
Q-Analysis Assessments of Inter-Ethnic Relationships ¹

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INTRODUCTION

This paper reports on the use Q-analysis to study the degree of inter-ethnic linkages between the Serbs, Croats, and Muslims in Bosnia-Herzegovina reflected in the results of public opinion poll data provided by the United States Information Agency (USIA). The degree of inter-group linkage is specified in terms of a property known as the Q-connectivity. Changes in this property reflect changes in the degree of mutual concurrence with specific sets of public opinion poll data (Figure 1). The material in the following paper is based on work described in previous papers (Woodcock and Heath, 1998a and 1998b) that has demonstrated the utility of the Q-analytic approach to examine the degree of linkage and division between these ethnic groups in Bosnia-Herzegovina in the period between 1995 and 1998.

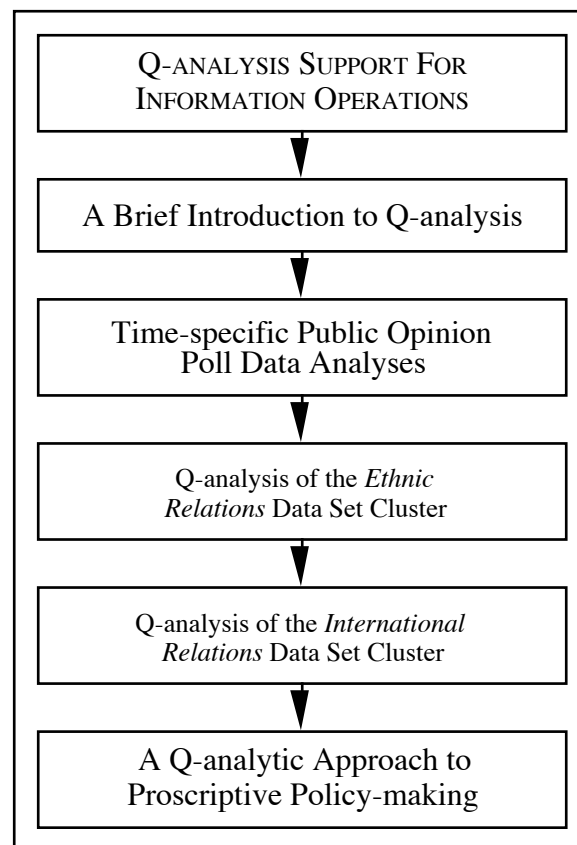


Figure 1: Q-analysis support for information operations can provide insight into the nature of inter-ethnic concurrence on answers to public opinion poll questions.

Two clusters of poll data have been used in the study. One of these clusters, called the *Ethnic Relations Data Set* by the authors, reflects answers to questions on matters related to the relationships between the three groups mentioned above. The other cluster, called the *International Relations Data Set*, reflects to a major extent the opinions of these groups on the nature of their relationships with several international entities and with the Dayton Accord.

Q-analysis of the Ethnic Relations Data Set is one in which the ethnic groups appear to have an overall level of confidence in the local government, the police, and the courts and express the need to forget the injustices of the past. However, there is a corresponding unfavorable opinion by the other ethnic groups for their counterparts and pessimism about peaceful coexistence and the risk of living as an ethnic minority.

The major feature that emerges from the Q-analysis of the International Relations Data cluster is the generally relatively high level of concurrence with the Dayton Accords and the belief that they are better than continued war. There was confidence that the Accords would result in a lasting peace and support for the presence of the Stabilization Force (SFOR) [the successor to the Implementation Force (IFOR)] peacekeeping troops in Bosnia. However, there was also significant concern that fighting might start again in a few years.

The Q-analytic approach has also been used to study the potential impact of policy-directed actions on ethnic concurrence with selected USIA poll questions in a process called *Proscriptive Policy-making* by the authors. In this case, the results from an actual set of public opinion questions were progressively modified to reflect the potential impact of notional actions aimed at increasing inter-ethnic concurrence with those questions. These changes were assumed to reflect the impact of SFOR and other entity actions on ethnic public opinion and results of the associated Q-analysis could be used to guide policy-making and related activities.

A BRIEF INTRODUCTION TO Q-ANALYSIS

Q-analysis is a method based on algebraic topology developed initially by Atkin (1972, 1974, 1979) that has stimulated research by many investigators including Dockery (personal communication, 1982, 1984), Griffiths (1983), Johnson (1982, 1990a, 1990b, 1991), and Coombs *et al.* (1997) in application areas ranging from the physical to the social and military sciences. Atkin (1972) states that all observation involves identifying the membership of entities in finite sets and identifying the mesh of observed points. This must depend upon the choice of base-element and the phenomenological interpretation of the intuitive "point" in the set $\{P\}$. The actual-space is interpreted as a simplicial complex $K(P)$.

The process of observation establishes relationships between the sets $\{P\}$ and $\{A\}$ where $\{A\}$ is the set of the physically-possible phenomena permitted by the observational technique. In the following paper the set $\{P\}$ is identified as the three ethnic groups: Serb, Croat, and Muslim in Bosnia-Herzegovina. The set $\{A\}$ is identified with specific poll data reflecting the public opinions of these groups on a series of topics related to their beliefs and feelings of security and related matters in Bosnia-Herzegovina.

The relationship, λ , between the ethnic groups and their poll results is expressed in terms of the sets $\{P\}$ and $\{A\}$, as follows: $\{A\} \times \{P\} \supset \lambda$. This relationship can be represented as a matrix array with entries representing the relationships between the different components of the sets $\{P\}$ and $\{A\}$, as described in more detail below. In this paper, the incident matrix will be chosen to represent the opinion of the different ethnic groups on specific poll questions. Furthermore, it is also possible to define the relationship (λ^{-1}) where: $\{P\} \times \{A\} \supset \lambda^{-1}$ in which the corresponding incidence matrix is the transpose of the matrix formed for the relationship (λ) .

Incidence matrices will be constructed for the abovementioned public opinion poll data and used as input to the Q-analytic process. Before such analysis can be performed, it will be necessary to use the “slicing” process defined by Atkin in order to prepare the data as described below (also see Atkin, 1974, and Woodcock and Heath, 1998a, for example). Slicing the data has the effect of filtering out some of the data elements with values below the threshold slicing level.

ENTITIES AND RELATIONSHIPS

Q-analysis provides methods for expressing and examining the structure of relationships between different entities. The analysis provides a method for providing a clear distinction between well-defined sets of elements and well-defined relations between these sets. The structure involves the relationships between these sets, and is known mathematically as a simplicial complex. It is often represented by the letter K . The nature of the relationships between two sets P and A can be represented by a series of 0's and 1's since each element of P is usually related to more than one A entity, and *vice versa*.

The complete set of relationships between P and A constitute an incidence matrix. A notional incidence matrix is shown in Figure 2. In this case, the entity P_1 is related to the entities $A_1, A_2, A_3, A_5,$ and A_6 while the entity A_3 is related to the entities $P_1, P_2, P_3,$ and P_4 . The following paper will demonstrate how Q-analysis techniques can be used to study the relationships between the Serb, Croat, and Muslim ethnic groups in Bosnia-Herzegovina as reflected in public opinion poll data collected by the United States Information Agency (1998).

λ	A_1	A_2	A_3	A_4	A_5	A_6
P_1	1	1	1	0	1	1
P_2	0	1	1	0	0	0
P_3	0	1	1	1	0	1
P_4	0	0	1	0	1	0
P_5	0	1	0	1	0	1

Figure 2: Notional incidence matrix for properties P and A linked by a relationship described by the symbol, λ (Modified after Atkin, 1974).

These relationships can be interpreted geometrically. Thus, if one element of P (P_N , say) is related to a single member of A (A_i) then this relationship is referred to as a zero-order relationship or a 0-simplex, $P_N = \langle A_i \rangle$, that can be interpreted geometrically as a point. If P_N is related to two members of A (A_i and A_j), then these entities possess a 1-dimensional relationship that constitutes a 1-simplex $\langle A_i, A_j \rangle$ that can be interpreted geometrically as a line. Higher order relationships are represented by higher dimensional simplices, each of which has a corresponding geometrical interpretation. In general, if P_N is associated with $(p+1)$ relationships then these relationships form a p -dimensional simplex.

It is possible to use the relationship (described by the symbol, λ) to define the nature of the linkages between the different sets P and A. This can be accomplished by identifying the relationships between the (n) components of P (P_1, \dots, P_n) and the (m) components of A (A_1, \dots, A_m). The complete set of relations forms the simplicial complex K, represented by $K_P(A; \lambda)$. This can be interpreted in the following manner: the set A provides the vertices of the simplices and the set P provides the names of the simplices that reflect the action of the property (λ). The set of relationships for λ can be obtained by reading off the horizontal terms in the corresponding incidence matrix. The relationships contained in Figure 2 are expressed in Figure 3.

$P_1 = \langle A_1, A_2, A_3, A_5, A_6 \rangle$	a 4-simplex
$P_2 = \langle A_2, A_3 \rangle$	a 1-simplex
$P_3 = \langle A_2, A_3, A_4, A_6 \rangle$	a 3-simplex
$P_4 = \langle A_3, A_5 \rangle$	a 1-simplex
$P_5 = \langle A_2, A_4, A_6 \rangle$	a 2-simplex

Figure 3: Simplex structures for the P_n entity data presented in Figure 2.

In this notional example, the property P_1 (A_1, A_2, A_3, A_5, A_6) is linked to the property P_2 (A_2, A_3) by a connection chain of order 1 due to the shared vertices (A_2, A_3). Furthermore, P_1 is linked to P_3 (A_2, A_3, A_4, A_6) by a chain of order 2 due to the sharing of vertices (A_2, A_3, A_6) between these two entities. These relationships are illustrated geometrically in Figure 4. Based on analysis of the linkages contained in an incidence matrix, it is possible to generate an overall picture of the linkages between all entities. This information can be expressed for $K_P(A; \lambda)$ in the form of a Q-connectivity matrix, as shown in Figure 5. The matrix is diagonally symmetrical so that only the upper right-hand half has been presented. Analysis of Figures 2 and 5 shows that the entity P_1 forms a 4-simplex and that entities P_1 and P_3 are linked by a 2-dimensional simplex, for example. It is also possible to use the inverse relationship for λ , that is, λ^{-1} , in order to create a conjugate simplicial complex ($K_A(P; \lambda^{-1})$). In this case, the set P provides the vertices and the set A the labels for the simplices constructed by the property λ^{-1} . Furthermore, the set of relationships for λ^{-1} can be obtained by reading off the vertical terms in the corresponding incidence matrix.

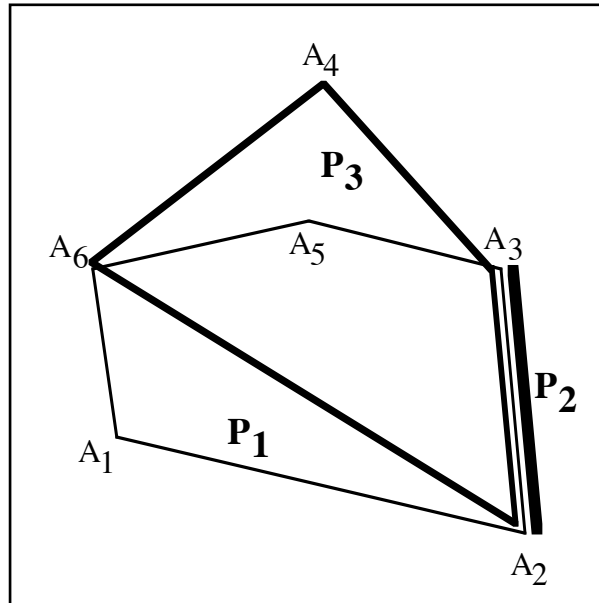


Figure 4: Simplicial complex relationships for some of the entities in Figure 2.

	P₁	P₂	P₃	P₄	P₅	
	4	1	2	1	1	P₁
	•	1	1	0	0	P₂
	•	•	3	0	2	P₃
	•	•	•	1	-	P₄
	•	•	•	•	2	P₅

Figure 5: Q-connectivities for $K_p(A; \lambda)$ based on the data contained in Figure 2.

SLICING DATA REVEALS STRUCTURAL RELATIONSHIPS
AT DIFFERENT SIGNIFICANCE LEVELS

The initial discussion of some of the techniques associated with Q-analysis has discussed the structure of relationships in which an entity is either linked, or not linked, to another entity. The relationship is either 1 (linked) or 0 (not linked). The following study will use public opinion poll data to determine the degree of inter-ethnic concurrence on particular matters. these data are described in percentage values and not as (0) and (1) type data. Figure 6 shows the structure of an array of the answers to N poll questions from Serbs, Croats, and Muslims, and Figure 7 shows a selection of actual poll data. A technique known as Slicing makes it possible to use Q-analysis on non (1, 0)-type data. The processes involved in this method are illustrated in Figure 7 for a notional set of poll data arranged in three rows and four columns.

	Poll 1	Poll 2	Poll N
Serbs	$(PI)_{1s}$	$(PI)_{2s}$	$(PI)_{Ns}$
Croats	$(PI)_{1c}$	$(PI)_{2c}$	$(PI)_{3c}$

Muslims	(PI) _{1m}	(PI) _{2m}	(PI) _{3m}
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Figure 6: Notional arrangement of public opinion poll data for subsequent Q-analysis.

Actual Public Opinion Poll Data								
13	6	65	45	25	78	63	65	53
22	9	57	16	16	47	40	86	70
91	42	72	67	51	85	74	90	75

Figure 7: Public opinion poll data collected from Bosnia-Herzegovina. Source: United States Information Agency, 1998.

Slicing the data has the effect of filtering out some of the data elements with values below the threshold slicing level (Figure 8). Thus, a slicing level of 30 generates a matrix of elements in which a 1 is entered for all elements with a value greater than 30, and a 0 otherwise. The process has also been carried out with a slicing level of 70. In this case, the matrix has considerably fewer elements than the corresponding matrix generated with a 30 slicing level. Q-connectivity matrices have also been calculated for the relationships (λ) and (λ^{-1}) and it is evident that the data sliced at the 30 level has a significantly greater Q-connectivity than those data sliced at the 70 level. We will use this method to pre-process public opinion poll data before those data are subjected to Q-analysis.

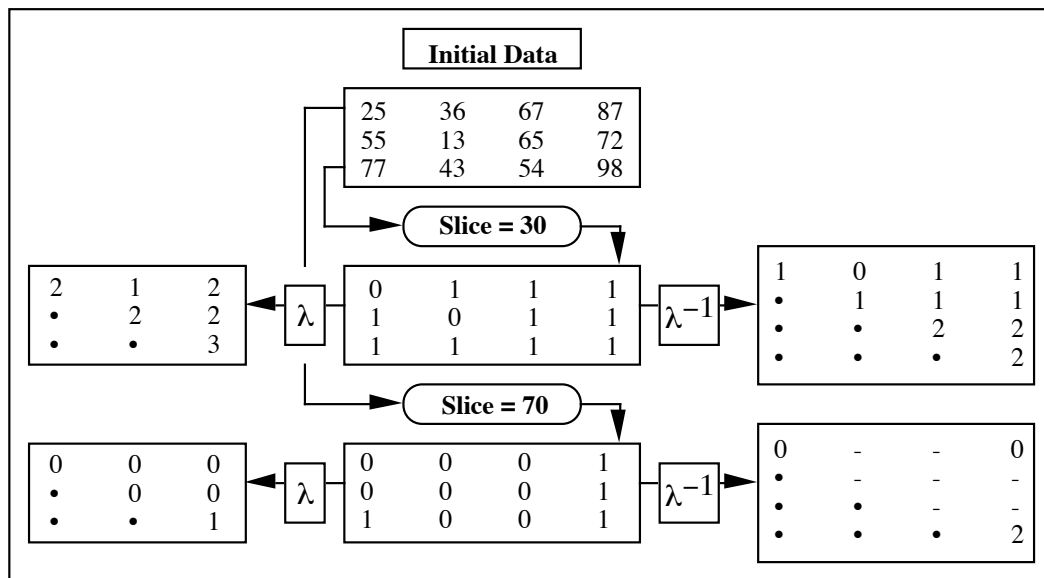


Figure 8: The Slicing technique permits the Q-analysis of non (1, 0)-type data.

Q-ANALYSIS OF TIME-SPECIFIC PUBLIC OPINION POLL DATA FROM BOSNIA

Q-analytic methods have been used to study data collected by the United States Information Agency between December 1995 and February 1998 in order to determine whether or not changes have occurred in the nature of the answers provided to specific questions by these

ethnic groups between 1995 and 1998. Two clusters of poll data have been used in the study. One of these clusters, called the *Ethnic Relations Data Set* by the authors, reflects answers to questions on matters mainly related to the relationships between the three groups mentioned above. The other cluster, called the *International Relations Data Set*, reflects to a major extent the opinions of these groups on the nature of their relationships with several international entities and with the Dayton Accord.

THE 'ETHNIC RELATIONS' DATA SET CLUSTER

The so-called Ethnic Relations Data Set cluster involves data on the answers to the following public opinion poll questions collected by the United States Information Agency during 12/1995, 4/1996, 1/1997, 7/1997, and 2/1998 and published in 1998. These results are summarized in Figures 2 to 10.

1. Question E1: “Do you believe that the Serbs, Croats, and Muslims can live peacefully together in the country or has the war done too much damage for them to live together peacefully anymore?” (Figure 9, source: USIA, 1998, Table 48). Some 13 per cent of Serbs stated that they could live together in 12/1995 and 13 per cent in 1/1998; the corresponding data for the Croats change from 31 per cent (12/1995) to 22 per cent (2/1998); and the figures for the Muslims change from 65 per cent (12/1995) to 91 per cent (2/1998).

Bosnian Serbs					
	12/95	4/96	1/97	7/97	2/98
Can Live Together	13	7	7	7	13
Too Much Damage	81	83	79	86	74
Bosnian Croat					
	12/95	4/96	1/97	7/97	2/98
Can Live Together	31	23	13	19	22
Too Much Damage	64	75	82	77	73
Bosnian Muslim					
	12/95	4/96	1/97	7/97	2/98
Can Live Together	65	82	84	83	91
Too Much Damage	34	15	12	11	5

Figure 9: Public opinion poll answers to the question: “Do you believe that the Serbs, Croats, and Muslims can live peacefully together in the country or has the war done too much damage for them to live together peacefully anymore?” (Source: USIA, 1998, Table 48).

2. Question E2: “People can feel completely safe only when they are in the majority in their country” (Figure 10, source: USIA, 1998, Table 49). Some 85 per cent of Serbs agreed with the statement in 12/1995 and 90 per cent in 2/1998; the corresponding data for the Croats changed from 75 per cent (12/1995) to 89 per cent (2/1998); and the figures for the Muslims change from 40 per cent (12/1995) to 54 per cent (2/1998).

3. Question E3: “*What is your opinion of the Muslims in Bosnia?*” (Figure 11, source: USIA, 1998, Table 50). Some 9 per cent of Serbs gave favorable responses in 12/1995 and 12 per cent in 2/1998; the corresponding data for the Croats changed from 41 per cent (12/1995) to 15 per cent (2/1998); and the figures for the Muslims change from 97 per cent (12/1995) to 95 per cent (2/1998).
4. Question E4: “*What is your opinion of the Serbs in Bosnia?*” (Figure 12, source: USIA, 1998, Table 51). Some 88 per cent of Serbs gave favorable responses in 12/1995 and 89 per cent in 2/1998; the corresponding data for the Croats changed from 20 per cent (12/1995) to 33 per cent (2/1998); and the figures for the Muslims change from 20 per cent (12/1995) to 24 per cent (2/1998).

Bosnian Serbs					
	12/95	4/96	1/97	7/97	2/98
Total Agree	85	84	92	91	90
Total Disagree	4	14	6	4	6
Bosnian Croat					
	12/95	4/96	1/97	7/97	2/98
Total Agree	75	86	91	93	89
Total Disagree	24	14	8	6	9
Bosnian Muslim					
	12/95	4/96	1/97	7/97	2/98
Total Agree	40	42	49	57	54
Total Disagree	57	57	46	37	42

Figure 10: Public opinion poll answers to the question: “*People can feel completely safe only when they are in the majority in their country*” (Source: USIA, 1998, Table 49).

Bosnian Serbs					
	12/95	4/96	1/97	7/97	2/98
Total Favorable	9	8	5	36	12
Total Unfavorable	89	91	92	57	77
Bosnian Croat					
	12/95	4/96	1/97	7/97	2/98
Total Favorable	41	28	13	19	15
Total Non-confid.	56	71	85	80	84
Bosnian Muslim					
	12/95	4/96	1/97	7/97	2/98
Total Favorable	97	98	96	94	95
Total Non-confid.	2	1	1	1	1

Figure 11: Public opinion poll answers to the question: “*What is your opinion of the Muslims in Bosnia?*” (Source: USIA, 1998, Table 50).

Bosnian Serbs					
	12/95	4/96	1/97	7/97	2/98
Total Favorable	88	94	97	66	89
Total Unfavorable	10	6	2	4	4
Bosnian Croat					
	12/95	4/96	1/97	7/97	2/98
Total Favorable	20	17	28	30	33
Total Non-confid.	76	83	70	69	65
Bosnian Muslim					
	12/95	4/96	1/97	7/97	2/98
Total Favorable	20	20	15	23	24
Total Non-confid.	79	78	79	69	68

Figure 12: Public opinion poll answers to the question: “What is your opinion of the Serbs in Bosnia?” (Source: USIA, 1998, Table 51).

5. Question E5: “What is your opinion of the Croats in Bosnia?” (Figure 13, source: USIA, 1998, Table 52). Some 12 per cent of Serbs gave favorable responses in 12/1995 and 18 per cent in 2/1998; the corresponding data for the Croats changed from 94 per cent (12/1995) to 97 per cent (2/1998); and the figures for the Muslims change from 72 per cent (12/1995) to 59 per cent (2/1998).

Bosnian Serbs					
	12/95	4/96	1/97	7/97	2/98
Total Favorable	12	12	22	37	18
Total Unfavorable	87	85	76	57	71
Bosnian Croat					
	12/95	4/96	1/97	7/97	2/98
Total Favorable	94	98	96	98	97
Total Non-confid.	4	2	2	3	
Bosnian Muslim					
	12/95	4/96	1/97	7/97	2/98
Total Favorable	72	61	48	50	59
Total Non-confid.	27	39	51	41	34

Figure 13: Public opinion poll answers to the question: “What is your opinion of the Croats in Bosnia?” (Source: USIA, 1998, Table 52).

6. Question E6: “We need to forget the injustices of the past and concentrate on the future” (Figure 14, source: USIA, 1998, Table 125). Some 42 per cent of Serbs gave favorable responses in 12/1995 and 53 per cent in 2/1998; the corresponding data for the Croats changed from 66 per cent (12/1995) to 70 per cent (2/1998); and the figures for the Muslims change from 53 per cent (12/1995) to 75 per cent (2/1998).

Bosnian Serbs

	12/95	4/96	1/97	7/97	2/98
Total Agree	42	45	65	44	53
Total Disagree	47	53	33	51	45
Bosnian Croat					
	12/95	4/96	1/97	7/97	2/98
Total Agree	66	69	57	58	70
Total Disagree	3431	42	41	29	
Bosnian Muslim					
	12/95	4/96	1/97	7/97	2/98
Total Agree	53	70	51	46	75
Total Disagree	48	31	46	52	23

Figure 14: Public opinion poll answers to the question “We need to forget the injustices of the past and concentrate on the future” (Source: United States Information Agency, 1998, Table 125).

7. Question E7: “How much confidence do you have in the local government?” (Figure 15, source: USIA, 1998, Table 109). Some 49 per cent of Serbs had confidence in the local government in 12/1995 and 65 per cent in 2/1998; the corresponding data for the Croats changed from 39 per cent (12/1995) to 57 per cent (2/1998); and the figures for the Muslims change from 62 per cent (12/1995) to 72 per cent (2/1998).
8. Question E8: “How much confidence do you have in the police?” (Figure 16, source: USIA, 1998, Table 113). Some 54 per cent of Serbs had confidence in the police in 12/1995 and 78 per cent in 2/1998; the corresponding data for the Croats changed from 51 per cent (12/1995) to 47 per cent (2/1998); and the figures for the Muslims change from 78 per cent (12/1995) to 85 per cent (2/1998).

Bosnian Serbs					
	12/95	4/96	1/97	7/97	2/98
Total Confidence	49	52	67	75	65
Total Non-confid.	45	46	31	19	31
Bosnian Croat					
	12/95	4/96	1/97	7/97	2/98
Total Confidence	39	57	47	59	57
Total Non-confid.	60	43	49	37	41
Bosnian Muslim					
	12/95	4/96	1/97	7/97	2/98
Total Confidence	62	70	66	77	72
Total Non-confid.	38	30	30	22	25

Figure 15: Public opinion poll answers to the question: “How much confidence do you have in the local government?” (Source: USIA, 1998, Table 109).

Bosnian Serbs

	12/95	4/96	1/97	7/97	2/98
Total Confidence	54	68	74	44	78
Total Non-confid.	40	30	25	49	21
Bosnian Croat					
	12/95	4/96	1/97	7/97	2/98
Total Confidence	51	71	48	53	47
Total Non-confid.	49	30	47	41	50
Bosnian Muslim					
	12/95	4/96	1/97	7/97	2/98
Total Confidence	78	89	86	94	85
Total Non-confid.	22	12	11	6	13

Figure 16: Public opinion poll answers to the question: "How much confidence do you have in the police?" (Source: USIA, 1998, Table 113).

9. Question E9: "How much confidence do you have in the courts?" (Figure 17, source: USIA, 1998, Table 114). Some 54 per cent of Serbs had confidence in the courts in 12/1995 and 63 per cent in 2/1998; the corresponding data for the Croats changed from 48 per cent (12/1995) to 40 per cent (2/1998); and the figures for the Muslims were 74 per cent in both (12/1995) and (2/1998).

Bosnian Serbs					
	12/95	4/96	1/97	7/97	2/98
Total Confidence	54	54	63	39	63
Total Non-confid.	38	40	28	49	32
Bosnian Croat					
	12/95	4/96	1/97	7/97	2/98
Total Confidence	48	63	36	36	40
Total Non-confid.	51	36	59	56	56
Bosnian Muslim					
	12/95	4/96	1/97	7/97	2/98
Total Confidence	74	90	82	83	74
Total Non-confid.	25	9	14	10	23

Figure 17: Public opinion poll answers to the question: "How much confidence do you have in the courts?" (Source: USIA, 1998, Table 114).

Q-ANALYSIS OF THE 'ETHNIC RELATIONS' DATA SET CLUSTER

The public opinion poll data presented in Figures 9 to 17 were subjected to Q-analysis using the computer facilities outlined in Woodcock and Heath, 1998. It should be noted that since question E2 was asked as a negative question: "people feel safe only ..." the amount of disagreement (4, 24, and 57 per cent for the Serbs, Croats, and Muslims, respectively) were used in the Q-analysis procedures. A more extensive analysis of these data has been carried out and is reported in Woodcock and Heath (1998a).

ANALYSIS OF 'ETHNIC RELATIONS' DATA
COLLECTED IN 12/1995

Results of the Q-analysis of the data collected in 12/1995 presented in Figure 18 show the Q-connectivities for the direct relationship (λ) between the opinions of the Serb, Croat, and Muslim ethnic groups and the inverse relationship (λ^{-1}) between the answers to the nine questions which were presented to these groups in the USIA public opinion poll surveys. Analysis was performed at four slicing levels (40, 50, 60, and 70) in which survey results above a particular slicing threshold were set to a value of 1, and those that were below the slicing level were set to 0.

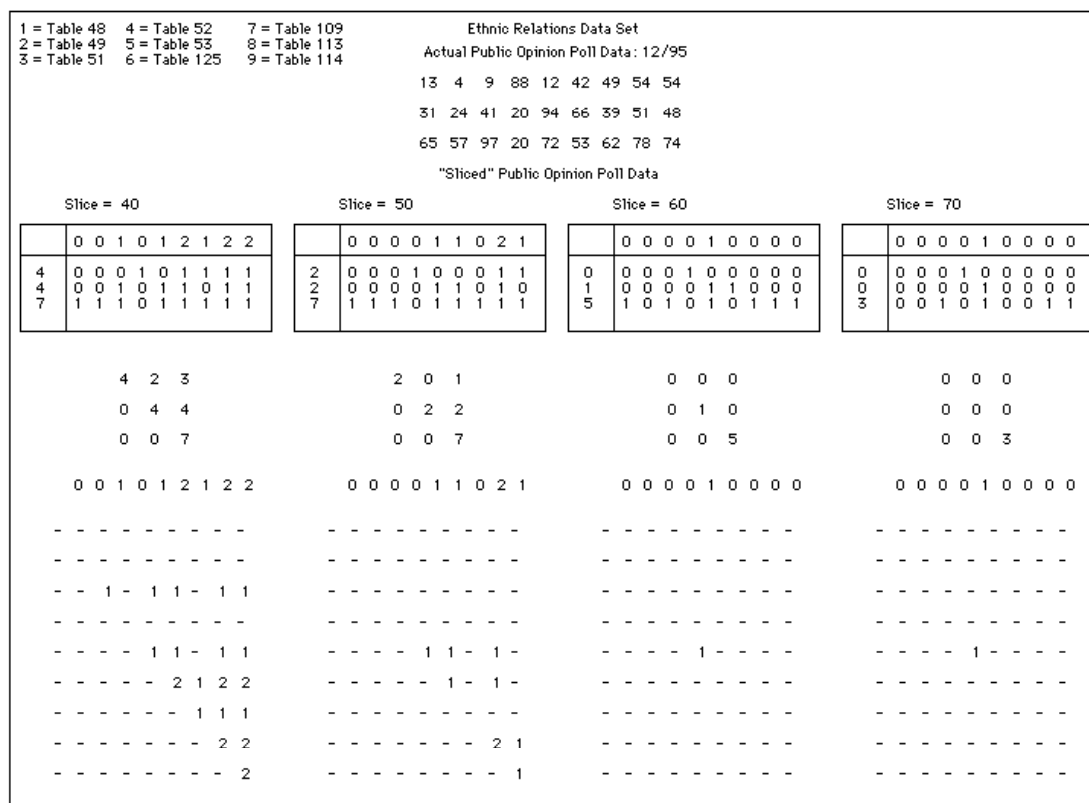


Figure 18: Q-analysis of the 'ethnic relations' public opinion poll data from 12/1995.

Results of the Q-analysis of 12/1995 data sliced at the 40 and 50 percent levels is reported below for both the direct and indirect relationships.

1. 40 per cent Slicing: The Direct Relationship (λ). The Serbs concurred with five of the poll questions (E4, E6, E7, E8, and E9, see above), and these answers form a structure that we have referred to as a self 4-simplex. The Croats concurred with five of the poll questions (E3, E5, E6, E8, and E9) and were also involved in a self 4-simplex. The common agreement between Serbs and Croats on questions E6, E8, and E9 form a 2-simplex linkage structure. The Muslims concurred with all but question E4 and are involved in a self 7-simplex. As the result of the ethnic concurrences to the questions, the

relationship between the Serbs and Muslims formed a 3-simplex, and that between the Croats and Muslims forms a 4-simplex (Figure 18).

2. 40 per cent Slicing: The Inverse Relationship (λ^{-1}). Answers to questions E1, E2, and E4 were not involved in any 1- or 2- simplex relational structures (Figure 18). The answer to question E3 was involved in a self 1-simplex relationship and also with E5, E6, E8, and E9; E5 was involved in a self 1-simplex relationship and 1-simplex relationships with E6, E8, and E9; E6 was involved in a self 2-simplex, in 2-simplexes with E8 and E9, and a 1-simplex with E7; E7 was involved in a self 1-simplex and 1-simplexes with E8 and E9; E8 was involved in a self 2-simplex and a 2-simplex with E9; and E9 was involved in a self 2-simplex.
3. 50 per cent Slicing: The Direct Relationship (λ). The Serbs concurred with only three of the questions (E4, E8, and E9) and these answers formed a self 2-simplex; the Serbs concurred with only one of the Croat positive answers (E8) and thus formed a 0-simplex; the Serbs concurred with two of the Muslim answers (E8 and E9) and formed a 1-simplex relationship with that group (Figure 18). The Croats concurred with three questions (E5, E6, and E8) and formed a 2-simplex. The Muslims also concurred with these answers, and the Croats and Muslims were involved in a 2-simplex relationship. The Muslims concurred with all but question E4, and their answers were involved in a self 7-simplex.
4. 50 per cent Slicing: The Inverse Relationship (λ^{-1}). Answers to questions E1, E2, E3, E4, and E7 were not involved in any 1- or 2-simplex structures; E5 was involved in a self 1-simplex and 1-simplexes with E6 and E8; E6 was involved in a self 1-simplex and 1-simplex with E8; E8 was involved in a self 2-simplex and a 1-simplex with E9; E9 was involved in a self 1-simplex.

COMPARISON OF THE 12/1995 AND 2/1998 'ETHNIC RELATIONS' PUBLIC OPINION DATA

Results of the Q-analysis of the data collected in 2/1998 are shown in Figure 19. A significant feature is the partial restoration of confidence in the courts (question E9) by the Serbs at slicing levels 40, 50, and 60 and by the Croats at the 40 per cent level as well as the concurrence with other questions, as described below. Results of the Q-analysis of 2/1998 data sliced at the 40 and 50 per cent levels is reported below for both the direct and indirect relationships.

1. 40 per cent Slicing: The Direct Relationship (λ). The Serbs now concur with questions E4 and E6 to E9, The Croats concur with questions E5 to E9, and the Muslims concur with all questions except E4. This latter reflects a continuing distrust of the Serbs by the Muslims. As a consequence, the Serbs were involved in a self 4-simplex and in a 3-simplex with the Croats and Muslims, compared with 4-, 2-, and 3- in 12/1995. The Croats were involved in a self 4- simplex and in a 4-simplex with the Muslims and the Muslims

were involved in a self 7-dimensional simplex, as they were in 12/1995 (Figures 18 and 19).

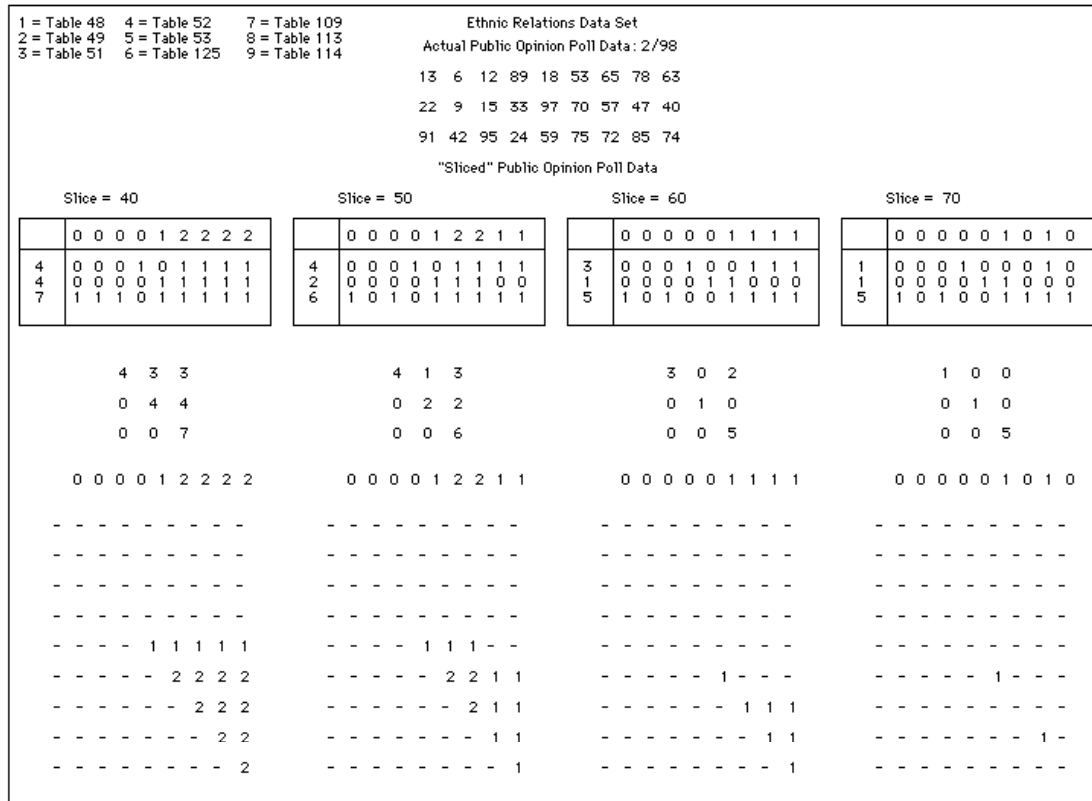


Figure 19: Q-analysis of the ‘ethnic relations’ public opinion poll data from 2/1998.

2. 40 per cent Slicing: The Inverse Relationship (λ^{-1}). Question E5 was involved in a self 1-simplex, and in 1-simplex relationships with questions E6 to E9. Questions E6 to E9 were involved in self and inter-question 2-simplex relationships (Figure 19).
3. 50 per cent Slicing: The Direct Relationship (λ). The Serbs concurred with questions E4 and E6 to E9 and were involved in a self 4-simplex and in 1- and 3-simplices with the Croats and Muslims, respectively, compared with 2-, 0-, and 1-dimensional relationships, respectively, in 12/1995. The Croats were involved in a self 2-simplex as well as a 2-dimensional simplex relationship with the Muslims as they were in 12/1995. The Muslims were involved in a self 6-dimensional simplex, compared with a 7-dimensional relationship in 12/1995 (Figures 18 and 19).
4. 50 per cent Slicing: The Inverse Relationship (λ^{-1}). Increased connectivity occurred in the 2/1998 data compared with the 12/1995 data. The question E5 was involved in self 1-simplex and in 1-simplex relationships with E6 and E7; E6 was involved in a self 2-simplex, in a 2-simplex relationship with E7, and 1-simplex relationships with E8 and E9; E7 was involved in a self 2-simplex and in 1-simplex relationships with E8 and E9; E8 and E9 were involved in 1-simplex relationships (Figures 18 and 19).

The picture that appears to emerge from the results of the time-dependent Q-analysis described in this section is one in which the ethnic groups appear to have an overall level of confidence in the local government, the police, and the courts (questions E7 “*How much confidence do you have in the local government?*”, E8 “*How much confidence do you have in the police?*”), and E9 “*How much confidence do you have in the courts?*”) and in the need to forget the injustices of the past (question E6 “*We need to forget the injustices of the past and concentrate on the future*”).

However, there is a corresponding generally unfavorable opinion by the other ethnic groups for their counterparts (questions E3 “*What is your opinion of the Muslims in Bosnia?*”, E4 “*What is your opinion of the Serbs in Bosnia?*”, and E5 “*What is your opinion of the Croats in Bosnia?*”) and pessimism about peaceful coexistence (question E1 “*Do you believe that the Serbs, Croats, and Muslims can live peacefully together in the country or has the war done too much damage for them to live together peacefully anymore?*”) and the risk of living as an ethnic minority (question E2 “*People can feel completely safe only when they are in the majority in their country*”). This seems to suggest that there is an apparent willingness of the ethnic groups to look for support from, and to have faith in, entities that are potentially above the immediate group level. It also suggests that each of the ethnic groups have relatively low opinions of the other groups on a more personal level and that there is a real fear of being placed at risk by being in an ethnic minority.

It is possible that these results could be used to identify where significant actions need to be taken to stabilize and then enhance the ethnic, societal, and political environment in Bosnia. One approach could capitalize on the relatively high level of belief in the local government. It might be possible, for instance, to develop an environment where the increasing participation of different ethnic individuals in local government could lead to a change in the perceptions of one group by the other. However, if these activities were not undertaken with care, a potential back-lash could be extremely counter-productive, and could create even deeper inter-ethnic divisions in Bosnia.

THE ‘INTERNATIONAL RELATIONS’ DATA SET CLUSTER

Having considered the inter-personal and inter-ethnic dimensions of public opinion in Bosnia, attention will be paid to the opinions of the different ethnic groups with regard to questions concerning the more international aspects of that environment. In order to support these activities, a so-called *International Relations Data Set* cluster has been identified. This cluster involves data on the answers to the following public opinion poll questions collected by the United States Information Agency during 12/1995, 4/1996, 8/1996, 1/1997, 7/1997, and 2/1998 and published in 1998.

1. Question 11: “*Do you favor or oppose the Dayton Peace Accords?*” (Figure 20, source: USIA, 1998, Table 18). The Accords were favored by a clear majority of the three ethnic groups for the period of interest. Some 67 per cent of the Serbs favored the Accords in both in 12/1995 and in 2/1998. The corresponding figures for the Croats were 74 and 73 per cent and the figures for the Muslims were 85 per cent and 97 percent.

Bosnian Serbs

	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Favor	67	81	68	63	79	67
Total Oppose	33	18	31	34	19	26
Bosnian Croat						
2/98						
Total Favor	74	79	79	76	76	73
Total Oppose	25	20	21	23	22	24
Bosnian Muslim						
2/98						
Total Favor	85	95	94	94	97	97
Total Oppose	15	5	6	6	3	3

Figure 20: Public opinion poll data in answer to the question “Do you favor or oppose the Dayton Peace Accords?” (Source: USIA, 1998, Table 18).

2. **Question I2:** This question asked whether or not the [Dayton] Accords are better than continued war (Figure 21, source: USIA, 1998, Table 19). All groups considered the Dayton Accord to be better than war. Some 76 per cent and 81 per cent of the Serbs agreed in 12/1995 and 2/1998, respectively. Corresponding figures for the Croats were 78 per cent and 79 per cent and for the Muslims 85 per cent and 94 per cent in 12/1995 and 2/1998, respectively.

Bosnian Serbs						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Accord Better	76	84	83	82	88	81
Continue Fighting	22	11	14	16	3	13
Bosnian Croat						
2/98						
Accord Better	78	81	77	78	81	79
Continue Fighting	19	18	21	20	18	18
Bosnian Muslim						
2/98						
Accord Better	85	89	89	89	93	94
Continue Fighting	14	10	8	11	5	4

Figure 21: Public opinion poll data in answer to the question of whether the Dayton Accords are better than continued war (Source: USIA, 1998, Table 19).

3. **Question I3:** “How much confidence do you have that these [Dayton] accords will result in a lasting peace for us?” (Figure 22, source: USIA, 1998, Table 21). There was generally much lower confidence that the Dayton Accords would lead to a lasting peace. Thus, 51 per cent of the Serbs were confident of the peaceful impact of the Accords in 12/1995 and this had increased to 58 per cent in 2/1998. The corresponding figures for the Croats were 48 in

12/1995 and 41 per cent in 2/1998. Muslim confidence changed from 65 per cent in 12/1995 to 87 per cent in 2/1998.

Bosnian Serbs						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Confidence	51	76	53	51	-	58
Total Non-confid.	48	22	44	36	-	34
Bosnian Croat						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Confidence	48	44	33	32	-	41
Total Non-confid.	49	56	67	68	-	56
Bosnian Muslim						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Confidence	65	71	80	78	-	87
Total Non-confid.	36	28	19	21	-	12

Figure 22: Public opinion poll data in response to the question: "How much confidence do you have that these [Dayton] accords will result in a lasting peace for us?" (Source: USIA, 1998, Table 21).

4. **Question I4:** "What is your opinion of the provision that Bosnia Hercegovina (*sic.*) will remain a single state?" (Figure 23, source: USIA, 1998, Table 22). This was only supported by 4 per cent of the Serbs in 12/1995 and by 18 per cent in 2/1998. The corresponding figures for the Croats were 65 per cent in 12/1995 and 36 per cent in 2/1998. Some 99 per cent of the Muslims supported the proposition in 12/1995 and 97 per cent in 2/1998.

Bosnian Serbs						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Support	4	7	4	5	9	18
Total Oppose 96	91	95	94	89	75	
Bosnian Croat						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Support	65	52	31	36	34	36
Total Oppose	35	46	67	62	63	60
Bosnian Muslim						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Support	99	99	97	98	98	97
Total Oppose 1	1	2	1	0	2	

Figure 23: Public opinion poll data in response to the question: "What is your opinion of the provision that Bosnia Hercegovina (*sic.*) will remain a single state?" (Source: USIA, 1998, Table 22).

5. **Question I5:** “*What about the Bosnian Serb Republic? Do you favor or oppose the existence of a Bosnian Serb Republic?*” (Figure 24, source: USIA, 1998, Table 25). Some 98 per cent of the Serbs favored this proposition in 12/1995 and 98 per cent in 2/1998. The corresponding figures for the Croats were 43 per cent and 47 per cent in 12/1995 and 2/1998, respectively, and the level of Muslim support changed from 7 per cent to 11 per cent between 12/1995 and 2/1998.

Bosnian Serbs						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Favor	98	97	98	98	98	98
Total Oppose 1	1	0	1	0	1	
Bosnian Croat						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Favor	43	37	52	54	45	47
Total Oppose	55	61	44	43	50	46
Bosnian Muslim						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Favor	7	5	3	3	11	11
Total Oppose 93	94	96	96	86	86	

Figure 24: Public opinion poll data in response to the question: “*What about the Bosnian Serb Republic. Do you favor or oppose the existence of a Bosnian Serb Republic?*” (Source: USIA, 1998, Table 25).

6. **Question I6:** “*Do you favor or oppose the Muslim-Croat Federation between Bosnian Croats and Muslims?*” (Figure 25, source: USIA, 1998, Table 26). This proposition was supported by 31 per cent of the Serbs in both 12/1995 and 2/1998. Some 58 per cent of the Croats supported the proposition in 12/1995 and 39 per cent in 2/1998 while the level of Muslim support was 91 per cent in 12/1995 and 90 per cent in 2/1998.
7. **Question I7:** “*And what about the Confederation agreement between Croatia and the Muslim-Croat Federation?*” (Figure 26, source: USIA, 1998, Table 27). Only 23 per cent of Serbs supported this proposition in 12/1995 and 29 per cent in 2/1998. The level of Croat support changed from 77 per cent to 72 per cent while the level of Muslim support had declined from 67 to 43 per cent over the same period.

Bosnian Serbs						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Favor	31	17	46	50	61	31
Total Oppose 67	69	42	39	29	43	
Bosnian Croat						

	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Favor	58	52	38	39	38	39
Total Oppose	42	47	62	57	61	59
Bosnian Muslim						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Favor	91	97	91	93	93	90
Total Oppose	8	3	7	5	6	9

Figure 25: Public opinion poll data in response to the question: “Do you favor or oppose the Muslim-Croat Federation between Bosnian Croats and Muslims?” (Source: USIA, 1998, Table 26).

Bosnian Serbs						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Favor	23	12	36	45	-	29
Total Oppose	75	77	49	41	-	47
Bosnian Croat						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Favor	77	79	66	74	-	72
Total Oppose	22	18	31	20	-	23
Bosnian Muslim						
	12/95	4/96	8/96	1/97	7/97	
2/98						
Total Favor	67	70	65	56	-	43
Total Oppose	32	27	27	38	-	52

Figure 26: Public opinion poll data in response to the question: “And what about the Confederation agreement between Croatia and the Muslim-Croat Federation?” (Source: USIA, 1998, Table 27).

8. **Question 18:** “How concerned are you that fighting might start again in a few years?” (Figure 27, source: USIA, 1998, Table 31). Some 91 per cent of Serbs were concerned about future conflict in 12/1995 and 76 per cent in 2/1998. The level of Croat concern changed from 62 per cent to 63 per cent and that of the Muslims from 68 per cent to 54 per cent over the same period.
9. **Question 19:** “What is your opinion of the presence of SFOR [IFOR] peacekeeping troops in Bosnia Hercegovina (sic.)?” (Figure 28, source: USIA, 1998, Table 33). The level of Serb support for the proposition changed from 5 per cent in 12/1995 to 50 per cent in 2/1998. The level of Croatian support changed from 81 to 59 per cent while the level of Muslim support changed from 93 to 95 per cent over the same period.

Q-ANALYSIS OF THE 'INTERNATIONAL RELATIONS'
DATA SET CLUSTER

The data presented in Figures 20 to 28 were subjected to Q-analysis in order to determine the pattern of direct relationships (λ) between the opinion of the Serbs, Croats, and Muslims with regard to the international relations data cluster as well as the inverse relationship (λ^{-1}) between the answers to the public opinion poll questions. The major difference between the results of the Ethnic and International Relations data clusters is the greater level of concurrence with the International relations questions. This results in a greater connectivity between the opinions of the different ethnic groups with regards to international matters. This observation can be seen as a possibly partial extension of the results obtained from analysis of the Ethnic Relations data set. In that case, there appeared to be less inter-ethnic group agreement about relatively personal matters and more agreement concerning local government and the judicial system, matters that are local or regional in scope.

Bosnian Serbs						
2/98	12/95	4/96	8/96	1/97	7/97	
Total Favor	91	91	74	72	56	76
Total Oppose	7	23	14	42	22	
Bosnian Croat						
2/98	12/95	4/96	8/96	1/97	7/97	
Total Favor	62	82	86	82	74	63
Total Oppose	36	18	14	16	24	36
Bosnian Muslim						
2/98	12/95	4/96	8/96	1/97	7/97	
Total Favor	68	81	76	68	66	54
Total Oppose	32	18	21	25	30	44

Figure 27: Public opinion poll data in response to the question: "How concerned are you that fighting might start again in a few years?" (Source: USIA, 1998, Table 31).

Bosnian Serbs						
2/98	12/95	4/96	8/96	1/97	7/97	
Total Support	5	49	53	51	32	50
Total Oppose	57	50	46	48	66	45
Bosnian Croat						
2/98	12/95	4/96	8/96	1/97	7/97	
Total Support	81	72	65	72	66	59
Total Oppose	19	28	35	27	33	39
Bosnian Muslim						
2/98	12/95	4/96	8/96	1/97	7/97	
Total Favor	93	90	90	93	96	95

Total Oppose	7	9	9	7	5	5
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Figure 28: Public opinion poll data in response to the question: “What is your opinion of the presence of SFOR [IFOR] peacekeeping troops in Bosnia Hercegovina (sic.)?” (Source: USIA, 1998, Table 33).

ANALYSIS OF THE ‘INTERNATIONAL RELATIONS’ DATA
COLLECTED IN 12/1995

Results of the Q-analysis of the data collected in 12/1995 presented in Figure 29 show the Q-connectivities for the direct relationship between the opinions of the Serb, Croat, and Muslim ethnic groups and also for the inverse relationships. As mentioned above, these data exhibit a greater degree of connectivity at all slicing levels compared with the ethnic relations data. This higher level of connectivity reflects significantly greater agreement of the benefit of the Dayton Accords and the possibly relatively greater belief in the benefits of strong international relations compared with the perceived belief in and benefit from inter-ethnic relationships.

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Figure 29: Q-analysis of the ‘international relations’ opinion poll data collected in 12/1995.

Results of the Q-analysis of 12/1995 data sliced at the 40 and 50 percent levels is reported below for both the direct and indirect relationships.

1. 40 per cent Slicing: The Direct Relationship (λ). The Serbs concurred with questions I1 (“*Do you favor or oppose the Dayton Peace Accords?*”), I2 (whether or not the [Dayton] Accords are better than continued war), I3 (“*How much confidence do you have that these [Dayton] accords will result in a lasting peace for us?*”), I5 (“*What about the Bosnian Serb Republic? Do you favor or oppose the existence of a Bosnian Serb Republic?*”), and I8 (“*How concerned are you that fighting might start again in a few years?*”), (Figure 29). The Croats concurred with all questions, and the Muslims concurred with all but question I5 (Figure 29). As a result, the Serbs are involved in a self 4-simplex and in 4- and 3- simplexes with the Croats and Muslims. The Croats are involved in a self 8-simplex and in a 7-simplex with the Muslims and the Muslims are involved in a self 7-simplex.
2. 40 per cent Slicing: The Inverse Relationship (λ^{-1}). Questions I1, I2, and I3 are involved in self and inter-question simplex relationships, question I8 is involved in a self 2-simplex and in 1- simplexes with other questions, the other questions are involved in some 1-dimensional simplex relationships (Figure 29).
3. 50 per cent Slicing: The Direct Relationship (λ). The Serb and Muslim concurrence remained the same as at the 40 per cent level and the Croats failed to concur with questions I3 (“*How much confidence do you have that these [Dayton] accords will result in a lasting peace for us?*”) and I5 (“*What about the Bosnian Serb Republic? Do you favor or oppose the existence of a Bosnian Serb Republic?*”) at the 50 per cent level. The Serbs were involved in a self 4-simplex and in 2- and 3- simplex relationships with the Croats and Muslims (Figure 29). The Croats were involved in a self 6-simplex and also in a 6-simplex relationship with the Muslims. The Muslims were involved in a self 7-simplex.
4. 50 per cent Slicing: The Inverse Relationship (λ^{-1}). Question I5 (“*What about the Bosnian Serb Republic? Do you favor or oppose the existence of a Bosnian Serb Republic?*”) was involved in zero-degree simplex relationships, Questions I1, I2, and I8 were involved in some 2- and some 1-dimensional simplex relationships, and all other relationships were as shown in Figure 29.

COMPARISON OF THE 12/1995 DATA AND THE 2/1998 DATA

Simplex relationships and other data for Serb, Croat, and Muslim ethnic groups are shown in Figure 30 for the opinion poll information collected in 2/1998. Analyzed poll data show a reduction in the level of entity question concurrence and entity simplex connectivity. Results of the Q-analysis of 2/1998 data sliced at the 40 and 50 percent levels is reported below for both the direct and indirect relationships.

1. 40 per cent Slicing: The Direct Relationship (λ). The Serbs concurred with all questions except I4, I6, and I7, the Croats with all but questions I4 and I6, and the Muslims with all but question I5. As a result, the Serbs were involved in a self 5-simplex, and in 5- and 4-simplexes with the Croats and Muslims,

respectively, compared with 4-, 4-, and 3-, respectively, in 12/1995. The Croats were involved in a self 6-simplex and a 5-simplex with the Muslims, compared with 8- and 7-, respectively in 12/1995 and the Muslims retained a self 7-simplex relationship (Figures 29 and 30).

2. 40 per cent Slicing: The Inverse Relationship (λ^{-1}). Questions I1, I2, I3, I8, and I9 were involved in self 2-simplex connectivities, questions I5 and I7 were involved in self 1-simplex relationships, and I4 and I6 were involved in zero-degree connectivity relationships (Figures 29 and 30).
3. 50 per cent Slicing: The Direct Relationship (λ). The Serbs were involved in a self 5-simplex and in 3- and 4-simplex relationships with the Croats and Muslims, respectively, compared with 4-, 2-, and 3- in 12/1995 (Figures 29 and 30). The Croats were involved in a self 4-simplex and a 3-simplex with the Muslims, compared with 6- and 6- in 12/1995 and the Muslims were involved in a self 6-simplex, compared with a 7-simplex in 1/1997.
4. 50 per cent Slicing: The Inverse Relationship (λ^{-1}). Questions I4 to I7 were involved in zero-degree connectivity relationships in 2/1998 (Figure 30).

The major feature that emerges from the Q-analysis of the 'International Relations' data cluster is the generally relatively high level of concurrence with more of the questions compared with the concurrence with those questions in the Ethnic Relations data cluster. However, the levels of concurrence for the International Relations Cluster decline between 12/1995 and 2/1998. In particular, the general persistent concurrence with questions I1 ("*Do you favor or oppose the Dayton Peace Accords?*"), I2 (whether or not the [Dayton] Accords are better than continued war), I3 ("*How much confidence do you have that these [Dayton] accords will result in a lasting peace for us?*"), I8 ("*How concerned are you that fighting might start again in a few years?*"), and I9 ("*What is your opinion of the presence of SFOR [IFOR] peacekeeping troops in Bosnia Hercegovina (sic.)?*") is very noticeable.

This relates to the persistence of support for the 'Ethnic Relations' questions E6 ("*We need to forget the injustices of the past and concentrate on the future*"), E7 ("*How much confidence do you have in the local government?*"), E8 ("*How much confidence do you have in the police?*"), and E9 ("*How much confidence do you have in the courts?*"). (Figures 18 and 19). By contrast, there is a relatively marked lack of support for propositions suggesting support for one ethnic group by the other ethnic groups on an inter-group basis. However, a decline in group and issue connectivity on internationally-related matters appears to have occurred between 12/1995 and 2/1998.

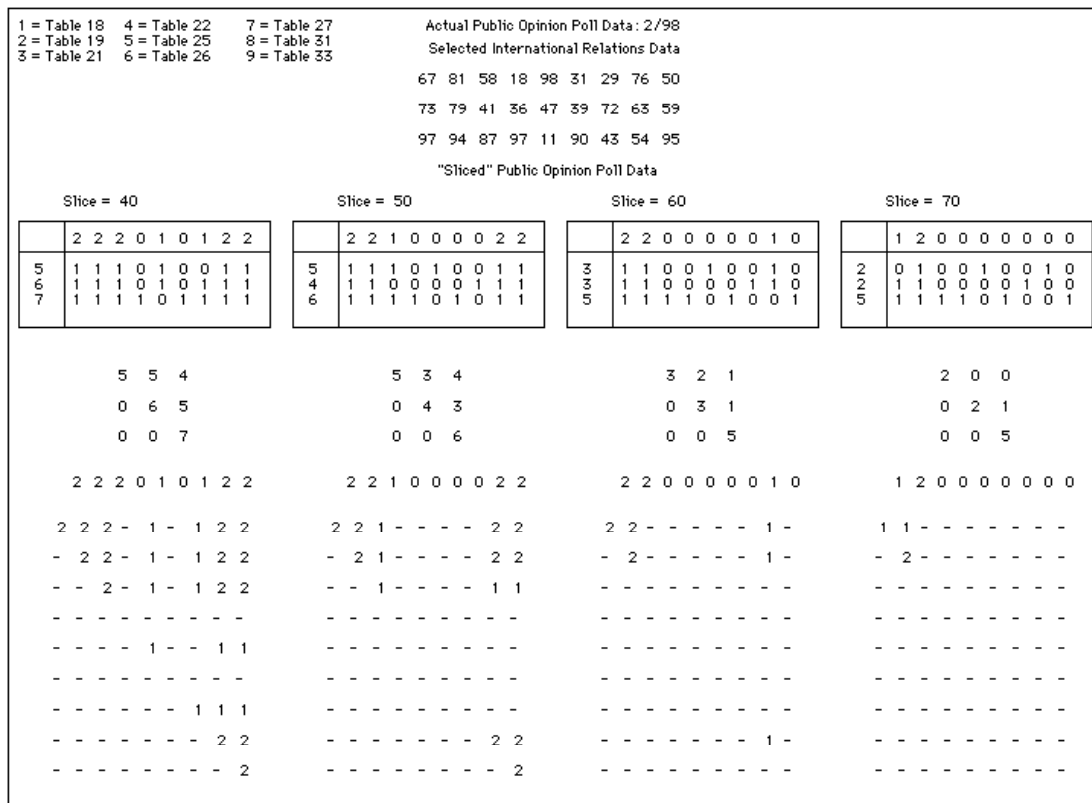


Figure 30: Q-analysis of the ‘international relations’ 2/1998 opinion poll data.

Having demonstrated that Q-analysis methods can be used to examine the relationships between the opinions of different types of ethnic group, the remainder of the paper will show how these methods can be used in a new way to support policy-making. In particular, a series of “thought-experiments” will be undertaken in which the level of support for one or more of the public opinion poll questions is changed to reflect the notional outcome of actions that might be taken by local, national, and/or international entities. This form of analysis could be used to examine the effectiveness of a range of potential policies by selected international entities, and thus could be used to provide prospective guidance to such entities on the selection of appropriate tactics aimed at achieving particular types of outcome.

A Q-ANALYTIC APPROACH TO PROSCRIPTIVE POLICY-MAKING

This paper has just shown how Q-analysis can reveal relational structure in public opinion poll data. The data were derived from multi-ethnic sources in Bosnia-Herzegovina and the Q-analysis described above has identified patterns of agreement and disagreement between these sources. Q-analysis can also be used to examine the emerging structure of opinion relationships caused by the actions of international and other entities aimed at changing the opinions of the different ethnic groups within Bosnia-Herzegovina. The result of such activities could set the scene for an activity called *Proscriptive Policy-making* by the authors.

Q-analysis-based Prospective Policy-making involves the undertaking of an initial Q-analysis of a selected public opinion poll data set. The results of such analysis using data collected by the United States Information Agency in 2/1998 are presented in Figure 31.

These data could be subjected to progressive modification to mimic the effect of possible changes in public opinion that might be caused by international and other actions. The modified opinion poll data could then be subjected to an additional phase of Q-analysis. These modified data and the results of the second phase of Q-analysis show a significant increase in connectivity (Figure 32). A comparison of the results of the Q-analysis of the actual or initial and the modified data sets would reveal the impact of the notional changes in poll data on inter-ethnic connectivity. Acceptance of the desirability of such changes would set the scene for the development of plans and procedures aimed at achieving the desired changes in public opinion poll data. The impact of the results of the implementation of such plans and procedures could be monitored with the aid of actual public opinion polls. Data collected during such polls could be subjected to Q-analysis and the results compared with the results obtained during the notional modeling activities described below, for example.

In the following study, poll data collected by the United States Information Agency in response to the following questions: (A₁) *Do you believe that the Croats, Muslims, and Serbs can live peacefully together in the country, or has the war done too much for them to live together peacefully anymore?*; (A₂) *People can feel completely safe only when they are in the majority nationality in their country*; (A₃) *How much confidence do you have in the local government?*; (A₄) *How much confidence do you have in the central government of Bosnia?*; (A₅) *How much confidence do you have in the collective presidency of Bosnia?*; (A₆) *How much confidence do you have in the police?*; (A₇) *How much confidence do you have in the courts?*; (A₈) *Everyone living in Bosnia should have the same rights, regardless of his or her nationality*; and (A₉) *We need to forget the injustices of the past and concentrate on the future*. The modifications of public opinion poll data involve the following categories and changes.

Actual Public Opinion Poll Data							
13	6	65	45 25 78 63 65 53				
22	9	57	16 16 47 40 86 70				
91	42	72	67 51 85 74 90 75				
"Sliced" Public Opinion Poll Data							
Slice = 40		Slice = 50		Slice = 60		Slice = 70	
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4	0 0 1 0 0 1 1 1 1	2	0 0 1 0 0 0 0 1 1	1	0 0 0 0 0 0 0 1 1	1	0 0 0 0 0 0 0 1 1
8	1 1 1 1 1 1 1 1 1	7	1 0 1 1 1 1 1 1 1	6	1 0 1 1 0 1 1 1 1	5	1 0 1 0 0 1 1 1 1
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Figure 31: Output generated by the prototype Q-analysis software for actual data sliced at the 40, 50, 60, and 70 per cent threshold levels (Data Source: United States Information Agency, 1998).

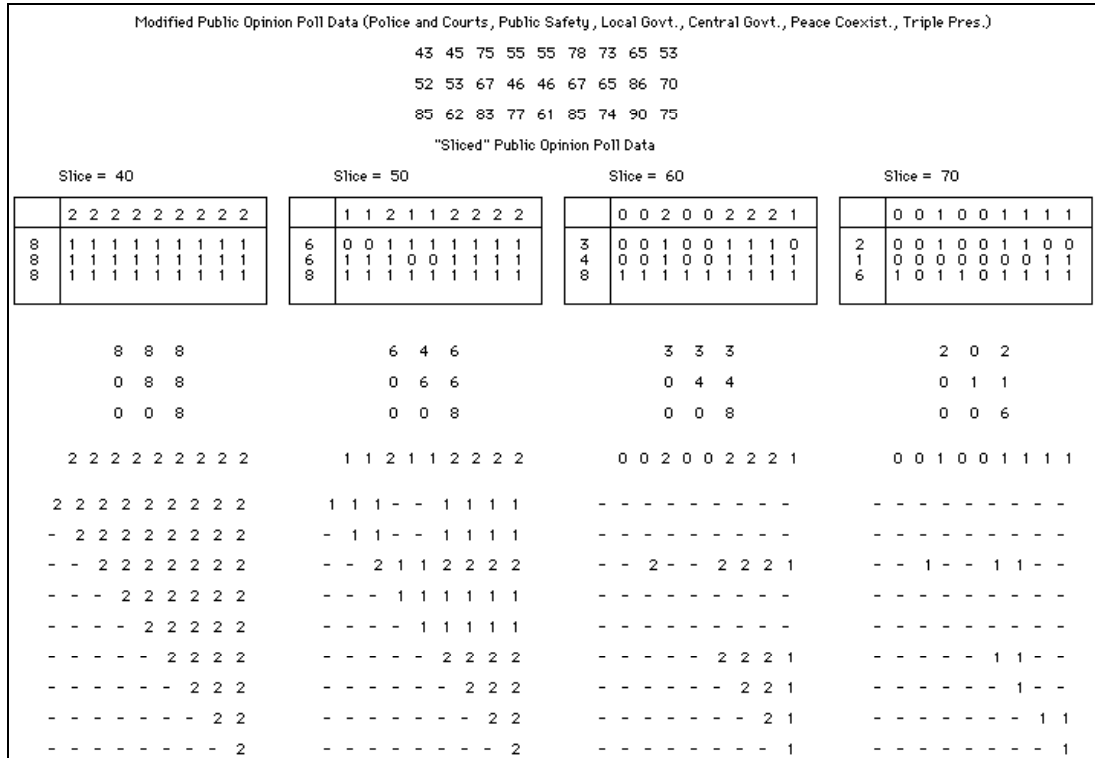


Figure 32: Q-analysis of data modified for increased confidence in the police, the courts, public safety, local government, the central government, peaceful co-existence, and the triple presidency reveal increased levels of connectivity.

1. *Confidence in the police (A₆) and the courts (A₇):* The level of support for the police is assumed to have increased from 47 to 67 per cent for the Croats and to have remained constant at the relatively high levels of 78 and 85 per cent, respectively, for the Serbs and Muslims. The level of support for the courts is assumed to have increased from 63 to 73 per cent for the Serbs, from 47 to 67 per cent for the Croats, and to have remained constant at 74 per cent for the Muslims (Figures 31 and 32).
2. *Perception of the public safety (A₂):* The perception of public safety (A₂) is assumed to have increased from 6 to 45 for the Serbs, from 9 to 58 per cent for the Croats, and from 42 to 62 for the Muslims.
3. *Confidence in the local government (A₃):* The confidence in local government (A₃) is assumed to have increased from 66 to 75 for the Serbs, from 57 to 67 per cent for the Croats, and from 72 to 83 for the Muslims.
4. *Confidence in the central government (A₄) and perceived peaceful coexistence (A₁):* The assumed increase in the level of confidence in the central government (A₄) is assumed to have increased from 45 to 55 per cent for the Serbs, from 16 to 46 per cent for the Croats, and from 67 to 77 per cent for the

Muslims. The perception of peaceful coexistence (A_1) is assumed to have increased from 13 to 43 per cent for the Serbs, 22 to 52 per cent for the Croats, and to have decreased from 91 to 85 per cent for the Muslims.

5. *Confidence in the collective presidency (A_5):* The level of confidence in the triple presidency (A_5) is assumed to have increased from 25 to 55 per cent for the Serbs, from 16 to 46 per cent for the Croats, and from 51 to 61 per cent for the Muslims.

THE WAY FORWARD

This paper has used Q-analysis methods to study selected public opinion poll data obtained from Serbs, Croats, and Muslims in Bosnia Herzegovina by the United States Information Agency and published in 1998. This analysis has shown some linkages at the 40 per cent slicing level and a reduced level of linkage at the 50 per cent level, but relatively few relationships at the 60 and 70 per cent levels. Two clusters of public opinion poll data, referred to as the '*Ethnic Relations*' and '*International Relations*' data clusters.

Q-analysis of the '*Ethnic Relations*' data set appears to suggest that there is an apparent willingness of the ethnic groups to look for support from, and to have faith in, entities that are potentially above the immediate group level. Another feature that appears to emerge from this study is the generally relatively higher level of positive responses to the different questions from the Muslim poll sample compared with those from the Serbs and Croats.

This analysis also suggests that each of the ethnic groups has a relatively low opinion of the other groups on a personal level and that there is a real fear of being placed at risk by living in a region where an individual would be in an ethnic minority. This finding clearly reflects the wide divisions between these different ethnic groups in Bosnia Herzegovina in early 1998. However, there appears to be a relatively high level of confidence in the local government as well as in the police and the courts.

The major feature that emerges from the Q-analysis of the '*International Relations*' data cluster is the generally relatively high level of support for the Dayton Accords, the likelihood that the Accords would provide the basis for a lasting peace, and the presence of SFOR [IFOR] peacekeeping troops in Bosnia. There was a serious concern by all ethnic groups that fighting might break out again.

Results obtained from the Q-analysis of actual public opinion poll data suggested a method for using this technique, called *Proscriptive Policy-making* by the authors, to assess the impact of policies and actions aimed at changing public perceptions of the situation in Bosnia Herzegovina. This was accomplished by progressively changing public opinion poll data in order to reflect a notional situation as if policies and actions had created a change in these data (Figure 33). This activity built in the initially relatively high level of confidence in the local government by each of the ethnic groups.

- As a first stage in the process of poll data modification, an increase in the confidence in the police (A_6) and the courts (A_7) was assumed. Subsequent modifications involved changing the perceptions of the public safety (A_2).

- An increase in the level of confidence in local government (A_3), which might be expected from a population that had a feeling of increased security and an increasing belief in the fairness of the justice system, was then assumed to have taken place.
- Increasing confidence in the local government when coupled with additional actions and policies could set the scene for an increased level of confidence in the central government (A_4) and the perception of the possibility of peaceful coexistence (A_1).
- These changes and additional policies and actions could lead to an increase in the confidence in the capabilities of the collective presidency (A_5).

This paper has shown how methods based on Q-analysis can be used to determine the degree of inter-ethnic connectivity contained in public opinion poll data collected in Bosnia Herzegovina by the United States Information Agency. In general, the degree of connectivity appears to be lowest for questions involving relatively low-level and real inter-ethnic group relationships and higher for questions associated with the perceived benefit of relatively high-level, and perhaps more abstract concepts involving the Dayton Accords.

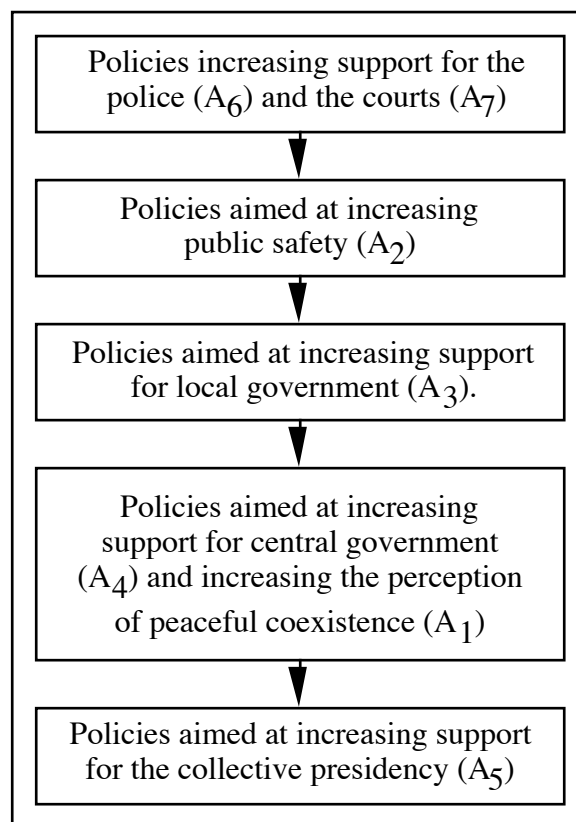


Figure 33: Proscriptive policy-making can be used to guide a program of actions aimed at increasing inter-ethnic connectivity.

Q-analysis can reveal the impact of time-dependent changes in public opinion on inter-ethnic group connectivity. Time-dependent Q-analytic results could provide a new type of indicator that could alert policy and decision-makers to potential trouble, for example. Such

alerts could be used to identify where existing policies and activities might be changed with benefit in order to maintain or increase existing levels of connectivity. The relative impact of particular changes can be assessed with the aid of the Proscriptive Policy-making procedures outlined in this paper. These matters are the subject of on-going studies and the results of those activities may be reported elsewhere in due course.

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