

# Objective Discourse Measures applied to Psychoanalytic Sessions

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Wilma Bucci, Ph.D.

Derner Institute

Adelphi University

Garden City NY 11530

[bucci@Panther.adelphi.edu](mailto:bucci@Panther.adelphi.edu)

Bernard Maskit, Ph.D.

Mathematics Department

Stony Brook University

Stony Brook NY 11794-3651

[bernie@math.sunysb.edu](mailto:bernie@math.sunysb.edu)

We describe a new method for tracking linguistic variables having psychological importance within psychoanalytic or psychotherapeutic sessions. Our Discourse Attribute Analysis Program (DAAP) (Maskit, Bucci and Roussos, In preparation) has the capability of tracking any number of variables; here we show and use Referential Activity, as given by the Weighted Referential Activity Dictionary (WRAD) (Bucci and Maskit, 2005); Positive Affect (AFFP), Negative Affect (AFFN), Mixed Affect (AFFZ) (Schwartz, In preparation); Disfluency (DF), and Reflection (REF).

After describing these basic variables, and the measures derived from them, we first show explicit results relating certain of these measures with expert clinical judgments of sessions, and then describe how our techniques can be used to understand the therapeutic process as it plays out in any one session.

## The Referential Process

According to the theory of the Referential Process (RP), as this operates in psychoanalysis and psychotherapy (Bucci, 1997), change in an emotion schema takes place through sequential occurrence and iteration of three major phases: *Arousal*, *Symbolizing in Narrative*, and *Reflection*; these phases repeat within and across sessions.

*Arousal* — Activation of the "affective core": The patient struggles to find and make current in the session some subsymbolic bodily and/or sensory component(s) of a troublesome emotion schema.

*Symbolizing through Narrative*: Having accessed a problematic emotion schema, the patient next connects the subsymbolic affective experience to images and words, in the form of prototypical stories, fantasies, dreams or other narrative material that serve to represent the schema, but whose emotional meaning may not be understood.

*Reflection*: In the shared context of the session, this narrative material is examined, leading to emotional insight and ultimately to change in the problematic schema.

*Iteration of the RP*. Effective sessions are likely to be characterized by relatively well organized appearances and iteration of the phases of the RP; in less effective work, the process does not play out, or plays out only partially. Each shift or reconstruction of an activated emotion schema potentially enables access to deeper levels of affect and imagery, including experience that has been dissociated. In therapeutic work, in the context of the relationship, the dangers that triggered the initial dissociation may also be reactivated but in attenuated form, able to be tolerated to a greater degree in the new context. The iteration of the RP within sessions and across treatments, with new levels of affect and new objects, is a psychological formulation of the process of *working through*.

## The Dictionaries

Referential Activity (RA) was initially conceptualized by Bucci (1984) as a measure of the extent to which the speaker is engaged in the symbolizing mode described above; that is, the speaker is connecting to some emotion schema, and so evoking emotion in the listener. The original RA measure was an average of four measures (*Clarity*, *Concreteness*, *Specificity* and *Imagery*) as rated by judges on a scale of 0 to 10 (Bucci & Kabasakalian-McKay).

The Weighted Referential Activity Dictionary (WRAD) is, like its predecessor, the CRA of Mergenthaler and Bucci (1999), an empirically based word list. The WRAD accounts for about 85% of spoken language (in texts encountered thus far), and has weights lying between -1, meaning that the item is most common in low RA speech, and +1, meaning that the item is most common in high RA speech (Bucci and Maskit, 2005). This dictionary has been normalized so that an average WRAD weight of zero corresponds to the neutral RA score, as rated by judges, of 5.

We also use several other dictionaries; these are listed in Table One. The items mentioned for the WRAD are the 10 most common (our system splits contracted words into two words; “s” is part of a contraction); they are listed with their weights.

Table One

Name	Number of Items	Typical Items
Pos. Affect (AFFP)	270	cute, hoped, kisses, love, terrific, wonderful
Neg. Affect (AFFN)	399	alone, anxiety, cried, fight, hate, screaming
Mixed Affect (AFFZ)	86	admitted, dare, feel, important, languid, needs
Disfluency (DF)	6	like, kind, know, mean, well*, mm**
Reflection (REF)	678	argued, but, cause, confuse, if, logical, thinks
WRAD	696	I (-.75), and (1.0), the (1.0), to (.25), it (-.875), s (-1.0), she (1.0), that (-.875), a (.625), was (1.0)

\*These five words all require disambiguation by the transcriber.

\*\*mm is our transcription of “uhm”, “hm”, etc.

## The Discourse Attributes Analysis Program (DAAP)

The DAAP reads a text and, for each turn of speech or other unit, creates a smooth graph reflecting the density of matches for each dictionary; for a weighted dictionary, such as the WRAD, the graph reflects the density of the weights; the appended graph (on page 9) shows the density of matches for three of our dictionaries for the patient speech in an analytic session. Along with the graph, the program reproduces the text with markers inserted every 10 words so that one can compare the graph with the text.

The DAAP also produces certain numerical measures based on the dictionaries. There are several unary measures for each dictionary; these are computed for each turn of speech and for each speaker for the text as a whole.

There is also a binary measure, the covariation, for each pair of dictionaries; as above these are produced for each turn of speech and for each speaker for the text as a whole.

### Unary Measures

For each dictionary, the basic unary measures are the mean and standard deviation. For technical reasons, the mean of the unweighted dictionaries is computed using raw scores, so that it is computationally the same as the coverage; that is, the average number of words matching a word in the dictionary. For weighted dictionaries, such as the WRAD, the mean is computed using the smoothed scores produced by DAAP; these are the numbers that appear on the graph. For all dictionaries, the standard deviation is computed using the smoothed DAAP scores.

*Additional unary measures.* The WRAD has a natural zero, which essentially corresponds to a neutral RA score. We are interested, not only in whether or not the speaker is connecting to an emotion schema when speaking, as shown by whether or not the smoothed WRAD score is positive or negative, but also in the degree to which the speaker is immersed in the emotion schema when such a connection is being made; that is, how high is the smoothed WRAD score when it is positive. To measure this, we introduce two new unary variables, the total High WRAD score (HWRAD), which is the sum of the positive smoothed WRAD scores, and the Mean High WRAD score (MHWRAD), which is the total High WRAD score, divided by the number of words for which the smoothed WRAD score is positive.

### Binary Measures

For each pair of dictionaries, we introduce the *covariation*, which is a measure of the extent to which the smoothed scores for these two dictionaries are simultaneously relatively high and relatively low. For our unweighted dictionaries, we use the mean as the dividing line between relatively high and relatively low; for the WRAD, we use its natural zero. The covariation between two unweighted dictionaries is computationally almost identical to the correlation coefficient, but does not carry the same statistical meaning; the smoothed dictionary values at nearby words are not independent, and some words are in two or more dictionaries.

### The DAAP Measures of Effectiveness of the Therapeutic Process

We can represent each of the three phases of the referential process in terms of the relative strengths of the WRAD, DF and REF dictionaries. We do not currently use the Affect dictionaries for the purpose of assessing effectiveness; their usefulness arises in the microanalysis of certain texts.

In the *arousal phase*, DF is relatively high, WRAD and REF are relatively low. The speaker has not as yet connected to relevant imagery or experience in symbolic form that can be expressed verbally. This phase is also marked by relatively slower word production.

In the *symbolizing through narrative phase*, WRAD is relatively high; DF and REF are relatively low. The speaker is immersed in the story, telling it fluently, and not yet reflecting on it.

In the *reflection phase*, REF is relatively high, and WRAD is relatively low. We also expect DF to be on the high side, but not very high; low DF (high fluency) in this phase might indicate the reiteration of previously formulated material, rather than the search for new material.

In a more effective session, the patient spends more time in the symbolizing through narrative phase, and does so more effectively. The patient also spends fewer words in the arousal phase, and more clearly separates the narrative and reflection phases. These observations lead to the following predictions.

### Predictions

- The mean WRAD score is higher in more effective sessions.
- The MHWRAD is higher in more effective sessions.
- The mean DF score is lower in more effective sessions.
- The WRAD-REF covariation is more highly negative in more effective sessions (it is usually negative).
- The WRAD-DF covariation is more highly negative in more effective sessions.
- The DF-REF covariation is more highly positive in more effective sessions.

### The Data Set

This study covers 16 sessions from the treatment of Ms. Y., a married woman in her thirties seen by an experienced female analyst. The treatment is recorded verbatim and is being studied in depth by the IPTAR Program of Research in Psychoanalysis. The design incorporates the subjective judgment of the treating analyst, and evaluation by consultants using methods of peer review, as well as our computerized validation. The method of the study is described in detail by Freedman, Lasky and Hurvich (2003), and is also discussed by Bucci (In press).

Immediately after each session, the analyst records her *scan*; this is her impressions of the session just ended. The study covered 54 sessions, the second year of Ms. Y's psychoanalysis, but the third year of her treatment which began as psychotherapy. The sessions were rated on dimensions that were given the abstract designations 'A' or 'Z', with 'A' representing features of integration, developmental progression and relatively stable exploration, and 'Z' representing qualities of nonintegration, regression and destabilization. The abstract terms were used to represent distinctions in process without an evaluative designation; effective treatment is seen by the IPTAR group as involving a rhythmic alternation of these qualities. A-Z difference scores were computed for each session, and sixteen criterion sessions, representing extremes of the A-Z difference scores based on the analyst's ratings, were selected for more intensive study; these included 9 rated as dominantly A, and 7 as dominantly Z. Two experienced analysts, who were not acquainted with the analyst's scans, then listened to or read these sessions in their entirety, and also evaluated them on the A and Z dimensions. The judges' evaluations based on the analyst's scans could then be directly compared with the consultants' ratings based on listening to the audio-tapes of the entire session.

Both sets of ratings could then be compared to the linguistic analysis using the computerized measures.

The consultants' ratings were in agreement regarding the characterization of the session as dominantly A or dominantly Z for 12 of the 16 criterion sessions; analyst scan and consultant ratings disagreed for 4 of the 16 sessions.

## Results

The correlations between the patient language variables and clinical ratings, based on the analyst's scan and by expert clinicians, are shown in Table Two.

Table Two

Patient Language Variables	Correlation to Clinical Ratings Based on Analyst Scan (Pt. Biserial)	Correlation to Consultant Ratings (Pt. Biserial)
Mean WRAD	.263	<b>.537*</b>
Mean High WRAD	.383	<i>.361</i>
Mean DF	<i>-.341</i>	<i>-.424</i>
WRAD-REF	<i>-.418</i>	<b>-.697**</b>
DF-REF	<i>.449</i>	<b>.523*</b>
WRAD-DF	<i>-.352</i>	<i>-.249</i>

Probability 2-tails: \* - .05 \*\* - .01

Medium effect sizes (.30 - <.50) marked in italics; large effect sizes (>.50) marked in bold.

## Discussion

All of the linguistic measures had correlations with the A-Z scores in the predicted directions. The correlations with the consultants' ratings were significant for three of the six measures. The strength of these correlations is powerful evidence for the usefulness of the global versions of our linguistic measures in measuring the effectiveness of such treatments. The graphs and local versions of these same measures can also be used to pick out important points in each session; this is illustrated with one example below, and is discussed in detail in Bucci and Maskit (Paper submitted).

The correlations with the analyst's scans were also in the predicted directions, but much less strong; none were significant. This suggests that the analyst's involvement in the treatment also affects her judgments of its effectiveness.

### Note on Analyst Speech

Our system also tracked the analyst's speech, computing the basic unary variables, but, since the analyst's turns of speech tended to be quite short, we did not track the binary variables; the basic results are shown in Table Three. We did, however, track the number of times the analyst encouraged the patient by simply saying "um-hmm", or other similar utterance, without actually interrupting the patient; these are the Non-Turn Vocalizations (NTVs). We found a strong correlation between the number of NTVs in a session and the effectiveness of the session as rated by the consultants, and also a surprising effect of analyst HWRAD. These were not predicted, but can be explained from a clinical perspective, and will be pursued in future work.

Table Three

Analyst Language Variables	Correlation to Clinical Ratings Based on Analyst Scan (Pt. Biserial)	Correlation to Consultant Ratings (Pt. Biserial)
Mean WRAD	-.154	.037
Mean HWRAD	.243	.480
Mean AFF	-.006	.014
Mean REF	-.060	-.096
Mean DF	.324	.231
Mean NTV	.457	<b>.619*</b>

Probability 2-tails: \* - .05 \*\* - .01

### Linguistic Micro-analysis

In addition to the data for sessions as a whole discussed above, the tools made possible by the DAAP program also include graphic representations of the DAAP output; computation of numeric linguistic measures for individual turns of speech; and transcripts marked according to word count that enable precise correspondence of the linguistic and clinical material. The following example, taken from Bucci & Maskit (paper submitted), is given to illustrate these tools. The example is a brief excerpt from a micro-analytic study of clinical and linguistic features of a session from a long term psychoanalytic case, the case of Mrs. D. The case is one of a group of psychoanalytic treatments that were recorded by the analyst for research purposes and evaluated by him and two expert peer consultants. The session was selected for this study on the basis of qualitative clinical evaluations, as a session where the evaluations of the treating analyst and the consultants diverged.

### The Graphic Output

The graph of Session L appended below (on page 9) shows levels of three selected variables, WRAD, REF and DF, for patient speech only for a single session. The point shown for each word is a weighted average of the dictionary scores for a selected number of the nearby words spoken by

the same speaker within a turn of speech. The location of the analyst interventions is indicated here by gaps in the curves for the patient speech; the length of the gap represents the word count of the intervention. The difference in overall levels of the linguistic variables seen in the graph is a function of the different contents of the dictionaries; the WRAD values represent the varying levels of a weighted measure fluctuating generally around the .5 midpoint of the scale, and are understood as indexed to the midpoint of the RA scales (a rating of 5 in a scale of 0 to 10), whereas the REF and DF values generally represent the varying proportions of those linguistic categories in the patient’s speech.

### The Turn Data

Table Four shows values of the unary and binary variables based on the three dictionaries WRAD, REF and DF, for each patient turn of speech of over 100 words in the session.

Table Four

	No. of Words	First Word	Last Word	M WRAD	M HWRAD	DF-WRAD	REF-WRAD	DF-REF
Turn 2*	213	2	215	.423	0	-.036	.583	-.656
Turn 4	562	231	793	.443	.06	-.628	-.589	.243
Turn 6	271	800	1071	.379	.008	.967	-.823	-.928
Turn 8	249	1082	1331	.354	0	-.530	-.007	-.328
Turn 38	133	1952	2085	.426	0	-.904	-.727	.691
Turn 40	230	2105	2335	.497	.115	-.148	-.943	.309

\*The first patient turn in the session is labeled Turn 2; the analyst begins each session with a conventional greeting, which constitutes Turn 1.

### The Marked Text

The system reproduces the text with markings inserted by word intervals as chosen by the operator. The following text example shows the marked text, with 10 word intervals in square brackets. Pauses are shown by seconds within parentheses (transcribing conventions are used for representing nonverbal expressions, emphasis and inaudible words). The following excerpt is taken from about the middle of Turn 6.

P: I can say, "something's wrong with this hand" I [900] take an X-ray, and just let it go, mm (p:00:00:12) until [910] somebody else confirms it and then - - - - (laughs) (p:00:00:08) I don't know [920] and then what? and then I see (p:00:00:06) that I've [930] got a problem. I can't deny it anymore I [940] don't know what! I do. (p:00:00:06) usually (p:00:00:09) I do! heal [950] quickly. I mean I always do. I just, ignore stuff [960] and it goes away but - - - (sighs) (p:00:00:25) and the pressure of time, [970] I think I really! feel, like here's something else [980] I know,

I (sighs) (p:00:00:21) if I think of what I said, [990] when I came in here I don't know what [1000] the connection then, I don't know what connection I'm [1010] making ...

As shown in the graph, WRAD declines across the turn, while REF increases. The patient becomes more fluent as she becomes more abstract, indicated by her falling disfluency score and diminishing pauses, and her positive DF-WRAD and negative DF- REF covariations.

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