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7. Initial Interpersonal Attraction between Mixed-Sex Dyad and Movement Synchrony

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Abstract. Rhythmic synchronization phenomena in interpersonal communication are classified into two, based on its temporal aspect and behavioural form similarity aspect. We focus on the temporal aspect, *movement synchrony*, the gestalt-like perception of movement rhythmicity or coordination. With the aid of THEME, we aim to describe it based on statistical definition of objective behavioural data. Behavioural synchronization phenomena can also be conceptualised according to the number of actors involved in synchrony (*self-synchrony* and *interactional synchrony*). In a waiting room situation, we unobtrusively videotaped initial interaction of unacquainted mixed-sex dyads, and investigated whether movement synchrony between a dyad related with the formation of interpersonal attraction. Participants' behaviour in the first and last minutes of initial 10-minute interaction was coded frame by frame. Movement synchrony measures calculated from it related with a participant's interest in the partner more strongly in the first minute than in the last minute. However, the relationships were mostly explained by the increase of movement frequency. A movement synchrony measure that remained to be a significant signal was the repetitiveness of behaviour time-sequences. A dyad with a male participant interested in the partner decreased the repetitiveness of movement synchrony in the first minute. On the other hand, a dyad with a female participant who reported frequent sexual approaches by male strangers showed increase in the repetitiveness of movement synchrony. It suggested that such behavioural characteristics of frequently approached women tend to be interpreted as a courtship-like signal by male strangers. Only among dyads with frequently picked up women, the increase of female self-synchrony patterns positively correlated with male interest in her, circumstantially supporting the explanation.

Keywords: Movement synchrony; interpersonal attraction; rhythm; sexual approach

Contents

7.1 Introduction

7.1.1 Movement synchrony: one definition of rhythmic behavioural synchrony

From the pioneering work of Condon and Ogston [1], the importance of movement timing matching in smooth, friendly communication has been suggested among behavioural scientists, and efforts have been made to empirically describe phenomenon and explore its significance in interpersonal communication. Condon and Ogston filmed natural dyadic interaction, examined the films frame by frame, and coded points when the movement direction and speed of each body part changed. The work impressively demonstrated that in communication, etic segmentations of articulated speech correspond with changes of direction and speed of interactants' body parts. Such matching of movements was observed to occur with small time-lag (less than 50 ms [2]), suggesting its unconscious, automatic formation.

Condon and Ogston [1] revealed that bodily "dance" of interactants is inherent in normal communication, and the main point of the described phenomenon was the precise matching of movement timing within individual (*self-synchrony*) and inter-individuals (*interactional synchrony*). However, their coding method was extraordinary time consuming, and simplified method of it may lead to a spurious conclusion [3]. Even when coding is correctly applied, there was difficulty in describing statistically meaningful differences in forming behavioural synchronization. Bernieri and his colleagues relied on raters' perception instead, and explored the relationship between behavioural synchrony phenomena and rapport among interactants [4-6]. Raters viewed interaction clips and rated the degree of (a) simultaneous movement, (b) tempo similarity, (c) coordination/smoothness, and (d) posture similarity, as synchrony variables. The results revealed that raters were not able to discriminate among detailed aspects of temporal synchronization, but the distinctive aspects were *movement synchrony* (a, b, c) and *posture similarity* (d). Posture similarity does not concern with temporal aspects of behaviour so much, but movement synchrony refers to general impression of tempo coordination or entrainment between interactants.

Grammer, Kruck, and Magnusson [7] coded the beginnings and endings of interactants' behaviour catalogued from past ethological research, and analyzed time-patterns of them using THEME. The method defined the rhythmicity of interaction as repeated patterns of time structure of categorized movement, as *hierarchically patterned synchronization*. Patterns are characterized by similar time intervals between their components, and larger patterns are built up of smaller ones [8, 9]. This definition is similar to movement synchrony defined by Bernieri and his colleagues, in the respect that definition of interaction rhythmicity is based on gestalt perception of movement time structure, not solely on strict coincidence of movement timing.

However, some differences in synchronization phenomena covered by movement synchrony and hierarchically patterned synchronization should be noted. The definition by Grammer et al. [7] did not include which behavioural event types should constitute synchronous patterns, but because THEME searches for patterns using elaborate behavioural categorization adopted by the authors, the categorization necessarily affected what kind of patterns were detected. And also, they analyzed 10-minute interaction as a whole. Therefore time ranges of repeated behaviour patterns were broad, and detected patterns should have been differed from gestalt perception of movement rhythmicity occurring in short time spans. In this study, we modify rhythmic synchrony definition by Grammer et al., and use the patterns detected, using THEME, as objective measurement of movement synchrony. The targets for analyses are the first and last minutes of 10-minute

interaction, 1-minute each. Behavioural categorization adopted is broader seven categories instead of 83 categories used in the previous study.

7.1.2 Does rhythmic synchrony indicate positive affection between first-met dyad?

Independent from the type of synchronization, the higher degree of synchronization is generally regarded to be a sign of higher degree of mutual rapport, involvement, and togetherness [10, 11]. However, the meaning of temporal aspect of behavioural synchronization in mutual rapport may change according to the degree of acquaintanceship. The formation of interest between opposite-sex interactants should also be considered with that prospect in mind.

Animals of many species and people in many cultures use dance in courtship. Coordination of rhythmical tempo [12, 13], and the repetition of *ritualized* (patterned) behaviour sequences [14] are regarded to be important aspects of it, functioning as mutual assessment process of coordination.

Perper [15] observed opposite-sex approaches in public places like bars, parties, trains, and so on. Intimacy developed in the sequence - approach, talk, turn, touch, synchronize, and it took from 15 minutes to over 3 hours. The synchronization reported by Perper seems to refer to the simultaneous and similar movement of interactants, thus containing both temporal and form aspects of synchronization. With regard to interaction between intimate couples, Weisfeld and Stack [16] reported that happily married couples tended to synchronize with in timing of expressing the same emotions, though they did not show baseline data comparative to it.

Does rhythmic synchrony play a significant role in initial interaction between first-met couples? The initial assessment of attractiveness and degree of interest in the first-met partner are reported to occur in a very short time span [17, 18], and such difference in affection may appear in behavioural synchrony. Bernieri et al. [6] filmed interaction between unacquainted mixed-sex dyads, and examined the relationships between movement synchrony and posture similarity in the second minute from the start of interaction, and rapport perceived by interactants. Both kinds of interactional synchrony positively correlated with the rapport reported by females but not with the rapport reported by males. Bernieri et al. concluded that this was because women are superior to men at nonverbal behaviour perception, and more attended to interactional synchrony phenomena as the socioemotional status of the interaction.

Grammer et al. [7] examined the relationship between hierarchically patterned synchronization in the first 10-minute interaction and participants' reported interest in the opposite sex partner. They also found positive relationships with regard to female interest, not with regard to male interest. They associated the phenomena with the initiation of courtship with subtle female signals, sometimes reported on opposite-sex approaches in public places [15, 19, for a review, see 20]. Therefore, they assumed that women interested in a male partner manipulated synchronization behaviour.

Caution should be taken to regard the rhythmic synchrony as a sign of rapport or affection in initial interaction between first-met dyads. In comparison of the first and third minutes of mother-infant interaction, Bernieri et al. [5] found difference in the development of movement synchrony between true mother-infant dyads and unrelated, first-met mother-infant dyads. In the interaction of true mother-infant dyads, movement synchrony increased as the time passed. On the other hand, in the interaction of first-met mother-infant dyads, movement synchrony decreased as the time passed, to the degree of baseline, random occurrence. The result indicates that synchronization development in time series may differ according to the depth of relationship between interactants.

Another suggestion to caution the interpretation of rhythmic synchrony as the manifestation of positive affection comes from the work by Warner, Malloy, Schneider, Knoth and Wilder [21]. They did not measure nonverbal behavioural data, but analyzed rhythmicity of 40-minutes interaction as the cyclicity of vocal activity, using spectral analysis. As demonstrated by the work of Condon and his colleagues [1, 2, 22, 23], vocal activity should be tightly linked with interactants' movement. Warner et al. reported the curvilinear relationship between rhythmicity of interaction and the positive affect between interactants rated by observers. That is, the rated positive affect was the highest when rhythmicity level was intermediate, and was lower when rhythmicity level was very low or high. Therefore, as it was probably the case, in the first minute interaction of first-met mother-infant dyads in Bernieri et al. [5], high movement synchrony in initial interaction of unacquainted dyads may contain the dimension of nervousness manifestation, rather than an active solicitation signal. In the current study, we contrast the first and last minutes of 10-minute interaction of first-met dyads, and explore the development of movement synchrony in time series.

7.1.3 The aim of current research

The previous study of Grammer et al. [7] found positive correlation between hierarchically patterned synchronization and female interest in the male partner. However, questions whether women controlled interactional synchrony as a courtship signal and, whether they used male partner's movement as a "Zeitgeber (exogenous stimulus to give timing to start rhythm)," were left not fully answered.

To explore whether movement synchrony, in an initial opposite-sex encounter, has the function of a female courtship signal, the frequency of women's experiences of having been a target for picking up is considered as an independent factor. Frequently picked up women are reported to have characteristic personality traits such as unrestricted sociosexuality, high extraversion and openness (submitted) [24], and high self-monitoring (submitted) [25]. These personality traits are known to associate with the differences in nonverbal communication style. Especially, self-monitoring concerns with the tendency to strongly control one's expressions of emotion, responding to the keenly perceived needs of social environment. One possible strong cause for that some women experience frequent sexual approaches by strangers is, they emit courtship like movement signals though they may not mean or be aware of it [23]. Therefore, if high movement synchrony is a female solicitation signal in general, and if it is true in many populations, as was suggested concerning other subtle movement signals [26], dyads with frequently picked up women are expected to form more movement synchrony.

As mentioned before, the first and last minutes of the first 10-minute interaction of unacquainted mixed-sex couples are analyzed for movement synchrony using THEME. To identify the contribution of each sex's movement, measures of self-synchrony (time-patterns formed by only one individual) are calculated and their impact on interpersonal communication is examined.

7.2 Method

7.2.1 Overview

Interaction of unacquainted 47 mixed-sex couples was videotaped unobtrusively for 10-minute. After the interaction session, participants answered a questionnaire that assessed their interest in the partner, and the frequency of approaches by strangers they had

experienced in daily lives. Recorded interaction was coded into beginnings and endings of categorized behaviour in time series, and their time-patterns were detected with THEME. Relationships between the measures of movement synchrony, interest in the partner, and the frequency of women's having been picked up were analyzed.

7.2.2 Participants

Forty-seven female (mean age 21.6 years, age range 19-24 years) and 47 male (mean age 20.6 years, age range 18-27 years) undergraduate and graduate students from universities in Tokyo, Japan, volunteered for "an experiment on communication with strangers". Male and female strangers were selected randomly to form 47 mixed-sex dyads. Age differences between the two participants of a dyad ranged from –6 to 6 (female age minus male age; M = 1.04). As the formation of rhythmic synchrony is timing-sensitive and assumed to be beyond conscious control, we informed participants about the video recording in recruitment, rather than relying on deception. Participants were given a small gift for their participation.

7.2.3 Setting and equipment

The observation room was 4.2 m long, and 2.8 m wide (Figure 7.1). The participants were seated approximately 1.3 m from each other, with an angle of 120 degrees between them. A pinhole surveillance camera (measuring 3.5 × 3.5 cm) was used to monitor the interactions between participants. The camera was mounted about 1.3 m above the floor in ductwork in the corner of the room. A colour television monitor and recording devices were placed in another room and were concealed from the participants.

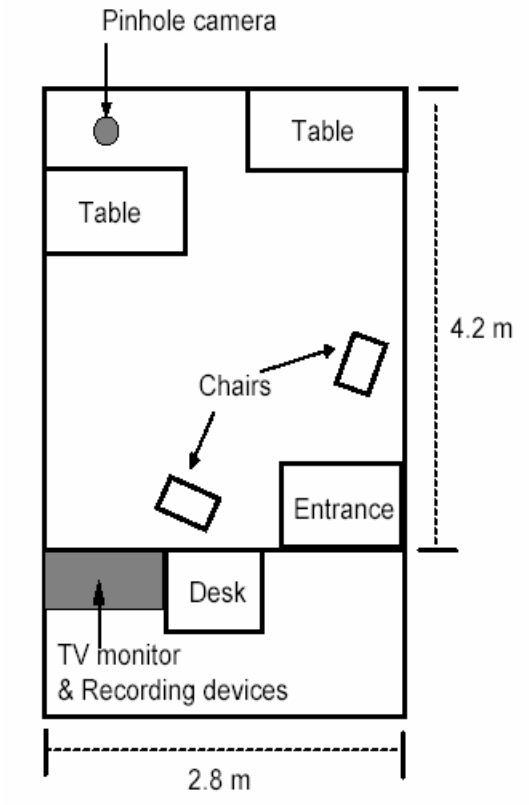

Figure 7.1 Floor plan of the observation room.

7.2.4 Procedures

A female researcher escorted one male and one female participant into the observation room. The researcher briefly introduced them to each other, but no instructions were made to encourage conversation. Then the researcher left the room to "continue setting up the experiment" creating a waiting room situation. This is a standard dyadic interaction paradigm in studies of unstructured interaction between unacquainted dyads [27]. A research assistant in the adjacent monitor room activated the video recording devices and a stopwatch, and the interaction of the dyad was recorded for 10 minutes. After five minutes, the researcher entered the observation room to explain a further delay and asked the participants to wait a little longer. When the 10-minute observation period ended, the researcher returned to the room. Each participant was taken into a separate room and filled out a questionnaire. The researcher then informed them that the experiment had been completed and debriefed the participants. The researcher also asked them for permission to use the videotape for analysis. All participants gave their permission.

7.2.5 Nonverbal behaviour data

Video-recorded data of the interactions of the 47 pairs were converted into digital *avi* files, 25 frames/s, on a Windows OS personal computer. The beginnings and endings of categorized movements for each participant, during the first and last minutes of the 10-minute interaction were coded frame by frame using special multimedia software (Video Coder for THEME, Beta version).

A catalogue of 83 categories of nonverbal behaviour adopted by Grammer et al. [7] was considered to be too detailed classification for the purpose of measuring rhythmic synchrony in this study. Therefore, we used broader categories. First, movements were categorized depending on the main body parts that acted (head, hand, leg, trunk). Second, categories of major nonverbal behaviour that are often studied by themselves were included. Consequently, the following seven categories were used to code behaviour: three categories of head movement i. e. (1) looking at the partner, (2) nodding, (3) other head movements; two categories of hand and arm movements, i.e. (4) gestures, (5) automanipulation; touching one's body or clothes, (6) leg movements, and (7) trunk movements. Coded beginning and end points on video frames were the *raw data points* of movement occurrences.

The reliability and robustness of behaviour coding based on the broader 7-category system was tested. Four one-minute time periods, randomly chosen from the entire dataset, were used for testing. Pearson correlations were calculated between the coded data of a trained researcher and an independent coder who was untrained about detailed discrimination criteria of the coding system. High reliabilities were observed for looking at the partner, gestures, manipulation, and leg movements (r = .83 ~ .97, n = 4). Correlations in the other three categories did not reach .80. Disagreement was caused mostly by confusion between nodding and other head movements, and there were differences in response to the criterion for detecting trunk movements. Correlations including all categories were moderately high (r = .78, n = 4), and the data coded by the researcher were used in the subsequent analyses. The standard deviation of frame differences between matched events coded by two raters was 15 frames. This rather large discrepancy was derived from the difference and limit of the personal computer's processing parameters.

THEME analyzed time-patterns of coded behaviour (T-*patterns*). Patterns were formed automatically (bottom-up) from coded events, based on the repeated appearance of behavioural sequences with a significantly similar time structure, for example, the end of the male looking at the partner followed the beginning of female nodding with a four

second interval. If this behaviour sequence appeared more than twice in the one-minute observation period, it was detected as one kind of T-pattern (Figure 7.2). Each dyad formed many different patterns, each of which was repeated a certain number of times. The average repetition times for one kind of pattern can be calculated. The other measures, pattern length and pattern level, represent the complexity of the pattern cluster. Behavioural measures used in this study were as follows:

1. Number of raw data points (conventional movement frequency)
2. Number of different patterns (variability of T-patterns)
3. Average pattern length (complexity of T-patterns)
4. Average pattern level (complexity of T-patterns)
5. Average pattern repetition

T-pattern measures (2) – (5) were used to describe the quality of dyadic interaction from the aspect of movement synchrony. To attend to rhythmic aspects of gestalt-like movement patterns, contents of behaviour event types were disregarded in subsequent analyses.

Both self-synchrony (time-patterns of movements within an individual) and interaction synchrony were included to describe the characteristics of the interaction as a whole. Subsequently, to examine an individual's contribution to form rhythmicity of interaction, (2) the number of different patterns formed by each participant, outside the interactional synchrony was calculated.

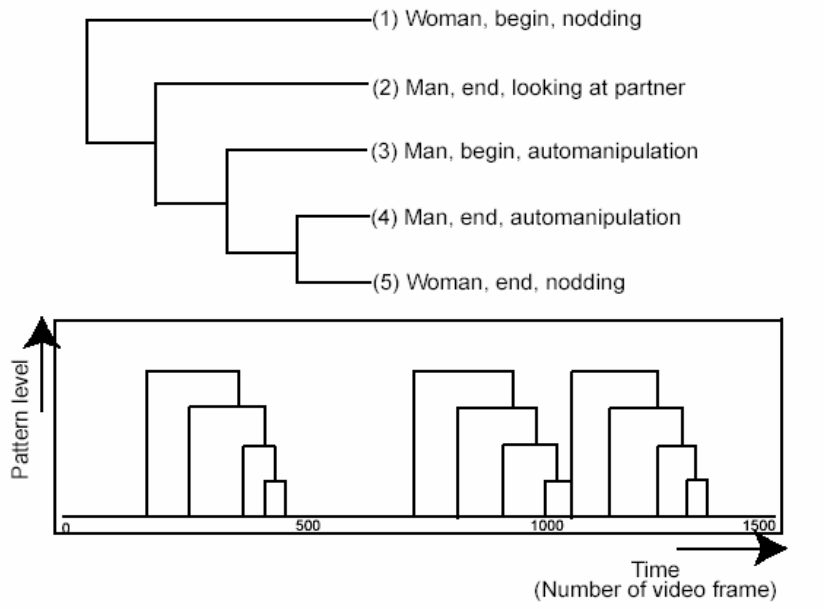

Figure 7.2 Upper: the inner structure of a T-pattern. Lower: time distribution of a repeated pattern. Example of one kind of pattern repeated three times, that is, the *number of different patterns* is one. *Pattern length* is five; one cluster contains five elements of movement. *Pattern level* is four; one cluster contains four nodes.

7.2.6 Questionnaire data

7.2.6.1 Interest in the partner participant

Participants answered questions about their degree of interest in the partner participant using 7-point Likert scales (1 = very unlikely, 7 = very likely). Interest was assessed by rating the following statements: (1) "I would give my telephone number to the partner if asked for it," and (2) "I would go out for lunch or dinner with the partner if asked". The Spearman rank correlation coefficient between these two items was .60 for women (N = 47, $p < .0001$), and .63 for men (N = 47, $p < .0001$). The two items were summed to form

one composite score of *interest in the partner*, with a possible range of 2 to 14. The interest scores of both sexes were sufficiently variable (women: range 2-12, Mdn = 8.0; men: range 3-14, Mdn = 10.0). Female interest in the partner was independent of male interest in her (ρ = -.17, ns).

Estimation of the partner participant's interest in themselves was also rated on a 7-point scale: (1) "The partner would give his/her telephone number if I asked for it," and (2) "The partner would agree to go out for lunch or dinner with me if I asked." The Spearman rank correlation between the two items was .66 for women (N = 47, $p < .0001$), and .53 for men (n = 46 because of missing data, $p = .0001$). The two items were summed to form one composite score of *estimated interest of the partner*.

7.2.6.2 Frequency of being a target for picking up

Female participants answered a question about the frequency of (1) being approached or followed by strangers with apparent sexual intentions when walking in the street (being a target for picking up) since entering high school (i.e., after 15 years of age); (2) being a target for picking up before entering high school. Participants responded using a five-point scale (1 = never; 2 = 1-2 times; 3 = 3-5 times; 4 = 6-9 times; 5 = more than 10 times). They were asked about their experiences in these two periods of life to assess internal consistency within individuals. Participants reported that most of the sexual approaches were heterosexual.

Scores on both items did not correlate significantly with participants' age ($p > .65$, N = 47, Spearman rank, two-tailed; this condition was also applied to subsequent correlation analyses). This may look strange, but the effect of individual differences in the frequency of being approached is much stronger than the effect of age at participation [24]. Therefore it is plausible that we failed to find significant correlations in this age range and sample size of participants. The frequency scores of two periods of life significantly correlated with each other ($\rho = .58$, $p < .0001$), and a composite score of the two items were used in subsequent analyses as the frequency of being a target for picking up (possible score range: 2-10). Two subgroups of women were made based on this composite score; *rarely picked-up women*, with a score range of 2-4, n = 22, and *frequently picked-up women*, with a score range of 5–10, n = 25. In the last analysis, correlations between a participant's interest in the partner and behavioural measures in dyads were contrasted between dyads with two subgroups of women.

7.3 Results

7.3.1 Descriptive statistics of behaviour data

Among 47 dyads, the number of raw data points (measure 1) ranged from 14 to 160 (M = 119.1) in the first minute and from 22 to 153 (M = 112.1) in the last minute. From these, THEME found different time-patterns (2) ranging from 1 to 436 (M = 126.6) in the first minute and from 2 to 566 (M = 138.2) in the last minute. The number of patterns can be larger than the number of raw data points, because the same data point can belong to different T-patterns. The average pattern length (3) within a dyad ranged from 2.0 to 7.1 (M = 4.75) in the first minute and from 2.0 to 8.8 (M = 4.88) in the last minute. The average pattern level (4) ranged from 1.0 to 4.2 (M = 2.81) in the first minute and from 1.0 to 4.5 (M = 2.80) in the last minute. Average pattern repetitions (5) ranged from 2.0 to 4.0 (M = 2.63) in the first minute and from 2.0 to 3.4 (M = 2.69) in the last minute.

	1.	*2.*	*3.*	*4.*	*5.*
1. Number of raw data points	--	.84***	.68***	.72***	-.34*
2. Number of different patterns	--	--	.87***	.88***	-.53***
3. Average pattern length	--	--	--	.98***	-.41**
4. Average pattern level	--	--	--	--	-.45**
5. Average pattern repetition	--	--	--	--	--

Table 7.1 Intercorrelations between behaviour data, the first minute (N = 47) *Spearman rank, $p < .05$, **$p < .01$, ***$p < .0001$.

As is shown in Table 7.1, these behaviour data were strongly intercorrelated with each other. Though detected time-patterns were non-random patterns statistically calculated with THEME, if number of raw data points (conventional movement frequency) strongly correlated with movement synchrony measures, there is a possibility that movement synchrony was a redundant explaining factor in this interactional situation. Therefore, in subsequent analyses, partial correlations controlling the number of raw data points were also considered.

7.3.2 Movement frequency and interest in the partner

Correlations between the number of raw data points (measure 1) of a dyad in each observation period, the frequency of a woman's being a target for picking up and interest in the partner were calculated. The frequency of being a target for picking up did not significantly correlate with the number of raw data points. Female interest in the partner and male interest in the partner both significantly positively correlated with the number of raw data points in the first minute (female interest, $\rho = .32$, $p = .03$; male interest, $\rho = .29$, $p = .05$), but not with the number of raw data points in the last minute ($ps > .30$).

To explore the movement frequency of which sex more reflected the interest of a participant, the number of raw data points of female movements and that of male movements were separately examined for correlations with the interest of a participant. The only significant correlation found from eight possible combinations (2 observation periods × data points of 2 sexes × interest of 2 sexes) was raw data points of male participants in the first minute and male interest ($\rho = .33$, $p = .02$). The number of raw data points of either sex had no significant correlations with the frequency of a woman's being a target for picking up.

To summarize these results is; the interest of a participant was more apparent in the behaviour at the very beginning of an interaction, and male interest more directly related to his movement frequency.

7.3.3 Movement synchrony measures, the frequency of having been a target for picking up and interest in the partner

Correlations between movement synchrony measures (measures 2-5) of a dyad, the frequency of a woman's having been a target for picking up and interest in the partner were calculated. As is shown in Table 7.2, in the first minute of an interaction, both female interest and male interest correlated with movement synchrony measures. More numerous kinds, more complex, and less repeated time-patterns indicated higher interest of participants. On the other hand, dyads with frequently picked up women tended to form more repeated behavioural time-patterns.

	Female picked up	Female interest	Male interest
2. Number of different patterns	-.05	.23	.33*
3. Average pattern length	-.04	.25†	.27†
4. Average pattern level	-.06	.29*	.32*
5. Average pattern repetition	.28†	-.21	-.38**

Table 7.2: Correlations between movement synchrony measures and questionnaire data, the first minute (N = 47). †Spearman rank, $p < .10$, *Spearman rank, $p < .05$, **$p < .01$.

In the last minute of a 10-minute interaction, no significant correlations were found at the 10% significance level. As described in the preceding section, the interest of a participant was revealed to be more apparent in behaviour at the very beginning of an interaction.

7.3.4 Partial correlations of movement synchrony measures and questionnaire data

To explore the significance of movement synchrony measures besides the effect of mere movement frequency, correlations between synchrony measures and questionnaire data, statistically controlling for the number of raw data points were calculated.

Note the decrease of absolute values of correlation coefficients concerning interest of a participant in the partner. On the other hand, with regard to the frequency of female experiences of having been a target for picking up, changes of coefficient values were minor. Correlations remained significant after controlling for movement frequency were the one between pattern repetition and the frequency of a woman's having been picked up, and the one between pattern repetition and male interest in the partner. As is the same with zero-order correlations, no significant correlations were found in the last minute of a 10-minute interaction.

	Female picked up	Female interest	Male interest
2. Number of different patterns	-.06	-.07	.17
3. Average pattern length	-.04	.05	.11
4. Average pattern level	-.07	.09	.16
5. Average pattern repetition	.30*	-.12	-.32*

Table 7.3 Partial correlations between movement synchrony measures and questionnaire data, the first minute (N = 47) *Spearman rank, $p < .05$.

The results indicate that the relationship between the complexity of movement synchrony and interest of a participant in the partner in the first minute was basically derived from the effect of frequent movement. A movement synchrony measure that was likely to have a function as a nonverbal signal beyond movement frequency was the average pattern repetition. That is, dyads with frequently picked-up women developed more repeated manneristic behaviour sequences, and higher male interest in the partner related with the reduced repetition of manneristic behaviour sequences.

7.3.5 Self-synchrony and a participant's interest in the partner

Movement synchrony measures considered so far included both self-synchrony and interactional synchrony. To examine behavioural characteristics of each sex independent of the interactive behaviour of the two, self-synchrony of each sex that was not included in

interactional synchrony was considered. In the whole sample (N = 47), the number of different behavioural patterns (measure 2) within each sex did not have a significant correlation with the frequency of a woman's being a target for picking up, nor with a participant's interest in the partner.

Consequently, correlations between the number of self-synchrony patterns and interest in the partner were contrasted between the two subgroups based on the frequency of a woman's being a target for picking up (Table 7.4).

	Female interest	**Male interest**	**Female interest**	**Male interest**
Self-synchrony	*Rarely picked up* (n = 22)		*Frequently picked up* (n = 25)	
		The first minute		
Female patterns	-.06	-.19	.01	.49*
Male patterns	.37†	.30	.09	.07
		The last minute		
Female patterns	-.05	-.15	-.04	.36†
Male patterns	-.08	-.17	.05	-.07

Table 7.4 Correlations between self-synchrony within one sex and interest in the partner. †Spearman rank, $p < .10$, *Spearman rank, $p < .05$.

There was a trend of a positive correlation between self-synchrony within a man and female interest in him, in dyads with rarely picked-up women, in the first minute of the interaction. On the other hand, in dyads with frequently picked-up women, positive correlations were found between self-synchrony within a woman and male interest in her, though the correlation was somewhat weaker in the last minute of the observation period.

The results indicated that synchronization of female behaviour correlated positively with male interest in the woman, among dyads with frequently picked-up women. And such sex roles tended to reverse in dyads with rarely picked up women. Then, did interest of a participant precede self-synchrony of the opposite-sex partner, or was it the other way around? There is indirect evidence to reject the former possibility: That is, both sexes were bad estimators of the partner's interest in themselves (Spearman's rank correlations between a participant's interest in the partner and the partner's estimation of it: *ps* > .24, N = 47, for female estimation and male estimation), so it is rather unlikely that a participant sympathized with the partner's attention and its physical response appeared on higher self-synchronous behaviour. When the other way around is more likely, the interpretation is that among dyads with frequently picked up women, a woman's self-synchronous movement attracted male interest in her, but it did not occur among dyads with rarely picked up women.

7.4 Discussion

We explored the relationship of initial attraction between an unacquainted mixed-sex dyad and their behavioural signals, from the perspective of movement synchrony. The results demonstrated that the relationships were stronger at the very beginning of interaction, and much weaker at the latter stage of interaction. In the first minute, male interest in the partner as well as female interest related with higher movement synchrony.

This may look contradict to the results of the previous study [7], that reported more complex hierarchically patterned synchronization in the initial 10-minute related only with female interest, not with male interest. However, our coding method restricted time ranges

for analyses to short, and this seems to have enabled to capture movement synchrony phenomenon at very the beginning of interaction and its significance to the interpersonal attraction formation. Some studies reported that in interaction of unacquainted dyads, movement signals are heightened in the first one or two minutes [5, 17, 28], and settle down in the latter minutes. The current study suggested the function of the initial signaling as an interpersonal assessment and interest formation phase. In this phase, complexity of movement synchrony (i.e. pattern length and pattern level) was rather a secondary product of movement frequency, and a pattern repetition was a more significant measure (Table 7.3).

With regard to differences in nonverbal signals between frequently picked up and rarely picked up women, only among dyads with frequently picked up women, were positive correlations found between female self-synchrony and male interest in her (Table 7.4). Are there any possible behavioural characteristics among frequently picked up women that might have brought about such relationship? That is the high pattern repetition of movement synchrony among dyads with frequently picked up women (Table 7.3). Note that such increased repetitiveness of behavioural patterns was not explainable by the mere increase of movement frequency, implying that it is subtle but may have the special significance as a communication signal. As behavioural ecological study suggests, high repetitiveness of manneristic behavioural sequences is one important aspect of courtship signals [14]. Therefore, it is plausible to hypothesize that frequently picked up women, who possibly have personality characteristics of unrestricted sociosexuality and high self-monitoring (submitted) [24, 25], tend to unconsciously make more repeated rhythmically synchronous movement in an initial interaction with a male stranger, and as such synchronous movement increases, a man gets interested in her. Another, but not mutually exclusive possibility is that frequently picked up women tend to react sensitively to the stressful situation with a male stranger, that was the cause of high repetitiveness of movement synchrony, and they tend to make patterns more when they unconsciously perceive the partner's interest in them. The examination of relationships between the personality traits and repetitive movement synchrony in a similar experimental setting will test the hypotheses.

Then, what is the function of reduced pattern repetition among dyads with men who were highly interested in the female partners? Our idea is that reduced repetitiveness of movement synchrony is a manifestation of a male drive to initiate patterns; a man moved more with increased interest in the partner (7.3.2), resulting in a more diversity of formed patterns (Table 7.2). This assumption concerns the hypothesis that a man may act as a zeitgeber (who gives the timing to form synchronous patterns) and a woman follows it and makes synchronous patterns more repetitive (this study) and more complicated [7]. Analysis of hierarchically patterned synchrony in interaction with allocation of speaker/listener roles (unpublished data) gives collateral evidence: The public self-consciousness of a *listener* positively correlated with the complexity of synchrony, but with regard to a *speaker*, negative correlations with the repetitiveness and interactiveness were observed in a certain situation. In summary, an unobtrusive, observational experimental design left causal association concerning movement synchrony unresolved but has raised many interesting questions to deal with in further studies in this area. The current study underlines the importance of using advanced methods and tools, such as THEME, to study movement synchrony phenomena objectively. Movement synchrony may have significance as a courtship-like communication signal in quick interpersonal assessment and interest formation between first-met dyads, and the movement of male participants was also actively involved in such relationship.

7.5 References

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