 (Avatime-history_110905_BB_07:27)



FIGURE 4. Screenshot of the gesture in example 10. The speaker moves his right hand from down near his side up in an arc to above his head while describing how the Avatime people left the place they had been staying and moved up to a new place on higher ground.

Three relative clauses were produced with single totally overlapping gestures. Notably, they all provide further explication of the event, rather than the otherwise more common use of relative clauses to provide more information about one of the participants in the event. These cases thus have more of a single event reference, both in the gesture and in the semantics of the spoken utterance. In example 11, the speaker is describing how a baby will turn before it is born. She makes fists with both hands, one on either side of her stomach, and circles them around clockwise. This circling motion is repeated until the end of the full complex clause construction.

- (11) kɔ ɔ-nɛ̀vɔ-ε èé-tsyí te
 so C₁SG-child-DEF C₁SG.PROG-turn like.that
kɪle gi èé-tsyí te petee rrrr
 how REL C₁SG.PROG-turn like.that all continuously
 ‘So the baby will be turning how it is turning like that all along.’
 (Midwifery_110901_AB_09:46)

The nonfinite complement constructions are the only other complex constructions that deviate from the general pattern. They behave more like the SVCs, with more single totally overlapping than multiple gestures. See, for instance, the nonfinite complement construction in 12, where the speaker describes rice starting to drink water and produces a single event gesture overlapping the entire construction. She moves her right hand up from in front of her chest to in front of her shoulder and then dips it downward toward herself as if she is taking in the water.

- (12) e-kpese kù-ni-o ḍ-ɲwè
 C₃PL.PFV-start C₅SG-water-DEF INF-drink
 ‘It (the rice) starts to drink water.’
 (Rice-farming_100613_EN_04:07)

The nonfinite complements are also syntactically and semantically very different from the rest of the other complex clauses. The subordinate verb is in a nonfinite verb phrase,

rather than a full finite clause. So there is only one full finite clause in these constructions. The matrix verb is semantically light and modifies the aspect or modality of the subordinate verb, which provides the main event semantics. It is, therefore, not surprising that they tend to occur with single totally overlapping gestures and apparently describe single events.

4. DISCUSSION. The results show a strong tendency for SVCs to occur with single totally overlapping gestures and for other complex clauses to occur with multiple gestures. This suggests that SVCs do indeed refer to single conceptual events, while other complex clauses refer to multiple events.

Nonfinite complement constructions were the only other complex clauses that seemed to refer to single rather than multiple events. They are also unique among the other complex clauses since they take a nonfinite verb phrase rather than a full finite clause as a complement. The finding that Avatime SVCs and nonfinite complements tend to have single totally overlapping gestures supports the view that events relate more to clauses (e.g. Evans 2010, Jackendoff 1991, Pustejovsky 1991) than to individual verbs (e.g. Baker & Harvey 2010, Croft 1990, Folli & Harley 2006, Malaia 2014).

While there was a strong tendency for SVCs and nonfinite complements to occur with single totally overlapping gestures and other complex constructions to occur with multiple gestures, this tendency was not absolute. This suggests that there is not a simple isomorphism between syntactic structure and conceptual event structure. Indeed, coordinated clauses should be the most likely to refer to multiple events, yet there were some cases where they occurred with single totally overlapping gestures, as in example 10 above. Conversely, simple clauses with a single verb should be the most likely to refer to single events, yet there were cases where they occurred with multiple event gestures, such as example 13. Here the speaker is describing placing rice grains in the sun to dry. She first makes one gesture with both hands in front of her chest moving straight down toward her lap, overlapping with the subject agreement and directional prefix on the placement verb. She then makes a second gesture with both hands, starting from in front of her chest and moving down and spreading out, overlapping with the object and location. The gestures appear to describe placement and spreading-out actions, motions required for placing rice in the sun, though the second action is not explicit in the lexical description.

(13) wɔ-zɛ-plɛ lá we-o-we-o kò

2SG.PFV-IT-put C₃SG=LOC sun-DEF-sun-DEF just

‘You put it (the rice) in the sunshine (moving in a direction away from the origin).’

(Rice-farming_100613_EN_06:59)

This is in line with previous studies (e.g. Garber & Goldin-Meadow 2002, Kita & Özyürek 2003) that have highlighted cases where gesture and speech differ in the aspects of the conceptual message they encode. In the present case, it is an issue of one focusing on a higher-order event unit while the other takes a more granular view, focusing on lower-order subevents.

5. CONCLUSION. Researchers working on SVCs have generally assumed they refer to single conceptual events (e.g. Aikhenvald 2006, Bisang 2009, Comrie 1995, Durie 1997). However, evidence to support this connection has been elusive. The study presented here is the first investigation of iconic event gestures occurring with SVCs. It shows that SVCs in Avatime tend to occur with single gestures overlapping the entire construction. This suggests that they do, in fact, refer to single conceptual events. In contrast, other complex clauses in Avatime tend to occur with multiple distinct gestures,

suggesting that they refer to multiple events. This provides long-awaited evidence supporting the assumed connection between SVCs and single events and offers a new method for evaluating the relationship.

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