

Gesture frequency is linked to story-telling style: evidence from bilinguals*

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ABSTRACT

Individuals differ in how frequently they gesture. It is not clear whether gesture frequency is related to culture, since varied results have been reported. The purpose of this study was to test whether the frequency of representational gestures is linked with story-telling style. Previous research showed individual and cross-cultural differences in story-telling style, some preferring to tell a chronicle (how it happened) or an evaluative story (why it happened). We hypothesized that high gesture frequency might be strongly associated with using a chronicle style, since both rely on visuospatial imagery. Four groups of bilinguals, English as their second language (L2) participated. Their first language (L1) was one of: Mandarin, Hindi, French, or Spanish. Participants watched a cartoon and told the story, once in English, once in L1. The results showed group differences in the rate of gesture use: the Chinese and Hindi L1 participants gestured less frequently than the French and

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Spanish L1 participants. The participants from Asian cultures were more likely to tell an evaluative story and the Romance-language L1 participants a chronicle. We conclude that these culture/language groups differ in story-telling style. A chronicle style is associated with more gesture production than an evaluative style.

KEYWORDS: gesture use, story-telling style, cross-cultural variation.

1. Introduction

Representational gestures often occur when people talk about imagistic and/or spatial concepts (Alibali, 2005; Hadar & Butterworth, 1997; Hostetter & Alibali, 2007, 2008; Hostetter, Alibali, & Kita, 2006), such as movement through space in story-telling (manner/path gestures; Brown & Gullberg, 2008). Representational gestures refer to hand/arm movements that represent a concept, such as using a single index finger to trace the path of motion or pumping one's arms at one's side to represent running. Representational gestures may help activate or keep activated visuospatial mental images (Morsella & Krauss, 2004; Wesp, Hesse, Keutmann, & Wheaton, 2001). For example, when describing a previously viewed image, people gestured more than when describing the image in full view (Wesp et al., 2001). Furthermore, when participants are encouraged to gesture in solving a difficult spatial task, they perform better than when not encouraged to gesture (Chu & Kita, 2011).

There are individual differences in how frequently people gesture, even when performing spatial tasks. Individual differences in gesture frequency have been linked to a number of variables, including personality (Hostetter & Potthoff, 2012; O'Carroll, Nicoladis, & Smithson, 2015) and cognitive abilities (Chu, Meyer, Foulkes, & Kita, 2014; Smithson & Nicoladis, 2013). As will be presented in greater detail below, some researchers have argued that people from some cultures might gesture more frequently than people from other cultures. In the present study, we question whether gesture frequency is related directly to culture. An alternative possibility is that gesture frequency is related indirectly to culture, through discourse style. In this study, we focus specifically on cross-cultural differences in story-telling style that might emerge in both the spoken form of the story as well as gesture frequency.

Oral story-telling is a complex task, involving the use of both linguistic and non-linguistic means to convey the content, affect, and effect desired by the story-teller (Colletta, 2009; Rubin, 1995; Scheub, 1977). Linguistically, story-tellers can, among other means, choose words to reflect varying degrees of vividness or structure sentences with varying degrees of complexity (Baron & Bluck, 2011). Non-linguistically, story-tellers can, among other means, vary their facial expressions and prosody and/or use co-speech hand gestures (Colletta, 2009; McNeill, 1992; Scheub, 1977).

Despite substantive similarities in story-telling style (Erbaugh, 1990; Mandler, Scribner, Cole, & Deforest, 1980), cultures do vary in their expectations about what constitutes a 'good story' (oral/formulaic vs. literate/analytic, Ong, 1977; interaction vs. content, Tannen, 1982; themes, Miller, Wiley, Fung, & Liang, 1997). One aspect of story-telling that seems to show cross-cultural differences is the focus of the story: story-tellers might focus more on the chronicle of a story (what happened and *HOW* it happened) or the emplotment of a story (what happened and *WHY* it happened; Ryan, 1993; Tannen, 1980). A focus on emplotment is sometimes called an evaluative style, since story-tellers bring their own perspective and construal in recounting why events occurred (Tannen, 1980). Tannen compared the story-telling style of Greek and American adults recounting a film. She found that the Americans focused more on a detailed chronicle of the story, often explicitly mentioned that they were telling the story of a film they had seen, and telling longer stories (see also Tannen, 1982). The Greeks focused more on the emplotment, telling somewhat shorter stories with more of their own interpretations of the characters' roles and their evaluations than the Americans. The Greeks were also more likely to philosophize about the deeper meaning of what had happened in the film.

Individuals who focus on the chronicle in retelling a story about particular events might use a lot of gestures, particularly representational gestures. By opting to focus their story on what they had seen, story-tellers adopting a chronicle style might activate visuospatial imagery (Baron & Bluck, 2011; Rubin, 1995). Activating visuospatial imagery could lead to the production of a lot of representational gestures (Hostetter & Alibali, 2008; Wagner, Nusbaum, & Goldin-Meadow, 2004; Wesp et al., 2001). In support of this argument, Nicoladis, Marentette, and Navarro (2016) found that children's gesture frequency was linked with the length of the story they told, a finding they attributed to the children's degree of activation of visuospatial imagery leading to both telling a long story and gesturing a lot. Recall that Tannen (1980) found that long stories were characteristic of a chronicle style. While Nicoladis et al. (2016) did not analyze story-telling style, the link between story length and gesture frequency could be due to individual children relying more or less on a chronicle style (like the Americans in Tannen, 1980). Individuals who focus on emplotment, such as what motivates the characters and why events unfolded the way they did, might not rely much on their visuospatial imagery in telling the story and might therefore use representational gestures infrequently. To date, there has been more research on cross-cultural differences in gesture frequency than on differences in story-telling style. For that reason, to explore the possibility of a link between the two, we first compare the gesture frequency of speakers of multiple languages and then analyze their story-telling style.

Some studies have found cross-cultural differences in how frequently people gesture (see Kita, 2009, for a review of cultural differences in gesture use), although the direction of the difference is not always the same. For example, Goldin-Meadow and Saltzman (2000) found that Taiwanese mothers gestured more than American mothers when interacting with their three- to four-year-old children. There was no difference between the cultural groups on number of verbal propositions that the mothers used. Goldin-Meadow and Saltzman considered the possibility that the high gesture frequency among the Chinese mothers arose because they considered one of their primary roles in communication was to instruct their children. In contrast, So (2010) found that adult Chinese speakers from mainland China gestured less than adult English speakers from the United States in the context of story-telling to other adults. So argued that Americans gesture frequently because gestures are accepted in American culture. In contrast, another study comparing monolingual adults from mainland China and from an English-speaking part of Canada showed no differences in gesture frequency in a story-telling context (see Nicoladis, 2007). One possible explanation for the contrasting findings in these studies is that gesture frequency does not simply reflect cultural tendencies to gesture frequently or to gesture infrequently. Instead, cross-cultural differences in gesture frequency could be linked to the type or style of discourse in which people are engaged.

In order to understand the rationale for thinking that cross-cultural differences in gesture frequency might be linked to discourse style, let us consider an analogy with personality. In some studies showing a link between personality and gesture use, that link has not necessarily been direct (Hostetter & Potthoff, 2012; O'Carroll et al., 2015). That is, it is not simply that extroverts gesture more than introverts. Instead, researchers have found that extroverts can gesture more than introverts, depending on how they process language in a particular context. For example, O'Carroll et al. (2015) found that people gestured more and used more concrete words when they could not see an interlocutor than when they could see their interlocutor, differences that were moderated by extroversion (i.e., extroverts gestured even more when their interlocutor was not visible than introverts). The authors argued that extroverts were more likely than introverts to use gestures when they were uncertain if their interlocutor had understood them. In other words, personality did not impact directly how frequently people gestured, but impacted instead how people spoke and gestured simultaneously.

By analogy, one possible reason previous studies have had varied results regarding cross-cultural differences in gesture frequency is that culture does not impact gesture frequency directly. Instead, culture could affect how people

both speak and gesture simultaneously. In the present study, we focus specifically on the possibility that culture might be related to both story-telling style and gesture frequency. Specifically, a chronicle style that focuses on conveying the visuospatial events might be associated with high use of representational gestures, gestures that are linked to visuospatial processing.

In this study, we study cross-cultural differences in story-telling style in four groups of adults who are bilingual. Most previous studies on gesture frequency in bilinguals have tested for possible effects of proficiency (Gregersen, Olivares-Cuhat, & Storm, 2009; Gullberg, 1998; Laurent, Nicoladis, & Marentette, 2015; Marcos, 1979; Nicoladis, Pika, Yin, & Marentette, 2007; Sherman & Nicoladis, 2004; So, 2010) and/or bilingual status (vs. monolingual status; Nicoladis, Pika, & Marentette, 2009; Pika, Nicoladis, & Marentette, 2006). Similarly, most previous studies of bilinguals' story-telling have focused on effects of proficiency, and usually in children (Laurent et al., 2015; Montanari, 2004). In the present study, we rely on data from bilinguals for another reason: bilinguals have generally been found to use a similar stylistic effect in telling a story in both their languages, with regard to gesture use (Brown & Gullberg, 2008; Laurent et al., 2015; Nagpal, Nicoladis, & Marentette, 2011), complexity (Laurent et al., 2015), and encoding of motion events (Brown & Gullberg, 2008). Kang (2003) has demonstrated this stability in second language learners, showing that the story-telling style of Korean learners of English was highly influenced by the norms of their first language. We thought that bilinguals might therefore adopt a similar story-telling style in both their languages, as seen in gesture frequency and focus on chronicle vs. emplotment.

1.1. THIS STUDY

We asked bilingual adults whose first language was one of Mandarin Chinese, Hindi, French, or Spanish, to watch a cartoon and tell the story, once in English (their second language) and once in their first language. We first compared these four groups on their rate of gesture use in telling the story. We predicted that there would be cross-cultural differences in how frequently people gestured, although there is not enough previous comparative work to hypothesize the direction of this difference for all of the groups. We thought that the Chinese speakers would gesture less (So, 2010) than the Romance-language speakers (Efron, 1941), but we could not predict a priori how frequently the Hindi speakers would gesture relative to the other groups.

We then used the cultural-group differences in gesture frequency to explore possible differences in story-telling style between the groups. We predicted that the groups with high gesture use would focus more on the chronicle, or what happened and how those events unfolded (Ryan, 1993; Tannen, 1980).

We predicted that those with low gesture would use an evaluative style focusing on why the events happened. The only group for which we could formulate an a priori prediction was Chinese speakers: they might adopt an evaluative style (see Wang & Leichtman, 2000, for evidence that Chinese children do so in autobiographical stories).

There is no one simple measure for the style adopted by a story-teller so we relied on a combination of quantitative and qualitative measures (following Tannen, 1980, 1982). We expected that story-tellers adopting a chronicle style would tell longer stories than those adopting an evaluative style, as has been shown in previous studies (Erbaugh, 1990; Tannen, 1982; although see Wang & Leichtman, 2000). They might also comment explicitly on telling the story of a cartoon they had watched (Tannen, 1980). Adjectives and adverbs are not required for grammatical utterances and inherently convey evaluation (e.g., by specifying that the tree was a *tall* tree, the speaker is drawing attention to a particular quality of the tree). Story-tellers adopting an evaluative style might include more adjectives and adverbs to convey the speakers' attitude than those adopting a chronicle style (see Cappelli, 2005). They might also explicitly mention their own attitude toward the story and inferred emotions of characters as well as giving an explicit moral of the story (Tannen, 1980).

In using these variables to identify story-telling style, we have assumed that the basic unit of story-telling style is the entire story itself, rather than potentially smaller units of discourse, such as clauses or utterances. This assumption follows previous research on story-telling style (e.g., Erbaugh, 1990; Tannen, 1980). In the 'Discussion', we return to this assumption to speculate on whether our results might generalize to smaller units of discourse as well.

2. Methods

2.1. PARTICIPANTS

A total of 48 adults who spoke English as a late second language participated in this study, 12 (6 female) with each of the following first languages: Mandarin Chinese, Hindi, French, and Spanish. Some of these participants were included in other studies on the role of proficiency in gesture use (Nagpal et al., 2011; Nicoladis et al., 2007; Sherman & Nicoladis, 2004), but the present comparisons are new. All participants took English courses in school in their home countries or provinces but only started speaking English regularly upon moving to an English-speaking country or to a primarily English-speaking part of the country in early adulthood. They had all lived in an English-speaking part of the world for the previous 5 to 15 years. As previous studies have found inconsistent results related to degree of proficiency, we did not attempt to control English proficiency beyond

recruiting participants who could speak English well enough to tell a story according to self-report (see Nagpal et al., 2011; Nicoladis et al., 2007; Sherman & Nicoladis, 2004, for the results relating proficiency to gesture use). For descriptive purposes, the participants' spoken English proficiency varied between intermediate and advanced, as characterized by a former English-as-a-Second-Language teacher. Most of the Chinese speakers could be characterized as intermediate. Most of the Hindi speakers were advanced. The French speakers varied between intermediate and advanced. The Spanish speakers could all be characterized as advanced. As will be seen, the results with regard to story length and gesture use do not correspond well to proficiency characterizations. The Chinese-speaking participants grew up in mainland China. The Hindi-speaking participants grew up in India. The French-speaking participants all grew up in Canada, in a primarily French-speaking part of the country. The Spanish-speaking participants grew up in various countries in Central and South America.

2.2. MATERIALS

The participants watched short clips from two Pink Panther movies, one after the other, totalling approximately 8 minutes. In the first clip, the Pink Panther tries to get rid of a bothersome bird from a cuckoo clock. In the second clip, the Pink Panther attempts to pilot a fighter jet. There are no spoken words in these clips. Our analyses concern only the first clip, as we found that speakers in all of the groups were more engaged with that story.

2.3. PROCEDURE

For each language session, the participants were asked to tell what they had seen to a native speaker of the relevant language who spoke only that language. The participants' narrations were videotaped. The participants all watched the video clips and told back the story twice, once in their L1 and once in English. The order of the two language sessions was counterbalanced. There was approximately one week between language sessions. No differences on dependent measures were found based on the order of the two language sessions.

2.4. TRANSCRIPTION AND CODING

A native speaker transcribed the participants' speech in orthographic words. What constitutes orthographic words is straightforward for English, French, and Spanish. Hindi was transcribed phonetically with the English alphabet (see Nagpal et al., 2011). Chinese was transcribed in pinyin with compound

words written as single words (see Nicoladis et al., 2007, for details). This method of transcription showed no difference in the number of word tokens between the Chinese pinyin version and an English gloss for Chinese speakers (Nicoladis et al., 2007) and no difference between Hindi and English stories for the Hindi speakers (Nagpal et al., 2011).

Gestures were defined as deliberate hand movements and were coded as one of the following four categories: (i) representational, (ii) conventional, (iii) beats, or (iv) unknown. Representational gestures referred to those gestures that depict some aspect of the narrative. For example, some speakers used an open and closing hand to show a cuckoo bird cuckooing. We included as representational gestures those sometimes called ‘metaphoric’ (McNeill, 1992), such as an index finger making a circular motion to indicate ‘again’, and abstract deictic gestures (McNeill, 1992), such as pointing to a place in story space to indicate the location of the Pink Panther’s house or the bridge. Conventional gestures refer to gestures that are common within a particular cultural group and can often be understood without speech, such as number gestures since different fingers are used in different cultures to convey quantities (Pika, Nicoladis, & Marentette, 2009). Beats refer to rhythmic and repetitive gestures that are often used to emphasize speech (McNeill, 1992). Any gestures not classified in the above categories were categorized as ‘unknown’. Most often these were gestures that looked like the speaker might intend something representational but it was unclear what the meaning was. There was an average of less than one gesture per participant classified as unknown in this study. The present analyses concern only the representational gestures, those most closely linked with visuospatial processing (e.g., Kita, 2000). Representational gestures are also the most frequently occurring kind of gesture in a narrative context (McNeill, 1992).

To check on the inter-rater reliability coding of the gestures, a second coder coded the gestures produced in ten randomly selected stories. The second coder identified a total of 208 representational gestures where the first coder had identified 187. Most of the discrepancies (i.e., 30 out of 35) were due to the second coder identifying as representational gestures (i.e., usually path of movement) gestures that the first coder had categorized as beats. There was a high correlation between the number of gestures per speaker categorized as representational by the two coders ($r(8) = .950$, $p < .01$). For the sake of consistency, we included only the first coder’s categorizations in the analyses.

Because there are individual and group differences in how long the stories were, the number of gestures the participants produced during a particular story could reflect how long they had chosen to talk. A participant who told a long story might produce more gestures than one who told a short story simply by virtue of having a longer period of time in which to produce

gestures. To operationalize gesture frequency, taking into account individual differences in story length, we calculated the gesture rate, that is the number of representational gestures produced per 100 word tokens used to tell the story (following many other studies on gesture use; see, for examples, Nagpal et al., 2011; So, 2010).

Story length was measured in word tokens. Word tokens refer to the number of words produced to tell the story, including repetitions and self-corrections. We calculated the word tokens using the CLAN software associated with CHILDES (MacWhinney, 2000). The reason we included these disfluencies in the word count is that we were using the participants' stories as a unit, however they decided to tell the story. The inclusion of disfluencies is unlikely to lead to an underestimate of the participants' gesture use, since one study showed that the stroke of gestures produced during disfluencies is often simply held still until the disfluencies are resolved (Graziano & Gullberg, 2013). As noted earlier, through our orthographic coding choices, we attempted to control for potential cross-linguistic differences in morphology.

In counting adjectives and adverbs in each language, we included only those modifying words that were not quantifiers (like 'some' or 'many') because quantifiers are required grammatically in some contexts in Romance languages. We counted only those modifiers that were adjectives or adverbs in the language spoken by the story-teller. For example, many Spanish speakers referred to the bird as *pajarito*, which would translate to 'little bird' in English but the littleness is encoded in a diminutive suffix in Spanish so not counted as an adjective. We included the adjective for 'pink' if it was in the target language of the session. For example, if a story-teller used the English word *pink* in telling a Chinese story, we reasoned that he or she might be using the adjective as a proper noun (i.e., *the Pink Panther*). To account for potential differences in story length, we calculated the number of adjectives and adverbs per 100 word tokens in each participant's story in each language.

To check for the inter-rater reliability for the number modifiers, we asked a second coder who was not aware of the hypotheses to count the modifiers in thirty randomly chosen transcripts. The first coder counted an average of 20.6 ($SD = 13.8$) modifiers in these thirty transcripts and the second coder 25.2 ($SD = 15.9$). There was no significant difference between the two coders on an independent *t*-test ($p < .23$). The Cronbach's alpha was .904, considered excellent. We included the first coder's modifier counts in the following analyses.

We counted a number of qualitative manifestations of style, namely whether participants explicitly mentioned watching the cartoon, inferring a character's thoughts or feelings, explicit mention of the story-teller's own thoughts or feelings, direct quotes, and providing a moral to the story. To test

for inter-rater reliability, we asked a second coder to code for the presence/absence of these stylistic techniques in the same thirty transcripts randomly chosen for the inter-rater reliability check on modifiers. The second coder was not told our hypotheses. The two coders agreed on the presence/absence of these stylistic techniques between 80% (for inference of a character's thoughts or feelings) and 97% (for using direct quotes and providing a moral) or the participants. The Cohen's kappa between the two coders ranged between .524 (for inference of a character's thoughts or feelings) to .930 (for using direct quotes), or from moderate to very good. We included only the first coder's classifications in the analyses.

Examples from the stories are provided using a gloss for the non-English L1 narratives.¹ The gloss is intended to capture the meaning and to note grammatical function, in particular presence of adjectives and adverbs, of words in the story-teller's narrative rather than provide a literal translation.

All analyses were done with the Statistical Package for the Social Sciences.

2.5. INDEPENDENT RATERS' CLASSIFICATIONS

To provide an additional measure of story-telling style, we asked seven English-speaking undergraduate students to classify all 48 English stories as either more of a chronicle or more of an evaluative style, using these descriptions:

A chronicle style story focuses on what happened and how it happened. There is a focus on what can be observed, the behavior of the characters. An evaluative style story focuses on what happened and why it happened. There is a focus on the characters' internal states and motivations and why the story happened the way it did.

The independent raters did not consult with each other and did not know our hypotheses. The order of the transcripts was randomized with regard to the participants' language background and then numbered from 1 to 48 so that the raters would be blind to the language background of the participants. One rater did not classify one of the stories. So, for each participant, we calculated the number of times the story was rated as evaluative out of the total number of times it was rated as either a chronicle or an evaluative style story. This ratio allows us a measure of the degree to which a story could be considered a chronicle or an evaluative style story.

[1] We are willing to share the primary data. Contact primary author for text of narratives in their original language.

3. Results

3.1. GESTURE RATE

Figure 1 presents descriptive data for gesture rate by cultural group and language. A 4 (culture: Hindi, Mandarin, French, Spanish) \times 2 (language: L1, L2) repeated-measures ANOVA indicates a large and significant effect of culture on gesture rate ($F(3,44) = 12.15, p < .001, \eta^2 = .58$). Planned post-hoc comparisons for gesture rate were conducted using the conservative Sheffé test. These comparisons revealed two groups: Chinese and Hindi story-tellers produced a significantly lower rate of gestures than French and Spanish speakers did. The mean difference between Chinese and French speakers was 4.4 gestures per 100 words and between Chinese and Spanish speakers 3.7. The mean difference between Hindi and French speakers was 4.0 gestures per 100 words and between Hindi and Spanish speakers 3.3. No other differences reached significance.

There was a small but significant difference in gesture rate between L1 ($M = 3.4, SD = 3.0$) and L2 ($M = 4.3, SD = 3.0$) ($F(1,44) = 6.44, p = .02, \eta^2 = .04$). There was no interaction between language/cultural groups and gesture rate across language. This result indicates that all participants produced a slightly higher gesture rate when telling their story in English compared to their native language.

3.2. STORY LENGTH

We hypothesized that cultural groups that differ in gesture rate would also differ in story-telling style. The remaining analyses were conducted between two groups: the higher gesture frequency group (Spanish and French speakers, henceforth the Romance group) and the lower gesture frequency group (Hindi and Chinese speakers, henceforth the Asian group). We predicted that the higher gesture frequency Romance group would use a chronicling style and therefore produce a higher number of word tokens than the lower gesture frequency Asian group, who would adopt an evaluative style. A 4 (culture) \times 2 (language) repeated-measures ANOVA examining the effects of culture on story length showed a medium and significant main effect, with the Romance group telling longer stories (see Figure 2) than the Asian group ($F(1,46) = 13.88, p = .001, \eta^2 = .18$). There were no effects of language of story-telling (L1 vs. L2) on word tokens, nor any interactions.

3.3. USE OF ADJECTIVES AND ADVERBS

We hypothesized that participants in the lower gesture frequency Asian group would produce evaluative stories, which we assessed using rate of adjective and

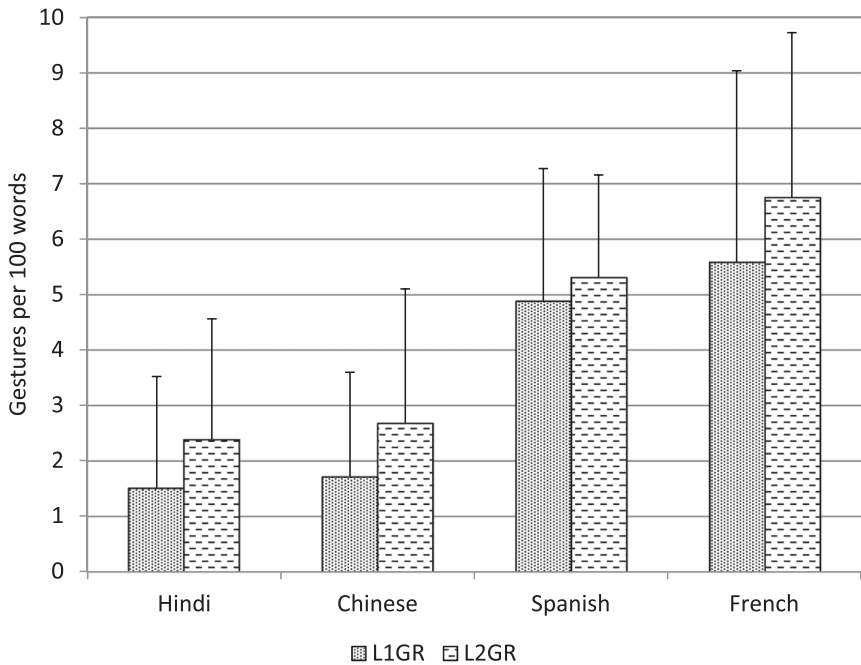


Fig. 1. Gesture rate by cultural group and language of story retelling. L2 is English in all cases. Error bars mark standard deviations.

adverb production. Figure 3 summarizes the average number of adjectives and adverbs used per word token by participants in each group. There is a large and significant difference between groups in the rate of adjective and adverb production ($F(1,46) = 59.00, p < .001, \eta^2 = .41$). There is also a small but significant effect of language of story retelling with participants using more modifiers in L2 ($M = .089$) compared to L1 ($M = .071$) ($F(1,46) = 5.66, p = .02, \eta^2 = .03$). This effect is likely influenced by the small but significant interaction between language of story-telling and cultural group. L1 Chinese and Hindi speakers used many more modifiers when speaking English (L2, $M = 13.2$) than when speaking their L1 ($M = 9.8$), compared to Romance language speakers who did not differ between L1 ($M = 4.3$) and L2 ($M = 4.5$) ($F(1,46) = 4.68, p = .04, \eta^2 = .02$).

3.4. QUALITATIVE ANALYSES OF NARRATIVE STYLE

We next turn to more qualitative aspects of story-telling style, providing examples to illustrate the conclusions. Elements that we predicted to be associated with chronicle style include explicit description of actions (marked in bold) and explicit commentary on the story as a viewed object

GESTURE AND STORY-TELLING STYLE

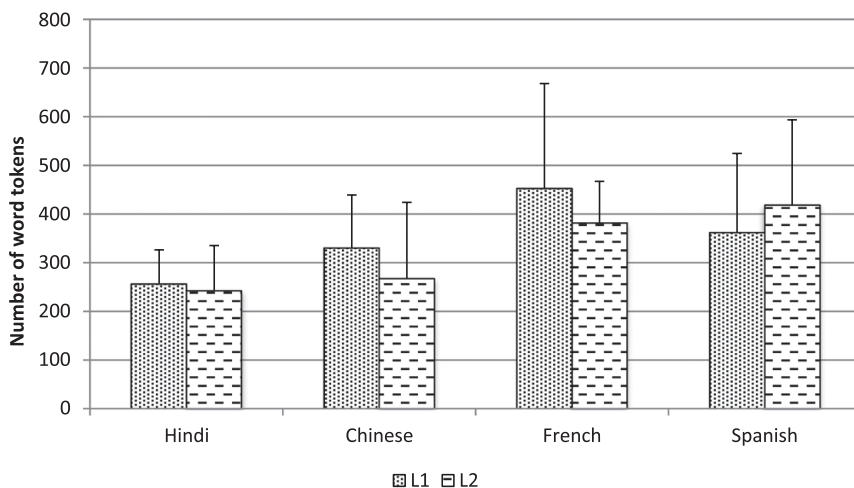


Fig. 2. Average word tokens by cultural group and language of story retelling. L2 is English in all cases. Error bars mark standard deviations.

(indicated with underline). Elements that we predicted would be associated with an evaluative style include inferred emotion (marked in *italics*) and their own attitude to the story or the presentation of a moral (marked in small capitals). Direct quotes are indicated using quotation marks.

As demonstrated in the quantitative analysis above, Romance-language speakers tended to use a chronicling style of story-telling. They told slightly longer stories than the Asian group, used more gesture, and included fewer adjectives and adverbs. This qualitative analysis shows that they told stories in terms of a series of specific actions they had observed, as in (1) and (2). Note that the word for ‘panther’ is feminine in both French and Spanish so speakers sometimes used the feminine pronoun to refer to the panther. In (1) the story-teller recounts specific actions (in **bold**), and makes explicit references to the story as a viewed object, using “we see [her]” (underlined). She makes very little use of adjectives or adverbs. She makes no explicit reference to a moral, nor uses any direct quotes.

(1) French story-teller, speaking in French

She is in the process of installing a clock. So we see her in the process of **hammering** on the wall to install it with um, in the process of setting it, we suppose. She **pulls** on the cord so we ... yeah, I say, she to, um, we suppose that she is setting her clock. She **gets in** her bed. She **lies down**. So, we see [her], **turning and turning** some more, the hours passing. And then, just at the moment that the clock **begins to ring**, we see that there is a kind of of bird, that **comes**

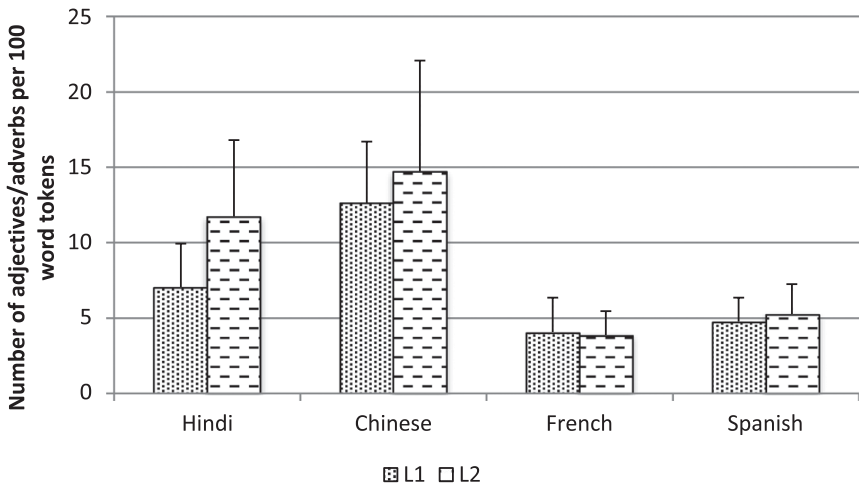


Fig. 3. Rate of adjectives/adverbs by cultural group and language of story retelling. L2 is English in all cases. Error bars mark standard deviations.

out and sings. The Pink Panther, the first thing she does is that she **turns around** and she uh **hits** the the table that is next (to her). She **breaks** it into a thousand pieces.

In (2) the story-teller also recounts a series of specific actions (in bold). She does not make any explicit references to the story as a viewed object. She does not make any inferences about the motivation for the character's actions: that the panther is very mad is an explicit and central aspect of the story. Nevertheless she comments on this emotional state (italics). The story-teller uses occasional adjective and adverbs. Like the story-teller in (1) she makes no explicit reference to a moral. She does use one direct quote.

(2) Spanish story-teller, speaking in English

And the bird decided to **make a hole** on the wall and **get out** of his house. And then uh he went to uh **knock** the door very, very late at night of the Pink Panther and the Pink Panther **opened** the door and there was the cuckoo clock with a with a terrible orchestra **making** a lot of noise and **saying**, "Wake up! Wake up!" So, the Pink Panther got very mad and he **went** to pick up the house of the Pi(nk) ... of the cuckoo clock. And uh **pick up** the, the, the bird, the cuckoo clock with the orchestra. And he **cross** the, the bridge. Let's see, San Francisco bridge, I don't know which. And eh he **threw** away the cuckoo clock and everything to the river. So then he **come back** home and he **start sleeping** again.

Narratives from the Asian group were more focused on why the various events occurred, as is predicted in the evaluative style. When adjectives and adverbs appeared in stories regardless of language, their function was often to convey something about the story-teller's attitude or construal of events. Recall that in (2), a Spanish-English bilingual referred to the set of instruments as a "terrible orchestra", conveying her impression of the bird's lack of musical talent. The Hindi and Chinese speakers simply did so more often, as can be seen in (3) and (4). Here, while the narrators do include specific actions (bold), they also include inference about the character's thoughts and feelings (italics). In (3) the story-teller does make explicit reference to a moral at the very end of the narrative (small capitals), while in (4) the narrator present this explicit moral at the beginning to set up the story. The story-teller in (4) also includes a direct quote.

(3) Mandarin story-teller, speaking in Mandarin

He was sleeping. It seemed that it was not morning. Probably, look, I don't know maybe it seemed that it was not morning [but] the alarm clock **was ringing**. He was very much *surprised*. So, later he **put** the bird on the bed to sleep together with him. I just think maybe THIS STORY EXPRESSES THE IDEA THAT LOST THINGS WOULD BE CONSIDERED TO BE BETTER. IF IT IS NOT LOST, MAYBE ONE WOULD FEEL IT WAS DISGUSTING BEFORE ONE WOULD TREASURE IT.

(4) Hindi story-teller, speaking in English

Many days ago in a jungle many animals **lived** and in that there were two animals, one was our [Pink Panther] and second a small [cuckoo bird]. BETWEEN THEM THERE WAS SOMETIMES FRIENDSHIP SOMETIMES RIVALRY, THE GAME OF LOVE AND AFFECTION USED TO KEEP GOING. ... Now our [panther] sir was *very sleepy* because it was a Saturday morning, it was a weekend, so he said that "no I don't want to wake up". So he *got very angry* on him and *showed him eyes in anger* and **made him go** inside but [the bird] had a *sense of responsibility*, he **came out** and again to wake up, he **gave** a signal again.

Recall that explicit mention of watching the video has been linked to a chronicle style (Tannen, 1980). Most of the other aspects of story-telling style have been linked to an evaluative style, with the exception of the use of direct quotes. The use of direct quotes was an aspect of story-telling style that stood out (since none of the characters in the cartoon ever actually spoke) and, as will be seen below, did not fall out neatly according to chronicle vs. evaluative style.

We now summarize the number of participants who included the various qualitative measures described above. These summaries are followed by further

brief examples of that specific variable. All participants used explicit description of actions when describing the stories so we do not provide a summary table for that variable. Table 1 summarizes the number of people who made at least one explicit mention of watching the movie while they were narrating their stories. As can be seen in Table 1, most of the Hindi- and Chinese-L1 speakers did not explicitly mention having seen the movie, while the majority of French- and Spanish-L1 speakers did. Some examples can be seen underlined in (1), as well as in (5) and (6).

- (5) French story-teller, speaking in French
And probably, it's probably in New York because I saw the bridge, I don't know where it is, but it looks a little bit like New York.
- (6) Spanish story-teller, speaking in English
And, and put it, put the, the bird into a, a, in the bed with it, with him. And um ... so um the next, the next scene you see that that there's a, a, a clock going off. The alarm goes off. And the cuckoo took a, took, takes a huge industrial wrench and breaks the clock to pieces and, and, and the Pink Panther was pretty happy.

Some differences were observed across cultures for inferring emotion as motivating behaviour (assuming that the emotion was there before the behaviour). Table 1 also summarizes the number of people who explicitly mentioned an emotion as motivating behaviour. Here, the distribution does not fall perfectly in terms of Asian group vs. Romance group, since the French L1 speakers seem to be the least likely to mention emotion as a motivator. See some examples in (7) through (10).

- (7) Hindi story-teller, speaking in Hindi
Also, the cuckoo bird doesn't lose courage. She tries a lot [of things] in order to wake him.
- (8) Hindi story-teller, speaking in English
And he needs some company so this guy goes to the river.
- (9) Hindi story-teller, speaking in Hindi
Pink Panther in anger throws him from the bridge into the river, then comes home and sleeps.
- (10) Mandarin story-teller, speaking in Mandarin
After the alarm clock rang, he was very angry. With his eyes still closed, in a daze, he banged the clock off the table to the ground.

Table 1 summarizes the number of people who made at least one explicit mention of his/her own thoughts, feelings, or perspective on the story or the characters in the story. As can be seen in Table 1, half the Hindi-L1 speakers did so in one language and just over half the Chinese-L1 speakers did so in at

GESTURE AND STORY-TELLING STYLE

TABLE 1. *Number of people who included the following in their stories*

	Hindi L1	Chinese L1	French L1	Spanish L1
Explicitly mentioned watching the movie				
Both languages	0	1	2	4
Only one language	1	3	7	5
Neither language	11	8	3	3
Included inferred emotion as a motivation for behaviour				
Both languages	8	8	3	7
Only one language	2	3	5	2
Neither language	2	1	4	3
Mentioned their own thoughts, feelings, or perspective on the story or characters				
Both languages	0	3	2	0
Only one language	6	4	2	1
Neither language	6	5	8	11
Used direct quotes				
Both languages	1	2	2	2
Only one language	9	1	5	6
Neither language	2	9	5	4
Explicitly mentioned a moral to the story				
Both languages	1	1	0	0
Only one language	3	3	1	0
Neither language	8	8	11	12

least one language; see the underlined bits in examples (11) through (13). In contrast, the majority of the French- and Spanish-L1 speakers did not mention their own feelings about the story.

- (11) Mandarin story-teller, speaking in English
It's funny that in morning it is the bird who smash the new clock the cat is very happy with that
- (12) Mandarin story-teller, speaking in English
 Um ... well, that Pink Panther is, is pretty lazy, I think.
- (13) Hindi story-teller, speaking in Hindi
 Goes again to see her, swims also, looks for her, till then she reaches their home again [*laughs*]. Then this poor one goes, thinks that she must have died and everything is over so puts flowers and comes back.

Table 1 summarizes the number of people who used a direct quote in their narrations. The Chinese-L1 speakers rarely did so, while the majority of people in all the other cultural groups did so at least once.

- (14) Hindi story-teller, speaking in English
 And he said that he won't be sitting inside the clock now, "He will be sleeping with me". So they both were very happy.
- (15) Hindi story-teller, speaking in English
 So he becomes so happy and he is like "Sheesh my friend!" And he brings the bird to his bed and both of them sleep together.

- (16) French story-teller, speaking in French
Then he says, "Okay, that's enough." He really tries to block all that.
- (17) Spanish story-teller, speaking in English
His dreams or he thinks of the birdie just drowning, "Ahhh!"

Table 1 summarizes the number of people who explicitly mentioned a moral to the story. As can be seen in Table 1, only a few people told a moral, but eight out of the nine people were from the Asian group. In some cases, as in (18), the moral of the story was at the beginning. More often the moral of the story was at the end, as in (19) and (20). One Mandarin–English bilingual explicitly mentioned a moral in both his languages, but the moral was not the same: see examples (18) and (19).

- (18) Mandarin story-teller, speaking in English
Here I am going to tell you a story of lazy Pink Panther.
- (19) Mandarin story-teller, speaking in Mandarin
Sometimes it's just like this. When something is always there beside you, you think it not important. Once you lose it, you think it very important, right?
- (20) Hindi story-teller, speaking in Hindi
So we learn from this story that people remember their love when their love gets separated from them.

In sum, the more qualitative analyses of the story-telling style showed that the Romance-language speakers were more likely to explicitly mention watching a movie than speakers from the Asian group. In contrast, speakers from the Asian group were slightly more likely to infer emotions as motivators, comment explicitly on their own perspective on the story, and mention a moral than the Romance-language speakers. Not all qualitative aspects of story-telling fell neatly into the categories of Asian group and Romance group. For example, the Spanish-L1 speakers were just as likely as the speakers from the Asian group to explicitly infer emotions as motivators. And, the Chinese-L1 speakers were the least likely of the four groups to give direct quotes in telling the story.

3.5. INDEPENDENT RATERS' CLASSIFICATIONS

The ratio of evaluative classifications (out of evaluative and chronicle) for the Hindi L1 speakers was .58 ($SD = .31$), for the Mandarin L1 speakers .68 ($SD = .34$), for the French speakers .40 ($SD = .35$), and for the Spanish speakers .19 ($SD = .19$). There was a significant difference between language groups on a one-way ANOVA ($F(3,44) = 6.03, p = .002, \eta^2 = .29$). Least squared differences post-hoc tests revealed significant differences between the Hindi speakers and the Spanish speakers ($p = .003$), as well as the Mandarin-speaking

and the French-speaking participants ($p = .03$) and the Spanish-speaking participants ($p < .001$). The Mandarin and the Hindi speakers did not differ from each other ($p = .44$), and the difference between the French and the Spanish speakers did not reach significance ($p = .10$).

We ran correlations between the raters' classifications and the continuous dependent variables in this study across all participants in their English L2 and in their L1. The ratio of evaluative classifications was negatively and significantly correlated with participants' gesture rate in L2 ($r(46) = -0.34$, $p < .05$) and in English ($r(46) = -0.33$, $p < .05$). The ratio of evaluative classifications was not correlated with word tokens in L2 ($r(46) = 0.04$, n.s.) or in English ($r(46) = -0.21$, n.s.). The correlations with modifier rate was positive in both L1 ($r(46) = 0.41$, $p < .01$) and in English ($r(46) = 0.39$, $p < .01$).

4. Discussion

In the present study, language/cultural differences in gesture rate were observed in both adults' first and second languages. Namely, Chinese–English and Hindi–English bilinguals gestured less often than French–English or Spanish–English bilinguals. We argue that these differences in gesture frequency are related to differences in story-telling style. Speakers from the Asian cultures tended to focus more on the emplotment, or why events happened (Ryan, 1993): they used a lot of modifiers to convey their attitudes toward events and characters, sometimes explicitly mentioned their own attitude toward the story, inferred emotions as motivators, and sometimes even explicitly added a moral to the story. In contrast, the Romance-language speakers told stories that were focused on the chronicle, or what happened (Ryan, 1993). The Romance-language speakers seemed to view their task as to tell what they had seen: they often made explicit mention of having watched a film (as found for Americans; see Tannen, 1980) and tended to tell longer stories than the Chinese or Hindi speakers. In telling a chronicle, the Romance-language speakers did not comment exclusively on the characters' behaviour: all but one inferred emotions as a result of something that happened in the story and often added direct quotes. This focus on the chronicle of the story could have led these participants to rely more on visuospatial imagery in telling their stories, resulting in more gestures than the speakers from Asian cultures (see Morsella & Krauss, 2004; Wesp et al., 2001 for discussion about the link between visuospatial imagery and gesture use). Representational gestures are often used to illustrate imagistic details of the speaker's meaning (Hostetter & Alibali, 2008; Kendon, 1997). This interpretation is consistent with the results from Nicoladis et al. (2016), who showed that English-, French-, and Spanish-monolingual children gestured more per word when they told longer stories.

These results could help explain the variable results on the direction of cross-cultural differences in frequency of gesture use. For example, So (2010) found that Chinese speakers used fewer gestures than English-speaking Americans in a story-telling context, while Nicoladis et al. (2007) found no difference in the rate of gestures between monolingual Chinese speakers and English-speaking Canadians. These differences could be related to the kind of story individual speakers chose to tell. The Western bias to include more details in stories could lead story-tellers to rely more on imagery in remembering the stories, thus leading to a greater use of gesture. Note, however, that there are individual differences even within cultures (Ryan, 1993), so within a sample of English speakers some may choose to tell stories with more of a chronicle focus than others. The Asian bias to focus more on an evaluative style would not require as much use of imagery and so fewer gestures would be used. Experimental studies could verify this interpretation: interference with visual imagery should affect Western story-tellers' story length and gesture use more than Asian story-tellers.

These results add to the literature showing cross-cultural differences in story-telling style. Recall that Tannen (1980) reported that Greeks focused more on emplotment, telling the why of the story, relative to Americans who focused more on the chronicle, the what-happened of the story. The present study suggests that this distinction can be extended to Mandarin and Hindi speakers, who tend to focus more on emplotment, and Spanish and French speakers, who tend to focus more on chronicle. Furthermore, we have suggested that this style can be linked to frequency of gesture use.

It is possible that the cultural differences in story-telling style reflect different culturally influenced cognitive processes. Nisbett, Peng, Choi, and Norenzayan (2001) argue that East Asians are likely to adopt a more holistic cognitive style focused on the relationship that exists between the focus and the whole group. Westerners, in contrast, are more likely to focus on categories, details, and the application of logical rules. While Nisbett et al. did not examine narrative in their review, the proposed cultural differences appear to align at least with findings of story length in the present study. A cognitive process that biases Westerners toward attention to detail leads to a story-telling style that focuses on what happened. In contrast, a bias toward holistic meaning, as reported for East Asian thinkers, might lead one to infer greater detail in terms of motivations of the characters, as well as offering their own perspective. Confirmation of the influence of such cultural biases toward self-construal and/or cognitive processes is needed for other Asian cultures, such as the Hindi speakers in this study.

While the correspondence of low vs. high gesture rate with evaluative vs. chronicle style held overall, we would like to remind readers that there were also individual differences within each of the cultural groups, and differences

between the two groups from Asian cultures and between the two Romance-language groups. Even within language groups there are degrees of these story-telling styles, as revealed by the independent raters' coding. Some evidence for individual differences can be seen by looking at the standard deviations in Figures 1 through 3. And, some participants in all of the cultural groups told more of a chronicle story (see also Ryan, 1993). There were also differences between the cultural groups that did not correspond to the Asian cultures vs. Romance languages distinction. For example, the Spanish speakers were more likely than the French speakers to infer an emotion as a motivator. The Hindi speakers were more likely than the Chinese speakers to use direct quotes. Future studies might include more variables reflecting potential predictors of individual differences in gesture use, such as personality (Hostetter & Potthoff, 2012) and visuospatial ability (Smithson & Nicoladis, 2013), in addition to cultural background. Nevertheless, in spite of the inter- and intra-group variability, the cultural background of speakers alone was related to both their gesture rate and their story-telling style.

There is an alternative explanation for the present findings that we cannot rule out with the data themselves: the choice of the cartoon. The Pink Panther is a Western cartoon. Kintsch and Greene (1978) showed that cultural expectations about story structure influence recall. Participants were more likely to retell detailed stories if the schema of the story was consistent with cultural expectations. In the present study, it is possible that Hindi and Chinese speakers were less familiar with the Pink Panther cartoon than the French and Spanish speakers. The lower degree of familiarity could have led to shorter stories with fewer gestures. It is worth noting, however, that Kintsch and Greene asked their participants (American undergraduate students) to recall stories whose schema was highly unfamiliar (Alaskan Indian narratives). It is less likely that Hindi and Chinese speakers living in North America would be as unfamiliar with American cartoons as the American undergraduates were with Alaskan Indian narratives. So, we think that unfamiliarity with either the Pink Panther or the style of narrative in the cartoon itself is unlikely to explain the present results. While it may well be impossible to propose a story with which all cultures would have equal familiarity, future studies could ask participants to recount various stories, with varying degrees of familiarity.

The design of the present study was predicated on the assumption that bilinguals have a similar story-telling style in their two languages (Brown & Gullberg, 2008; Kang, 2003). While the cross-language stability did seem to hold for the quantitative variables in our study (i.e., gesture rate, story length, adjective/adverb use), for the qualitative variables the bilinguals only rarely used the exact same stylistic variables in both languages (see Table 1). It is

unclear whether these data challenge the assumption that bilinguals tend to use a stable cross-language story-telling style. It is possible that the qualitative variables are those that are particularly likely to change from one narration to another. An interesting follow-up study would be to ask monolinguals to tell the same story twice to do different people. We expect that monolinguals will show the same degree of variability as the bilinguals across their two languages.

As noted in the 'Introduction', the present study was designed under the assumption that the basic unit of story-telling style is the entire story. We have shown here that there is a correspondence between story-telling style (across the entire story) and gesture frequency (across the entire story). A possible future direction is to test whether the same principle will hold true across smaller units of discourse. Namely, when a person produces an utterance that has a more chronicle style (e.g., "next I saw him walking back home"), is a gesture more likely to occur with that utterance than an utterance with a more evaluative style (e.g., "he was so angry that he walked quickly home")? Designing such a study faces some practical challenges: notably, we know of no research that has attempted to identify the style of utterances or clauses. Even if these practical challenges can be met, it is not clear that chronicle vs. evaluative style of smaller units of discourse will predict when a gesture might be produced. Our interpretation of the results of the present study has been couched in terms of participants' reliance on visuospatial imagery. If this interpretation is correct, the chronicle vs. evaluative style of smaller units of discourse may not, in fact, predict with which utterances a gesture is likely to occur. Instead, it would be the degree of visuospatial imagery used in the processing of utterances or clauses that would be more likely to predict the production of a gesture. Future research can test this interpretation.

We conclude that gesture rate in a story-telling context can differ according to culture and can be linked to differing story-telling styles. We found that Romance-language story-tellers gesture a lot and tend to tell chronicle style stories, focusing on what happened and how it happened. In contrast, story-tellers from Asian cultures gestured less and tended to tell evaluative style stories, focusing on what happened and why it happened. We have emphasized the differences between languages/cultures in the story-telling style, but it is important to keep in mind that these differences are largely a matter of degree rather than categorical differences. All the participants in this study did (as requested) tell some degree of what happened and how it happened, and many participants, regardless of cultural background, included some degree of inference. It is important to remember, in the context of looking for differences, that it is easy to overlook the essential similarities in the nature of story-telling across cultures.

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