A Computer Analysis of the Isaiah Authorship Problem

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Biblical scholars have been arguing the Isaiah problem—whether or not the same man wrote all 66 chapters of the book of Isaiah as it stands in the Old Testament—at least since the Twelfth Century. The divisionists separate the authorship into 1st Isaiah—chapters 1-39—and 2nd, or Deutero-Isaiah—chapters 40-66. Some critics have proposed that all evidence points to more than two divisions written by different authors.

The greater part of the critical attack on the unity of Isaiah has concerned itself with the literary unity of the book, with the multiple author theorists claiming that variables such as vocabulary, syntax, textual forms, contents, and poetic style differ from section to section.[1] They generally attribute similarities in the various sections cited in defense of the single author claim as the work of Isaiah's disciples who patterned their work after his, or even copied the prophet. The result is that in many cases, both sides cite the same sources to support opposing conclusions.[2]

Since the stylistic elements frequently cited by critics are amenable to statistical analysis, many linguists have suggested that statistical research methodology be applied to problems of authorship, using subject matter and contextually oriented word families as a base. Two such studies have been done,[3]

[1] R. K. Harrison, *Introduction to the Old Testament* (Grand Rapids: William B. Eerdmans, 1969), pp. 775-76.

[2] L. Lamar Adams, "A Statistical Analysis of the Book of Isaiah in Relation to the Isaiah Problem" (Ph.D. diss., Brigham Young University, 1972), pp. 28-29, 37.

[3] See Asa Kasher, "The Book of Isaiah—Characterization of Authors by Morphological Data Processing" (Essay, Department of Mathematics, Bar-Ilan University, 1970), pp. 1-54; Yehuda Radday, "Isaiah and the Computer: A Preliminary Report," *Computers and the Humanities* 5 (November 1970):65-72.

but they failed to solve the problem because a different researcher applying the same assumptions, variables, and statistical methods to different texts by known authors will get widely divergent findings.[4] As a matter of fact, the studies noted were inter- and even intra- contradictory.

PROCEDURES USED IN THE PRESENT STUDY

In the investigation of authorship style of literary works, variables should be sought that are consistent from work to work for a given author and at the same time vary from author to author. This type of variable is referred to as a *marker variable* and may be used to identify the literary style that is unique to a given author compared to other authors. Many characteristics of the Hebrew language provide excellent sources of pertinent stylistic elements in authorship identification.[5] These include function prefixes, certain parts of speech that remain constant from text to text for a given author, and special vocabulary, even word families, providing there is consistency and reliability in usage rates for the given author.

Function prefixes include all prefixes except those which are pronominal, verbal, and participial. The latter three types were considered to be too contextual to serve as reliable literary elements for authorship determination. Vowels in the Hebrew language are referred to as points. Ancient Hebrew scriptures were written without these points, which were later added by scribes and other transcribers. This study is based on the unpointed Hebrew texts. Morphology of the Hebrew word includes the basic word root plus suffixes and prefixes. One phase of this study is based on the Hebrew root to avoid effects of later changes by scribes and transcribers. Function prefixes are perhaps the most useful stylistic element in determining authorship from a Hebrew text. In Hebrew, these prefixes constitute a major stylistic element corresponding to the habit-prone parts of speech in English.

The major division in this study for analyzing style in the

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[4]Adams, "Statistical Analysis," pp. 86-101.

[5]In any language some stylistic elements are less reliable for determining authorship than others. Some of the less reliable elements in Hebrew include word families which are subject to contextual influences, parts of speech that are subject to contextual influences, and certain prefixes and suffixes that are influenced by contextual orientation and by the audience to which the text is addressed.

book of Isaiah consists of the commonly used two-fold division, chapters 1-39 and 40-66. In addition, stylistic elements are examined using several different types of subdivisions in the book of Isaiah for intratext analyses. Some of these smaller divisions are (1) a subdivision of the second half of the book, chapters 40-55 and chapters 56-66; (2) divisions used by Radday plus the section he omitted, chapters 1-12, 13-23, 24-35, 36-39 (the omitted section), 40-48, 49-57, and 58-66; and (3) a combination of the divisions postulated by S. R. Driver[6] and Alois Barta,[7] 1-12, 13-23, 24-27, 28-33, 34-35, 36-39, 40-48, 49-55, 56-62, and 63-66.

Perhaps one of the most determining factors in authorship identification is the comparison of intertext with intratext variation. Changes between the two Isaiah divisions take on more meaning when compared to variations between control texts and within control texts. It must be determined whether or not intraauthor variation is smaller than interauthor variation for a given element if that element is to be used as a stylistic marker variable in determining authorship.

The literary style in the complete book of Isaiah is compared with the style in random samples from the following Old Testament books: Amos, Jeremiah, Ezekiel, Hosea, Micah, Habakkuk, Zechariah, Daniel, Ezra, Malachi, and Nehemiah. These eleven samplings serve as Hebrew control texts for comparisons with the book of Isaiah.

This study is the most extensive to date. Specialists in the areas of Semitic languages, statistics, and computer science were involved. Over seventy different types of stylistic elements were examined and several hundred linguistic variables were analyzed.

STATISTICAL RESULTS

A number of stylistic elements from the unpointed Hebrew text of Isaiah indicate a literary style in both parts of the book that is characteristic of that book in contrast to the other books of the Old Testament examined. Stylistic elements that support single author unity include function prefixes, Hebrew marker roots, special vocabulary, certain parts of speech, rep-

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[6]S. R. Driver, *An Introduction into the Literature of the Old Testament* (New York: Charles Scribner's Sons, 1902), p. 206.

[7]Alois Barta, *Syntax of the Sentence in Isaiah 40-66* (Chicago: The University of Chicago Press, 1901), pp. 3-4.

etition of phrases, first letter and last consonantal letter of the Hebrew word. These letters of the Hebrew word show individual habits of speech because of morphological characteristics of the Hebrew language.

Among all stylistic elements examined, the function prefix appears to be the most salient. The book of Isaiah has a surprisingly large number of function prefixes which indicate single authorship. Out of 36 different prefixes and types of prefix combinations examined in the Hebrew texts, 24 occurred in the book of Isaiah. Table 1 contains frequencies for 18 of these 24. Although each of the 18 prefixes is used in both sections (chapters 1-39 and 40-66) in the book of Isaiah, some have zero frequencies in a number of the control texts.

It is evident from the last two columns (Isa-A and Isa-B) in Table 1 that for a number of prefixes the rates of usage exhibit a similarity between the two Isaiah texts at a rate peculiar to the book of Isaiah contrasted to the control texts. For example, both Isaiah sections have a rate of two (equivalent to .02 per 50 prefixes) for the prefix הם compared to .00 for each of the control texts.

A "correlation" measure was devised to compare rates of usage of these 18 prefixes between any two texts. It can vary from zero to one, with zero indicating no relationship, and one showing perfect relationship; all gradations between these two extremes are possible. Among the eleven control books and two sections of Isaiah there are 78 possible pairings of texts. The correlation between the two Isaiah sections is .98, indicating a very high degree of overall similarity in rates of prefix usage. Only three of the other 77 comparisons are as high, a lower number than would be expected from the laws of chance when this many comparisons are made. These results show a closer unity between texts in the book of Isaiah than there is in accepted single author texts.

The analysis was repeated with prefixes eliminated which were not characteristic of the style in Isaiah. Correlations were obtained based upon the remaining six prefixes: כ , במ , הם , מה , וב , and ול . The average correlation for the control texts was .46 with a range from 0 to .89. The correlation between the two sections of Isaiah is .997, which can easily be rounded to 1.00. These results are indeed strong evidence for authorship unity in the book of Isaiah.

An investigation of marker roots discovered approximately

Table 1

Average Frequencies* per Prefix Block from Old Testament Sample
Texts and the Two Sections of the Book of Isaiah
for Certain Function Prefixes

Prefix	AM	DN	EZ	HB	HS	JR	MC	ML	NH	ZC	ZK	Isa-A	Isa-B
ב	920	325	400	733	900	750	966	600	200	625	950	688	676
ה	1120	425	925	700	233	1125	566	700	1225	1475	800	752	467
כ	120	25	50	233	633	50	300	33	200	175	50	231	219
ל	500	625	825	833	900	850	666	500	500	400	375	700	863
מ	360	100	325	500	333	300	666	533	475	150	375	446	521
ו	1700	1700	1425	1800	1833	1650	1633	2266	1650	1950	1650	1834	1884
וב	00	00	00	00	00	00	00	00	00	00	00	2	2
וה	00	00	00	00	00	00	00	00	00	00	00	1	2
וכ	00	00	00	00	00	00	00	00	00	00	00	4	6
כל	00	00	25	33	00	00	00	00	00	00	00	2	6
המ	20	00	25	00	00	00	00	00	25	00	75	15	10
בנ	40	50	125	00	00	00	00	00	50	00	50	11	2
הר	80	50	125	00	66	100	33	166	175	00	150	68	80
וה	40	125	75	100	00	75	33	166	200	25	150	76	56
מהה	00	00	00	00	00	00	00	00	25	00	00	1	2
בה	00	50	00	00	66	00	66	33	00	25	00	15	47
לל	00	75	50	00	00	50	00	00	200	150	00	68	67
מה	80	50	125	00	33	00	33	00	50	00	00	56	73

Abbreviation for the 11 Sample Texts, Isaiah 1 - 39, and Isaiah 40 - 66

*Average frequencies were multiplied by 100 for statistical applications.

350 which have rates of usage characteristic of the two Isaiah texts in contrast to the control texts. Correlations for various groups from the 350 marker roots is 0.95. This is an extremely high index of style similarity compared to the control text indices which range from 0 to .74 for the same variables.

Intertext variation was compared with intratext variation for prefixes, marker roots, and other stylistic elements to determine the degree of similarity between the various texts. Statistical comparisons of intratext with intertext variations indicate that a high degree of similarity exists throughout the book of Isaiah contrasted with the control texts. The correlations between pairs of sections in Isaiah range from .97 to 1.00 for the following sections: chapters 1-12, 13-23, 24-35, 36-39, 40-48, 49-57, and 58-66. Intratext correlations for the other Old Testament books sampled range from .83 to .93. Thus Isaiah shows greater internal consistency than any of the other books examined.

Another example of uniqueness in the book of Isaiah for the usage rate of the prefix ול (in Table 1) may be observed in the English text. Isaiah 19:24 concludes with a description of a condition that will exist in the millennial era: "In that day shall Israel be the third with Egypt *and with* Assyria." In this phrase the Hebrew prefix ול is rendered "*and with.*" This prefix combination may also be translated as follows: ו : *but, for, then, or,* etc., and ל : *to, unto, at, into, for,* etc. Thus, the same prefix is *and to* (King James) in Isaiah 60:9 from the phrase, " . . . to bring thy sons . . . unto the name of the Lord thy God, *and to* the Holy One of Israel. . . ." This has reference to the gathering of exiled Israel in the last days.

The rate usage for ול is unique to the book of Isaiah, occurring approximately 68 times for every 1,000 function prefixes in Isaiah 1-39, and 67/1,000 in Isaiah 40-66, compared to a zero rate (i.e., almost never) for such books as Amos, Micah, and Ezekiel. Usage occurs at a high rate of 200/1,000 in the book of Nehemiah, as exemplified in Nehemiah 2:16: " . . . neither had I as yet told it to the Jews, *nor to* the priests, *nor to* the nobles, *nor to* the rulers, *nor to* the rest that did the work."

A number of other stylistic elements also support authorship unity. Table 2 contains a representative sample of correlations for a number of literary elements that are character-

Table 2
Correlations for Old Testament Control Texts and the
Two Sections of the Book of Isaiah for
Three Stylistic Elements

	Marker Conjunctions	Parts of the Body	Repetition of Phrases
Old Testament Control Texts*	0.65	0.18	0.42
Sections of the Book of Isaiah	0.99	0.99	0.71

*Indices for control texts are means for the indices of several texts.

istic of the style found throughout the book of Isaiah. William Harper lists Hebrew roots for a number of parts of speech and word families.[8] Frequencies from the Harper prepositions and conjunctions were analyzed using the correlation as well as other statistical measures. The two sections of Isaiah are more closely associated to each other in stylistic usage of prepositions and conjunctions than are the control texts. For example, the correlation for the Isaiah texts is 0.99, while the average index for the control texts is 0.65 (see Table 2).

Harper lists roots for a number of word families found in the Old Testament.[9] One word family found to be an exceptionally strong marker family consists of words for different parts of the body. Approximately one dozen words from this word family have a more consistent rate of usage in the two Isaiah texts than in any of the other Old Testament texts examined. Correlations for the rates of usage of the roots for these words are also listed in Table 2. The index for the two Isaiah texts is again higher than any other set of comparisons. These results also tend to support unity of the book of Isaiah, with 0.99 contrasted to a mean of 0.18 for the control texts.

Since some conservative scholars argue that, in comparison to the rest of the Old Testament writers, Isaiah had a greater tendency to repeat or quote himself, repetition of phrases was examined to test the validity of this claim. Roots which have high frequencies in the Old Testament texts were submitted to the computer program to obtain phrase frequencies. Repetitions were counted for nine-word phrases that had four or more identical roots or roots and prefixes. Correlations were obtained for comparisons between the two Isaiah texts and the

[8]William R. Harper, *Hebrew Vocabularies,* 8th ed. (New York: Charles Scribner's Sons, 1902), pp. 1-32.
[9]Ibid.

combined sample texts. In repetition rate, the two Isaiah texts have a higher degree of similarity to each other (correlation of .71) than to the combined sample texts (.42).

Additional *stylistic* elements were examined and found to support the unity of the Book of Isaiah. These include the first and last consonantal letter of the Hebrew word, both of which contribute significantly to morphological characteristics of the Hebrew language.

The majority of stylistic elements examined in this study were also analyzed using other types of statistical procedures. The results confirm the inferences drawn from the correlation measure and support authorship unity of the book of Isaiah.

SUMMARY AND CONCLUSIONS

The statistical results in this study do not support the divisionist claim that little or no evidence exists for unity of the book of Isaiah. To the contrary, results from the statistical analyses over a wide range of types and numbers of stylistic variables strongly support the authorship unity of the book. Several different types of stylistic elements were found to have marker variables unique to Isaiah chapters 1-39 and chapters 40-66. These elements include function prefixes, marker words, prepositions and conjunctions, certain word families, first letter, and last consonantal letter of the Hebrew words, and repetition rates of certain types of phrases.

The two parts of Isaiah most often claimed to have been written by different authors, chapters 1-39 and 40-66, were found to be more similar to each other in style than to any of the control group of 11 other Old Testament books. The book of Isaiah also exhibits greater internal consistency than any of the other 11 books.

These computerized results do not exclude the possibility that minor changes in the text have been made by scribes and editors since the time of its origin. However, the evidence indicates that in spite of such possible changes, deletions, or additions, an overall style has been retained, as measured by the literary variables examined.

The results of our research bear witness that the book of Isaiah has a literary unity characteristic of a single author.