Temporal Gestures in Different Temporal Perspectives

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Abstract

Temporal perspectives have been studied as a part of spatial thinking of time. They allow us to place ourselves and temporal events on a timeline, making it easier to spatialize time. This study investigates how we adopt temporal perspectives in temporal gestures. We asked participants to retell temporal scenarios written in the Moving-Ego (ME), Moving-Time (MT), and Time-Reference-Point (Time-RP) perspectives in spontaneous and elicited gesture conditions. Participants adopted temporal perspectives similarly regardless of the gesture condition, with few differences. Our results showed that participants' temporal gestures resonated better with the Ego-Reference-Point versus Time-Reference-Point distinction. Participants produced more ME and Time-RP gestures for the corresponding scenarios and speech, however the MT perspective was not adopted more than the others in any condition. Our findings show that we incorporate temporal perspectives into our temporal gestures to a considerable extent, however, the classical ME and MT classification may not hold for temporal gestures.

Keywords: temporal perspective; moving-ego; moving-time; time-reference-point

Introduction

When we talk about time, we use many spatial words. These uses are called the spatial metaphors of time, and they reflect how we think about time (Lakoff & Johnson, 1980). One way of thinking about time involves putting ourselves and temporal events in perspectives with respect to each other. Moving-Ego (ME), Moving-Time (MT), and Time-Reference-Point (Time-RP) perspectives are the three perspectives we take as we think and talk about time (Clark, 1973; Nuñez, Motz, & Teuscher, 2006). Research has shown that we incorporate these perspectives into our thinking of time while processing temporal statements (Gentner, Imai, & Boroditsky, 2002), resolving temporally ambiguous situations (Boroditsky, 2000), and even after daily experiences of bodily movements (Boroditsky & Ramscar, 2002). Our hand gestures also reflect our temporal thinking by depicting different spatial metaphors of time (Cooperrider & Nuñez, 2009, among others). In this study, we asked our participants to retell temporal scenarios written in the ME, MT, or Time-RP perspectives. We investigated whether our participants would adopt the perspectives of temporal scenarios in their temporal gestures and in their speech paired with temporal gestures.

Temporal Perspectives

Spatial metaphors of time come into play about many aspects of time, ranging from metaphorically locating temporal events (e.g., "Leave it *behind*.") to describing duration in spatial terms (e.g., "It was a *long* concert.") However, perhaps the most studied aspect of space-time metaphors is the temporal perspective (Duffy & Feist, 2014). Temporal perspectives allow us to set reference points for temporal events and/or observers to view temporal situations in particular ways.

The ME and MT perspectives are the first defined temporal perspectives (Clark, 1973). In the ME perspective, there is a stationary temporal event, and an observer (ego) moves with respect to it. For example, "She was *approaching* the vacation." demonstrates the ME perspective. In the MT perspective, the ego is stationary and temporal events move with respect to the ego. "The concert was approaching." takes this perspective with a stationary ego and a moving temporal event. These perspectives are not just ways of speech and writing, we incorporate them into our conceptualizations of time. McGlone and Harding (1998) asked their participants to answer some temporal questions written in either the ME or MT perspective. The participants then received the famous prompt, "The meeting originally scheduled for next Wednesday has been moved forward two days." and asked to indicate the new date of the meeting. Those who had answered the ME questions mostly thought that the meeting would be on Friday. Contrarily, those answered the MT questions thought that the meeting would be on Monday. This shows that the participants did not superficially interpret and answered the questions, but rather, they incorporated the perspectives of these questions into their temporal thinking. Specifically, ME participants thought that the forward would be a later date because that is what forward would correspond to in the ME perspective. In

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the MT perspective, however, the forward would be the forward of the temporal event's location, which corresponds to an earlier date, as it moves toward the observer. Gentner and colleagues (2002) further supported these findings by showing that participants needed longer time to process time-related statements if they had to switch from the perspective established by the previous statements. Moreover, these perspectives are also effective when we do not overtly think about time. Boroditsky and Ramscar (2002) showed that even everyday bodily experiences make us adopt certain perspectives. In a series of studies, they showed that those who move through space (e.g., on a queue for lunch or a train) were more likely to adopt the ME perspective while answering the "next Wednesday" question. Those who spent less time moving through space or had waited for a relative to arrive, however, took the MT perspective. To sum up, temporal perspectives have psychological reality, and we take those perspectives to think about time.

The ME and MT perspectives, although they have been around for quite a while, are not the only perspectives we employ in our conceptualizations of time. Nuñez and colleagues (2006) outlined a third perspective called the Time-Reference-Point (Time-RP) perspective. They argued that the ME and MT perspectives require that "Now" be fixed to the ego's location, however, that would not cover the entire spatialization of time in our minds. Some expressions do not require "Now". For example, "August follows June." does not require a fixed ego, nor a "Now." Furthermore, the locations of temporal events become reference points for one another in this perspective. To specify, we know that August follows June because it comes after June, regardless of and without the need for an ego, which also resonates the distinction between deictic and sequential time as described in Nuñez and Cooperrider (2013). As a result, they proposed a new classification of temporal perspectives. They divided the perspectives into two groups according to their reference points: Ego-Reference-Point (which involves the ME and MT, as Ego represent the present in both) and Time-Reference-Point perspectives (which does not require a fixed present and ego.) In a series of studies, they showed that the "Monday" answer to the "next Wednesday" question did not need a fixed ego to be given. This answer was formerly thought to be a result of assuming the MT perspective, but Nuñez and colleagues (2006) showed that the same answer could be achieved with assuming the Time-RP perspective free of a fixed ego or present. In summary, the Time-RP perspective is the third perspective we take while thinking about time, along with the ME and MT metaphors, which we incorporate into our temporal thinking in various situations.

Time, Gesture, and Temporal Perspectives

Our thinking of time is not only reflected in our answers to temporally ambiguous questions or the perspectives we use in verbal language. The co-speech gestures we produce also reveal how we think about time. Nuñez and Sweetser (2006) showed that the Aymara people of the Andes place the past in front and future behind them with their hand gestures, conforming to their verbal expressions. Cooperrider and Nuñez (2009) showed that we depict many metaphors of time ranging from placing temporal events within our gestural space, to thinking of time as an entity possessing motion. Moreover, Casasanto and Jasmin (2012) showed that language and whether one is encouraged to gesture are linked to how we gesture about time. They conducted two experiments in which they either encouraged their participants to gesture or not. They found that when they explicitly asked the participants to gesture, they often produced gestures on the sagittal axis -the axis that language mostly spatializes time on. While gesturing spontaneously, the link between language and gestures were weaker, as they moved on the lateral axis, which is not explicitly used in language. Walker and Cooperrider (2016) also replicated this finding and suggested that when explicitly asked to gesture, people consider how they (would) talk about time, and gesture accordingly. To sum up, we consider how we talk about time when we are explicitly asked to gesture. Our gestures link more closely to the mappings in language when we are encouraged to gesture, compared to when we do it spontaneously.

Gestures and temporal perspectives have been studied together in comprehension studies before. Winter and Duffy (2020) primed their participants with speech and gesture instances and asked them the "next Wednesday" question. They showed that speech was more powerful in priming participants to a certain temporal perspective than gesture. However, we know of no study that investigated co-speech temporal gesture production while talking about temporal scenarios with different perspectives. This study intends to fill this gap in literature by observing temporal gestures while talking in and about different temporal perspectives.

The Current Study

This study investigated how temporal perspectives were reflected in co-speech temporal gestures in both spontaneous and elicited gesture conditions. We asked our participants to retell four-sentence temporal scenarios written in ME, MT, and Time-RP perspectives in spontaneous and elicited gesture conditions. We expected that our participants would take the temporal perspectives in the scenarios and gesture accordingly in both conditions. Specifically, we expected to see more ME gestures than other gestures in ME scenarios, more MT gestures in MT scenarios and more Time-RP gestures in Time-RP scenarios. We also expect the scenarios to elicit the corresponding gesture perspective more than other scenarios. To specify, there would be more ME gestures for ME scenarios than other scenarios, more MT gestures for MT scenarios, and more Time-RP gestures for Time-RP scenarios than the others. Last, we expected the speech and gesture instances to go along, meaning that ME speech would accompany ME gestures, MT speech MT gestures, and Time-RP speech would be paired with Time-RP gestures. The current state of the literature prevents us from formulating specific hypotheses about spontaneous and

elicited gesture conditions paired with temporal perspectives. There are good reasons to expect that the participants would take the perspectives of the scenarios similarly in both conditions. However, there might be more gestures consistent with the perspective of scenarios and accompanying speech in the elicited gesture condition, as the participants would think more about how they talk about scenarios. Any scenario-specific differences by conditions would provide us with valuable insights into the coupling of temporal gestures and temporal perspectives for further research in the field.

Method

Participants

Thirty six (24 females) university students (*M*age = 21.9, *SD* = 3.2) participated in the study. We calculated the sample size using G*power 3 (Faul et al., 2007) for repeated-measures ANOVA with an effect size of 0.25. All participants had normal or corrected vision and no neurological history. We recruited the participants via the university's subject pool and daily bulletin for 30 Turkish Liras or course credit. This study was approved by the Institutional Review Board of the university (2021. 393.IRB3.180).

Materials

We used three baseline questions and six short paragraphs in our study. Our three baseline questions were about the participants' leisure time habits, the route to the closest market, and their work schedule in a week from the experiment day. The experimental stimuli were six Turkish short paragraphs written in four sentences with a specific temporal perspective -ME, MT, or Time-RP. We constructed two four-sentence paragraphs in each temporal perspective. The two ME paragraphs were about a person (Deniz or Ege, common Turkish names) with the four sentences describing the person approaching a temporal event, thinking that s/he is approaching that event, remembering that s/he is also approaching to another event that would happen after the initial event, and reflecting on the situation when s/he reached or passed the second event. All four sentences in the ME paragraphs conveyed the ME perspective. The two MT paragraphs were also about a certain person. Similarly, the four sentences in the MT paragraphs described an event approaching to him/her, a necessity brought about by the approaching event, the situation/feelings caused by the approaching event, and another event approaching with the initial event. Like the ME paragraphs, all four sentences explicitly conveyed the MT perspective. Last, we had two Time-RP paragraphs. The Time-RP paragraphs did not have an overt subject to ensure that the temporal events, not the metaphorical temporal location of ego, were the reference points. The four sentences in the Time-RP paragraphs described two temporal events following each other, a sidenote about these two events, the reason for or the contents of the events, and a reflection on these two events. Again, all sentences conveyed the Time-RP perspective by stating that these events follow each other. We also had a demographic form asking about the participants' age, gender, neurological history, problems in their vision, and the languages they spoke. Our baseline questions and experimental stimuli are available through this link with their English translations: https://osf.io/ecyq8/.

Procedure

Participants provided informed consents to participate in the study. We conducted the experiment face-to-face with the experimenter and the participants wearing masks due to the COVID-19 protocols of the university. We conducted the experiment in Turkish. The experimenter sat about 5 feet across the participant and told the participant that they would be asked three questions about their daily lives, then they would be shown six paragraphs printed on separate papers. The participants read each paragraph aloud first and retold them to the experimenter, which was the spontaneous gesture condition part. After the third paragraph, the experimenter said that everything had been okay up to that point, but from then on, the participant had to use their hands actively as they retold the remaining paragraphs, which was the elicited gesture condition. The order of the sentences and their distribution to the conditions were counterbalanced. However, all participants saw one ME, one MT, and one Time-RP paragraphs per condition. We recorded the experiment with a camera placed to the right of the experimenter for later coding of the gestures. After the paragraph explanation task, the participants filled out a demographic form and the session was terminated.

Coding

We coded our data using ELAN Linguistic Annotation Software (Version 6.2, Max Planck Institute for Psycholinguistics, 2021). We transcribed our participants' speech verbatim as they retold the paragraphs. We coded each gesture from various aspects. We coded gestures for McNeill's classifications scheme (McNeill, 1992) as iconic, pointing, beat, and metaphoric. We coded the perspective of the accompanying speech instance for each gesture as ME, MT, or Time-RP. We, then coded each gesture for these perspectives. An ME gesture would be one showing an ego's movement through space, whereas an MT gesture would show the movement of a temporal event toward the ego. A Time-RP gesture would be any gesture showing the location of a temporal event with respect to another event. We also coded the gestures for the hand preference as left, right or both. Finally, we categorized the gestures based on whether they were temporal gestures to be included in the analyses. This categorization was based on the content of the accompanying speech. The first and second authors coded 10% of the data (4 participants) again to ensure reliability. There was a 90% agreement in detecting gestures and 87% agreement in assigning types to the gestures.

Results

Our participants produced 1798 gestures in total. For the purposes of this study, we discarded all nontemporal gestures. This left us with 699 temporal gestures to run the analyses. A paired-samples t-test showed that our participants produced more temporal gestures in the elicited gesture condition (M = 13.08, SD = 6.28) than in the spontaneous gesture condition (M = 6.56, SD = 5.08), $t(35) = -6.81$, $p < .001$. We conducted all analyses on the number of gestures produced in certain conditions or as a response to certain scenarios. The elicited and spontaneous conditions were analyzed separately to investigate how our participants gestured within each condition. We first analyzed whether participants produced temporal gestures in the corresponding perspective within scenario types. This analysis provided us with an idea of how each scenario type elicited temporal gestures in different perspectives. We then compared temporal gesture perspectives across different scenario types to see whether our participants took certain gestural perspectives only in the corresponding scenarios. This analysis showed us the distribution of gestural perspectives across scenarios. Last, we analyzed speech-gesture pairs to see whether our participants adopted the perspectives in their speech while producing temporal gestures. We tested our hypotheses using within-subjects ANOVAs separately in the spontaneous and elicited gesture conditions. We used the Greenhouse-Geisser corrections when necessary.

Spontaneous Gesture Condition

Before our specific analyses on the gesture perspectives within and across scenario types, and speech-gesture pairs, we investigated whether any scenario type elicited more gestures than the others. Since all our analyses were tied to the number of gestures, this analysis would provide a solid starting point to view the other results. Our results showed that the scenarios elicited similar numbers of gestures $F(2, 70) = .96$, $p = .39$.

We then investigated whether our participants took the perspectives in the temporal scenarios in their co-speech gestures. For the ME scenarios, our participants differed in their gesture perspectives $F(2, 70) = 6.52$, $p = .003$. ME gestures (M = 1.06, SD = 1.22) were more frequent than both MT (M = .33, SD = .86) and Time-RP (M = .44, SD = .97) gestures, (ps = .003 and .035). For the MT scenarios, our results did not show any difference among ME (M = .5, SD = .78), MT (M = .22, SD = .43) and Time – RP (M = .64, SD = 1.37) gesture perspectives $F(1.43, 49.97) = 1.72$, p=.19. Last, we found a difference in gesture perspectives for the Time-RP scenarios, $F(1.01, 35.39) = 15.94$, p<.001. Time-RP perspective was more prevalent (M = 1.31, SD = 1.92) than both ME (M = .03, SD = .17) and MT (M = 0, SD = 0) perspectives in our participants' gestures, (ps =.001 and <.001).

Next, we analyzed whether participants took a temporal perspective more frequently in their gestures while retelling the corresponding scenario than the others. For the ME gestures, our participants differed across scenarios $F(1.62, 56.67) = 16.84$, p<.001. ME gestures were more prevalent for ME scenarios (M = 1.06, SD = 1.22) than both MT (M = .5, SD = .78) and Time-RP (M = .03, SD = .17) scenarios, (ps = .017 and <.001). For the MT gestures, the perspective prevalence differed across scenarios again, $F(1.26, 44.17) = 3.21$, $p = .046$. Our participants produced more MT gestures for MT scenarios (M = .22, SD = .42) than Time-RP scenarios (M = 0, SD = 0), (p = 010), but not for ME scenarios (M = .33, SD = .86). Our participants differed in their Time-RP gesture production across scenarios as well, $F(1.59, 55.6) = 3.41$, $p = .05$. Time-RP gestures were more prevalent for Time-RP (M = 1.31, SD = 1.94) scenarios than ME scenarios (M = .44, SD = .97), (p=.047), but not MT scenarios (M = .64, SD = 1.38), (p=.36).

Last, we checked whether our participants took the perspective of their speech as they gesture. Table 1 shows the means and standard deviations for speech-gesture pairs. For the ME speech parts accompanied by a gesture, our participants differed in their gesture perspectives $F(1.08, 36.66) = 11.8$, p<.001. When they adopted the ME perspective in their speech, participants produced more ME (M = .56, SD = .93) gestures than MT (M = .03, SD = .17) and Time-RP (M = 0, SD = 0) gestures, (ps = .006 and .003). For MT speech, our participants differed in their gesture perspectives as well, $F(2, 70) = 12.2$, p<.001. They produced more ME (M = 1.06, SD = 1.17) and MT (M = .53, SD = .91) gestures than Time-RP (M = .08, SD = .28) gestures, (ps <.001 and .028). For Time-RP speech, participants produced only Time-RP gestures (M = 2.25, SD = 2.53) and nothing else.

Table 1: Means (SD) of speech-gesture interaction in the spontaneous gesture condition.

Speech	Gesture		
	Moving-Ego	Moving-Time	Time-RP
Moving-Ego	.56(.93)	.03(.17)	-
Moving-Time	1.06(1.17)	.53(.91)	.08(.28)
Time-RP	-	-	2.25(2.53)

Elicited Gesture Condition

We started with the number of gestures across scenarios again. Our results showed that the scenarios did not elicit different numbers of gestures than each other $F(2,70) = 1.11$, p=.34.

We then checked participants' perspectives in co-speech gestures while retelling the scenarios. For the ME scenarios, our participants differed in their gesture

perspectives $F(1.58, 55.22) = 4.48$, $p = .023$. Our participants produced more ME ($M = 1.39$, $SD = 1.38$) and Time-RP ($M = 1.47$, $SD = 1.95$) gestures compared to MT ($M = .53$, $SD = .77$) gestures, (ps .012 and .018). There was no difference between the ME and Time-RP gestures. For the MT scenarios, our results did not show any difference between ME ($M = .97$, $SD = 1.25$), MT ($M = .53$, $SD = .81$) and Time – RP ($M = 1.11$, $SD = 1.82$) gesture perspectives $F(1.49, 52.06) = 1.76$, p=.18. Last, our participants differed in their gesture perspectives for the Time-RP scenarios, $F(1.01, 35.49) = 38.99$, p<.001. Time-RP perspective was more prevalent ($M = 2.97$, $SD = 2.77$) than both ME ($M = .0$, $SD = 0$) and MT ($M = .08$, $SD = .28$) perspectives in our participants' gestures, (ps <.001).

Next, we analyzed whether our participants gestured more in a certain perspective while retelling the corresponding scenario. For the ME gestures, our participants differed across scenarios $F(2, 70) = 19.37$, p<.001. ME gestures were more prevalent for the ME ($M = 1.39$, $SD = 1.38$) and MT ($M = .97$, $SD = 1.25$) scenarios compared to the Time-RP ($M = 0$, $SD = 0$) scenarios, (ps <.001). There was no difference between the ME and MT scenarios, p=.3. For the MT gestures, the perspective prevalence differed across scenarios again, $F(2, 70) = 7.34$, $p = .001$. Our participants produced more MT gestures for the ME ($M = .53$, $SD = .77$) and MT scenarios ($M = .53$, $SD = .81$) than Time-RP scenarios ($M = 08$, $SD = .28$), (ps = .003). There was no difference between ME and MT scenarios. Last, participants differed in their Time-RP gesture production across scenarios, $F(2, 70) = 7.47$, $p = .001$. Time-RP gestures were more prevalent for Time-RP ($M = 2.97$, $SD = 2.77$) scenarios than both ME ($M = 1.47$, $SD = 1.95$) and MT scenarios ($M = 1.11$, $SD = 1.82$), (ps = .021 and .009).

Last, we analyzed the gesture perspectives of our participants when they took certain perspectives in their speech. Table 2 shows the means and standard deviations for speech gesture pairs. For the ME speech instances, our participants differed in their gesture perspectives $F(1.1, 38.47) = 18.41$, p<.001. When they adopted the ME perspective in their speech, participants produced more ME ($M = .83$, $SD = 1.08$) gestures than MT ($M = .08$, $SD = .28$) and Time-RP ($M = 0$, $SD = 0$) gestures, (ps = .001). For MT speech, our participants differed in their gesture perspectives as well, $F(1.37, 47.99) = 13.41$, p<.001. They produced more ME ($M = 1.69$, $SD = 1.88$) and MT ($M = 1.06$, $SD = 1.26$) gestures than Time-RP ($M = .06$, $SD = .23$) gestures, (ps = <.001). There was no difference between the ME and MT gestures, p=.37. Last, our participants differed in their gesture perspectives for Time-RP speech, $F(1.01, 35.20) = 76.95$, p<.001. Participants produced more Time-RP gestures ($M = 5.64$, $SD = 3.84$) than both ME ($M = .03$, $SD = .17$) and MT ($M = .03$, $SD = .17$) gestures, (ps <.001).

Table 2: Means (SD) of speech-gesture interaction in the elicited gesture condition.

Speech	Gesture		
	Moving-Ego	Moving-Time	Time-RP
Moving-Ego	.83(1.08)	.08(.28)	-
Moving-Time	1.69(1.88)	1.06(1.26)	.06(.23)
Time-RP	.03(.17)	.03(.17)	5.64(3.84)

Discussion

This study investigated the link between temporal perspectives and co-speech temporal gestures by studying them in spontaneous and elicited gesture conditions. Temporal perspectives constitute an important and often-studied part of our spatial conceptualization of time. Our spatial thinking of time reflects in our hand gestures via the axis we produce the gestures on, or the different spatial metaphors we depict. Thus, we asked (1) whether participants would take the perspective of the temporal scenarios in their temporal gestures, (2) whether they would produce gestures with certain perspectives more frequently for the scenarios with the corresponding perspective than the others, and (3) whether they would gesture in the perspective that they adopted in their accompanying speech in spontaneous and elicited gesture conditions. We found that participants took the ME and Time-RP perspectives in their gestures within and across the corresponding temporal scenarios. The overall picture was similar for their speech instances in different temporal perspectives as well. Different from the gestural axis findings in the literature (Casasanto & Jasmin, 2012; Walker & Cooperrider, 2016), our findings show that temporal perspectives work in the same way independent of whether we gesture spontaneously or not, with only few differences. We should also note that the ideal experiment would be the one in which the order of the spontaneous and elicited conditions was counterbalanced. However, having the elicited condition first would reveal that the participants' gestures were of interest, which in turn would have contaminated the following spontaneous condition.

In the spontaneous gesture condition, participants used ME and Time-RP gestures more than the other types while retelling ME and Time-RP scenarios. However, MT scenarios elicited all three types similarly. This shows that participants indeed took an ego-based perspective for the ME scenarios and a time-referenced perspective for the Time-RP scenarios, with no clear direction for the MT scenarios. Nuñez and colleagues (2006) pointed out this problematic nature of the MT perspective, suggesting that it is not clear where this perspective takes its polarity from. Specifically, the forward of the timeline may be determined both with respect to the ego- as the closer temporal event, and to the temporal events on the line itself- the frontmost or earlier event on the timeline without necessitating an ego. Supporting this argument, our participants' gesture perspectives distributed equally to the three perspectives. Our across-scenarios gesture analyses showed an interesting

pattern as well. MT gestures were more frequent for ME and MT scenarios than Time-RP scenarios. This reflects the Ego-Reference-Point (ME and MT metaphors) versus Time-Reference-Point (Time-RP metaphors) distinction of Nuñez and colleagues (2005), further showing that the MT metaphor may be a somewhat problematic conceptualization because of its links with and volatile polarity concerning the timeline and ego. Last, our speech-gesture analyses painted a similar picture with ME and Time-RP gestures were produced overwhelmingly more with the corresponding speech perspective, and MT speech failing to elicit more MT gestures than other types in any condition. Moreover, gestures produced with MT speech look more like those produced with ME speech than Time-RP speech (Figure 1). This finding may resonate well with the embodied conceptualization of metaphors by Lakoff and Johnson (1980) if we combine it with the classification of Nuñez and colleagues (2006). Specifically, if metaphors in language and gesture (Lakoff, 2008) are reflections of our embodied thinking about time, and if ME and MT metaphors can be classified as subclasses of an umbrella Ego-Reference perspective with little differences from each other, it is not odd that the MT perspective elicited gestures somewhat similar to the ME perspective.

Our elicited gesture condition shared most findings with the spontaneous gesture condition with some disparities. First, ME scenarios elicited similar number of ME and Time-RP gestures (which was not the case for the spontaneous condition.) We think that the participants paid a closer attention to the ME scenarios and reflected the two events in the scenarios along with its ego-referenced nature in the elicited gesture condition. The scenarios worked qualitatively similarly to the spontaneous condition in eliciting gestures beyond this difference. Across-scenario analyses showed an interesting pattern. ME gestures were produced more frequently for ME and MT scenarios than the Time-RP ones. This, again, reflects the Ego- versus Time-Reference Point distinction by Nuñez and colleagues (2006). ME and MT scenarios elicited a similar number of ME gestures, almost underlying the common ego-based conceptualization of these two. This finding is also in line with the embodiment argument again (Lakoff & Johnson, 1980). When instructed to gesture, our participants took the reference point to themselves whenever possible and produced ME gestures for both ME and MT scenarios.

A comparison between the spontaneous and elicited gesture condition results presents an interesting picture. The scenarios worked mostly the same with some extra involvement of the Time-RP gestures for ME scenarios and ME gestures for MT scenarios in the elicited gesture condition. Both of these findings can be explained by the participants' paying closer attention to the stimuli and assuming the reference point for themselves in an embodied conceptualization of time, respectively. However, the speech-gesture analyses showed that the temporal perspectives were adopted qualitatively similarly regardless of the gesture condition. Although the elicited gesture condition made the participants produce more gestures, the distribution of these gestures was very similar across conditions. This picture of data is at odds with temporal gesture axis studies. Past research showed that we show a closer coupling of verbal language and gestures when we are instructed to gesture, which was explained by people attending to the verbal language and thinking about how we would speak about the concepts (Casasanto & Jasmin, 2012; Walker & Cooperrider, 2016). This may be true for temporal gestures' axes, which mostly vary between the sagittal timeline and the lateral timeline that does not have a place in verbal metaphors, but it is not supported by our data in the context of temporal perspectives. Our findings, however, further support the body of research on temporal perspectives. We incorporate temporal perspectives into our temporal thinking when we read statements written in these perspectives (McGlone & Harding, 1998), when someone asks a question framed in a certain perspective (Gentner et al., 2002), or even when we experience a corresponding bodily motion in our daily lives (Boroditsky & Ramscar, 2002). Combined with these findings, our study shows that we took temporal perspectives qualitatively similarly when we gesture spontaneously or deliberately. However, our thinking of time in terms of temporal gestures do not follow the classical ME-MT distinction. It rather reflects the Ego-Reference-Point vs. Time-Reference-Point distinction of Nuñez and colleagues (2006), with the ME and Time-RP perspectives forming the two extremes, and the MT perspective falling on the middle, somewhat closer to ME gestures.

In conclusion, this study investigated the links between temporal perspectives and temporal gestures by studying temporal gestures produced within and across different perspectives, and speech-gesture pairs. Our participants showed a similar distribution in their gesture perspectives in the spontaneous and elicited gesture conditions, with some minor differences across conditions. Our results showed that temporal perspectives are adopted similarly in the context of temporal gestures whether we deliberately gesture or not. The distribution of temporal gestures resembled the Ego- versus Time-Reference-Point dichotomy with MT gestures standing closer to the ME gestures. That is, our data fits the deictic versus sequence time conceptualization better than the ME versus MT distinction. Further research with more metaphors and different conditions may shed more light on how we gesture in different perspectives with respect to spatial metaphors of time.

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