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Method of inquiry paper

Contextual Content Analysis[1]

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Abstract. This article suggests one way to systematically code textual data for research. The approach utilizes computer content analysis to examine patterns of emphasized ideas in text as well as the social context or underlying perspective reflected in the text. A conceptual dictionary is used to organize word meanings. An extensive profile of word meanings is used to characterize and discriminate social contexts. Social contexts are analyzed in relation to four reference dimensions (traditional, practical, emotional and analytic) which are used in the social science literature. The approach is illustrated with five widely varying texts, analyzed with selected comparative data. This approach has been useful in many social science investigations to systematically score open-ended textual information. Scores can be incorporated into quantitative analysis with other data, used as a guide to qualitative studies, and to help integrate strengths of quantitative and qualitative approaches to research.

Abbreviations: C-scores = Contextual Scores, E-scores = Idea/Emphasis Scores, KWIC = Key-Word-In-Context, MCCA = Minnesota Contextual Content Analysis

Introduction

Words are a basic form of data for much social science research because they are the usual medium for social exchange. For many purposes, insight into meanings can be obtained by examining profiles of ideas and contextual information contained in text. In this paper we address one approach to the social science research problem of systematically coding textual data. The approach makes quantitative distinctions between texts varying in both the pattern of emphasis upon different sets of ideas and in the context or social perspective from which these ideas are addressed. Scores are used to describe comparative patterns of meaning in textual data, generate traditional statistical analyses with other non-textual variables, and aid in organizing and focusing further qualitative analysis.

By "text" we mean a transcript of naturally occurring verbal material. Included are conversations, written documents such as diaries or organization reports, books, written or taped responses to open-ended questions, media recordings, and verbal descriptions of observations. Ultimately, the transcript consists of a computerized file of conventional words and sentences for one or more cases.

Methodologies for directly, systematically and efficiently handling textual data are needed. Traditionally, trained coders are utilized but serious validity, reliability, and practical problems are often encountered. Computer approaches (available since the 1960's) permit more systematic and reliable coding of themes and meanings in text but these have not been widely adopted in social science research. Like Markoff et al. (1975), we take the view that content analysis must be integrated with

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traditional methodology. The approach described here extends computer content analysis, making it a more useful and complementary research tool in traditional social science methodology.

Content analysis has been summarized in a number of places in the literature.[2] *Contextual* content analysis, implemented in the Minnesota Contextual Content Analysis (MCCA) computer program, builds upon computer content analysis methodology in a number of ways.[3]

Overview of Contextual Content Analysis

First, *all* words in one or more texts are divided into a large number of idea categories (including a "not elsewhere classified" category), guided by a conceptual "dictionary". A dictionary groups words (or in our case, word meanings) into categories thought to express (singly or in patterns) ideas important to an investigator. Several conceptual dictionaries have been used in computer-based content analysis, each organized around somewhat different theoretical perspectives.[4]

The contextual-conceptual dictionary MCCA uses is oriented toward more frequently used words whose meanings are organized into a large number of categories. The categories are of general social science interest and are mutually exclusive (Pirro and McTavish 1982). Words with multiple meanings are disambiguated. Relative emphasis upon each category in the text is then normed with respect to a standard (i.e., the expected emphasis on these categories, accounting for expected variability in the use of a category over a number of social contexts), a process described later. This vector of normed scores (called "emphasis" scores or E-scores) permits an investigator to examine the over- and under-emphasis on idea categories relative to the norm of expected category usage. Broader concepts and themes in a text can be identified from scores for sets of related categories. Quantitative distinctions between texts can also be made in terms of the overall profile of emphasis on idea categories.

Secondly, MCCA incorporates an hypothesis that different social contexts (social groups, institutions, organizational cultures, or other socially defined situations) can be identified by the overall profile of relative emphasis upon idea categories utilized in communication in that context. The idea-emphasis profile appears to contain important information for distinguishing and characterizing social contexts.

To aid in interpreting contextual information in these profiles, we use four general "marker" contexts we call "traditional", "practical", "emotional", and "analytic". Each marker context is an experimental, empirically-derived profile of relative emphasis on each idea category, which characterizes the perspective typical of a general social or institutional context. As a set, the four contextual markers serve as dimensions to define a social context space. MCCA computes these contextual scores (called C-scores). Texts can be scored and differentiated on these four dimensions. Distinctions can be made, for example, between a more "traditional" concern for breach of norms and appropriate sanctions in a religious discussion, and a more "practical" concern for failure to successfully achieve goals and consequences in a business discussion. Similar ideas may be discussed in quite different ways in different social contexts. These scores appear to be important parameters of social contexts.

Third, the approach helps link strengths of qualitative and quantitative social science research. For example, an investigator can realistically examine transcribed conversational interviews on a topic for a large representative sample of cases. Quantitative scores can help guide comparative, qualitative analysis of social meanings in textual data, adding depth and anchoring to quantitative causal analyses as well. Fourth, computerized content analysis eliminates coder reliability problems, permitting more careful analysis of measurement and validity issues.

In summary, this approach has a number of advantages for systematic analysis. Norming provides a basis for examining topical emphasis (including distinctive omissions) in a text, a task which is problematic in coding open-ended response data with earlier procedures. Using the normed, idea-emphasis scores (E-scores) and scores reflecting emphasis upon the set of four marker contexts (C-scores), naturally occurring textual material can be "coded" to reflect meanings of interest to an investigator. The set of scores (C-scores and E-scores for each text) can be combined for traditional quantitative, statistical analysis with independent and dependent variables measured in other ways. We refer to this as "Contextual Content Analysis" to distinguish it from more traditional hand and computer content analytic approaches. This approach has utility for social science research by providing a broad framework for characterizing social meanings in text and a practical, systematic means for scoring textual data. The following sections further describe MCCA and provide illustrations of its use.

Meanings in Text

As in any research, the meaning that is attributed to a text depends upon the researcher's theory. There is no general answer to the question of what a textual passage "really" means. Nor is there generally a research interest in capturing "all" of the meanings that may be attributable to a text. In short, the research problem and the theory the investigator uses will specify the relevant meanings in appropriate text for certain research purposes.

Markoff et al. (1975) distinguishes between a situation where subjects have an interest in sharing meanings and a situation where subjects intend to manipulate the investigator's understanding by what is said. From our point of view, manipulative intentions on the part of subjects do not invalidate an analysis of what is said. This does suggest, however, that explanatory theories might also include the possibility of intentional manipulation. Similarly, sub-cultural and individualistic uses of words should also be entertained in explanatory research uses of text.

Measuring Context

By "context", we mean the shared meaning or social definition of a situation of interaction. Context provides an underlying orientation for subsequent action.[5] There are several levels of context. Broad social contexts may be all-encompassing such as the meaning of being a world citizen or a human or a member of a culture or nation or sub-culture. More specifically, shared contexts exist regarding aspects of life, such as work, family or leisure.[6] The meaning of social context plays an important role in a number of explanatory perspectives in social science.[7]

The setting of communication provides a framework within which other types of analysis proceed. Typically, in hand content analysis, context information is assumed or intuitively determined (e.g. "since we are in a work context, we will examine meanings of job satisfaction and not religious satisfaction"), or uses information outside the communication itself (e.g. the status of the speaker, conditions under which the text was prepared) (Krippendorff 1980). This confounds description or characterization of a communication with the explanatory problem of determining its causes and consequences. To avoid these hazards, one could focus on the measurement problem: coding descriptive information about ideas and context expressed within a text, then utilize some of these codes in explanatory analysis with independently measured variables.

Typically, words introduce the context, although other signs and symbols may do so as well. For example, when someone says "Tell me about your work", the conversation has had limits and direction established by placement within one context (an economic or work context) to the relative exclusion of other contexts (e.g. religious, family, leisure).

Context is indicated by several features of language. First, it is indicated by the range of vocabulary used in a social encounter or in discussing a topic (the number of unique words and the total number of words used). The more frequently used words carry much of the important information that distinguishes between general social contexts. Of all the available words and constructions, some specific subset is chosen for use because it is needed to encode that communication.[8]

Middle range words carry most of the interesting contextual information because they are generally known and used, appear in different social contexts, and their relative use varies widely from one social context to another. These words include the general classes of nouns, verbs, adjectives and adverbs which allow description and evaluation across settings. They also include (with augmentation from the top 50 or so words) the pronouns, adverbs and adjectives which specify and structure the situation. MCCA focuses particular attention on the middle-range and more widely used words.

Contextual information is also contained in the focus upon some words or word groups compared to others. This can be seen in probability distribution patterns across idea/word categories. Individuals use ideas/words in distinctive, patterned ways which reflect role and location within a social system as well as individual socialization and other individual factors. Sub-cultures have typical overall patterns of the relative use of conceptual categories. Furthermore, specific social settings or contexts appear to have typical idea/word patterns. Individuals learn these patterns, and their speech reflects changes in patterns when they become involved in different social settings (e.g. from church to job to recreation to school). Usage patterns, such as these, come to typify and distinguish institutionalized social settings (Namenwirth 1968; Cleveland et al. 1974). Finally, contextual information is contained in the connectedness or co-occurrence of ideas.

However specific or general, the social meaning of the situation is important because it provides the starting point for individual social interaction. Knowing the social context means that a person is aware of what general kind of activity is likely and what, generally, is appropriate behavior.

Contextual information is also useful in distinguishing between multiple meanings of certain words, such as "service", as illustrated below.

"Service"

Meanings	Context
a. Religious gathering e.g., church "service"	Traditional
b. Provision of aid, assistance e.g., road "service"	Practical
c. Introductory game ploy e.g., tennis "service"	Emotional

An empirical approach to the problem of measuring social context proposed here makes use of the content analysis framework. This provides a basis for a more precise evaluation of the meaning of social contexts as well as comparison of communication across contexts. MCCA attempts to systematically code contextual information from textual data.

A Framework of Four General Contexts

It is possible to distinguish a large number of different contextual dimensions. However, we have found it convenient and useful to work with a small, comprehensive set of four general contexts: (a) traditional, (b) practical, (c) emotional, and (d) analytic.

These four satisfy several criteria we consider important for any set of contextual "markers" used in social science investigation. First, it must be possible to integrate the set of contexts into social science inquiry in a way which contributes to social science theory and interpretation. Secondly, they should broadly address all aspects of society. That is, each context should substantially contribute to a kind of "triangulation" which would help to locate any potential text in relation to each of the "marker" contexts. Thirdly, the set of contexts should contribute to the interpretation of ideas/words which may be identified as important. In particular, the dimensions should help identify the different meanings of a given word which has multiple meanings and is thus contextually ambiguous (i.e. "spring", "service"). Fourthly, contexts should contribute to the explanation of social behavior by making it possible to move across levels of analysis, considering individual social motivation as well as institutionalized social perspectives. Finally, the set of contexts should fit with the general social uses of language.

In our application of MCCA four scores indicate the relative closeness of an analyzed text to each of the four general contexts. These four scores (called C-scores) are used as measures on the four contextual dimensions. Some evidence suggests that they can be used to define an approximately orthogonal space (Anderson 1970; Cleveland et al. 1974; Osgood 1957), although this is not a necessary criterion. Distances between texts in this four-space can be computed and used to express the proximity of texts to each other.

Each of the four contexts incorporates a general idea of societal activity and represents a different framework within which specific concepts can emerge:

a) Traditional Context. A normative perspective on the social situation predominates and the situation is defined in terms of standards, rules and codes which guide social behavior.
b) Practical Context. A pragmatic perspective of the social situation predominates and behavior is directed toward the rational achievement of goals.
c) Emotional Context. An affective perspective predominates and the situation is defined in terms of expressions of emotion (both positive and negative), and maximizing individual involvement, personal concern and comfort.
d) Analytic Context. An intellectual perspective predominates and the situation is defined in objective terms.

Table 1 schematically illustrates the way in which word groupings in a conceptual dictionary can reflect idea categories and certain idea categories may be emphasized more heavily in certain social contexts. In MCCA, ambiguous words are contextually disambiguated to determine the most appropriate category, and each category receives some differential weight reflective of its usage in the different contexts.

Table 1. Illustrative Conceptual Categories and Words More Likely To Be Found In Each of the Four Context Categories

Context	Category	Typical word or phrase
Traditional	Guide	should, ought, guard
	Structural Roles	mighty, military
	Prohibit	restrict, watch
	Ideals	stability, honesty
Practical	Activity	walk, buy, sell
	Merchandise	product, spend
	Strive	maintenance, development
	Organization	management, office, factory, retail
Emotional	Happy	friendly, wonderful
	Pleasure	gladness, refreshment
	Expression Arena	museum, music
	Self-other	respond, wish
Analytic	Differentiate	analysis, analytic
	Relevant	solution, signify
	Similarity	alike, comparison
	Scholarly Nouns	library, university, science

Conducting Contextual Content Analysis

Conceptual content analysis focuses on ideas in text. Contextual content analysis lends perspective to those ideas. The two sets of scores are used together. There are a series of stages in the execution of a research design incorporating contextual/conceptual content analysis.

The first stage involves the methodological choice of content analysis.[9] A contextual/conceptual content analysis is appropriate in one of three situations. Because it is basically an approach to measurement, it is useful in (a) descriptive or explanatory studies -- especially where one wants to identify and contrast meanings for one or more text units, (b) in hypothesis testing, or (c) in exploratory inquiries -- especially where questions are complex, uncharted and changing, (e.g. new constructs, developing issues, or changes over time).

The second stage involves decisions on specific research procedures. Contextual/conceptual content analysis involves all the usual considerations in research such as design, measurement, sampling, pretesting, data-gathering, all of the possibilities of statistical analysis and reporting.[10] In each of these, standard considerations about theoretical grounding and craftsmanship apply.

Since contextual content analysis examines patterns of use of ideas in text, it is important that the text qualify as research data. That is, it must be relevant to the research problem and contain characteristic patterns of word usage rather than an edited or altered pattern of usage. In the interview situation, skill in providing a free, natural stimulus to expression with minimal intrusive constraint is important. Use of a verbatim transcript (or a representative sample from it) is critical because it contains the pattern information central to contextual/conceptual analysis.[11] A machine-readable computer file of the desired verbatim text is created. Word processors are useful for this purpose, and optical scanners are available which read printed text and convert it directly into a computer file.

The third stage involves the scoring procedures themselves. MCCA uses a conceptual dictionary augmented with the four contexts (traditional, practical, emotional and analytic). The computer matches each word in the text against the word meanings in the dictionary, keeping a running tally of usage, concept by concept. Words not in the dictionary are tallied in a "leftover" list. Conceptual category tallies are percentaged for each text by the total words in the text. This score is subtracted from an expected score obtained from a norm to yield an emphasis score for each of the concepts included in the dictionary.[11] It is important to take account of variability in the use of ideas/words across social contexts. This is done by dividing by the standard deviation of category usage across the four contexts to yield useful emphasis scores (E-scores):

$$E\text{-}score_{i,k} = \frac{p_{i,k} - P_i}{S_i}$$

where E-score(i,k) is the E-score for category "*i*" in text "*k*"; $p(i,k)$ is the observed proportion of text in conceptual category "*i*" for text "*k*"; $P(i)$ is the overall expected probability of use of category "*i*"; and $S(i)$ is the expected standard deviation of category usage across contexts.[12]

E-scores are computed for each of 116 idea/word categories distinguished in the current dictionary. They are the basic measures used for the *conceptual* analysis. The pattern of connectedness of various ideas in a text is examined using a clustering routine. Similarity and distinction between texts in terms of emphasized patterns of ideas can be quantified as well. A distance between texts can be measured as a discrepancy between texts on their profile of relative use of the 117 conceptual categories (the 117th category is the "left-over" list of uncategorized words). The structure of conceptual differences shown in this proximity matrix can also be examined by clustering and other statistical techniques.

Four *C-scores* or contextual scores are also created during computer processing of the text. As each word is identified and classified into a conceptual category, four cumulative contextual scores are each updated as illustrated in Table 3. The updating uses weights which reflect the relative use of each conceptual category in the four general social contexts. At any point during processing, these accumulating scores are available to be used in contextually disambiguating ambiguous words. Context scores are used to decide between alternative categorizations.

Accumulated contextual scores over a text are standardized. These four scores are the four contextual dimension measures. Distances between texts in this four-space can be computed and used to express the proximity of texts to each other, in terms of their approach to the ideas that are discussed. Cluster analysis helps display the structure of this proximity matrix.

Finally, E-scores often identify fruitful starting points for further qualitative analysis. The computer can further assist qualitative analysis by sorting and organizing the text, by searching for all instances of the use of some word or phrase, or by showing the use of key words in sentences and phrases in the text through key word in context (KWIC) lists. An inspection of these phrases often permits a refinement of the sense of the general conceptual categories and helps identify broader concepts extending across several conceptual categories. This grounding draws on strengths of qualitative approaches to text analysis within a systematic, comparative research framework.

Variables, including composite indices developed from contextual and conceptual analysis scores, can be included in a data set for statistical analysis, together with variables developed in any of the other more traditional ways. We have treated C- and E-scores as continuous, interval-level measures.

Table 2. Accumulation of C-scores for an Illustrative Sentence[a]

"Work like mine keeps me from doing my best."

	Accumulation of C-score Deviations				
Words	Traditional	Practical	Emotional	Analytic	Weight average
Work	+0.001	+0.008	-0.004	-0.003	0.009
like	+0.001	+0.006	-0.002	+0.005	0.012
mine	-0.008	0.000	+0.018	-0.010	0.021
keeps	-0.007	+0.001	+0.016	-0.010	0.027
me	-0.007	-0.008	+0.033	-0.018	0.038
from	-0.007	-0.002	+0.016	-0.007	0.149
doing	-0.008	+0.002	+0.016	-0.010	0.166
my	-0.008	-0.007	+0.034	-0.019	0.177
best.	-0.007	-0.007	+0.034	-0.020	0.184
C-scores for sentence	-7.0	-7.0	+34.0	-20.0	0.0

[a] Words in text are looked up in a computerized dictionary and their idea category is identified. Probability of occurrence of that category in each "marker" context is added to the accumulating context sums. In the illustration above, deviations from the mean probability of occurrence for that category are summed. Negative figures reflect below-mean deviations. Positive figures indicate above-mean deviations or an emphasis on that contextual approach. Final C-scores for the entire sentence (or text) are multiplied by a constant, and their mean for a text is set at zero.

An Illustration

To illustrate the ability of contextual/conceptual analysis to distinguish between texts, we selected short passages from five published articles:

(a) Scholarly Journal Article - report of research findings on the impact of pre-retirement programs on post-retirement satisfaction and behavior for older people;
(b) Airline Finance News - a financial-page, newspaper report about an airline's financial problems associated with costs of long-distance flights;
(c) Magazine Fiction - a newsstand magazine story incorporating "stream of consciousness" writing about personal feelings, reflections on life situation, and future possibilities;
(d) Religious Devotional - a passage from a daily religious reading providing guidance for personal living (this selection dealt with feelings of depression and loneliness);
(e) Editorial on Recent Crimes - an incensed editorial reaction to a series of person-crimes, coupled with demands for action to be taken by authorities.

The first four texts were expected to show relative emphasis on one of the four contexts. The last text was chosen to illustrate the use of contextual/conceptual content analysis in locating an ambiguous text in relation to other texts.

The texts were entered verbatim into a computer file and checked for accuracy and spelling but not edited in any way. Using the MCCA 8.3 contextual/conceptual content analysis program, each text was scored both conceptually (E-scores) and contextually (C-scores).

Table 3, below, provides a profile of four contextual scores for each of these five passages. In this example, the scores are standardized to sum to zero for a text, to aid in comparing relative emphasis on contexts. The higher the positive score, the more the text can be said to focus on a contextual dimension. Greater negative scores reflect less emphasis on that context.

Table 3. Distribution of contextual scores (C-scores) for five selected texts

	Four context dimensions			
	Traditional	Practical	Emotional	Analytic
1. Scholarly article	-3.24	10.02	-14.46	7.67
2. Airline finance news	-5.59	11.21	-6.77	1.15
3. Magazine fiction	-2.69	-13.79	29.66	-13.19
4. Religious devotional	6.08	-7.19	5.44	-4.33
5. Editorial on recent times	3.51	-12.65	19.47	-10.33

There are two major contrasts to be explored in Table 3. First, the analyst can examine distinctions between articles. It is clear in the table that the scholarly article is the highest of all texts on the *analytic* contextual dimension. The magazine fiction and the crime editorial have high C-scores on the *emotional* dimension. Both the scholarly article and the airline finance news have high *pragmatic* scores while the religious devotional and, to some extent, the crime editorial, emphasize the *traditional*. An analysis of contextual scores provides information on similarity between texts in the approach taken to the topic at hand. Here, differences clearly reflect what one might expect texts from these sources to be.

The second analytic path is an examination of the pattern of emphasis on different contexts for a given text. Each of the pieces is not exclusively in a single context but has a primary focus and under-emphasizes certain other contexts. That is, the text-author opted to emphasize a given contextual approach at the expense of certain other approaches which could have been utilized. Often the particular pattern of positive and negative C-scores is important to examine.

For example, the scholarly article contains both practical and analytic elements, reflecting both the practical concern of pre-retirement programs as well as the analytic approach of research. Interestingly, the contextual pattern for the crime editorial emphasizes the emotional component stemming from the writer's anger at the lack of resolution, and traditional elements about what "should" be done. This is accomplished by de-emphasizing practical and analytic approaches.

C-scores for each text can be included with other variables in a more extensive analysis of hypothesized causes, consequences or correlates of the social context of texts. Context scores can also be used as controls in an analysis of other relationships. A distance measure (shown in table 4) can be computed between texts, using the four C-scores for each text in Table 3. This can be used in cluster analyses to display the structure of contextual differences.

The five texts differ in the way they approach their subject-matter. The scholarly article and the airline financial news are contextually more similar--quite different in approach from the magazine fiction. The crime editorial falls between the emotionality of the magazine story and the traditionalism of the religious text. Equipped with theoretical expectations, such plots have proven helpful in measuring patterned differences in context between texts.

Table 4. Matrix of Euclidean distances between five texts on the four contextual dimensions

	Text groups				
	1	2	3	4	5
1. Scholarly article	--	10.4	54.3	30.4	45.1
2. Airline finance news	10.4	--	46.5	25.6	38.4
3. Magazine fiction	54.3	46.5	--	28.0	12.3
4. Religious devotional	30.4	25.6	28.0	--	16.4
5. Crime editorial	45.1	38.4	12.3	16.4	--

Table 5 shows the E-score pattern for the five illustrative texts on 25 of the 116 conceptual categories identified in the conceptual dictionary. Conceptual categories where the absolute value (or maximum absolute difference in E-scores across texts) met a heuristic, substantive criterion (i.e. 10 or larger) were selected. The rationale is that small differences, approaching zero, are close to the overall norm for use of that category and that important emphasis, omission, or differences between texts are of initial analytic interest.

Table 5 shows that the five illustrative texts deal with quite different concepts as was anticipated. The general character of the concepts with which they each deal can be identified simply from the ad hoc labels of the dictionary's broad conceptual categories. Thus, the crime editorial dealt with the need for sanctions to be applied for wrongs which had occurred. The role of authorities and what they should be expected to do were central ideas. On the other hand, the religious devotional dealt with wanting to change one's life in some way to deal with or avoid feelings of depression and loneliness. The magazine story was toying with ways of seeing things and changing viewpoints, themes that begin to be reflected in conceptual category labels in Table 5. Some of these ideas are shared by other texts as well. Handling more immediate financial obligations involved in flying can be seen in E-scores for the airline news text. Finally, some of the ideas involved in retiree activities and the helpful role of former employer's programs can be seen in the scholarly article.

A proximity matrix can be computed showing the distance between the overall profile of ideas emphasized in different texts. This matrix of "conceptual" differences between texts (not shown), like the matrix of "contextual" differences between texts shown in Table 4, above, can be analyzed with cluster and other analytic techniques. Differences and similarities between texts may be evident in the context of the discussion and/or the kinds of concepts which are discussed.

Most analysis would not stop at this point but instead would make use of further detail on vocabulary and phrases found in each of the texts which accounts for notably high or low E-scores. MCCA provides lists of words from each text which were classified in each conceptual category. An examination of these often leads to an identification of the specific conceptual meanings only broadly hinted in the overall category labels. More appropriate theoretical concepts may be identified from a pattern of E-scores over more than one conceptual category, using more elaborate measurement models (Weber 1983).

Table 5. E-Scores for five texts on selected conceptual categories

Conceptual Categories[b]	Five selected texts[a]				
	1	2	3	4	5
Activity	11.80	-0.27	-0.36	-3.47	-1.54
Fellow feeling	9.79	-2.76	-2.76	-2.76	7.43
Kind of	5.47	-2.87	1.57	-4.98	-1.57
Now	3.72	9.10	-0.18	-2.79	-1.87
Object	-0.64	9.24	-0.33	0.11	-1.79
Obligation	3.25	9.42	-1.49	-1.49	-1.49
Spatial	-1.25	10.83	0.95	-1.83	-1.44
About changing	8.95	-4.44	9.57	-0.29	-1.96
Cognition	-3.59	-2.95	12.69	2.00	5.88
Eternal	-4.25	-0.34	5.90	6.28	-2.68
Expression arena	-3.65	1.33	-2.04	6.40	-2.65
We	-2.47	-1.85	-1.67	8.38	-2.47
Want responding	-2.27	-3.21	-0.40	9.91	-1.46
Depressed	-2.28	-2.28	-2.28	10.46	-2.28
With	0.44	5.16	-0.01	11.04	2.98
Good	-6.09	0.95	2.18	13.16	-3.51
Begin action	1.86	2.79	2.61	14.90	-0.04
Error	4.22	-1.98	-1.98	17.25	0.89
Tender	-3.12	-3.12	-0.78	-3.12	7.03
Tradition directed	5.98	-3.90	-1.44	1.21	8.32
Bad	-3.18	-3.18	4.53	-3.18	8.78
Human roles	-0.58	-3.37	-1.81	-2.29	8.59
Status	-3.20	-3.20	-3.20	-3.20	16.37
Sin	-2.26	-2.26	-2.26	-2.26	16.92
Sanction	-5.68	-5.68	4.11	-5.68	49.01
Total words in text	541	470	724	349	1167
Percent unclassified	15%	25%	16%	8%	15%

[a] Texts are those referred to in Tables 3 and 4: (1) Scholarly article; (2) Airline news; (3) Magazine fiction; (4) Religious devotional; (5) Crime editorial.

[b] Heuristic category labels suggest the overall character of word meanings in a category. Examination of words and surrounding phrases refines the identity of the subset of words which were actually found in the text.

The issues of validity and reliability

Issues of validity and reliability for contextual content analysis are best addressed in specific research situations as is true for other measurement techniques (e.g. Likert scaling) where concepts and their measures can be examined. A number of authors have addressed reliability and validity questions in hand content analysis (Krippendorff 1980; Holsti 1969; Weber 1983; Andren 1981). There are a number of relevant observations we would make about computer content analysis.

Important aspects of reliability in content analysis are handled by the use of a computer. Computer content analysis procedures process a given text file reliably, in accordance with instructions in a specific program. This is a major advantage in that computers permit investigators to realistically consider the inclusion of verbatim text in systematic research on larger or more representative samples and on contrasting varieties of substantive topics.

There are larger questions of reliability, however, which need attention, such as the reliability involved in production of text (e.g. will two conversations with the same person on the same topic yield the same patterns, controlling for pretesting and other change factors?). There is also an interesting area of inquiry involving sampling variability of patterns given a certain number of respondents, documents, words, topics, and the like, which may require some reconceptualization prior to application of traditional sampling theory. In some instances, for example, it appears that one should take account of the over-time branching pattern developed in a conversation on a topic or acknowledge that some conversations amount to different respondents independently articulating a widely shared aspect of culture. In any event, it appears from experience that stability in patterns is often reached with relatively few words (500 to 1000 on a topic) or modest samples of respondents.

It is generally inappropriate to generalize validity findings to a whole measurement approach although certain typical strengths and weaknesses may be identified. Few social science theories provide a deductive link with word patterns and constructs. Instead, investigators using content analysis rely upon many of the same assumptions about shared meanings which are central to the use of other measurement approaches (e.g. survey questionnaires). The assumption that there are wide areas of consensus about the meaning of words appears to be justified (illustrated by the usefulness of a standard dictionary) in many research situations. There is also widespread reliance upon face (content) validity assessment of measures, which emerges from informed judgments, prior knowledge, tests of intuitive plausibility, etc.

Can anything be said in general about validity of content analytic measures, including those computed by MCCA? Our experiences to date suggest rather direct links between content analysis measures and certain theoretical concepts. One reason for this may be that content analysis allows one to operate directly on the expressed meanings and emphases of subjects rather than requiring them to translate their experiences into structured statements closer to the researcher's needs. The emphases and nuances of respondents are preserved. Another possible reason for a sense of greater substantive validity is that the data are more likely to be gathered as a part of the normal process of human communication rather than the "encoded" or "pre-structured" conversation.

There have been a number of opportunities for predictive validity checks within research projects. For example, a study which compared open-ended conversation by husbands and wives about their relationship, resulted in accurate classifications of couples both in behavioral terms (seeking divorce, seeking outside help, or coping) and as compared with independent judgments made by clinicians with access to the couples (McDonald and Weidetke 1979).

Another study assessed open-ended responses to a series of proposed new financial services to be offered by a bank. The content analysis data were able to accurately predict the success or failure of the actually offered services (Pirro 1981). A recent study of religious meaning and life satisfaction (Woodworth 1982) used both a content analytic assessment of interview transcriptions about life satisfaction and a widely used scale item. Initial comparisons suggested a lack of correspondence between the scale item and content analytic scores but further examination indicated that some of the minor content analytic scores could predict the structured scale rating (R squared = .86) but the main ideas that were emphasized by respondents in discussing their satisfaction were in quite different areas. This suggests predictive validity of that which a traditional scale measures, but points to the utility of being more sensitive to a subject's own emphases. A content analytic assessment of interviews with sixteen prison ex-inmates about their prison experience led to the accurate post-diction of general type of crime, escape record and recorded recidivism over the twenty years prior to the interview, all from a few content analytic scores (Felt and McTavish 1983).

MCCA has also been utilized in an examination of the validity of scale items. Here, each scale item is treated as a distinct "text" for which C-scores and E-scores are derived. A number of analyses have been pursued such as discriminant function analysis where scale (or sub-scale) discrimination in terms of the content analytic meaning scores is attempted. In suggestive analyses of standard Likert scales (e.g. alienation, job design, job satisfaction), a small set of relevant E-scores and C-scores accurately classify scale items on their theoretically appropriate scale. Inaccurately classified items reflected scale-item problems discussed in the literature. Further, the particular MCCA scores in the classifying equations reflect the substantive character of the concept which the scale items were purported to measure (McTavish and Felt 1985; Pierce et al. 1984). A comparison of published reliability scores for scales and the contextual distance between scale items suggests that contextual ambiguity may contribute to scale unreliability. Contextual content analysis was useful in identifying problem items and suggesting more specific ways in which items could be improved to fit with the rest of the scale (McTavish 1987). MCCA has also been useful in an examination of organizational context and role distance in nursing homes (McTavish and Felt 1987).

It has been helpful to include traditional measures of key concepts in content analytic studies as well as separately measured predictors. Adding "criterion text" profiles to an analysis also aids validity assessment. If the criterion text/s represent a relatively pure instance of a theoretical construct or position on a theoretical continuum, then analysis of the distance of other texts from the criterion can aid in analysis and validity assessment. Predictive and post-dictive studies are useful where alternative information can identify relevant criteria to predict.

Finally, one can often identify expected relationships which can be examined in content analysis. Our experience is that during the process of analysis a whole series of relatively low level expectations can be generated and tested along the line of "if this is an accurate interpretation, then one would also expect that to be true..." The result is a series of small construct validity tests or "triangulations" which, in sum, lend substantial insight into validity questions.

Conclusions

Computer-based, contextual/conceptual content analysis augments traditional measurement approaches and provides a further means by which strengths of qualitative and quantitative research can be integrated. It would appear to expand realistic possibilities for reliable and systematic analysis of a broader range of social science data such as historic documents, cross-cultural materials, transcripts of interviews, ongoing verbal processes, and open-ended responses.

Further theoretical and quantitative work is needed on linkages between conceptual definitions of key social science variables and patterns of word usage as well as on expectations for comparative word patterns across cultures, societies, institutions, organizations and historic time. Work to date suggests that an ability to more directly deal with expressions of social meanings in a rigorous analytic framework is possible and useful for social science investigation.

Notes

1. We are indebted to Susan Schrader for her editorial assistance.
2. The most recent introductory summary is by Weber (1985). Wood (1980) summarizes alternatives and options in computer content analysis. Earlier literature includes Berelson (1952, 1954), I. de Sola Pool (1959), Holsti (1969), North et al. (1963), Gerbner et al. (1969), Krippendorff (1980), and Rosengren (1981). Stone's General Inquirer computer program is a prominent, early computer content analysis system developed at Harvard (Stone et al. 1966). Grimshaw (1973, 1974, 1980) reviews some of the social science literature on language. Content analysis appears in several social science methods texts such as Kerlinger (1973) and its integration into general methods has been discussed (Markoff et al. 1975). Recent special issues of journals have presented suggestive uses of microcomputers in handling text field note data in research ("Computers and Qualitative Data" in *Qualitative Sociology* (1984); and *Quality and Quantity* (1984).
3. MCCA 8.3, the Minnesota Contextual Content Analysis computer program (version 8.3 by McTavish), is operating on a Control Data Cyber 174 computer at the University of Minnesota, Twin Cities. The package of programs which accomplishes contextual content analysis operates directly on a machine-readable, verbatim text file. Three output files are created: a) an across-group comparative summary of results of the MCCA analysis including cluster analyses and co-occurrence analysis, b) a file of results and certain diagnostic indices summarized separately for each text analyzed, and c) a data file of content analytic scores for each text (including C-scores and E-scores) which can be used as a part of a data base for further statistical analysis in programs such as SPSS. Distinctive word usage is identified and these can be used as starting points for further examination of the text (e.g. key-word-in-context listings and phrase retrievals).

   The analysis reported here was partially supported by grants from Rural Sociology and the University Computer Center, University of Minnesota. Currently, MCCA 8.3 is being extended and converted for use on micro computers and mainframe computer systems other than the CDC Cyber at the University of Minnesota on which it is currently operating. Arrangements for research use of the MCCA program on the University of Minnesota computer can be made by contacting Don McTavish, Department of Sociology, University of Minnesota, Minneapolis, MN 55455.
4. These include the Harvard social-psychological dictionaries which are based, in part, on the work of Talcott Parsons and embody structural-functional concepts (Stone et al. 1966 chapters 4 and 5; 1974); the Lasswell Value Dictionary centers around his theory of values (Peterson and Brewer 1965; Lasswell 1968). Special topic dictionaries exist such as the Pirro African Dictionary (Pirro 1968); a verbal style dictionary (Hart 1984); the Institutional Rhetorics Dictionary (Cleveland 1972); and others), as well as dictionaries for several languages including French and German.
5. Here we are interested in an aspect of the social use of language or "pragmatics" (Levenson 1983; Bates 1978; Watslawick et al. 1967).
6. More specific contextual meaning may be shared by virtue of participation in an organization, as an organizational "culture" (Barley 1983; Felt 1985). Many more specific contexts exist as well, in particular places or times (e.g. firm A's mail room or marketing division). Individuals typically participate in several different social contexts in the course of a day (e.g. family, work, ball game, college class), shifting language patterns as they do so.
7. Parsons 1951, 1964; Rose 1962; Stone and Farberman 1970; Rochberg-Halton 1982; Deese 1965; Berger and Luckman 1967; Carroll 1957.
8. In the U.S. (and apparently in other Western societies as well), a few words, specifically the most frequently used 50 words, account for a high percentage of word use (about 43 percent for English). The next 4950 most frequently used set of words (up to, the 5,000th word) account for another 48 percent of word usage. Words beyond the top 5,000 or so account in the aggregate for about 9 percent of word usage and are often technical terms or proper nouns which are restricted to highly specific conversations or situations.
9. One does content analysis, of any variety, when there is theoretical reason to believe that meaning is embodied in a set of written or spoken textual materials. Additional discussion of the incorporation of content analyses as a method for research can be found in Krippendorff (1980), Holsti (1969), Markoff et al.(1975), and Weber (1985).
10. Content analysis studies involve many of the same sampling issues that are involved in other types of social science research. For example, the selection of texts to examine is a reflection of the theoretical problem and the types of needed contrasts. Texts may be selected to reflect different actors or organizations or time periods, or a combination such as selection of material over the course of a conversation between two people where both speaker and time are

distinguished. Content analytic texts can be selected from individuals, groups, societies, organizations or various analytic groupings of text. Text to be content analyzed generally should be an accurate, unedited, verbatim statement. In some instances, theory may dictate editing out irrelevant material.

The level at which sampling is done depends to some extent on the theoretical level of interest in research. Generally, the more complex the organizational level to be investigated, the more extensive the block of text that would be identified as the unit in sampling (e.g. word, phrase, sentence, paragraph, document, or set of documents.). Traditional probability sampling procedures are relevant and useful in content analysis.

11. The contextual analysis proposed here is based on the differential profile of use of language by individuals and groups as established by regularities in language use in several settings. Various works on language and its use have helped to establish some of the regularities. Kucera and Francis (1967) provide word counts and percentages for a large sampling of public, written material produced in the United States in the 1960's. Probabilities associated with word use can be used as a general norm or expectation for use of written words/ideas in a broad, contemporary American context. Differences from such expectations become significant for social science text analysis. A summary of a variety of US-based text tends to confirm the stability of these general probability distributions.

12. For example, in the sentence, "Work like mine keeps me from doing my best.", the idea of "self" appears three times (e.g. mine, me, my) out of nine words or $p(i,k) = .333$. If the expected occurrence of this category is $P(i,k) = .045$ and the standard deviation of this category's usage across contexts is $S(i) = .028$, then the E-score can be calculated as follows:

$$\text{"Self" E-score} \; - \; \frac{0.333 - 0.045}{0.028} \; - \; +10.29,$$

This suggests that the idea category "self" occurs more frequently than one would expect if the nine words reflected usual English conversation.

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