IEICE TRANS. INF. & SYST., VOL.E91–D, NO.6 JUNE 2008

PAPER Special Section on Human Communication III

Body Movement Synchrony in Psychotherapeutic Counseling: A Study Using the Video-Based Quantification Method*

Chika NAGAOKA[†a)], *Nonmember and* **Masashi KOMORI**[††b)], *Member*

SUMMARY Body movement synchrony (i.e. rhythmic synchronization between the body movements of interacting partners) has been described by subjective impressions of skilled counselors and has been considered to reflect the depth of the client-counselor relationship. This study analyzed temporal changes in body movement synchrony through a video analysis of client-counselor dialogues in counseling sessions. Four 50-minute psychotherapeutic counseling sessions were analyzed, including two negatively evaluated sessions (low evaluation groups) and two positively evaluated sessions (high evaluation groups). In addition, two 50-minute ordinary advice sessions between two high school teachers and the clients in the high rating group were analyzed. All sessions represent role-playing. The intensity of the participants' body movement was measured using a video-based system. Temporal change of body movement synchrony was analyzed using moving correlations of the intensity between the two time series. The results revealed (1) A consistent temporal pattern among the four counseling cases, though the moving correlation coefficients were higher for the high evaluation group than the low evaluation group and (2) Different temporal patterns for the counseling and advice sessions even when the clients were the same. These results were discussed from the perspective of the quality of client-counselor relationship.

key words: *body movement synchrony, counseling, advice session, video-based analysis, client-counselor relationship*

1. Introduction

Dialogue is a common form of everyday communication between two participants incorporating verbal behavior and nonverbal behavior (e.g. facial expressions and gestures). In a dialogue, two participants convey information to each other and share feelings, and also draw out creativity and discover a new way, and subsequently gain a new viewpoint and arrive at new self-understandings and understandings of others. Therefore, dialogue is a complicated mutual interaction involving higher-order mental processes concerning knowledge, emotions and intentions.

This study focused on client-counselor dialogues in psychotherapeutic counseling sessions. Client-counselor dialogues have the goal of facilitating patient recovery from psychological problems. In client-counselor dialogues, the main motivation is decreasing the client's psychological pain and distress. Client-counselor dialogues have the following characteristics: (a) Dialogues are often lengthy (approximately 50 minutes per session), (b) Dialogues often include emotional and/or introspective elements and (c) Roles of speaker and listener are fixed where the counselor participates as a "professional listener." And in the ways, counseling dialogues differ from everyday conversations. Clients have been known to benefit from client-counselor dialogues to gain new perspectives, self-understandings and understandings of others. It is known that clients, who are in "confused states" at the starting point, change into the state of being ready to gain a new viewpoint and arrive at new self-understandings and understandings of others, in the process of counseling dialogue. As such, counseling dialogues provide good examples of dialogues utilizing all the potential of dialogue.

In the client-counselor dialogue, client's change depends on communication with counselor, especially on verbal and nonverbal behavior of counselor. Counselors seldom talk during a session and leave time to talk to clients by using brief questions and nonverbal gestures (e.g. nodding) for communication. By doing this, counselors prepare the context in which the client can gain a new viewpoint. Although the professional skills of a counselor have been described qualitatively by experts, there have been few attempts to analyze dialoguing skills empirically. It is expected that an empirical investigation of client-counselor dialogues can assist with the development of guidelines for counselor training and contribute to development of dialogue theory, or engineering application.

It is known that the context for eliciting the client change is deeply related to the client-counselor relationship. Unlike spousal or parent-child relationships, which are long-term and fixed, client-counselor relationships can be affected by small changes in word choices and gestures. Furthermore, it is rare that the relationship is displayed directly in words or gestures, rather, it is common that the relationship is expressed through slight nonverbal behaviors, or by meanings concealed behind words. The client-counselor relationship is adjusted by counselors, and is kept in the state being appropriate at that time period, for clients who continue to change minute by minute. Clients are provided the necessary context for thinking and considering new perspectives, when there is an appropriate client-counselor relationship [1]. Prior research has shown the pos-

Manuscript received September 8, 2007.
Manuscript revised December 11, 2007.

[†]The author is with Kokoro Research Center, Kyoto University, Kyoto-shi, 606–8501 Japan.
[††]The author is with the Faculty of Information and Communication Engineering, Osaka Electro-Communication University, Neyagawa-shi, 572–8530 Japan.

*This research will be published in the Proceedings of International Conference on Kansei Engineering and Emotion Research 2007 (KEER2007). This research was supported by a postdoctoral fellowship grant from Japan Society for the Promotion of Science.

a) E-mail: nagaoka@educ.kyoto-u.ac.jp
b) E-mail: komori@isc.osakac.ac.jp

DOI: 10.1093/ietisy/e91–d.6.1634

sible use of body movement synchrony [†] (i.e. synchronization between the body movements of interacting partners. The phenomenon is also called "entrainment" [4]) and has been used as an index for measuring the client-counselor relationship [3], [5], [6].

Body movement synchrony, as well as postural congruence, has been described by the subjective impressions of skilled counselors and has been considered to indicate the depth of the client-counselor relationship (e.g. [7]). There is also research suggesting that body movement synchrony, congruence of posture, and the duration of pauses or response latencies (i.e., latency before responding to the partner's last utterance) are strongly associated with the relationship among persons interacting [2], [3], [5], [6], [8], [9].

Body movement synchrony as well as postural congruence and congruence of pause duration generally increases temporally in everyday conversations (e.g. [10]–[13]). In psychotherapy sessions, it is observed that the total duration of postural congruence between a therapist and a client increases as a session progresses [14]. However, research by Nagaoka et al. [5] examining body movement synchrony in counseling sessions found that the degree of the synchrony does not always increase with time but demonstrates fluctuationses, even in the session which was highly evaluated by experts. It remained to be examined how level of the synchrony changes along with time, in other cases of counseling session.

The present study analyzed the temporal structure of body movement synchrony in client-counselor dialogues to reveal the characteristics of body movement synchrony in counseling dialogue. We also examined the client-counselor relationship based on the characteristics of body movement synchrony.

To study the characteristics of the body movement synchrony in psychotherapeutic counseling, we made comparisons from two perspectives. Firstly, the counseling dialogues evaluated highly were compared with the counseling dialogues evaluated negatively. The evaluators of the client-counselor dialogues were counselors involved in the session and an expert viewing the video of the session. It is thought that client's utterances were used as cues and provided insight as to whether the client was receptive to new perspectives on their problems.

Secondly, client-counselor dialogues were also compared with everyday conversations concerning advice about problems. While there are many similarities between these two types of dialogues, there is a difference in behaviors of the listener; in everyday discussions of problems, the listener offers advice and comfort, whereas the counselor who is the listener in counseling dialogue does not. In client-counselor dialogues, counselors listen closely to the client and prepare a context in which the client can think and gain new perspectives. Therefore, advice sessions in everyday conversations provide the best comparison with client-counselor dialogues for understanding counselors' skill. While some prior studies have qualitatively compared these two types of dialogue [15], few studies have assessed these differences empirically.

The degree of body movement synchrony was evaluated through video analysis (see [16]). In the analysis method, the intensity of participants' body movement was respectively measured using a video-based system, and cross-correlation function between the two time series of the intensity were used as the body synchrony index. The method enabled objective evaluation of interactions over an extended period, since the analysis was conducted via a computer. This video based method was an enhanced approach compared to methods of cording (e.g. [14]) and psychological evaluations (e.g. [5]) used in previous studies. And this method is not expensive and needs only a video camera and a computer, unlike the method using motion capture system. The purpose of the present study was different from that of Komori et al. [16]: They analyzed the overall level of the synchrony, while the present study analyzed the temporal structure in the synchrony to investigate the client-counselor relationship.

2. Method

2.1 Video Analysis and Case Evaluation

The videos consisted of three intake role-playing interview counseling sessions [††] between a female counselor (27 years old) with four years of counseling experience and three female clients (ranging in age from 20 to 23, Cases 1–3), and one intake role-playing interview between a female counselor (50 years old) with 27 years of counseling experience and one female client (25 years old, Case 4)(Table 1). Both counselors were Jungian depth psychologists.

After each session, the counselor was asked whether she felt this session was generally good and evaluated the session on a 9-point scale ranging from 1 (I don't think so at all) to 9 (I strongly agree). Case 1 received a score of 3, Case 2 a score of 4, Case 3 a score of 6, and Case 4 a score of 7. Furthermore, an expert with 27 years of counseling experience examined and evaluated the videos. The expert found that in Cases 1 and 2 the client-counselor relationship ended without deepening and the client's conversation was insufficiently introspective and remained superficial. In Cases 3 and 4, the expert found that sufficient depth was attained in the relationship and the clients' conversations were very introspective. Overall, Cases 1 and 2 could be grouped

[†] 'interactional synchrony' [2], [3] is similar to 'body movement synchrony', with one important exception; 'interactional synchrony' includes tempo similarity, simultaneous movement, and coordination and smoothness [2], [3], while in this work 'body movement synchrony' focuses on simultaneous movement mainly.

[††] Role-playing counseling is often closely similar to actual counseling, and generally used as a method for the counselor's skill acquisition. Therefore, it is thought that phenomena occurring in actual counseling also occur in role-playing counseling, and so using role-playing counseling as material for study is considered to be significant. Since intake sessions are known to reveal characteristics of subsequent sessions, intake sessions provide especially rich material for analysis.

Table 1 Description of cases analyzed in this study.

		Case No.	Counselor / Teacher	Clients	Evaluation score	Evaluation by an expert
Counseling Sessions	Low Evaluation Group	Case 1	Counselor A	Client A	3	Superficial relationship and conversation
		Case 2	Counselor A	Client B	4	
	High Evaluation Group	Case 3	Counselor A	Client C	6	Sufficient deep relationship and introspective conversation
		Case 4	Counselor B	Client D	7	
Advice Sessions		Case 3'	Teacher A	Client C	-	Good match
		Case 4'	Teacher B	Client D	-	Hierarchical relationship

as the "low evaluation group" and Cases 3 and 4 as the "high evaluation group."

In addition, the two clients in the high evaluation group also participated in individual advice sessions with high school teachers. The client in Case 3, as a former student, participated in an advice session with a female high school teacher (30 years old) with seven years of teaching experience (Case 3'). Similarly, the client from Case 4 participated in an advice session with a female high school teacher (50 years old) with 27 years of teaching experience (Case 4'). Although both pairs were actually meeting for the first time, they were told to imagine that the teachers had taught the clients a few times during their school days. Therefore, the clients were supposed to remember the teachers, whereas the teachers were supposed not to remember the clients. The videos from each session were evaluated by an expert in the same manner as above. Case 3' was evaluated a good match as both the client and the teacher disclosed intimate, personal things about themselves. The client-teacher relationship in Case 4' was commented to be very hierarchical, in which the client did not sufficiently disclose about herself; she tried to accept the teacher's advices.

A miniature camera (Sony, MS-36) was located approximately 2.3 meters from both of the clients and the counselors and 1.3 meter height. The miniature camera focused on both of the participants. The video signal from the camera was recorded with a digital video camera (Sony, DSR-PD170). All the counseling and advice sessions took place in a counseling room, with each session lasting 50 minutes. To control for differences in age and family structure of all the clients, as well as the content of the problem (worries concerning interpersonal relationships and overeating), they were held constant. Prior to the role-playing counseling session, clients were given a form to complete concerning their age, family structure, and so on that served as a basis for the session. Clients and the counselors gave consent to have the session videotaped.

2.2 Analysis

For all the cases, 48 minute and 10 second videos in which the two participants maintained a seated position were analyzed. The videos were converted to AVI format (360 × 240 pixels, frame rate 30 f/s). Each frame (t) of videos was divided into 3456 blocks (5 × 5 pixels), and the RGB values (0–255) for the image pixels in each block were averaged and set to a low resolution. Furthermore, the RGB values of each block were converted into 256 grey level brightness ($Y_{t,i,j}$), as below. The brightness levels of each frame of a video sequence were normalized.

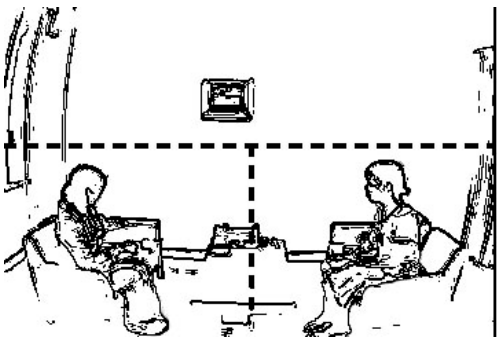


Fig. 1 Role-playing counseling scenes and analysis areas from Komori et al. [16]. Reproduced by permission of Department of Social Psychology, Osaka University.

$$Y_{t,i,j} = 0.299R + 0.589G_{t,i,j} + 0.114B_{t,i,j} \quad (1)$$

In addition, a discrete Fourier transformation (DFT) with a window length of 5 seconds (150 frames) and a window shift of 5 seconds was performed on each time series of the normalized brightness values.

The region of analysis consisted of the image areas including each participant in dialogue (Fig. 1), and the total power of each region was obtained by adding up 0.6–2.4 Hz power of all the blocks included in each region. The bandwidth of 0.6–2.4 Hz was determined based on a preliminary investigation of the frequency of natural human movements. The logarithm of total power was normalized for each of the participants and used as the index of perceived body movement level (Fig. 2). A preliminary study revealed a strong correlation between this value and the perceived intensity of human body movements.

3. Results

Moving correlation was used to analyze the temporal

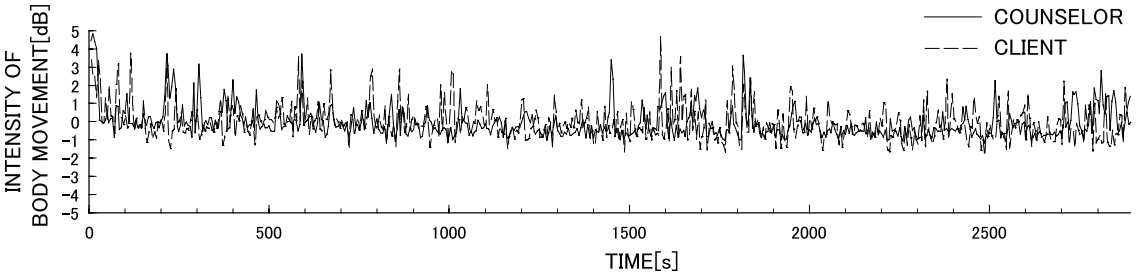


Fig. 2 An example of bodily movement time series from Komori et al. [16]. Reproduced by permission of Department of Social Psychology, Osaka University.

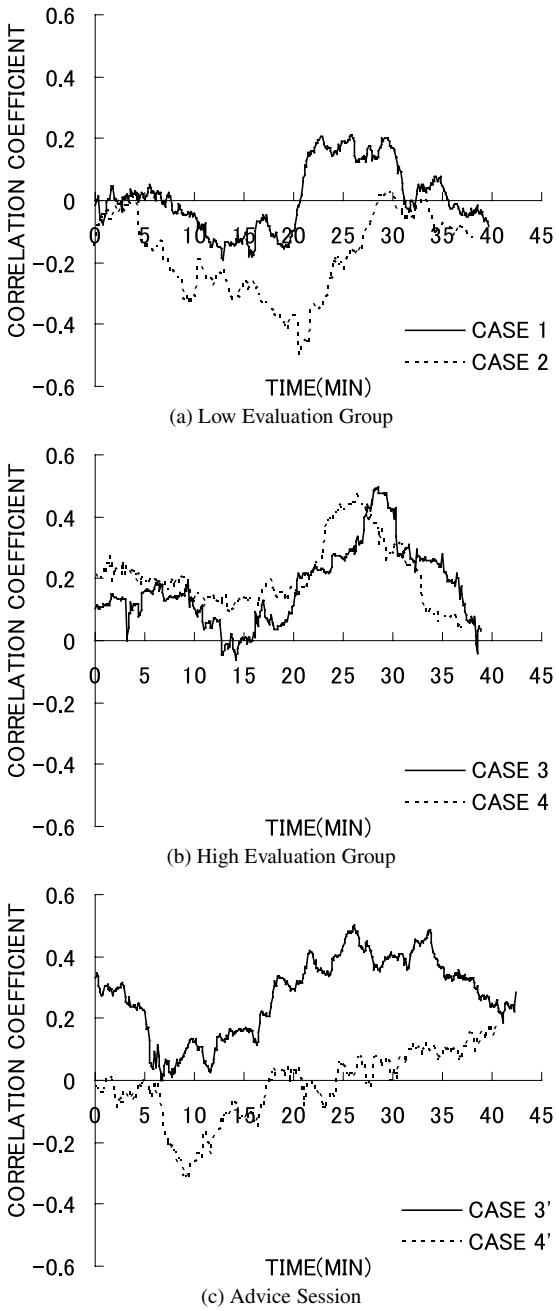
changes in the relationship of the intensity of the counselor's body movements and the client's body movements (Fig. 3). A window-length of 10 minutes and a window-shift of 5seconds were employed.

3.1 Overall Degree of Body Movement Synchrony

Comparison between the moving correlation coefficients for the high evaluation group and the low evaluation group during the 50-minute periods indicated that the coefficients were higher for the high evaluation group (the estimated population correlation coefficient= 0.32; 95% CI, 0.25 to +0.40), which received the evaluation that "the client-counselor relationship became sufficiently deep and the client's talk was very introspective", than the low evaluation group (the estimated population correlation coefficient= −0.01; 95% CI, −0.09 to 0.07), which evaluated that the client-counselor relationship ended without deepening and the client's conversation was insufficiently introspective and remained superficial. Peak values of the coefficients for Case 3 and 4 were approximately 0.5, while the values for Case 1 was low and the values for Case 2 were not significant These indicated that synchrony of body movements of the counselor and client are observed in the high evaluation group, while not in the low evaluation group. The results support prior findings that the evaluation of the client-counselor relationship and the quality of counseling corresponds to overall degree of the body movement synchrony [5], [16].

On the other hand, the overall coefficients for advice sessions were inconsistent between two cases; the coefficient for the Case 3' (the estimated population correlation coefficient= 0.29; 95% CI, 0.22 to +0.36), which was considered a "good match", was higher than that of Case 4' (the estimated population correlation coefficient= −0.04; 95% CI, −0.12 to +0.04), in which "hierarchical relations were strong". Peak value of the coefficients for Case 3' was about 0.5, while the value for Case 4' was not significant. Prior research has shown that in cooperative dialogues, such as when two people construct a plan, synchrony in movements is observed when there is strong rapport between the participants [17]. The results of the current study are consistent with these findings.

Comparison between Case 4 and Case 4', in which the



(a) Low Evaluation Group

(b) High Evaluation Group

(c) Advice Session

Fig. 3 Temporal changes of body movements synchrony.

client were same, indicated that the overall coefficients for Case 4 were high, while the overall coefficients for Case 4' were not significant. This is evidence indicating that body movement synchrony does not reflect only a participant's attribution, but depends on interaction between participants. The overall coefficients for Case 3 and Case 3', in which the client were same, were both high.

3.2 Temporal Patterns in Body Movement Synchrony

Comparison of the temporal patterns of the moving correlation coefficients revealed the following: (1) A consistent temporal pattern among the four counseling cases, and (2) Different temporal patterns for the counseling and advice sessions even when the clients were the same.

The temporal pattern in the counseling sessions began with 20 minutes of relatively low moving correlation, after which the correlation began to increase. As the session reached a close, there was a slow decrease in correlation. In the high evaluation groups, synchrony of body movements could be occasionally seen during the first 20 minutes, with increasing strength in synchrony developing after 20 minutes. Synchrony peaked at around 30 minutes, followed by a slow decrease until the end. In the low evaluation groups, similar temporal patterns to the high evaluation group were observed, although the values were low. Thus, a 50-minute counseling dialogue could be divided into three phases: a low consistent phase (first phase, or from the 0 to 20 minute point); an rapid increase phase (middle phase, or from the 20 to about 30 minute point); and a gradual decrease phase (final phase, or from around the 30 minute point until the end).

On the other hand, the patterns for advice sessions were inconsistent between two cases. Case 3' revealed a pattern in which synchrony was relatively high during the first five minutes, fell off temporarily before slowly increasing, and then decreased again during the last 15 minutes. While the range of change of the coefficients for Case 4' was small and the values on the whole were about 0, though a similar temporal pattern to Case 3' was observed (omitting the final decrease during the last 10 minutes).

4. Discussion

The results indicated that the temporal pattern in counseling sessions is consistent among the four counseling cases and that the temporal pattern of counseling sessions is different from advice sessions (even when the client is the same). This temporal pattern suggests three features of the relationship in counseling; (1) Stability over the long time, as long as 20 minutes, in the first half, (2) A rapid change in the middle phase, (3) Coming back to the relationship at the beginning in the final phase.

The first feature, stability during length of the first half contrasts with the results in the advice session, suggesting there is no period in which the relationship is kept constant and that the relationship in the advice sessions changes dramatically during the first half of a session. This indicates that a stable relationship for a long duration at early stages of counseling may play a role in preparing the context under which client change can occur. The further research is necessary to examine the hypothesis. It is because there is the possibility that the difference of the patterns of the first half of counseling and advice sessions was caused by setting differences: a counselor and a client in the counseling sessions were set as non-acquaintances, while a teacher and a client in the advice sessions were set as acquaintances.

The second feature of the relationship in counseling is the rapid change in the middle phase, is suggested by the rapid ascent of body movement synchrony in the middle stage of counseling, and is unlike the advice session, in which a rapid ascent was not observed in the advice session (omitting Case 4. The ascent in Case 4 was more gradual than that in Case 3'). It has been suggested that counselors reduce the psychological distance to clients at a certain time point [1], and reducing the psychological distance may correspond to the rapid change indicated by this study. Furthermore, voice analysis results revealed that in high evaluation group, around the 30 minute point, which corresponds after the rapid change of relationship, the duration of the client's utterance in a single conversational turn (including pauses) was the longest (this will appear in another paper, presently under preparation). This finding suggests that the rapid change in the relationship influences client's utterances, implying that the rapid change in the relationship affects client's thinking and recognition. It is also possible that stability during the long period before the rapid change in relationship has an importance for client change.

The third feature of the relationship in counseling was marked by the pattern of falls in the final phase of counseling and comes back to almost the same level as the level at the beginning. Though the further research is necessary, it is likely that this feature relates to bringing a dialogue to an end in preparation for the next session.

Temporal change in the client-counselor relationship is considered to be adjusted by the counselor, because the temporal pattern in counseling sessions was consistent among the four counseling cases, and temporal patterns of counseling sessions were different from those of advice sessions.

The result indicated in temporal pattern for Case 3' of advice session is consistent with the previous findings that reported the degree of the body movements synchrony increases according to time of interaction (e.g. [10]–[13]), excluding a sharp trough at the seven minute point. It is possible that the sharp trough at the initial stage represents uncomfortable feeling between two participants, because the listener is not a counselor, when the client talked about her psychological pain. This possibility requires further examination.

5. Conclusions

This study analyzed the temporal structure of the synchrony of body movements in counseling and advice ses-

sions through a video analysis. The results indicated that overall degree of body movement synchrony during 50-minute counseling sessions corresponds to the evaluation of the client-counselor relationship. Previously, quality of counseling has been evaluated by experienced counselors using utterance meaning of a client and a counselor as a cue. Results suggested that body movement synchrony can also act as an indicator of the quality of counseling. Results also indicated the correspondence exists between body movement synchrony and the evaluation of the relationship in advice sessions, suggesting that the evaluation method used in this study can be applied to not only counseling dialogues but also ordinary conversation to examine quality of the relationships. Of course, it is necessary to investigate whether the same results are obtained also for other cases in the future, in order to establish the evaluation method of the relationship using only the present method, without using other videos and vocal record.

The present study suggested that mental processes of participants in dialogues, which are thought to change minute by minute, can be approached from the perspective of change in the relationship between the participants. This provides a new perspective in research on interaction. This study also suggested that body movement synchrony is useful as indicator of the relationship. However, it is necessary for future studies to examine how temporal change of the relationship leads to change of clients, and about what kind of verbal and/or nonverbal behavior is used by counselors to manipulate the relationship.

There were some limitations to the study. First, only six cases were examined in this study. It is necessary to investigate whether the same results are obtained also for a larger sample size in the future. Second, the present method treats all body movements, including nodding, gesture, changes of posture as one variable, therefore results do not indicate which parts of body, and what kind of movement contribute to body movement synchrony. There is the possibility that according to time course, significant body parts and movements are different, which should be examined in future studies. Thirdly, the present method can not evaluate congruence of posture, so that it is difficult to compare the results with Charny [14], who reported that in a psychotherapy interview the total duration of period in which postural congruence between a therapist and a client was observed increases as the interview progresses. In addition, this study didn't examine utterances. It is thought that the analysis of function of counselor's utterances and the examination of correspondences between the results of the analysis and the present results is effective to approach to counselor's skills. Such further investigation is assumed to leads understanding of the skills to prepare the context in which people can gain a new viewpoint.

Acknowledgments

We thank Dr. T. Kuwabara of Kyoto Univ., Dr. S. Yoshikawa of Kyoto Univ., and Dr. M. Watabe of Waseda Univ. for permitting the analysis of the six videos of counseling and advice sessions and for their helpful discussions.

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Chika Nagaoka received M. Human Sciences and D. Human Sciences degrees from Osaka University in 2001 and 2004, respectively. She is currently a postdoctoral fellow of Japan Society for the Promotion of Science (JSPS), and with Kokoro Research Center, Kyoto University.

Masashi Komori received M. Med. Sci. and D. Human Sci. degrees from Osaka University in 1998 and 2001, respectively. He is currently an associate professor of Department of Informatics, Osaka Electro-Communication University.