The MATRIX, a novel tool exploring dynamic psychotherapy: Preliminary psychometric properties

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ABSTRACT

Most measures in the field of psychodynamic psychotherapy are bound to a specific theory, and usually focus only on patient processes or therapist interventions. The MATRIX is a newly developed research tool that focuses on events within both the patient and the therapist individually, as well as on dyadic events, and provides the simple and meaningful coding of content for therapy session transcripts in psychotherapy. The present study describes the inter-rater reliability and construct validity of the MATRIX.

Reliability of the MATRIX was assessed by applying it to 805 fragments of psychodynamic-oriented psychotherapy sessions. Three independent experts coded fragments, and the tool was examined for reliability. Validity in identifying the theoretical inclinations was assessed by applying the MATRIX to 30 segments (containing 1309 fragments) of sessions that reflect different theoretical orientations. Findings evinced high inter-rater reliability for all dimensions. The MATRIX was found to have high degree of validity for differentiating the theoretical inclinations of segments of sessions.

The MATRIX is a reliable and valid measure that may enable moment-to-moment, quantitative, analysis of psychodynamic psychotherapy.

1. Introduction

As it is impossible to pinpoint any single factor that is crucial in dynamic psychotherapy, psychotherapy research is in a need for a non-dogmatic, multiple factor model that successfully incorporates the knowledge obtained from the many existing theories in the field. These include drive-conflict theories (viewing therapy as aimed at improving the capacity of these patient to manage drives), developmental-arrest theories (holding that therapy should remove developmental barriers that hinder an authentic experience of one's self), and relational theories (emphasizing the mutual co-construction of patient's and therapist's subjectivity in therapy) (See Mitchell, 2009, for review). Developing practical or operational markers of these theoretical orientations

is essential for assessing the clinical effect, and improving the clinical praxis, of psychotherapy.

Psychodynamic therapy has undergone a major shift in the last three decades, often referred to as "the relational turn." This shift involves the move from one-person psychology that focuses exclusively on the patient's processes to two-person psychology, which recognizes the fact that the therapist is significantly involved in the process of change. Increasingly, treatment is seen as emerging from the interaction between two individuals, not from the solitary change of one (Aron, 1990; Mitchell, 1995). Prominent psychotherapy researchers are increasingly calling for an examination of the processes that take place in both patients and therapists and the interaction between them, thus taking into account theories that recently emerged in psychotherapy (Safran and Muran, 2000; Castonguay, 2011; Norcross, 2011; Wiseman

and Tishby, 2014). This call emphasizes the need to develop an empirically sound measure that would integrate the examination of the processes of the patient, the therapist, as well as the interaction between them.

Over time, numerous measures have been developed to assess interventions from different psychotherapy orientations (Crits-Christoph et al., 2013), and in particular- to analyze psychodynamic processes (Barber et al., 2013). Many of these measures are theory-bound, and focus on the therapists' techniques (for example, the Comparative Psychotherapy Process Scale (CPPS; Hilsenroth et al., 2005), the Interpretive and Supportive Technique Scale (ISTS; Ogrodniczuk and Piper, 1999), the Multitheoretical List of Therapeutic Interventions (MULTI; McCarthy and Barber, 2009), the Psychodynamic Intervention Rating Scale (PIRS; Milbrath et al., 1999), the Comprehensive Psychotherapeutic Interventions Rating Scale (CIPRS; Trijsburg et al., 2002), the Transference Work Scale (TSL; Ulberg et al., 2014) and the Manual for Process Ratings (Bøgwald et al., 1999)), or patients' processes (e.g., the Core Conflictual Relationship Theme (CCRT; Luborsky and Crits-Christoph, 1998), the Defense Mechanism Rating Scales (DMRS; Perry and Henry, 2004), the Structural Analysis of Social Behavior (SASB; Benjamin, 1979), and the Achievement of Therapeutic Objectives Scale (ATOS; McCullough et al., 2003)). Even measures that examine a wide range of therapeutic phenomena and are not bound to a specific theory, such as the Psychotherapy Process Q-Set (PQS; Ablon and Jones, 2005) and the Analytic Process Scales (APS; Waldron et al., 2004), are confined to therapist interventions (e.g., interpretation, clarification) and patient productivity (e.g., greater understanding, affective engagement). Only initial studies explore therapist's involvement in the process of change (Safran et al., 2014), while the mutual processes that occur between the patient and the therapist, and other aspects of psychotherapy (for example, the potential to experience), have hardly been investigated.

Inspired by the need to apply a measure that will incorporate processes that occur within the patient, within the therapist, and between the therapist and patient, as central to understanding how the treatment functions (Mitchell, 1995; Fosha, 2001; Bromberg, 2003; McCullough et al., 2003; Aron and Harris, 2014), the current study presents a novel research tool (the MATRIX)[1] that was designed to provide meaningful coding of psychotherapy sessions while focusing on the patient, the therapist, and their interaction and taking into account various dimensions of experience (potential to experience, experience itself, relations between experiences).

1.1. The MATRIX: patient/therapist/dyad-X-space/content/order

The MATRIX is a tool that allows the sequential coding of psychotherapy sessions on two axes: focus (patient/therapist/dyad) and dimension (space/content/order).

The first axis, the focus, refers to the subject of the fragment ("who is the fragment about?"). The three possible foci are the patient, the therapist and the dyad. The patient and therapist codes are obvious (e.g., – P[atient]: "I am sad" and T[herapist]: "I am confused… I cannot follow you," respectively). The dyad code indicates fragments in which experience is attributed inseparably to both patient and the therapist. Dyad codes indicate fragments in which patient and therapist are merged in such a way that the experience could not be attributed separately to either of them (i.e., "There is a lot of sadness in the room right now… and it is from both of us…"). Current psychoanalytic literature refers to the dyad with varying terms (*the analytic third* [Ogden]*, mode*

1 of relatedness [Mitchell]), reflecting the importance of this inseparable entity in therapy.

The second axis consists of three dimensions (space, content, and order) that capture elements of the treatment process and techniques from the major (drive-conflict, developmental-arrest and relational) psychodynamic models (for an extensive review of the three dimensions, see Mendlovic, 2015).

Space refers to the potential to experience. The dimension of space indicates the ability to experience. It does not indicate a specific experience but rather the ability/inability to experience. Utterances that can be modified to the structure: "The speaker refer to his/her ability/inability to experience; thus, he/she says that…" are of the space dimension. Examples of such utterances are "I am blocked…I can feel nothing," "Everything is numb…as if nothing really affects me," or "I lost the capacity to think…I am in a black hole of nothingness". Metaphorically, space is the range of tones we can hear; it does not refer to a specific tone but the ability to hear a given set of tones.

Content is the experience itself: an action (e.g., the patient restlessly moves in his chair), a thought ("I think I should go there"), or a discrete feeling ("I am sad"). Utterances that can be modified to the structure: "The speaker refer to his/her action, thought or feeling; thus, he/she says that…" are of the content dimension. While space refers to the potential to experience (metaphorically, the range of tones one can hear), the content refers to a specific experience (metaphorically, a musical note).

Order reflects the relationships between experiences. Order refers to doubts, conflicts, dilemmas, and intra-psychic decisions. Hence, order refers to (conscious and unconscious) negotiations and decisions made by one ("I had a dilemma," "I weighed the opportunities and decided that…," or "On the one hand, I thought that… and, on the other hand, that…"). Utterances that are of the order dimension can be modified to the structure: "The speaker refers to relationships between different experiences; thus, he/she says that…" Metaphorically, while the space is the range of tones we can hear and the content is the musical note, the order is the relationship between the notes (the musical interval).

Many of the statements in therapy are complex and contain different dimensions. For example, the statement "I am sad and I cannot feel anything" contains two dimensions- content ("I am sad") and space ("I cannot feel anything"). The process of determining the dimension of a certain statement (see below, 2.2 The MATRIX Manual and Coding) may thus require prioritizing the dimension according to the central theme raised by the speaker (in the example above, whether the core of the statement is the sadness [content] or the inability to feel [space]).

The MATRIX incorporates the three foci (patient, therapist and dyad) and three dimensions (space, content and order), creating a bi-axial 3 × 3 tool (Fig. 1). Table 1 presents a fragment of a psychotherapy session exemplifying the nine possible space/content/order-X-patient/therapist/dyad combinations of the MATRIX.
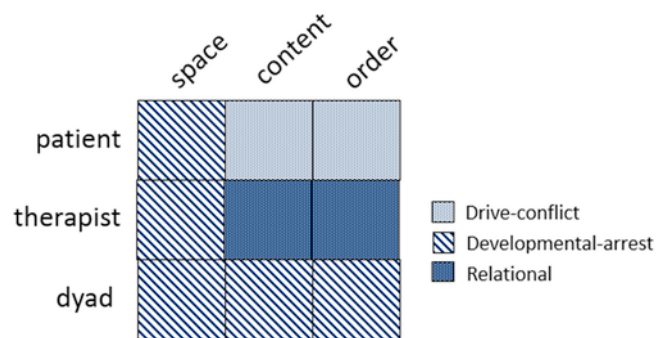

Fig. 1. The MATRIX and its relation to major psychoanalytic theories.

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[1] The MATRIX has no relation to the MATRICS (Marder,2006), a standardized battery for use with adults with schizophrenia and related disorders.

Table 1

A fragment of psychotherapy exemplifying the nine possible MATRIX combinations.

Content	MATRIX combination
P(atient): I am sad…	patient-X-content
P: I am trapped in a mess. Should I tell her how angry I am? Should I remain silent? Should I take the risk or not?	patient-X-order
P: I am frozen… I cannot think, I cannot feel…	patient-X-space
T(herapist): I am embarrassed.	therapist-X-content
T: I feel that, on the one hand, I am expected to do something; on the other hand, something is blocking me.	therapist-X-order
T: … I am also drained, with no thoughts or feelings.	therapist-X-space
(Silence, after which the therapist speaks) T: There is a very significant silence in the room…and this silence belongs to the both of us.	dyad-X-content
T: It is as if here, in this room, the ability to think and feel was lost…	dyad-X-space
T: And we both want to move ahead, but we are entangled in something… in a conflict… It's not you, and it's not me — it's the both of us.	dyad-X-order

Different psychoanalytic orientations (Mitchell, 2009) refer to specific combinations of the MATRIX. The theoretical orientations in psychotherapy are related mostly to differences in technique and understanding the focus of the mutative action in dynamic psychotherapy (Baudry, 1995; Abend, 2007). Drive-conflict theories (Freud's topographic and structural models and ego psychology) refer to patient-X-content (e.g. - drive, day residue, memory trace, primary scene, mental representation) and patient-X-order (e.g. – ambivalence, associations, conflict, defense mechanisms, primary or secondary processes, regression and resistance) combinations. These MATRIX combinations reflect the classical Freudian abstinent attitude that focuses solely on the psychology of the patient (Sandler et al., 1992; Eagle, 2011). Developmental-arrest theories (Frankel, 2001) add to the drive-conflict theories MATRIX combinations that incorporate the dyad (e.g. – Donald Winnicott's transitional space, Heinz Kohut's merger transference) and space (e.g. – Wilfred Bion's pre-conception and black hole of experience, Winnicott's capacity to be alone, going on being, holding environment and primary maternal preoccupation), reflecting the interest of these theories in the dyad and analytic transitional space (Winnicott, 1971). Relational theories (intersubjective and relational psychoanalysis) adds to the drive-conflict and developmental-arrest MATRIX combinations also the therapist-X-content (e.g. – self-disclosure, countertransference enactment) and therapist-X-order (e.g. – therapist's ritual and spontaneity, therapist's self-deception and therapist dissociation) combinations, both related to the concepts of *shared intersubjectivity* (Marks-Tarlow, 2011) and *self-disclosure* (Broucek and Ricci, 1998) (Mitchell and Black, 1996; Akhtar, 2009; Mitchell, 2009). It should be stressed out that the MATRIX combinations of each of the models are accumulative, thus adding to combinations of preceding models, and not replacing them. The differential distribution of psychoanalytic theories on the MATRIX (Fig. 1) suggests that the MATRIX may identify the theoretical inclination of sessions (or of fragments of sessions) of psychotherapy.

Compared to other measures, the MATRIX notably adds a focus on the dyad, and adds the dimension of the potential of experience (space). These additions may allow a more elaborated analysis of processes in psychodynamic psychotherapy. The present study aims to explore the reliability of the MATRIX and its validity in terms of ability to differentiate theoretical inclinations.

2. Method

2.1. Participants

Therapists ($M_{age} = 35.6$ years, $SD = 9.8$; ratio of males to females-3:4) were either residents in psychiatry (17 MD with at least 3 years of experience in psychotherapy), psychiatrists (13 MD with at least 6 years of experience in psychotherapy) or clinical psychologists (12 MA with at least 2 years of experience in psychotherapy). Patients were from the Shalvata Mental Health Center Out-Patient Clinic. Patients were all over the age of 18 ($M_{age} = 32$ years, $SD = 14.5$), with an about equal sex ratio. Patients mainly suffered from either affective disorder, or personality disorder. Diagnosis was made before the initiation of therapy by intensively-trained independent clinicians. All sessions were taken from a period of time of 3–6 months after initiation of therapy. Patients and therapists provided signed informed consent for providing clinical material for analysis. Patients and therapists were blinded to the MATRIX. The study was approved by the Shalvata Mental Health Center IRB (26/6/2014).

Evaluation of the theoretical orientations of the sessions was performed by senior psychotherapists (with an average of 11 years of psychotherapy), who were actively involved in teaching and supervising of candidates in psychoanalytic psychotherapy. Therapists contributing sessions, and evaluators for the sessions' theoretical orientation, were aware of the general aims of the study, but were not aware of the features examined by the Matrix.

Coders (all, senior psychiatrists trained in psychoanalytically-oriented psychotherapy with an average of 9 years of seniority) were trained to use the MATRIX Manual and practiced coding prior to the actual coding work. Training consisted in studying the coding manual, participating in group discussions and consensus rating of 8 session transcripts. Training lasted 12 h. To partially reduce some rater biases (e.g., preferences for a specific psychotherapeutic approach, the identity of the sessions' contributors), we gave no information about therapies or therapists to the coders.

Altogether, the study used 10 naturalistic sessions (with 805 fragments) for reliability, and 30 segments (with 1309 fragments) for validity.

2.2. The MATRIX manual and coding

The MATRIX Manual[2] defines the procedure by which a session's transcript is translated into a set of MATRIX codes. The MATRIX Manual (Mendlovic et al., 2015) is algorithmic (i.e., defines a set of steps that are followed by the coders), easy to use, and requires no previous experience in the assessment of psychotherapeutic sessions. The 4th edition of the Manual, used in the present study, is the result of 3 years of ongoing research and transcript-based process analysis in psychotherapy. The third version of the MATRIX was presented at the 2015 8th European Conference on Psychotherapy Research (Mendlovic et al., 2015).

The Manual defines how to break the session into fragments (step 1, fragmentation), how to decide whether a fragment is significant (step 2, significance), and if so, the way to code the fragment's patient/therapist/dyad focus (step 3, focus) and space/content/order dimension (step 4, dimension).

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[2] More details that appear in the Manual of the MATRIX can be obtained upon request from the authors.

2.2.1. Fragmentation

Generally, and in accordance with other studies (e.g. – Colli and Lingiardi, 2009), the basic evaluation unit of the MATRIX is the individual turn of either the patient or the therapist. In this method, the entire session is fragmented, and all fragments are coded. Therefore, there is no selection of fragments, and analysis is unbiased. A speech turn that contains a change in the subject is broken into two fragments (e.g., P(atient): "It is unbearable… I cannot stand it anymore… and you are really trying to help me" contains two subjects: the patient ["It is unbearable… I cannot stand it anymore…"] and the therapist ["and you are really trying to help me"] and is thus broken into two fragments). The length of a fragment may vary from very short (e.g., "I feel sad"), to very long (e.g., the patient tells a dream). The entire session is fragmented, and all fragments are assessed to significance (in Step 2).

After fragmenting the verbatim, each fragment is numbered sequentially. All fragments are numbered, including those that appear to be of little relevance to the therapeutic process (e.g., "P(atient): Good morning;" or "T(herapist) rearranges the small pillow on his chair"). Fragmentation process involves little discretion, and to our experience discrepancies are very rare (< 0.3%).

2.2.2. Significance

Significant fragments are termed by the MATRIX Manual as *nodes*. A *node* is an understandable (i.e., an utterance that the coder can turn into the syntax of "what is being said is …") verbal or non-verbal statement referring to the patient, the therapist, or the dyad. This definition excludes non-understandable statements (Patient: "mm-hm"), questions, or propositions. It also excludes statements that are not about the patient, the therapist, or the dyad (e.g., the patient says something about his co-workers).

Patients (and therapists) may often not follow the routes of language in their expression; thus, their verbal material is not always clearly understandable. However, the material can nonetheless be highly meaningful. By referring only to significant fragments, the MATRIX Manual ensures more reliable coding; on the other hand, it neglect less understandable (though potentially significant) expressions.

If a fragment is marked in Step 2 as a node, it is coded for its focus (step 3) and dimension (step 4). Non-significant fragments are marked as *N*(one).

2.2.3. Focus

Focus refers to the question "Who is the subject of the node?" This can be the patient (e.g., "P: I was mad at her!"), the therapist ("T: When you put it like this, I feel embarrassed," or "P: You look worried about my condition…"), or the dyad (*nodes* that jointly and equally belong to both the patient and therapist; "T: It seems that both of us feel uncomfortable…"). The speaker and the focus of the *node* are not necessarily identical; the therapist can say something about the patient ("T: You seem to feel guilty") and vice versa.

2.2.4. Dimension

After determining the focus of the node, the dimension is to be determined: space (the potential of the experience), content (the experience), or order (the relationship of the experiences). Dimension is determined using a fixed algorithm. Space (which may be, for the untrained coder, more difficult to code and thus receives special attention in the Manual) is considered first, then content and order dimensions. The coding of the dimension relies upon the leading question: "What is the nature of the node? Does it refer to the potential to experience (space)? To a specific experience (content)? Or to relation between experiences (order)?" The Manual provides the guidelines, as well as numerous examples, for determining the node's dimension.

The MATRIX Manual thus transforms fragments into codes. A fragment can either be coded as non-significant (*N*; i.e., non-understandable or not referring the patient, the therapist, or the dyad) or significant (node). Nodes are then coded for focus (patient/therapist/dyad) and dimension (space/content/order). Each individual fragment receives only one MATRIX code. Nodes are marked by a three-letter code: the first letter marks the speaker (P[atient]/T[herapist]), the second letter marks the subject of the fragment (P[atient]/T[herapist]/D[yad]), and the third letter- the fragment's dimension (S[pace]/C[ontent]/O[rder]). For example, a TDS marks a significant fragment in which the therapist (T) referred to the dyad [D] space [S]. Such a fragment could be: "T: It seems that something in the session is liberated, open-minded". In case of ambiguity, the coder is expected to assign the MATRIX code that best describes the fragment.

The time needed for the MATRIX coding process of a 45- to 50-min transcript depends on the complexity of the session, and is 1½ h per session transcript in average.

2.3. Reliability

To test the reliability, we coded all 805 fragments (derived from 10 naturalistic psychoanalytically oriented sessions) by the MATRIX. As suggested by Walter et al. (1998), when seeking to optimize the sample size, one has to find the appropriate balance between the number of raters and the number of items analyzed. According to Shoukri (2004), when seeking to detect a Kappa of 0.40 or greater, it is disadvantageous to use more than 3 raters per subject because, for a fixed number of observations, increasing the number of raters beyond 3 has little effect on the power of hypothesis tests or the width of the confidence intervals. Therefore, increasing the number of sessions under assessment is the more effective strategy for maximizing power. We therefore based our reliability test on 3 raters. The 805 fragments were MATRIX coded by 3 coders, producing 3 sets of MATRIX codes. None of the coders was involved in the formulation of the Manual.

Fleiss' Kappa was used to test the overall inter-rater agreement, the agreement regarding the decision as to whether the fragment is a node or not, and its focus and dimension (Fleiss, 1971).

2.4. Validity

Research in the field of dynamic psychotherapy is lacking a measure that would differentiate theoretical inclinations of sessions. This, of course, hinders the comparative study of these inclinations (for example, from the outcome perspective). It is, therefore, of importance to develop a measure that will categorize therapies according to their theoretical inclination. As different combinations of the MATRIX reflect different dynamic psychotherapeutic theories, the MATRIX validity was assessed by examining its ability to discern the theoretical orientation of the therapist in the session. Because theoretical orientations are not fixed and because a therapist usually exploits varying combinations of orientations in individual sessions, we used segments rather than full sessions. Forty-two trained psychotherapists were asked to provide a segment of a verbatim of a session (approximately 250–300 words; 15–20 fragments) that reflected, in their opinion, one (drive-conflict, developmental-arrest, or relational) theoretical orientation. Discriminating drive-conflict, developmental-arrest and relational orientations was based upon Mitchell's Relational Concepts in Psychoanalysis (2009). Three evaluators were asked to evaluate the segment's orientation by assigning a 1–10 rating for each of the possible orientations. For example, a segment reflecting the relational orientation was expected to be coded with lower numbers in drive-conflict and developmental-arrest theories but with high numbers in relational theories. The ten segments with the highest theoretical orientation ratings in

each framework were chosen to be representative segments of the framework in question (for example, the ten segments with the highest relational ratings were considered to be representative of relational-oriented segments). The 30 segments used for validity were derived from 24 therapies, made by 11 therapists.

We expected the MATRIX to effectively differentiate the theoretical inclinations of the segments. In the drive-conflict framework, the majority of the therapist's interventions were expected to be of the patient-X-content/order type. In the developmental-arrest framework, interventions associated with the dyad and space was expected to emerge. The relational framework was expected to yield, in addition to dyadic interventions, therapist content and order interventions (Fig. 1). Accordingly, we assumed that we would find the patient-X-content/order combinations in the drive-conflict orientation, that the focus of the dyad and the space dimension would appear in the developmental-arrest orientation, and that the therapist-X-content/order combinations would emerge in the relational orientation.

To test the hypothesis that the MATRIX correctly identifies the theoretical orientations of the segments, we compared the median probabilities of the appearance of certain MATRIX codes among the therapists' interventions in the segments of the three frameworks. We compared the probabilities of the therapists' patient-X-content/order interventions (drive-conflict orientation), interventions coded as either belonging to the dyad focus or the space dimension (developmental-arrest orientation), and interventions coded as therapist-X-content/order (relational orientation). Finally, to obtain a single parameter that identified whether the MATRIX can distinguish between the three frameworks according to our hypothesis, we ordered the sessions according to the frequencies of the coding of various nodes as follows: the primary criterion for the order was the frequency of nodes in which the focus was the therapist and the dimensions were content or order, and the secondary criterion was the frequency of the nodes in which the focus was the dyad or their dimension was space. Our hypothesis was that, according to this order, the relational sessions would appear first, followed by the sessions oriented toward the developmental-arrest framework, while the drive-conflict sessions would appear last. Therefore, we hypothesized that, according to this order, the distribution of the locations of segments from each theoretical framework would be different. We tested this hypothesis by using the Kruskal-Wallis test and then ran further comparison analyses between each two frameworks using the Mann-Whitney *U* test. Because the probability distributions of the MATRIX codes across the sections were unknown, and since the number of segments was too small to justify parametric presumptions regarding the distribution of the data, nonparametric tests were used.

The statistical analysis was conducted using R-statistics.

3. Results

3.1. Reliability

Eight hundred and five (805) fragments were MATRIX coded. In 699 fragments (87%), full agreement was achieved between the three coders; in 103 fragments (13%), agreement was achieved between two coders; only three fragments (< 1%) were coded differently by each of the three coders. The Kappa value for the entire coding process was 0.876; for differentiation of nodes from non-nodes- 0.937; for the coding of the focus (patient/therapist/dyad) − 0.926; and for the dimension (space/content/order) − 0.868. All pairwise Kappa coefficients were significant ($P_v < 0.001$).

In addition to the 805 fragments, reliability was also tested on the clinical material used in the validity section (see below). Similar reliability was found in the sample of 1309 fragments in the 30 segments compromising the validity section, with Kappa value for the differentiation of nodes from non-nodes was 0.939; for the coding of the focus (patient/therapist/dyad) − 0.922; and for the dimension (space/content/order) − 0.864. All pairwise Kappa coefficients were significant ($P_v < 0.001$). Reliability was examined for individual (patient/therapist) differences, and was found to be similar.

3.2. Validity

Table 2 presents the median probabilities of different MATRIX codes in 30 segments (regarded by their therapists as reflecting drive-conflict, developmental-arrest of relational inclination) of psychodynamic therapies. All of the therapists' interventions in the drive-conflict segments concerned the patient-X-content/order. In the developmental-arrest segments, the median probability of the therapist's intervention concerning the patient-X-content/order was 0.634 (95% CI 0.49–0.77), and the median probability of the therapist's intervention concerning the space or dyad was 0.506 (95% CI 0.33–0.75). None of the therapists' interventions at the developmental-arrest segments concerned the therapist-X-content/order. In the relational segments, the probabilities of interventions concerning the patient-X-content/order, and the therapist-X-content/order were 0.32 (95% CI 0.24–0.37) and 0.5 (95% CI 0.39–0.61), respectively. All of the differences between the three theoretical frameworks were significant (p < 0.001 for every comparison). Furthermore, the Kruskal-Wallis test revealed that segments from different theoretical frameworks had different locations in this order (Kruskal-Wallis chi-squared = 36.9, df = 2, p < 0.001). We used the Mann-Whitney *U* test to compare the locations of the segments from each pair of frameworks according to the suggested order. We have found that each group of segments is distinguished from the two others (p < 0.001 for every comparison). Thus, the MATRIX distinguishes between segments from different theoretical frameworks.

Fig. 2 shows boxplots of the frequencies of therapist's interventions regarding the patient's content/order, the dyad and space and the therapist's content/order in the three groups of segments. As shown, in the drive-conflict segments there are only interventions regarding the patient's content/order. Interventions regarding the therapist's content/order appear solely in the relational segments, and interventions regarding the dyad and space appear more frequently in the developmental-arrest segments.

4. Discussion

The MATRIX is a novel measurement tool based on expert judgment and enables algorithmic, moment-by-moment coding of psychodynamic-oriented sessions. The present study examined the MATRIX's inter-rater reliability and construct validity. Using a detailed algo-

Table 2
Median probabilities of the therapist's interventions in each group of sessions (95% Confidence intervals).

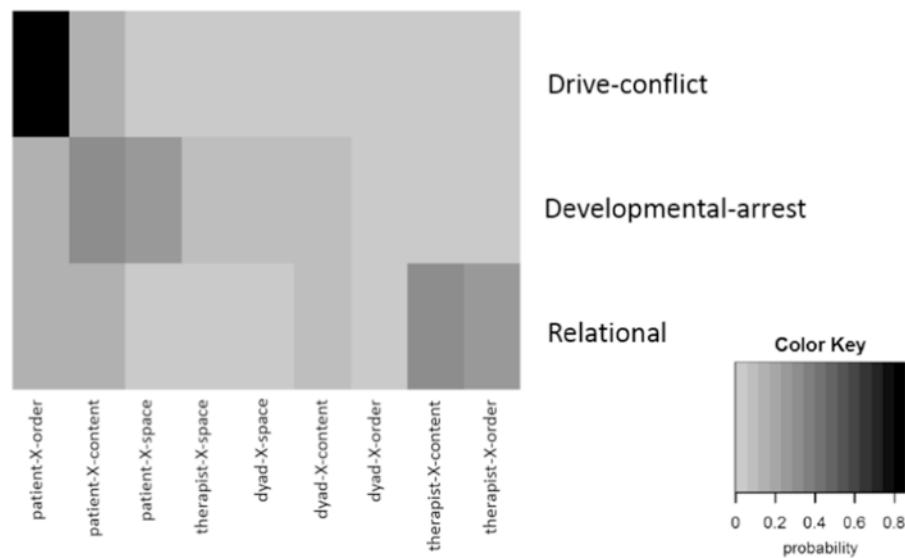|	Patient's content/order interventions	Space/dyad interventions	Therapist's content/order interventions
Drive-Conflict	1.00	0	0
Developmental-Arrest	0.63 (0.49–0.77)	0.50 (0.33–0.75)	0
Relational	0.32 (0.24–0.37)	0.212 (0.14–0.28)	0.5 (0.39–0.61)
Kruskal-Wallis test	KW chi-squ. = 29.03, df = 2, Pv < 0.001	KW chi-squ. = 28.22, df = 2, Pv < 0.001	KW chi-squ. = 38.86, df = 2, Pv < 0.001

Fig. 2. Boxplots of the frequencies of therapist's interventions in the three groups of segments.

rithmic Manual, high inter-rater reliability was achieved for all parameters coded that differentiated nodes from non-nodes, determined the focus (patient, therapist, or dyad), and determined the prominent quality (dimension; space, content, order) of each node. By analyzing the interventions of the therapist, differentiating between the major psychodynamic theoretical orientations of the session (drive-conflict, developmental-arrest, relational) was possible. Taken together, the MATRIX was found to have high degree of reliability and validity, thus suggesting its application for quantitatively investigate psychodynamic psychotherapy.

The MATRIX is situated in the context of other measurement models and methods for the observational analysis of psychotherapy. Many existing measures were developed within a broadly psychodynamic frame (e.g., measures of the interpretive level, Piper et al., 1991; Høglend et al., 2006;) and interpersonal models (Benjamin, 1979). The MATRIX adds a more phenomenological tool to these existing measures. Thus, it addresses (and potentially integrates) the full spectrum of dynamic psychotherapeutic orientations and, as such, allows for the extraction of measurable (nominal/serial) and discriminative (differentiating various theoretical, clinical and technical aspects of psychotherapy) data. Unlike previous process measures, which have mostly on patients' processes (e.g., CCRT (Luborsky and Crits-Christoph, 1998); DMRS (Perry and Henry, 2004)) and therapists' interventions (e.g., CPPS; Hilsenroth et al., 2005), and in consistent with recent calls to examine therapeutic processes from both partners of the dyad (Norcross, 2011; Wiseman and Tishby, 2014), the MATRIX allows an examination of micro-processes within the patient, within the therapist, and within the dyad. It measures the relative weight of the therapist or the patient in the session, examines the proportions between the different types of therapist interventions (in terms of focus and dimension), and, based on this information, can indicate the therapist's theoretical orientation as reflected in a given session.

The MATRIX may allow examination of fluctuations in core therapeutic phenomena (the potential to experience [order], experience [content] and relations between experiences [order]) from both the patients' and the therapists' perspectives, with intensive repeated assessments throughout treatment. This complies with the current emphasis made on the importance of examining the treatment process at a finer temporal resolution and from both perspectives of the therapeutic dyad (Crits-Christoph at al, 2013). For example, a pilot study that used the MATRIX indicates that specific MATRIX sequences predict the induction of therapeutic ruptures (e.g. – therapist-X-therapist-X-content [coding a fragment in which the therapist reveals something personal]) and their resolution (e.g. – therapist-X-dyad-X-content [coding a fragment in which the therapist refers to a content that is shared by both therapist and patient]) (Mendlovic et al., 2017). Studying MATRIX sequences that induce ruptures can further explore interventions at a finer-grain level (e.g., their appropriateness, accuracy, timing, fidelity to theory). In addition, exploring associations between the MATRIX analysis of psychotherapeutic sessions and Routine Outcome Measurements (ROM) may reveal MATRIX sequences that are associated with other process variables (e.g., alliance and/or insight) or with treatment outcome. Such is, for example, the possible correlation between MATRIX sequences in which patient and therapist echo one another (i.e. – both refer to the same focus and dimension) and a better therapeutic alliance. Given that therapists contribute to the outcome of therapy (Kim et al., 2006), future MATRIX studies can assist therapists to better design their interventions.

Psychotherapeutic approaches other than psychodynamic (e.g., CBT, inter-personal therapies) can also benefit from the MATRIX, which (in continuation of previous studies (Castonguay, 2011)) may compare their differential focus and dimension combinations' diversity and clarify their nature.

The present study suggests the MATRIX is a reliable and valid measure. However, it has limitations: All coders in this study were professionals with a substantial background in psychotherapy, and observer bias may still affect the coding procedure; although the procedure of dividing the session into fragments is fixed, this step may affect the coding of the fragments; the criteria to differentiate significant (node) from non-significant (NONE) fragments in stringent and result in loosing important data that despite coded as non-significant (NONE) may hold meaningful content of a session; the MATRIX is a structural measure that overlooks the valence or pragmatics of the node content. In addition, we have shown that the MATRIX differentiates qualitatively between the theoretical orientations of segments of psychotherapy. However, full-length sessions (as opposed to segments) frequently reveal a mixture of several approaches. We hope that future studies would enable developing a tool which will provide a numerical measurement of the theoretical approaches and will monitor their change during a full-length session.

Developing new ways of assessing therapeutic processes is extremely important given the pressing need for empirical work on process and outcome of psychodynamic psychotherapy. The MATRIX joins the growing effort of psychotherapy researchers to explore

processes that occur within and between the patient and the therapist. It operates "upwards" (comparing different theories) instead of "downwards" (focusing on one specific theory), does not assume a given (psychoanalytic) theoretical frame but instead captures magnitudes of theories. Based on informed simplicity (i.e., the ability to discern or create clarifying patterns within complex mixtures), the MATRIX may shed light on patient-therapist transactions in dynamic therapy sessions, and allow an exploration of their nature. It may provide a rich multiple perspective measure of how patient and therapist processes fluctuate together from moment to moment as well as from session to session throughout the course of treatment. This information may have implications for the theory of change as a process that occurs within the context of a dyadic relationship and to enable a better understanding of the mechanisms of change that account for positive treatment outcomes.

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Uncited references

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