

10. Facial Expression Patterns in Common and Psychotherapeutic Situations

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Abstract. The T-pattern algorithm of Magnusson's was used to find emotional process patterns EPP in facial expressions shown by subjects in different social situations (Common and psychotherapeutic situations). The facial behaviour of the participants was coded using EMFACS (Emotional Facial Coding System). Purpose of the study of common situations was to find indicators for the influence of gender and mental disorder on EPP. 60 dyadic discussions about common political problems were analysed focussing on smiling patterns between subjects.

134 therapy sessions were analysed to find EPP representing psychotherapeutic processes. In the psychotherapeutic situations early indicators of the enactment of maladaptive relationship pattern were searched and related to the emotional quality of the therapeutic relationship and therapeutic outcome. It was shown that the frequency of dyadic EPP in the first session correlated negatively with therapeutic outcome and that they are indicators of conflictous psychotherapeutic processes. The results demonstrate that EPP analysis is a useful tool to identify maladaptive relationship patterns in psychotherapeutic interactions.

Keywords: Emotional process patterns (EEP); facial expression; psychotherapy; gender; mental disorder.

Contents

10.1	Introduction	150
10.2	Method	150
10.3	EPP of patients and healthy subject in everyday relationships (Study 1)	152
10.4	EPP of patients and therapists in therapeutic relationships (Study 2)	153
10.5	Single case study: EPP in a less successful psychotherapy	156
10.6	Summary	156
10.7	References	158

10.1 Introduction

Several studies investigating the functions of facial expressions of emotions in dyadic interactions demonstrate the importance of facial expressions for the self-regulatory processes and for the relationship-regulation in social interactions [1]. In the realm of mental disorders and psychotherapeutic processes facial-emotional behaviour is a good starting point for the understanding of psychopathological processes taking place in social interactions between patients and their interacting partners [2]. Most clinical disorders can be understood as being based on maladaptive relationship-patterns [3].

The present contribution describes facial-emotional behaviour of different subjects (healthy subjects, subjects suffering from mental disorder, therapists) in dyadic interactions and especially demonstrates the usefulness of the detection of Emotional Process Patterns (EPP) with the aid of Magnusson's algorithm THEME [4].

The results presented are part of the projects of the Analysis of Multi-Channel Spontaneous Behaviour (AMC-SB) in clinical and normal contexts [5]. Besides the analysis of facial behaviour other nonverbal channels are analyzed and combined with multi-channel context-analysis as described in. In the present chapter the focus of the analysis is on "Emotional Process Patterns" EPP as they can be detected in the spontaneous facial-emotional behaviour. Emotional Process Patterns (EPP) can be used to investigate individual and dyadic emotional processes. EPP contain information about emotional self-regulatory processes as well as about the quality of the relationship-regulation in social interactions. In some cases they indicate potential conflicts in the self- or relationship-regulation of patients, which makes them extremely useful to study the psychodynamic backgrounds of spontaneous social interactions not only in the realm of clinical research.

Study 1 investigates the role of EPP in common situations. Are they useful (diagnostic) indicators for the influence of gender and mental disorders in everyday situations?

Study 2 investigates the role of EPP in psychotherapeutic situations. How useful are EPP to analyze the quality of the therapeutic relationship and its effect on therapeutic outcome? First (a) emotional behaviour in the therapeutic relationship is compared to that in everyday relationships. (b) The effect of the implementation of relationship-patterns on therapeutic outcome is studied. Finally a single case study (c) is described to exemplify how EPP indicate intra- and interpersonal conflictive processes in a less successful psychotherapy.

10.2 Method

10.2.1 Coding of facial behaviour

Facial behaviour of all protagonists was measured using EMFACS (Emotional FACS), a technique developed by Friesen and Ekman [6] based on the Facial Action Coding System (FACS, [7]). While FACS comprehensively measures all movements in the face, EMFACS measures only movements which are potentially relevant to emotion. Using a dictionary [6] the measured facial events are interpreted as expressions of the basic emotions of happiness, anger, contempt, disgust, fear, sadness, and surprise or as social smiles (see Figure 10.1). The dictionary also interprets blends and masks from the raw scoring of facial events. Blends are innervations of two of the above mentioned basic emotions from the anhedonic spectrum, which are emitted at the same time. Masks are patterns where a happiness display is used to cover a negative expression. Since the dictionary is restrictive and an interpretation is given only if the coded facial pattern fits one of the listed configurations, a number of facial actions are categorized as non-emotional.

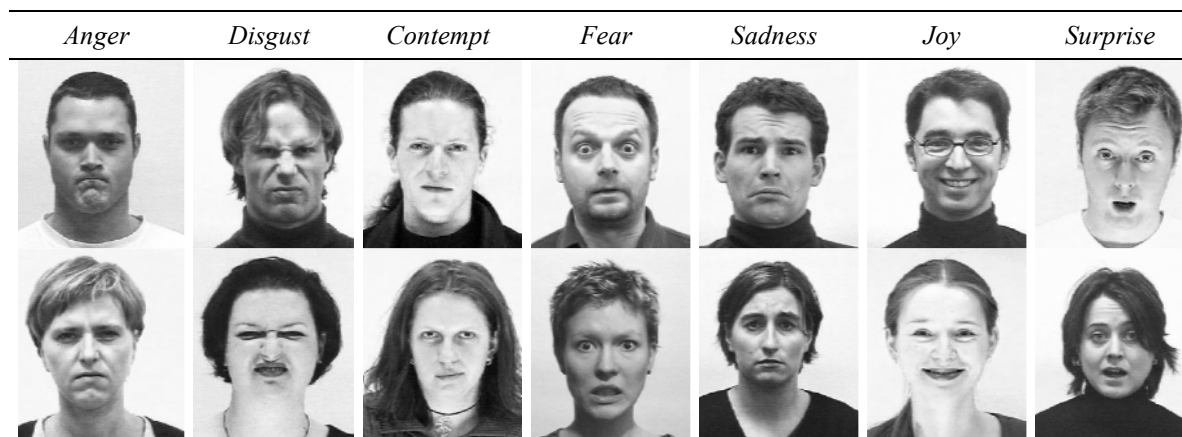


Figure 10.1 Examples of facial displays of basic emotions interpreted by the emotional dictionary

10.2.2 M the EMFACS-coding software

A software called M to code digitized video recordings was developed and adapted to the coding of facial behaviour as measured by EMFACS. The two main windows of M (The video-window and the coding-window) are depicted in Figure 10.2. In the background of Figure 10.2 a time-lining software is running that gives the graphical illustration of the codings done on a timeline. This software is called ForM.

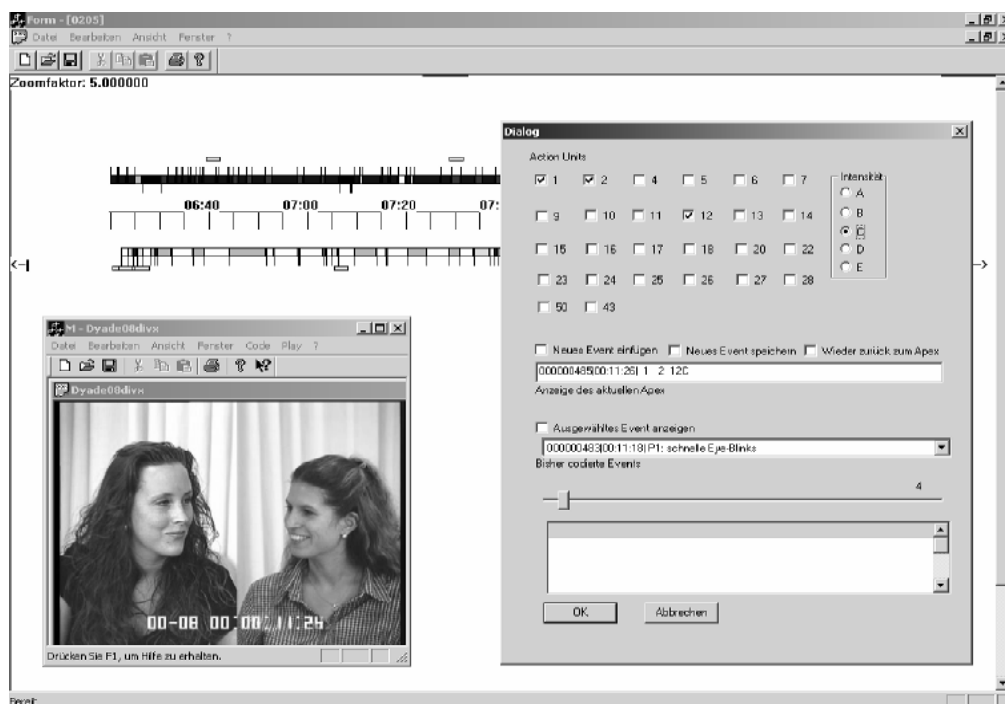


Figure 10.2 Screenshot of the M software

The software M allows fast coding and retrieving of events. A list of coded events can be scrolled through while the corresponding video frames are shown. The same can be done by a slider. Important for the coding of micromomentary behaviour is the possibility to go through the video back and forward frame by frame or in slow motion. The video-window and the coding-window can be sized independently of each other and can be adapted to the needs of the coder. Another important feature is the possibility to

synchronize frame numbers and visible video timers. So the time marks of the codings are not only in frames but can be related to timers already mixed in the video.

10.3 EPP of patients and healthy subject in everyday relationships (Study 1)

The following examination focuses on emotional process patterns (EPP) detected with THEME [4] that are consisting of simple forms of smiling. Smiling is an often found facial expression that seems to be prominent in common situations. We differ smiles called "happy felt" (Duchenne Smile) and "happy unfelt" (social smile) and their interactive combinations. Within the THEME detected patterns as EPP one could distinguish different simple interpersonal smiling patterns along their possible functions to express emotional states and/or interaction regulating intent.

1) EPP as an *intimacy implementing* pattern: Both show Duchenne Smiles aligned by a T-pattern. This may signal positive interactive intentions and express enjoyment.

2) EPP as an *appeasement* pattern: Both show social smiles aligned by a T-pattern. These patterns may function as appeasement signals, with no connection to enjoyment

3) EPP as an *intimacy intensifying* pattern: On partner (A) shows a social smile while the other (B) is reacting with a Duchenne Smile. These facial expressions are aligned by a T-pattern and may be understandable as intimacy intensifying signals, with a positive evaluation of the partner by B.

4) EPP as an *intimacy de-intensifying* pattern: On partner (A) shows a Duchenne Smile while the other (B) is reacting with a social smile. These facial expressions are aligned by a T-pattern and may be understandable as an intimacy de-intensifying signaling.

To study facial emotional interactive behaviour we videotaped the facial-emotional behaviour of healthy and non-healthy subjects of both sexes (see video-window in Figure 10.2). The participants discussed political problems for about 20 minutes. The healthy partner was uninformed about the diagnosis of their interlocutor. Dyads were matched in age and education.

The sample consisted of 120 subjects from 60 dyads (see Table 10.1). Two healthy controls one with male subjects (N= 10 dyads) and one with female subjects (N= 10 dyads), a male and a female sample (each with 10 dyads) in which one partner suffered from colitis ulcerosa were videotaped. Two other samples were composed of male subjects only: 10 dyads with one schizophrenic outpatient interacting with a uninformed healthy partner and 10 dyads with a patient suffering from colitis ulcerosa.

	<i>sci</i>	<i>col (m)</i>	<i>lbp</i>	<i>cg (m)</i>	<i>col (f)</i>	<i>cg (f)</i>
N of dyads	10	10	10	10	10	10

sci = dyads with schizophrenic outpatient; *col (m)* = ...with male colitis ulcerosa patient; *lbp* = ...with male low back pain patient; *cg (m)* = male control group; *col (f)* = ...with female colitis ulcerosa patient; *cg (f)* = female control group

Table 10.1 Subjects in everyday relationships

Women show more interactive intimacy implementing EPP (both showing Duchenne Smiles) independent of a their status of mental disorder. In healthy male control dyads THEME detects 51 EPP with two Duchenne Smiles. The male dyads with one colitis ulcerosa patient show 30 patterns where a Duchenne Smile followed by the same expression of the partner. In female dyads the sum of these intimacy implementing EPP is significantly higher (U-test of male control and colitis dyads vs. female control and colitis

dyads; $p = .000$). The disorder of one interaction partner in the other male dyad samples doesn't seem to have an effect on intimacy implementing EPP (see Table 10.2).

T-pattern	<i>sci</i>	<i>col (m)</i>	<i>lbp</i>	<i>cg (m)</i>	<i>col (f)</i>	<i>cg (f)</i>
intimacy implementing EPP	44	30	44	51	157	158
appeasing EPP	65	60	31	95	7	0
intimacy intensifying EPP	48	51	28	38	33	17
intimacy de-intensifying EPP	44	33	13	14	17	18

sci = dyads with schizophrenic outpatient; *col (m)* = ..with male colitis ulcerosa patient; *lbp* = ...with male low back pain patient; *cg (m)* = male control group; *col (f)* = ..with female colitis ulcerosa patient; *cg (f)* = female control Group

Table 10.2 Sum of interactive Smiling-Patterns detected with THEME

Dyads with a severely disturbed partner show more intimacy de-intensifying EPP. In the aggregate this T-pattern is rarely detected (control groups: female: 18; male: 14) mostly it is found in male dyads with an unhealthy interlocutor (*sci*: 44; *col*: 33). Men show significantly more appeasing EPP than female dyads independent of an existing disturbance of one partner (U-test of male control and colitis dyads vs. female control and colitis dyads; $p = .000$).

In sum women show more intimacy implementing EPP, while men show more appeasing EPP. While Dyads with a severely disturbed partner *do not* show less intimacy implementing EPP they show more intimacy de-intensifying EPP. This intimacy reducing smiling pattern of answering a Duchenne Smile with a social smile may be the mild or polite kind of rejecting an invitation to intimacy and mutual positive evaluation. This EPP may only be one part of a affective choreography that forms a "dance" (vicious circle) of reduced involvement. These simple event pairs between two persons are a starting point in the analysis of affective choreographies. THEME is detecting a lot of other affective patterns and higher level patterns that are of interest too. What is described here are smiling patterns that gave a hint of how hidden choreographies in interactions can be analyzed and may reveal different choreographies for different dyads (see also Schwab [11]). Sex-differences seem to be a main factor of facial-emotional behaviour. Any diagnosed disturbance may influence those choreographies through a modification of the basic sex typical shape of the facial-emotional interaction-behaviour. As Malatesta and Culver [10] criticized, it would be a serious mistake to generalize from any observation of disturbances made in one sex to the other. If we start to analyze disturbance-specific interactive facial behaviour intimacy implementing EPP don't seem to be a good predictor for the severity of a disturbance. Maybe the healthy partners try to compensate or reinforce the rare Duchenne Smiles of their partners. The intimacy reducing Duchenne Smile – social smile – patterns seem to come along with more severe mental illness. In the following study the emotional quality of the relationship of patients and their therapists is described by EPP.

10.4 EPP of patients and therapists in therapeutic relationships (Study 2)

10.4.1 The therapeutic relationship in contrast to an everyday relationship

In a research project, funded by the German Research Community, 11 experienced therapists of cognitive-behavioural, psychoanalytic, and client-centered theoretical

orientation, who treated severely disturbed patients in a brief psychotherapy setting of 15 hours, were videotaped by two cameras. The patients were selected by the therapists as being very severely disturbed, 9 of whom had been treated before without success.

If one compares facial-emotional behaviour in "everyday"-situations and psychotherapeutic situations, one yields the following results: the overall facial emotionality of patients and therapist is reduced when compared to that of healthy subjects in "everyday"-interactions. Joy and disgust are especially displayed less by patients and therapists, while fear and surprise are more often shown by patients in the psychotherapeutic situation. The therapists also show more surprise than subjects in "everyday"-interactions. Patients and therapists often display less contempt than healthy subjects in "everyday"-interactions, but patients show contempt twice as much as therapists. In comparison to "everyday"-interactions simultaneous Duchenne Smiles (indicative of felt happiness) of both patient and therapist are significantly reduced. Healthy subjects in "everyday"-interactions show three times more simultaneous Duchenne Smiles than patients and therapists.

10.4.2 How is the implementation of relationship-patterns tied to therapeutic outcome?

10.4.2.1 Negative emotions, the "Leitaffekt" and therapeutic outcome

The analysis of facial behaviour in therapy-sessions yielded the following results: facial activity in the first session was highly variable across patients and therapists. Patients displayed facial events in a range from 145 to 641 events per session, therapists from 48 to 226. In 10 of the 11 therapies, patients' facial activity was higher than that of their therapists. Taking into account only basic emotions, only 8 patients were more expressive than their therapists. In general, the therapists showed less idiosyncratic facial behaviour, less emotional blends and more "pure" basic emotions than the patients.

Facial behaviour of the therapists did not exhibit any change that could be related to differences in their theoretical orientation (psychodynamic, cognitive-behavioural, humanistic). The variance between therapists of the same theoretical orientation was even higher than that found between the groups of different theoretical orientation. Facial behaviour depends more on individual characteristics and/or dyadic adaptation processes than on theoretical orientation. In dyadic interactions between two healthy persons, the most frequent facial-emotional event was felt happiness. This occurred during therapeutic interaction only in 6 therapists and 5 patients out of a sample of 11. The others showed mainly contempt or disgust and in one dyad anger was the most frequent facial-emotional event. The "Leitaffekt", which is the most predominant and constantly displayed emotion of a subject, was shown in different frequencies. One patient displayed 187 facial events interpreted as disgust during the 50 minutes of the first session but only once expressed felt happiness. These emotions can be considered as indicators of interactive and self-regulatory processes, which is a way of defining transference as a function and could be related to therapeutic outcome. Nevertheless, neither the emotional valence of the "Leitaffekt" of the patient nor its frequency correlated significantly with one of the outcome measures (Perspective of therapist with frequency: $r = .23$, $p = .49$; Patient: $r = .22$, $p = .54$; FBL (Freiburger Beschwerdeliste: $r = .08$, $p = .83$, all 2-tailed).

In line with the above-mentioned results on adaptation [5], therapists whose facial-emotional behaviour responded to the facial control of their patients could be expected to be related to poor therapeutic outcome. Indeed the relative frequency of the "Leitaffekt" of the therapist correlated negatively with therapist's outcome rating which was given usually half a year later ($r = -.63$, $p < .05$, $N = 11$). Therapists who displayed high amounts of *one single* facial emotion during the first session rated therapeutic outcome as "worse" after the 15th session and this was irrespective of the type of "Leitaffekt" displayed. This could be interpreted as a consequence of the implementation of a maladaptive repetitive pattern

which reduces the normal variance of emotionality. This hypothesis is supported by the fact that three *different* negative emotions (anger, contempt and disgust) in the amounts shown by the therapist were positively correlated with his own outcome rating ($r = .81, p = .003, N = 11$) and with the change assessment scores of a questionnaire for symptoms (pre-post differences, $r = .54, p = .11, N = 10$). The proportion of felt happiness of patients and negative emotions of therapists correlated with all three outcome measures as depicted in table 10.3. In therapies in which patient expressed many positive emotions and there were only a few negative emotions on behalf of therapist outcome was worse. Successful therapists compensated an excess of positive emotions with their own negative emotions.

Predictor	Outcome perspective		
	Therapist	Patient	Combined
% "Leitaffekt" _T	-.63*		
Negative emotions _T	+.81*		
Happy felt _p /negative emotions _T	-.64*	-.55 ⁺	-.76*

Spearman correlations, * $p < .05$, + $p < .10$ %; "Leitaffekt"_T: relative frequency of most frequent facial emotion ("Leitaffekt"); Happy felt_p/negative emotions_T: Proportion of patient's happy felt expression and therapist's negative emotions

Table 10.3 Facial-emotional behaviour and therapeutic outcome

10.4.2.2 EPP in the first session and therapeutic outcome

The correlations reported above between frequencies of facial-emotional and therapeutic outcome do not cover the actual implementation of maladaptive relationship-patterns. The actual implementation of maladaptive relationship-patterns takes place on the level of dyadic emotional patterns that describe emotions of patient and therapist as they occur simultaneously or within a short temporal distance. The application of the algorithm of Magnusson revealed that dyadic patterns of Duchenne Smiles (that is, smiles that appear simultaneously or almost simultaneously in the interaction) occurred in nearly all analyzed therapies and that no pattern of negative emotions on behalf of both participants was found. Therefore, motor mimicry of facial-emotional behaviour - as far as it is registered by EMFACS - only takes place in the case of a positive emotion when indicated by a Duchenne Smile. In cases where negative emotions are part of a dyadic pattern, the negative emotion is compensated by a social smile or a Duchenne Smile of the partner. In addition, several therapy-specific patterns describe core psychodynamic conflicts of the patient. An example of a patient with a conflict with attachment and separation is given below. This and other cases are described elsewhere in detail in [2, 8, 9]. Table 10.4 shows the correlations between characteristics of emotional patterns in the first session of different therapies and therapeutic outcome. One major result is that the frequency of dyadic emotional patterns correlates negatively with therapeutic outcome in all three perspectives. Maximum complexity of the patterns - number of elements in a pattern - also correlates negatively in the same manner.

A specific subcategory of emotional patterns is that composed of the appearance of a Duchenne Smile in both interacting partners, which occurs simultaneously. The frequency of simultaneous Duchenne Smiles correlates significantly with therapeutic outcome, namely from the perspective of the therapist (table 10.4).

In addition, we found a curvilinear quadratic relation between the frequency of mutual smiling initiated by the therapist and therapeutic outcome ($p = .038, b_2 = -.64$). Therapies in which not even one incident of positive mutual smiling initiated by the therapist is observed were rated on a medium level of outcome. In the therapies in which the process was deteriorated or the patient dropped out more than four incidents of mutual smiling

initiated by the therapist were found. The therapies with highest outcome rate lie in between the two above described cases.

Predictor	Outcome perspective		
	Therapist	Patient	Combined
Maximum complexity of patterns	-,69*	-,43	-,68 ⁺
# of dyadic patterns	-,58 ⁺	-,81*	-,75*
Simultaneous Duchenne Smiles	-,63*		

Complexity of patterns: Number of elements in a pattern Spearman correlations, * $p < .05$, + $p < .10$

Table 10.4 Correlations between EPP in the first therapy session and therapeutic outcome

It can be concluded that the implementation of relationship-patterns is indicated, in general, by high frequencies and high complexity of dyadic patterns and also by the presence of too many patterns of positive emotions from both interacting partners. Furthermore, this kind of implementation is correlated with bad therapeutic outcome.

If the therapist gets involved in the maladaptive relationship-pattern and it is not resolved during the course of treatment, the dreaded pattern will be repeated and further reinforced. This assumption was confirmed by the following results. In therapies with better outcome conflict-indicators augmented to a certain point in treatment and tended to decrease in later sessions. Indicators for bad outcome were high complexity in dyadic relationship-patterns and their predominance in high frequencies in the last session. In these cases therapists were unable to recognize and/or resolve the maladaptive relationship-pattern they were involved in.

10.5 Single case study: EPP in a less successful psychotherapy

One of the 10 psychotherapies analyzed above was used to detect T-patterns in all the 15 sessions. The advantage of the procedure was that also patterns are detected that occur only once in a session, if they also occur in the other sessions. Several patterns were found that demonstrate how intra- and interpersonal conflicts are implemented in the spontaneous facial-emotional behaviour.

10.5.1 Inhibition of the patient's anger by herself and by the therapist

In short the strategy of the therapist can be described as supportive. The patient did avoid to really work on her conflictive problems and also the therapist was not able to change this attitude because he was hampered by feelings of countertransference. Under these circumstances one can expect that a lot of the conflictive issues not dealt with explicitly come up in the spontaneous emotional behaviour. In line with this expectation is the fact that this therapy was one with suboptimal outcome. For a more detailed description of this case please see [2, 9].

Prototypical relationship-patterns were already found when analyzing the first therapy session (Figure 10.3). There was one positive reciprocal pattern of smiling that occurred very often, but was followed in some cases by an anger expression of the therapist. And there was a individual pattern of the patient that indicates the core of her conflict between autonomy and attachment. The first element of the pattern - an anger-expression - was followed by a fear-expression, indicating that the mobilization of the action-tendency of separation immediately induced fears to loose the emotional attachment.

	Anger _p → Fear _p	
Duchenne Smiles _T →	Duchenne Smiles _p →	"possible anger" _T

Figure 10.3 Patterns in the first session

In the course of this treatment several EPP were found that characterize the psychodynamic of patient and therapist and their kind of relationship regulation. Also in the course of treatment it was the expression of anger on the side of the patient which was crucial. Although the patient showed anger only very seldom, five different T-patterns started with the patient's expression of anger. In one pattern the anger was followed by a expression of joy. This might indicate a positive evaluation of the autonomy-potential of the anger by the patient and/or an interactive compensation of the separating effects of the anger. In line with these interpretations there are two other patterns that demonstrate the ambivalence of anger for the patient. In the first one the anger was followed by fear (as described for the first session) and in the other one the anger was followed by a mixture out of negative emotions also indicating the conflictiveness of the separating power of the anger. But not only the patient inhibited her anger, but also the therapist did as can be seen in two interindividual T-patterns involving the patients anger (Figure 10.4).

Anger _p →	Joy _p
Anger _p →	Fear _p
Anger _p →	Blends _p
Anger _p →	Contempt _T
Anger _p →	Blends _T

Figure 10.4 EPP involving "anger" (across treatment)

The therapist once responded with contempt and in the second pattern with a mixture out of negative emotions. Especially the expression of contempt signals to the patient that her anger is not evaluated positive by therapist. On the contrary it means to the patient that she has become worthless and that she is in danger to loose the emotional bond to the therapist. That the therapist's contempt-expressions have considerable importance for the patient can be seen in the interindividual EPP starting with the therapist's contempt (Figure 10.5).

Contempt _T →	Joy _p
Contempt _T →	Social Smile _p
Contempt _T →	Blends _p

Figure 10.5 EPP involving "contempt" (across treatment)

At the first glance this interpretation is contradicted by two other dyadic T-patterns found which start with the therapist's expression of contempt and are followed by a joy-expression in the first case and a social smile in the second case both shown by the patient. These should not be misinterpreted as a positive evaluation of the therapist's contempt but are better understood as compensatory signals to the therapist to reestablish the emotional attachment to the patient.

10.6 Summary

The results presented supply evidence that EPP are valid and useful indicators of individual and interactive emotional processes. In "everyday"-situations EPP are indicators of sex typical styles of relationship regulation and could be used as indicators for the severity of a mental disturbance. What was described here were simple smiling patterns. Sex differences seem to be a main factor of facial-emotional behaviour. Mental disturbances of one interlocutor seemed to influence those sex typical relationship-patterns through modifications of the facial-emotional interaction-behaviour.

EPP are also substantial indicators of therapeutic processes and can be used as good predictors of therapeutic outcome. The frequency of EPP in the first session indicated the amount of the implementation of relationship-patterns and showed to what amount the therapist had become part of the relationship-pattern. As predicted therapeutic outcome was worse if this involvement of the therapist on the level of spontaneous emotional behaviour was high. The quality of EPP across therapy sessions indicate therapeutic (no-) change processes and can be used as explanation for "failures" in therapy as was demonstrated in a single case study.

It has become obvious that the conflicts not only show up in individual patterns but mostly in dyadic patterns which comprise emotional expressions of patient and therapist. This results emphasizes the importance of the analysis of the dyadic behaviour for the understanding of psychotherapeutic processes.

10.7 References

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