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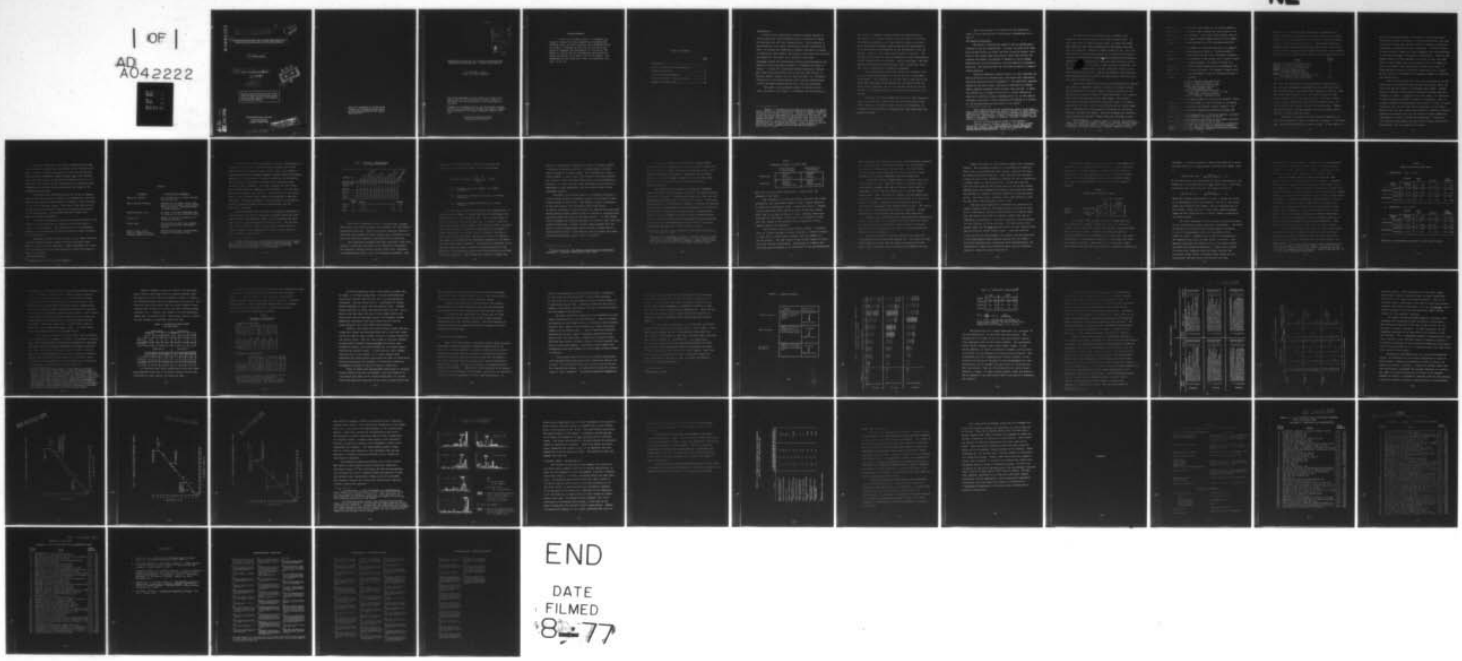

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INFORMATION PROCESSING AND OUTCOME FORECASTING FOR MULTILATERAL NEGOTIATIONS: TESTING ONE APPROACH

William J. Durch

CNA — Professional Paper No. 188

May 1977

58p.

The ideas expressed in this paper are those of the author. The paper does not necessarily represent the views of either the Center for Naval Analyses or the Department of Defense.

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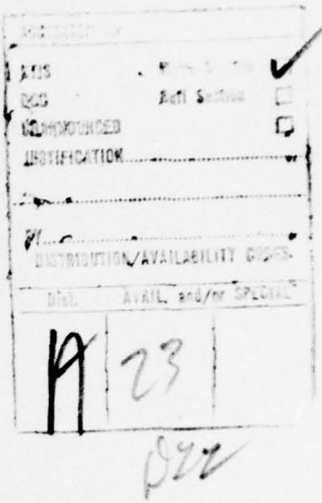
Arlington, Virginia 22209

Prepared for presentation to the 18th Annual Convention of the International Studies Association, Chase-Park Plaza Hotel, St. Louis, Missouri, March 16-20, 1977.



INFORMATION PROCESSING AND OUTCOME FORECASTING FOR MULTILATERAL NEGOTIATIONS: TESTING ONE APPROACH

by William J. Durch
Center for Naval Analyses

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Prepared for presentation to the 18th Annual Convention of the International Studies Association, Chase-Park Plaza Hotel, St. Louis, Missouri, March 16-20, 1977.

ACKNOWLEDGEMENTS

I would like to thank Robert L. Friedheim and Joseph B. Kadane for their suggestions regarding the research design of the reliability tests presented herein; Karen W. Goudreau for her help in setting up the analytic framework and programming for the tests; and Robert B. Mahoney for his considerable methodological advice and review of an early draft of the paper. The responsibility for opinions, errors and omissions, however, is my own.

TABLE OF CONTENTS

INTRODUCTION

Multilateral negotiations generate enormous amounts of written materials, which resemble useful information in about the same way that iron ore resembles steel. The processing of those materials into useful information involves extraction of data, its storage and reduction to summary indicators of trends in bargaining, participants' positions on key issues, and so forth. The purpose of this paper is to evaluate a data base management system for multilateral negotiations developed at the Center for Naval Analyses by Robert L. Friedheim and Joseph B. Kadane.[1] Coupled with forecasting models developed by Kadane, the system was used by CNA's Law of the Sea (LOS) Project to provide analytic support to U.S. Navy and other U.S. government negotiators at the United Nations Law of the Sea negotiations, in both the Seabed Committee and later, the LOS Conference.

The paper will principally report the results of two tests, designed by the author, to determine the reliability of

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[1]Robert L. Friedheim is now associate director for marine policy studies at the Institute for Marine and Coastal Studies, University of Southern California. Joseph B. Kadane is chairman of the statistics department at Carnegie-Mellon University. The author was associated with the LOS project from the end of 1973 through mid-1976. The tests reported here were given in the spring of 1976. For an early exposition of the LOS project's methodology, see Friedheim and Kadane, "Ocean Science in the UN Political Arena," Journal of Maritime Law and Commerce 3, April 1972: 473-502.

the project's thematic content analysis and policy-scaling techniques. The content analysis test was given to two groups of graduate students, one an ocean policy seminar, the other a class on research methods. Both groups had the equivalent of one class period of introduction to the methodology of the LOS project. That is, test coders were minimally "tutored." The results of the tests can thus be considered a worst case approach to the reliability of the project's coding techniques. The best case is represented by within-project coder reliability, which will also be reported for comparative purposes.

The policy-scaling tests were given to a different type of group--substantive experts on Law of the Sea in government and academia. The intention of the test was to both survey the range and consistency of perceptions of LOS issues within the ocean policy community, and to test the sensitivity of the LOS project's forecasting models to differential perceptions of key issues.

The paper will also compare the project's final forecasts (made in the spring of 1975) with the Single Negotiating Text (SNT) issued by the Geneva session of the LOS Conference, as a measure of the validity of forecasts that were made using the project's models.

Before proceeding to the results of the reliability tests, a brief explication of the Project's methodology is in order.[2]

LOS PROJECT METHODOLOGY

The project collected two types of data on states participating in the LOS negotiations: national attribute data drawn from standard reference works[3] and data concerning states' positions on the issues under negotiation, drawn from official UN verbatim and summary transcripts of debates in the UN Seabed Committee and the LOS Conference, and supplemented by diplomatic reporting. The position data was collected by means of thematic content analysis.

Generally speaking, content analysis is "any technique for making inferences by systematically and objectively identifying specified characteristics of messages."[4] The particular approach adopted by the LOS Project involved the extraction of themes--ideas, complete thoughts--from the basic data sources. A theme was defined as a statement of policy on a single negotiating issue by an official country representative, or, in the case of diplomatic reporting, a policy statement attributed to a country or its representative by the author of the report.

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[2]This description of the methodology draws on and summarizes a more complete discussion found in Center for Naval Analyses Research Contribution 291, "Forecasting Outcomes of Multilateral Negotiations: Methodology, Volume I: Techniques and Models," by Robert L. Friedheim, Karen W. Goudreau, William J. Durch, Unclassified, forthcoming.

[3]A list of sources may be found in the appendix.

[4]Ole R. Holsti, "Content Analysis," in Gardner Lindzey and Elliot Aronson, eds., The Handbook of Social Psychology Volume Two: Research Methods, 2nd edition, (Reading, Mass.: Addison-Wesley Publishing Co., 1968), p. 601.

The system used an open-ended list of themes, and separated theme identification from theme categorization. An open-ended list of themes allowed coders to create new themes when they felt that ideas encountered in the source materials were not adequately covered by themes already in use. The open-ended list facilitated the analysis of an evolving negotiation, in which the negotiators themselves were breaking new conceptual ground every year, especially in the late 1960s and early 1970s. For example, concepts like the "common heritage of mankind," the "international seabed area," and the "exclusive economic zone" were unknown ten years ago. Adding new themes as new ideas were encountered allowed the scope of the data base to keep pace with the scope of negotiations.

Separating theme identification from categorization reduced the number of judgments required of coders, who simply scanned source documents for codable remarks (policy statements), and determined the specific theme or themes expressed in the remarks. Every theme was assigned its own code number. When coders encountered remarks expressing a particular theme (for example, support for a 12-mile limit to the territorial sea, theme number 934), they would mark that number in the margin of the source document, opposite the remark. When the document was completely coded and quality-checked,[5] theme codes were recorded on card

[5]A ten percent or greater sample of coding, stratified by issue, was checked by a senior coder, or a project analyst, before a round of coding was added to the data base. Errors found were corrected, and large error rates triggered complete recoding.

layout sheets along with the code number of the country speaking and certain other reference codes, keypunched, and stored on computer tape for later analysis. Using this coding system, the project assembled a data bank of 45,000 observations on 1,500 themes, covering a nine year period from late 1967 through spring 1975.

Assignment of themes to categories was done in a separate process, that of creating policy scales or "issue-variables"--so called because they constitute the basic conceptual framework along which national positions on the issues vary in their values.[6]

To create an issue-variable, all themes relating to a particular policy question under negotiation are aggregated, and then ordered into a policy continuum. For example, themes relating to territorial sea delimitation might be ordered according to breadth of limit proposed.[7]

Support a "narrow" territorial sea
Support a 3-mile territorial sea
Support a 12-mile territorial sea
Support for 12 miles tied to a 200-mile economic zone
Support a 50-mile territorial sea
Each state has a right to delimit its own sovereignty zone unilaterally
Support a 200-mile territorial sea

The sets of ordered themes are then policy spaced.[8] Scale values are assigned each theme in a set according to the degree of substantive difference seen between adjacent themes in the ordered set. The smallest substantive difference between two

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[6]A definition suggested by J. Christian Kessler, currently with Lulejian and Associates, Arlington, Virginia.

[7]This example uses only one-sixth of the themes contained in the delimitation variable used by the project.

[8]The system used by the LOS project generally corresponds to what Torgerson calls the subjective estimates/arrangements method. See Warren S. Torgerson, Theory and Methods of Scaling, (New York: Wiley, 1958), Chapters 1 and 4.

themes X and Y that would have non-trivial consequences for policy (it would in fact matter if Y were written into a treaty instead of X) is represented by a difference of one whole number in the scale values assigned X and Y. Functionally equivalent proposals would be assigned identical scale values, while those seen to differ markedly would be separated by two or more numbers. The above set of ordered themes might be policy spaced as follows:

Theme	Scale Value
Support a "narrow" territorial sea	1
Support a 3-mile territorial sea	1
Support a 12-mile territorial sea	3
Support for 12 miles tied to a 200-mile economic zone	4
Support a 50-mile territorial sea	9
Each state has a right to delimit its own sovereignty zone unilaterally	17
Support a 200-mile territorial sea	20

The first two themes differ insignificantly. Twelve miles is the currently designated replacement for the three-mile limit. Had limits of six or eight miles been included in this set, they would have been scaled at two. The theme expressing conditional support for 12 miles was placed at 4 because countries using it were offering to trade a broad territorial sea (up to 200 miles) for a narrow sea plus an economic zone. Themes expressing support for much broader limits are placed correspondingly further down the scale.

Problems in scaling arise when there are themes in the set whose substantive impact is difficult to assess. In the above set, unilateral delimitation is such a theme. It was placed far

down the scale both because it represents a policy that would allow every country to declare a very broad territorial sea, and because the concept was used as a kind of codeword by countries interested in establishing such broad zones. Thus the placing of such ambiguous themes is in part dependent upon some knowledge of how they were used in the actual negotiations. There is some danger inherent in this approach, of course, in that one might begin to scale themes less on the basis of what the themes say than on the basis of who said them; and that could result in distorted calculations of countries' positions on the issues. We will return to the question of ambiguous themes in evaluating the scaling tests.

Due to that potential for bias, policy spacing on the LOS project was a collegial process, and the final policy scale for each issue was the product of consensus among judges. However, because a process of socialization within the project may have created, in effect, a project bias on some issues, we endeavored to make the scaling process as "public" as possible. That is, whenever possible, decision-makers were asked to review the issue-variables, and indicate where their perceptions of the issues departed from our own. Where they differed in important respects, comparative analyses were run, the results of which showed the consequences, if any, of differing perceptions. In addition, the issue-variables underlying each analysis were reported with the analysis, for the inspection of users.

A country's position on an issue is defined as the mean of its remarks on that issue, as measured on the relevant policy scale. Thus if Australia supported a 12-mile territorial sea once, and gave conditional support another time, its "national score" for territorial sea delimitation would be (3+4)/2 = 3.5. As a mean, this figure can be interpreted as the expected value of Australia's position on the territorial sea, based on its remarks for the record.

Since there are always some countries who do not address some of the issues during a session of the Conference (or during whatever time period is being used for analysis), there are gaps in the sets of national scores. Since one of the goals of the project was forecasting the votes of all eligible participants in the negotiations, those missing data were filled in by means of multiple regression.

A separate regression is run for each issue-variable in the analysis. Each country with a national score constitutes a case in the regression. The national score is the dependent variable, and dichotomized national attribute/interest variables are the predictors.

Countries receive a score of one (1) for those attribute/interest variables whose inclusion criteria they meet, and a score of zero (0) on the remainder. Sample variables (of a total of 33 available for use by the regression routine) are given in table one, below.[9]

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[9] A complete list is given in the appendix.

TABLE 1

Variable	Criterion for inclusion
Major oil producer	Oil production of at least 100,000 barrels per day
Major mineral producer	Accounts for at least 2% of world production of copper, nickel, manganese, or cobalt. (Minerals found in seabed nodules.)
Major merchant fleet	At least 5 million deadweight tons of shipping fly the country's flag.
Group of 77	Member of the UN's "Group of 77" developing nations.
Broad shelf	Countries with wider than average (30 nautical miles) continental shelves.
Africa, Asia, Latin America, Eastern Europe, Western Europe and others	UN political groups. Each country belongs to one and only one.

The regression is forced through the origin, distributing the constant term to a set of variables that represent the United Nations regional caucusing groups (Africa, Asia, Latin America, Eastern Europe, and a residual category, Western Europe and Others). Membership in these groups is mutually exclusive and exhaustive. The regression coefficient for region thus constitutes each country's "base" estimate. Its other interests and attributes act to effect marginal changes in that estimate. Up to 25 variables are allowed in the equation. Those entering in the latter steps of the regression make minimal contributions to variance explained. They are included to allow the model to discriminate as much as possible among countries with similar, but not identical, interests.

The non-standardized regression coefficients generated by each regression are used to calculate estimated scores for every country--those that served as cases in the regression and those that did not (countries without national scores). The estimate for a given country is simply the sum of the coefficients of those variables in the regression for which it has a score of one, as shown in table two.[10]

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[10]The table contains only those variables from the regression to which at least one of the sample countries belong. Thus two regions, Asia and Eastern Europe, are not represented although they were included in the regression.

TABLE 2: CALCULATION OF REGRESSION ESTIMATES
(ISSUE-VARIABLE: TERRITORIAL SEA)

Independent Vars:	Offshore Oil	Major Oil Producer	Maj.Mineral Producer	Landlocked	Broad Shelf	Blue Water Navy	Coastal Navy	Africa	Latin America	W.Europe & Others	U.S. Treaty Ally	OPEC	Mixed Archipelago State
Regression Coeffs:	1.76	-3.2	-2.6	-7.9	-1.5	3.6	2.4	12.6	15.2	6.7	-1.6	-2.1	2.3
Scores on Indep. Variables:													
Australia	1	1	1	0	1	1	0	0	0	1	1	0	0
Botswana	0	0	0	1	0	0	0	1	0	0	0	0	0
Chad	0	0	0	1	0	0	0	1	0	0	0	0	0
Ecuador	1	0	0	0	0	0	1	0	1	0	0	1	1

	National Scores	Estimates		Residuals
Australia	3.5	1.76+(-3.2)+(-2.6)+(-1.5)+3.6+6.7+(-1.6)+2.3	= 5.46	-1.96
Botswana	3.0	(-7.9)+12.6	= 4.7	-1.7
Chad	---	(-7.9)+12.6	= 4.7	-----
Ecuador	19.0	1.76+2.4+15.2+(-2.1)+2.3	= 19.56	-0.56

This use of regression to fill in missing data assumes that states with like attributes and interests will take similar negotiating positions. Thus the procedure generates identical estimates for Botswana and Chad, because their interests in the model are identical--both are landlocked African countries.

Once regression estimates have been generated, final indicators of countries' positions on the issues are calculated. For countries lacking national scores, these final indicators, or "preferred positions," equal the regression estimates. For

countries with national scores, preferred positions are calculated as a weighted average of score and estimate:

$$\text{Preferred Position} = \frac{Y_{ij} N_{ij} + \hat{Y}_{ij}}{N_{ij} + 1}, \text{ where}$$

Y_{ij} = National score for country j on issue-variable i.

$\hat{Y}_{ij}$ = Regression estimate for country j on issue-variable i.

N_{ij} = Number of remarks by country j on issue-variable i.

In calculating preferred positions, the national score is weighted by the number of remarks upon which it was based, and the estimate is given a weight of one. This has the effect of both introducing a "group"influence into a country's position, and correcting for stray remarks. The potential effect of averaging in the estimate is inversely proportional to the number of remarks weighting the national score ("potential" because if score and estimate are close, the effect will be nil, whatever the number of remarks; we are essentially speaking of the effect on states with large residuals). Operationally, averaging in the estimate serves to move a country's preferred position in the direction of the preferred positions of those countries with whom it shares interests. The estimate also serves to cushion the

effect of idiosyncratic remarks which may not reliably reflect a country's negotiating position, a problem when a national score is based on a single remark. This assumes that, given a large residual in such a case, the regression estimate reflects the country's "true" interests better than its own statement of policy; or at least that the final preferred position does so--admittedly a large assumption, but one we have found to give reasonable results.

The median of the distribution of preferred positions on a given issue-variable is generally used as the estimate of most likely outcome on that issue. The median is used in preference to the mean because its calculation gives equal weight to scores, analogous to one-state-one-vote, whereas the mean would assign proportionately greater impact on outcome to countries with positions toward the tails of the distribution. It also consistently minimizes the aggregate movement of countries away from their preferred positions. Finally, voting theory suggests that the median is that outcome against which no other outcome can win, under majority voting -- provided only that all states vote their indicated preferences, and no deals are made.[11]

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[11] See Duncan Black, The Theory of Committees and Elections (Cambridge: Cambridge University Press, 1958).

There are a number of additional forecasting models incorporated in the methodology of the LOS project--among them utility models for single issues and packages of issues; and a program to maximize the number of supporters for any given package of proposals--they go beyond the scope of the tests reported in this paper.[12] We turn now to those tests.

CODING RELIABILITY

The coding test consisted of 12 composite "speeches" drawn from United Nations summary records of the Caracas session of the LOS Conference. Speeches were compiled so that each one addressed three issues and (if possible) no others: territorial sea delimitation, the question of powers to be given the proposed International Seabed Authority, and the question of jurisdiction over scientific research in coastal waters. Countries were chosen so as to represent all five regional caucusing groups, and were stratified according to development status and whether or not they were "geographically disadvantaged."[13] Countries included in the test are listed in table 3, below.

[12] They are, however, fully discussed in CNA Research Contribution 291, chapter three.

[13] The term "disadvantaged" applies to countries that are either landlocked, or shelflocked--unable to claim an offshore area extending beyond the 200-meter isobath. "Advantaged" states have open coastlines and can make more extensive claims.

TABLE 3

COUNTRIES INCLUDED IN CODING TEST

	Geographically disadvantaged	Geographically advantaged
Developing	Bolivia Iraq Trinidad	Ecuador India Nigeria
Developed	Austria Finland Germany, GDR	Canada Japan United States

Each cell in table three constitutes a country type for purposes of this test.

The introduction to the test briefly explained the coding methodology, and then asked readers to code a sample speech as an exercise in learning by doing. Coders were given a codebook listing themes and theme numbers for each of the test issues, which was to be used in coding the test. However, coders were instructed to add themes of their own to the codebook if they felt that themes in the codebook did not adequately reflect remarks found in the speeches.

The test was given to three separate groups: a graduate class in research methods (38 tests returned), a graduate seminar in ocean policy (eight tests returned), and four members of the LOS project. The last served as the control group for evaluating the students' performance. Both groups of students had one class meeting devoted to an explanation of the LOS methodology.

Thus compared to the control group, they were relatively untutored in the methodology. The methods class was not socialized to the norms and perceptions of the project. The ocean policy seminar, however, was taught by the project director, Robert Friedheim, and must be considered partially socialized.

Coders were given a questionnaire to complete after they had finished the test. They were asked to give the amount of time taken to complete the test, to indicate their level of knowledge of law of the sea issues, and to rate the coding instructions. Time (two hours on average) and self-rated level of knowledge (medium) did not vary sufficiently to be useful as control variables. However, the six coders who rated the instructions "inadequate" were dropped from the test. The results given below are thus controlled for sheer confusion. Coders evaluated at least believed they knew what they were doing.

Deriving test results for both experienced and inexperienced coders should enable us to establish the upper and lower bounds of reliability for the project's content analysis techniques. Results for the control group will thus be reported along with those for the test groups.

The test speeches were brief, averaging 22 lines each (the shortest was 13 lines, the longest 27). The order of issues within speeches varied, and the order of countries was such that country types were evenly distributed throughout the test.

Coders were asked to first bracket remarks they considered codable. This procedure allowed us to transform the completed tests into a three dimensional data matrix, countries by coders by theme-cells-within-countries. Each theme-cell was assigned a score of zero or one, depending on whether ot not it represented a codable remark in the original text. Scores were derived from the tests taken by the control group of LOS project coders. Remarks which were bracketed and coded by two or more LOS coders were defined as "codable" and those theme-cells received scores of one. All other cells, including those rated codable by just one LOS coder, were assigned a score of zero.

The tests were evaluated to determine the proportion of codable remarks missed by the student coders (the rate of omission or undercoding) as well as the proportion of remarks coded that the control group did not consider codable (the rate of commission or overcoding). National scores were then calculated for each country, by issue and coder. Differences were taken between these and the base national scores for each country/issue derived from the control group's tests. (The base national score for India on deep seabeds, for example, was the grand mean of all deep seabed themes assigned India by the LOS coders.) While the calculations of differences were straightforward, the calculation of under- and overcoding rates, and the reasoning behind it, requires greater explanation.

The overall results of the coding test can be simply displayed in a 2 x 2 contingency table (table 4). Cell one represents joint agreement--numbers of codable remarks caught by test coders. Cell two represents undercoding--codable remarks missed. Cell three represents overcoding--extraneous themes. Cell four is agreed non-acts, and as such cannot be readily defined.

TABLE 4

CODING TEST CONTINGENCY TABLE

		Test Coders Results: Did code	Test Coders Results: Did not code
Control group results	Should code	1/ 1859	2/ 474
	Should not code	3/ 334	4/

To evaluate these results, one might simply calculate the proportion of remarks in each cell, that is, 70% of all remarks in the table were correctly recognized; 18% were missed; and 13% were extraneous. However, that approach uses an inflated denominator to calculate error proportions. The undercoding score in particular is deflated to the extent that there are overcoding errors. (The reverse is not the case. Fewer undercodings mean greater joint agreement, leaving the denominator

unchanged.) A better approach to undercoding would be to calculate the proportion of valid themes missed by test coders, that is,

$$\text{Undercoding rate} = \frac{\text{cell 2}}{\text{cell 1 + cell 2}} = .20 .$$

By the same token, overcoding would be better represented as the proportion of overcodes among all test coding acts. Since cell 2 constitutes test coder non-acts, the equation would be,

$$\text{Overcoding rate} = \frac{\text{cell 3}}{\text{cell 1 + cell 3}} = .15 .$$

Using the frequency distribution in table 4, above, we arrive at an undercoding rate of 20% (overall, one out of five valid themes was missed by test coders); and an overcoding rate of 15% (overall, about one out of every seven remarks assigned themes by test coders was not, in fact, codable, according to the control group).

The chief advantage of this approach is that both rates can be interpreted as simple probability statements. The chief disadvange for those who prefer single summary statistics, is that it disaggregates error into two measures that cannot be readily combined (due to differing denominators.) The combined error rate, in other words, is not 35%. The measures constitute two distinct cuts at the coding results and should be considered separately. Indeed, more informative than their combined values are their relative distributions across issues and country types (which will be noted below) and what those distributions say about

systematic error in the coding. Compared to the first approach of measuring the proportional distribution of coding results in table 4, the dual approach is relatively conservative, constituting a worst case approach to recognition error.

As noted above, over all issues and countries, test coders averaged 20% undercoding and 15% overcoding. Comparable figures for the control group (LOS project coders) were 15% and 7%, respectively.[14] Coders using the LOS project's content analysis methods might be expected, then, to catch 80-85% of all codable remarks in a given set of documents, and to actually assign themes to codable, as opposed to extraneous remarks 85-93% of the time (see table 5). Note in table 5 that errors of omission are greater than commission for both the test and control groups. Indeed, the difference in rates is more marked in the control group: while still small, omissions are double commissions. This is a persistent problem in thematic analysis, because the units of analysis (themes) have no natural boundaries. Thus coders tend to code too few, rather than too many, remarks.

There is a good deal of variation by issue in both types of error, and a certain amount of variation by country type. Test coders had least difficulty with territorial sea, more difficulty with science, and most with the deep seabeds. The

[14] LOS coders' error rates were calculated using the same evaluation matrix used for the student coders. Thus if two of the four project coders rated a given remark as codable, and two did not, two omission errors resulted. Remarks coded by just one project coder constituted overcoding.

TABLE 5

THEME RECOGNITION ERROR RATES

A. UNDERCODING [.20 (.15)]*

Country types		Issues: Overall scores	Terr. sea	Science	Deep seabeds
		.12 (.04)	.19 (.22)	.27 (.15)	
Developing	Disad.	.25 (.20)	.09 (.08)	.18 (.19)	.36 (.26)
	Advan.	.21 (.11)	.26 (.05)	.06 (.10)	.31 (.17)
Developed	Disad.	.19 (.13)	.03 (0)	.31 (.25)	.07 (0)
	Advan.	.16 (.16)	.0 (0)	.18 (.29)	.22 (.10)

B. OVERCODING [.15 (.07)]*

Country types		Issues: Overall scores	Terr. sea	Science	Deep seabeds
		.03 (.04)	.17 (.07)	.21 (.09)	
Developing	Disad.	.13 (.08)	0 (0)	.18 (.14)	.16 (.05)
	Advan.	.12 (.07)	0 (.05)	.08 (0)	.24 (.05)
Developed	Disad.	.17 (.04)	.11 (.08)	.14 (0)	.26 (.08)
	Advan.	.19 (.11)	0 (0)	.27 (.11)	.20 (.18)

*Numbers in parentheses are scores for the control group.

increasing error rate parallels the increasing technical complexity of the issues. The first is a simple boundary question, and policy statements relating to it are brief and straightforward. Science involves the degree of coastal state jurisdiction over research, while the third question combines the issues of access to seabed resources and powers to be accorded the proposed international seabed minerals agency. While control group undercoding errors are more frequent for the latter two issues than for territorial sea, overcoding remains low for all three. Additional experience, in other words, seems to effectively teach coders what not to code. It also reduces errors of omission, but not to the same degree.

Test results also vary by country type. More accurately, they vary according to whether a country is developed or developing. Test coders tended to miss policy statements by LDCs more frequently than they missed statements by developed countries. They also coded fewer extraneous remarks for LDCs. Overall, then, test coders seemed to devote more attention to speeches by developed countries, coding them more intensively. This differential coding suggests a certain amount of cultural bias in test coders, relative to the control group.[15]

[15]It should be noted that neither of the patterns discussed above (variation in error rate by issue and country type) are as evident when issues and countries are cross-tabulated. Clearly, the relatively small number of countries in the test, allowing only three countries per "type" may permit sufficiently strong interaction effects--due to idiosyncratic structure or style of individual speeches, for example--to masquerade as main effects. For the time being, this problem can only be acknowledged, and the suggestion made that, if country effects are uncertain, issue effects appear to be genuine, confirmed by analysis of differences in national scores below.

Table 6 compares recognition results from the ocean policy seminar with those from the research methods class. The sample size from the policy seminar is small (7 coders), so conclusions drawn from this comparison are tentative. The partially socialized coders from the seminar seemed to have a better idea of what not to code, but had a slightly higher omissions rate. Overall, they tended to be less aggressive coders than the methods class. Both groups, however, exhibit the same tendency to undercode remarks by LDCs.

TABLE 6: RECOGNITION ERROR RATES, BY TEST GROUP

	Undercoding			Overcoding		
	Terr. Sea	Science	Seabeds	Terr. Sea	Science	Seabeds
Policy	.14	.17	.32	.01	.15	.17
Methods	.11	.20	.26	.03	.17	.22

	Undercoding				Overcoding			
	Developing		Developed		Developing		Developed	
	Dis.	Adv.	Dis.	Adv.	Dis.	Adv.	Dis.	Adv.
Policy	.32	.23	.17	.17	.14	.08	.13	.14
Methods	.23	.21	.20	.16	.11	.11	.19	.20

To determine what effect recognition errors and theme misassignments might have on analysis, national scores were calculated for each country, by issue and coder.

Differences between test and base scores were assessed two ways--by absolute mean difference, and by direction of difference (table 7). A difference of 4 scale values or more between a coder's national score and the appropriate "base" was considered a serious error. Such a difference would result in a substantively different interpretation of a country's position on any one of the three test issue-variables.

TABLE 7

DIFFERENCES IN NATIONAL SCORES, TEST CODERS AND LOS CODERS*

A. Absolute Mean Differences

Issues:	Terr. Sea	Science	Seabeds
Mean Difference	.50 (.06)	1.5 (.80)	2.3 (.80)
Percent Serious Difference	2% (0)	10% (0)	18% (0)

Country Types:	LDC Dis.	LDC Adv.	DC Dis.	DC Adv.
Mean Difference	1.0 (.5)	1.6 (.6)	1.3 (.5)	1.4 (.6)
Percent Serious Difference	10%	9%	11%	9%

B. Distribution of Differences**

	All Differences (1 unit or greater)			Serious Differences (4 units or greater)		
	T.S.	Sci.	SB	T.S.	Sci.	SB
All Test Coders	26%	59%	58%	100%	60%	66%
Policy Seminar	26%	56%	66%	100%	0	84%
Methods Class	26%	60%	57%	100%	66%	63%

*LOS project coders' differences, also calculated from the base national scores, are given in parentheses.

**Cell entries are percent of cases in which test coders' national scores were smaller -- more toward the developed state end of the policy scale -- than the base scores.

As with recognition errors, differences in scores vary by issue, in the same issue order. The mean difference for territorial sea was less than one unit, an uninterpretable difference. Serious errors ran 2%. Differences in science scores averaged 1.5 units, with 10% serious error. Seabeds scores were off 2.3 units, and serious errors ran 18%. Still, even in the last case, four out of five coders scores fell within four units of the base scores, an acceptable outcome especially considering that test coders did not know the scale values of any of the themes they assigned.

However, test coders did tend to assign themes that were ranked more toward the developed state end of the three issue-variables (smaller scale values) relative to themes assigned by the control group. That is, they tended to interpret remarks as being more favorable toward narrower territorial seas, freedom of science, and limited powers for the seabed agency, than did LOS project coders. If this does not again suggest cultural bias in test coders, it at least suggests that experience and socialization sensitizes the coder to third world policies and reduces the tendency to reinterpret unfamiliar statements according to familiar frames of reference.

Table 7b shows that interpretable differences in national scores (those of one unit or greater), with the exception of territorial sea, where 10 of 12 base scores were 3.0, tilted toward the developed state end of the scale by about 60% to 40%.

The distribution of serious differences was even more skewed, favoring developed state positions by 2:1. The distribution of differences was about the same for both test groups.

Country type seems not to have affected this process. Developed and developing countries alike were shifted toward the developed state end of the policy scales by test coders.

To summarize the results of the coding test, we found that minimally trained coders can use the content analysis methodology with very reliable results. The chief benefits of increased coder socialization were found in reduction of over-coding and cultural bias.

POLICY SCALING RELIABILITY

Next to the data itself, the policy scales (issue variables) developed to measure countries' negotiating positions on the issues are the most important variables affecting the project's analyses of negotiations and forecasts of negotiating outcomes. Those forecasts are valid only to the extent that the underlying issue-variables reflect reasonably well the way negotiators perceive the issues and the relationships of alternative solutions to one another. Whether the issue-variables do so depends in part on our perceptions of the issues, and in part on the method of scaling we have developed to reify those perceptions. To

test the reasonableness of LOS project analysts' perceptions of the issues and the reliability of the scaling methods, we consulted law of the sea experts outside of CNA by means of a three-issue scaling test. Seventeen tests were sent out to experts in government and academe; ten were returned and constitute the sample evaluated here.

The three issues were chosen to be representative of the scope of negotiations at the LOS Conference. Thus we included the question of deep seabed mining, a navigation issue (straits transit), and a coastal state jurisdiction issue (scientific research in the coastal zone). Twelve themes were selected, representing the full range of proposals tabled during the negotiations, for each issue. Themes were printed on cards. Thus each participant received a deck of 36 cards arranged into three 12-card issue-subsets. Card order within subsets was randomized across participants to avoid primacy-latency effects on ordering.

Participants were given a set of written instructions that explained how policy scales were created and used by the project. The instructions also gave step-by-step procedures for ordering and scaling. All participants rated the instructions at least "adequate." Following Torgerson's suggestion,

the scaling criterion and the policy endpoints for each issue were specified (table 8), as was the origin (a scale value of one).[16] Participants were given the option of rescaling any of the test issues according to a different criterion if they felt the one given in the test was inappropriate. (None did so.) Identical tests were given to three LOS project analysts for purposes of direct comparison with outside test participants' results.

The tests are evaluated here in several ways, proceeding roughly from the micro to the macro level. First, table 9 gives the intercorrelation matrix of standardized test scales for each issue. Correlations of less than .70--pairs where less than half of the variance is accounted for -- are highlighted. In each issue, most of the low correlations are due to a few participants whose perceptions differ considerably from those of LOS analysts and their fellow test participants. These outliers largely account for the lower reliability figures for test participants reported in table 10, where LOS analysts' tests are evaluated separately.

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[16] Torgerson, p. 69.

TABLE 8 : SCALING CRITERIA

	CRITERION	POLICY LIMITS
Straits Transit	degree of restriction imposed on passage of vessels through straits	No restrictions ↓ Straits closed
Deep Seabeds	degree of control over seabed mining to be accorded any new international seabed agency.	No control ↓ Complete control
Scientific Research	degree of coastal state control over research conducted in the coastal zone.	No control ↓ Complete control

TABLE 9 : INTERCORRELATION MATRICES, STANDARDIZED SCALING TESTS, BY ISSUE

		Analysts		Test Participants									
		B	C	1	2	3	4	5	6	7	8	9	10
Seabeds	A	0.93138	0.90514	0.76103	.70680	0.93001	0.94396	0.89067	0.89148	.95292	.35382	.72123	.62819
	B		0.96361	0.66 53	.83429	0.96729	0.97783	0.8 .04	0.95606	.90402	.47940	.68756	0.77 6
	C			0.73893	.80616	0.96157	0.95567	0.07602	0.98302	.93214	.57347	.94431	0.79162
	1				.62059	0.70528	0.73787	0.04103	1.77033	.79299	.54 45	0.79022	0.60374
	2					0.83541	0.80836	0.81940	0.84735	.75222	.74715	0.71925	0.84978
	3						0.95371	0.86495	0.96993	.91717	.87234	0.74261	0.80775
	4							1.94257	0.95481	.95420	.45571	0.7 073	0.78875
	5								0.88271	.89453	.55 00	.773 3	0.73494
	6									.91873	.61 49	0.77774	0.82 14
	7										.77524	0.69377	0.64873
	8											0.72,66	0.819
	9												0.87764
Straits	A	0.92019	0.96009	0.92328	0.87533	0.88485	0.88961	0.46899	.06774	.85670	.12825	.27967	0.75843
	B		0.96219	0.93 86	0.93173	0.79985	0.94891	0.57146	.5633	.93408	0.85255	0.762 2	0.87409
	C			0.95126	0.92995	0.85434	0.94295	0.53716	.00 01	.91573	0.84834	0.-3510	0.83446
	1				.92220	0.79692	0.95565	0.20892	.4609	.M1900	0.48673	0.81568	0.85718
	2					0.78445	0.940 7	0.80618	1.47324	.00087	0.51592	0.74769	0.80058
	3						0.78068	0.45723	0.85144	.M1903	0.58764	0.73747	0.72338
	4							0.61531	0.57612	.89472	0.55115	0.748 5	0.63 69
	5								0.42282	.51129	0.78:.7	0.137 4	0.75251
	6									.87793	0.66180	0.75152	0.88745
	7										0.68441	0.7765	0.79734
	8											0.68564	0.52762
	9												0.80827
Science	A	0.95649	0.95724	0.81569	.80463	0.66064	0.82709	0.70048	0.9553	.42664	0.83167	0.83137	0.79896
	B		0.97759	0.88353	.88845	0.70781	0.89372	0.71989	0.95191	.54422	0.83825	0.87512	0.80254
	C			0.87167	.86404	0.74168	0.89181	0.75199	0.95979	.53951	0.80994	0.397	0.79101
	1				.87399	0.88845	0.83615	0.89208	0.85313	.57143	0.85075	0.93099	0.76065
	2					0.78406	0.87534	0.84934	0.08911	.56652	0.83671	0.91425	0.78437
	3						0.69901	0.93395	0.75104	.67919	0.70761	0.859 1	0.82485
	4							0.88892	0.93452	.06152	0.70542	0.90294	0.70415
	5								1.76409	.52970	0.80979	0.85815	0.88545
	6									.59211	.82745	0.1131	0.71562
	7										.24491	0.727 2	0.773 5
	8											0.8049	0.80420
	9												0.71436

TABLE 10: INTRACLASS CORRELATIONS[a]

	LOS		TEST		
Issue	r_1	r_3	r_1	r_3	r_{10}
Seabeds	.93	.98	.76	.90	.97
Straits	.95	.98	.71	.88	.96
Science	.97	.99	.75	.90	.97

a/ $r_1 = \frac{\overline{cov}}{\overline{var}}$, and $r_k = \frac{kr_1}{1+(k-1)r_1}$.

B. J. Winer, Statistical Principles in Experimental Design, 2nd edition (New York: McGraw-Hill Book Company), pp. 291-296.

The reliability of a single measurement (r_1) averaged .95 for LOS analysts and .74 for other test participants. The reliability of the mean of all ten test participants' results (r_{10}) approaches that of LOS project members. The consistency of the results suggests that a much larger sample of the policy community at large is required to produce a policy scale as reliable as that produced by a highly socialized group. More interesting than this commonsensical finding, however, is the reported reliability of the mean of three measurements for test participants, which averages .89 with almost no variation over the three issues. That is, the reliability of a policy scale based on a sample of three outside experts, while not perfect, can be expected to be sufficiently high to be used as a framework for analysis.

In practice, the project's approach to the problem of differing perceptions has been to rely on a collegial scaling process that takes into account several points of view. To simulate this process in the test, we developed issue-variables for each issue based on the composite test results of LOS analysts and other test participants, respectively. Following Torgerson, the mean scale value assigned to a given theme in the tests (standardized for comparability across participants) was taken as its scale value on the composite issue-variable.[17] The resulting composite scales were then transformed monotonically to produce a scale approximately 25 units in length with an origin of 1. The resulting variables are shown in table 11.

Table 12 gives the results of a comparative analysis of the composite variables, starting with the comparative rank-ordering of themes. The respective Spearman rank-difference correlations (Spearman's rho) are .97 for seabeds, .99 for straits, and .87 for science. Though LOS analysts and test participants differ most on the rank-ordering of science themes, test participants differ least among themselves on that issue, as shown by the standard deviations of ranks within themes, across participants. A standard deviation of +/- 2.0 scale values indicated substantively significant differences of opinion among participants as to the proper ranking of a given theme. Such differences occurred over the ranking of the proposed regime of coastal state consent for "resource-related" research, and over the question of coastal state control over the publication of

[17] Torgerson, p. 71.

TABLE 11: COMPOSITE VARIABLES

	LOS Analysts			Test Participants		
	Scale Value	Theme Title	Theme #	Scale Value	Theme Title	Theme #
Seabeds	1	REGISTRY/FIRST COME FIRST SERVED	711	1	REGISTRY/FIRST COME FIRST SERVED	711
	5	INTL LICENSING SYSTEM	717	4	INTL LICENSING SYSTEM	717
	7	LEASING BASED ON POPULATION AND GNP	783	7	QUOTA UNDER LICENSING SYSTEM IN ISRA AREA	402
	10	QUOTA UNDER LICENSING SYSTEM IN ISRA AREA	402	10	LEASING BASED ON POPULATION AND GNP	783
	11	US BANKING PROPOSAL	1531	12	US BANKING PROPOSAL	1531
	13	MIXED MACHINERY-DIRECT E+E AND LEASE	181	14	MIXED MACHINERY-DIRECT E+E AND LEASE	181
	16	PROCN SYS ISRA CHOICE-PHASE OUT LIC,PHASE IN DIR.....	805	15	SUPRT CONTRACTUAL JV OVER EQUITY PARTICIPATION	1593
	19	ESTABLISH JOINT ENTERPRISES	781	16	ESTABLISH JOINT ENTERPRISES	781
	21	SUPRT CONTRACTUAL JV OVER EQUITY PARTICIPATION	1593	16	PROCN SYS ISRA CHOICE-PHASE OUT LIC,PHASE IN DIR.....	805
	23	LIC INCOMPATBL W/CCM MER,OBSOLETE,PATERNALISTIC	860	17	LIC INCOMPATBL W/CCM MER,OBSOLETE,PATERNALISTIC	860
	24	CONTRACT/JV W/STS,FIRMS- IN TIME DIRECT E+E ONLY.....	839	21	CONTRACT/JV W/STS,FIRMS- IN TIME DIRECT E+E ONLY.....	839
	25	ENTERPRISE SYSTEM	186	25	ENTERPRISE SYSTEM	186
Straits	1	SUPPORT FREE TRANSIT THRU STRAITS	947	1	SUPPORT FREE TRANSIT THRU STRAITS	947
	2	NO MILITARY ACTIVITIES WHILE TRANSITING STRAITS	984	4	NO MILITARY ACTIVITIES WHILE TRANSITING STRAITS	984
	3	CS MAY IMPLEMENT INTL REGS RE POLL IN STRAITS	285	5	SUPPORT FT IF STRAITS 6 MI/LESS EXEMPTED	1117
	7	SUPPORT FT IF STRAITS 6 MI/LESS EXEMPTED	1117	7	CS MAY IMPLEMENT INTL REGS RE POLL IN STRAITS	285
	7	NO FT FOR STRAITS CONNECTING HIGH SEAS AND TS	1214	9	PRIVATELY SYMPATHIZE WITH FREETRANSIT,NOT PUBLIC.....	1264
	10	PRIVATELY SYMPATHIZE WITH FREETRANSIT,NOT PUBLIC.....	1264	11	NO FT FOR STRAITS CONNECTING HIGH SEAS AND TS	1214
	14	OBJECTIVE CRITERIA FOR INNOCENT PASSAGE	158	13	SUBMARINES MUST PASS STRAITS SURFACED	1202
	15	INNOCENT PASSAGE INTL STRAITS NO FREE PASSAGE	954	14	OBJECTIVE CRITERIA FOR INNOCENT PASSAGE	158
	17	PRIOR NOTIFICATION BY WARSHIPS	1179	15	INNOCENT PASSAGE INTL STRAITS NO FREE PASSAGE	954
	19	SUBMARINES MUST PASS STRAITS SURFACED	1202	16	PRIOR NOTIFICATION BY WARSHIPS	1179
	23	PRIOR PERMISSION REQUIRED FOR WARSHIPS	65	20	PRIOR PERMISSION REQUIRED FOR WARSHIPS	65
	25	RIPARIAN STATES EXCL JURISDICTION OVER STRAITS	957	26	RIPARIAN STATES EXCL JURISDICTION OVER STRAITS	957
Science	1	NO CS RESTRICTIONS ON BASIC RESEARCH BEYOND TS	375	1	NO CS RESTRICTIONS ON BASIC RESEARCH BEYOND TS	375
	4	SR IN ECON ZONE COMPLY W/INTL POLL STNDS	1103	4	ACCESS TO INFO IN RETURN FOR FREEDOM OF SCIENCE	338
	5	ACCESS TO INFO IN RETURN FOR FREEDOM OF SCIENCE	338	5	NOTIF TO CS FOR SR IN EZ	388
	8	FOR REASONABLE CS REGS FOR SR IN ECONOMIC ZONE	377	6	SR IN ECON ZONE COMPLY W/INTL POLL STNDS	1103
	9	NOTIF TO CS FOR SR IN EZ	388	13	CS CONSNT,EE RELATED SR IN EZ,BASIC SR FREE	764
	13	CS CONSNT,EE RELATED SR IN EZ,BASIC SR FREE	764	13	CS CONSENT(EZ SR),BUT GIVEN IF CONDITIONS MET	1369
	14	CONSENT FOR EZ SR ASSUMED IN FIXED TIME PERIOD	414	13	CONSENT FOR EZ SR ASSUMED IN FIXED TIME PERIOD	414
	16	CS CONSENT(EZ SR),BUT GIVEN IF CONDITIONS MET	1369	16	FOR REASONABLE CS REGS FOR SR IN ECONOMIC ZONE	377
	22	SCIENTIFIC RESEARCH W/CONSENT OF COASTAL STATE	302	19	FAILURE TO REPLY INDIC CS REFUSAL OF SR REQUEST	771
	22	COASTAL STATES HAVE RIGHT TO CONTROL RESEARCH	314	24	SCIENTIFIC RESEARCH W/CONSENT OF COASTAL STATE	302
	23	FAILURE TO REPLY INDIC CS REFUSAL OF SR REQUEST	771	26	COASTAL STATES HAVE RIGHT TO CONTROL RESEARCH	314
	26	CS RT TO SUPPRESS SR DATA/CONTROL PUBLICATION	203	26	CS RT TO SUPPRESS SR DATA/CONTROL PUBLICATION	203

TABLE 12

COMPARISON OF COMPOSITE VARIABLES, SCALING TEST

	Theme	Composite rank ordering of themes: LOS (X)	TEST (Y)	Rho	σ Ranks, within theme	Composite issue-variables (policy-spaced), regressions with residuals	
Seabeds	711	1	1		.2	-1.2	
	717	2	2		.5	-1.4	$\hat{Y}$=1.4+.81X
	783	3	4		2.1 a	2.9 a	
	402	4	3		.8	-2.5	r^2=.89
	1531	5	5	.97	2.4 a	1.7	r=.94
	181	6	6		2.1 a	2.1	
	805	7	8.5		1.4	1.5	
	781	8	8.5		1.3	-.8	
	1593	9	7		2.0 a	-3.4 a	
	860	10	10		3.1 a	-3.0 a	
	839	11	11		.7	.2	
	186	12	12		.3	3.4 a	
Straits	947	1	1		.2	-1.7	$\hat{Y}$=1.9+.83X
	984	2	2		1.6	.5	
	205	3	3		1.0	2.7	r^2=.89
	1117	4	4.5		1.3	-2.7	r=.94
	1214	5	4.5		2.8 a	3.3 a	
	1264	6	6		3.2 a	-1.2	
	158	7	7	.99	2.5 a	.5	
	954	8	8		2.3 a	-.1	
	1202	9	10		1.7	-3.8 a	
	1179	10	9		1.3	.03	
	65	11	11		1.4	-1.0	
	957	12	12		1.3	3.4 a	
Science	375	1	1		1.0	-.8	
	1103	2	4		1.3	1.4	
	338	3	2		1.3	-1.6	$\hat{Y}$=.8+.96X
	377	4	8		1.5	7.5 a	r^2=.85
	388	5	3		1.1	-4.4 a	r=.92
	764	6	6	.87	2.4 a	-.3	
	414	7	6		1.4	-1.2	
	1369	8	6		1.0	-3.2	
	302	9.5	10		1.0	2.1	
	314	9.5	11.5		1.3	4.1 a	
	771	11	9		1.2	-3.9 a	
	203	12	11.5		2.5 a	.3	

[a] Substantively significant differences

research results. With the exception of the latter theme, participants tended to disagree least on themes ranked near either end of the respective composite scales. That is, as one might expect, participants were able to place more extreme proposals with greater consistency. Even so, on average, participants' rankings of even the more ambiguous themes tracked closely with LOS analysts' rankings.

To compare the policy-spaced composite variables, test variables were regressed on their LOS project counterparts. The results are reported in the last column of table 12, and plotted in figures 1 through 3. In each regression, the LOS composite accounted for at least 85% of the variance in the test variable. Thus, independent measures of perceptions for each issue, drawing on two different groups of substantive experts -- one heavily socialized in the particular methodology being tested and one not socialized at all -- produced results that were strikingly similar across groups.

Because the regressions were run using non-standardized scales, the residuals can be directly interpreted in terms of scale values. Themes with residuals of three or greater are labeled in figures 1 through 3. A positive residual means that test participants considered the proposal embodied in a particular theme to be more restrictive (of access to the seabeds; freedom of transit; or freedom of research) than did LOS analysts. A negative residual indicates a less restrictive interpretation.

FIG. 1: COMPOSITE VARIABLES REGRESSION: SEABEDS

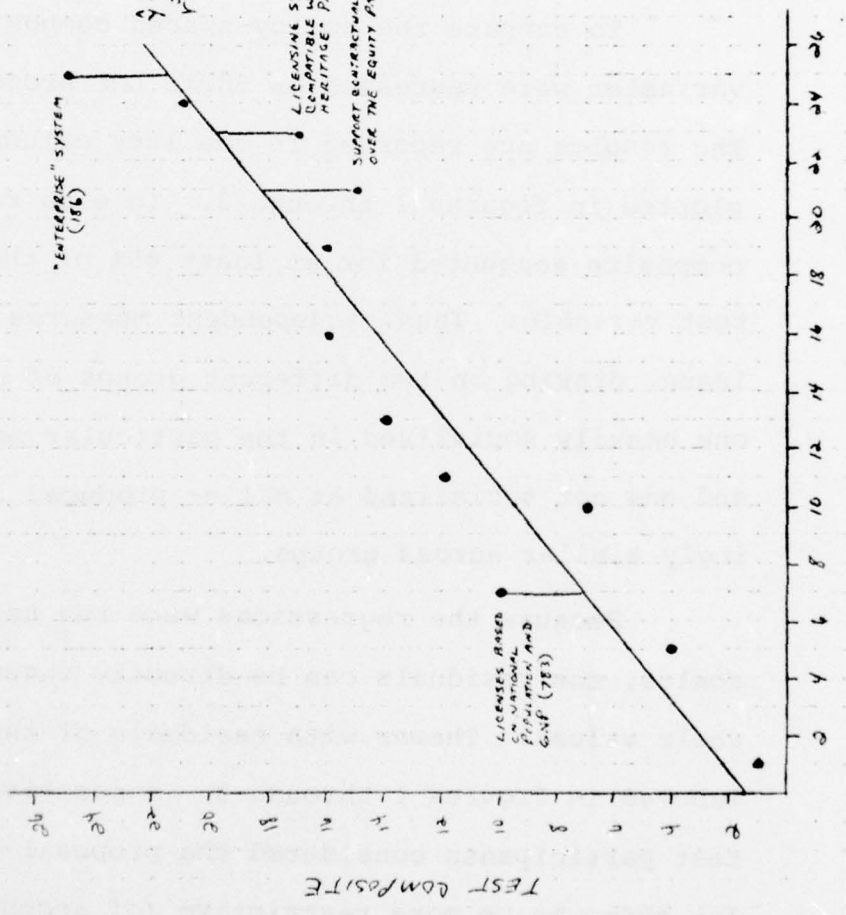


FIG. 2: COMPOSITE VARIABLES REGRESSION: STRAITS

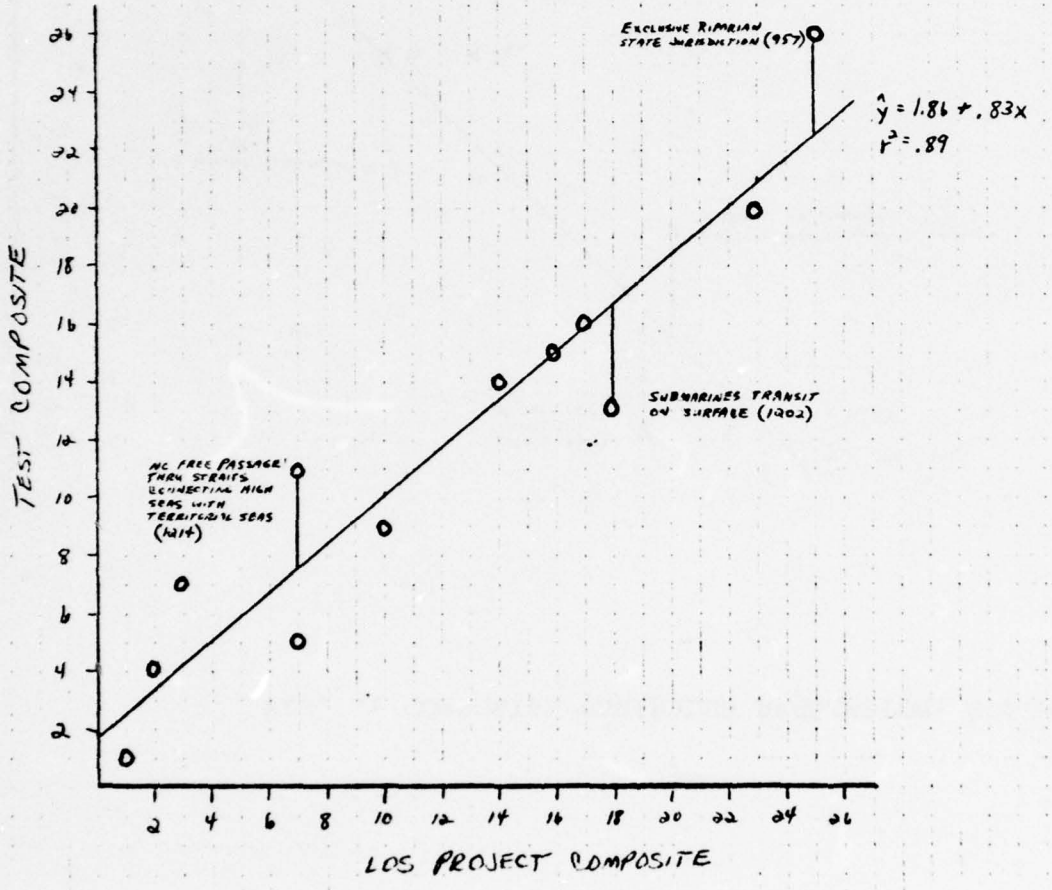
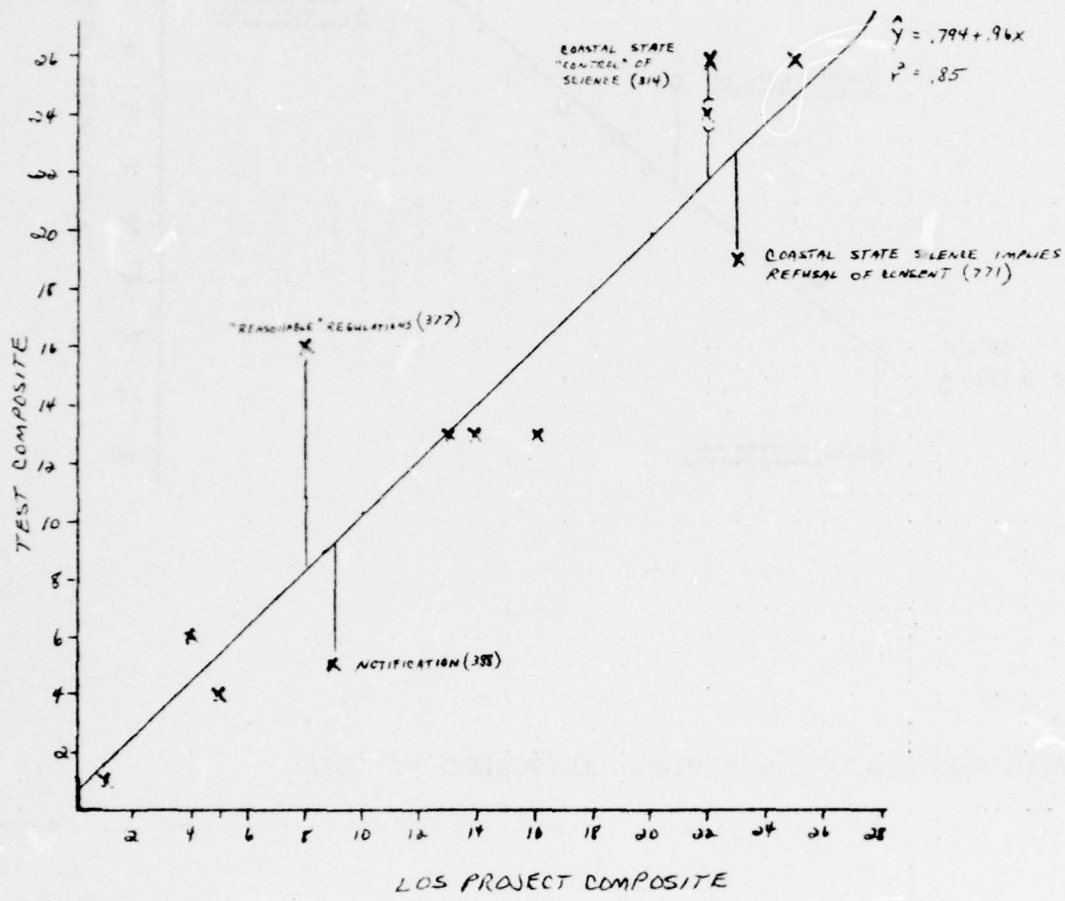


FIG. 3: COMPOSITE VARIABLES REGRESSION: SCIENCE



High positive residuals tended to be associated with "umbrella" proposals that seem to leave operational discretion to the coastal state (or in the case of the deep seabeds, to the international agency). Thus, more restrictive interpretations were given the"Enterprise" system, "exclusive riparian state jurisdiction" over straits transit, "coastal state control" over scientific research, as well as a proposal for "reasonable" coastal state regulations for research. Test participants tended to take more of a worst-case approach to such proposals than did LOS analysts. A similarly consistent pattern is not evident for high negative residuals.

The respective composites produce very similar results when used to create distributions of countries' preferred positions (figure 4).[18] The issue where LOS and test perceptions vary the most--scientific research--shows distributions of data and estimates that nevertheless closely parallel one another. The respective medians for science are substantively identical (coastal consent for research).

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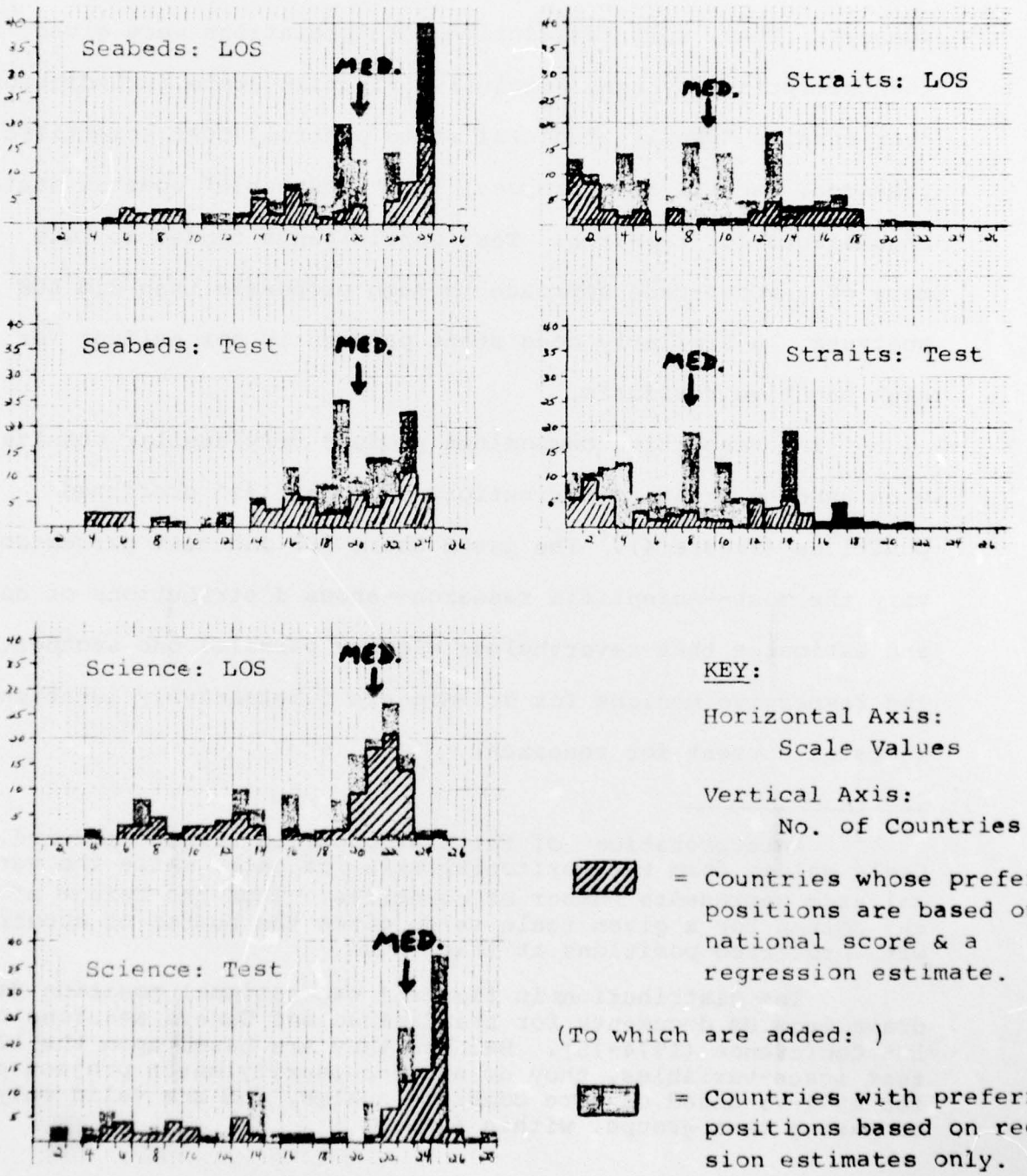
[18] Interpretation of the histograms is straightforward. Scale values form the horizontal axis for each, while the vertical axis represents number of countries. Thus the height of the column for a given scale value gives the number of countries with preferred positions at that value.

The distributions in figure 4 use national position data drawn from UN documents for the Caracas and Geneva sessions of the LOS Conference (1974-75). Because they are based upon the 12-theme test issue-variables, they do not necessarily match project analyses for 1974-75 based on more complete scales, and are valid only for comparing test groups, within issues.

FIG. 4: COMPARATIVE DISTRIBUTIONS OF COMPOSITE ISSUE-VARIABLES



KEY:

Horizontal Axis:
Scale Values

Vertical Axis:
No. of Countries

= Countries whose preferred positions are based on a national score & a regression estimate.

(To which are added:)

= Countries with preferred positions based on regression estimates only.

These results demonstrate the relative robustness of the project's policy scales, and their relative insensitivity to minor differences in perceptions of the issues. The chief factor determining the overall effect of any change in ordering or policy-spacing is of course the proportion of data accounted for by reordered themes. The larger the proportion, the more serious the potential impact of reordering on analysis. Thus, even though the policy scales themselves are rather robust, it is important that procedures for creating them be reliable. The results of this test suggest that they are.

A VALIDITY CHECK: LOS AND THE SNT

The results of the scaling test suggest the validity of the LOS project's models of the law of the sea negotiations, at least for the questions of the deep seabeds, scientific research, and straits transit. A further validation effort has been undertaken. Although the Single Negotiating Text (SNT) issued at the Geneva (spring 1975) session of the LOS Conference is not the final treaty, it does represent the considered judgments of the chairmen of the three main committees of the conference as to the direction of negotiations in their respective committees at that time. If the SNT did not represent the "true" preferences of Conference participants, it was used as the point of departure for the next round of negotiations. Comparing LOS project medians on key issues, generated just prior to

Geneva, with the relevant provisions of the SNT will at least tell us whether the project's forecasts were at all "in the ballpark."

Provisions of the SNT that corresponded to our major issue-variables were coded, in the sense that appropriate scale values were assigned to them. These were compared to the medians of the corresponding issue-variables. Table 13 gives these comparisons. Differences are presented as a range where the complexity of the text, or conflicting text articles relating to the same issue made assignment of a single scale value to the text impossible.

According to the criteria we have been using in this paper, no median was seriously off the mark. No difference was more than three scale values, according to our evaluation of the SNT.

TABLE 13: A COMPARISON BETWEEN LOS PROJECT FORECASTS AND THE 1975 SINGLE NEGOTIATING TEXT

ISSUE	DIFFERENCE BETWEEN FORECAST AND SINGLE TEXT		
	Distance Apart*	On a Scale of:	As a Percentage:
Powers of the International Seabed Resource Authority	2	15	13%
Territorial Sea Delimitation	1	20	5%
Straits Transit	3	24	15%
Economic Zone Delimitation	0	12	0
Degree of Coastal State Jurisdiction in Econ. Zone	2-5	20	10-25%
Fishing Zone Delimitation	0	12	0
Coastal State Jurisdiction Over Coastal Fisheries	0	20	0
Vessel Pollution Standards	0	12	0
Vessel Pollution Enforcement Schemes	1-3	20	5-15%
Scientific Research in the Deep Ocean Area	0-2	10	0-20%
Scientific Research in the Economic Zone	1-3	15	7-20%

* Measured in scale values.

SUMMARY AND CONCLUSIONS

This paper has reported the results of reliability and validity tests run on the CNA Law of the Sea Project's thematic content analysis and policy-scaling procedures. The results of the coding test suggest that the content analysis procedures are very reliable, even with marginally tutored coders; that substantial socialization raises coding reliability, while decreasing cultural bias. Errors of omission remain a problem for complex issues, but experienced coders can be expected to pick up 85% of codable remarks on such issues, while coding relatively few extraneous remarks, prior to quality checking. With quality checking procedures in use as described in the introduction to this paper, error rates in the final data base used for analysis should be lower.

Although perceptions of the issues under negotiation vary even among the experts, collegial policy-spacing as practiced by the LOS project can be expected to produce issue-variables that are on the order of 90% reliable and fairly robust. A comparison of LOS project forecasts with the 1975 Single Negotiating Text suggests further that issue-variables so developed can be valid indicators of trends in negotiations.

This information processing system and its attendant analytic and forecasting models are applicable not just to the law of the sea. They can be applied equally well to other multilateral negotiations, past or future, for purposes of trend and outcome forecasting, or historical reconstruction. Where there are reports of countries' negotiating positions, they can be coded. Where the policy dimensions underlying the issues are known, or can be deduced, issue-variables can be created. These procedures are not without cost. Content analysis in particular is a laborious process. Coders, both experienced and inexperienced, took an average of two hours to complete the coding test, generating about 60 items of information apiece. If this rate is typical of the entire LOS data base, then its creation required, over a period of years, about 1,500 hours of coding. The payoffs, however, especially in a large and technically complex negotiation, can be substantial, giving negotiators systematic information about the shape and progress of negotiations; a macroscopic counterpoint to the day-to-day interactions of diplomatic bargaining.

APPENDIX

TABLE A-1

INDEPENDENT VARIABLES USED IN LOS PROJECT REGRESSIONS

Economic and Geographic Variables	Sources
Offshore Hydrocarbons Major Oil Producers	Summary 1972 Oil and Gas Statistics, for Onshore and Offshore Areas for 151 Countries, USGS Professional Paper 885, 1974.
Major Mineral Producers	Summary Petroleum and Selected Mineral Statistics for 120 Countries, USGS PP 817, 1973.
Distant Fishing States	Department of State Estimates, 1972.
Major Fishing States	UN Statistical Yearbook, 1972.
Landlocked Shelflocked Narrow Shelf Broad Shelf States on Semi-Enclosed Seas	Limits in the Seas, Department of State International Boundary Study, Series A, No. 46, 1972.
Straits States	Sovereignty of the Sea, Department of State Geographic Bulletin No. 3, Revised October 1969.
Blue Water Navy Coastal Navy	Jane's Fighting Ships, 1973-1974
Major Merchant Fleet	Lloyd's Register of Shipping, 1973

POLITICAL VARIABLES

Regional Groups:	Scandanavian Group
Africa Asia Latin America Eastern Europe Western Europe and others	U.S. Treaty Allies
	Caribbean Bloc
	OPEC
Group of 77	Archipelago States
Arab League	European Economic Community

TABLE A-2: ISSUE-VARIABLES USED TO CALCULATE NATIONAL SCORES FOR CODING TEST

VARIABLE 1: TERRITORIAL SEA DELIMITATION

SCALE VALUES	THEMES	THEME NUMBERS
1	LL OPPOSE EXTENSION OF COASTAL STATES CLAIMS	76
1	10 MILE TERRITORIAL SEA	509
1	6 MILE TERRITORIAL SEA	713
1	4 MILE TERRITORIAL SEA	728
1	MODIFY POSITIVE LAW BY AGREEMENT ONLY	925
1	FOR NARROW TERRITORIAL SEA	955
3	FOR 12 MILE TERRITORIAL SEA	934
4	MITE TAKE 12MI TS/200 EZ W/FREENAV +OVERFLIGHTS	71
4	12MILE TS TIED TO EXCLUSIVE ECONOMIC ZONE	384
4	TS DELIM LINKED TO FREEDOM OF PASSAGE THRU STRAT.....	921
4	SYMPATHETIC TO PACKAGE(12MILE TS,SPECIAL CONT Z).....	922
4	MIGHT TAKE 12 MILE	965
4	DISCUSS 12 MI TS IF NO RIDERS	1028
5	NEED UNIFORM TERRITORIAL SEA	927
6	12MILE FOR SEA/FARTHER FOR OCEAN	965
7	18 MILE TERRITORIAL SEA	704
7	15 MILE TERRITORIAL SEA	707
8	FOR 25 MILE TS	990
8	FOR 30 MILE TS	992
9	50 MILE TERRITORIAL SEA	2
10	TS DEFINED ON BASIS OF RECIPROCITY W/NEIGHBORS	321
10	TS DELIMITATION DIFFERENT IN NARROW SEA,OPEN SEA.....	931
10	FIND FLEXIBLE CRITERIA FOR TS DELIMITATION	935
11	FOR 100 MILE TERRITORIAL SEA	900
12	130 MILE TERRITORIAL SEA	999
13	150 MILE TS	111
15	MIGHT GIVE UP 200 MILE TERRITORIAL SEA	237
16	SUPPORT LA CLAIMS OF 200 MI TS	39
17	FOR STATE RIGHT TO DELIMIT SOVEREIGNITY ZONE	905
17	SYMPATHETIC TO UNILATERAL CLAIMS,THO NOT DONE SO.....	914
17	TS NEED REGIME PLURALITY ON REGION BASIS FOR TS	936
17	PLURALITY WILL NOT LEAD TO ANARCHY	938
17	RETAIN PRE-RATIF TS GRTR THAN PRESCRIBED BY CONV.....	1297
18	OPPOSED TO 12 MILE TERRITORIAL SEA	963
20	LA HAS SPECIAL SECURITY REQUIREMENTS	907
20	200 MILE TERRITORIAL SEA	908
20	BIOMA THEORY-COAST +WATER IS NATURAL GEOGRAPHY	911
20	DEVELOPED WISH TO RESTRICT JURIS/UNILAT CLAIMS	916
20	200-MI CLAIM GOOD MODEL FOR LDC	917
20	BROAD NATL JURISD PROTECTS AGAINST PRIVATE DEV	918
20	TS CONCEPT WAS BASED ON MILITARY,NOW ECON+ECOL	937
20	200 MILE HAS IDEOLOGICAL SIGNIFICANCE	1307

TABLE A-2: (continued

VARIABLE 2: COASTAL ZONE SCIENTIFIC RESEARCH

SCALE VALUES	THEMES	THEME NUMBERS
1	NO CS RESTRICTIONS ON BASIC RESEARCH BEYOND TS	375
1	MAINTAIN FREEDOM OF OCEAN SCIENCE	120
1	FREE SR IN EZ OF SES.REGNL AGRMTS NOTWITHSTANDG	1431
2	SR SUBJECT TO POLL RESTRICTIONS IN ECONOMIC ZONE.....	372
2	SR IN ECON ZONE COMPLY W/INTL POLL STNDS	1103
3	NO CONSENT FOR E+E RELATED SR IN EZ	1499
3	CONSENT REGIME INCR COST/DECR VOLUME OF RESEARCH.....	1111
4	ACCESS TO INFO IN RETURN FOR FREEDOM OF SCIENCE	338
4	INTL GUIDELINES FOR SR IN EZ+SHELF	879
5	CONSIDER NOTIF TO CS FOR SCI RES OVER SHELF	401
6	NOTIFY RES EZ RE SB RESOURCES + COASTAL FISH	329
6	SYMPATHETIC TO US SCI RES ARTICLES	1055
7	FOR REASONABLE CS REGS FOR SR IN ECONOMIC ZONE	377
7	SPECIFIC/LIMTD CS RIGHTS OVER RES/POLL IN EZ	17
7	NOTIF TO CS FOR SR IN EZ	388
7	RESEARCHER VESTED W/OBLIGATION/SHARING	51
7	ALLOW NOTIF TO CS FOR SCI RES OVR SHELF	399
7	CONSENT FOR SR IN EZ ASSUMED IN FIXE TIMEPERIOD	414
8	SET TYPE RES DONE FREELY + THAT REQUIRNG CS CONS.....	191
8	CS CONSNT,EE RELATED SR IN EZ,BASIC SR FREE	764
8	FREE SR IN WC/CS CONSENT IF CHANGE SB STRUCTURE	268
8	CS CONSENT F SR OVR SHELF IF STRUCT OF SHELF CHG.....	873
9	CS CONSENT FOR SR IN EZ - FALLBACK	327
9	CS GIVE PREF TRTMT TO NEIGH LL/GDS SR REQUESTS	950
9	COND SUPPORT CONSENT REGIME FOR E+E-RELATED SR	1146
10	CS RITE TO SUSPEND RES IN EZ IF CONDS VIOLATD	160
10	CS CONSNT F/USE/PLACEMNT OF MONITOR EQUIP IN EZ	1397
10	SR CONSNT REQMT DESIGND TO LEVER TECH TRANSFER	1448
10	CS CONSENT (EZ SR), BUT GIVEN IF CONDITNIONS MET.....	1369
10	CONSENT FOR SR IN EZ BUT NOT UNJUSTIFIABLY WHELD.....	1145
10	FOR CS CONSENT REGIME, BUT WILLING TO BARGAIN	518
11	CS RT TO SUSP SR W/CONCURRENCE OF APPROP UN BODY.....	1136
12	CS RITE TO DET E+E-RELATD RES-CASE BY CASE	151
12	POLLUTION NECESSITATES COASTAL STATE RES CONTROL.....	315
12	CS CONSENT REQ FOR SR OVR SHELF	326
12	SCIENTIFIC RESEARCH W/CONSENT OF COASTAL STATE	302
12	REGNL AGRMTS AMNG RIPARIAN STS FOR SR IN SES	1432
13	NON-DUPLICABLE SR SPECIMENS REMAIN PROPTY OF CS	1437
13	CS PUBL CONSENT (SR) BUT NOT UNNECESSLY W/HELD	1438
13	REJECT PRIOR NOTIFN FOR SR- INADEQ PROTN FOR CS	1121
14	COASTAL STATES HAVE RIGHT TO CONTROL RESEARCH	314
14	CS CONTROL SR ON CONTINENTAL SHELF	379
15	CS IS OWNER OF DATA+ SAMPLS FRM SR IN EZ	245
15	COASTAL STATE CONTROL SCIENCE 200MILES	335
15	CS RT TO SUPPRESS SR DATA/CONTROL PUBLICATION	203
15	FAILURE TO REPLY INDIC CS REFUSAL OF SR REQUEST	771

TABLE A-2: continued

VARIABLE 3: WHO WILL EXPLOIT THE INTERNATIONAL AREA

SCALE VALUES	THEMES	THEME NUMBERS
1	REGISTRY/FIRST COME FIRST SERVED	711
2	NO DIRECT EXPLOITATION BY MACHINERY	719
4	CAN TRANSFR LICENS RIGHTS W/O AUTHORTYS CONSENT	177
4	OPPOSE QUOTA SYSTEM IN ISRA AREA	403
4	REGULATORY FCR E+E BEYOND NATL JURISDICTION	712
4	INTL LICENSING SYSTEM	717
4	LICENSES BASED IN FIXED GRID SYSTEM	722
4	DOUBLE CONCESSION SYSTEM IN REGIME	761
5	RELINQUISHMENT REQUIRED OF SUBLICENSEE ONLY	489
5	.GT. 1/2 RELINQ AFT EVAL,CONTRACTR CHOOSE AREAS	624
6	QUOTA UNDER LICENSING SYSTEM IN ISRA AREA	402
6	RELINQ BLOC IN DEEP SB IF NO E+E W/IN TIME FRAME.....	483
6	EQUAL AREAL QUOTAS,ALL STS,NO POP/SIZE CRITERIA	638
6	FOR RELINQUISHMENT IN DEEP SB AREA	679
6	CONTRCTR RELINQ 1/3 OF AREA BEFORE BEGNG EXPLT	1420
7	RESOURCE MANAGEMENT COMMISSION	175
7	FLEXIBLE ON ISRA LICENSING SYSTEM	456
8	RESERVE PERCENTAGE OF EACH OCEAN FOR COMMON HERT.....	720
8	LEASING BASED ON POPULATION AND GNP	783
8	RESERVE BLOC FOR FUTURE EXPLOITATION	848
9	AUTH TO CONTROL TRANSFER OF LICENSE IN INTL ZONE.....	1045
9	MIXED MACHINERY AS FALLBACK FROM LICENSING	276
9	SET UP SKELETON MACHINERY,EXPAND LATER	751
9	US BANKING PROPOSAL	1531
10	MIXED MACHINERY- DIRECT AND LEASE E+E	181
10	ASSEMBLY GOVERN E+E DIRECTLY, JOINT OR LICENCE	935
11	ORGANS ACCORDING TO TANZANIAN MODEL	773
12	MIGHT ACCEPT JOINT VENTURES ISRA AREA	113
13	INTL OPERATING AGENCY EVENTUALLY NOT NOW	726
13	INCLINED TOWARD INTL OPERATING AGENCY	769
13	PROCN SYS ISRA CHOICE-PHASE OUT LIC,PHASE IN DIR.....	805
14	SUPRT CONTRACTUAL JOINT VENTURE OVR EQUITY PARTI.....	1593
15	INTL OPERATING AGENCY WITHIN UN SYSTEM	715
15	CREATE INTL SEABED CORPORATION	729
15	ESTABLISH JOINT ENTERPRISES	781
15	JOINT RSRC MGT ESSENTIAL PART OF COMMON HERITAGE.....	837
15	CONTRACT/JV W/STS,FIRMS- IN TIME DIRECT E+E ONLY.....	839
15	SB RSRCS IN SITU REPRESNT LDC/AUTH CONTRIB TO JV.....	877
16	ENTERPRISE SYSTEM	186
16	LICENSING ENDANGERS MANY STATE INTERESTS	795
16	OPPOSE MIXD MACH-UNFAIR COMPETN FROM LICENSEES	815
16	LIC INCOMPATBL W/COM HER,OBSOLETE,PATERNALISTIC	860
16	LICENSING WIDEN FINANCL/TECHL GAP BETW DC/LDC	1125
17	DIRECT EXPLOITATION BY INTL AUTHTY	1022

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