Temporal procedures of mutual alignment and synchronization in collaborative meaning-making activities in a dance rehearsal

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Synchrony is a members' interactional solution for dealing with multiple relevant interactional tasks simultaneously when working on two or more separate, perceptual, and equally relevant projects, e. g., when dancing while pointing out a feature of the ongoing dance. This paper focuses on moments in which participants engage in joint meaning-making to identify, negotiate, and implement displayed multimodal gestalts of the choreography. Three temporal procedures of mutual alignment and synchronization were identified through a conversation analytical approach in combination with marker-less motion tracking movement analysis of a dance rehearsal: delays, accelerations, and accentuations. The analyses revealed that synchrony requires constant coordination in order to establish, maintain, and dissolve alignment between participants and their multimodal resources.

KEYWORDS

synchrony, alignment, multimodality, multiactivity, coordination, movement analysis, conversation analysis, dance

Introduction

Temporality is an essential feature of social interaction (Deppermann and Günthner, 2015). In the field of linguistic interaction research (e.g., Couper-Kuhlen and Selting, 2018), the temporality of spoken language has been conceptualized as online syntax (Auer, 2007) and studied in terms of incrementality and emergence of spoken language (Günthner, 2011). Most recently, the shift toward multimodality in the study of conversation analysis (cf. Mondada, 2019) has led to a focus on temporality in multimodal interactions. As such, the temporal logics of different processes (e.g., speaking and dancing, Keevallik, 2015), the prospectivity of deictic projections (Stukenbrock, 2018), and the retrospectivity of delayed completions (Oloff, 2018) have come into focus. Following Deppermann and Streeck (2018, p. 4), there are three factors involved in the temporality of interactions:

(a) temporality as duration: e.g., pauses in speech, stretched syllables, phases of movement within a gesture, and entire sequences of actions as "time-objects"

(b) temporality as frame of reference: e.g., the retrospective and prospective perspectives of participants on interactional events

(c) temporality as timing: e.g., temporal coordination of different phenomena, such as the linking of gestures and speech

This paper draws on all three by focusing on both the anticipation of verbal courses of action and movement trajectory estimations as basic requirements for synchronization in interactional situations like collective dance activities. Recent research on synchrony in interactions (e.g., Pfänder and Couper-Kuhlen, 2019) suggests that synchrony is used by participants for communicative purposes in narratives (see Section Mutual alignment and synchronization in social interaction for a literature review). Yet, the communicative function synchronization may have outside storytelling sequences (e.g., for collaborative activities) remains largely unexplored. Therefore, this paper investigates how and for what purpose interactants synchronize with each other in collaborative situations. Which alignment procedures do we find for verbal and bodily synchronization practices? Furthermore, what is the function of the similarity of multimodal gestalts (i.e., symmetry) for these synchronization practices?

Dances are appropriate for investigating these research questions because various processes can be regularly observed in dances in which participants resonate and synchronize with each other. These include alignment with the beat of the music, bodily synchronization with dance partners, and the integration of verbal sense-making activities (e.g., instructions, explanations, or inquiries) into the dance movements.

Alongside advances in multimodal interaction research, the collaborative, interactive production of dance is increasingly becoming a research focus in conversation analysis (Bassetti, 2014; Albert, 2015). Most relevant studies have focused on the interactions between dance teachers and students (Keevallik, 2015), between two dancers (e.g., the legitimacy of a dance hold as examined by Keevallik, 2021), or the coordination of a simultaneous movement start (Broth and Keevallik, 2014). However, until now, there has been no systematic description of the temporal procedures of these interactional alignment practices in dance rehearsals through which dancers establish synchronization of movement.

Therefore, this article aims to explore the temporal procedures (including delays, accelerations, and accentuations) that dancers use to establish alignment and synchronize with one another in terms of intensity, speed, and multimodal gestalt (Mondada, 2014). Thus, this article both connects to current research on personal and intercorporeal coordination in face-to-face interactions (Deppermann, 2014; Meyer and Wedelstaedt, 2017) and offers insights into the interactional and temporal practices of mutual alignment in a complex communicative project like a dance rehearsal.

Background

Temporal organization in interpersonal communication

In social interaction research, the simultaneous presence of different expressive resources is called multimodality. Recent studies on interactional multimodality have shown that all modalities can be equally relevant for interactants, meaning that none should be treated as automatically superior unless explicitly displayed by the participants. Modalities do not occur individually, nor are they perceived separately by interactants. The totality of all perceivable multimodal resources of a given participant in a given situation is referred to as a gestalt; this concept is in line with the holistic perspective on multimodality in interaction research (Koffka, 1928, 2013 [1935]). The central principle of gestalt theory is supersummativity, the idea that the perceived whole is more than the sum of its individual parts. Utilizing this principle for multimodal investigations allows for the definition of interactional displays as multimodal gestalts of simultaneously relevant resources that result from the situational actions of the participants. To date, the gestalt concept has only been applied to isolated resources, such as prosody (Couper-Kuhlen, 2009) or gestures (Streeck, 1993), due to interaction research's focus on linguistic features. Krafft and Dausendschön-Gay (2003) extend this perspective with their holistic concept of communicative gestalts, indicating that participants treat individual utterances as multimodal units due to their gestalt-like nature. Mondada (2014, p. 136) takes this idea further by describing all interactional contributions as "complex multimodal gestalts." According to this, pointing gestures should be described not only as arm and hand movements, but as movements of the whole body that use all multimodal resources (including posture, gaze, facial expressions, etc.) in their sequential environments.

With a multimodal perspective on social interaction, the organization of multimodal resources as interpersonal and intrapersonal coordination processes (Deppermann, 2014) moves into the research focus. Interpersonal coordination encompasses those multimodal behaviors through which interactants interactively coordinate with each other. This includes all sequential procedures, which are usually the foci of conversation analysts: Who acts in what ways in relation to whom? How do interactants indicate their understanding of previous interactional contributions? Intrapersonal coordination, then, describes the self-organization of multimodal expressive modalities: When does a gesture reach its climax? How do interactants establish simultaneity of their multimodal resources? The concept of coordination allows for the analysis of the reciprocal processes of both multimodal self-organization and the organization of multiple activities with other interactants. One particular form of coordination discussed in detail in the following Section Mutual alignment

and synchronization in social interaction is synchronization. In this paper, synchronization of multimodal resources is relevant as the rehearsal participants utilize it to align with each other and with the dance rhythm in order to engage in collaborative meaning making.

Closely linked to synchronization is the phenomenon of the simultaneous relevance of multiple activities; this is known as multiactivity (Haddington et al., 2014). To date, this term has subsumed all interaction analyses that examine the simultaneity (of whatever kind) of multiple activities in interactions (e.g., Nishizaka, 2014; Hoey, 2018; Kamunen, 2020). The phenomenon of multiactivity encompasses the coordination practices of complex activity packages in which participants must maintain their involvement in and the co-relevance of multiple courses of actions (Haddington et al., 2014, p. 3). In doing so, multiactivities follow their own temporal logics, which need to be aligned by participants to enable simultaneous coordination (Mondada, 2008). With the help of simultaneous coordination practices, interactants combine two or more courses of action (=activities) into one interactional unit (=multiactivity) (Mondada, 2011) until the same resources are needed for different activities (Ticca, 2014). Multiactivities increase the complexity of face-to-face interactions because participants use different multimodal resources in different orders for different courses of actions (Mondada, 2014) and pose particular demands for all participants in interactions. Multiactivities occur when interactants have two or more separate, perceptual, and equally relevant projects (Licoppe and Tuncer, 2014) to work on, e.g., performing a dance while discussing a feature of that dance. Multiactivities are not randomly occurring, inference-rich phenomena that interactants must deal with. Instead, they are both a "collective, collaborative, and intersubjective" (Haddington et al., 2014, p. 6) manufacturing effort of an entire interactional ensemble *in situ* and an interactional solution for dealing with multiple simultaneously relevant interactional tasks.

Mutual alignment and synchronization in social interaction

Interactional alignment is one of the basic requirements for face-to-face social interactions (Stivers, 2008). As interactants mutually orient themselves to each other, a social resonance is created that enables participants to, among other things, produce complex communicative projects (Luckmann, 1995; Linell, 2009) like dance rehearsals. Thus, reciprocal alignment is a prerequisite for synchronization in interaction. Synchronization as the "dynamic and reciprocal adaptation of the temporal structure of behaviors between interactive partners" (Delaherche et al., 2012, p. 351) encompasses processes through which interactants' multimodal resources are aligned in terms of speed, intensity, and form of realization. As research on interactional overlap suggests, participants purposefully vary the tempo of their speech in order to obtain the right to talk (Jefferson, 1973, 1986; Schegloff, 2000). Conversely, participants can also align with the speed of a turn to synchronize with another speaker's turn. This can be accomplished such that the multimodal resources that are "attuned" to each other are performed synchronously, e.g., when interactants finish sentences in unison (Pfänder and Couper-Kuhlen, 2019) (=simultaneous synchronization) or when other interactants practice gestural matching (Lerner, 2002; Sidnell, 2006) (=post-simultaneous synchronization).

Thus, if simultaneity describes the moment of temporal relation in which two or more (communicative) units (resources, practices, actions, activities, etc.) relate to each other, synchrony instead refers to the similarities between aligned communicative units. As Condon and Ogston (1966) showed using film recordings of an isolated utterance at 48 frames per second, synchrony in communicative situations occurs when so-called "patterns of change" (Condon and Ogston, 1966, p. 338) can be observed in kinesthetic behavior with respect to the immediate temporal antecedent. These patterns of change can be divided into self-synchrony (congruence of speech and body movement) and interactional synchrony (changes in body configuration by listeners in relation to speakers; cf. Condon, 1970). Thus, synchrony in interactions, as a special type of personal coordination, exhibits the same distinction between intrapersonal and interpersonal synchrony as coordination (cf. Deppermann, 2014). It is important to note that every (interactional) synchronization requires both intra- and interpersonal coordination, but not every intra- and interpersonal coordination results in synchrony. In situations like a dance rehearsal, the synchrony of simultaneous activities is made possible by the fact that interactants have established a common focus of attention that is maintained for the duration of the synchronization if not longer (cf. Chetouani et al., 2017). Furthermore, routinizations (Streeck and Jordan, 2009) or preparation markers that project specific activities (Auer, 2005), also allow participants to respond to actions before they are even performed. Synchronizing simultaneous actions can mean that participants simultaneously perform actions others are already engaged in (so-called symmetrical synchronization, Kim, 2015), e.g., in choral speaking (Lerner, 2002), mirroring the postures of co-participants (Kendon, 1970), or in this paper, moving to music in the same way as other participants. In asymmetrical synchronization, however, participants synchronize different simultaneous actions with ongoing actions by other participants. Examples include nodding in relation to speech (Whitehead, 2011) or, in this paper, placing footsteps to the rhythm of music.

Synchronization is not only observable in activities like a partner dance, but also in everyday settings like job applications (Delaherche et al., 2012), couples therapy (Tschacher and Ramseyer, 2017), and triadic situations of shared storytelling

(Zima, 2017). One explanation for synchrony in social interactions is positive relational work, which is the idea that the more synchronized a relationship is, the more positive (Kim, 2015). Synchrony is an interactional state or process that occurs when participants have coordinated their multimodal resources for both form and timing (McDowall, 1978). Pfänder and Couper-Kuhlen (2019, p. 25) describe the synchrony of speech and non-verbal behavior of two participants as "choral performance," thus (re)integrating verbal modality into the corporal synchrony concept, making the study of synchrony possible within the field of multimodal conversation analytics. When examined with this perspective, interactants establish synchrony when they align their gestalts, e.g., when dancers adopt the choreographer's posture, as illustrated in this paper. As synchrony involves similar forms, intensities, frequencies, and paces of actions, interactors use different temporal relation procedures, such as pauses, delays, or accelerations of individual movement trajectories, to synchronize. Furthermore, in the context of multiple activities, synchronization enables the simultaneous processing of multiple local interaction tasks, and thus complex communicative projects like dance rehearsals. With the help of various synchronization procedures, interactants combine their practices when participating in a multiactivity such that functionally divergent interactional tasks can occur simultaneously. A prerequisite for this is the structural compatibility of the multimodal resources of the co-relevant activities. Thus, while intra- and interpersonal coordination involve the organization of the activities that are part of every face-to-face interaction, synchronization focuses on the relationship between those activities. If activities are similar in terms of shape and function, they are considered synchronous (Pfänder et al., 2017). In the following, the synchronization concept developed based on monoactivity interactions will be transferred to simultaneous coordination processes of multiple activities. The focus here is on both synchronization for the purpose of communicative projects and the practices through which interactants adapt to structurally compatible multiactivities in terms of form, intensity, and speed. In sum, this study shows how dancers must align their multimodal gestalts to successfully collaborate on a dance rehearsal.

Dance in social interaction research

According to Goffman (1974, p. 66), a dance instruction is "an activity taken out of its usual functional context in order to allow someone who is not the performer to obtain a close picture of the doing of the activity." Dancing requires participants to focus on both the inter- and intrapersonal coordination of multimodal resources. However, unlike activities such as instructions, dancing is an activity that requires synchronization (Pfänder et al., 2017), much like choral singing or joint piano playing (Reed, 2015). While dance was rarely considered in

the field of interactional analysis before the 2000s (Levy, 1987 is an exception), the collaborative, interactive production of a dance has increasingly become a research focus with the rise of multimodal studies in interactional research. Recent studies on dance in interaction focus on creating intersubjectivity in partner dances (Bassetti, 2014; Bassetti and Bottazzi, 2015), the use of bodily resources for adjusting elements in dance lessons (Keevallik, 2010, 2013, 2015), and the interactional work partners conduct to count into a dance (Broth and Keevallik, 2014). Most recently, Ehmer's (2021) study on the multimodal synchronization practices of demonstrations in dances reveals that synchronization can be either emergent (i.e., when bodily alignment can be performed at any time) or orchestrated (i.e., when bodily alignment is required). These studies indicate the vital importance of the intercorporeal coordination of the dancers. In a pair dance, the two dancers act as one body: the movement of one is followed by the other, which, in turn, makes its own movement perceptible to the other. When dance partners are synchronized intercorporeally (Meyer and Wedelstaedt, 2017; cf. Goodwin, 2017), they are able to continue the logic of dance; two bodies are performing complementary, synchronized actions at very small distances, or even with direct body contact, within the same rhythmic-temporal temporality (cf. Keevallik, 2015).

All of these studies indicate the importance of intercorporal coordination in synchronized dance activities. However, temporal alignment practices have not been specifically addressed until now. One exception is Albert's (2015) study on the rhythmic coordination of performers and audiences in partner dance, which utilized beats as units of temporal alignment. While this hints at temporal synchronization, the synchronization practices of multimodal gestalts in terms of form, intensity, and speed cannot be described by temporal dimensions alone. To address this research gap, this paper aims to combine conversation analytical methodology and marker-less motion tracking of dance movements as described in the following section.

Data and methodology

The audiovisual data basis for this paper is a 36-min sequence in which participants in a German theater production work with a choreographer on the play's opening waltz. Since neither the actors nor the director had in-depth dance experience, the choreographer had to primarily use her body, and those of the participants, to suggest, instruct, and correct dance steps and figures. Therefore, our analysis focuses on sequences in which the participants engaged in joint meaning-making in order to identify, negotiate, and implement the displayed multimodal gestalts of the dance elements.

The data is presented in transcripts that follow GAT2 conventions (Couper-Kuhlen and Barth-Weingarten, 2011).

For multimodal annotations, Mondada's (2018) conventions were used. The analytical approach of the paper is within the framework of multimodal conversation analysis (Goodwin, 2018; Mondada, 2019), this involves a data-driven, subject-based perspective on the mutually synchronizing interactants.

In addition to audiovisual data, marker-less motion tracking (Pfeiffer, 2013) was used to analyze alignment practices regarding the dynamic position work in space and the distances between the dancers. Tracking was done using Adobe After Effects' built-in tracking tool. First, the single pixels of the dancer's left foot (unless stated otherwise) were tracked in 2d space. This data was then copied onto a shape layer where a line was drawn using the tracked coordinates. The lines were then normalized using the RotoBézier function, slightly adjusted for perspective distortions, drawn onto a white background, and visually analyzed in the context of the unfolding sequence. In the graphs, movement trajectories always start at the top of the image and move down; in that sense, the y-axis represents dance distance and x-axis represents movements to the left or right from the dancer's point of view. Excerpts 4 and 5 also contain time aligned spectrogram information that was extracted *via* PRAAT (Boersma and Weenink, 2022).

Temporal procedures of mutual alignment and synchronization in dance rehearsals

This section presents five cases in which participants engage in collaborative meaning-making sequences within a dance rehearsal. In all cases, a choreographer (CHO) guides an actress (ACF) and an actor (ACM) through a dance by simultaneously demonstrating dance elements and taking part in the dance itself. Thus, all cases involve multiactivity organizations of at least two co-relevant activities. The cases are part of a larger sequence in which the participants are working on the figure of the turn in a waltz. Both actors, according to their own statements, have experience with dance; the actor had mastered the basics of folk dances and waltzes while the actress had knowledge of ballet and jazz. Therefore, both actors understood that the male dancer must assist the female dancer during a turn. In this example, however, a turn needed to be defined for a dance that does not actually provide for a (single) turn of the female dancer. Therefore, developing a turn in a waltz specifically, as well as the entire choreography, more broadly, was new to all participants. Accordingly, the participants utilized the temporal procedures of mutual alignment and synchronization for collaborative meaning-making.

Each of the five cases represent one type of synchronization practice as follows: verbal (excerpt 1) and bodily (excerpt 2) delays, verbal (excerpt 3) and bodily (excerpt 4) accelerations, and multimodal accentuations (excerpt 5).

Verbal and bodily delays

The first case involves three verbal delaying practices (pause, lengthening, and verbal recycling) through which the participants establish synchrony between the verbal instruction and the bodily dance. Before the start of the excerpt, the actress asked the choreographer if she could teach a way to turn in a classic waltz. The choreographer initially refused because there are no single turns in waltzes. However, when the actress insisted, the choreographer complied as shown below.

Excerpt 1: Verbal Delaying Practices as a Synchronization Device

```
018   CHO    ähm-
             uhm
019   ACF    also wenn das PASST wenn das passt;
             so if that works if that works
020          wenn nicht (unverständlich)
             if no (unintelligible)
022   CHO    wir können das so MACHen,
             we can do it like this|
023          *(---)#
      cho    * approaches ACF & ACM-->
      fig          #fig.1.1
024   CHO    äh: *wenn man dann zum BEIspiel,
             uh when you then for example
      cho    --->*takes ACM's hand--------->
025   CHO    *wenn man (.) HIER ist,#  *
              when you are here
      cho    *moves into dance position*
      fig                      #fig.1.2
026   CHO    *dass man EINfach nur-*
              that you just
      cho    *moves into ACM's arms*
027   ACF    geNAU; (-)
             exactly
028          das is [SCHÖN];
             that is nice
029   DIR           [JA:  ] (.) das is schön;
                    yes, that is nice
```

This excerpt begins with the choreographer complying with the actress's request ("we can do it like this," line 022). She walks onstage (Figure 1.1) and approaches the actor and actress silently (line 023). The verbal pause between the projection (line 022) and the following sentence (line 024), during which she complies with the request, allows the choreographer to put the activity *explaining a turn in a waltz* on hold for a short time until the resources of her second activity, *dancing*, have been mobilized, i.e., standing next to the actor, assuming a dancer's posture. The pause as a verbal delaying practice thus enables the following synchronization of participants.

The choreographer then grabs the actor's hand (line 024), acquiring him as another intercorporeal resource for her dancing activity. She begins her explanation activity before she has fully grasped his hand; to bridge this gap of her not yet fully mobilized dance figure, she resorts to another delaying practice. She performs a particle ("äh," line 024) that she stretches until her hand has grasped his (Figure 1.2). Thus, in addition to the pause, the stretching serves to prepare for the synchronization of the participants' intercorporeal-kinesthetic coordination.
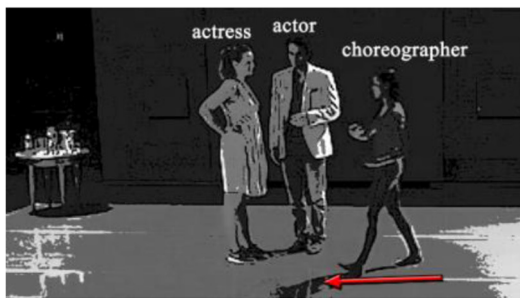
FIGURE 1. 1
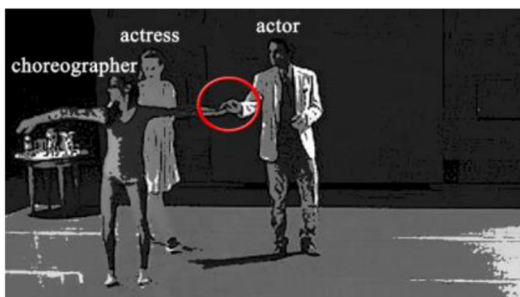CHO walks toward ACF and ACM.

FIGURE 1. 2
CHO takes dancing posture.

The choreographer has now acquired the intercorporeal resource of the couple, but still must establish her dance posture. She interrupts her own verbal participation in her explanation, meaning that her utterance "uh when you then for example" (line 024) remains syntactically incomplete. While she then adopts her dancing posture, she restarts her explanation by recycling speech material from her previous utterance ("when you are here," line 025). In this way, she once again buys herself time to adopt the necessary starting posture for the multiactivity *dance explanation*. Furthermore, she again delays the explanation in favor of her still-incomplete dance gestalt by utilizing a micro-pause (line 025) to synchronize her two activities, namely explaining and dancing. She synchronizes her two activities in such a way that the focal action phases (cf. Hoey, 2018) of both activities can be realized at the same moment ("here," line 025). Thus, the multiactivity becomes possible with the next utterance (line 026) as a synchronized syntactic-bodily gestalt (Keevallik, 2015). Simply put, she explains what she dances and dances what she explains.

Both the actress (lines 027–28) and the director (line 029) respond positively to her performance, thus displaying their understanding of the multiactivity as a collective sense-making device. This occurs at the moment that the choreographer

has synchronized her dancing and explanation activities and realized them simultaneously. The actress and the director indicate that the multiactivity is only ratable when the choreographer has synchronized her multimodal resources and formed a dance-explanation gestalt. The director and the actress clearly do not treat the synchronized activities as separate, but rather as one combined activity (a multiactivity). Therefore, it is not possible to distinguish which of the activities their visual and verbal actions are referring to. This is due to the close alignment of the activities, which are interdependent and mutually refer to each other. Thus, the choreographer achieves self-synchronization by using the delay practice of stretched particles, phases of verbal abstinence, and speech material recycling to slow down the verbal explaination in favor of the speech-free dance activity.

Delaying practices can also be observed in bodily activities, as shown in the following excerpt in which the choreographer slows down her kinesthetic actions until the actress reaches a certain moment in the choreography (turning around). In this way, the choreographer allows the actress to synchronize her actions with those of both the choreographer and the actor.

Excerpt 2: Movement Delaying Practices as a Synchronization Device

```
031 CHO GEnau;
        exactly
032     =[ei]ns zwei DREI?
          one two three
033 ACM [hm]
034 CHO und dann vielleicht *drehst +du DICH* um?
        and then maybe you turn around
    cho                      *turns around---*
    acf                             +turns----->
035 SCW ja;+#
        yes
    acf -->+
    fig    #fig.2.1
036     *(---)
    cho *changes dance hand grip-->
037 CHO und gehst +so (-)* in die HAND,
        and you go into the hand like this
    cho             -->*
    acf       +mirrors cho's dance hand posture-->
038 CHO und dann *+(5.0)#
        and then
    cho         *dances-->>
    acf          +dances-->>
    fig              #fig.2.2
```

The choreographer counts the ¾-beat of the waltz while leading the actor by the hand; the actress dances alone. The choreographer's recipient design addresses the instructions to the actress as it is she who must carry out the instructions. Thus, the choreographer must ensure that the actress can synchronize her multimodal resources with the multiactivity while simultaneously leading the actor by the hand and demonstrating the dance to him. The choreographer achieves this by first transferring her beat counting into an announcement "and then maybe you turn around" (lines 034) and then implementing the described figure (the turn) herself. However, instead of immediately following the next step in the choreography (changing hand postures), the choreographer

remains in this position with the actor holding her hand. In this way, she delays her dance, both intercorporeally indicating a pause to the actor and giving the actress the opportunity to perform the turn herself. This enables the actress to align with the progress of the multiactivity and synchronize her multimodal resources with those of the choreographer. The choreographer continues the dance only after the actress has turned and ratified the turn through a verbal feedback particle ("yes," line 035). This particle, in combination with the established eye contact (Figure 2.1), acts as a synchrony marker, indicating to the choreographer that the actress has synchronized with the multiactivity and the choreographer's gestalt. Having established synchrony between participants, the choreographer can continue her instruction.

With eye contact between the actress and the choreographer established, the latter changes the positioning of her hand (line 036), offering description of the movement shortly before the completion of the action ("and you go into the hand like this," line 037). Even before the target object of the action (hand) is introduced by the choreographer, the actress begins to imitate the shown but not yet described action with her imagined dance partner. The actress performs the imitation by physically mirroring the choreographer as the gestalt-giver while simultaneously continuing to orient herself so that she can

monitor the choreographer's further movements (Figure 2.2). This makes it clear that the actress is not only orienting herself to the verbal action of the instruction but also to the gestural-proxemic action of the dance. In this way both parts of the multiactivity contribute to the communicative project of the dance instruction. The choreographer also organizes her actions in such a way that she can monitor the progress of the actress, allowing the choreographer to wait for the actress's hand to change before announcing the next step in the choreography ("and then," line 038). This announcement is again defined as a verbally incomplete syntactic-bodily gestalt that all three participants perform simultaneously, thereby indicating symmetrical synchronization. The choreographer enables the actress to synchronize with the ensemble multiactivity by pausing her kinesthetic participation, as opposed to her verbal participation. In contrast to the previous excerpt, the delays here occur as part of a stop-and-go procedure; the choreographer performs a step of the choreography and then pauses her gestalt until the actress has also performed it. Thus, it is both the actress who synchronizes with the choreographer's action and the choreographer who aligns her participation in the ensemble multiactivity with that of the actress while intercorporeally coordinating with the actor. Synchronization status can be observed using a movement analysis, as shown Figure 2.3 below.

The movement analysis reveals three things. First, it shows the different levels at which the participants are synchronized with each other. When looking at the choreographer's movements, a regular pattern of one step forward on one followed by a movement to the side on two and three emerges. The actress also follows this pattern, but her movements take much more space than the choreographer's. When the dance sequence finishes, the actress's alignment converges even more such that when the choreographer ends the dance with a
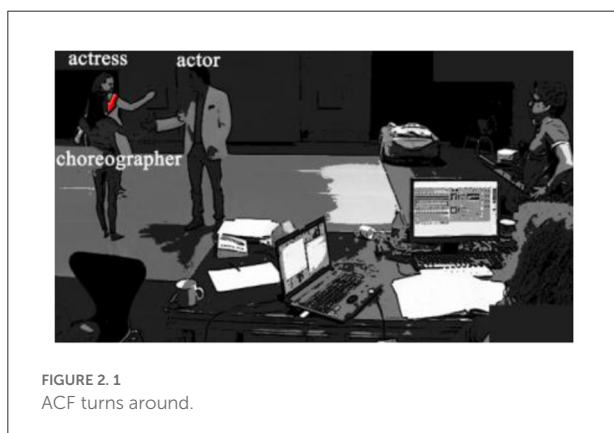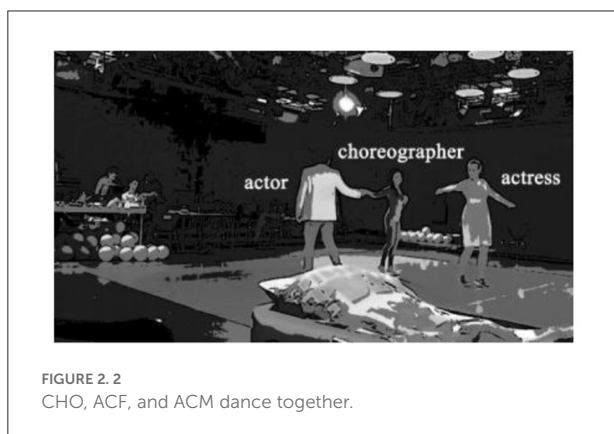

FIGURE 2. 1
ACF turns around.

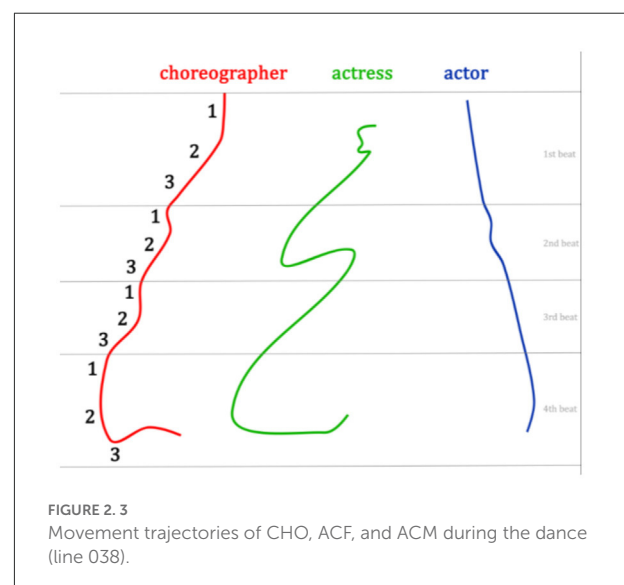FIGURE 2. 2
CHO, ACF, and ACM dance together.

FIGURE 2. 3
Movement trajectories of CHO, ACF, and ACM during the dance (line 038).

variation, the actress can duplicate this gestalt (see the large arc at the end of the graph). The actor's sideways movements show little variation, indicating a reduced dance style with a lack of effort. However, the 2nd and 4th beats particularly reveal his synchrony with the choreographer; he performs inversions of her sideways movements. Second, the analysis illustrates the different times at which the participants join the collective activity. Unsurprisingly, the choreographer starts her dancing self-synchronized with her imagined beat. The actor, still connected to the choreographer *via* intercorporeal handholding, starts to move just a short time later. This is different for the actress, who joins the collective dance last. The discrepancy of starting times can be explained by the lack of a projected go-time (cf. Broth and Keevallik, 2014). The choreographer's "and then" (line 038) indicates that a joint dance is imminent, but the precise starting time is unclear to the actor and actress. At the end of the dance, however, this changes; having established synchrony, the participants can interpolate the moment when the last "three" of the imagined, though commonly oriented to the beat, movements will take place. This is visible in the graph; all three participants end the dance almost at the same time. Third, the movement analysis shows actress's struggles to obtain synchrony. Not only is she delayed in her dance participation, but her footwork in the 1st beat suggests her working to match the choreographer's foot position.

Verbal and bodily accelerations

Synchronization involves practices not only of delay but also of acceleration; these practices become possible when participants can anticipate ongoing interactional projects. According to Streeck and Jordan (2009, p. 94), such anticipation arises through routinization, which makes a projection of the next steps and thereby a synchronization, possible: "specific types of interaction episodes—in fact, formalization and

FIGURE 3.1
CHO's and ACM's mutual gaze.

routinization alone—serve to make interaction predictable to some extent." In the following two excerpts, the participations utilize the routinized nature of a dance as a pre-agreed sequence of steps in order to re-align with ongoing dance activities. The first excerpt shows the choreographer's coordinative work to re-establish her counting after the actor has asked a question. It demonstrates how the choreographer resorts to a synchronization practice of acceleration while intercorporeally coordinating with the actor and simultaneously coordinating a request from him without dissolving the synchrony of the multiactivity.

Excerpt 3: Verbal Acceleration Practices as a Synchronization Device

```
029 CHO  wenn man (-)°h dies:es
         when you are doing this
030      *EINS zwei drei EINS +[zwei drei EINS zwei drei-   ]
         one two three one two three one two three
    cho  *dances-->>
    acm                        +dances-->>
031 ACM                         [wenn wir hier @VORn +sind,@+]#
    cho                          when we are here in front
                                               @gaze to ACM@
                                                     +nods--+
    fig                                                      #fig.3.1
032 CHO  GEnau;#
         exactly
    fig        #fig.3.2
033      =[ei]ns zwei DREI? |
          one two three
034 ACM  [hm]
```

At the beginning of the excerpt, the choreographer synchronizes her rhythmic action and her counting/describing action by moving her feet in synchrony with her counting (excerpt 5 will focus on this phenomenon in greater detail). Both the actress and actor, whom the choreographer still leads by the hand, synchronize as gestalt-takers with the choreographer as gestalt-giver. Being synchronized with the collective dance instruction activity, the actor establishes another activity by means of a question (line 030). The choreographer reacts to this new coordinative demand in such a way that, while continuing to count the beat and to move her feet in time, she first establishes eye contact with the actor (Figure 3.1), nods in response to his question, and additionally verbalizes her confirmation ("exactly," line 031). While this validates the conditional relevance of the actor's question, it also poses a new coordinative problem regarding the synchronization of the ongoing multiactivity.

The choreographer's two-syllable feedback particle "GEnau" ("exactly," line 031) occurs in the moment of the one-count within the dance instruction. At this point, a synchronization problem arises for the choreographer; by answering the question, she is now one beat behind. She solves this problem with two practices. First, she maintains her speed, thereby also maintaining alignment with the collective dance. Second, she uses a quick verbal connection that latches her answer to her counting (line 032). By skipping half a beat, she restores the synchrony of her kinesthetic movement practices and her counting action. In the course of her re-alignment, she breaks eye contact with the actor (Figure 3.2) and subsequently continues the counting activity. In this way,

the choreographer can re-synchronize her instruction with the dance activity to which the other two participants also orient themselves.

In the following excerpt, the actor resorts to a practice of acceleration, skipping a dance step in order to synchronize with his dance partner (in this case, the actress). The choreographer then acts as beat giver by providing a regular rhythm to which the actors orient.

Excerpt 4: Movement Acceleration Practices as a Synchronization Device

```
060    CHO    und dann,
              and then
061           (---)
062    CHO    *+CHA cha cha,
       acf    *dances-->
       acm     +dances-->
063           CHA# cha *cha*,
       acf              *intermediate step*
       fig       #fig.4.1
064    CHO    #CHA,*+
       acf       -->*
       acm       -->+
       fig    #fig.4.2
065           (--)
066    CHO    und dann drehst du dich wieder UM,
              and then you turn around again
```

In this excerpt, the choreographer sets the ¾-beat of the waltz by vocalizing each beat with a "cha" sound, emphasizing every first count ("CHA cha cha," line 062). The actress has aligned, and thus synchronized, her dancing with this rhythmic instruction consisting of non-lexical vocalizations (Keevallik, 2018). The actor's interpersonal alignment with the choreographer's verbal rhythm, as well as his intercorporal alignment with his dance partner, become clear when the actress improvises an intermediate step (line 063), changing her foot position. Instead of copying this intermediate step and thus risking asynchrony with the multiactivity, the actor skips this step and, in this way, accelerates a small part of his choreography. He does this by placing his right foot, which he had already placed behind him during previous

regular step (Figure 4.1), even farther back (Figure 4.2), becoming re-synchronized with both his dance partner and the choreographer's rhythm.

By skipping a dance step, thereby "fast-forwarding" his part of the choreography, the actor synchronizes with the collective multiactivity. This is possible in this situation because the next steps in the choreography are predetermined and projected from the previous step. Hence, the actor can anticipate where the actress will be on the next beat with the help of the rhythm encoded in the choreographer's instruction. The routinization of the dance movement synchronized with the choreographer's counting enables the actor to predict where the actress will put her foot on the next beat so he can act accordingly. Thus, both parts of the multiactivity contribute to the actor's ability to use the acceleration practice. While the instruction provides the rhythm, and thus the temporal frame, of the expected actions, the dance provides information regarding the concrete realization of the kinesthetic action. Therefore, the actor synchronizes both with respect to the speed given by the verbal action and the form given by the kinesthetic participation.

The movement analysis of the dance segment (Figure 4.3) suggests that both actors are aligned with the choreographer's counting. As in the choreographer's dance pattern in Figure 2.3, both actors take one step forward on one (here: emphasized CHA), followed by a movement to the side on two and three (here: cha cha). As compared to their movement patterns in Figure 2.3, where the actress displayed spacious (larger steps) and the actor reduced footwork (smaller steps), both use similar dance trajectories here. As this excerpt occurred several dance iterations after the previous one, it documents the actors' learning of the waltz. This implies the presence of a form of routinization, which the actor draws on when the actress initiates the improvised intermediate step on the 2nd beat. The spectrogram suggests that this step occurs before the third cha of this beat, meaning that the actor has little to no reaction time. Consequently, his movement trajectory shows no sign of attempting this new dance figure himself, which would sacrifice
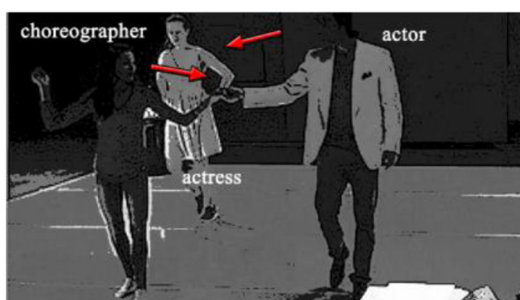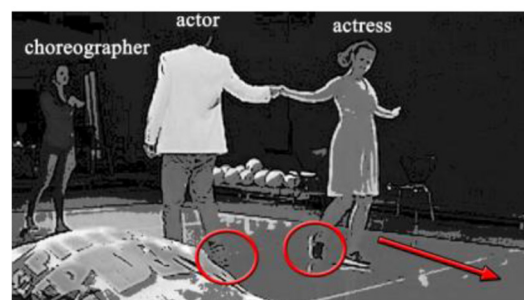

FIGURE 3. 2
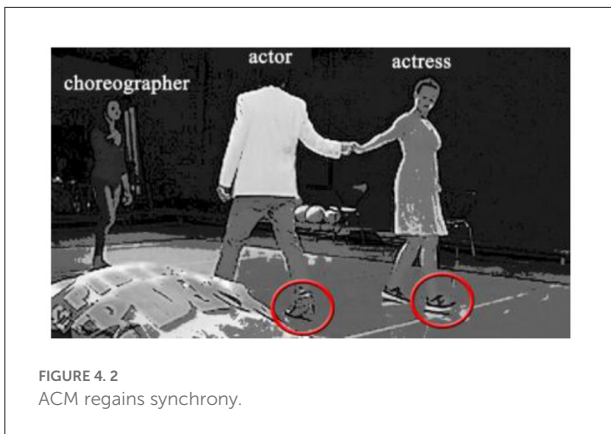CHO gazes past ACM.

FIGURE 4. 1
ACF realizes an intermediate step.

FIGURE 4. 2
ACM regains synchrony.

FIGURE 4. 3
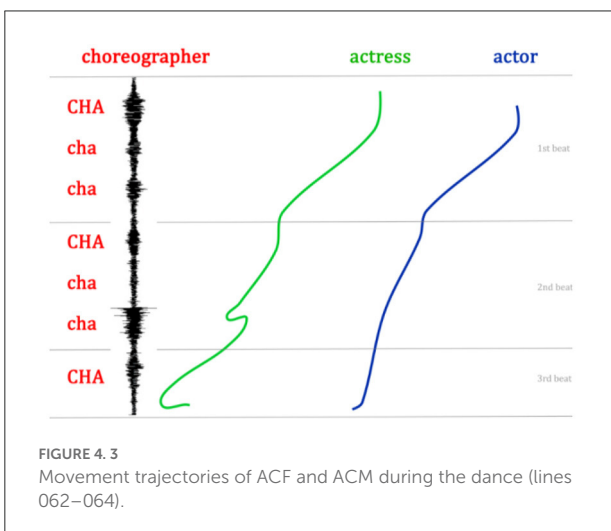Movement trajectories of ACF and ACM during the dance (lines 062–064).

FIGURE 5
Movement trajectories of CHO during the dance (line 029).

synchrony. The fact that he is reacting to the improvisation by accelerating his footwork becomes clear when he is able to end on the last CHA with his dance partner. If he had maintained his speed, his movement graph line would have been longer. This becomes apparent when analyzing the beginning of the respective graphs; while the actress starts dancing in synchrony with the first count of the choreographer, the actor starts relatively late. To establish synchrony, he must accelerate his dance participation.

Verbal and bodily accentuations

The remainder of this paper focuses on the verbal and bodily self-synchronization of the choreographer, which she uses to establish a regular rhythm for the actors to orient to within their collective dance instruction multiactivity. The following excerpt is taken from the beginning of excerpt 3, in which the choreographer holds the actor's hand while the
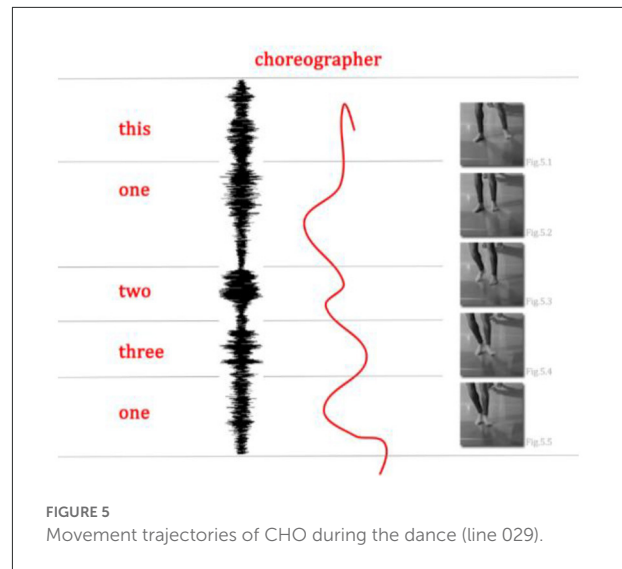
actress is dancing alone behind them. This illustrates the fine-grained interwovenness of verbal resources, movement, and (foot) posture.

Excerpt 5: Verbal and Bodily Synchronization Device for Accentuation purposes

```
029 CHO  wenn man (-) °h die:ses *EINS zwei drei EINS zwei drei EINS zwei drei
         when you are doing this one two three one two three one two three
    cho                          *dances--------------------->>
```

As described in excerpt 3, the choreographer first needs to get into position to start the dance; she does this by utilizing the verbal delaying practices described in excerpt 1 (pause and lengthening). She organizes her verbal construction "when you are doing x" as a syntactic-bodily gestalt. The choreographer first projects an imminent movement and then redeems the projection, not by explicating the movement, but by producing it herself. Interestingly, this change is also observable in her turn design. As soon as she starts to dance, the verbal modality is no longer needed for projection purposes; it is instead used as a method to establish a rhythm, a resource for the actors as they synchronize their actions with the choreographer. The following movement analysis (Figure 5) illustrates the choreographer's symmetrical self-synchronization and its communicative function.

The choreographer dances together with the actor, while describing her own movement in terms of rhythm and speed by counting, which the actress and the actor understand as an instruction to imitate these movements. In the context of the choreographer's utterance "when you are doing this one two three one two three" (line 029), she synchronizes her activities in such a way that she moves her feet with the accented counting beats and simultaneously counts at the speed of her dance. The close alignment between counting and dancing become apparent in the movement trajectories of her left foot. Before the start of the dance, she first gets into position *via*

a slight back and forth movement (Figure 5.1). Analyzing that movement's pattern reveals that every number is connected to a specific movement: On one, there is a movement to (her) right that is repeated at the beginning of each beat (compare Figures 5.2, 5.5). On two, it is primarily her right foot that moves, resulting in a small shift to each side (Figure 5.3). Finally, on three, she performs a movement to her left (Figure 5.4). While dancing, her coordination of the steps and her words differs from the temporal offset of the gestural peak and the speech-affiliate usually observed in speech-accompanying gestures (Schegloff, 1984). In face-to-face interactions, speech-affiliates are usually realized only when the peak of a gesture has already turned into a retraction (Streeck, 1993). Here, the choreographer establishes the synchronization practice of accentuation *via* the close alignment of the verbal counting and the accompanying footwork. Her accentuation thereby spans both parts of the dance instruction multiactivity; she stresses the beginning of each beat with her voice, imitating a typical waltz rhythm, and emphasizes every first step of the dance sequence with her footwork. The coinciding of the two emphasized actions here establishes the synchronization of the instructing and the dancing.

This synchronization is not only a temporal process, it also solves a communicative purpose; by describing the waltz rhythm by counting while dancing, the choreographer provides the same information *via* both her counting and her dancing. The actress and actor can then identify the direction of the movement and its rhythm, in addition to the dance posture, using her dance gestalt. Her verbal modality also provides information about the rhythm of the dance *via* acoustic references for the accented beats. This functional similarity, however, is not mere redundancy; it rather increases the interactional value of the multiactivity. Thus, the actor, who does not imitate the choreographer's dance posture (see excerpt 3), primarily uses the acoustic reference to help him perform his steps in rhythm so that he puts one foot forward per accented beat count. He cannot synchronize with the choreographer's dance posture because of his side-by-side perspective. Instead, he presumably uses the intercorporeal relationship of his hand with the choreographer's as a synchronization cue for both his dance posture and the direction of the dance. The verbal emphasis of beginning of the beat, which here coincides with a certain foot position, is thus a means of self-synchronization of the activities dancing and instructing within the collective multiactivity. It also makes the progress of the multiactivity anticipatable, thereby enabling the actors to synchronize the temporal relations of their actions with those of the choreographer in form, frequency, and speed. This synchronization of actions and activities enables a gestalt convergence of the parts of the multiactivity such that actions align. In this way, participants produce synchronized activities that allow them to work on multiple interaction tasks simultaneously.

Discussion

The paper examines the communicative purpose and practices by which participants in a dance rehearsal synchronize with each other. The participants in the data engage in the collective, collaborative, and intersubjective task of rehearsing a dance, meaning that they are constantly involved in joint meaning-making to identify, negotiate, and implement displayed multimodal gestalts. The rehearsal is organized in such a way that the dance could be performed while instruction was occurring, as opposed to instruction occurring prior to performance. As such, the participants have two or more separate, perceptual, and equally relevant projects to work on. Their interactional method for being able to deal with these multiple simultaneously relevant interactional tasks was based on achieving synchrony. With the help of various synchronization procedures, the interactants combined their practices while participating in an emerging multiactivity so that the different activities could be carried out and the functionally divergent interaction tasks could be mastered simultaneously.

Previous research suggests that interactants synchronize their multimodal resources in terms of speed, intensity, and form of realization. These aspects differ regarding their symmetry. In symmetrical synchronization, participants perform simultaneous actions that other participants are already engaged in. It is essential for those involved in a communicative project like a dance rehearsal to align themselves with the multimodal gestalts of their co-interactors; interactants establish symmetrical synchrony by aligning their gestalts with these of their co-participants. In terms of this study, this phenomenon can be observed when the actors aligned with the choreographer's dance posture in order to perform the instructed dance figure themselves. Here, speed, intensity, and form converge. This differs from asymmetrical synchronization, in which participants synchronize different simultaneous actions. This can occur when different modalities are aligned with each other, e.g., when dancers place their feet in a counted beat. While symmetrical synchronization allows participants to establish a collective, time-aligned activity, asymmetrical synchronization allows for complex interactional tasks, such as the explanation of a dance that occurs while that dance is performed, while also serving as a (symmetrical) synchronization device for the co-participants (excerpt 5).

To achieve synchronization, all necessary multimodal resources must be present at the same time. With the help of various synchronization procedures, interactants combine their practices so that the different activities can be carried out and functionally divergent interaction tasks can be mastered simultaneously. As synchrony involves similar forms, intensities, frequencies, and paces of actions, interactors must use different temporal relation procedures, such as pauses,

delays, and accelerations of individual movement trajectories, to synchronize. Verbal delaying practices, such as pauses, lengthening, and verbal recycling, allowed the participants to establish synchrony between a verbal instruction and a bodily dance (excerpt 1). Bodily delaying occurs when participants either slow down their movements or pause their kinesthetic participation (excerpt 2). Interestingly, this delay can be performed in either a smooth, emergent way or as part of a stop-and-go procedure. When participants can anticipate ongoing interactional projects and their trajectories, synchronization practices of acceleration can be used. These range from verbal practices, such as latching (excerpt 3), to bodily accelerations like skipping a dance step (excerpt 4). The analyses reveal that the nature of symmetrical synchrony can be corresponding rather than mutual exclusive; the actors regularly synchronized with respect to both the speed given by the verbal action (asymmetrical synchrony) and the kinesthetic form given by the choreographer and their dance partner (symmetrical synchrony). Therefore, synchrony involves constant coordination to establish, maintain, and dissolve alignment between participants and their multimodal resources when they are engaged in a collective meaning making activity like a dance rehearsal.

In conclusion, an important communicative function of synchronization in a dance rehearsal as a sense-making activity is to enable the performance of a complex multiactivity such as dance instruction. For dance instructions to work, the participants must synchronize in terms of speed, direction, and gestalt of movements. These coordination procedures are organized in a multimodal way and are found at both verbal and corporeal levels. They involve delays, accelerations, and accentuations of multimodal resources and occur in asymmetrical and symmetrical synchronization.

For the most part, this paper focuses on the participants' methods for establishing alignment and synchrony *in situ*. However, as indicated in the comparison between excerpts 2 and 4, movement analysis also suggests a longitudinal alignment. In that sense, movement analysis might be a useful method for documenting the learning of movements. This application is not limited to dances; it could be utilized in different settings where movements are taught to be performed independently later by participants, e.g., in sports or medical settings. To achieve more precision, the 2d marker-less motion tracking presented here could be expanded to include 3d space. This would also allow for the tracking of more than one point per participant as the trajectories could be related to each other. 3d tracking would also overcome one major limitation of this paper, which is the fact that, though the presented method enables trajectory comparisons, little information is available on the dynamics involved in gaining or losing momentum.

Despite this limitation, this paper manages to illustrate the multimodal delaying, acceleration, and accentuation practices

interactants employ when aligning their multimodal resources in terms of speed, intensity, and form of realization to reach an intersubjective understanding of an ongoing activity, such as a dance rehearsal.

Data availability statement

The datasets presented in this article are not readily available because of the data protection regulations regarding the consent forms of the study participants. However, it is possible to review the data on-site together with the author. Requests to access the datasets should be directed to MK, maximilian.krug@uni-due.de.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

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