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Comprehension and Analysis of Information in Text: III. Sentence Construction, Evaluation and Use

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This technical report describes a study designed to construct and validate a set of sentence materials necessary to the pursuance of a long-term research project on information analysis and integration in semantically-rich, naturalistic domains. This study complements the ones described in a previous report. The necessity for materials construction arises from the capricious character of natural materials within the primary semantic domain of this project, namely, the stock

market. We were able to select and modify from natural materials a large pool of 242 sentences pertinent to the market behavior of stock issued by typical American companies. We determined that relatively naive subjects could reliably categorize these sentences as being pertinent to one of six categories of information, General Factors, Capitalization, Growth, Sales, Earnings and Dividends, and that these sentences could be reliably rated as to their prognostic information regarding market behavior of the company. On the basis of rating and categorization study, three sets of sentences were generated. Set I consisted of 120 sentences, 20 falling within each category of information and representing a uniform distribution of ratings over a 5-point scale. Set II contains 111 nonambiguous sentences that are generally lower in category agreement to the sentences in Set I. Set III consists of eleven sentences with ambiguous category ratings.

Several applications are described, using the scaled sentences in text generation and accounting for the uncertainty in the sentences in concept learning studies.

Comprehension and Analysis of Information in Texts *

III. Sentence Construction, Evaluation and Use

(Addendum to Technical Report 82-ONR)

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This report describes the process of constructing and scaling sentence material to be used in the preparation of textual stimuli. This study complements the work described in Kozminsky, Bourne and Kintsch (Note 1) in which a set of 120 sentences were scaled and 20 texts were constructed and experimented with to verify their structural properties. In Kozminski, et al (Note 1) we described a general approach to the study of comprehension and analytic processes which apply to information in natural texts. For our research, we constructed a simulated stock market in which to examine these processes. Real stock reports, we found, vary in their structure and content; often they are ambiguous, skimpy, cluttered in jargon; they may be internally inconsistent and provide information on only a few of the stock characteristics. Therefore, we decided to construct artificial stock reports in which it was possible to control the information and other textual qualities. The construction process used in Kozminsky, et al. (Note 1) was as follows.

First, we identified six informational categories are are frequently found in real stock reports:

1) General information--information about market and/or economic conditions within this country and across the world which may have a bearing on the market, in general, but does not have direct application to a specific company.

2) Capitalization--information concerning the financial position of a specific company (assets, liabilities, cash on hand, credit status, existing loans, etc.).

3) Growth prospects and productivity--information concerning past growth, near-term and long-term expectations, possible mergers, expansions, and new products.

4) Sales--historical information on company sales, near-term and long-term expectations, sales comparisons with other companies within the industry.

5) Earnings and profitability--past earnings, near-term and long-term expectations and comparisons with other companies.

6) Dividends--past and anticipated payments to stockholders.

Next, we selected 211 sentences from various sources of financial data, such as analysts reports, company reports, newspapers, and financial magazines. These sentences were probed so that they fell, according to our judgment in roughly equal numbers into each one of the above six categories. Information contained in these sentences ranged from extremely positive, for example, "Dividends will be doubled next year," to extremely negative, for example, "Sales have struck an all time low in the first quarter."

In the third stage, we conducted several experiments in which these sentences were assigned by subjects to informational categories and were evaluated on a 5-point scale ranging from mostly negative (1) to mostly positive (5). The reliability of category assignments and evaluations was very high. Forty-two sentences were rated twice by the same 8 subjects. Median category agreement was 85% and the median Pearson correlation for the rating of these sentences was .90. Based on these procedures 120 sentences were selected, such that 20 sentences were identified with each one of the six categories and each 20 sentence sets were uniformly distributed on the 5-point evaluation scale. These sentences and their rating properties are given in appendices A and B in Kozminsky, et al. (Note 1).

In the fourth stage, the 120 sentences were used to construct textual material within a set. Subjects received sets of six sentences, one for each category within a set. Subjects were asked to order the sentences and to add natural connectives between them so as to form coherent text-like sequences. Agreement among subjects was used to generate 20 texts which were then used in several experiments on decision rule learning and rule using (e.g., Kozminsky, Kintsch, Coren & Bourne, Note 2).

While twenty texts or 120 sentences were sufficient for some of the work we planned, other studies require a larger pool of sentences. Therefore we decided to evaluate a new set of 242 sentnces. These sentences were selected from sources similar to those used in previous work. Some were modified from previously unused sentences or constructed mimicking the style of the previously used sentences. They were roughly equally distributed over the six categories and the 5-point evaluation scale, in our judgment.

Method

Subjects. Ten graduate students in the Department of Psychology, University of Colorado, served as subjects. They were paid $4 per hour for their work.

Materials. Two hundred forty two sentences were randomly ordered and typed on 14 pages. The third page and the last one contained the same 19 sentences. All other pages were randomly sequenced for each subject. A description of the six categories, along with categorizing and rating instructions, were typed on a separate face page.

Procedure. Each subject received a booklet that contained the sentences and the instructions page. Subjects were told to sort the individual sentences into one of the six categories, (1) general factors, (2) capitalization of company, (3) growth prospects of company and/or industry, (4) sales of company, (5) earnings of company, (6) dividends of company (see description of categories above). All sentences had to be assigned to one or another category. After categorizing, subjects were to rate the sentence on a five-point scale, with a 1 meaning most negative and 5 most positive regarding the future market performance of the company's stock.

Results

On the average subjects required about 3 hr to complete the task. Mean category agreement was 88%. Rerating reliability of 19 sentences was high. Median subjects category agreement was 92% (17.5 out of 19 sentences), $X^2(1) = 77.84$, $p < .001$. Comparing the reratings of these sentences, Median Pearson correlation for the ten subjects was $r = .93$, $t(17) = 10.45$, $p < .001$. These results are comparable to those obtained in the previous rating studies.

Based on these results, the 242 sentence pool was divided into three sets. Set I contained 120 sentences, selected so that each information category contained twenty sentences, four on each of the five scale values. A category agreement index[1] (a Chi-square statistic) was used as a selection criterion to include sentences in this subset. Set II contained 111 non-ambiguous sentneces that were generally lower in category agreement than the sentences in Set I. The third set of eleven sentences consisted of sentences with ambiguous category assignments.

The sentences are listed in Appendix A by categories. Set 1 consists of the sentences numbered 121 to 240; in Set II sentences run from 241 to 351, and Set III sentences are numbered 352 to 362. (Sentence numbers 1-120 are reserved for sentences selected in the previous study.) Appendix B provides a number of statistics for each sentence. The category agreement index is a chi-square statistic that can be used with one degree of freedom to determine additional selection restrictions. The assigned value column was determined by the mode value agreement for each sentence. For comparison, some of Set I (sentences 121-240) statistics are given in Table 1 together with those obtained in the previous study (sentences 1-120). The comparison indicates that the two sets can be combined into a homogeneous sentence pool of 240 sentences.

Insert Table 1 about here

Applications

How are these sentences put into use? There are two aspects that will be briefly outlined below: (a) combining sentences into more complex semantic entities--texts, and (b) incorporating sentence properties with other task parameters.

A variety of text types need to be generated. Sometimes texts consist of information on all six market categories, defined above. For other tasks only a category subset is used. We may want to impose constraints on the information sequence in a text, and so on. Empirical text construction is too tedious. Instead, we would like to generate texts out of sentence lists, while imposing certain generation constraints.

We hve formulated in Kozminsky (Note 3) a theoretical basis for this problem. Instead of devising a broad model for writing which includes many components, such as the generation, organization, translation and reviewing (e.g., Flower & Hayes, Note 4), the problem we address can be restricted to the components of organization and translation. The simplification of the text generation problem is achieved here by postulating a knowledge structure and a generation process used with these two components and then defining a set of production rules that translate the sentenial input into a coherent text. The knowledge structure--a schema--consists of a set of causal relations among market categories. When these relations are tested with the sentence input they can be realized as a set of natural connectives between sentences of the set. Sequential constraints are also controlled by the schema and a generation goal structure.

It is possible to use the sentence properties derived in this work to compute some performance limits and other text constraints on search and decision tasks. Consider the rule acquisition task in Kozminsky, Kintsch, Coren and Bourne (Note 2) in which subjects were asked to discover a conjunctive decision rule to guide stock purchases. One can ask whether subject performance, once the rule was discovered, can be perfect. The obvious answer is no, since there is still some uncertainty in identifying the information required for a correct decision. A performance ceiling can be computed, using sentence statistics, i.e., the probability of correctly identifying the sentence category and correctly evaluating it.

Assume there are three sentences in a text: Growth, Sales and Earnings sentences. For each sentence there are two parameters: the probability of correctly identifying the sentence category, $\underline{c}$, and the probability of correctly evaluating the sentence within some value range, $\underline{v}$. For simplicity assume that there are two value zones, negative (values 1, 2, and 3 on the 5-point scale) and positive (values 4 and 5). Then, if a sentence's value is 4.15 and its value standard deviation is .45, one can compute the probability of determining that the sentence has a value of 3.5 (the value dividing the positive and negative zones) or less. Assuming that these parameters define a normal distribution, the probability is .075 that the sentence will be evaluated to be negative instead of positive.

Let's assume now that the three text sentences have the following parameters: Growth (positive $\underline{c}_1 = .80$, $\underline{v}_1 = .90$); Sales (negative $\underline{c}_2 = .70$, $\underline{v}_2 = .80$); and EArnings (positive, $\underline{c}_3 = .90$, $\underline{v}_3 = .90$). Assume that the subject knows that Growth information is relevant to change in a stock price: If the growth sentences is valued as positive, the stock price goes up; if it is negative the stock price goes down. What is the probability of making the correct decision (price goes up) with this text? The computation is straightforward. The subject has to correctly identify the Growth sentence and correctly evaluate it as positive (.80 x .90 = .72). If the subject fails to identify the Growth sentence (.20), he may still identify one of the other two sentences (incorrectly) as Growth. Assume that this is done in direct proportion to their confusion (.30 + .10 = .40) so that Sales may be identified as Growth with the probability .30/.40 = .75 and Earnings .10/.40 = .25. If sales is identified as growth there is still a chance of evaluating it as negative (.20) so that using the sales sentence as a basis for decision yields a probability of correct response, .75 x .20 = .15. Similarly using Earnings as a decision base yields .25 x .90 = .225 as the 1. probability of correct decision. Multiplying these probabilities with the probability of incorrect Growth sentence identification yields .20x (.225 + .15) = .075 as the current guessing probability. Thus .72 + .075 = .795 will be the probability of a correct decision in this particular case. 2

This example provides an idea of how text uncertainty affects performance in such tasks. Different approaches to the task can yield different results. Thus one can potentially recover some of the strategies used by subjects by considering the error patterns. The sequence of sentences in the texts may provide another constraint for computing expected performance probabilities. Another consideration is subject knowledge about relations among text categories. If a subject knows that Growth and Sales are positively related, then these two information items in the text provide some redundancy, which may be evident from an increase in the correct decision probability compared to a subject that does not know this relation.

Reference Notes

1. Kozminsky, E., Bourne, L. E., Jr. & Kintsch, W. Comprehension and analysis of information in text: I. Construction and evaluation of brief texts. Technical Report No. 82-ONR, Institute for the Study of Intellectual Behavior, University of Colorado, July 1979.
2. Kozminsky, E., Kintsch, W., Coren, P. & Bourne, L. E., Jr. Comprehension and analysis of information in text: II. Decision making with texts. Technical Report No. 89-ONR, Institute for the Study of Intellectual Behavior, December 1979.
3. Kozminsky, E. Schema-based text generation. In preparation.
4. Flower, L. S. & Hayes, J. R. A process model for composition. Document Design Project Technical Report No. 1, Carnegie-Mellon University, August, 1979.

Footnotes

*The authors wish to acknowledge the assistance of Richard Murphy in selecting the material used in the study.

[1]The distribution used for this index was that of obtaining a maximal frequency on one of six possible categories. Conceptually, this is a "post hoc" test of the significance of a selected category compared to the frequencies obtained in the other categories. The properties of this distribution were determined empirically using a Monte Carlo procedure with 1000 samples.

Appendix A

Sentences within each of six information categories for Set I (sentences 121-240), Set II (sentences 241-351), Set III (sentences 352-362)

Table 1

Comparison of Set I Sentences and the 120 Sentences

Selected in Kozminsky, Bourne and Kintsch (Note 1)

Category	Sentences	Percent Category Agreement	Rating Mean	Rating Standard Deviation
General Factors	1-120	98	2.97	.51
	121-240	96	2.99	.45
Capitalization	1-120	92	3.08	.59
	121-240	100	3.00	.44
Growth	1-120	87	3.09	.54
	121-240	90	3.07	.44
Sales	1-120	83	2.87	.48
	121-240	88	2.95	.38
Earnings	1-120	80	3.09	.43
	121-240	84	2.96	.58
Dividends	1-120	99	3.06	.47
	121-240	99	2.98	.47
Total	1-120	90	3.03	.50
	121-240	93	2.99	.46

GENERAL FACTORS

121 World economic outlook is more favorable than in any time in the recent past.

122 A constructive set of fundamentals relating to the future course of the economy tends to be overly shaded.

123 The Senate Banking Committee said today that the Federal Reserve Board's tight money policies conflict with the Administration's effort to improve the economy and would lead to a slowdown.

124 The imbalance of payments which has plagued the economy for the last 18 months has been solved by decreasing all imports and increasing general exports.

125 The money supply spurted by $1 billion for the past week after displaying an essentially flat trend over the past few months.

126 Federal budget deficit is currently running at a $50 billion clip with no chance of improvement.

127 If the stock market were selling at the average dividend multiple of the past quarter century, its price would be 50% higher than today's.

128 We can foresee only a golden age for the economy.

129 Unemployment rate inched lower to 5.1%, a 2% reduction in the last six months.

130 The Dow Jones tacked on 11 points in the past week and is up 17% for the year as a whole.

131 The current Federal budget deficit prospect is $51 billion. A deficit of less than $51 billion is needed if the administration hopes to avoid fueling inflation.

132 The continuing problem with the U.S. currency is seriously endangering the economy.

133 Search for a new company Federal Reserve Board chairman has been fruitless to date which may damage the economy.

134 Savings rate hit an all time low this year.

135 It can be said that inflation and unemployment are finally under control confirming predictions for excellent economic trends.

136 The economy is on an upward trend with the Dow Jones moving up 30 points last week alone, adding 100 points in the last month.

137 The Dow Jones gave up 40 points last week, almost a 40 billion dollar loss to investors.

138 This was an average year for the economy.

139 The stock market gained ground despite news that consumer prices climbed at a 2 digit pace last month. The Labor Department reported that the consumer price index climbed 0.9% in April, equal to a 10.8% annual rate.

140 Americans today save or invest about 5-7% of their income. In Japan the figure is 22%. This low investment rate may have a negative effect on the economy in the long run.

CAPITALIZATION

141 ECTEX plans to announce changes in its financial structure.

142 Non-earning investments continued to increase during the second quarter and this trend is expected to continue, reducing available capital.

143 Severe cash flow problems were reported in the last Board meeting.

144 Recent sales provided ECTEX with all its cash demands so borrowing will not be necessary.

145 The company has accumulated enough cash from earnings to fulfill anticipated requirements.

146 The company can borrow $10,000,000 on a short term basis at prime.

147 The company's useable capital is at an all time high due to its low debt requirements and excellent credit rating.

148 An early recall of recently acquired loans has put ECTEX in a deep hole.

149 Accelerated advertisement costs have had an adverse effect on the already shaky ECTEX capital structure.

150 Company indicated that a new $5,000,000 is necessary.

151 Increased debt to capital ratio severely reduced ECTEX cash position.

152 ECTEX repaid all its short-term loans, vastly improving its position.

153 The company's financial position is less than satisfactory, calling for restructuring the Finance Department.

154 ECTEX has an excellent cash position.

155 Capital assets are thinly stretched between the new plant development and cash flow requirements.

156 A quick solution to the high debt to capital ratio was discussed in the last Board meeting.

157 Capital expenditure by ECTEX this year is estimated at $100,000,000.

158 Last week banks increased ECTEX's credit rating to the highest possible level.

159 In a good move, ECTEX accelerated its capital expenditure this year to be in pace with its competitotrs.

160 ECTEX credit rating is only average for the industry.

GROWTH

161 The competitive environment has become more intense and this should slow company growth.

162 Technological developments are driving communications and computers closer together.

163 Introduction of a new mini-computer and continued increased sales in existing markets lead to a rosy picture for future company growth.

164 Company growth is not expected to fluctuate significantly over the next several years.

165 The untimely growth of a major competitor has drastically diminished ECTEX's own growth potential.

166 The company has completely exhausted its potential for growth in its European division.

167 The company is redirecting its expansion efforts to emphasize profitable lines and better selling items.

168 AT&T and the computer industry encroaching on each other's domain should result in increased competition and debilitating pressure on the growth of the company.

169 Most current estimates of the industry's expansion to be expected over the next 10 years fall within the 5-10% range.

170 Due to unexpectedly strong foreign competition, previous predictions concerning the growth of the company over the next few years will have to be revised downward somewhat.

171 The company is encountering devastating production bottlenecks.

172 The company is facing an unprecedented reduction in production due to the loss of nearly half of its overseas markets.

173 Minicomputer manufacturers in general have broken open new markets for digital processors.

174 The company has made excellent progress in relieving capacity constraint problems.

175 The company has discovered a tremendous untapped market for its minicomputers and is taking immediate action to step up the manufacture of these products.

176 Scarcity of raw materials has recently been slowing the otherwise healthy pace of company expansion.

177 In order to stimulate growth, management instituted new corporate planning and management development systems in the early 1970's which are showing notable results now.

178 The market for test and measurements (T&M) instruments and minicomputers is expected to increase an impressive 15% compounded yearly for at least the next 10 years.

179 The growth of the minicomputer sector remains highly cyclical and competitive.

180 Worldwide demand for the company's products is expected to expand at a 25% annual rate through the next two years.

SALES

181 Cosmetic improvements in product design have led to unlooked-for success in domestic markets.

182 The company now sells more calculators than its 3 largest competitors combined.

183 New product areas are adding modestly to current sales.

184 Worldwide demand for the company's product is expected to expand company sales at a 25% annual rate through the next two years.

185 The company's new contract with China will result in an unprecedented 5 fold increase in sales over the next 2 years.

186 Cutbacks in the sales force will have an adverse effect on company sales.

187 New products introduced last year have only slightly strengthened the company's sales base.

188 Broadening of the product line should lead to increased sales.

189 The recent successful ad campaign has led to substantial sales gains.

190 Reduction in our sales force has had a terrible effect on retail sales.

191 Minicomputer manufacturers in general have broken open new markets for sales of digital processors, which should benefit the sales of the company.

192 The company lost 2 major customers last quarter.

193 Leading competitor has significantly lowered price on hand-held calculators, cutting into ECTEX retail sales.

194 Company sales performance for the last quarter improved only slightly over the very disappointing previous quarter.

195 Sales continue to plummet and there are no hopeful signs for the near future.

196 Company sales have followed the fluctuations of the market.

197 The effect of the company's extensive ad campaign has been trivial.

198 ECTEX's sales division is the least effective, least efficient sales division in the industry.

199 Because the company lacks the diversity of its 2 major competitors, recent saturation of the calculator market has hurt its sales somewhat more than those of its competitors.

200 Expanding foreign sales have been offset by declining domestic sales.

EARNINGS

201 We are raising our earnings estimate for the full year from $4.75 to $5.05 per share.

202 The company is showing only a moderate increase in earnings.

203 Upward earnings momentum continues very strong.

204 Large government contracts have not changed ECTEX's moderate earning outlook.

205 Efficient cost controls and sophisticated operations systems have allowed company to enjoy pre-tax profit margins of 30%.

206 The company has made major advances in improving its already healthy profitability.

207 Earnings have followed right along with the recent dramatic rise in demand.

208 ECTEX's reported earnings have shrunk this quarter.

209 New computer-game line moderated a predicted profit gain.

210 The company declared an earning gain unparalleled in its history.

211 Competitor advanced new products completely halted company's profitability this quarter, and could lead to substantial losses in the next quarter.

212 Over the next several years earnings can grow at an 8-10% rate.

213 We are revising our earnings estimate from a very good $4.50 a share to a respectable $4.00.

214 Company earnings declined in the last 2 quarters of last year.

215 New computer leasing program announced by leading competitor is responsible for a sluggish earning report.

216 Because the new product will hit the market only next year, ECTEX can show only a tardy earning growth until that time.

217 A potential moderate profit this year turned out to be a significant loss due to an accelerated increase in production costs.

218 Unpredictable relocation expenses put company earnings deep in the red.

219 A strong earning decline is forecasted for the next two years.

220 Projected leveling of earnings in the industry may be indicative of ECTEX earnings trend.

DIVIDENDS

221 Dividends are $0.70, a hefty 50% increase over the last year.

222 The company almost declared a negatively paid dividend.

223 In view of the last few years dividend history, ECTEX declared dividend is reasonable.

224 Dividends are reasonably comparable with the market.

225 Given the current industry trend, excellent dividend growth can be expected in the near future.

226 Dividends are not keeping pace with stock book value.

227 We revise our dividend estimate upward, again, adding 30% to it.

228 Dividend went down from $0.50 to $0.30 and may be dropped altogether next quarter.

229 The $0.50 dividend declared by the Directors is twice as much as our expectation.

230 Dividends were not paid last quarter and they will be skipped again in the next.

231 Although a steady dividend of $1.20 per share can be expected in the near future, the payout ratio may decline.

232 Company dividend yield is normal for the industry.

233 Directors recently decreased their quarterly dividend from $2.88 to $2.25 a share and one can expect a further dividend decrease before year end.

234 The company recently announced a 3-for-2 stock split and an increase in the cash dividend to $0.17 per share on the new stock which works out to $1.02 per share on the old stock compared to $0.80 per share previously; the stock has sold recently between $40-50 per share.

235 A 3 for 2 stock split has been proposed and the dividend rate will remain the same.

236 A significant dividend cut is inevitable.

237 Comparing with competitors, ECTEX dividends are below average.

238 The company pays out a healthy percentage of earnings in dividends.

239 Directors will meet next month and there is speculation about a stock split of 3 for 1.

240 The paltry $0.02 declared dividend per share is a far cry from the previously paid $0.35 one.

GENERAL FACTORS

241 Accords reached between Bonn and Washington to defend the dollar can only be viewed as analogous to affixing a band-aid to a gaping wound.

242 Short and long term economic forecasts must be extremely optimistic.

243 World wide political instability may have a devastating effect on the U.S. economy.

244 The recent election shakeup will be proven to have a positive effect on the economy.

245 Reduction of oil dependence due to the large Eastern shore discovery considerably brightened the economic outlook for a boom economy in the near future.

246 Many economists believe that a deep recession is very likely.

247 A $2.1 billion bulge in the weekly money supply figures led to speculation that the Federal Reserve Board might push domestic interest rates a notch higher to control the money supply growth rate as well as lean against the flareup of inflation in recent months.

248 Unemployment continues to decrease at a strong pace in the recent month, another very good sign for the strengthening economy.

249 If the housing industry is an indicator this year, it is going to be a boom year.

250 The dollar gained a significant amount of ground on the European market accompanied by sharp gold price reductions.

251 This month marks the fifth consecutive decline of the economy leading indicators; a certain strong recessional trend.

252 The Federal Reserve Board is attempting to control monetary growth which can lead to a moderate recession.

253 A majority of economists believe recent moves by government will finally solve the inflation problem.

254 The monthly trade deficit amounted to $2.03 billion and will continue to increase.

255 Unless history means nothing, stock market investors will eventually pay closer attention to the longer run prospects for business. In that kind of environment the focus will shift to earnings and their growth.

256 Equity market activity bucked a general sinking trend.

257 The economy has been growing modestly for the first half of the year.

258 At current yields and price/earnings ratios equities offer unusual values.

259 Deregulation legislature should have a strong positive impact on the industry in general and will lead to a sustained economic growth.

260 There is a downward pressure on margins.

261 Minicomputer manufacturers in general have already saturated the new market for digital processors.

CAPITALIZATION

262 Working capital declined by $5 million reflecting costs of starting up a new factory.

263 Nearly three fourths of this year's capital spending by the company will be financed from internally generated funds.

264 Nearly 3/4 of this year's capital spending will have to be financed by borrowing.

265 Next year capital expenditure will be financed in part by borrowing.

266 Capital spending for modernization is estimated at $12.5 billion, about $1 billion more than last year's outlays.

267 The balance sheet indicates a surge in ECTEX's assets and this trend is expected to continue.

268 ECTEX was forced to borrow again this quarter to refinance its new plant expansion reducing its credit rating.

269 Increased insurance rates continue pressures on ECTEX capital requirements.

270 The company's financial plan is excellent.

271 The challenge facing ECTEX management in the coming years is the successful investment of its excess funds, which in ten years could amount to over $400 million.

272 Non-earning capital investments continued to decline during the second quarter and this trend is expected to continue.

273 A seemingly innocent plant safety incident turned out to be a financial nightmare, requiring a large expenditure to correct the problem.

274 Credit tightening and a large proportion of short-term loans with high interest rates are sources of increased concern to the company.

275 Company capital reserves may not be enough to overcome a period of unstable market situation.

276 Company capital structure is a continued worry in financial analysts circle.

277 All new calculator developments will be completely financed by internal resources.

278 A price rate decrease has brightened ECTEX's financial outlook.

279 On August 1, 1978 the company intends to sell or close one of its plants that has been operating at a loss for several years. The one-time charge would be $650,000. The yearly loss has been approximately $250,000.

GROWTH

280 The company is falling hopelessly behind the competition in innovation and the development of new products.

281 The company is expected to continue expanding but very moderately.

282 The company is still depending on old product areas for what little growth it plans for the next few years.

283 Company growth has slowed to less than 2% and it is very likely that it will cease altogether.

284 Due to the great strides being made in research and development, the company is planning to take the market by storm with an entire new line of small, but very powerful, minicomputers.

285 The company's strong position in promising markets should lead to increased growth.

286 The company's weak position in important, opening markets should lead to a steep drop in growth over the next few years.

287 The company has a growing position in the industry.

288 Output will increase from 50% to 75% by the early 1980's.

289 The company hasn't opened a new market or brought out an original product in 4 years.

290 Due to prohibitive start-up costs and labor problems, the opening of the company's second overseas production plant has been postponed indefinitely.

291 The company is the most diversified in the industry and should continue to grow under generally good economic conditions.

292 The proposed merger with XYZ has fallen through unexpectedly.

293 New products have contributed nothing to the company's currently poor position in the industry.

294 Manufacture of test and measurement instruments and minicomputers is advancing strongly.

295 The company has lost the rights to two important patents, enabling competitors to make very serious advances into what has been up until now its most secure markets.

296 The acquisition of XYZ as a wholly owned subsidiary is expected to decrease the company's earnings by $0.08 per share to $4.52.

297 Company shares offer investors a sound medium for participation in the current growth taking place in the industry.

298 The company has recently offset the building of one new manufacturing plant with the closing down of an older one.

299 The company will continue to advertize in order to maintain its position in the domestic market.

300 The company's new product has been a dismal failure in the marketplace.

301 The company's position in the marketplace has stabilized.

SALES

302 AT&T has recently ordered 5 of ECTEX's new large scale model 3033 processors.

303 Introduction of a new minicomputer and continued increased sales in existing market lead to a very rosy sales picture for the company.

304 The company has switched advertizing firms due to the meager sales performance during the 1st 2 quarters.

305 Company sales of test and measurement instruments and minicomputers are advancing strongly.

306 Company sales could fall to $100 million down $10 million from last year.

307 The company's new product is showing a huge sales volume.

308 Due to very effective foreign boycotts of company's products, sales have fallen to one-half what they were only one year ago.

309 The lack of any new, innovative products is chiefely to blame for ECTEX's worst sales record in its history.

310 Management expects a striking sales increase of over 50% this fiscal year versus previous predictions of 10-20%.

311 Due in part by its enthusiastic reception by Consumer Reports magazine, orders for the company's recently introduced XK minicomputer have skyrocketed.

312 In response to a very healthy demand overseas, the sales force will be increased by 20%.

313 As a result of its extremely poor public image, the company has failed to move even half of its inventory.

314 In just 4 years ECTEX has moved up from fourth place in total sales among its competitors to first place.

315 The company's recent expensive advertizing campaign has not succeeded in even denting the competitions iron-clad grasp on the hand-held calculator market.

316 The company has not made any significant gains in the marketplace.

EARNINGS

317 Increased transportation costs contributed to a marginal earning profile.

318 Company's earnings are very unsatisfactory compared to the other giants in the industry.

319 Earnings in the third quarter were ahead of those a year ago by a whopping 50%.

320 Foreign operations have shown remarkable profit earlier than anticipated.

321 Earnings have exceeded previous forecasts for the fourth straight year.

322 Pre-tax profit margin jumped sharply due to margin on incremental volume.

323 Increased interest rates on new loans sharply reduced company's reported earnings per share.

324 Workers unrest over new proposed contract could modify earning picture in the next quarter.

325 The company can achieve an excellent early profitability due to the propensity of new customers to purchase large computers rather than rent them.

326 Estimated earnings are $4.60 a share versus $3.60 a share last year, reflecting the company's outstanding progress in relieving capacity restraint problems.

327 There is considerable pressure on profitability in the domestic hand-held calculator operation.

328 We estimate this year's earnings at $20.50 to $20.70 per share up some 12-13% over the splendid showing last year.

329 Presently at $6.60, revised earnings estimates may be exaggerated.

330 Heavy start up expenses for new series "E" hand-held calculator should put heavy load on profits.

331 Industry revenues grew 15.5% while ECTEX revenues were up 13.7%.

332 Disappointing performance of **the** new series 'D' printers put ECTEX in the red.

DIVIDENDS

333 Dividend payout has grown appreciably in the past 2 years.

334 We doubt the company dividend can outperform the market over the near term.

335 If dividend payout ratio remains the same we can certainly double our dividend estimate.

336 A stock dividend increase of over 50% is a strong possibility.

337 Dividend growth will remain normal over the next several years.

338 Dividend yield this quarter is unprecedented.

339 The dividend was not raised at the last company meeting and dividends may decrease over the next several years.

340 Dividends are 5% or better.

341 Poor pricing policy may contribute to a slight dividends decline.

342 The dividend has been increased slightly and remains attractive.

343 Stock offers a 5.3% dividend yield.

344 Dividend payout ratio in the last several years has been very disappointing to investors.

345 Investors can expect a very significant and attractive dividend growth in the next 10 years.

346 Poor investment policy is responsible for a continuous dividend reduction.

347 Conservatism on the Board of Directors is responsible for the drastic 50% dividend reduction.

348 A very modest dividend increase of 2% can be expected.

349 The dividend, slightly above the industry average, appears undervalued.

350 Although dividend was recently raised to $0.70 a share, we expect significant dividend growth over the next several years.

351 Dividend growth will continue to reflect the company's healthy position in the industry.

Category Ambiguous

352 Return on operating equity should approximate 15% this year.

353 Stock sells at 9.6 times this year's earnings projections and is regarded as undervalued.

354 Return on company assets should approximate 15% this year.

355 The acquisition of XYZ as a wholly owned subsidiary is expected to increase the company's earnings by nearly $1.00 per share to $7.52.

356 The company's Board of Directors has asked the retiring President to remain and the contract has been offered for five years.

357 Even a small increase in the prime rate will drastically reduce the company's borrowing power.

358 The effective tax rate should be nearly 65% this year versus only 40% last year because of the rapidly declining significance of tax-free operations in Singapore.

359 Recessional trends may halt company earning gains.

360 Economists expect a steady but very slow rise in the home use of minicomputers.

361 Only one of the company's 2 new products has found a receptive market.

362 The outlook for earnings in the 12% area makes the stock attractive.

Appendix B

Sentence properties by categories for Sets I, II and III: (a) Percent subject agreement on sentence assigned category, (b) category agreement index ($\underline{X}^2(1)$), (c) mean sentence rating, (d) sentence rating standard deviation, (e) discrete value assigned to sentence based on its mode rating.

GENERAL FACTORS

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
121	100	18.90	4.6	.70	5
122	100	18.90	2.9	.32	3
123	90	13.56	1.8	.42	2
124	100	18.90	4.0	.67	4
125	80	9.11	3.7	.95	4
126	100	18.90	1.4	.52	1
127	100	18.90	2.7	.53	3
128	100	18.90	4.8	.42	5
129	100	18.90	4.3	.48	4
130	90	13.56	4.4	.52	4
131	90	13.56	1.7	.48	2
132	100	18.90	1.2	.42	1
133	90	13.56	1.9	.32	2
134	90	13.56	1.4	.52	1
135	100	18.90	4.8	.42	5
136	100	18.90	4.9	.32	5
137	90	13.56	1.1	.32	1
138	100	18.90	3.0	0	3
139	100	18.90	3.3	.67	3
140	100	18.90	2.0	0	2
Mean	96	16.80	2.99	.45	3

GROWTH

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
161	100	18.90	2.3	.48	2
162	60	2.85	3.4	.70	3
163	100	18.90	4.8	.42	5
164	100	18.90	3.0	.47	3
165	100	18.90	1.3	.48	1
166	100	18.90	2.0	.82	2
167	90	13.56	4.1	.51	4
168	100	18.90	1.4	.52	1
169	80	9.11	3.3	.67	3
170	90	13.56	2.1	.32	2
171	80	9.11	1.1	.32	1
172	80	9.11	1.1	.32	1
173	80	9.11	3.9	.57	4
174	90	13.56	4.1	.57	4
175	80	9.11	4.6	.52	5
176	80	9.11	2.1	.32	2
177	90	13.56	4.1	.32	4
178	90	13.56	4.8	.42	5
179	100	18.90	3.0	0	3
180	100	18.90	5.0	0	5
Mean	90	13.82	3.07	.44	3

CAPITALIZATION

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
141	100	18.90	3.0	0	3
142	100	18.90	1.9	.57	2
143	100	18.90	1.1	.32	1
144	100	18.90	4.3	.67	4
145	90	13.56	4.1	.57	4
146	100	18.90	4.0	.82	4
147	100	18.90	5.0	0	5
148	100	18.90	1.0	0	1
149	100	18.90	1.3	.48	1
150	100	18.90	2.2	.63	2
151	100	18.90	1.2	.42	1
152	100	18.90	4.9	.32	5
153	100	18.90	1.6	.52	2
154	100	18.90	4.6	.52	5
155	100	18.90	2.1	.57	2
156	100	18.90	2.7	.95	3
157	100	18.90	3.1	.32	3
158	100	18.90	5.0	0	5
159	100	18.90	4.0	.82	4
160	100	18.90	2.9	.32	3
Mean	100	18.63	3.00	.44	3

SALES

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
181	50	1.05	4.5	.53	4
182	100	18.90	5.0	0	5
183	80	9.11	3.5	.67	4
184	80	9.11	5.0	0	5
185	80	9.11	5.0	0	5
186	90	13.56	1.7	.48	2
187	80	9.11	3.0	.82	3
188	80	9.11	3.5	.53	4
189	100	18.90	4.9	.32	5
190	100	18.90	1.2	.42	1
191	80	9.11	4.1	.32	4
192	80	9.11	1.4	.52	1
193	100	18.90	1.6	.52	2
194	100	18.90	2.6	.84	3
195	100	18.90	1.0	0	1
196	100	18.90	3.0	0	3
197	70	5.54	2.0	.67	2
198	100	18.90	1.1	.32	1
199	90	13.56	1.9	.32	2
200	90	13.56	2.9	.32	3
Mean	88	13.11	2.95	.38	3

EARNINGS

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
201	70	5.54	4.4	.52	4
202	90	13.56	3.5	.53	4
203	90	13.56	4.7	.48	5
204	90	13.56	2.5	.71	3
205	90	13.56	4.4	.52	4
206	80	9.11	4.6	.52	5
207	100	18.90	4.6	.52	5
208	100	18.90	2.0	.82	2
209	60	2.85	3.3	1.16	3
210	100	18.90	4.8	.63	5
211	80	9.11	1.7	.48	2
212	80	9.11	3.8	.92	4
213	60	2.85	2.7	.67	3
214	100	18.90	1.4	.52	1
215	80	9.11	1.9	.32	2
216	70	5.54	2.5	.53	2
217	90	13.56	1.3	.48	1
218	80	9.11	1.1	.32	1
219	100	18.90	1.3	.48	1
220	80	9.11	2.6	.52	3
Mean	84	11.69	2.96	.58	3

DIVIDENDS

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
221	100	18.90	4.7	.48	5
222	100	18.90	1.6	.52	2
223	90	13.56	3.2	.42	3
224	100	18.90	3.1	.32	3
225	100	18.90	4.7	.48	5
226	100	18.90	1.8	.42	2
227	100	18.90	4.9	.32	5
228	100	18.90	1.3	.48	1
229	100	18.90	4.8	.42	5
230	100	18.90	1.3	.68	1
231	100	18.90	2.8	.42	3
232	100	18.90	3.0	0	3
233	100	18.90	1.8	.42	2
234	100	18.90	4.3	.68	4
235	100	18.90	3.8	.63	4
236	100	18.90	1.5	.53	1
237	100	18.90	2.0	0	2
238	100	18.90	4.0	.94	4
239	90	13.56	3.6	.84	4
240	100	18.90	1.3	.48	1
Mean	99	18.37	2.98	.47	3
	93	15.40	2.99	.46	3

GENERAL FACTORS

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
241	100	18.90	1.7	.82	1
242	100	18.90	4.0	1.15	5
243	100	18.90	1.5	.53	1
244	100	18.90	4.1	.57	4
245	100	18.90	4.4	.52	4
246	100	18.90	1.2	.42	1
247	100	18.90	2.1	.74	2
248	100	18.90	4.7	.48	5
249	100	18.90	4.7	.48	5
250	100	18.90	4.4	.52	4
251	100	18.90	1.2	.42	1
252	100	18.90	2.1	.32	2
253	100	18.90	4.3	.82	5
254	90	13.56	1.5	.53	1
255	90	13.56	3.0	0	3
256	80	9.11	3.4	.97	4
257	80	9.11	3.7	.48	4
258	60	2.85	4.0	.82	4
259	60	2.85	4.5	.53	5
260	60	2.85	2.1	.57	2
261	40	.13	2.2	.42	2
Mean	89	14.27	3.09	.58	3.09

CAPITALIZATION

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
262	100	18.90	2.4	.70	3
263	100	18.90	4.3	.82	5
264	100	18.90	1.6	.52	2
265	100	18.90	2.5	.53	2
266	100	18.90	2.5	.71	2
267	100	18.90	4.5	.53	5
268	100	18.90	1.8	.63	2
269	100	18.90	2.0	0	2
270	100	18.90	4.7	.48	5
271	100	18.90	4.0	.82	4
272	90	13.56	3.3	1.16	4
273	90	13.56	1.5	.53	1
274	90	13.56	1.8	.42	2
275	90	13.56	1.8	.42	2
276	90	13.56	1.7	.67	2
277	80	9.11	4.2	.79	4
278	70	5.54	4.3	.48	4
279	60	2.85	3.1	.74	3
Mean	92	15.24	2.90	.61	3.0

GROWTH

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
280	100	18.90	1.1	.32	1
281	100	18.90	3.5	.53	4
282	100	18.90	2.2	.42	2
283	100	18.90	1.3	.48	1
284	100	18.90	4.6	.52	5
285	100	18.90	4.3	.48	4
286	100	18.90	1.1	.32	1
287	90	13.56	4.3	.48	4
288	90	13.56	4.4	.52	4
289	90	13.56	1.5	.53	1
290	90	13.56	1.6	.70	1
291	90	13.56	4.4	.52	4
292	90	13.56	1.8	.79	2
293	80	9.11	1.3	.48	1
294	70	5.54	4.4	.70	5
295	70	5.54	1.4	.52	1
296	60	2.85	2.1	.32	2
297	60	2.85	4.0	.47	4
298	60	2.85	3.1	.32	3
299	50	1.05	3.1	.32	3
300	50	1.05	1.2	.42	1
301	50	1.05	3.2	.42	3
Mean	81	11.1	2.70	.48	2.6

SALES

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
302	100	18.90	4.6	.52	5
303	100	18.90	4.8	.42	5
304	100	18.90	2.4	.70	3
305	100	18.90	4.7	.48	5
306	90	13.56	1.5	.53	1
307	90	13.56	4.8	.42	5
308	90	13.56	1.2	.42	1
309	90	13.56	1.1	.32	1
310	90	13.56	5.0	0	5
311	80	9.11	5.0	0	5
312	70	5.54	4.6	.52	5
313	70	5.54	1.2	.42	1
314	70	5.54	4.9	.32	5
315	70	5.54	1.6	.52	2
316	50	1.05	2.1	.57	2
Mean	84	11.71	3.30	.41	3.4

EARNINGS

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
317	100	18.90	2.3	.48	2
318	100	18.90	1.3	.48	1
319	100	18.90	5.0	0	5
320	90	13.56	4.8	.42	5
321	90	13.56	4.7	.48	5
322	80	9.11	4.2	.79	5
323	80	9.11	1.6	.70	1
324	80	9.11	2.1	.32	2
325	80	9.11	4.4	.52	4
326	70	5.54	4.6	.52	5
327	70	5.54	2.3	.48	2
328	60	2.85	4.9	.32	5
329	60	2.85	2.4	.52	2
330	60	2.85	2.2	1.14	2
331	50	1.05	2.7	.82	2
332	50	1.05	1.4	.52	1
Mean	76	8.87	3.18	.53	3.1

DIVIDENDS

Sentence Number	Percent Category Agreement	Category Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
333	100	18.90	4.3	.95	5
334	100	18.90	2.4	.70	3
335	100	18.90	4.4	.70	5
336	100	18.90	4.5	.71	5
337	100	18.90	3.0	0	3
338	100	18.90	4.3	.95	5
339	100	18.90	2.1	.88	2
340	100	18.90	3.6	.70	3
341	100	18.90	2.0	0	2
342	100	18.90	4.1	.32	4
343	100	18.90	3.3	.48	3
344	100	18.90	1.6	.52	2
345	100	18.90	4.9	.32	5
346	100	18.90	1.5	.52	1
347	100	18.90	1.5	.71	1
348	100	18.90	3.3	.67	3
349	90	13.56	3.4	.70	4
350	80	9.11	4.4	.70	5
351	60	2.85	4.3	.48	4
Mean	96	17.26	3.3	.58	3.4
	86	13.07	3.08	.53	3.1

Category Ambiguous

Sentence Number	Percent Category Agreement	Category* Agreement Index	Rating Mean	Rating Standard Deviation	Assigned Value
352	50 - cap 50 - earn.	1.05 1.05	3.7	.67	4
353	30 - earn. 30 - div.	.09 .09	3.2	1.14	3
354	50 - cap. 50 - earn.	1.05 1.05	4.3	.48	4
355	50 - grow. 50 - earn.	1.05 1.05	4.7	.48	5
356	40 - cap. 40 - grow.	.13 .13	3.0	.47	3
357	50 - G.F. 50 - cap.	1.05 1.05	1.5	.53	1
358	40 - G.F. 40 - cap.	.13 .13	1.6	.52	2
359	50 - G. F. 50 - earn.	1.05 1.05	1.9	.32	2
360	50 - G.F. 50 - grow.	1.05 1.05	3.5	.53	4
361	50 - grow. 50 - sales	1.05 1.05	2.6	.70	2
362	50 - earn. 50 - div.	1.05 1.05	4.6	.52	5
Mean	46	.79	3.15	.58	3.2

*The agreement index for ambiguous categories is not valid and brought here only for table completeness.

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