Introduction

Computer-aided analysis of psychotherapeutic discourse
An introduction to the workshop

Horst Kächele

MAX WEBER's recommendation (quoted from Ritsert, 1972, p. 15) to skip through the content of newspapers with "scissors and compass" to get a firm hold of quantitative change of published content in the course of history wasn't as new as he thought: J.G. SPEED (1893) was the first to compare changes in the Sunday papers of New York between the years 1881 and 1983. As a method on its own the technique of content-analysis developed rather slowly in its beginnings. From a first survey by BARCUS (1959) we gather the important role of propaganda research during the war as a major field of application. The eager reader may already have noticed that we are hinting at the fact that large quantities of text material have always been a strong favourite of content analysis.

This aspects also led such experienced leaders of the field as LASSWELL; LERNER and POOL to realize the possibility of using data-processing machines to reduce the tedious and time/consuming job of coding large amounts of text to a manageable size (1952, p. 63). The very first text-processing study using computing devices for content analysis was a study by SEBEOK and ZEPS (1958); for an analysis of 4000 fairy tales of the Cheremis Indians they wrote a programme for the computation of word-contingencies. Somewhat later, but obviously without being well informed about that first effort, STONES and BALES from Harvard University developed a first version of the General Inquirer System, to study thematic changes in small discussion group protocols (STONE, BALES, NAMENWIRTH and OGILVIE, 1962). STARKWEATHER and DECKER (1964) reported on a programme for the counting of word-frequencies and Type-Token indices. In the same year HARWAY and IKER

(1964) published their first paper on their WORDS-system. Further reports from their work, which was performed on an analytic case analyzed by Dr. GORDON PLEUNE; ROCHESTER, followed in 1965, 1966, 1969a, 1969b; a detailed description of the WORDS-system itself was only published in 1974 by IKER and KLEIN. At the same time Julius LAFFAL worked on a comparative analysis of excerpts from the famous Schreber case at first using manual procedures; a little known study on the treatment process of a schizophrenic patient dates from 1961 and his 1965 book on "Normal and Pathological Language" you find a fairly comprehensive rationale explaining why these kinds of studies are well compatible with the psychoanalytic view of language and its various functions. Four years later LAFFAL reports on the development of a programme system which was able to handle his highly differentiated dictionary (114 categories!) and was capable of handling an unlimited number of textbatches up to 15 separate speakers at a time, with virtually no limit on the amount of text in each batch. A preliminary German version of the LAFFAL dictionary was prepared by Kächele and Büscher, 1974/75, but was never really used.

The most systematical work has been carried out by Phil STONE who in 1966 published a detailed report on the General Inquirer system accompanied by various examples of the use of such a system in social science research. On the various dictionaries developed as analytic tools in the GI the HARVARD Socio-Psychological Dictionary went through different versions and has been applied in quite a few studies that touch our field: DUNPHY (1966) described changes of self-perception and role/differentiation of the participants of a psychoanalytic group. PAIGE (1966) analysed a well-known series of 167 "letters to Jenny" that had been published by ALLPORT in 1946. This study allows a comparison with the results of the manual content-analysis performed by BALDWIN (1942) on the same material. PSATHAS and ARP (1966) used the dictionary on material from experimental interview research by HELLER (1963).

A first application of the dictionary to verbatim material was performed by DAHL (1972). He first used the computer-based approach to validate a factorial study on clinical process ratings. In a second study (1974) he analyzed the relationship between category scores and single words to find relevant clusters of words representing category meaning.

Donald SPENCE, who had studied together with Phil STONE at Harvard, programmed himself a mini-inquirer (1969) – thus proving that even psychoanalysts can learn to shape their research tools to suit unusual applications – and applied it to a series of circumscribed questions. Taking up a case that had been described by LUBORSKY (1954) he studied the "up's and down's" of symptom language (1970); the next study was devoted to the process of clinical listening thus demystifying the "third ear" conception by applying rigorous experimental technique to the attention conditions and their consequences for verbal cues (SPENCE and LUGO, 1972). In an elegant analysis of the five initial sessions of a newly started psychoanalytic case he could trace a welldifined "thought stream by computer" (SPENCE, 1973). The next application studied "lexical derivatives in patient's speech", where he re-analyzed interview-data from George ENGEL's investigations of subliminal awareness of cancer patients; by the way, with the technique of computer-aided content analysis he could make a more correct prognoses than the interviewing psychiatrists.

The development of computer-aided techniques in content analysis in Germany is neatly summarized by MOCHMANN (1980). As it was practically impossible to use the General Inquirer on German linguistic material the Zentralarchiv für Empirische Sozialforschung in Cologne developed a system of their own. The system derived for the analysis of open answers in social science survey research by HOEHE and MOCHMANN (1970) had salient deficiencies in its applicability to unformatted texts. This led to the development of the TESTPACK system by HOEHE et al., 1973.

Our own investigations derive from a long-standing interest in psychoanalytic process research (Thomä & Kächele 1973). After some preliminary efforts to adapt the SPENCE Pl/1 programme on the IBM computer in Heidelberg we were lucky to get hold of the EVA-system by HOLZSCHECK and TIEMANN (1973, 1975) developed in Hamburg for the analysis of newspapers headlines. The aim of our research to analyze psychoanalytic sessions made some modifications of the EVA-system necessary (MERGENTHALER 1981). The problems in analyzing large amounts of text have so far not been dealt with adequately in the literature. With the assembly of many sessions protocols data-handling, storage and retrieval become insurmountable problems. The times of piles of punchcards are definitely over; a new technology for the archiving of texts has to be developed. This is where MERGENTHALER and I started development of a computer-based text archive of psychoanalytic texts. MERGENTHALER will report on basic problems of the construction of such archive which was a necessary prerequisite for the studies presented in this workshop.

For reference to the literature, see Appendix C.

Some hints on textual data
Classifying, archiving and analyzing

Erhard Mergenthaler

How to do things with words? Austin (1962) entitled his fundamental writings on speech acts with this question. Psychotherapists seldom asked - they rather did things with words. The conceptualisation of words as data is an achievement of the seventies. Thus, texts became one of the most important sources of primary data[1] in psychotherapy research. Collecting textual data from the actual psychotherapeutic situation gathered momentum, however, mostly in an unsystematic manner and with concentration in the United States and in the FRG. Handling textual data via text-base-management systems[2] (TBMS) has become a main goal for the early eighties. I would like to point out some aspects of this topic today.

Classifying textual data

Initially textual data must be sufficiently classified. It is necessary to find a typological system that would be capable of differentiating the circumstances and intentions of verbal expression. The outcome of a sequence of speech acts we call text. Such typological system would define text-types. During the last ten years, some linguist have endeavoured or even concentrated on the development of fruitful classification techniques and even of a theory of text-types. With regard to our own archiving purposes we followed the proposal of Sandig (1972) which

[1] Luborsky and Spence (1971) introduced this term concerning "data accumulated during actual analytic sessions. Ideally, two conditions should be met: the case should be clearly defined as analytic, meeting whatever criteria of process and outcome a panel of judges might determine; and the data should be recorded, transcribed, and indexed so as to maximize accessibility and visibility" (p. 426).

[2] I choose this definition in analogy to the data base-management systems (DBMS) and well-known term in computer-science.

is based on contrasting text markers. For further information confer Mergenthaler (1979).

Archiving textual data

Although Luborsky and Spence (1978) in the second edition of the Handbook of Psychotherapy can report on eleven data banks[3] with protocols from psychotherapeutic sessions, they still determined that there was a lack of primary data in quantitative oriented psychoanalytic research. Since that time three years have passed. The reported projects proceeded, some with progress, new ones arose. Today I would like to describe to you some of the basic features of one of the eleven data banks mentioned above, the Ulm Psychotherapy Text Archive (UPSTAR).

A short note to the history of UPSTAR. It is now ten years since psychoanalysts of the department of psychotherapy, University of Ulm, started recording and transcribing psychoanalytical sessions and initial interviews. The analysis of those texts has been done by clinical judgements and conventional content analysis. Later on a computerized system called EVA[4] was provided in order to perform computer-assisted content analysis. After some trouble-shooting during the first two years, this system worked well, and due to this positive experience

[3] Dahl-Downstate Medical Center, SUNY; University of Ulm, Department of Psychotherapy; Columbia Psychoanalytic Clinic; Gill-University of Illinois Medical Center; Rochester Project on the Computer Analysis of Content; Analytic Research Group of the Pennsylvania Hospital; The Therapeutic Process Study (Mount Zion Hospital and San Francisco Psychoanalytic Institute); University of Illinois School of Medicine, Psychotherapy Film Laboratory; National Institute of Mental Health Filmed Therapy Project; The Hampstead Index; Menninger Foundation Psychotherapy Research Project; (loc.cit., p. 353-356).

further colleagues felt encouraged to record some of their treatments or interview sessions. The body of texts grew rapidly and it became more and more apparent that new tools would be necessary to cope with the vast amount and variety of texts, both, as tape recordings and as data files within the computer center. A further very important topic arose, privacy of the above mentioned inputs.

The UPSTAR has several major aims and ambitions. The desired system has to assist therapists in firstly scientific and secondly clinical aspects. The latter yield mainly points as aids in supervision held on the basis of verbal protocol listings. The former aims at analyzing textual data from various aspects.

The computer-assisted system should offer facilities or aids during the process of transcribing. The secretary should be able to type texts on-line into the computer and the computer[5] could assist her in detecting type-errors, gathering identifying data, anonymizing personal data, setting up a format and printing the protocols in the desired quantities. Tape recordings (spool, cassette or cartridge) should be archived by a simple numbering system only. Other associated information, day, length etc. can be recalled through the numbering system stored in the computer. Retrieval of any recording should be facilitated as easily as possible. Apart from the on-line technique, the system should offer the chance to take in protocols via an optical character reader (OCR) with similar facilities and controls as above. The importance of this feature depends on the desire of gathering textual data not only from the Ulm inside-group but also from external participants.

Irrespective of the way the text became stored within the computer-system, the retrieval of textual units under various aspects should be uncomplicated. The criteria for text selection or grouping have to show strong connection to relevant aspects in psychotherapy research. Each user should be able to get its benefit from the system without special training. The main functions for a user are: one, the amount of stored text and its characteristics; two, the selection of texts either

[4] Electronic Verbal Analysis; c.f. Mergenthaler (1976)
[5] A micro-computer will be sufficient.

as a listing or as a data file; three, connection to text-analysis systems and statistical software packages and, finally, the performance of such.

In order to fulfil these requirements the archive should fairly represent the psychotherapeutic situation in quantity and quality. The system that has to be developed should be able to converse with the user and vice versa, and contain ample user-aids (e.g. system choice, pre-programmed formulas).

Where are we with our ambitions and aims? There is little literature describing existing or planned systems for archiving textual data. Mostly the storing of texts is implemented as a special function within content-analysis systems like the GENERAL INQUIRER (Stone 1966) or in a more comfortable manner in LDVLIB (Drewek, 1980). The text-storage capabilities in these systems are intended as an aid for single users to handle their own texts. They do not intend to provide a general archiving system. This is not the case in the Z.A.R. system (Mochmann, 1974-75). More conform to the above mentioned aims would be the Stanford Computer Archive of Language Materials (CALM, Sherman, 1978). The UPSTAR system from 1980 is specifically tailored for psychotherapy-research purposes. The linguistic capabilities are not as great as in CALM. The documentation aspects, which form the main component of Z.A.R. remain in the background while the UPSTAR favours techniques for sampling text material.

The system architecture of the Ulm text-base management system is shown on poster 1 (cf. Appendix). The main components are storage, procedures and users. The relation between storage and procedures is characterized by writing and reading data. Users and procedures are communicating one with another. The storage is static, users and procedures are dynamic. Within the storage we distinguish four types: The text storage, residing on hard disks and magnetic tapes, is holding all primary textual data. The information storage, residing on a hard disk, holds secondary textual data like text-type, information on the text-authors and results from text-analysis (e.g. TTR, AT-scores). The intermediate storage is needed by the procedures performing their different tasks. Most

important for the user will be the last type of storage consisting of various interfaces. The CRT[6] supports the communication with the system. Listings, reports and protocols contain the user desired informations. The hard disk and magnetic tapes are the interface to other software packages on the same or another computer system.

Among the procedures four types may be differentiated: Take in of text is the most basic action and may be performed off-line via an optical character reader (OCR), punch cards, tapes etc. or on-line via terminal (CRT). The take-in procedure supports the user in detecting errors (e.g. misspelled words, inadequate commentary) and with correcting facilities in the on-line version. Being taken in each text will pass some standard analysis-procedures. The data-base management is the most important brick in the system architecture. It consists of procedures allowing the definition of names for data that will be used describing texts (e.g. text-type, text-length, author names, diagnosis). Once being defined names can be used in manipulating data (insertion, deletion), formulating queries within the retrieval procedures (e.g. How many initial interviews with female patient and a diagnosis of psychosomatic disease there are? List age of patient and sex of interviewer!). The production of well-structured listings for printer or CRT-output finally is the task of the lay-out procedure.

Users are differentiated into an administrator and into the type-writers and scientists. The administrator's task is the complete management of the psychotherapy archive. In particular he performs those operations which would change the contents of the information storage. The type-writer's and scientist's job resp. Interest I just mentioned above.

A text archive will only be a good tool in psychotherapy research if enough text material is available. But instead of claiming a representative collection – this term is hardly to define (cf. Rieger, 1979) – an expected amount of text entities within the next one or two years can be stated, so that both, acquisition and

[6] Cathode ray tube (terminal)

research work, are realistic to success. Poster 2 (see Appendix) shows the gap between expected and actual text body with the example of two proto-types. The psychoanalysis protocols allow profound single-case studies with a spare chance of comparability. The initial interviews rather sustain field studies with good possibilities of sampling along numerous grouping variables (e.g. sex, diagnosis).

Analyzing textual data

Textual data may be interpreted as a structured system of signs. According to Peirce's tripartite differentiation of the relations in which signs may occur[7] we distinguish textual measures with respect to the formal structures, to the grammatical aspect, and to the contents of texts. Their application is either in a monadic (and interaction disregarding)

Measures with regard to	Examples	
	monadic	dyadic
FORM	Type-Taken Ratio	Order of Speaking
GRAMMAR	Verb-Adjective Quotient	Lexical Syncrony
CONTENT	Anxiety Themes	Thematic Coninuity

Table 2: Textual measures

or in a dyadic disposition of investigation. Some examples are listed in Table 2. Their output may fall to account as qualitative or quantitative data. Statistics, either descriptive, analytic or special (e.g. time-series) provide further methods for the secondary evaluation of those data.

[7] Peirce defines 'firstness' as mode of being without relation to anything, 'secondness' as being related to a second, and 'thirdness' as relating a second to a third (cf. Walther, 1969)

The first reader on psychotherapy research by Mowrer (1953) already reports on investigations of all three kinds of measures defined here. Johnson et al. (1944) designated the ratio represented by the number of different words (types) over the total number of words (tokens) the type-token ratio and applied to psychotherapy[8] and this stimulated further interest in the formal properties of language systems (c.f. Herdan, 1960; Kucera and Francis 1967; Meier, 1964). Grammatical aspects have been investigated by Zimmerman and Langdon (1949). Based on the textual data from a client-centred psychotherapy they counted the occurrences of pronouns and the relative incidence of different grammatical tenses.[9] Finally, to refer on a content depending measure, Dollard and Mowrer (1947) are mentioned. With their Discomfort-relief Quotient they offered a method of measuring tension in written documents.

All studies referenced above were achieved by manual coding techniques. The cumbersome, tedious and time-consuming aspects of such techniques may be the reason that they never gained a widespread application.
The following contributions base on computer-assisted analysis of textual data. Two of them fit under the category of formal measures (Brunner; Kächele), one of them under the grammatical type (Wirtz) and further two under the content depending measures (Grünzig; Lolas et al.).

[8] Normal and schizophrenic subject's written and spoken language has been compared by means of TTR and substantial differences had been stated.
[9] e.g. Zimmerman and Langdon found indications that therapeutic progress is accompanied by increased planfulness - and, hence, increased reference to the future.

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