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## Multimodal marks of iteration in discourse

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## Abstract

This article investigates the way speakers combine different verbal and gestural resources to express aspectual meaning in American English, specifically the way an event is repeated. It identifies stable gestural correlates to the OVER AND OVER adverbial phrase, which involves lexical iteration. Speakers have been shown to rely on co-verbal gestures to communicate aspectual information along with lexical and grammatical means. However, most of the research has focused on hand gestures, and on comparing the embodiment of different categories of aspect. Cyclic gestures have particularly been found in aspectual contexts, and linked with meanings of motion, either physical or metaphorical, as well as continuity. We use video datasets of spoken American English belonging to the Distributed Little Red Hen Lab (Steen *et al.* 2018) as part of the UCLA Library NewsScape Archive. We determine which formal features participate in the expression of iteration, in a variety of articulators (hands, head, eyebrows), and carry out a quantitative analysis, targeting gesture proportion, timing, and duration. This study shows how gestural components blend in and participate in the expression of grammatical and pragmatic meaning in speech. More specifically, it adds to the ongoing discussion within Construction Grammar about conventionality in multimodal constructions.

**Keywords:** aspect; gesture; multimodality; iteration; Construction Grammar

## 1. Introduction

This article focuses on the way speakers of American English express distinctions in how a process unfolds through time. Specifically, it investigates the resources speakers use to detail the way an event is repeated, when using the OVER AND OVER adverbial phrase.

OVER AND OVER involves lexical iteration and adds aspectual information via a grammatical constituent (i.e. an adverbial phrase), referring to an event repeating itself a certain number of times. It also features a lexical mark of coordination, *and*.

The expression of iteration is multifaceted in that depending on the lexical and grammatical resources it is expressed with, repetition can be attached to a wide range of construals (*e.g.* a series of identical punctual actions or a persistent, systemic pattern or state). Depending on these construals, repetition can be instantiated in many different ways. Yet, only cognitive linguistics has begun to investigate the expression of iteration with audiovisual data, and its instantiations remain largely underspecified (Bressems 2021). Co-speech gestures provide a window onto linguistic and conceptual representations (see Breckinridge Church & Goldin-Meadow 2017 for a review), as, as they are temporally (*e.g.* Chui 2005), semantically (*e.g.* McNeill & Duncan 2000), and structurally (*e.g.* Lewandowski & Özçalışkan 2018) linked with speech. Co-speech gestures are a visible part of the dynamic interplay between construals, physiological and interactional affordances, and language-specific categorial constraints speakers compose with during discourse production (Boutet *et al.* 2016). This study identifies regular gestural correlates to the OVER AND OVER adverbial phrase in American English. It also delineates different multimodal profiles of OVER AND OVER routinely used by speakers, and adds to the growing body of research documenting the multimodal resources used by speakers to express aspectual meaning. An embodied approach to speech and meaning sheds light on speakers' conceptualization of grammatical notions such as aspect.

### 1.1 Aspect

Aspect refers to the way a process (i.e. an event as referred to by a verb, such as *break*) is conceptualized by speakers through time, specifically how it unfolds (*e.g.* Croft 2012), independently from the expression of tense. Aspect is inherent to a process, in relation to its

semantic type, but can also be expressed grammatically. The expression of grammatical aspect is language-specific. In French as in English, grammatical aspect can be marked morphologically, but can also be communicated through a wide array of grammatical and lexical items (Smith 2013). The iterative aspect, in particular, as expressed with OVER AND OVER, can be applied to various semantic types<sup>1</sup> of processes, *i.e.* achievements (dynamic, punctual, telic, events, as in *those people break my heart over and over*), accomplishments (dynamic, durative, telic events, as in *we listened to the audio over and over*), activities (dynamic, durative, and atelic events, as in *you work with the same people over and over*), or states (non-dynamic, durative, atelic processes, as in *it's just the same thing over and over*), and can be combined with morphological marks of grammatical aspect (*e.g.* *-ing* or *-en*).

The concept of aspect is usually broken down into the categories of open, closed, and phase (Chung & Timberlake 1985; Frawley 1992; Hinnell 2018). The open and closed aspects are also referred to as imperfective and perfective respectively (*e.g.* Comrie 1976; Brinton 1988). Open aspects encompass all aspects expressing the extension of an event over time (either ongoing or happening routinely). Closed aspects express events viewed as complete and bounded. Phase aspects refer to the initial or final boundaries of an event, *i.e.* their starting or end points (Hinnell 2018).

Iteration belongs to the open category, as it expresses the extension of a process over time as it happens routinely. In the verbal modality, speakers may combine OVER AND OVER with other markers of aspect (such as auxiliaries like *KEEP + Ving* and morphological marks of grammatical aspect such as *-ing*) along with different semantic types of processes to create various expressions of the way an event is repeated. These instantiations depend on what a speaker may choose to highlight according to their own construal of an event (Mittelberg 2007), and on a variety of contextual factors (Cienki & Iriskhanova 2018).

## 1.2 Encoding aspect with gestures

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<sup>1</sup> Note that the classification between achievements, accomplishments, activities and states is not strictly semantic, but also depends on the syntactic properties of each verb constellation in context. This classification is also fluid as a predicate may supply shifted interpretations and the boundaries between categories are fuzzy (Brunet 2021).

Speakers have been shown to rely on co-verbal gestures to communicate aspectual information (Duncan 2002; Parrill *et al.* 2013; Cienki & Iriskhanova 2018; Bressem 2021) along with lexical and grammatical means. Gestural instantiations of aspect are diverse as speakers may choose to highlight different angles of an event depending on their construal (Mittelberg 2007). Many idiosyncratic and contextual factors influence speakers' gestures (*e.g.* Müller 2017; Ferrara & Hodge 2018; Cienki 2022), including the specific discourse context of use, information structure and salience, previous use of gesture space, as well as previous representational techniques (*e.g.* concrete vs. abstract instantiations). For this reason, the relation between specific gestural forms and the expression of a particular aspectual meaning is both manifold and restricted to the data including the same delimited discourse situation.

Duncan (2002) found a link between speakers' aspectual choices and several features in the hand gestures that were co-produced with them. She specifically reported that the gestures made in a context of open aspect in speech had a longer duration than gestures made in a context of closed aspect. Similarly, differences in aspectual force were linked with differences in gesture format (Matlock *et al.* 2012; Hinnell 2018), in that speakers produced more iconic gestures and less hand beats when they described events with an imperfective aspect compared to when they described the same events with a perfective aspect. Additionally, Duncan *et al.* (2013) found that progressive aspect marking was associated with gestures that were longer-lasting and more complex than those in speech without progressive aspect marking.

Hinnell (2018) investigated the relation between hand gestures and auxiliary constructions headed by aspectualized verbs belonging to the open and phase aspect categories. Her data included two open aspect constructions, *CONTINUE to V* and *KEEP + Ving*. Her qualitative analysis showed that *CONTINUE* attracted more hand gestures than *KEEP*, which conversely showed more gestures with multiple strokes than gestures with single strokes. Both aspectual expressions were characterized with more gestures with a straight type of movement than those with arced or cyclic types. Contrary to the paper's predictions, cyclic gestures were not significantly associated with open aspect constructions, but with a phase construction (*i.e.* *START + Ving*).

Cyclic gestures were found in contexts of open aspect in other studies in English and German, specifically instantiating continuity (Hirrel 2018) or ongoing events (Ladewig 2011). They were

linked with meanings of motion (Ladewig 2011; 2014), either physical or metaphorical (Zima 2014). Ladewig (2011) suggested cyclic gestures were a metaphorical extension of the image schema CYCLE, involving a cranking motion as a process in a machine (Hinnell 2018). Cyclic gestures were also described as marking discourse cohesion (Müller 2017), as speakers may use them as recurring forms linking parts of speech together in similar construals.

The study of gestural instantiations of aspect also brought up to the notion of force dynamics (Talmy 2000), which refers to how entities interact with respect to the internal or external force that activates the event. Force dynamics was acknowledged to occupy a central place in embodied approaches to meaning (Mittelberg 2013), and was found particularly relevant for the interpretation of expressions of open aspect in Hinnell's (2018) data. The embodiment of visible force dynamics is not univocal, given that a speaker can highlight any angle of an event depending on their construal (Mittelberg 2007; Hinnell 2018). A speaker might choose to represent visible force dynamics with a large cyclic gesture, while others might choose beat gestures with multiple strokes. *KEEP + Ving* expressions have been linked with a visible force-dynamic profile in Hinnell's (2018) data, because of the many gestures with multiple strokes she found in their instantiation.

However, most of the research has focused on hand gestures, and on comparing the hand gestures produced in co-occurrence with different categories of aspect. Little is known about the potential role of other articulators in the expression of aspect, and about the way these multimodal components blend in and participate in the expression of grammatical and pragmatic meaning in speech.

### *1.3 Objectives and overview*

This study does not compare the production of different categories of aspect. It focuses solely on the expression of iteration via one adverbial phrase. We determine which formal features participate in the expression of iteration, in a variety of articulators.

Our research questions are the following: 1) What is the verbal environment of OVER AND OVER expressions? 2) What are the gestural correlates of OVER AND OVER expressions?

The conclusion leads to a wider discussion on the ways gesture can encode grammatical components together with verbal and lexical parameters (Cienki 2022).

## 2. Methodology

Data for the study were extracted from the NewsScape library (<http://tvnews.library.ucla.edu/>), which contains audiovisual datasets of television news programs in American English and other languages as well as computational, statistical, and technical tools developed by the Distributed Little Red Hen Lab (Steen *et al.* 2018), an international consortium for research in multimodal communication (<https://sites.google.com/site/distributedlittleredhen/>), hosted by the Library of the University of California Los Angeles.

We extracted data in spoken American English. We performed a simple lexical query in the Edge search engine (string of words = "OVER AND OVER"), with 54576 hits spanning from 2013 to 2022.

We selected the extracts according to several criteria. Each video had to play without any glitch and to have sound. The video was not a duplicate of another video in the dataset. The audio and video had to be synchronized enough to assess whether the speaker's gesture co-occurred with their use of the target expression. We controlled the TV show type (celebrity guest interviews during talk-shows; television network news) and gesture visibility (speakers' hands and face had to be visible). We focused on the 116 most recent hits corresponding to these criteria. The broadcast area was not controlled. In terms of regional varieties of speech across the USA, the extracts we selected mostly feature speakers of the Western American (California) and New York City varieties.

As a first step towards delineating the gestural correlates of OVER AND OVER expressions, this study does not restrict their environment, specifically their immediate right co-texts. As a result, in this paper, OVER AND OVER expressions include "over and over", "over and over and over", as well as "over and over again", although they may have different conditions of use. While finer-grained distinctions between OVER AND OVER expressions are out of the scope of this first enquiry, our results are to be interpreted in this context only.

A control group was built with the same selection criteria. The lexical query for the control group was "ALL OF A SUDDEN", with 57465 hits spanning from 2012 to 2022. We chose this adverbial phrase because it contains the same number of syllables, and because of its similar prototypical position in clauses. The lexical aspect expressed with ALL OF A SUDDEN is perfective, thus

providing a near-opposite aspectual meaning. We ran a short perception test (participants N = 2) ensuring no extract contained iterative information in the verbal or gestural modalities. The video extracts were played twice to participants (graduate students in linguistics whose fields do not include grammar or gesture studies), who were asked the following question: *is the action expressed in this extract stretching over time or repeated?*

While the two TV show types offer similar discourse formats, they provide heterogeneous speaker profiles. News programs and talk-shows are similar in that most of the time, different participants that are present in a studio are enacting and displaying a rapport that extends to a distant audience. In some cases, a reporter, presenter, or interviewee faces the camera and directly addresses the audience. This study treated these two interactional settings in the same way<sup>2</sup>. We analyzed speech from presenters, public figures (such as actors and politicians) and members of the public, despite the fact that members of the public are likely to lack speech training skills, leading to differences in verbal, vocal, and gestural delivery. Public figures and presenters, whose position implies proficient public speaking skills, are likely to show features of hyper-articulation linked to the talk-show genre (Freeman 2014). Additionally, in video-mediated communication, speakers were found to modulate the acoustics of their speech as well as their gestures, as they adapt their signaling effort to decreased audio and video quality (Trujillo *et al.* 2021; 2022). Some remote interviewees are likely to show such features. However, all three types of speakers might experience local disturbances linked to turn-taking competition, lagging audiovisual feedback, or interruptions.

We performed the annotations in Elan (Sloetjes & Wittenburg 2008). They targeted tense, morphological aspect, semantic category of the verb (accomplishment; activity; achievement; state), type of delivery (rush-through; neutral; emphatic); silent pauses (+200 ms [Goldman *et al.* 2010];  $\kappa = .84$ ), eyebrow movement (rise; frown,  $\kappa = .73$ ), head movement (shake; beat; nod; jerk; waggle,  $\kappa = .53$ ). Several tiers were dedicated to hand gestures (Bressems & Ladewig 2011; Bressems

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<sup>2</sup> As a reviewer noted, TV news and interviews are different in that one is supposed to be informative, the other entertaining. However, the concept of infotainment (see Boukes 2019) applies to the selected time period, in that traditional distinctions between information-based and entertainment-oriented programming genres are blurred. Registers may also vary, including across each genre.



2021): form ( $\kappa = .75$ ), direction (down; up; right; left; inwards; outwards), trajectory (horizontal; vertical; oblique), repetition ( $\kappa = .64$ ). Repetition was annotated based on the "form" category.

We ran proportion tests looking for a relation between these variables and OVER AND OVER expressions. The threshold for significance was set at  $p < .05$ . Parallel to this quantitative analysis, a detailed qualitative analysis of several examples highlights the regularities in the data. These qualitative analyses aim to describe how speakers use these expressions in discourse, detailing the temporal articulation between speech and gesture during their production.

Example (1) along with Figure 1 show a screenshot from one of the selected extracts, an interview with Elizabeth Warren, broadcast on 01/04/2020 in Late Night with Seth Meyers (KNBC, NBCUniversal Owned Television Stations). In Example (1) and all examples in this paper, each line represents a tone-unit (i.e. a stretch of speech produced with a complete coherent intonational contour). The brackets correspond to the production of a gesture. Tone-units before and after the occurrence of OVER AND OVER were added to provide context in light of each ongoing discourse sequence. The number of preceding and subsequent tone-units varies in function of what was deemed relevant for comprehension.

- (1)        these are [HAND CIRCLES TWO ISSUES  
             we just talked about  
             over and over ]  
             and in the middle of this crisis

In this extract, the target adverbial phrase applies to *talk* as a process. *Talk*, as a predicate, refers to an activity: a dynamic, durative, atelic (i.e. unbounded) event. The speaker produces a two-handed circular gesture<sup>3</sup>, with repeated phrases. The onset of this gesture is right before the speaker provides a predicative complement (*two issues we just talked about over and over*) as part of a copular structure (see Huddleston & Pullum 2002, p. 266). This gesture stretches over the noun phrase and the relative clause, up to the end of the target adverbial phrase. This gesture is multiplex

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<sup>3</sup> This paper uses "circles" and "circular gestures" as synonyms of the "cyclic gestures" mentioned in cognitive linguistics and semiotics (e.g. Ladewig 2011; Hirrel 2018).

(Talmy 2000; Hinnell 2018) in the sense that it can be decomposed into several repeated circular strokes. The extract does not show any morphological mark of aspect, and the verb in co-occurrence with the gesture is in the simple past (*talked*). A head beat is produced in co-occurrence with this verb, and with the two-handed gesture.



Figure 1. Selected occurrence of OVER AND OVER from the NewsScape Archive, using the Distributed Little Red Hen video retrieval tool (2020-04-01\_0737\_US\_KNBC\_Late\_Night\_With\_Seth\_Meyers\_2475-2485).

### 3. Results

This section is organized into four subsections. The first subsection reports the results concerning the verbal features and environment of OVER AND OVER expressions. The second subsection reports the results concerning the different articulators used by speakers during their production. The last two subsections zoom in on general (subsection 3.3) and specific (subsection 3.4) features of the hand movements produced in co-occurrence with OVER AND OVER.

#### 3.1 Verbal features and environment

We first investigated the syntactic position of OVER AND OVER, in comparison with the control group. A chi-square test of independence showed that the proportion of postposed expressions (i.e. adverbial phrases produced after the main verb) significantly differed in OVER AND OVER expressions ( $\chi^2(1, N = 194) = 151.2, p < .0001$ ), as shown in Figure 2. We found a majority of

postposed OVER AND OVER expressions, making up 98.3% of occurrences. A very small portion of target expressions, conversely, are produced before the main verb.

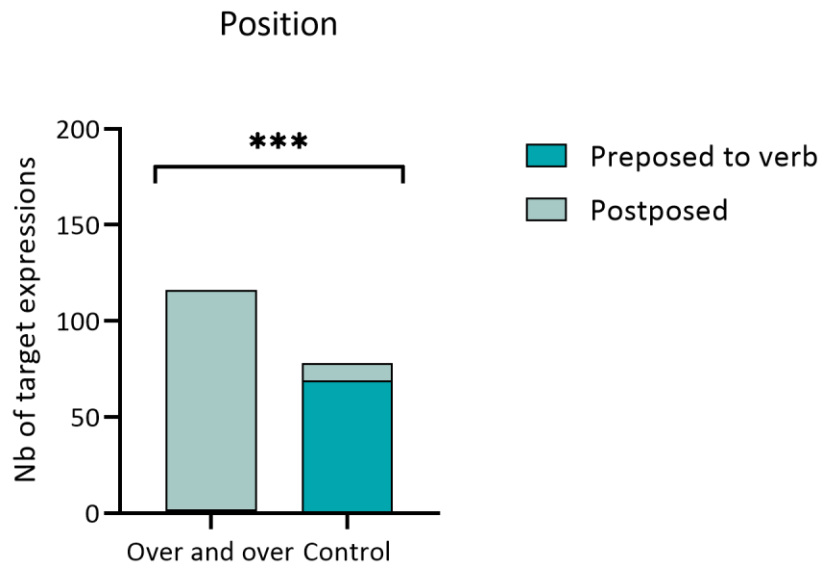


Figure 2. Significant<sup>4</sup> relation between the proportion of syntactic postposition and OVER AND OVER expressions. The square bracket points to the compared groups as well as significance levels.

Example (2) is an extract from a daily newscast (NBC4 News, broadcast on 26/08/2019, KNBC, NBCUniversal Owned Television Stations). It features a postposed OVER AND OVER expression.

- (2) what they plan to do  
 about these critical fire hydrants  
 that keep getting damaged over and over  
 they say they're exploring options  
 to more quickly identify and repair them

In example (2), the presenter introduces a news brief concerning damaged fire hydrants. OVER AND OVER is uttered at the very end of a relative clause whose antecedent is *these critical fire*

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<sup>4</sup> \* =  $p < .05$ , \*\* =  $p < .005$ , \*\*\* =  $p < .0005$ .

*hydrants*. The adverbial expression is also uttered immediately after the verb phrase it modifies (*keep getting damaged*). In this example, a preposed OVER AND OVER expression would be made infelicitous by the presence of the relative clause (e.g. *\*these critical fire hydrants that over and over keep getting damaged*).

We also looked into the aspectual environment of OVER AND OVER, in which one grammatical characteristic stood out. A chi-square test of independence showed that the proportion of verbs with a morphological mark of grammatical aspect significantly differed in OVER AND OVER expressions ( $X^2(1, N = 194) = 13.52, p < .0001$ ), making up 44.8% of occurrences, as shown in Figure 3. Our data showed a majority of verbs with progressive (59.6%) over perfective aspect (40.4%)<sup>5</sup>.

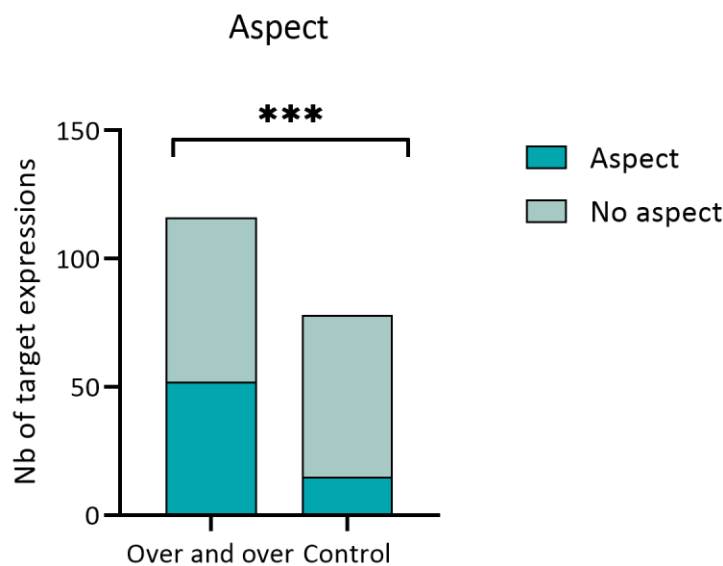


Figure 3. Significant relation between the proportion of verbs with aspect and OVER AND OVER.

Example (3) is an extract from a talk-show (Late Night with Seth Meyers, KNBC, NBCUniversal Owned Television Stations), broadcast on 24/12/2021. The host is engaged in an argumentation segment about the shifting identity of the GOP since Trump's departure from public view. It

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<sup>5</sup> Occurrences including both progressive and perfective aspects were counted in each category.

features an occurrence of OVER AND OVER used with a morphological mark of grammatical aspect on the verb.

- (3) that the Party would return to a sense of normalcy  
but over and over  
Republicans keep proving  
how naive and wrong that assumption was

Example (3) features a total of three marks of iteration, all from different categories involved in the expression of aspect. OVER AND OVER creates lexical iteration with the coordination of two identical lexical items in an adverbial phrase, while the use of the aspect-marking auxiliary *keep* in conjunction with a second lexical verb participates to iteration through its semantics. Finally, the second verb *proving* features a morphological mark of grammatical aspect (i.e. *-ing*). *Keep + Ving* expresses open aspect (Hinnell 2018), as its meaning is not focused on one bounded phase of a process contrary to *start + Ving* or *stop + Ving*.

### 3.2 Articulators used

We now focus on the articulators speakers use during the expression of OVER AND OVER. We first investigated the relation between OVER AND OVER and head movement, in comparison with the control group. A chi-square test of independence showed that the proportion of head beats significantly differed in OVER AND OVER expressions compared to the control group ( $X^2(1, N = 102) = 19.44, p < .0001$ ). As shown in Figure 4, head beats make up 76.8% of head movement in OVER AND OVER expressions, as opposed to 25% in the control group.

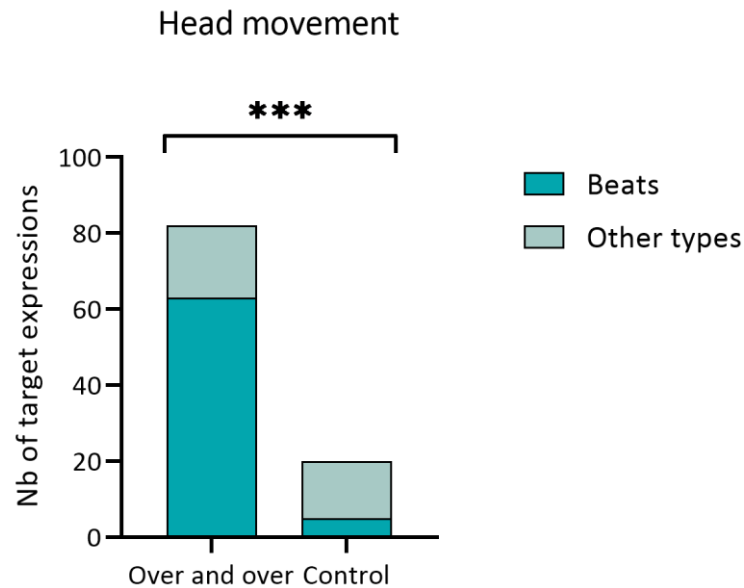


Figure 4. Significant relation between the proportion of head beats and OVER AND OVER expressions.

Head beats are, however, the only head gestures that differed across our two groups. The rest of head gestures were used consistently across OVER AND OVER and the control group.

Example (4) from a news talk show (Your World with Neil Cavuto, broadcast on 16/02/2022, FOX News Channel) features two head beats in co-occurrence with the production of OVER AND OVER. As part of a piece on Washington's response to gas prices and inflation judged inadequate by Republicans, the reporter provides a quick summary as a sequence coda. The brackets correspond to video stills (a), (b), and (c) in Figure 5.

- (4) so the Administration has made that asked [(a) to the Saudis] [(b1) over] [(b2) and over]  
 again  
 and # [(c) up to now]  
 they said no

Example (4) is associated with Figure 5, in which still (b1-2) shows the reporter's head beats. The blue line demarcates the speaker's baseline chin position.

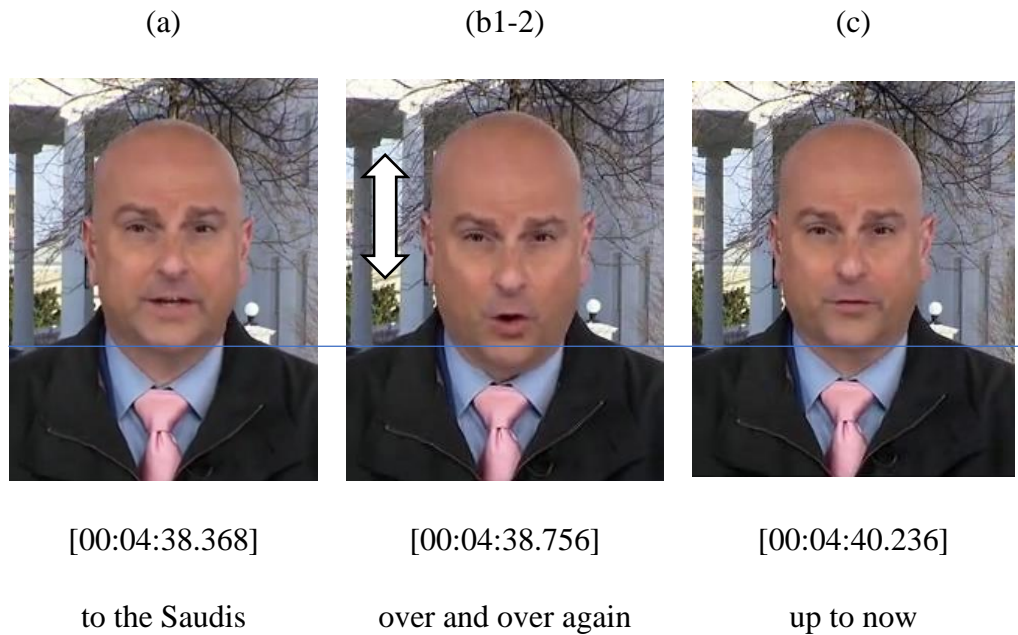


Figure 5. Head nod produced in co-occurrence with OVER AND OVER during a TV news program (2022-02-16\_2100\_US\_FOX-News\_Your\_World\_With\_Neil\_Cavuto).

Example (4) features an occurrence of OVER AND OVER used with the perfect aspect, along with the present tense. The speaker produces a head tilt in co-occurrence with *the Saudis*, then makes two head beats coupled with each stressed syllable of *over*. The onset of the first head beat is immediately before the verbal delivery of the adverbial phrase. After a short silent pause indicating a transition, he produces another head beat in co-occurrence with *up to now*. These successive head beats highlight a repetitive action which is still ongoing, in stark contrast with the absence of beat on the last tone-unit, which delivers the response from the Saudis. This response is delivered in the simple past. The discrepancy between present perfect and simple past also participates to the contrast between the multiple iterations of the demand and a straightforward answer.

We next tested whether the use of hand gestures differed across OVER AND OVER and the control group. First, we looked into a relation between hand gesture frequency and our target expression. OVER AND OVER expressions significantly featured a higher proportion of co-occurring hand gestures than that of the control group ( $X^2(1, N = 194) = 21.1, p < .0001$ ). Speakers produced 68.1% of OVER AND OVER expressions with a co-occurring hand gesture, while 34.2% of the expressions in the control group were accompanied with a hand gesture, as shown in Figure 6.

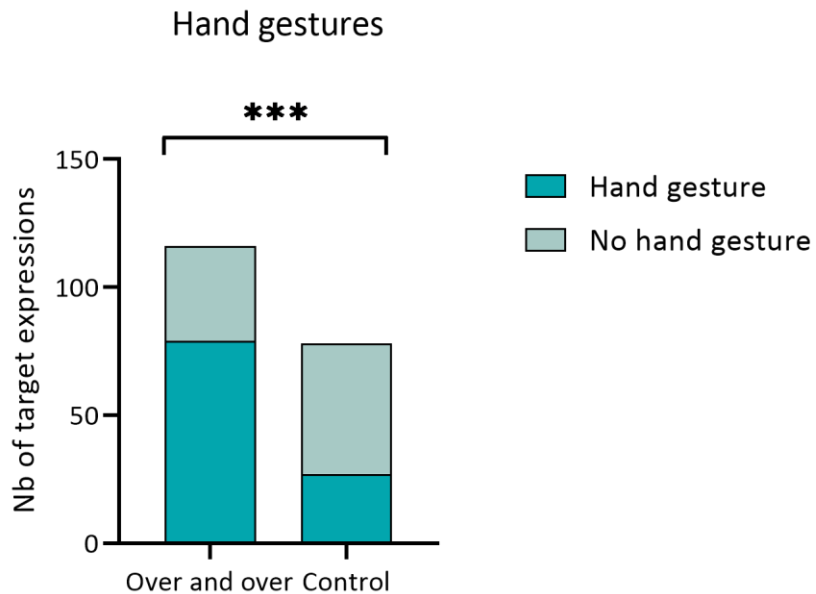


Figure 6. Significant relation between the proportion of co-occurring hand gestures and OVER AND OVER expressions.

Example (5) shows screenshots of a segment from Today in LA, a local morning news and entertainment program, broadcast on 16/12/2019 (KNBC, NBCUniversal Owned Television Stations). In example (5), the single hand gesture in the extract is produced in co-occurrence with OVER AND OVER. The brackets correspond to video stills (a), (b), and (c) in Figure 7.

- (5) Presenter 1 have you and the girls seen Frozen 2 yet  
 Presenter 2 [(a) oh yeah  
 mh mh  
 soundtrack] [(b) over and over and over  
 getting] [(c) in the car]

Example (5) is associated with Figure 7, in which still (b) shows Presenter 2's hand gesture.



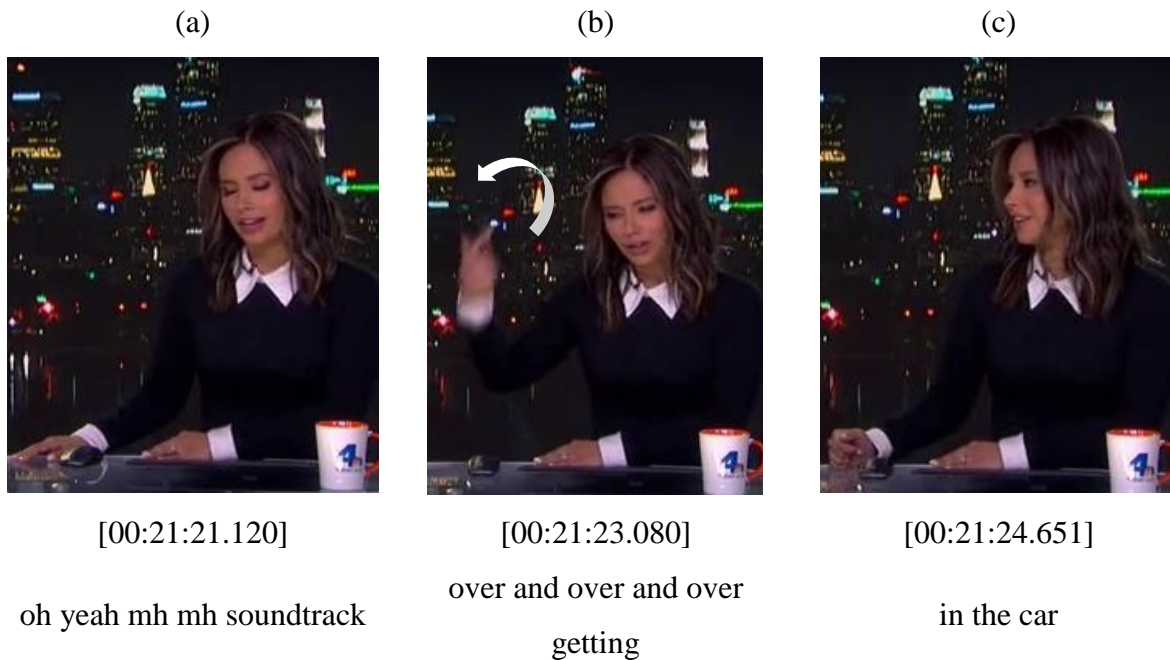


Figure 7: Hand gesture produced in co-occurrence with OVER AND OVER in a TV news program (2019-12-16\_1200\_US\_KNBC\_Today\_in\_LA).

Extract (5) is part of a question-answer series among the two hosts of the show. After nodding at Presenter 1's question, presenter 2 makes a single hand gesture during the extract, as she raises her hand and extends her index finger up to her temple. She then moves her wrist to produce three circular motions, in synchrony with the three occurrences of *over*. She also makes three head beats, which mark each circle's completion. Similar to Elizabeth Warren's two-handed gesture in Figure 1, this gesture can be decomposed into several repeated circular strokes, which qualifies it as multiplex (Talmy 2000; Hinnell 2018). However, contrary to Example (1), this extract features a morphological mark of aspect (*getting in the car*), and does not feature any finite clause.

### 3.3 General features of hand movements

We now zoom in on hand gestures and their general characteristics, such as repetition and handedness. In terms of hand gesture repetition, OVER AND OVER sequences showed significantly more repeated hand gestures ( $X^2(1, N = 107) = 12.46, p = .0004$ ). Repeated hand gestures make up 45% of hand gestures in OVER AND OVER expressions, as opposed to 7.41% of hand gestures in the control group. This gap is shown in Figure 8.

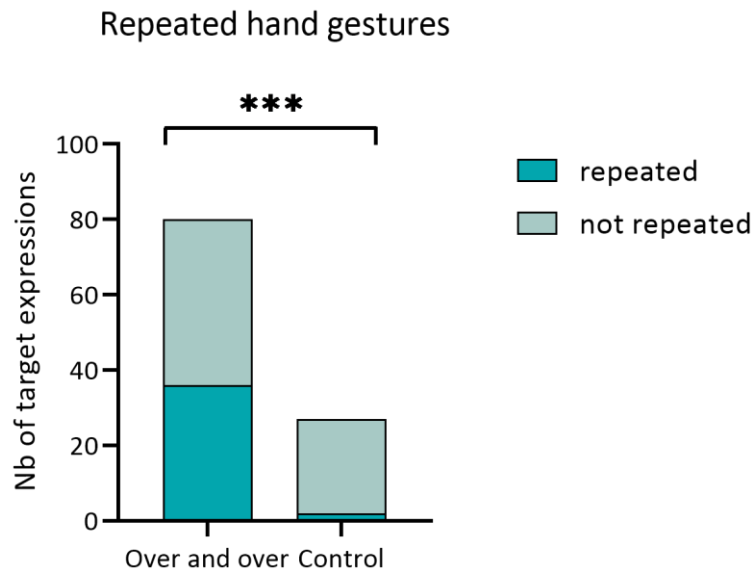


Figure 8: Significant relation between the proportion of gesture repetition and OVER AND OVER expressions.

Example (6) is from a late-night talk show (Late Night with Seth Meyers, broadcast on 06/10/2018, NBC, NBCUniversal Owned Television Stations). The interviewee and the host take part in a joint argumentation about how topical witch trial films are. The interviewee answers with a description of the history of witch trials, and makes a series of different hand gestures. Those produced with her right hand are repeats of the first gesture she makes at the beginning of her speech turn. The right-hand gesture in co-occurrence with OVER and OVER is part of the repeats, but is moved further right in the speaker's space. The brackets correspond to each video still in Figure 9. The first hand gesture corresponds to still (a), and the repeat made in co-occurrence with OVER AND OVER is visible in stills (e) and (f).

- (6) [(a) witch trials] [(b) have happened  
periodic-]  
[(c) since Salem]  
[(d) they've happened periodically in American history #]  
in- [(e) over and over again (f)]  
whether it was the fifties

Example (6) is associated with Figure 9.

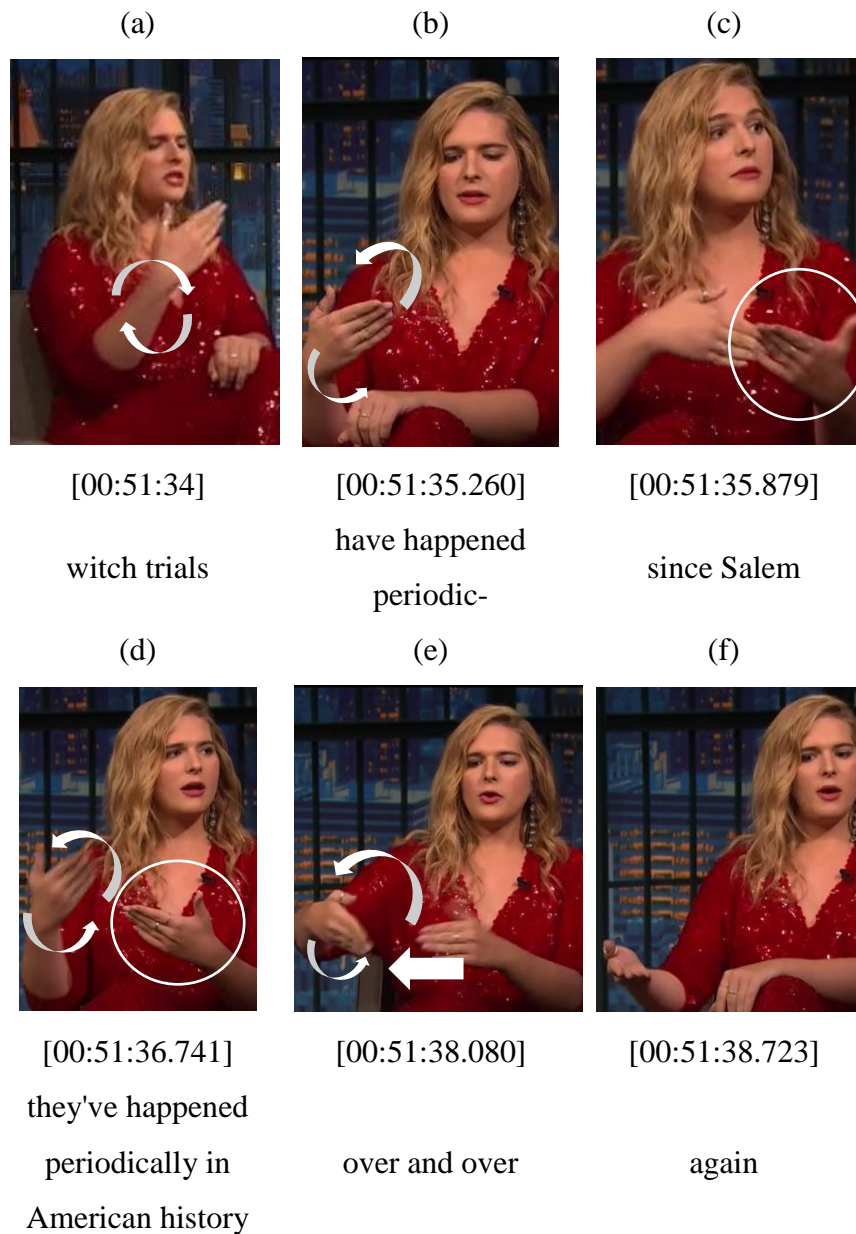


Figure 9. Repeated hand gestures in a discourse sequence containing an OVER AND OVER expression (2018-10-06\_0737\_US\_KNBC\_Late\_Night\_With\_Seth\_Meyers).

In example (6), the speaker makes a first right-hand gesture in (a), moving her wrist to produce circular motions with an open palm. She then briefly interrupts her speech and pauses a new occurrence of this same gesture (b) as she introduces a time landmark (*since Salem*), with a new palm-up gesture with her left hand (c). This palm-up gesture is different given it is made with the speaker's other hand, which had been unused. The speaker then resumes her speech with a full

clause as a repeat (*they've happened periodically*). This repair is accompanied with the same hand gesture as in (a) and (b). She holds the latter as she changes her choice of adverbial item (OVER AND OVER instead of a *in-* prepositional phrase). OVER AND OVER *again* is produced with the same repeated circling hand gesture (d), which is moved further right in the speaker's space. She briefly holds this configuration (f) before producing different hand gestures in form in the rest of her speech turn.

Hand gestures significantly differed in their handedness as well ( $X^2(1, N = 107) = 12.28, p = .0005$ ). Figure 10 shows that gestures were mostly single-handed during OVER AND OVER (71.25% of hand gestures) while they were mostly two-handed during ALL OF A SUDDEN (66.67% of hand gestures).

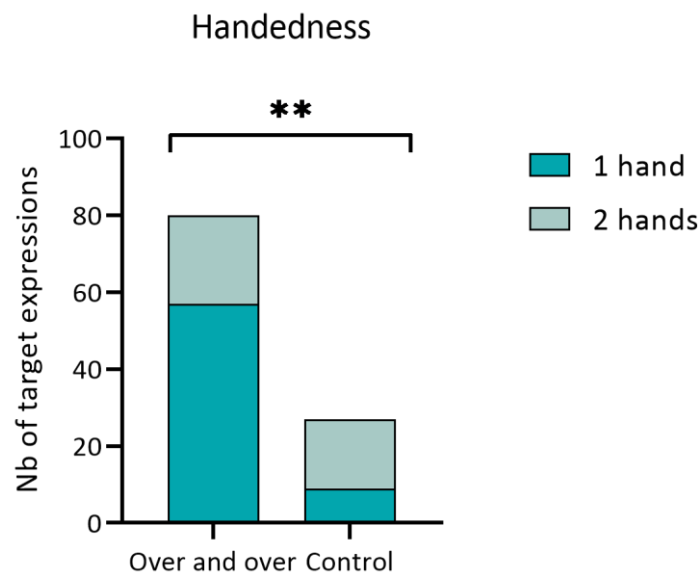


Figure 10. Significant relation between the proportion of single-handed gestures and OVER AND OVER.

Example (7) is an extract from a late-night show (The Late Show with Stephen Colbert, CBS Television Studios, broadcast on 12/04/2021), and is part of a question-answer series. The interviewee is asked to pick one desert island song that he gets to listen to for the rest of his life. In the course of the first tone-units of his answer, the interviewee makes a series of hand gestures. The first one is made with both hands, while the gesture produced in co-occurrence with OVER AND OVER is produced with his right hand only. In example (7), OVER AND OVER is used with the simple past.

- (7) you know that recording with that solo that he's got  
 it [(a) drove me absolutely crazy]  
 and I played it [(b) over and over and over again]  
 [(c) then there was a time recently]  
 where Erroll Garner plays Eldorado

Example (7) is associated with Figure 11 in which still (b) shows the hand gesture in co-occurrence with OVER AND OVER.

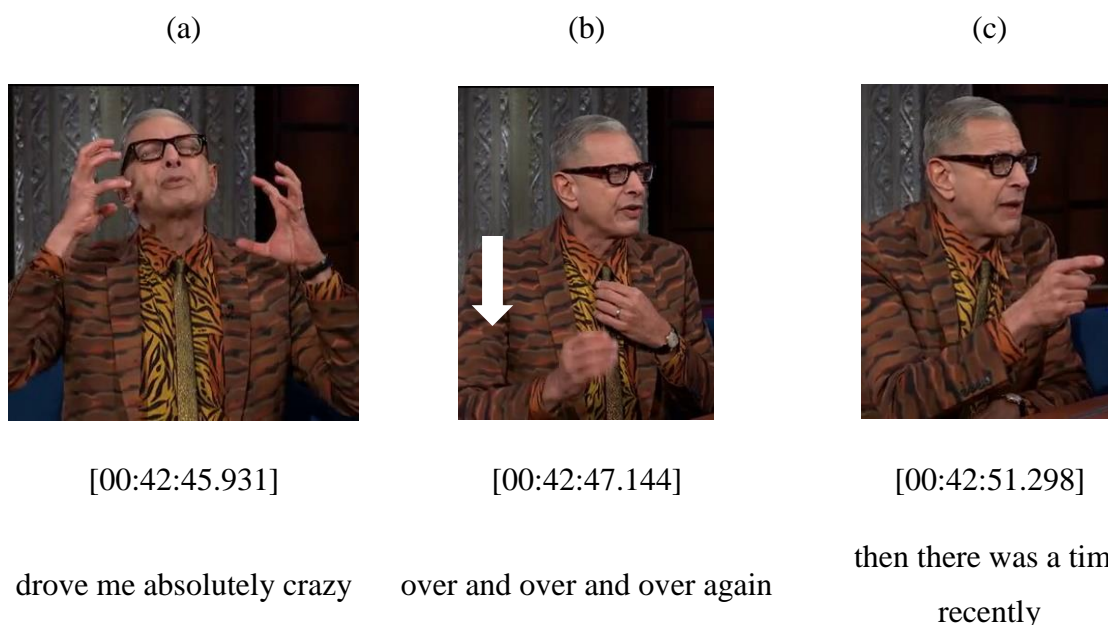


Figure 11. Single-handed gesture produced in co-occurrence with OVER AND OVER, in a sequence containing other hand gestures (2021-12-04\_0735\_US\_KCBS\_The\_Late\_Show\_With\_Stephen\_Colbert).

In example (7), the interviewee refers to a song he has grown up listening to. After briefly describing the song, he provides a stance-taking segment and makes a large two-handed gesture. The amplitude of the gesture resonates with *absolutely* as an intensifier while its position over his ears and head as well as its configuration pairs up with *crazy* as an adjective. This occurrence of OVER AND OVER also contributes to intensification, as OVER is repeated two times. The speaker produces three hand beats in synchrony with each first syllable of OVER, while he readjusts his tie with his other hand. Contrary to the previous examples, iteration is here represented on a vertical axis, with downward beats. The very direction and nature of these gestures are thematically cohesive with the topic of the discourse sequence, i.e. music. The speaker moves on to a different

song with a pointing gesture (c) to his interlocutor, used both as an attention-centering device and as a marker for topic change.

### 3.4 Specific features of hand movements

We now turn to specific features of hand gestures, and focus on hand configurations and their semantic input. A first difference lies in the form of hand gestures. Circles were frequently produced in co-occurrence with OVER AND OVER, making up 42.5% of hand gestures produced with OVER AND OVER, while none of them were found in the control group ( $X^2(1, N = 107) = 16.82, p < .0001$ ). This result is shown in Figure 12.

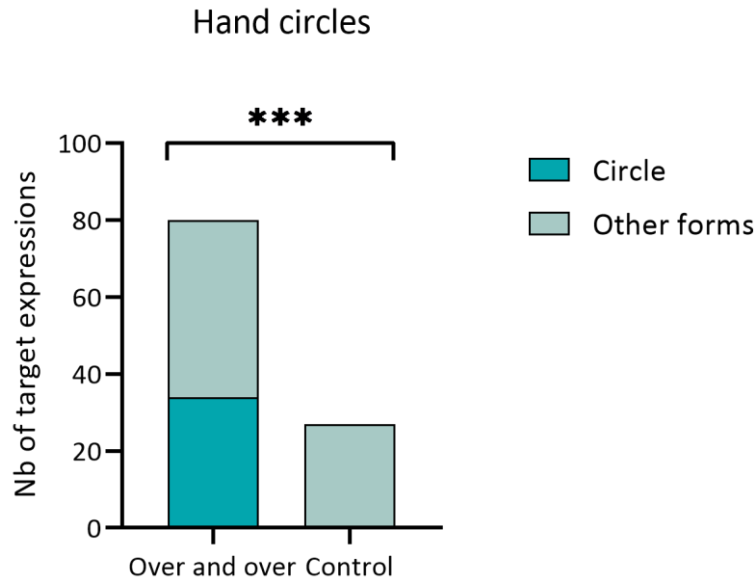


Figure 12. Significant relation between the proportion of hand circles and OVER AND OVER.

Example (8) is an extract from a daily newscast (The Situation Room with Wolf Blitzer, broadcast on 13/12/2020, CNN). In this example, the reporter uses the perfect aspect in combination with OVER AND OVER, in the middle of a descriptive sequence detailing the logistics of vaccine shipment reception at an airport. The reporter makes a single-handed circling gesture, which has only one stroke. The onset of this gesture is early in the tone-unit, shortly before the verb.

- (8) the companies need to know that right away  
because of the sensi[(a)tivities] with these vaccines



[(b) we have talked over and over] again  
 about the ex[(c)treme] cold they need to be kept in

Example (8) is associated with Figure 13, which shows the reporter's hand circle in still (b).

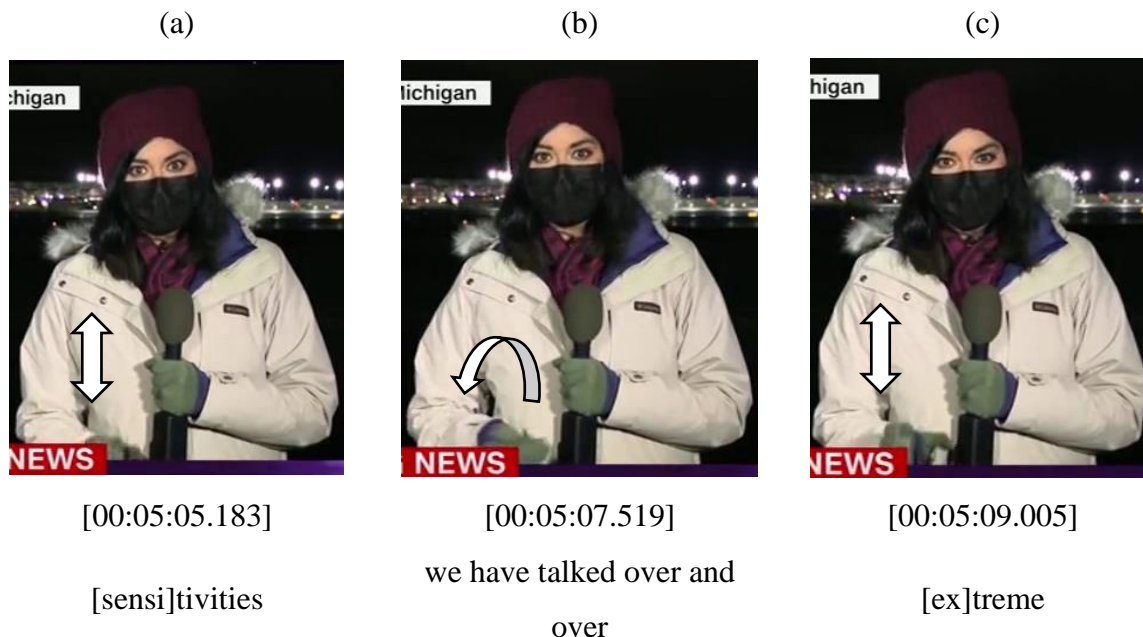


Figure 13. Single-handed circling gesture produced along the use of the perfect aspect in co-occurrence with OVER AND OVER, in a discourse sequence containing a series of hand beats (2020-12-13\_0100\_US\_CNN\_The\_Situation\_Room\_With\_Wolf\_Blitzer).

In sequence (8), the reporter produces a series of hand beats correlated with the prominent syllables of the lexical items in narrow focus (i.e. *sensitivity*; *extreme*). Two of these hand beats are visible in stills (a) and (c). The hand gesture produced in (b) is longer-lasting, spanning an almost complete syntactic structure (i.e. *we have talked over and over*). The reporter's right hand traces an arc away from her body. This gesture ends in a palm-up configuration as her wrist stops its rotating course. A head beat immediately follows the hand gesture in synchrony with the second (stressed) syllable of *again*. The reporter then resumes her series of hand beats in synchrony with other focused items, starting with the second syllable of *extreme*.

Hand beats were quite frequent as well, making up 38.75% percent of hand gestures in co-occurrence with OVER AND OVER, as opposed to 3.7% of the hand gestures in the control group

( $\chi^2(1, N = 107) = 11.83, p = .0006$ ). The proportion of hand beats for each group are shown in Figure 14.

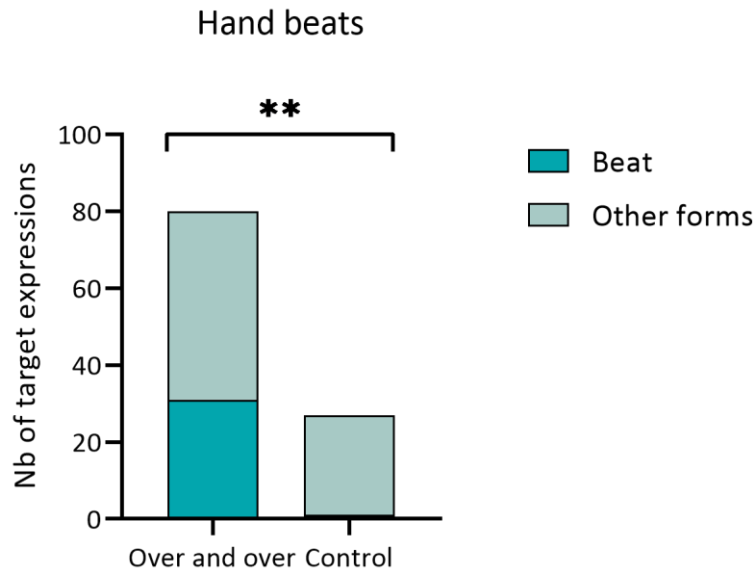


Figure 14. Significant relation between the proportion of hand beats and OVER AND OVER.

Example (9) is from a late-night show (The Late Show with Stephen Colbert, CBS Television Studios, broadcast on 13/06/2018), in which the host produces several beat gestures in co-occurrence with the target expression. OVER AND OVER is used jointly with the present tense and the progressive aspect. The items in italics represent overlapping speech.

- (9) host no but people are [(a) binge-watching The Office]  
 people are #  
 interviewee *it's crazy*  
 host *they're* [(b) *watching over and over* again]  
 and a [(c) whole new generation] is discovering it now

Example (9) is coupled with Figure 15, showing the host's successive hand gestures.



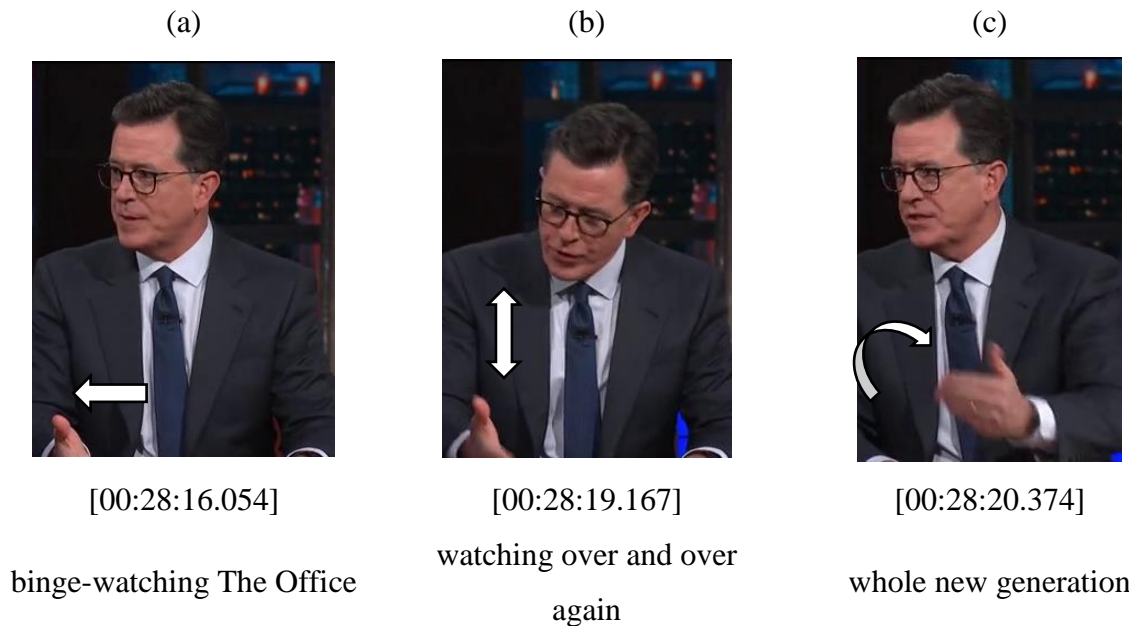


Figure 15. Hand beats produced in co-occurrence with OVER AND OVER in a sequence featuring multiple types of hand gestures.

In example (9), the host is in the middle of an argumentative sequence praising the qualities of a television series that stopped airing a few years before. He first makes a metaphoric palm-up gesture during which he places his right hand on the table and slides it further right as he presents his point, prefaced by *no*. He starts another structure, but makes a silent pause and maintains eye contact with the interviewee. As the interviewee tries to take the speech turn and provides a stance-taking utterance (*it's crazy*), the host keeps the turn as he breaks off mutual gaze and makes two beat gestures in synchrony with each occurrence of *over*, his palm now facing the side. He then produces another tone-unit prefaced with the discourse marker *and*<sup>6</sup>, and points at two specific locations on the table with the side of his other hand in co-occurrence with *whole new generation*. This new point is introduced with the conjoined use of a discourse marker and the change in gesturing hands. Having secured the turn, he also restores eye contact with the co-speaker.

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<sup>6</sup>The interpretation of *and* as a discourse marker in this example is based on its initial position in a tone-unit containing a shift in reference (from *people* [who] *are binge-watching The Office*, subsequently referred to as *they*, to *a whole new generation*), which marks a transition between discourse segments (see Redeker 2006 for an overview of coherence-oriented discourse markers).

The last significant difference with hand gestures is related to their direction. Hand gestures co-occurring with OVER AND OVER mostly featured a downward movement, making up 40.78% of them as opposed to 8.33% of hand gestures in the control group ( $X^2(1, N = 107) = 12.83, p = .0003$ ), as shown in Figure 16.



Figure 16. Significant relation between the proportion of downward hand gestures and OVER AND OVER.

Example (10) is an extract from a late-night show (The Late Show with Stephen Colbert, CBS Television Studios, broadcast on 16/01/2019). The interviewee first makes a metaphorical gesture, followed by a series of iconic gestures, all duplicates from the first. Their vertical axis gives them a beat aspect. She eventually returns to two-handed metaphorical gestures. In this extract, OVER AND OVER is used with the simple past.

- (10) that's what we did when we passed the 9/11 health bill  
 when we [(a) had our first responders]  
 [(b1) they came] to [(b2)Washington]  
 [(b3)over] and [(b4)over] again to [(c) be heard]  
 I amplified their voices

Example (10) is paired with Figure 17.



Figure 17. Downward hand gestures produced in co-occurrence with OVER AND OVER, in a discourse sequence containing hand gestures with various trajectories (2019-01-16\_0735\_US\_KCBS\_The\_Late\_Show\_With\_Stephen\_Colbert).

In example (10), the interviewee is in the middle of an argumentative sequence. As a Senator who has just announced her candidacy for President, she lays out the ways in which she would end the government shutdown, and mentions a health bill she has passed. She maintains a two-handed metaphorical gesture she has introduced with *the 9/11 health bill*, and superimposes a beat gesture in co-occurrence with *our first responders* (a), as she metaphorically includes the *first responders* as part of the *9/11 bill* example. The interviewee then makes a first iconic gesture in co-occurrence with *they came*, with the side of her right hand hitting the palm of her left hand. This gesture is

repeated three times, including two iterations during *over and over* (b1-4). The end of this same tone-unit is uttered with a different two-handed gesture, this time going up, her palms facing her chest (c). Another two-handed gesture going up is produced in the next segment.

We then investigated the relation between OVER AND OVER and eyebrow movement. Although a chi-square test of independence showed that the proportion of eyebrow rises significantly differed in OVER AND OVER expressions ( $X^2(1, N = 194) = 5.65, p < .05$ ), eyebrow rises were only present in 16.4% of the target expression. Eyebrow rises and movement, overall, were not found to be a characteristic feature of OVER AND OVER.

Table 1 provides a list of all variables tested for a relation with OVER AND OVER expressions, along with their significance and the proportion of data all occurrences for any given variable represent. Our data did not reveal any significant relation related to hand gesture trajectory. Likewise, no pattern was found concerning tense. A majority of speakers use the present tense over the past. The semantic types of processes were balanced across our data, with almost as many occurrences featuring stative verbs (*e.g. be*) as ones containing dynamic verbs (*e.g. hit*). The control group showed balanced frequencies as well, to a lesser extent (55% of stative verbs, 45% of dynamic verbs). No effect of silent pause or prosodic phrasing was observed on the target expression, which were not typically uttered with a silent pause immediately preceding OVER AND OVER (19.8% of occurrences). The adverbial phrase was not specifically uttered in a separate tone-unit from the preceding co-text either (31% of occurrences).

Table 1. List of variables tested for a relation with OVER AND OVER expressions.

<b>Variables</b>	<b>Significance</b>	<b>% of the data</b>
postposed syntactic position	< .0001	98.3
verbs with aspect	< .0001	47.9
head beats	< .0001	76.8
co-occurring hand gestures	< .0001	68.1
repeated hand gestures	< .0005	45
single-handed gestures	< .001	71.2
hand circles	< .0001	42.5
hand beats	< .001	38.7
downward hand gestures	< .0005	40.7
eyebrow rises	< .05	16.4

hand trajectory = vertical; horizontal; oblique	n.s.	46.8; 30.4; 22.8
silent pauses	n.s.	19.8
separate intonational unit	n.s.	31
tense = past; present	n.s.	31; 69
semantic types of process = stative; dynamic	n.s.	48.3; 51.7

#### 4. Discussion

We investigated the verbal environment of OVER AND OVER expressions (research question 1) as well as the different articulators used by speakers during their production (research question 2). Relative to our first research question, we found that most OVER AND OVER expressions are syntactically postposed to the main verb, and that the main verbs they are produced with frequently feature a morphological mark of grammatical aspect. Regarding research question 2, this study found a link between OVER AND OVER and formal features involving head and hand gestures compared to a control group. Specifically, OVER AND OVER was linked to head beats and a higher proportion of co-occurring hand gestures (mostly single-handed). Zooming in on the specific hand configurations of these gestures and on their semantic input, we also reported a link with circling and downwards gestures. Our findings are consistent with Hinnell's (2018) results concerning open aspect for direction, handedness, and gesture rate. Specifically, Hinnel (2018) described a higher relative frequency of vertical hand gestures produced with open aspect than with phase aspect in her data, as well as a bigger proportion of gestures with several separate articulation periods within a stroke. The gestures produced with open aspect were also one-handed in majority. Given that most circling and beat gestures are multiplex in our data, our results are also in line with Duncan *et al.*'s (2013) report of complex gestures produced with open aspect, if complexity is defined as multiple, repeated strokes.

The relation between OVER AND OVER and gesture duration remains to be investigated. Hinnell (2018) reported for instance a greater asynchrony between the onset of hand gestures and the target verbal expression (with earlier gestures) in the case of open aspect (*KEEP + Ving* and *CONTINUE + to V*) compared to other aspectual types. In light of the examples presented here, we expect a similar asynchrony for hand gestures whose onset is timed around the verb phrase combined with

OVER AND OVER. However, cases in which hand gestures are initiated in co-occurrence with the adverbial phrase itself might show different durations and timing.

Interestingly, both semantic types (stative; dynamic) of verbs co-occurred with OVER AND OVER as no specific type was over- or underrepresented. The fact that OVER AND OVER expressions attract more hand gestures than the control group is thus not linked with the semantic type of processes. Similarly, no systematic association was found between gestural features and semantic categories (*e.g.* achievements or activities) at this stage. Semantic categories show even collocations in the corpus with OVER AND OVER, suggesting that the semantic verbal categories do not constrain the use of this expression.

We found a relation between gesture frequency and our target expression. Since no link was found between semantic verbal types and categories, we posit that a speaker's construal of the force dynamics of an event might influence the production of gestures independently from its semantic type. The force-dynamic profile of OVER AND OVER can be made more visible or neutral depending on the speaker's construal, and on their choice of *aspectual cluster*, i. e. the number of aspectual marks used in combination in a given speech segment (in speech and gesture). Given the collocations observed in this corpus, a visible force-dynamic profile of OVER AND OVER corresponds to occurrences where a speaker combines OVER AND OVER with *KEEP + Ving*, and uses a series of similar multiplex hand gestures along with head beats. Used with a verb belonging to the semantic categories of achievement (dynamic, punctual, telic events) or accomplishment (dynamic, durative, telic events), this instantiation expresses an exertion of force required to shift an event into motion or for it to continue in motion. A neutral force-dynamic profile of OVER AND OVER corresponds to occurrences where a speaker uses either the past or present tense with a verb denoting either an activity or a state. A palm-up hand gesture or any other low-profile metaphorical hand gesture would also express a neutral perspective regarding the force dynamics of a process.

Regardless of event profiling choices, other factors influence the delivery of OVER AND OVER. One of them is the syntactic position of the adverbial phrase within a discourse sequence. We found a majority of postposed OVER AND OVER expressions, i.e. adverbial phrases produced after the main verb. The majority of postposed OVER AND OVER expressions (i.e. adverbial phrases

produced after the main verb) reported earlier in the discussion corresponds to the prototypical, "neutral" distribution of adverbial constituents in English (Hasselgård 2010), since a preposed position is more likely to attract the co-speaker's attention as it opens a frame of expectation (Dancygier & Sweetser 2000). The flexible position of OVER AND OVER suggests that this expression is not restricted to a single framing function. However, speakers very rarely use OVER AND OVER to open a frame of expectation in our data.

Additionally, speakers' choices to make any aspect of an event visible or neutral are coextensive with choices regarding information structure. Systematic differences across instantiations of OVER AND OVER regarding information structure have yet to be probed, but speakers' choice of gesture and prosody can make deliveries either "rushed-through" (Local 2007), neutral, or emphatic regardless of event profiling choices and syntactic positioning.

On this matter, we found a relation between repeated hand gestures and OVER AND OVER. In Bressems's (2021) cognitive-semantic classification of gestural repetitions, gesture iterations (i.e. repetitions with no change in realization between strokes in configuration, coordinates, or trajectory that repeat a single gestural meaning) are made distinct from reduplications (i.e. repetitions with a change between strokes in direction or position). In our data, iterations are more frequent than reduplications. According to Bressems (2021), iterations predominantly fall within the area of discourse and are linked with a variety of textual and pragmatic functions. Iterations are thus particularly prone to mark out information structure.

Assuming that emphasis is correlated with increased communicative effort from the speaker involving all articulators (*e.g.* Jiménez-Bravo & Marrero-Aguiar 2020; Pouw *et al.* 2020), an emphatic delivery of OVER AND OVER corresponds to cases where the speaker uses a series of gesture iterations in Bressems's (2021) sense. Speakers can also make bigger hand and head gestures compared to those produced before in terms of size and use of gesture space, although these are less frequent in our data. Speakers are less likely to make silent pauses before and/or after the expression, or use eyebrow rises.

Conversely, a "rushed-through" or "trailoff" (Local 2007) production corresponds to decreased communicative effort from the speaker, with no or small nondescript uniplex gestures. Speakers

are also likely to use flat intonation and an increased speech rate, although these parameters were not tested in the present study.

The prosodic parameters assessed in this study did not show any association with OVER AND OVER. The target expression was not produced with silent pauses before or afterwards, and was found to be mostly produced as part of the ongoing tone-unit, in that a majority of OVER AND OVER occurrences were not uttered in separate tone-units from their co-text. This suggests that the speakers do not usually rely on these two prosodic features, whatever the delivery style (i.e. emphatic, neutral, rushed-through). However, this study did not investigate the speakers' use of duration, speech rate, and variations in fundamental frequency (i.e. F0). These parameters deserve further inquiry, as they are known to perform a variety of pragmatic functions, including the marking of information structure (*e.g.* Priva 2017; Mo 2008; Cole *et al.* 2019).

Likewise, no relation was found between eyebrow movement and OVER AND OVER. Measuring pitch movement may shed light on this result, given the interaction between eyebrow movement and intonational contours (*e.g.* Berger & Zellers 2022). We also may find different patterns with a functional categorization of OVER AND OVER segments, as finer-grained trends might emerge with specific discourse-pragmatic functions.

Based on the relations reported in the results, it has been said that different multimodal profiles of OVER AND OVER are routinely used by speakers. However, this study did not investigate clusters of gestural, prosodic, and verbal features on a same expression, meaning that the association between multimodal features within OVER AND OVER expressions was not tested (*e.g.* whether hand beats are significantly associated with the use of the simple past or present). Whether single features of the different profiles highlighted here (*e.g.* hand circles, head beats) can be mixed and matched with others gives information on the degree of conventionality of OVER AND OVER instantiations. Given that no systematic relation between semantic verbal categories and gesture was found, we expect OVER AND OVER to qualify as crossmodal collocations with flexible degrees of association between items on the gestural and verbal modalities (Uhrig 2022; Lehmann 2022) rather than fully-fixed constructions. A first step towards verifying this assumption consists in delineating several discourse uses for OVER AND OVER expressions.



In this regard, investigating the relation between significant features and discourse sequences (i.e. contexts of use according to speakers' goals) is an immediate next step. To compare OVER AND OVER instantiations across discourse settings, we plan to classify discourse sequences into narratives, argumentations, question-answer series, and descriptions. Hand gestures will also be classified in terms of (primary) representational or pragmatic functions, which will be further detailed if a majority of gestures are either representational or pragmatic. Each tone-unit containing OVER AND OVER will be annotated regarding its delivery in terms of information structure (emphatic; neutral; rushed-through).

A first observation concerning the discourse uses of OVER AND OVER concerns their appearance in the vicinity of segments with strong displays of epistemic, affective, or deontic stance (Andries *et al.* 2023) in all examples presented in this study. Although these displays of stance might be encouraged by the television speech genre, the iterative aspectual meaning of OVER AND OVER, as a way to express a speaker's conceptualization of a process through time, needs to be examined in light of the other resources speakers use to position themselves towards states of facts, people, or objects (Andries *et al.* 2023).

We did not control the immediate left and right co-texts of OVER AND OVER. The right-co-text is specifically of interest. Some occurrences show another iteration of *over* (OVER AND OVER AND OVER) while other occurrences show the conjoined use of another adverb, *again* (OVER AND OVER AGAIN). These two collocations might be associated with different multimodal instantiations, as sound symbolism is likely to act on their delivery, especially gesture production (Perlman & Woodin 2021). Comparing OVER AND OVER with AGAIN AND AGAIN might for instance lead to differences in gesture types, with more circles for OVER AND OVER and more beat gestures for AGAIN AND AGAIN.

To sum up prospective work, measuring more prosodic parameters and testing their association with the formal features reported in this paper might help delineate different delivery styles of OVER AND OVER. We expect associations between OVER AND OVER and a slower speech rate and longer tone-units for emphatic deliveries. Likewise, the different discourse uses of OVER AND OVER have yet to be delineated and will be helpful for analyses targeting how features can be clustered within a same expression.

Finally, differentiating OVER AND OVER from OVER AND OVER AND OVER and OVER AND OVER AGAIN might also lead to more clear-cut differences between the use of hand beats and hand circles.

## **5. Conclusion**

This study set out to identify stable gestural correlates to the OVER AND OVER adverbial phrase in American English. OVER AND OVER showed a higher hand gesture co-frequency than the control group, and was associated with repeated hand gestures. A link was also found with head beats, as well as hand circles and hand beats. Hand gestures mostly featured a downward movement. Finally, an association was found between the target expression and the presence of grammatical aspect on co-occurring verbs, mostly progressive.

Given the propensity of repeated hand gestures to mark out information structure, different multimodal deliveries of OVER AND OVER have been delineated in the discussion depending on the force-dynamic profile of the verbs they co-occurred with, and on their information status. Several lines of research have been suggested to account for the iterative aspectual meaning of OVER AND OVER in relation with 1) its multimodal deliveries and 2) its discourse uses. After enlarging the data, a series of clustering analyses could indeed be used to investigate the way speakers combine multimodal marks of aspect on a same expression. OVER AND OVER instantiations could then also be compared across discourse sequences and functions.

One of the aims of this paper was to show the benefits of an embodied approach to speech and meaning for exploring speakers' conceptualization of grammatical notions. Conversely, targeting correspondences between gestural forms and aspectual functions in specific discourse genres helps delineate the dynamic interplay between construals and the physiological as well as interactional constraints of discourse production. We have described how speakers routinely use different marks of iteration in temporal association with other types of resources according to the interactional goals and affordances of each sequence, giving different multimodal profiles of OVER AND OVER.

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