VOICE AND PSYCHOTHERAPY: INTRODUCTION TO A LINE OF RESEARCH ON MUTUAL REGULATION IN PSYCHOTHERAPEUTIC DIALOG*

VOZ Y PSICOTERAPIA: INTRODUCCIÓN A UNA LÍNEA DE INVESTIGACIÓN SOBRE LA REGULACIÓN MUTUA EN EL DIÁLOGO PSICOTERAPÉUTICO

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Abstract: The present paper aims to do an overview of our line research -for practitioners and researchers- on the voice as a dimension of the mutual regulation in the psychotherapeutic dialog. Firstly, we offer a brief review of theoretical and empirical literature we have gathered and systematized, which constitutes the conceptual framework behind the specific methodologies used to approach vocal coordination in therapeutic dialog, and which made it possible to interpret the results of its implementation. Secondly, a general description of the specifics systems of analysis that we have developed is presented. And thirdly, we cover and discuss our mains results and conclusions of the analysis of patient-therapist coordination of vocal rhythm and vocal quality in psychotherapeutic process.

Keywords: voice and psychotherapy, mutual regulation in psychotherapy, non-verbal interactions.

Resumen: El presente trabajo tiene como objetivo dar a conocer a clínicos e investigadores un resumen de nuestra línea de investigación sobre la voz como una dimensión de la regulación mutua en el diálogo psicoterapéutico. En primer lugar, ofrecemos una breve reseña de la literatura teórica y empírica que hemos recolectado y sistematizado,

y que constituye el marco conceptual de los métodos utilizados para acercarse a la coordinación vocal en el diálogo terapéutico, y que hace posible la interpretación de los resultados de su aplicación. En segundo lugar, presentamos una descripción general de los sistemas específicos de análisis que hemos desarrollado. Y en tercer lugar, discutimos nuestros principales resultados y conclusiones del análisis de la coordinación del ritmo vocal paciente-terapeuta y la cualidad vocal en el proceso psicoterapéutico.

Palabras clave: Voz y psicoterapia, regulación mutua en psicoterapia, interacciones no verbales.

1. Introduction

OVER THE LAST YEARS, research on the connection between aspects of the psychotherapeutic process and its outcomes has focused on the study of the techniques and interactions that facilitate psychic change, and on the role of the patient-therapist alliance for fostering a good treatment outcome (Asay and Lambert, 1999; Orlinsky, Ronnestad, and Wilutzki, 2004). Scholars have privileged the study of verbal interventions over the non-verbal interactional aspects of the process (see Elliot, *et al.*, 1987 –Primary Therapist Response Modes–; Etchebarne, Fernández, and Roussos, 2008 –A Classificatory Schema for Psychotherapeutic Interventions in Interpersonal Therapy–; Stiles and Shapiro, 1995 –Verbal Response Modes–; Wiser and Goldfried, 1996 –Verbal Interventions in Significant Psychodynamic-Interpersonal and Cognitive-Behavioral Therapy Sessions; Buchheim and Mergenthaler, 2001 –Computer-based Text Analysis of the Adult Attachment Interview–; Czogalik and Russell, 1995 –Interactional Structures of Therapist and Client Participation in Adult Psychotherapy–; Valdés, Tomicic, Krause, Pérez, 2010 –Therapeutic Activity Coding System–).

The non-verbal interactional aspects of the psychotherapeutic process have been highlighted by studies showing patient-therapist non-verbal coordination and its association with change (e.g. dialogic moments, Cissna and Anderson, 1998; moments of meeting, Stern, 2004; synchrony, Ramseyer and Tschacher, 2006, 2008). Coordination in therapeutic interaction has been regarded as an expression of patient-therapist regulation processes which, as a whole, are the basis for the construction of the intersubjective matrix which makes change in the patient possible (Bebee, 2006).

The purposes of our research line has been to produce knowledge about implicit interactional processes, which we have linked with nonverbal behavior as forms of organization of the patient-therapist experience, and

to analyze their relationship with the evolution of the alliance and change in psychotherapy. Specifically, we have focused on the coordination of vocal quality and vocal rhythm, as the human voice is one of the main ways through which verbal communication travels in psychotherapeutic dialog. Within the latter, the objectives were to determine the characteristics of patient-therapist vocal coordination in change and stuck episodes, to establish its evolution throughout the psychotherapy, and to observe its relationship with mutual regulatory process. In order to cover the aforementioned objectives, we have designed and implemented a mixed research methodology to create a coding system to identify the vocal quality of patients and therapists and, an automated system for the analysis of patterns of vocal rhythm coordination in patients-therapists dyads. Moreover, the research has involved conducting two successive studies to determine the characteristics and evolution of vocal coordination in change and stuck episodes through different stages of a brief individual psychotherapy.

The present paper aims to do an overview of our line research on the voice, as a dimension of the mutual regulation in the psychotherapeutic dialog, that's as a whole includes (a) a brief review of the gathering and systematization of theoretical and empirical literature, which constitutes the conceptual framework behind the specific methodologies used to approach vocal coordination in therapeutic dialog, and which made it possible to interpret the results of its implementation; (b) a general description of such systems of analysis; and (c) the mains results and conclusions of the analysis of patient-therapist coordination of vocal rhythm and quality in change and stuck episodes, from the cross-sectional and longitudinal perspectives used in the two aforementioned studies.

2. The Formulation: A brief review of the gathering and systematization of theoretical and empirical literature

How and to what degree do patients and therapists coordinate their vocal expression? And, what is the association between such coordination and the processes of mutual regulation and psychotherapeutic change? These were the main questions that have guided our research. With them, this inquire assumes a bidimensional focus.

One of these dimensions was the coordination in therapeutic interaction as an expression of the regulation processes involved in the patient-therapist relationship, which, as a whole, are regarded as the basis for the construction of the intersubjective matrix that makes change in the patient

possible (Beebe, Knoblauch, Rustin, and Sorter, 2005). A large part of the reflection on the association between coordination, mutual regulation processes, and intersubjectivity in psychotherapeutic interaction has relied on information from infant research. It has focused on the nonverbal aspects of caregiver-infant communication, accounting for the implicit processes –roughly associated to the nonverbal– underlying the mutual regulation processes that make up different forms of intersubjectivity in the caregiver-infant dyad (Beebe, 2006; Beebe, Jaffe, Lachmann, Feldstein, Crown, and Jasnow, 2000; Beebe, Knoblauch, Rustin, and Sorter, 2005). These implicit processes, associated with nonverbal behavior, have been regarded by adult psychotherapy authors and researchers as forms of organization of the experience in the patient-therapist interaction which are related and entwined with other explicit forms –broadly associated with the verbal– (Beebe, Knoblauch, Rustin, and Sorter, 2005; Bucci, 2007a, 2007b). Nevertheless, a review of traditional process research in adult psychotherapy showed us that most efforts had been aimed at describing and understanding explicit forms of interaction and their association with change (Tomicic, Martínez, Altimir, Bauer, and Reinoso, 2009). In the search the scientific literature for studies dealing with the phenomenon of coordination in interaction, and focusing on its nonverbal aspects, we discovered that in the last decades, specialized journals such as Psychotherapy Research, The Psychoanalytic Review, Psychoanalitic Inquiry, Journal of Clinical Psychology, Psychoanalytic Dialogues, and Journal of Contemporary Psychotherapy, among others, had begun to publish studies exploring the coordination of facial expressions and body movements as aspects of nonverbal regulation in therapeutic communication. A few studies, most of which followed the tradition of speaker-centered speech, that focus in the emotion expressions (Campbell, 2007), considered the voice as another nonverbal aspect that was relevant for psychotherapy. At this point, the voice emerged as the second dimension of the object of study at the core our research.

Still, the fact that the voice as a nonverbal aspect –or paraverbal aspect for some authors– had received less attention in process research and in the study of therapeutic interaction was not a sufficient argument per se to consider it the second dimension of our object of study. Why the voice? To answer this question, before making any attempts at empirical inquiry, we found the reflections by authors such as Russel (1993), Andersen (1998), and Knoublauch (2000, 2005) very relevant. They all pointed out the importance of the voice as one of the main carriers of verbal communication in psychotherapeutic dialog, while by itself –considering parameters such as timbre, rhythm, resonance, and accent– it was regarded as an aspect

that gave meaning to spoken words, and that was a source of information in patient-therapist communication. Also, it was important to discover the value that patients and psychotherapists ascribed to the voice in the everyday practice of psychotherapy. The studies titled "La voz como una herramienta psicoterapéutica: La perspectiva de los terapeutas" (The voice as a psychotherapeutic tool: Therapists' perspective - Tomicic, Bauer, Martinez, Reinoso, and Guzmán, 2009) and "The Meaning of the Voice and the Tone of Voice for the Psychotherapeutic Process from the Patients' Point of View" (Bauer, Tomicic, Martínez, Reinoso, *et al.*, 2010) showed us that, without specialized knowledge about the matter, the therapists and patients interviewed not only recognized the voice as a nonverbal aspect present in psychotherapeutic interaction, but also used and identified it as a tool with specific functions depending on different characteristics of the psychotherapeutic process.

3. Methodology: the development of specific methods used to approach to vocal coordination in therapeutic dialog

Where and how to study patients and therapists vocal expression and coordination in the psychotherapy?

Rice and Greenberg (1984) have stated that the event-based approach to psychotherapy process research made it possible to study the process in context, grounding research in the observation of key performances, allowing a detailed understanding of the patient-therapist moment-by-moment interaction that conjointly and, usually in non-linear ways, moves them toward psychotherapeutic change and outcome. Using conceptual and methodological arguments, several authors had already advanced the idea that a psychotherapy is made up by a series of segments, periods, or phases whose causal and temporal relationships are complex and not necessarily linear (Bastine, Fiedler, and Krommer, 1989; Elliott, 1984; Greenberg, 2007; Krause, 2005; Orlinsky, Ronnestad, and Wilutzki, 2004; Rice and Greenberg, 1984) and that the use of these segments (eg. Change Episodes: Krause, *et al.,* 2007; Innovative Moments: Gonçalves, Matos and Santos, 2009; Stuck Episodes: Herrera, *et al.*, 2009; Rupture Episodes: Safran and Muran, 2000) was relevant to solve the practical problem of managing an excessive amount of information, and, at the same time, assigns a theoretical meaning to its study. For us, two key moments in the psychotherapeutic process are (a) when in the therapeutic interaction the patient achieve a new comprehension which change his/her subjective perspective (Krause,

de la Parra, Arístegui and Strasser, 2006; Krause *et al.*, 2007) and (b) when the therapist and patient interactional process get stuck or communicative break generating a rupture of the therapeutic alliance (Herrera, *et al.*, 2009; Safran and Muran, 2000).

The conceptualizations and procedures for the determination of change and stuck episodes were well established on the basis of the research on relevant episodes in psychotherapy and the studies by Krause and collaborators (e.g. Herrera, *et al.*, 2009; Krause, de la Parra, Arístegui and Strasser, 2006; Krause *et al.*, 2007). A change episode has been conceptualized and operationalized as an interaction segment in a psychotherapeutic session in which a representational-level change is observed in the patient. This definition is based on the notion of change of subjective theories and has been operationalized via Generic Change Indicators (GCI), a hierarchy of indicators divided into three levels reflecting the phases of the psychotherapeutic change process (Altimir *et al.*, 2010; Echávarri, *et al.*, 2009) (see Table 1). In turn, and as a way of identifying episodes of contrast, Krause, *et al.* (2006; Krause, de la Parra, Arístegui and Strasser, 2008) coined the notion of "stuck episodes". The researchers defined "stuck" as a temporary halting of the patient's process of change due to the reedition of the problem during the therapeutic session. They characterized this reedition as the persistence of forms of understanding, behavior, and emotion that contribute in sustaining the problem and stopping the progression of change as described by change indicators (Herrera *et al.*, 2009; Krause, *et al.*, 2006; Ramírez, *et al.*, 2006).

Table 1. Generic Change Indicators (GCI).

Level	Indicators
I. Initial consolidation of the structure of the therapeutic relationship.	1. Acceptance of the existence of a problem 2. Acceptance of his/her limits and of the need for help. 3. Acceptance of the therapist as a competent professional. 4. Expression of hope 5. Questioning of habitual understanding, behavior and emotions. 6. Expression of the need for change. 7. Recognition of his/her own participation in the problems.
II. Increase in permeability towards new understandings.	8. Discovery of new aspects of self. 9. Manifestations of new behaviors and emotions. 10. Appearance of feeling of competence. 11. Establishment of new connections. 12. Reconceptualization of problems and/or symptoms. 13. Transformation of valorizations and emotions in relation to self or others.

III. Construction and consolidation of a new understanding.	14. Creation of subjective construct of self through the interconnection of personal aspects and aspects of the surroundings, including problems and symptoms.
	15. Founding of the subjective constructs in own biography.
	16. Autonomous comprehension and use of the context of psychological meaning.
	17. Acknowledgment of help received.
	18. Decreased asymmetry between patient and therapist.
	19. Constructions of a biographically grounded subjective theory of self and others and of the relationship with surroundings.

Taken from Altimir *et al.* (2010).

Once we decided where to study the vocal expression of the regulation process, the next question was: How to do it?

Scherer (1982) had stated that the lack of studies on vocal phenomena was due to the technical difficulties involved in the recording and analysis of sound. Some years earlier, Jaffe and Feldstein (1970) developed a model of communication in dyadic systems through the empirical study of vocal rhythm coordination in mother-baby dyads (Beebe, *et al.*, 2000; Jaffe, Beebe, Feldstein, Crown, and Jasnow, 2001). They defined vocal rhythm as pause-vocalization cycles, and coordination as an interpersonal contingency (co-action), so that a participant's vocal rhythm could be predicted based on that of the other (Jaffe, *et al.*, 2001). In order to analyze the dyadic coordination of vocal rhythm, they defined five vocal states: speaker switches, vocalizations, pauses, exchange pauses, and simultaneous speech, and manually coded such categories in recordings of mother-baby interactions made in experimental settings (Beebe, *et al.*, 2000; Feldstein and Welkowitz, 1978). In turn, and using a more naturalistic approach specifically aimed at studying vocal interaction in psychotherapy, in the late 1960s and 80s Rice and and her collaborators (Rice and Kerr, 1986; Rice and Wagstaff, 1967; Wiseman and Rice, 1989) developed highly original process-rating measures that assessed patient and therapist vocal quality. The ideas behind these methods were the value of the close observations of the psychotherapeutic process and the creation of meaningful coding categories based on those observations; the importance of the style of patients' and therapists' expressions rather than their content; and the relevance of the way in which these non-verbal expressions account for the activation of recurrent cognitive-affective schemas of the patients.

Based on ideas by Jaffe and Feldstein (1970) and by Rice and collaborators (Rice and Kerr, 1986; Rice and Wagstaff, 1967; Wiseman and Rice, 1989),

and taking advantage of the currently available technological advances for the recording and processing of acoustic signals such as the human voice, we developed two methods which, by themselves, made it possible to cover the objective of establish the characteristics of patient-therapist vocal rhythm and quality coordination.

The first of them, the Vocalization-Silence Dynamic Patterns System (VS-DP) (Tomicic, Barraza, Rodríguez, 2012), was based on the analysis of dyadic systems by Jaffe and Fledstein (1970). In contrast to it, however, with Dr. Paulo Barraza and Dr. Eugenio Rodríguez we created it so it could be applied to audio recordings obtained in natural contexts, that is, without ambient noise control and with omnidirectional microphones, as in the case of the recordings usually made in psychotherapeutic process research. In addition, this system sought to automatize the detection process of vocalization-silence cycles, or rhythmic patterns of speech. Specifically, VS-DP was designed as a system for the visual organization of acoustic information, which allowed for the simultaneous observation of vocalization-silence coordination patterns in patient-therapist interaction (through VS-Scattergrams) and of the way in which these patterns of vocalization-silence cycles develop over time (through VS- Dynamic Graphs), for example over the course of a relevant psychotherapeutic episode (see Figure 1).
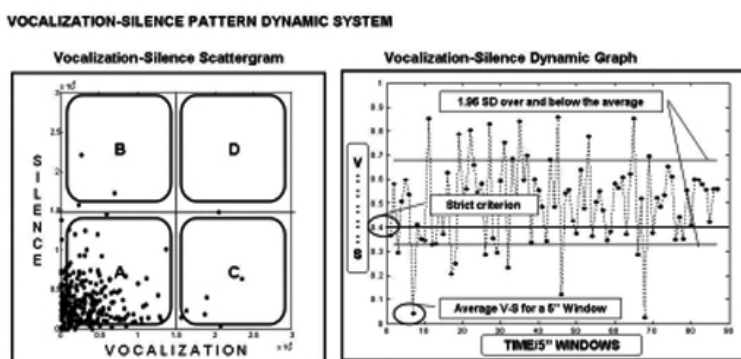
Figure 1. Vocalization-Silence Dynamic Patterns System: VS-Scattergram and VS-Dynamic Graph (taken from Tomicic, 2011).

As it was said above, the development of this system made it possible to construct an initial general characterization of the rhythmic coordina-

tion patterns that may be observed in therapeutic interaction. Specifically, through VS-Scattergrams, four prototypical rhythmic coordination patterns or regularities in vocalization-silence cycles: pattern A (cycles of short vocalizations-short silences), pattern B (short vocalizations-long silences), pattern C (long vocalizations-short silences), and pattern D (long vocalizations-long silences) were identified. Also, this made it possible to observe variations in the degree of regularity of each of these patterns (according to certain variations of the cycles within the limits of their configuration), that is, each of them could display varying levels of tightness. These two possible characterizations of the rhythmic patterns of vocalization-silence coordination –based on their prototypical configuration and their varying degrees of regularity– were fundamental for describing differences in the coordination of rhythmic patterns during change and stuck episodes of therapeutic conversation, along with its evolution throughout a psychotherapeutic process.

The second method that we developed for this research, the Vocal Quality Patterns (VQP) system (Tomicic, Martínez, Chacón, Guzmán and, Reinoso, 2011), drew inspiration from the systems for coding the vocal quality of patients and therapists created by Laura Rice and collaborators (Rice and Kerr, 1986; Rice and Wagstaff, 1967; Wiseman and Rice, 1989). In this case, our purpose was to re-create a single VQP coding system for patients and therapists that could be applied, through a trained auditory assessment, to psychotherapeutic dialog in the cultural context of Chile and of Spanish-speaking countries (Tomicic, *et al.*, 2011). The VQPs were defined as a combination of specific vocal parameters in the utterances of speakers, whose speech gives a specific impression to a listener regardless of the contents transmitted.

Like the VS-Dynamic Patterns system, the VQP system also made it possible to establish an initial general characterization of the vocal quality patterns observable in the speech of patients and therapists during psychotherapeutic interaction. Specifically, as it is shown in table 2, six VQPs were identified (Report, Connected, Affirmative, Reflection, Emotional-Expressive, and Emotional-Restrained) and two categories of conversational phenomena (Full Pause and Overlapping). With this, we later conduct comparative and sequential studies of the VQPs used by both participants throughout the psychotherapeutic process.

Table 2. Characterization of Vocal Quality Patterns.

VQP	Characterization
Report	It adds to the speech the quality of *something already known*, of detachment concerning what is said and/or certain emotional distance. It sounds as if the speaker was reporting, narrating, or exploring a content without any emotional involvement. In this pattern, the central element is the listener's impression of a detached speech.
Connected	It conveys the quality of being oriented toward someone else (the partner) and of being developed while it is uttered. In this pattern, the central element is the listener's impression of an elaborative speech geared towards someone else.
Affirmative	It conveys the quality of certainty and conviction. It sounds as if the speaker was teaching or instructing the listener, or as if he/she was very sure of what he/she is saying. In this pattern, the central element the listener's impression of a secure and instructive speech.
Reflection	It conveys the quality of being directed *toward oneself* (the speaker). It sounds as if the speaker was connected with her/his internal world or in a dialog with her/himself. In this pattern, the central element is the listener's impression of an introverted speech.
Emotional-Expressive	It conveys affection and/or that the speech has a heavy emotional load. It sounds like the speaker's emotion (joy, anger, sadness, fear, etc.). In this pattern, the central element is the listener's impression of an emotionally charged speech, regardless of the type of emotion.
Emotional Restrained	It conveys affection and/or that the speech has a heavy emotional load. However, even though in this case the speaker's emotion is not audible, what does impress the listener is an effort to contain her/his *emotion*. In this pattern, the central element is the listener's impression of suffocation and control to avoid being overwhelmed by emotion.
Exclusion Categories for VQPs	
Overlapping	It is an instance of simultaneous speech, which, in VQP coding, makes it impossible to distinguish the vocal characteristics of the participants in a full segment or speaking turn When coding this conversation phenomenon, the overlapping of the actors is noted.
Full Pause	Short utterances with para-verbal content (hmm, aha, okay). They are usually ways of agreeing, showing attention, disagreeing, or displaying the wish to end a conversation. Their meaning depends mainly on the context and on certain vocal characteristics of the utterance; however, due to their brevity, they are hard to analyze in terms of the vocal parameters that define the VQPs described.
Non Codable	These are units of analysis which do not meet the phenomenological characteristics and the parameters of the VQPs. It can also apply to the cases in which the recording is not completely audible, due to ambient noises, mispronunciations, or other errors by the speakers. They are neither full pauses nor instances of overlapping.

Taken from Tomicic (2011).

4. Outcomes: Mains results and conclusions of the analysis of patient-therapist coordination of vocal rhythm and quality in change and stuck episodes

After testing the validity and reliability of the methods developed to meet the requirements of the study of vocal rhythm (Tomicic, Barraza & Rodríguez,

2012) and quality coordination (Tomicic, *et al.*, 2011), we approached the object of study focusing on three specific questions: How does the coordination of patient-therapist vocal rhythm and quality vary in change and stuck episodes throughout the psychotherapeutic process?, What are the connections between the coordination of patient-therapist vocal rhythm and quality and therapeutic outcomes? And, how could the coordination of patient-therapist vocal rhythm and quality reflect the characteristics and evolution of processes of mutual regulation between the participants?

4.1. Coordination of Vocal Rhythm in Psychotherapeutic Conversation

In order to cover the questions associated with the coordination of vocal rhythm in therapeutic conversation, we applied the Vocalization-Silence Dynamic Patterns method (VS-DP) (see above) to a sample of six change and six stuck episodes taken from sessions belonging to different phases of a brief psychodynamic psychotherapy (see table 3; Tomicic, Martínez, Krause, 2011; Tomicic, 2011). That is to say, this was a longitudinal single case study, following the strategy of performing systematic explorations of psychotherapeutic processes as a whole, in order to provide a detailed account of the phenomenon analyzed (see Elliot, 2002; Kazdin, 1999). What answers to the questions above resulted from this analysis?

Table 3. Characterization of the participants of Study 1.

Therapy	Patients' sex	Patients' age	Therapists' sex	Therapist years of practice	OQ at beginning	OQ at end
I	Female	37	Male	10	115	71
II	Female	36	Male	10	68	48.4
V	Female	40	Male	15	111	91
X	Female	42	Male	15	52	30
XV	Male	32	Female	10	128	46
XVI	Male	21	Male	3	47	14

Taken from Tomicic, 2011.

First, in the case studied, we managed to establish that two prototypical patterns predominate in both change and stuck episodes: pattern A (cycles of short vocalizations followed by short silences) and pattern C (cycles of long vocalizations followed by short silences). So, both patterns were thought

to account for two different therapeutic conversation rhythms, irrespective of the type of episode. Also, it was observed that these patterns displayed variations in their regularity levels depending on the type of episode and the moment of the therapy involved. Specifically, this variation appeared in stuck episodes from the medial phase onwards, when both patterns (A and C) become more regular and display more coordination than in change episodes. These variations were interpreted in terms of a regulatory function that increased coordination within tense or difficult moments of the therapeutic interaction. Taking into account Beebe's (2006) concept of interactive regulation, this rise in coordination of the vocalization-silence rhythmic patterns during these episodes from the medial phase onwards was interpreted as a sign of increased attention to mutual regulation by the participants, in order to preserve the therapeutic bond and relationship. Regarding this, Beebe (2006) has pointed out that a balance that can improve the therapeutic relationship relies on the equilibrium between self-regulation and mutual regulation, with the intermediate range permitting an optimum flexibility between both dimensions of the interaction. From this point of view, more coordination between patient and therapist can be interpreted as increased attention to mutual regulation in the interaction, and thus as increased attention to the therapeutic bond, while neglecting their self-regulation needs.

With respect to the way in which these coordination patterns develop or behave during the course of the episodes (VS- Dynamic Graphs developed according to the average values of silences and vocalizations plotted within a five-second "window"), it was observed that, regardless of the phase of the therapy, the change episodes analyzed displayed rather heterogeneous trajectories, with mean peaks towards both vocalization and silence. In contrast, it was not possible to establish a single characterization, irrespective of the phase of the therapy, for vocalization-silence trajectories in stuck episodes. Stuck episodes from the initial and final stages displayed a markedly less heterogeneous trajectory than medial phase stuck episodes. Regarding the heterogeneity of these trajectories, it was fundamental to interpret them considering the presence of breakdowns towards silence. It was observed that more heterogeneous trajectories presented more breakdowns towards silence. Thus, this heterogeneity results in a weaker average tendency towards vocalization. In this regard, stuck episodes as a whole presented a stronger tendency towards vocalization compared to change episodes, that is, the participants incorporated shorter silences, or less silences, to the interaction during this type of episodes. An interpretation of this difference was that

an increased presence of silence in the interaction was associated with the process of change. However, the results also showed that, in medial phase stuck episodes, silence was more frequent in the interaction, thus displaying the tendency of this type of episodes to resemble change episodes during this stage of the therapy. With respect to this result, we had to think of an emergent hypothesis: that the incorporation of silence might have a regulatory function which could only be understood by considering the contextual and temporal elements of the therapeutic interaction containing the silences that pushed tendencies towards vocalization.

Considering both analyses (VS- Scattergrams and VS- Dynamic Graphs), a general configuration of patterns of vocal rhythmic coordination was observed in the whole therapeutic process, mostly based on the difference between change and stuck episodes in the different phases of the process. The initial stage of the therapy showed differences between change and stuck episodes according to their degree of regularity or coordination and depending on the degree of heterogeneity of the mean peaks of vocalization and silence along them. These differences disappeared in the medial stage of the process, since stuck episodes became nearly as regular and heterogeneous as change episodes. The final stage of the therapy again displayed a difference between episode types. In other words, the general configuration of patterns of vocal rhythmic coordination in therapeutic dialog was shaped like the letter U (see tables 4 and 5). This U-shape trajectory of the therapeutic process has been described in other studies on the evolution of therapeutic interaction throughout the treatment (see Gennaro, Gonçalves, Mendes, Ribeiro, and Salvatore, 2011; Martínez, 2011; Salvatore, Gelo, Gennaro, Manzo, and Al-Radaideh, 2011; Tomicic, 2011), and it has been proposed that it may reflect a part of the therapeutic process during which tension between the participants seems to increase due to therapeutic work. Regarding the results that have been summarized, this rise in tension was thought to be reflected in the higher coordination observed in the medial phase, because of the participants' increased attention to mutual regulatory demands aimed at preserving the therapeutic bond (Beebe, 2006).

4.2. Coordination of Vocal Quality in Psychotherapeutic Conversation

Having established the characteristics of patient-therapist vocal rhythm coordination patterns in change and stuck episodes, their connection with the evolution of therapeutic change, and their possible association with the

evolution of interactive regulation processes, we focused on the questions and objectives derived from patient-therapist vocal quality coordination in psychotherapeutic interaction. In order to do this, the Vocal Quality Patterns system (VQP) was applied to another sample of change and stuck episodes taken from sessions belonging to different phases of seven brief psychodynamic psychotherapies (see tables 3, 4 and 5; Tomicic, Martínez, Domínguez, and Krause, 2011). In this case two successive studies were performed. The first study intended to determine and compare the characteristics of the VQPs in change and stuck episodes gathered through different therapies (see tables 3 and 4). The second one focused on determining the evolution of the VQPs in change and stuck episodes throughout the stages of a brief psychodynamically oriented psychotherapy (see table 5). What answers did the results of these analyses provide to questions about a) variations in patient-therapist vocal quality coordination during change and stuck episodes, b) the connections between such coordination and the evolution of therapeutic change and outcomes, and c) how these variations in patient-therapist vocal quality coordination reflect the characteristics and evolution of mutual regulation processes between the participants?

Table 4. Characterization of Study 1 sample.

Therapy number	Change Episodes						Stuck Episodes					
	Initial phase		Medial phase		Final phase		Initial phase		Medial phase		Final phase	
	Session	Episode number	Session	Episode number	Session	Episode number	Session	Episode number	Session	Episode number	Session	Episode number
I	3	2	15	7	21	8	5	2	11	8	22	15
II	3	3	7	6	17	13	N/D		9	1	17	6
V	4	5	10	13	21	24	6	3	12	5	20	10
X	4	6	7	8	19	22	2	3	N/D		18	12
XV	4	3	N/D		N/D		N/D		9	3	12	4
XVI	3	3	9	7	19	13	3	1	8	5	18	9
Total amount of episodes	6		5		5		4		5		6	

Taken from Tomicic, 2011.

Table 5. Characterization of Study 2 sample.

	Change Episodes						Stuck Episodes					
	Initial phase		Medial phase		Final phase		Initial phase		Medial phase		Final phase	
	Session	Episode number	Session	Episode number	Session	Episode number	Session	Episode number	Session	Episode number	Session	Episode number
	1	1	11	15	30	45	1	1	13	16	29	15
	6	5	13	21	31	46	6	4	8	7	28	14
Amount of episodes	2		2		2		2		2		2	

Taken from Tomicic (2011).

Firstly, the results of both studies showed that the connected VQP was more likely to occur in change episodes, while the affirmative VQP, the full pause and overlapping were more probable during stuck episodes (Tomicic, 2011; Tomicic, Martínez and Domínguez, 2011, June; Tomicic, Martínez, Krause and Domínguez, 2011). The differences observed in the probability of specific VQPs during change and stuck episodes were explained on the basis of the operational characteristics of each VQP (see table 2 for the definition of each VQP). Therefore, the higher probability of the connected VQP in change episodes was thought to be consistent with the idea that this episodes are interaction segments during the session which display changes in the patient's subjective theory about him/herself, his/her relationship with others, and his/her problems (Krause, *et al.*, 2007). This consistency became evident when it was considered that the connected VQP suggests listeners that speech is prepared as it is uttered, which leads to its being perceived as a speech capable of transmitting its potential for innovation and transformation due to its aural quality. On the other hand, the higher probability of the affirmative VQP in stuck episodes was thought to be coherent with the idea that these episodes are interaction segments during the session in which the patient persists in his/her usual forms of understanding, behaving, or feeling, which solidifies his/her problem and halts progress towards therapeutic change (Herrera, *et al.*, 2009, Ramírez, 2006). In this case, consistency became apparent when considering that the affirmative VQP adds certainty and conviction to speech, and, therefore, is capable of transmitting inwardness and a lack of openness towards reelaboration. Also,

the connection between overlapping and full pauses with stuck episodes was thought to reflect a lack of fluidity, rhythm, and coordination in the turn taking process associated with this type of therapy segments.

Secondly, the use of sequential analyses (LSA, Bakeman and Quera, 1995; Bakeman, Deckner and Quera, 2005) allowed us to establish VQP sequences that were interpreted as micro-regulatory vocal sequences. Two types were identified: self-regulation sequences (if the temporal association between the VQPs took place in the same patient or therapist utterance) and mutual regulation sequences (if the temporal association between the VQPs corresponded to interactions between the members of the therapeutic dyad) (Tomicic, 2011; Tomicic, Martínez and Domínguez, 2011, June; Tomicic, *et al.*, 2011).

The result revealed that only the self-regulation VQP sequences of patients and not those of therapists were associated with the type of episode (Tomicic, 2011; Tomicic, Martínez and Domínguez, 2011, June; Tomicic, *et al.*, 2011). This was hypothesized to be related to the fact that the latter could correspond to a speech that characterizes a general form of therapeutic intervention, whereas the former could be linked to a self-regulatory process in a patient open to change.

With respect to mutual regulation sequences, the results of the first study showed that the sequence of connected VQP in the patient and connected VQP in the therapist was associated with change episodes, and that the opposite occurs with the sequence of affirmative VQP in the therapist and affirmative VQP in the patient (Tomicic, 2011; Tomicic, Martínez and Domínguez, 2011, June; Tomicic, *et al.*, 2011). This situation was hypothesized to derive from the interaction effect of two variables present in the makeup of these sequences. A first variable might correspond to the specific VQPs that constitute these sequences. The more descriptive results showed that the connected VQP was associated with change episodes and that the affirmative VQP was linked with stuck episodes. It was also observed that four of the five mutual regulation VQP sequences that include the affirmative VQP appeared more often during stuck episodes, and that the sequence that broke this tendency presented the connected VQP in the therapist. A second variable that was considered was the actor who initiated the sequence. In the results, it was noteworthy that all the mutual regulation VQP sequences in which the given behavior was a therapist VQP, in other words, all the VQP sequences initiated by the therapist, appeared more frequently in stuck episodes. Therefore, both variables –specific VQP and actor who initiate the sequence– were thought to be helpful to explain the

fact that two symmetrical VQP sequences (that is to say, sequences in which similar VQPs are temporally linked) were associated in opposite ways with respect to the type of episode.

In the second study, all the mutual regulation VQP sequences observed were asymmetrical (that is to say, sequences in which different VQPs are temporally associated), and it was noteworthy that they all presented the full pause category (Tomicic, 2011; Tomicic, Martínez and Domínguez, 2011, June; Tomicic, *et al.*, 2011). As a result of the association of these sequences with the episode type, it was necessary to include two additional variables. The mutual regulation sequence initiated by the patient with the connected VQP and followed by a full pause by the therapist was more often found in change episodes. In contrast, the two mutual regulation sequences initiated with a full pause by the therapist and followed by the report or affirmative VQPs in the patient, were present more frequently in stuck episodes (Tomicic, 2011; Tomicic, Martínez and Domínguez, 2011, June; Tomicic, *et al.*, 2011). Two possible explanations were proposed for these findings. First, the type of VQP that accompanied the full pause in the sequence. For instance, if this category was accompanied by the connected VQP, it was more likely to be associated with change episodes, since, as previously pointed out, this VQP has a higher probability of appearing in such episodes. A second, non-incompatible explanation refers to the actor who started the mutual regulation VQP micro sequence. It was observed that sequences in which the given behavior belonged to the therapist were more often found in stuck episodes, whereas those in which the given behavior was the patient's prevailed in change episodes.

With respect to the evolution of VQPs throughout the psychotherapeutic process, the results of the second study revealed the relatively stable presence of the reflection and emotional-expressive VQPs and of the full pause category in the three phases of the therapy: initial, medial, and final. Other VQPs appeared in specific stages of the process, providing clues for the distinctive interpretation of the each phase, and modifying the meaning of the presence of the most stable VQPs in each of them (Tomicic, 2011; Tomicic, Martínez and Domínguez, 2011, June; Tomicic, *et al.*, 2011). In the initial phase, the more frequent presence of the report VQP and the higher probability of the connected VQP were thought to assign to this period of the therapy –in vocal terms– a quality that was termed deconstructive. On the one hand, the report VQP conveys the quality of the known and a certain degree of detachment; on the other hand, the connected VQP transmits a more elaborative quality. In other words, it is the association between a

detached speech, accumulated and constructed over time (Derrida, 1966), with another affected by the here and now, elaborative and open to the novelty of the interlocutor. In the medial phase, the more frequent presence of the affirmative VQP, along with the more usual presence and probability of overlapping, was thought to reflect –in vocal terms– a period displaying a working quality. On the one hand, the affirmative VQP conveys a quality of certainty, conviction, and commitment with what the speaker says; on the other, overlapping, a display of simultaneous speech reveals a lack of fluidity and tension in the distribution of speaking turns and turn taking. Thus, in this intermediate stage of the process, there could be a noteworthy association of a committed and certain speech with a conversational scenario of disputes or tensions regarding the right to speak. Both actors appear to work by putting their convictions at stake in their speech, permanently negotiating their space in the conversation. In the final stage of the therapy, the higher presence of the report VQP and the decrease of instances of overlapping were thought to reflect –in vocal terms– a quality that was termed consolidation. Therefore, the final phase of the process, like the initial one, was characterized by a quality of speech that combines the known with a degree of detachment, but in a more fluid conversational scenario, with less tension due to turn taking. In this case, the report quality was hypothesized to be a reflection of the knowledge accumulated through experience during the therapy, while the decrease in instances of overlapping were hypothesized to signal more coordination between the participants due to the relational experience constructed during the therapy (Tomicic, 2011). In sum, the general configuration, in this case of the presence of different VQPs along the stages of the psychotherapeutic process, again showed a U shape (Gennaro, *et al.*, 2011; Salvatore, *et al.*, 2010). In this case, the interesting point was that, although the phases at both ends of the process (initial and final) displayed a similar VQP configuration, the use of contextual and temporal cues in their interpretation revealed that they expressed different regulatory functions in patient-therapist interaction (Beebe, 2006). Also, these results could be interpreted from the point of view of the process of psychotherapeutic change as a process of construction of new meanings about the patient's problems, its relation with his or her own biography, and with his or her relations with the other and his or her environment (Krause, 2005). For example, in the study conducted by Salvatore, *et al.*, (2010), two phases were identified in the evolution of the

change of meanings during the therapeutic process: a deconstructive stage followed by a constructive one. In their view of the psychotherapy as a sense-making process –where time is a matter of indexicality working as a relevant interpretative context (Nightingale and Cromby, 1999)– there is an early stage in which dysfunctional meanings are deconstructed so that new meanings can emerge afterwards. In a commentary on the aforementioned study, Krause and Martínez (2011), have said that, at the beginning of the therapy, meanings should be more rigid; then, they should become unfrozen, and, finally, a new consolidation should take place, made up by meanings constructed in the therapy. They drew a parallel between this notion and the evolution of Generic Change Indicators (GCI), which also involves an early "melting" moment followed by the consolidation of new meanings in later phases (Krause *et al.*, 2007). Therefore, the U-shape observed in the evolution of VQPs in the patient and the therapist along the therapeutic process could be regarded as a parallel phenomenon to what is said that occurs in the domain of how is said, and both from the perspective of the when question (Salvatore, *et al.*, 2010; Lauro-Grotto, Salvatore, Gennaro and Gelo, 2009).

Finally, regarding the presence of self-regulation and mutual regulation VQP microsequences in the different stages of the psychotherapeutic process analyzed in the second study, one finding stood out: all the VQP microsequences clustered in the medial and final stages of the psychotherapy. This was interpreted as revealing that, in these phases, personal interaction styles had already translated into interpersonal patient-therapist interaction patterns. It was thought that these microsequences could well be an expression of such crystallization (Tomicic, 2011; Tomicic, Martínez and Domínguez, 2011, June; Tomicic, *et al.*, 2011).

As a whole, the results derived from applying the VS- Dynamic Patterns method and the VQP coding system allowed us to characterize patient-therapist vocal rhythm and quality coordination in therapeutic conversation, depict patient-therapist vocal rhythm and quality coordination in change and stuck episodes throughout the psychotherapeutic process, determine connections between patient-therapist vocal rhythm and quality coordination with the evolution of therapeutic change and outcomes, and identify the way in which patterns of patient-therapist vocal rhythm and quality coordination reflected the characteristics and evolution of mutual regulation processes between the participants (see tables 6 and 7).

Table 6. Summary of results of specific objectives 1 and 2.

Specific Aims	Vocal Rhythm Coordination	Vocal Quality Coordination
(a) To establish the characteristics of patient-therapist vocal coordination.	Four prototypical patterns of rhythmic coordination in therapeutic interaction: *Pattern A*: Cycles of short vocalizations-short silences. *Pattern B*: Cycles of short vocalizations-long silences. *Pattern C*: Cycles of long vocalizations-short silences. *Pattern D*: Cycles of long vocalizations-long silences.	VQPs: combination of specific vocal parameters in the utterances of the speakers, whose speech gives a specific impression to a listener, regardless of the contents transmitted. Six VQPs: *Report, Connected, Affirmative, Reflection, Emotional-Expressive,* and *Emotional-Restrained*. Two categories of conversational phenomena: *Full Pause and Overlapping*.
(b) To describe the characteristics of patient-therapist vocal coordination in change and stuck episodes throughout the psychotherapeutic process.	–Predominance of *Pattern A* and *C* in change and stuck episodes throughout the whole psychotherapy. –Variations in *Pattern A* and *C* levels of regularity depending on the type of episode and the stages of the therapy involved. –Change episodes displayed rather heterogeneous trajectories, with mean peaks toward vocalization and silence; however, it was not possible to establish a single characterization for stuck episodes.	–The *connected* VQP was more likely to occur in change episodes. The *affirmative* VQP, the full pause and overlapping were more probable during stuck episodes. –Study 1: The sequence of *connected* VQP in the patient and *connected* VQP in the therapist was associated with change episodes; the opposite occurs with the sequence of *affirmative* VQP in the therapist and *affirmative* VQP in the patient. –Study 2: The sequence initiated by the patient with the *connected* VQP and followed by a *full pause* by the therapist was more often found in change episodes. In contrast, the sequences initiated with a *full pause* by the therapist and followed by the *report* or *affirmative* VQPs in the patient, were present more frequently in stuck episodes.

Table 7. Summary of results of specific objectives 3 and 4.

Specific Aims	Vocal Rhythm Coordination	Vocal Quality Coordination
(c) To determine the connection between patient-therapist vocal coordination and the evolution of therapeutic change and outcomes.	A general *U shape* configuration of the vocal rhythmic coordination of therapeutic dialog was observed: the initial stage showed differences between change and stuck episodes according to their degree of coordination and according to the degree of heterogeneity of the mean peaks of vocalization and silence. These differences disappeared in the medial stage of the process, since stuck episodes became nearly as regular and heterogeneous as change episodes. The final stage of the therapy again displayed a difference between episode types.	–Relatively stable presence of the *reflection* and *emotional-expressive* VQPs and of the *full pause* category in the three phases of the therapy. –A general *U shape* configuration: The initial phase (more presence of the *report* VQP and the *connected* VQP) displays a quality termed *deconstructive*. The medial phase (more presence of the *affirmative* VQP and the *overlapping* category) displaying a *working* quality. The final stage of the therapy (higher presence of the *report* VQP and a decrease in instances of *overlapping*) shows a quality of *consolidation*. –All the VQP microsequences clustered in the medial and final stages of the psychotherapy.

(d) To identify the way in which patient-therapist vocal coordination could reflect the characteristics and evolution of processes of mutual regulation.

–*Patterns A* and *C* were thought to account for two different therapeutic conversation rhythms, irrespective of the type of episode.
–The increased coordination in stuck episodes from the medial phase was interpreted as a sign of increased attention to mutual regulation by the participants, in order to preserve the therapeutic bond and relationship.
–The higher level of coordination observed in the medial phase was interpreted as the participants' increased attention to mutual regulation in the interaction, and thus as their increased attention to the therapeutic bond.

–The differences observed in the probability of a specific VQP during change and stuck episodes were explained on the basis of the operational characteristics of each VQP.
–Study 1: The specific VQP and actors who initiate the mutual regulation sequence through their interaction were considered helpful for explaining the fact that two symmetrical VQP sequences were associated in opposite ways with respect to episode type.
–Study 2: The type of VQP that accompanied the *full pause* in the sequence and the actor who started the mutual regulation VQP micro sequence were the two variables employed to explain the difference in their prevalence in change or stuck episodes.
Although the initial and final phases of the process displayed similar VQPs, contextual and temporal cues revealed that they expressed different regulatory functions in patient-therapist interaction.
–It was interpreted that, in the medial and final phases of the therapy, personal interaction styles had already translated into interpersonal patient-therapist interaction patterns. It was thought that the clustering of VQP microsequences could well be an expression of such crystallization.

5. Conclusion, Discussion and Projections

We think that our line research on the voice as a dimension of the mutual regulation in the psychotherapeutic dialog makes three central contributions in terms of its methodological and theoretical scope. First, the research conducted provides empirical arguments for the relevance of the voice in the psychotherapeutic process. In this regard, we think that the results summarized make it possible to understand that the clinical exchange is carried out not only by means of *what* is said, but also by means of *how* it is said. Even more so, we think that this comprehension of the importance of the voice for psychotherapy that our research line conveys is not only based on the presentation of new advances for a study field which has been only intermittently covered in the history of psychotherapy process research, but is also grounded on the fact that it posits two methodological models that permit a more systematic exploration of the vocal variable in therapeutic exchange.

Second, and with respect to regulatory processes, the findings presented in this paper allow us to establish certain specific characteristics that they acquire in the context of therapeutic exchange, and which may extend to other communication channels in which such processes are appear (e.g. discourse, facial expression, body movement). The forms taken by patient-

therapist regulation processes (e.g. degree of regularity of vocalization-silence coordination patterns, type of VQP microsequences –self-regulation or mutual regulation–, symmetry or asymmetry of mutual regulation VQP sequences) and the regulatory function that they fulfill are not independent from the context in which they occur. In this regard, two interconnected contexts were extremely relevant: the *setting of therapeutic roles* and the *temporal context*. The context which we have termed *setting of therapeutic roles* not only participates in the regulation of *what* is said and *who* said it, but also on *how* it is said and by *whom*. For example, the results of the application of the VQP coding system show the differences between the VQP repertoires of patients and therapists. Even more so, reveal how mutual regulation VQP sequences made up of the same VQPs are observed differentially in change and stuck episodes, depending on which participant uses a certain given VQP. On the other hand, the temporal context is not only part of the regulation of *what* is said, *who* says it, and *how* it is said what is said, but also of *when* it is said by *whom*, and *how*. An example of this was the general configuration observed after applying both the VS- Dynamic Patterns system and the VQP coding system to the longitudinal analysis, which showed a U shape.

Third, in connection with the above, the results here synthesized reinforce the notion of psychotherapy as a dynamic phenomenon, that is, a process depending on time and concerning the global form and organization of the intersubjective field of communication between therapist and patient (Salvatore *et al.* 2009), in which the clinical exchange aimed at producing therapeutic change in the patient is carried out not only by means of what is said, but also by means of *who* says it, *how* it is said, and *when* it is said.

In spite of the scope of the results obtained until now, both the methods that we have developed for the analysis of vocal rhythm and quality coordination as well as the findings resulting from their application to the analysis of change and stuck episodes from different psychotherapies, are undoubtedly limited. Regarding the methods developed, and specifically with respect to the technical limitations of the VS- Dynamic Patterns method, we must stress that one of the reasons for developing it was the need for an empirical approach to dyadic vocal coordination in interactional processes recorded in non-experimental contexts, such as the psychotherapy. Also, some of these recordings were not originally intended for the methodological needs of this research. This resulted in a series of technical constraints, for example, all of them were one-track recordings with no ambient noise control. However, taking advantage of the technological advancements and improvements in acoustic signal processing and analysis models, the

development of the VS- Dynamic Patterns method allowed us to deal with these issues in a straightforward manner. On the other hand, with respect to the VQP coding system, given the nature of its object of analysis and its analytic procedure, one of its main limitations is its lack of validation with external criteria. Specifically, we cannot assure that the system's ability to discriminate VQPs through a trained auditory assessment is truly associated with objective measurements of the vocal parameters used to characterize them. In this regard, a first projection is to conduct more studies to determine the system's ability to discriminate VQPs through a trained auditory assessment which is truly associated with objective measurements of the vocal parameters used to characterize them. We are thinking in a concurrent validity study via the analysis of segments coded with each VQP, employing the following external criteria: objective acoustic parameters of fundamental frequency, amplitude of the acoustic signal, and discursive rate at a suprasegmental level (Bachowroski and Owren, 1995, 2008, 2009), analyzing the differential presence of each parameter in the different VQPs.

Regarding the results obtained, one of its limitations was the difficulty of generalizing the findings for psychotherapy. Since some of them are based on a single-case design, and others on a rather small and homogeneous sample, several questions arise about possible differences in the general and specific configurations of the coordination of vocal rhythm and quality observable when comparing psychotherapeutic processes of different modalities and theoretical approaches, dyads of the same or different sexes, or even patients with different diagnoses. For this reason, most of the findings here summarize must be carefully interpreted when weighing their external validity. Nevertheless, all the results that we have briefly exposed in this article are connected with the description of such vocal coordination, and with the possibility of understanding its characteristics and its evolution throughout the psychotherapy as a reflection of the patient-therapist regulation processes which are applied and modified in the interaction, and which take part in the process of change.

Also, we have thought of some specific research questions with respect to the different results exposed and which, based on our reflections, can guide the continuation of an empirical inquiry oriented towards strengthening and adding precision to such ideas. For example, what can be the meaning of the breaks toward silence observed in change episodes of the whole therapy and, to a lesser degree, in the stuck episodes of the medial phase of the psychotherapeutic process? Levitt (2001a, 2001b) has identified seven types of silent client processes –mnemonic, associational, disengaged, interactional, reflective, emotional, and expressive– developing the Pausing Inventory

Categorization System (PICS). These seven types of silent processes led to a three-category model: neutral silences, obstructive silences, and productive silences. In a recent study, Frankel, Levitt, Murray, Greenberg and Angus (2006) have shown that productive silences occur more frequently within good-outcome therapeutic dyads, whereas obstructive silences occur more frequently within the poor-outcome therapeutic dyads. Considering the PICS developed by Levitt and colleagues, we think that it would be interesting to track the moments in which long silences take place within the VS-Dynamic Graphs of change and stuck episodes, in order to code them as representing productive, obstructive or neutral silences. In this way, it could be possible to increase our understanding of the contextual and temporal elements involved in the variation of tendencies towards vocalization and of the possible regulatory functions said variations.

Other future research which we have projected in association with the findings briefly presented here, draws on the idea of an oscillator model of the timing of turn-taking, developed by Wilson and Wilson (2005). These authors have stated that, during conversation, endogenous oscillators in the brains of the speaker and the listener become mutually entrained, on the basis of the speaker's rate of syllable production. This entrained cyclic pattern could govern the potential for initiating speech at any given instant for the speaker and also for the listener (as the potential next speaker). Furthermore, the readiness functions of the listener are counter phased with those of the speaker, minimizing the likelihood of simultaneous starts by a listener and the previous speaker and participating in the coordination of the vocalization-silence pattern of interaction. Regarding this idea, we found it reasonable to think that the configuration of rhythmic vocalization-silence patterns in the patient-therapist dyad throughout a psychotherapeutic process is related to the endogenous oscillation of the brains of each participant, and also that said configuration –which necessarily occurs in the interaction between them– could operate in the opposite direction: in a transformation of such endogenous oscillations. We think that further methodological developments and research are needed, since they could shed light on the embodied characteristics of the regulatory processes that participate in the development of the therapeutic relationship and change in psychotherapy.

With respect to the results associated to vocal quality coordination between patient and therapist, we are proud to say that from our point of view the groundbreaking ideas by Rice and her collaborators were confirmed as a current and useful way to explore not only therapeutic interaction but also the manifestations of the self in the vocal expression of its participants. In 1967, Laura Rice and Alice Wagstaff stated that their system was focused

on the attempts of patients to express themselves, and that such attempts exerted an influence on the therapist beyond the contents of communication. In our studies we have revisited these notions to understand how vocal expression participates in the patient-therapist relationship and in the regulation between its members during the psychotherapeutic process. With respect to the research challenges associated to these results, the most relevant one is, in our opinion, integrating the other channels of human communication which participate in the mutual regulation processes that configure the intersubjective matrix in psychotherapy. These channels, which include verbal discourse, facial behavior, body movement and posture, visual contact, and, certainly, vocal quality and rhythm, have mostly been studied as isolated variables. However, it has been advanced that the explicit and implicit attempts of each participant of the therapeutic dyad at regulating the state of the relationship are influenced and affected by those of the other party, in a circular, continuous, and dynamic process (Beebe, 2006; Beebe and Lachmann, 2003) which is expressed in a simultaneous and combined fashion through these diverse communication channels. Thus, future studies in this area require the development of a methodological strategy aimed at capturing the complexity of regulatory processes to establish, for instance, the connections between verbal discourse and vocal quality, or between the facial expression and the vocal quality of participants in order to attain a better comprehension of these interactional processes, especially of those associated with the creation of a therapeutic relationship that fosters change (see Martínez, Tomicic, Altimir, Pérez and Krause, 2011; Tschacher, Tomicic, Martínez and Ramseyer, 2012).

Despite the limitations presented and the new research questions that emerge, we strongly think that the reflections, results, and interpretations discussed are a relevant contribution to the greater task, in the field of psychotherapy process research, of bringing to light the elements participating in all expression channels of the mutual regulation processes of effective therapeutic interactions, and that, in the future, they may have an impact on the training of psychotherapists and in psychotherapy practice. This could be done through concrete and specific applications of the methods developed, for example, to train individuals to go beyond content in therapeutic listening, interpreting the utterance considering its aural characteristics. In addition, the results presented here could also be conveyed to practitioners in the clinical field in a more general and abstract manner, in order to contribute to the comprehension and identification of the aspects and dimensions that participate in the regulatory processes of therapeutic exchange and which define its dynamic nature.

References

Altimir, C., Krause, M., de la Parra, G., Dagnino, P., Tomicic, A., Valdés, N., Echávarri, O., Vilches, O., Reyes, L., Ramírez, I., and Arístegui, R. (2010). Clients', therapists' and observers' perspectives on moments and contents of therapeutic change. *Psychotherapy Research, 20* (4), 472-487.

Andersen, P. (1998). *Nonverbal communication: Forms and functions.* Mountain View, California: Mayfield.

Asay, T. P., and Lambert, M. J. (1999). The empirical case for the common factors in therapy: quantitative findings. En M. Hubble, B. Duncan and S. Miller (Eds.), *The heart and soul of change: The role of common factors in psychotherapy* (pp. 57-88). Washington, DC: American Psychological Association Press.

Bachorowski, J. and Owren, M. J. (2008). Vocal expression of emotion. In Lewis, M., Haviland-Jones J. M. and Feldman L., *The Handbook of emotions* (pp.196-210). New York : Guilford Press.

Bachorowski, J. and Owren, M. J. (2009). Emotion in speech. En R. L. Squire (Ed.), *Encyclopedia of neuroscience* (pp. 897-901). Oxford: Academic Press.

Bachorowski, J.-A. and Owren, M. J. (1995). Vocal expression of emotion: Acoustic properties of speech are associated with emotional intensity and context. *Psychological Science, 6,* 219-224.

Bakeman, R. and Quera, V. (1995). *Analyzing interaction: Sequential analysis with SDIS and GSEQ.* New York, NY: Cambridge University Press.

Bakeman, R., Deckner, D. F., and Quera, V. (2005). Analysis of Behavioral Streams. In D. M. Teti (Ed.), *Handbook of research methods in developmental psychology* (pp. 394–420). Oxford, UK: Blackwell Publishers.

Bastine, R., Fiedler, P., and Krommer, D. (1989). Was ist therapeutisch and der Psychotherapie? Versuch einer Bestandsaufnahme und Systematisierung der Psychotherapeutischen Prozeßforschung. *Zeitschrift für klinische Psychologie, 18*, 3-22.

Bauer, S., Tomicic, A., Martínez, C., Reinoso, A., Schäfer, H., Peukert, A., and Frangkouli, A. (2010). Die Bedeutung von Stimme und Stimmklang im psychotherapeutischen Prozess aus der Sicht der Patienten und Patientinnen. *Psychoanalyse and Körper, 17* (9), 27-50.

Beebe, B. and Lachmann, F. (2003). *Infant research and adult treatment: Co-constructing interactions*. Hillsdale, NJ: Analytic Press.

Beebe, B. (2006). Co-constructing mother-infant distress in face-to-face interactions: Contributions of microanalysis. *Infant Observations, 9,* 2, 151-164.

Beebe, B., Jaffe, J., Lachmann, F., Feldstein, S., Crown, C. and Jasnow, M. (2000). Systems models in development and psychoanalysis: The case of vocal rhythm coordination and attachment. *Infant Mental Health Journal, 21*, 99-122.

Beebe, B., Knoblauch, S., Rustin, J., Sorter, D. (2005). Forms of intersubjectivity in infant research an adult treatment: A system view. In B. Beebe, S. Knoblauch, J. Rustin, J., D. Sorter (Eds.), *Forms of Intersubjectivity in infant Research and Adult Treatment* (pp.1-28). New York: Other Press.

Bucci, W. (2007a). Four domains of experience in the therapeutic discourse. *Psychoanalitic Inquiry, 27*, 617-639.

Bucci, W. (2007b). The role of bodily experience in emotional organization: New perspectives on the multiple code theory. En F. S. Anderson (Ed.), *Bodies in treatment: The unspoken dimension* (pp. 51-78). New York, NY: The Analytic Press.

Buchheim, A. and Mergenthaler, E. (2001). The relationship among attachment representation, emotion-abstraction patterns, and narrative style: A computer-based text analysis of the Adult Attachment Interview. *Psychotherapy Research, 10* (4), 390-407.

Campbell, N. (2007). On the use of non verbal speech sounds in human communication. En A. Esposito, M. Faundez-Zanuy, E. Keller and M. Marinaro (Eds.), *Verbal and nonverbal communication behaviours* (pp. 117-128). Berlin: Springer.

Cissna, K. and Anderson, R. (1998). Theorizing about dialogic moments: The Buber-Rogers position and postmodern themes. *Comunication Theory, 8*, 1, 63-105.

Czogalick, D. and Russell, R. (1995). Interactional Structures of Therapist and Client Participation in Adult Psychotherapy: P Technique and Chronography. *Journal of Consulting and Clinical Psychology, 63*, 1, 28-36.

Derrida, J (1966). La structure, le signe et le jeu dans le discours des sciences humaines. Conférence prononcée au Colloque international de l'Université Johns Hopkins sur "Les langages critiques et les sciences de l'homme", Baltimore.

Echávarri, O., González, A., Krause, M., Tomicic, A., Pérez, C., Dagnino, P., De la Parra, G., Valdés, N., Altimir, C., Vilches, O., Strasser, K., Ramírez, I., and Reyes, L. (2009). Cuatro terapias psicodinámicas breves exitosas estudiadas a través de los Indicadores Genéricos de Cambio. *Revista Argentina de Clínica Psicológica,* 18 (1), 5-19.

Elliot, R. (1984). A discovery-oriented approach to significant change events in psychotherapy: Interpersonal process recall and comprehensive process analysis. In L. Rice and L. S. Greenberg (Eds.), *Patterns of change: intensive analysis of psychotherapy process* (pp. 249-286). New York: Guilford.

Elliot, R. (2002). Hermeneutic single-case efficacy design. *Psychotherapy Research, 12*, 1-20.

Elliott, R., Hill, C., Stiles, W., Friedlander, M., Mahrer, A. and Margison, F. (1987). Primary therapist response modes: comparison of six rating systems. *Journal of Consulting and Clinical Psychology*, 55, 2, 218-223.

Etchebarne, I., Fernández, M., and Roussos, A.J. (2008). Un esquema clasificatorio para las intervenciones en terapia interpersonal. *Anuario de Investigaciones – Facultad de Psicología, Universidad de Buenos Aires,* 15, 15-30.

Feldstein, S., and Welkowitz, J. (1978). A chronography of conversation: In defense o fan objetive approach. In A.W. Siegman and S. Feldstein (Eds.), *Nonverbal behavior and communication*, (pp. 329-378). Hillsdale, NJ: Erlbaum.

Frankel,Z., Levitt, H., Murray, D., Greenberg, L., and Angus, L. (2006). Assessing silent processes in psychotherapy: an empirically derived categorization system and sampling strategy. *Psychotherapy Research, 16* (5), 627-638.

Gennaro, A., Gonçalves, M., Mendes, I., Ribeiro, A., and Salvatore, S. (2011). Dynamics of sense-making and development of the narrative in the clinical exchange. *Research in Psychotherapy, 14*, 1, 90-120.

Goncalves, M., Matos, M., and Santos, A. (2009). Narrative Therapy and the Nature Of "Innovative Moments" in the Construction of Change. *Journal of Constructivist Psychology, 22*, 1, 1-23.

Greenberg, L. (2007). A guide to conducting a task analysis of psychotherapeutic change. *Psychotherapy Research, 17* (1), 15-30.

Herrera, P., Fernández, O., Krause, M., Vilches, O., Valdés, N. and Dagnino, P. (2009). Revisión teórica y metodológica de las dificultades en psicoterapia: propuesta de un modelo ordenador. *Terapia Psicológica, 27,* 169-179.

Jaffe, J., and Feldstein, S. (1970). *Rhythms of dialogue*. New York: Academic Press.

Jaffe, J., Beebe, B., Feldstein, S., Crown, C. L., and Jasnow, M. D. (2001). Rhythms of dialogue in infancy. In W. D. Overton (Ed.), *Monographs of the Society for Research in Child Development, 66* (2), Serial No. 265.

Kazdin, A. E. (1999). The meaning and measurement of clinical significance. *Journal of Consulting and Clinical Psychology*, 67, 332-339.

Knoblauch, S. H. (2000). *The musical edge of therapeutic dialogue*. Hillsdale, NJ: The Analytic Press.

Knoblauch, S. H. (2005). Body rhythms and the unconscious: Toward an expanding of clinical attention. *Psychoanalytic Dialogues, 15,* 807-827.

Krause, M. (2005). *Psicoterapia y cambio: Una mirada desde la subjetividad*. Santiago de Chile: Ediciones Universidad Católica de Chile.

Krause, M., De la Parra, G., Arístegui, R. and Strasser, K. (2006). *Hacia una práctica efectiva en psicoterapia: estudio de episodios de cambio relevantes en diferentes tipos de psicoterapia y sus efectos en los resultados terapéuticos* (Proyecto FONDECYT N° 1030482). Manuscrito no publicado, Escuela de Psicología, Pontificia Universidad Católica de Chile, Santiago, Chile.

Krause, M., De la Parra, G., Arístegui, R. and Strasser, K. (2008). *Hacia una práctica efectiva en psicoterapia: estudio de episodios de cambio relevantes en diferentes tipos de psiocoterapia y sus efectos en los resultados terapéuticos* (Informe Final Proyecto FONDECYT N° 1030482). Manuscrito no publicado, Escuela de Psicología, Pontificia Universidad Católica de Chile, Santiago, Chile.

Krause, M., de la Parra, G., Arístegui, R., Dagnino, P., Tomicic, A., Valdés, N., *et al.* (2007). The evolution of therapeutic change studied through generic indicators. *Psychotherapy Research, 17* (6), 673-689.

Krause, M. and Martínez, C. (2011). Dynamic of subjective change in psychotherapy. Coments on the paper "Dynamics of sense-making and development of the narrative in the clinical exchange". *Research in Psychotherapy*, *14*, 2, 12-23.

Lauro-Grotto, R.P., Salvatore, S., Gennaro, A., and Gelo O. (2009). The unbearable dynamicity of psychological processes: Highlights of the psychodynamic theories. In J. Valsiner, P. Molenaar, M. Lyra, and N. Chaudhary (Eds.), *Dynamics process methodology in the social and developmental sciences* (pp. 1-30). New York: Springer.

Levitt, H. (2001). Clients' experiences of obstructive silence: Integrating conscious reports and analytic theories. *Journal of Contemporary Psychotherapy, 31*(4), 221-244.

Levitt, H. (2001). Sounds of silence in psychotherapy: The categorization of clients' pauses. *Psychotherapy Research, 11*(3), 295-309.

Martínez, C., Tomicic, A., Altimir, C., Pérez, C. and Krause, M. (2011). *Manifestaciones verbales y no verbales de la regulación mutua en episodios relevantes de psicoterapia y su relación con el proceso de cambio.* Fondecyt N° 1110361(2011-2013).Facultad de Psicología, Universidad Diego Portales, Santiago, Chile.

Martínez, C. (2011). *Regulación mutua y dialogicidad en psicoterapia. Un análisis empírico de la subjetividad e intersubjetividad en el discurso terapéutico*. Saarbrücken: EAE Publishing.

Nightingale, D. J., and Cromby, J. (Eds.). (1999). *Social constructionist psychology. A critical analysis of theory and practice*. Buckingham, UK: Open University Press

Orlinsky, D. E., Ronnestad, M. H., and Wilutzki, U. (2004). Fifty years of psychotherapy process-outcome research: continuity and change. In M. Lambert (ed.), *Bergin and Garfield's handbook of psychotherapy and behavior change* (pp. 307-389). New York: John Wiley and Sons.

Ramirez, I., Krause, M., Reyes, L., Echávarri, O., Tomicic, A., de la Parra, G., Arístegui, R., Strasser, K., Vilches, O., Valdés, N., Dagnino, P., Ben-Dov, P., Altimir, C. (2006, Agosto). *No todo es cambio: Hacia una definición de episodios de estancamiento en psicoterapia.* Ponencia presentada en el 7° Encuentro de Investigación en Psicoterapia. Comité de la Sociedad de Neurología, Psiquiatría y Neurocirugía y SPR (Society for Psychotherapy Research), Reñaca, Chile.

Ramseyer, F., and Tschacher, W. (2006). Synchrony: A core concept for a constructive approach to psychotherapy. *Constructivism in the human sciences, 11* (1/2), 159-180.

Ramseyer, F., and Tschacher, W. (2008). Synchrony in dyadic psychotherapy sessions. In S. Vrobel, O. E. Roessler and T. Marks-Tarlow (Eds.), *Simultaneity: Temporal structures and observer perspectives* (pp. 329-347). Singapore: World Scientific.

Rice, L. and Greenberg, L. (Eds.) (1984). *Patterns of Change*. New York: Guilford Press.

Rice, L. N. and Kerr, G. P. (1986). Measures of client and therapist vocal quality. En L. S. Greenberg and W. M. Pinsof (Eds.), *The psychotherapeutic process: A research handbook* (pp. 73-106). New York, NY: The Guilford Press.

Rice, L. N. and Wagstaff, A. K. (1967). Client voice quality and expressive style as indexes of productive psychotherapy. *Journal of Consulting Psychology, 31,* 557-563.

Russell, R. (Ed.). (1993). *Language in Psychotherapy: Strategies of Discovery*. New York: Plenum Press.

Safran, J. D., and Muran, J. C. (2000). *Negotiating the therapeutic alliance*. New York: Guilford Press.

Salvatore, S., Gelo, O., Gennaro, A., Manzo, S., and Al-Radaideh, A. (2010). Looking at psychotherapy as an intersubjective dynamic of sensemaking. A case study with Discourse Flow Analysis. *Journal of Constructivist Psychology, 23 (3)*, 195-230.

Scherer, K. R. (1982). Methods of research on vocal communication: Paradigms and parameters. En K. R. Scherer and P. Ekman (Eds.), *Handbook of methods in nonverbal behavior research* (pp. 136-198). Cambridge: Cambridge University Press.

Stern, D. N. (2004). *The present moment in psychotherapy and everyday life*. New York: W.W. Norton and Company, Inc.

Stiles, W. and Shapiro, D. (1995). Verbal exchange of brief psychodynamic-interpersonal and cognitive-behavioral psychotherapy. *Journal of Consulting and Clinical Psychology, 63 (*2), 15-27.

Tomicic, A., Bauer, S., Martinez, C., Reinoso, A., and Guzmán, M. (2009). La Voz como una Herramienta Psicoterapéutica: La Perspectiva de los Terapeutas. *Revista Argentina de Clínica Psicológica, 18* (3), 197-208.

Tomicic, A., Barraza, P., and Rodríguez, E. (2012). Vocal-Silence Dynamic Patterns: A System for Measuring Rhythm Coordination in Dyadic Conversations. Manuscript submitted for publication.

Tomicic, A., Martínez, C., Altimir, C., Bauer, S., and Reinoso, A. (2009). Coordinación Vocal Como una Dimensión de la Regulación Mutua en Psicoterapia. *Revista Argentina de Clínica Psicológica, 18* (1), 31- 41.

Tomicic, A., Martínez, C., Bauer, S., Reinoso, A., Guzmán, M. and Chacón, L. D. (2010). El sonido de la psicoterapia: visión general de una línea de investigación. *Gaceta de Psiquiatría Universitaria, 6,* 98-107.

Tomicic, A., Martínez, C., Chacón, L., Guzmán, M. and Reinoso, A. (2011). Patrones de Cualidad Vocal en Psicoterapia: Desarrollo y estudio de confiabilidad de un sistema de codificación. *Revista Psykhé*, 20, 1, 77-93.

Tomicic, A., Martínez, C., Domínguez, M., and Krause, M. (2011). The Sound of Change: A Study of the Psychotherapeutic Process Embodied in Vocal Expression. Laura Rice Ideas Revisited. *Unpublished manuscript.*

Tomicic, A., Martínez, C. and Domínguez, M. (2011, June). *Vocal Regulatory Micro-sequences: Vocal Quality Patterns in the Psychotherapeutic Change Proces*. Society of Psychotherapy Research. 42nd International Meeting, June 29 – July 2. Bern, Switzerlan

Tomicic, A., Martínez, C., and Krause, M. (2011). The Beat of Change: A Study of Vocal Patterns of Rhythmic Coordination within the Psychotherapeutic Conversation. *Unpublished manuscript.*

Tomicic, A. (2011). *Vocal coordination: A window for the study of mutual regulation in psychotherapeutic dialog*. Doctoral dissertation, Pontificia Universidad Católica de Chile.

Tschacher W, Tomicic A, Martinez C and Ramseyer F (in press). Formen der Synchronie in dyadischer Interaktion. In J. Witte and J. Petersen (eds.), *Hamburger Symposium Sozialpsychologie* (pp. x-xx). Lengerich: Pabst Science.

Valdés, N., Tomicic, A., Pérez, J.C., and Krause, M. (2010). Sistema de Codificación de la Actividad Terapéutica (SCAT-1.0): Dimensiones y categorías de las acciones comunicacionales de pacientes y psicoterapeutas. *Revista Argentina de Clínica Psicológica, XIX*, 117-130.

Wilson, M. and Wilson, T. (2005). An oscillator model of the timing of turn-taking. *Psychonomic Bulletin and Review, 12* (6), 957-968.

Wiseman, H. and Rice, L. (1989). Sequential analyses of therapist-client interaction during change events: a task-focused approach. *Journal of Consulting and Clinical Psychology*, 2, 281-286.

Wiser, S. and Goldfried , M. (1996). Therapist interventions and client emotional experiencing in expert psychodynamic-interpersonal and cognitive-behavioral therapies. *Journal of Consulting and Clinical Psychology, 66* (4), 634-640.