

Isaiah's Structure from Random Forest Regression Analysis

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Abstract

This is the first paper to analyze the tripartite linguistic structure of Isaiah using Random Forest Regression, a supervised machine learning statistical approach. By predicting the occurrences of 'judgment' and 'hope' verses, we examine the threefold structure of Isaiah (section 1--chapters 1-39; section 2--chapters 40-55; and section 3--chapters 56-66) for differences in expression within and between each section. We find more inter-sectional homogeneity between sections 1 and 2 than between sections 1 and 3 or between sections 2 and 3, with respect to both judgment and hope word structures. Moreover, analysis of the judgment-vs-hope word structure indicate that section 3 heterogeneity differs significantly from sections 1 and 2 homogeneity, reinforcing the hypothesis that there is indeed a post-exilic authorship of section 3 (Isaiah 56-66).

Keywords: Isaiah, Random Forest Regression, judgment, hope, linguistic comparison

1. Isaiah Authorship: One Partition (1-66), Two Partitions (1-39; 40-66) or a Three-Part Partition (1-39; 40-55; 56-66)?

Isaiah ben Amoz prophesized in Jerusalem from 740 BC to 701 BC during the reigns of kings Uzziah, Jotham, Ahaz, and Hezekiah. Under the later, Isaiah had relatively great political and religious influence. The book of Isaiah is quoted in the New Testament more than any other Old Testament book. While all of Isaiah is regarded as very important scripture for many reasons (Barker, 1987), and chapters 1-39 are regarded as the direct sayings of Isaiah himself, whether the rest Isaiah was written by the prophet (or under his direction when he was alive) is controversial. Many scholars regard chapters 40-66 as the work of Isaiah disciples, or subsequent prophets writing under his name, rather than the prophet Isaiah himself.

Most modern scholars favor a tripartite structure to the book of Isaiah: 1) chapters 1-39 are general prophecies/oracles against Judah, Jerusalem and surrounding nations; 2) chapters 40-55 do not threaten nor pronounce judgment, but rather offer hope and comfort to the people through God's salvation (especially through his servant: 42:1-4, 49:1-6, 50:4-9 and 52:13-53:12), and 3) chapters 56-66 offer both prophecies of judgment (56-59) and promises of salvation (60-62), and sometimes both (Achtemeier, 1990; Goldingay, 2010; Brown et al., 1990; Barker, 1987). Many scholars believe that Isaiah did not write these later chapters in Isaiah section 3 (that is, chapters 56-66).

Other scholars while accepting the possibility of the tripartite division, maintain the greater relevance of a two-part division of Isaiah rather than a three-part division, that is, Isaiah conceived of as consisting of just 1-39 and 40-66 (for example, Ackroyd, 1971 and Barker et al., 1995) as its relevant literary structure. Indeed, Barker et al. (1995) maintain that the prophet Isaiah likely saw the future, and wrote all of the Isaiah chapters himself (or at least, that Isaiah is directly responsible for writing/dictating all 66 chapters of the book). Their argument for a single author is based upon a linguistic argument for unique words and phrases found throughout most of Isaiah, but seldom found anywhere else in the Old Testament (Barker et al., 1995, p. 1316). A similar linguistic argument for the uniqueness of Isaiah relative to the rest of the Old Testament, and for the unity of Isaiah as a whole, based on a correlation analysis of Hebrew prefix types is given in Adams (1972) and Adams and Rencher (1974).

This is the first paper to analyze the tripartite structure of Isaiah using Random Forest Regression (RFR), a supervised machine learning statistical approach. Prior research indicates that Random Forest Regression is especially suitable for finding hidden linguistic structure: in textual analysis in distinguishing fraudulent 10-K filings (Hajek & Henriques, 2017; Gokturk, 2022); in detecting corporate misconduct (Wang et al., 2020); in

“big data” analysis of accounting information (Nissim, 2022); in detecting the propensity to fall in older adults (Usmani et al., 2021); in analyzing public sentiment (Shahzad et al., 2022; Adamu et al., 2021; Angelopoulou, Mykoniatis, & Smith, 2022); and—most relevant to our analysis—in text classification (Lagutina & Lagutina, 2021; Shah, Patel, Sanghvi, & Shah, 2020; Gupta, Sharma, & Mohapatra, 2021; Khan et al., 2021; Bastian, 2022). And while this is the first RFR analysis of Isaiah, Peurieku et al. (2021) compare Proverbs, Ecclesiastes, and Wisdom from the Bible to the Quran, Yogasutras (India), Tao Te Ching (China) and the Upanishads after extensive pre-processing of the documents, and subsequently applying various supervised machine learning approaches, including random forest regressions (RFR), but with no formal hypothesis testing involved of the type we engage in here.

On the other hand, we do not impose any prior restrictions or pre-processing before the RFR analysis, and keep the analysis relatively simple by dividing each of the three sections into halves when analyzing the intra-sectional homogeneity of Isaiah. That is, we do not drop chapters nor restrict some verses that may be otherwise viewed as inserted or borrowed text. Rather, we take a broad view of the Isaiah chapters in order to test the usefulness of our RFR approach. This analysis of all three parts of Isaiah, with minimal a priori restrictions, will pave the way for more sophisticated analyses later on, not only of Isaiah, but also of other texts where there is controversy over the authorship. In this study, the (null) hypotheses explored include:

Hypothesis 1—*judgment vs hope*: word instruments associated with judgment are not different from word instruments associated with hope, within each of Isaiah’s three major sections (that is, the differences in the ranks of the nodal-orderings will be statistically insignificant from one another)

Hypothesis 2—*intra-sectional homogeneity*: dividing up (into halves) and then analyzing each of the three Isaiah sections will indicate that there are no statistical differences within each section, when predicting either warnings of judgment or expressions of hope.

Hypothesis 3—*inter-sectional homogeneity*:

H3a: section 1 will be like section 2, and also like section 3, at least with respect to judgment

H3b: section 2 will be like section 3, with respect to judgment and hope if the bi-partite advocates are correct (alternative: section 3 will differ from section 2, if section 3 is a post-exilic text and sections 1 and 2 existed before Jerusalem was captured)

2. Random Forest Regression and the Structure of Isaiah

We do a statistical analysis of word usage in Isaiah different from Adams (1972) and Adams and Rencher (1974), in that we look at verse by verse predictors of ‘judgment’ (prominent in chapters 1-39) and ‘hope’ (prominent in chapters 40-55) using ‘instrumental’ word associations, rather than a correlational analysis. Throughout, our source material is the New International Version (NIV) translation of Isaiah. Our data criteria for finding intra-sectional and inter-sectional homogeneity (i.e., similarity) between the Isaiah sections is the relative ordering of predictive nodes using Random Forest Regression (RFR).

RFR is like the monks in a huge monastery randomly exchanging their word pattern associations for judgment verses (and in separate exchanges, for hope verses) on their randomly assigned subsections of Isaiah, with other monks with different subsections, for verification of each other’s findings. This is done repeatedly and impartially, without any a priori assumptions beyond the definition of a ‘judgment’ (or in separate analyses, ‘hope’) verse in Isaiah. The monks’ instructions for this process is simple: find the instrumental words that ‘best’ predict the likelihood of a judgment-type word in each verse (those word choices are given in Table 1) of your subsection, while varying the set of predictors you monks consider. (Then do the same for hope-type verses.) The monks’ ultimate goal is to find what instrumental word patterns each group has found in their repeated draws—whether they vary within, and vary between Isaiah’s sections 1, 2, and 3—as a means to clarify the Isaiah debates mentioned briefly in the introduction.

The accumulated summary of the overall rank ordering of the monks’ independent researches provide the answers—that is, their RFR-equivalent rank ordering of instrumental words’ predictive power in explaining judgment-verses or hope-verses. Instead of these repeated Monk exchanges, we look at the actual RFR nodal rank ordering of instrumental words on the basis of Out-Of-Bag Gini values (OOB Ginis, see James et al., 2013) associated with the RFR-nodes that predict a ‘judgment’ word in a verse in Isaiah (or alternatively, predicting a ‘hope’). That is, we compare how these nodal-orderings (i.e., the predictive power of an instrumental word) vary within and between the three Isaiah sections. If all three sections are written by the prophet Isaiah, then the word instruments best predicting judgment ought to be somewhat similar between the sections, as well as within each section (and probably more so within sections than between sections). If it’s all written by Isaiah, there should be

little statistical difference between the Isaiah sections being compared.

This approach might be criticized for ignoring the possible impact of age on the grammatical style of the prophet Isaiah, but this is a criticism that applies equally to all the linguistic (non-archeological) arguments made by all scholars, including those scholars mentioned in the introductory section.

We formally test intra- and inter-sectional differences in the generated nodal-orderings using the non-parametric Wilcoxon signed rank sum tests in alternative specifications. Since our approach is based on machine-learning, we hope to more carefully deal with pre-test biases of standard linguistic simple word-count, or correlational, approaches in our linguistic analysis of Isaiah. Such pre-test adjustments may bias the analysis, especially if the analyst’s theological graduate training predisposes her to particular word associations. That is, we want our analogue monks to be impartial when examining the word associations.

Table 1. Basic linguistic indicators for the random forest regression analysis of Isaiah, NIV translation

Explanatory Instruments	Judgment Indicators	Hope (Comfort) Indicators
BABYLON ASSYRIA SWORD GARMENTS GARMENT ISRAEL	JUDGMENT	HOPE PEACE COMFORT
JERUSALEM FOREIGNERS JUDAH JACOB ZION EGYPT COVENANT	REBUKE	REJOICE COMFORTS
TEMPLE HEAVENS EARTH PROPHECY HEART HEARTS ISLANDS	REBELLIOUS	COMFORTED
NATIONS NATION KING HEZEKIAH SPIRIT PROPHETS PROPHET	REBELLION	SALVATION SAVE
PHAROA H ROCK VOICE ARM TONGUE BLIND DEAF FIRE FIRES	REBEL REBELS	SAVED RIGHTEOUS
STREAM STREAMS SUN MOON DESERT VINEYARD VINEYARDS	DESTRUCTION	RIGHTEOUSNESS
RAIN SEED FEED EARS EYES PARCHED SOVEREIGN RESTORE	DESTROY	ATONED GLORY
WILDERNESS PRIEST PRIESTS GOD LORD WORSHIP ALMIGHTY	DESTROYED	GLORIOUS REDEEM
DEATH SIGN JUSTICE WORD CREATOR CREATION ATTACK	WICKED	REDEEMER REDEEMED
REMNANT MOUNTAINS RULE RULES DEAD BIRTH WORLD ALTARS	WICKEDNESS	SAVIOR REJOICES
INCENSE SERVANT SERVANTS PRAYER PRAYERS PRAY FORSAKEN	REVOLT WRATH	
FEAR CALLED BREATH CHILDREN CITY CITIES DESCENDANTS	FAINT	
HOLY SACRIFICE SACRIFICES DAVID DAUGHTER CREATED GODS	INQUITIES	
KINGDOMS KINGS OFFERINGS HAND HANDS HEAR LOVE SIN SINS	SHAME FALL	
SPLENDOR SHAME OPPRESSED OPPRESSION OPPRESSIVE	FALLEN JUDGE	
OPPRESSOR OPPRESSORS FAITHFULNESS	JUDGMENTS	
110 indicators	20 judgments	19 hopes

The left-hand column in Table 1 lists the 111 instruments we use to predict judgment (with nodal-orderings in Table 2) and hope (with nodal-ordering in Table 3). The 20 ‘judgment’ variables are listed in the middle column of Table 1; the 19 ‘hope’ variables are listed in the right-hand column of Table 1. The nodal-orderings were generated by Random Forest Regressions (RFR) when “regressing” judgment words (or, alternatively, hope words) on the 111 word-instruments. The means for these variables by Isaiah sections is given in Appendix Table A1.

Random Forest Regression (RFR) is a random aggregation of decision trees. A decision tree is a sequential list of yes/no questions, subdividing the instrumental data to yield the predicted probability for a verse being a judgment verse (or hope verse) for given subsets of the sample defined by ‘nodes’. Figure 1 is a decision tree aligned with our word analysis of Isaiah’s judgment verses, with a root node indicating whether or not the word ALMIGHTY is in the representative verse as the root node, with the initial branches (“branches” are those lines connecting the nodes) indicating the Yes/No response patterns starting at this root node. Each ‘internal node’ indicates a sample attribute that helps divide the sample population into subsets, and each leaf node (also known as a terminal node, at the bottom of the inverted tree) defines a predicted likelihood of a given verse being a judgment verse on the basis of its containing one or more of the judgment words from the middle column of Table 1. The tree continues to subdivide at nodes, until it reaches a bottom with several terminal nodes. All members in a particular terminal node (or leaf) are assigned the probability of being a judgment verse by taking the average percentage of judgement verses that follow that respective branch in the tree (Gareth et al., 2013).

The word ‘ALMIGHTY’ is an important predictor in Figure 1, so the first question (root node) for this illustrative example is “Does this verse contain the word ‘ALMIGHTY’ in it? The response splits the verse into two groups: the “yes” branch (going to the right) represent verses with ALMIGHTY in it, the “no” branch (going to the left from the root node), those without the word ALMIGHTY in it. The “no”s for this split, are divided further by the next node split if it has the word ‘HEART’ in it. There are 12 verses with no ALMIGHTY in them,

but with the word HEART in them. This terminal node (leaf)—with no ALMIGHTY but with the word HEART in the verse—has an average judgment rate of 33.3 percent: that is, .333 of the verses not containing the word ALMIGHTY in them but containing the word HEART in them are judgment verses. All verses in this group would be assigned a predictive probability of being a judgment verse equal to .333.

The “no” ALMIGHTY verses with “no” HEART in those verses, are then split again: “Among this set: how many have the word SWORD in it?”—a question that creates two more terminal nodes. Hence, the ‘yes’ answer to the word SWORD—20 verses without ALMIGHTY in them and without HEART in them, but with the word SWORD—has a judgment probability of .400 (40 percent), compared to those without a SWORD, without a HEART, or without an ALMIGHTY (980 verses) which has a judgment indicator only 36.3 percent of the time.

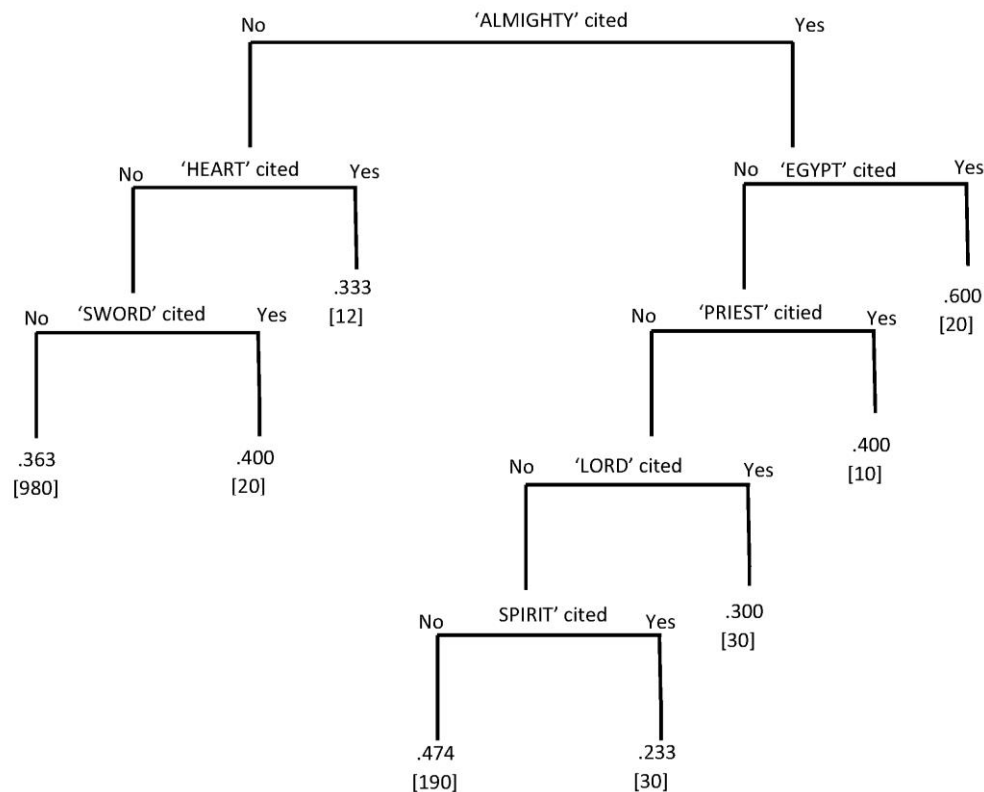


Figure 1. Illustrative decision tree for Isaiah: The Likelihood of a ‘Judgment’ Verse

On the right side of this illustrative decision tree, there are 20 verses that have both the words ALMIGHTY and EGYPT in them, and that combination is associated with more judgment verses than any other combination pictured, as 60 percent of the verses with this combination are judgment verses. On the very bottom, there are 190 verses with an ALMIGHTY in them, but no EGYPT nor PRIEST nor LORD nor SPIRIT in them, with 47.4 percent of them at this terminal node being judgment verses.

Decision trees are relatively easy to understand, and by employing all possible splits of the data, you can obviously forecast the likelihood of getting a judgment as precisely as you want. Of course, you want to employ the decision tree results (namely, the predicted probabilities within each subset needs to apply to new samples of verses) to make good predictions on new data. (You want your monks’ subsection predictive model to work well on the different subsections being examined by other monks.). Unfortunately, a single tree trained on one data section (say a given subset of Isaiah’s verses) usually does a very poor job predicting outcomes on a new subsection. And supervised machine learning models, such as RFR, are mostly valuable to the extent that they can predict outcomes for new data (the “testing” data, a holdout section of Isaiah not included in the original training data analytics), where the testing data set was not previously included in the “training” analysis which fit the initial RFR model.

So Random Forest Regression predicts these outcomes by averaging across several decision trees (hence, “forest”), but it does so by randomizing the analysis in two ways. First, it randomly samples the training data points when building the trees. This is obviously an important advantage when taking averages, as such

bootstrapping helps reduce the variance in the model prediction. The second randomization comes from taking random subsets of nodal attributes (the predictor variables) when splitting the nodes.

This second randomization ‘decorrelates’ the node choices otherwise made from averaging, and increases the out-of-sample usefulness of Random Forest predictions (Gareth et al., 2013, pp. 319-321). Consider Figure 1: Suppose, as is the case for our sample of verses, that the word ALMIGHTY is a very strong predictor for a judgement verse, and EYPT is a moderately strong predictor. Then in random subsets of the data, most or all of the trees would have ALMIGHTY as the root node (top split) even when we included all the other variables in the analysis. And likely, EYPT would most often provide one of the next internal node splits. Hence, even though we would be drawing new random samples to create new trees (for averaging), they would all look very similar to one another, so that this averaging across very similar trees would not be that different from using a single tree.

To get around this problem of generating the same nodal splits, random forests force each nodal split to consider only a subset of the possible predictor variables (say, $k^* < k$, where k is the number of instruments—or predictor variables—in the analysis). Again, this is the second randomization. So, for example, if there are 111 instruments ($k=111$), then the random decorrelation would only consider 11 ($k^*=11$) of these instruments, picked at random, in repeated draws. Hence, some trees would be constructed without even considering a split by ALMIGHTY, or a split by EGYPT, or both. Repeating this process several times leads to better out-of-sample forecasting. It also provides the researcher with access to the most predictive word instruments (how the left hand column list in Table 1 gets ordered in importance in Tables 2 and 3): just look for the variables chosen most often for the top nodes, then rank them by their OOB Gini (their influence), and compare those ranks on that randomly chosen subset of verses (say for Isaiah 1-39) with the ranks on those same respective nodal values on other subsets of verses (say for Isaiah 40-55, or Isaiah 56-66, which is what we do in Tables 4-6 below, based on the RFR rankings in Tables 2 and 3).

Table 2. Isaiah ‘Judgments’: Nodal-ordering of Instruments used to Predict a ‘Judgment’ verse From Random Forest Regressions (using just 20 words to represent JUDGMENT)

Chap 1-39 (Judgment Nodal-orderings)			Chap 40-55(Judgment Nodal-orderings)			Chap 56-66 (Judgment Nodal-orderings)		
1-39	1-19	20-39	40-55	40-48	49-55	56-66	56-61	62-66
NATIONS	JUSTICE	NATIONS	SHAME	SHAME	SHAME	CHILDREN	SINS	SPIRIT
JUSTICE	NATIONS	SPIRIT	DESCENDANTS	ARM	ALMIGHTY	DESCENDANTS	TONGUE	SHAME
CHILDREN	HEARTS	ZION	ALMIGHTY	SWORD	FEAR	JACOB	DEAD	CHILDREN
ZION	CHILDREN	ALMIGHTY	WORD	DESCENDANTS	SPLENDOR	ARM	TEMPLE	SERVANTS
JERUSALEM	NATION	JERUSALEM	HANDS	HEART	HEAVENS	BIRTH	DESCENDANTS	GARMENTS
ALMIGHTY	KINGDOMS	HEAR	ARM	ALMIGHTY	JACOB	SINS	GOD	HEART
KINGDOMS	HANDS	CHILDREN	SINS	WORD	KINGS	TONGUE	SACRIFICE	HOLY
SPIRIT	JERUSALEM	BIRTH	EYES	ISLANDS	RESTORE	SHAME	NATIONS	SWORD
MOUNTAINS	BABYLON	LORD	SWORD	HANDS	GOD	SPIRIT	DEATH	NATION
NATION	ZION	SHAME	HEAR	SOVEREIGN	EYES	HEAR	JACOB	INCENSE
SHAME	KING	CALLED	EGYPT	FEAR	SERVANT	KINGS	HEAR	SACRIFICES
KING	OPPRESSOR	HAND	SPLENDOR	ZION	FEED	GARMENTS	EARTH	DESCENDANTS
HANDS	CITY	EGYPT	HEART	CITY	CITIES	NATION	BIRTH	ARM
HEARTS	VINEYARD	MOUNTAINS	DESERT	DESERT	ZION	NATIONS	HEART	GOD
HEART	HEART	JUSTICE	JUDAH	EGYPT	HEAR	DEAD	ARM	LORD
HAND	ALMIGHTY	WORSHIP	SPIRIT	EYES	SWORD	DEATH	CHILDREN	HEAR
DEAD	WORD	PROPHETS	ISLANDS	KINGS	ISLANDS	HAND	NATION	HANDS
DAVID	DESCENDANTS	HEARTS	BIRTH	HAND	ARM	HEART	VOICE	ISRAEL
EARTH	JUDAH	DEAD	FEED	EARTH	SUN	SACRIFICE	LORD	BIRTH
JUDAH	HAND	REMNANT	EARTH	MOUNTAINS	CHILDREN	HEARTS	KINGS	WORD
ATTACK	SWORD	GODS	HEAVENS	FIRE	DESCENDANTS	SACRIFICES	ISRAEL	TEMPLE
CALLED	HEAVENS	JUDAH	FEAR	BREATH	GARMENTS	SWORD	SIN	JACOB
SWORD	PROPHET	PRIEST	CALLED	SINS	ISRAEL	HANDS	OFFERINGS	EARTH
PARCHED	FAITHFULNESS	GOD	NATION	HOLY	NATIONS	SPLENDOR	FORSAKEN	JERUSALEM
HEAR	EYES	PRIESTS	GOD	BIRTH	GARMENT	INCENSE	SACRIFICES	ALTARS
GOD	JACOB	ASSYRIA	ISRAEL	SPIRIT	MOUNTAINS	ISRAEL	INCENSE	NATIONS
ISRAEL	DAVID	HOLY	RULES	JUDAH	EARTH	OFFERINGS	JUSTICE	SPLENDOR

CITY	SOVEREIGN	KING	HAND	ROCK	NATION	GOD	FOREIGNERS	SOVEREIGN
EYES	WORLD	ATTACK	HOLY	RULES	HAND	HOLY	HANDS	CITY
FIRE	RULE	TEMPLE	RESTORE	NATIONS	CALLED	FORSAKEN	SOVEREIGN	JUDAH
PROPHETS	FIRE	SWORD	CITY	CALLED	HEART	SERVANTS	SPIRIT	HEARTS
OPPRESSOR	ISRAEL	EARTH	SERVANT	GODS	FORSAKEN	JUSTICE	COVENANT	HAND
SERVANTS	SIGN	SOVEREIGN	MOUNTAINS	DEAF	ASSYRIA	WORD	FEAR	MOUNTAINS
RULE	MOUNTAINS	WORLD	SIN	BABYLON	COVENANT	VOICE	BLIND	FIRE
TEMPLE	RAIN	BREATH	JERUSALEM	CREATED	DAUGHTER	TEMPLE	HEZEKIAH	ASSYRIA
EGYPT	STREAMS	OPPRESSION	BREATH	KING	HOLY	FOREIGNERS	SWORD	PROPHET
DESCENDANTS	CITIES	EARS	JACOB	SERVANT	SPIRIT	HEAVENS	EGYPT	DEAD
WORSHIP	EGYPT	PRAY	KINGS	JERUSALEM	EGYPT	JUDAH	FIRES	PROPHETS
RAIN	GOD	NATION	FIRE	JACOB	SINS	CALLED	STREAM	SUN
BREATH	SINS	PROPHET	JUSTICE	STREAMS	OPPRESSOR	MOUNTAINS	SUN	DEAF
HOLY	OPPRESSED	HEART	FIRES	SIN	DESERT	RESTORE	PROPHET	DESERT
PRIEST	EARTH	HEZEKIAH	BLIND	FAITHFULNESS	OPPRESSED	OPPRESSION	ASSYRIA	VINEYARD
SIN	HEAR	VINEYARD	DEAF	HEAVENS	HANDS	BLIND	VINEYARDS	COVENANT
STREAMS	BIRTH	EYES	WILDERNESS	EARS	JUDAH	EYES	STREAMS	STREAMS
PRIESTS	PARCHED	COVENANT	SOVEREIGN	DAUGHTER	STREAMS	ISLANDS	GARMENT	GARMENT
FEAR	LORD	TONGUE	NATIONS	CHILDREN	FOREIGNERS	VINEYARDS	FEED	MOON
JACOB	FEAR	STREAMS	GARMENTS	OFFERINGS	BABYLON	MOON	REMNANT	ISLANDS
HEZEKIAH	SERVANTS	PRAYER	CREATED	BLIND	FIRE	BABYLON	JUDAH	EYES
WORLD	DEAD	FEAR	EARS	RAIN	VOICE	FEED	PARCHED	REMNANT
OPPRESSED	HOLY	DESERT	CHILDREN	PARCHED	PROPHECY	STREAM	KING	STREAM
SINS	SPLENDOR	RAIN	FAITHFULNESS	FIRES	HEZEKIAH	COVENANT	RESTORE	HEZEKIAH
EARS	SIN	FIRE	PARCHED	CREATOR	DEAF	SUN	WILDERNESS	WILDERNESS
GODS	SPIRIT	WORD	STREAMS	HEAR	EARS	PROPHETS	MOON	PRIEST
PROPHET	DAUGHTER	KINGDOMS	DAUGHTER	COVENANT	TEMPLE	ASSYRIA	PRIESTS	PRIESTS
SIGN	FOREIGNERS	DAVID	GODS	ISRAEL	PHAROAH	REMNANT	PHAROAH	PHAROAH
SOVEREIGN	BREATH	HANDS	BABYLON	OPPRESSION	LORD	FAITHFULNESS	BABYLON	BABYLON
HEAVENS	OPPRESSIVE	SIN	FORSAKEN	PRIESTS	WORSHIP	STREAMS	WORSHIP	WORSHIP
ROCK	OPPRESSORS	PROPHECY	CITIES	GARMENTS	WORD	ALMIGHTY	ALMIGHTY	ALMIGHTY
KINGS	CALLED	VOICE	CREATOR	FEED	HEARTS	GARMENT	GARMENTS	DEATH
WORD	STREAM	RULE	ZION	SIGN	SIGN	PRIESTS	ISLANDS	SIGN
BABYLON	FORSAKEN	FAITHFULNESS	RAIN	OPPRESSORS	BLIND	PHAROAH	JERUSALEM	JUSTICE
REMNANT	DEATH	SEED	ROCK	HEARTS	FIRES	FIRES	WORD	FOREIGNERS
FOREIGNERS	EARS	DEATH	OFFERINGS	GARMENT	KING	KING	CREATOR	KING
VINEYARD	KINGS	ISRAEL	COVENANT	CREATION	CREATION	HEZEKIAH	CREATION	CREATION
LORD	GARMENT	SACRIFICE	KINGDOMS	ATTACK	ATTACK	ATTACK	ATTACK	ATTACK
DESERT	HEZEKIAH	STREAM	OPPRESSED	PRIEST	REMNANT	CREATED	CREATED	CREATED
ALTARS	ROCK	JACOB	HEARTS	MOON	MOON	EGYPT	MOUNTAINS	EGYPT
FAITHFULNESS	INCENSE	PARCHED	ATTACK	RULE	RULE	RULE	RULE	RULE
SEED	OFFERINGS	ISLANDS	RULE	HEZEKIAH	VINEYARD	RULES	RULES	RULES
PRAY	SUN	GARMENT	TONGUE	DEAD	DEAD	WORSHIP	HEAVENS	OFFERINGS
CITIES	PRAYERS	ARM	PROPHECY	PROPHECY	VINEYARDS	PROPHECY	PROPHECY	PROPHECY
BLIND	TEMPLE	GARMENTS	SIGN	DEATH	WORLD	WORLD	WORLD	WORLD
BIRTH	FEED	OFFERINGS	PRIESTS	ALTARS	ALTARS	SEED	ALTARS	FEED
SPLENDOR	DEAF	INCENSE	INCENSE	INCENSE	INCENSE	EARS	HEARTS	EARS
DEATH	CREATED	CREATOR	ASSYRIA	ASSYRIA	SACRIFICE	DEAF	SERVANT	SERVANT
ASSYRIA	CREATOR	SERVANTS	CREATION	FOREIGNERS	CREATOR	CREATOR	SERVANTS	FIRES
TONGUE	COVENANT	CREATION	PRAYERS	PRAYER	PRAYER	CREATION	PRAYER	PRAYER
OPPRESSORS	GARMENTS	RESTORE	HEZEKIAH	RESTORE	PRAYERS	PRAYERS	PRAYERS	RESTORE
FEED	ALTARS	DESCENDANTS	ALTARS	PRAY	WILDERNESS	PRAY	PRAY	PRAY
OPPRESSIVE	ISLANDS	FORSAKEN	PRIEST	FORSAKEN	PRIEST	PRIEST	PRIEST	FORSAKEN
GARMENT	PROPHETS	FOREIGNERS	PROPHETS	PROPHETS	PROPHETS	FEAR	PROPHETS	FEAR
COVENANT	RULES	MOON	DEAD	PROPHET	PROPHET	PROPHET	OPPRESSOR	OPPRESSOR
DAUGHTER	WORSHIP	PHAROAH	PHAROAH	PHAROAH	BREATH	OPPRESSORS	BREATH	BREATH

FORSAKEN	OPPRESSION	BABYLON	WORSHIP	WORSHIP	FAITHFULNESS	ROCK	ROCK	ROCK
INCENSE	PRAY	VINEYARDS	VINEYARDS	VINEYARDS	DAVID	DAVID	CITY	VOICE
SERVANT	ARM	FEED	DEATH	CITIES	DEATH	CITIES	CITIES	CITIES
OPPRESSION	TONGUE	ALTARS	SEED	TONGUE	TONGUE	SIGN	SIGN	TONGUE
SUN	BLIND	LOVE	PROPHET	LOVE	LOVE	SERVANT	LOVE	BLIND
PROPHECY	SACRIFICE	DEAF	FOREIGNERS	NATION	SIN	KINGDOMS	DEAF	SACRIFICE
PRAYERS	CREATION	SACRIFICES	SACRIFICES	SACRIFICES	SACRIFICES	PRAYER	FIRE	CREATOR
GARMENTS	VOICE	FIRES	DAVID	DAVID	OFFERINGS	VINEYARD	DAVID	DAVID
FIRES	ATTACK	DAUGHTER	STREAM	STREAM	STREAM	DAUGHTER	DAUGHTER	DAUGHTER
CREATED	RESTORE	CREATED	REMNANT	REMNANT	CREATED	OPPRESSED	OPPRESSED	OPPRESSED
CREATOR	GODS	SUN	OPPRESSION	SEED	GODS	GODS	GODS	GODS
ISLANDS	LOVE	OPPRESSIVE	MOON	KINGDOMS	KINGDOMS	LOVE	KINGDOMS	KINGDOMS
CREATION	DESERT	OPPRESSOR	TEMPLE	TEMPLE	RULES	DESERT	DESERT	KINGS
PHAROAH	FIRES	OPPRESSORS	VINEYARD	VINEYARD	SERVANTS	OPPRESSOR	VINEYARD	OPPRESSORS
LOVE	VINEYARDS	PRAYERS	PRAYER	SPLENDOR	PARCHED	PARCHED	HAND	VINEYARDS
ARM	PROPHECY	SINS	WORLD	WORLD	RAIN	RAIN	RAIN	RAIN
DEAF	PRIESTS	KINGS	PRAY	OPPRESSED	SEED	WILDERNESS	SEED	SEED
MOON	PRAYER	RULES	LOVE	SACRIFICE	OPPRESSION	OPPRESSIVE	OPPRESSORS	LOVE
RULES	SERVANT	SIGN	SACRIFICE	SERVANTS	OPPRESSIVE	BREATH	EARS	SIN
RESTORE	PHAROAH	BLIND	SERVANTS	PRAYERS	PRIESTS	EARTH	SHAME	PARCHED
SACRIFICES	SHAME	HEAVENS	OPPRESSORS	OPPRESSOR	OPPRESSORS	JERUSALEM	OPPRESSIVE	PRAYERS
VINEYARDS	WILDERNESS	WILDERNESS	OPPRESSIVE	OPPRESSIVE	PRAY	CITY	FAITHFULNESS	OPPRESSION
OFFERINGS	SACRIFICES	OPPRESSED	OPPRESSOR	JUSTICE	CITY	FIRE	EYES	OPPRESSIVE
SACRIFICE	MOON	CITIES	KING	VOICE	JUSTICE	SOVEREIGN	HOLY	FAITHFULNESS
VOICE	SEED	ROCK	LORD	WILDERNESS	SOVEREIGN	SIN	OPPRESSION	SINS
WILDERNESS	REMNANT	SPLENDOR	SUN	LORD	JERUSALEM	LORD	SPLENDOR	HEAVENS
STREAM	PRIEST	CITY	VOICE	SUN	ROCK	ALTARS	ZION	CALLED
PRAYER	ASSYRIA	SERVANT	GARMENT	GOD	BIRTH	ZION	CALLED	ZION

Note. Nodes are listed from most important (top, with rank 1) to least important (bottom, rank 111) in the respective lists. These results are based on the NIV translation of Isaiah. Possessive word forms (Lord’s, Babylon’s, etc) were excluded from the analysis.

Table 3. Isaiah ‘Hopes’: Nodal-ordering of Instruments used to Predict a ‘Hopeful’ verse From Random Forest Regression (using twenty words to represent HOPE)

Chap 1-39 (Hope Nodal-orderings)			Chap 40-55 (Hope Nodal-orderings)			Chap 56-66 (Hope Nodal-orderings)		
1-39	1-19	20-39	40-55	40-48	49-55	56-66	56-61	62-66
JUSTICE	ALMIGHTY	JUSTICE	GOD	GOD	EARTH	HEART	DESCENDANTS	NATIONS
ROCK	LORD	ROCK	EARTH	EARTH	NATION	NATIONS	VOICE	GOD
RULE	SIN	CITY	FEAR	HEAVENS	ZION	ARM	JACOB	SPLENDOR
OPPRESSOR	HEAR	RULE	JACOB	DESCENDANTS	EYES	SPLENDOR	SINS	JERUSALEM
RAIN	OPPRESSOR	EARS	ISLANDS	ISLANDS	MOUNTAINS	NATION	NATION	ARM
HANDS	HANDS	RAIN	EYES	JACOB	GOD	GOD	HEART	HEART
SIN	JUSTICE	HEARTS	HAND	DAUGHTER	HEAR	CHILDREN	JUSTICE	CHILDREN
CALLED	NATIONS	PROPHETS	DESCENDANTS	CREATED	BIRTH	INCENSE	HANDS	HOLY
HEZEKIAH	TEMPLE	ZION	CREATED	BLIND	CITY	HOLY	OFFERINGS	SACRIFICES
ALMIGHTY	HAND	SOVEREIGN	JERUSALEM	KING	FEAR	SACRIFICES	BIRTH	GARMENTS
LORD	STREAM	GOD	ZION	JUDAH	OPPRESSED	OFFERINGS	NATIONS	SWORD
CITY	CALLED	HEZEKIAH	BREATH	WILDERNESS	NATIONS	TONGUE	FORSAKEN	INCENSE
EARS	ISRAEL	ASSYRIA	HOLY	FEAR	ISRAEL	EYES	CHILDREN	SOVEREIGN
HOLY	HOLY	CALLED	MOUNTAINS	EGYPT	HEART	SHAME	TONGUE	HEAVENS
FEAR	SOVEREIGN	EARTH	EGYPT	SWORD	HOLY	SIN	SPLENDOR	CALLED
TEMPLE	JERUSALEM	SPIRIT	JUDAH	LORD	ISLANDS	JERUSALEM	EYES	JACOB
SPIRIT	BABYLON	OPPRESSED	NATIONS	SINS	KINGS	DEATH	ARM	NATION
WORD	EYES	PROPHET	SPIRIT	HANDS	RESTORE	LORD	SIN	SHAME
GOD	DAVID	EGYPT	ROCK	BREATH	ROCK	JUSTICE	DEATH	SINS
EYES	RULE	ISRAEL	WILDERNESS	CALLED	SERVANT	GARMENTS	OPPRESSION	HAND
SINS	WORD	HEAR	ALMIGHTY	EYES	CHILDREN	ISRAEL	FOREIGNERS	MOUNTAINS

ISRAEL	OPPRESSED	FEAR	HEAR	HAND	ALMIGHTY	SWORD	SACRIFICES	FIRE
WORLD	KINGDOMS	EYES	SERVANT	FAITHFULNESS	GARMENTS	WORD	CALLED	DESCENDANTS
PROPHETS	EARTH	BREATH	BLIND	HOLY	SINS	EARTH	ZION	HEARTS
BABYLON	FEAR	PRAY	KING	JERUSALEM	SUN	SINS	TEMPLE	COVENANT
HAND	SPIRIT	TONGUE	HANDS	SHAME	CITIES	TEMPLE	EARTH	PROPHETS
HEAR	KINGS	WORLD	HEAVENS	CITY	SHAME	ALTARS	KINGS	RULES
BREATH	OPPRESSIVE	WORD	BIRTH	NATIONS	CALLED	KINGS	INCENSE	BABYLON
NATIONS	ROCK	HANDS	HEART	ALMIGHTY	JERUSALEM	SOVEREIGN	SACRIFICE	PROPHECY
JACOB	GOD	KING	FAITHFULNESS	BABYLON	HAND	HEAR	ISRAEL	REMNANT
DAVID	DEAD	SIN	SIN	RAIN	SOVEREIGN	HEARTS	ISLANDS	FORSAKEN
REMNANT	NATION	DAVID	VOICE	COVENANT	SPIRIT	SPIRIT	DEAD	GARMENT
OPPRESSED	ZION	HAND	CHILDREN	CREATOR	DESCENDANTS	COVENANT	SWORD	ISRAEL
WILDERNESS	RAIN	COVENANT	CREATOR	ARM	JUSTICE	FOREIGNERS	BABYLON	DEAF
MOUNTAINS	HEARTS	FIRE	FIRE	VOICE	OPPRESSOR	ZION	EGYPT	ASSYRIA
KINGDOMS	WORLD	CHILDREN	OPPRESSED	EARS	FEED	CALLED	KING	VOICE
DEAD	REMNANT	NATIONS	NATION	KINGS	SWORD	SACRIFICE	HEZEKIAH	STREAM
SWORD	KING	MOUNTAINS	BABYLON	GODS	GARMENT	HANDS	COVENANT	STREAMS
CHILDREN	CHILDREN	NATION	LORD	SOVEREIGN	DEAD	OPPRESSION	PROPHETS	SUN
EGYPT	HEAVENS	OPPRESSION	SWORD	DESERT	ASSYRIA	HEAVENS	MOON	MOON
SEED	SINS	REMNANT	CALLED	STREAMS	FOREIGNERS	FIRE	GARMENT	DESERT
HEART	JUDAH	JUDAH	STREAMS	SIN	JUDAH	DEAD	ASSYRIA	VINEYARD
JUDAH	SWORD	ATTACK	SHAME	ROCK	STREAM	CITY	VINEYARDS	DEAD
PARCHED	FAITHFULNESS	KINGDOMS	JUSTICE	DEAF	BABYLON	VOICE	STREAMS	RAIN
JERUSALEM	DESCENDANTS	LORD	CITIES	HEART	VINEYARD	STREAMS	SEED	SEED
KING	JACOB	PRIESTS	GODS	MOUNTAINS	MOON	PROPHETS	FEED	FEED
PROPHET	SEED	GODS	RAIN	CHILDREN	EARS	PROPHECY	PHAROAH	ISLANDS
ZION	HEART	BIRTH	DESERT	SPIRIT	FIRE	ASSYRIA	JUDAH	FOREIGNERS
BIRTH	HEZEKIAH	STREAMS	RULES	KINGDOMS	ATTACK	EGYPT	FIRES	CREATION
SUN	VINEYARD	KINGS	CITY	ZION	KING	STREAM	STREAM	KING
NATION	GARMENT	SERVANT	EARS	PARCHED	STREAMS	HEZEKIAH	RESTORE	HEZEKIAH
FIRE	CITIES	JERUSALEM	DEAF	HEAR	HEARTS	MOON	SUN	WILDERNESS
ATTACK	PROPHET	SWORD	FEED	JUSTICE	PRIEST	PRIEST	PRIEST	PRIEST
EARTH	SPLENDOR	VOICE	RESTORE	FIRES	TEMPLE	PRIESTS	PRIESTS	PRIESTS
OPPRESSIVE	SUN	HOLY	KINGDOMS	BIRTH	PHAROAH	ATTACK	OPPRESSORS	PHAROAH
GODS	EARS	PRAYER	SUN	TEMPLE	LORD	BABYLON	FAITHFULNESS	FAITHFULNESS
KINGS	PARCHED	DEAF	RULE	HEZEKIAH	PROPHECY	WORSHIP	WORSHIP	WORSHIP
FAITHFULNESS	ASSYRIA	WILDERNESS	FORSAKEN	HEARTS	RULE	SUN	ALMIGHTY	ALMIGHTY
HEAVENS	FORSAKEN	SHAME	KINGS	FEED	DEATH	GARMENT	GARMENTS	DEATH
TONGUE	MOUNTAINS	DAUGHTER	ISRAEL	SIGN	SIGN	SIGN	BLIND	SIGN
VINEYARD	DEATH	VINEYARDS	COVENANT	SACRIFICES	DEAF	PHAROAH	JERUSALEM	JUSTICE
SPLENDOR	MOON	DESERT	WORD	ASSYRIA	FIRES	CREATION	WORD	SACRIFICE
PRIEST	DAUGHTER	FAITHFULNESS	DAVID	FOREIGNERS	CREATOR	KING	SHAME	FIRES
DESCENDANTS	PRAYERS	SIGN	HEARTS	CREATION	CREATION	DAVID	CREATION	DAVID
CITIES	FIRE	HEAVENS	ATTACK	ATTACK	HEZEKIAH	DAUGHTER	ATTACK	ATTACK
ASSYRIA	FOREIGNERS	BLIND	SIGN	PRIEST	REMNANT	REMNANT	REMNANT	CREATED
GARMENT	WILDERNESS	HEART	CREATION	PRIESTS	EGYPT	GODS	MOUNTAINS	EGYPT
MOON	SERVANTS	VINEYARD	ASSYRIA	RULE	KINGDOMS	RULE	RULE	RULE
STREAM	OPPRESSORS	PROPHECY	HEZEKIAH	VINEYARD	RULES	RULES	RULES	KINGS
OPPRESSION	FEED	WORSHIP	DEAD	DEAD	OFFERINGS	VINEYARDS	HEAVENS	OFFERINGS
COVENANT	SIGN	DEAD	GARMENT	GARMENT	RAIN	ROCK	PROPHECY	VINEYARDS
STREAMS	PRIEST	CREATOR	DEATH	DEATH	WORLD	WORLD	WORLD	WORLD
HEARTS	INCENSE	FEED	PRIESTS	ALTARS	ALTARS	FEED	ALTARS	HEAR
OPPRESSORS	BREATH	INCENSE	INCENSE	INCENSE	INCENSE	SERVANT	HEARTS	EARS
DEATH	EGYPT	PARCHED	STREAM	SACRIFICE	WORD	EARS	SERVANT	SERVANT
PRAY	OFFERINGS	GARMENTS	FOREIGNERS	NATION	PARCHED	FIRES	CREATOR	EYES
SHAME	STREAMS	CREATION	PRAYER	PRAYER	PRAYER	PRAYER	PRAYER	PRAYER

ISLANDS	BIRTH	JACOB	PRAYERS	RESTORE	DAVID	RESTORE	PRAYERS	RESTORE
SERVANTS	DEAF	GARMENT	ALTARS	PRAY	WILDERNESS	PRAY	PRAY	PRAY
ALTARS	CREATOR	OPPRESSIVE	PRIEST	FORSAKEN	FORSAKEN	WILDERNESS	WILDERNESS	OPPRESSION
DAUGHTER	PRAY	RULES	VINEYARD	PROPHETS	PROPHETS	FEAR	FEAR	FEAR
SIGN	RULES	SERVANTS	PROPHET	PROPHET	PROPHET	PROPHET	PROPHET	PROPHET
DESERT	ISLANDS	PHAROAH	PHAROAH	PHAROAH	BREATH	BREATH	BREATH	BREATH
PRIESTS	GARMENTS	ARM	PROPHECY	PROPHECY	WORSHIP	VINEYARD	ROCK	ROCK
VOICE	VINEYARDS	BABYLON	VINEYARDS	GARMENTS	VOICE	ALMIGHTY	CITY	PARCHED
INCENSE	ARM	SEED	WORLD	CITIES	HANDS	CITIES	CITIES	CITIES
SERVANT	TONGUE	DESCENDANTS	TONGUE	TONGUE	TONGUE	SEED	SIGN	TONGUE
SOVEREIGN	BLIND	FOREIGNERS	SERVANTS	LOVE	BLIND	LOVE	LOVE	BLIND
PRAYERS	SACRIFICE	ISLANDS	SACRIFICE	MOON	SACRIFICE	DEAF	DEAF	SIN
VINEYARDS	CREATION	SACRIFICES	SACRIFICES	SERVANTS	SACRIFICES	CREATOR	FIRE	CREATOR
SACRIFICES	FIRES	FIRES	FIRES	DAVID	OPPRESSORS	PARCHED	DAVID	OPPRESSORS
PROPHECY	ATTACK	STREAM	WORSHIP	STREAM	PRAYERS	PRAYERS	DAUGHTER	DAUGHTER
FOREIGNERS	CREATED	CREATED	REMNANT	OPPRESSED	CREATED	CREATED	CREATED	OPPRESSED
FEED	GODS	FORSAKEN	PROPHETS	OPPRESSION	GODS	OPPRESSED	GODS	GODS
BLIND	COVENANT	MOON	MOON	VINEYARDS	OPPRESSIVE	KINGDOMS	KINGDOMS	KINGDOMS
FIRES	DESERT	OPPRESSOR	TEMPLE	RULES	DESERT	DESERT	DESERT	OPPRESSOR
PHAROAH	VOICE	OFFERINGS	OFFERINGS	OFFERINGS	SERVANTS	OPPRESSORS	VINEYARD	LOVE
GARMENTS	WORSHIP	OPPRESSORS	OPPRESSORS	SPLENDOR	VINEYARDS	FAITHFULNESS	HAND	PRAYERS
CREATED	PROPHECY	PRAYERS	OPPRESSIVE	WORLD	FAITHFULNESS	RAIN	RAIN	OPPRESSIVE
DEAF	ALTARS	RESTORE	SEED	SEED	SEED	OPPRESSOR	OPPRESSED	ZION
LOVE	LOVE	LOVE	LOVE	OPPRESSORS	LOVE	OPPRESSIVE	PARCHED	JUDAH
CREATION	SERVANT	SINS	OPPRESSOR	OPPRESSIVE	SIN	ISLANDS	EARS	EARTH
CREATOR	PRIESTS	SACRIFICE	OPPRESSION	OPPRESSOR	PRIESTS	BLIND	SERVANTS	CITY
ARM	PRAYER	SUN	PRAY	PRAYERS	OPPRESSION	DESCENDANTS	OPPRESSIVE	SERVANTS
RESTORE	SHAME	PRIEST	GARMENTS	WORSHIP	PRAY	FORSAKEN	OPPRESSOR	BIRTH
SACRIFICE	RESTORE	ALTARS	SOVEREIGN	WORD	JACOB	SERVANTS	SOVEREIGN	WORD
RULES	OPPRESSION	CITIES	PARCHED	FIRE	DAUGHTER	JACOB	SPIRIT	LORD
PRAYER	PROPHETS	TEMPLE	SPLENDOR	REMNANT	HEAVENS	JUDAH	HEAR	TEMPLE
OFFERINGS	PHAROAH	ALMIGHTY	SINS	SUN	SPLENDOR	HAND	HOLY	SPIRIT
WORSHIP	SACRIFICES	SPLENDOR	ARM	SERVANT	COVENANT	BIRTH	GOD	ALTARS
FORSAKEN	CITY	DEATH	DAUGHTER	ISRAEL	ARM	MOUNTAINS	LORD	HANDS

Note. Nodes are listed from most important (top, with rank 1) to least important (bottom, rank 111) in the respective lists. These results are based on the NIV translation of Isaiah. Possessive word forms (Lord’s, Babylon’s, etc) were excluded from the analysis.

3. Structuring the Analysis and Results

We test differences in the nodal-ordering between subsections of Isaiah, when the nodes are chosen randomly. For example, in a comparison of section 1 of Isaiah (chapters 1-39) with section 2 of Isaiah (chapters 40-55), suppose that a randomly generated sample of nodal identifiers are BREATH, MOON, OPPRESSORS, PROPHECY and SACRIFICE, with “section 1 nodal-ordering, section 2 nodal-ordering, and difference values” respectively for these nodes are “101, 95, 6”, “70, 94, -24”, “78, 104, -26”, “89, 71, 18” and “107, 104, 3”. Then the differences in nodal-orderings between section 1 and section 2 (those differences are the third term in each set) are statistically analyzed as a Wilcoxon signed rank test (a nonparametric test for median differences in ranks). In this case, the test statistic indicates no difference in relative ranks between section 1 and section 2 of Isaiah, based on this randomly generated five-rank comparison.

In Tables 4, 5, and 6 below, we present results for various subsets of nodes. We initially attempted to analyze the different subsections of Isaiah by choosing nodal orderings (the relative ranks of the nodes within each subset) randomly, but found that changing the random seed value (the statistic that generates the random sample subset of nodes) had unanticipatedly large impacts on the values of the Wilcoxon tests, leading to difficulties in reproducing consistent answers, and leading to conflicting conclusions within the same comparison groups. The differences in tests based on randomization seemed to be associated with how many of the top nodes were randomly included in the analysis. The number of top nodes included (the most important explanatory factors in RFR) make all the difference in statistical tests. So—to test our nodal ranking equivalencies within and between

subsections of Isaiah—we use the top nodal ranks in Table 2 for judgment, and top nodal ranks in Table 3 for hope, with the top 75, 80, 85, 90, 95 and 100 nodes chosen to explain judgment verses in Table 5 (or hope verses in Table 6) in each comparison group.

Our dual-baseline comparison approach includes the left hand side statistic (indicated with the ‘()’ brackets in the comparison set) where the top nodes from the left-hand Isaiah section in the respective heading comparison are measured against equivalent nodal rankings of the right hand subsection. Then, on the right hand side (in the ‘[]’ bracket comparisons) we consider the top nodal rankings given in the right hand side of the Isaiah comparison group listed in the respective headings against the equivalent nodal rankings from the left hand side. So, for example, comparing Isaiah 1-39 against Isaiah 40-55, in the left-hand side as the comparison group, would be ‘NODE(rank order)’ given as: NATIONS (1), JUSTICE (2), CHILDREN (3), ZION (4), JERUSALEM (5) for Isaiah 1-39 ranks, whose nodal ranks in Isaiah 40-55 are NATIONS (46), JUSTICE (40), CHILDREN (50), ZION (60), JERUSALEM (35). These differences are statistically significant (with a probability significance of exhibiting the same nodal ordering approaching zero, and so indicate very little likelihood that they have the same structure). If we take the Isaiah 40-55 section as the baseline, then the top five nodal choices are SHAME (1), DESCENDANTS (2), ALMIGHTY (3), WORD (4), and HANDS (5) which have left hand nodal ranks of SHAME (11), DESCENDANTS (37), ALMIGHTY (6), WORD (60), and HANDS (13). Again, the comparison reveals a statistically significant difference (with low probability significance level of the null hypothesis that they are the same being true). As the number of top ranks considered approaches 111 (the total number of nodal word instruments in the far-left hand column of Table 1), the Wilcoxon test values will necessarily approach 1.00 (indicating no difference in median rank value), as the median rank will necessarily be equivalent and tests will indicate no significant difference.

Since we want a *relative* assessment of the likelihood of similarity within and between Isaiah sections (taking, of course, Isaiah 1-39 judgments as the authentic baseline), using RFR in a way that it has never been used before, we examine those top-ranked node sample sizes, where we switch from statistical significance (always significant in smaller samples) to statistical insignificance which will necessarily be the case as the number of nodes approaches this sample’s maximum number of nodes, 111. Statistical significance indicates different nodal patterns (different “authorship”), while insignificance indicates similar “authorship” patterns (maybe Isaiah, or one of his attentive disciples). In the analysis presented in Tables 4, 5 and 6 below, we found those sample sizes that can differentiate relative authorship (going from statistical significance to insignificance) to generally be in the range between the top 75 nodes and the top 100 nodes.

3.1 Judgment vs. Hope Comparisons

Table 4 compares the nodal-orderings of judgment verses in the three sections of Isaiah (J_1_39, J_40_55, J_56_66) against the nodal-orderings of the hope verses from the same sections (H_1_39, H_40_55, H_56_66), using our dual-baseline approach. Again, the dual-baseline approach examines top nodal orderings from the RFR analysis using the right-hand group as one baseline, with significant values indicated inside the ‘()’ bracket; then using the left-hand group as the other baseline with significant values indicated inside the ‘[]’ bracket. Probability significance values closer to one indicates no statistical difference between the sections being compare—accepting the null hypothesis, given these sections and the indicated ranks considered. Probability significance values closer to zero indicates that the relevant sections being compared are statistically different—a rejection of the null hypothesis for similarity, given these sections and the indicated ranks considered.

Table 4. HOPE vs JUDGMENT: Probability significance for nodal similarity in random forest regressions, based on Comparison of Nodal-ordering; Hope vs Judgment Outcomes

Isaiah Sections: Judg. Vs Hope Differences	J_1_39	H_1_39	J_40_55	H_40_55	J_56_66	H_56_66
Wilcoxon signed rank: Top 75 ranks	(0.3661)	[0.0951]	(0.3963)	[0.0099]	(0.0158)	[0.0003]
Wilcoxon signed rank: Top 80 ranks	(0.4745)	[0.2240]	(0.4785)	[0.0058]	(0.0221)	[0.0007]
Wilcoxon signed rank: Top 85 ranks	(0.4940)	[0.3532]	(0.4610)	[0.0052]	(0.0330)	[0.0009]
Wilcoxon signed rank: Top 90 ranks	(0.6626)	[0.3809]	(0.5566)	[0.0039]	(0.0743)	[0.0028]
Wilcoxon signed rank: Top 95 ranks	(0.6331)	[0.5391]	(0.6896)	[0.0116]	(0.1819)	[0.0076]
Wilcoxon signed rank: Top 100 ranks	(0.5870)	[0.5845]	(0.8968)	[0.0205]	(0.2507)	[0.0197]

Note. “J” prefix indexes judgment nodal rankings, with subsequent beginning and ending chapters subsequently indicated. “H” prefix indexes hope nodal rankings. Hence, J_1_39 vs H_1_39 tests in the left hand columns test if the nodal-ordering for instruments given in the left hand side samples are similar to the right hand side samples when drawing nodes from the top 75 to 100 nodal ranks as indicated. Statistical significance levels from two tailed, Wilcoxon signed rank tests are indicated in the respective rows and columns. These results are based on the NIV translation of Isaiah. (with top left-hand nodes) [with top right-hand nodes].

Overall, Table 4 indicates judgment nodes are the same as hope nodes for Isaiah 1-39 (the J_1_39 vs H_1_39 comparison column) since the probability significant levels are high—ranging from .3661 to .6626 for rank comparisons based on the top judgment ranks, and ranging from .0951 to .5845 for rank comparisons based on the top hope ranks. By contrast, for Isaiah 56-66, the probability significant levels are relatively low (and generally reject the idea of a similar intra-sectional structure): for the top hope ranks comparisons (the “[]” values) for Isaiah 56-66, the probability significance levels are always significant (rejecting a similar construction), ranging from .0003 to .0197. The Isaiah 40-55 section is mixed: showing similarity in authorship structure when using the judgment verses as the baseline for comparing ranks, (J_40_55, given by the “()” values) but a profound difference in authorship structure when using the hope verses as the baseline for comparing ranks (H_40_55, given again as the right hand column baseline comparison in the “[]” notation).

Using Isaiah judgment nodes from section 1, the chapters 1-39 (the J_1_39) section in the far left-hand column, we find all the comparisons of nodal differences between judgment and hope verses are statistically insignificant (same authorship) with values from ‘(0.3661)’ to ‘(0.6626)’ in the far left-hand column of Table 4. Using the hope nodal ranks, instead of the judgment nodal ranks, as the baseline, we again find strong evidence for a same authorship structure of the judgment and hope verses, with values ranging from just barely significant at the 10 percent level, ‘[0.0951]’ to overwhelming similar authorship ‘[0.5845]’. Either baseline analysis concurs that there is a similar authorship structure in the hope/judgment nodal structure, whether using a hope baseline for analysis, or a judgment baseline for analysis of the verses in Isaiah 1-39.

The far right-hand column of Table 4 looking at the similarity of judgment and hope verses in the third section of Isaiah finds just the opposite pattern from the section 1 pattern discussed above: the structure of judgment verses in section 3 of Isaiah is different than the structure of hope verses in section 3. Using judgment verses as the baseline, four of the six comparison values are less than 10 percent: (0.0158), (0.0221), (0.0330), (0.0743). Even the significant sample size values are much smaller than the judgment comparisons in the other sections: (0.1819) in section 3 is much smaller than (0.6331) in section 1, or than the (0.6896) in section 2 for the top 95 rank comparisons; and (0.2507) in section 3 is much smaller than (0.5870) in section 1, or the (0.8968) value in section 2. Whoever wrote section 3 of Isaiah, did not use the same template for judgment and hope verses, contrary to Isaiah section 1 (chapters 1-39).

Section 2 has very mixed results. Using judgment verses as baseline, hope and judgment verses appear to have a similar nodal structure and hence, the same template for hope verse construction as for judgment verse construction, as was the case with Isaiah section 1. However, the hope verse nodal rankings of section 2 indicate very different templates, just like Isaiah section 3.

However, row-by-row comparisons by the number of top nodal ranks employed in testing reinforce our relative ranking: section 1 is most similar in linguistic construction, and section 3 the least similar in linguistic construction. Comparing the judgment-hope similarity for any given number of ranks by going across the rows in Table 4, the linguistic structure of hope-verses is most like judgment-verses for Isaiah section 1 (chapters 1 through 39) and least alike for Isaiah section 3 (chapters 56 through 66). Take the first-row, top 75 ranks as illustrative of the rows in Table 4, “[]”—with top ranked hope-nodes as the baseline, then going from left to right the relative significance values are .0951 (9.51 percent chance that judgment and hope verses are similar) for section 1; .0099 for section 2; and only .0003 for section 3. That is, for section 3, there is virtually no chance that the judgment and hope verses have a similar linguistic structure; but very likely that they do have a similar linguistic structure for section 1.

Overall, the author of section 1 of Isaiah (Isaiah himself) uses a similar template for hope verses as for judgment verses, reflecting the same authorship (or at least, the same nodal structure for predicting a hope verse as for predicting a judgment verse). Section 3 results indicate the opposite: the judgment and hope nodal structures are different whatever baseline is used. With these strong results in judgment compared to hope nodal patterns for Isaiah’s three sections, we next examine the intra-sectional and inter-sectional template construction of Isaiah first for judgment verses, and then for hope verses. Hypothesis 1 is accepted for Isaiah section 1 and rejected for Isaiah section 3.

3.2 Intra-Sectional and Inter-Sectional Analysis of Isaiah’s Judgment Verses

Intra-sectional Judgment Homogeneity. While the overall Random Forest Regression (RFR) predicted judgement word patterns are very much like the overall hope word patterns for Isaiah section 1, as indicated in Table 4, predicted judgment word patterns vary considerably within Isaiah section 1 (upper left-hand 6 rows in Table 5) and within Isaiah section 2 (upper central 6 rows in Table 5)—that is, there is intra-sectional heterogeneity for Isaiah sections 1 and 2 up until the 95 and 100 top ranks results. Isaiah section 3 (upper

right-hand 6 rows) indicate relatively more intra-sectional homogeneity than either Isaiah sections 1 and 2: that is, for any top rank row examination, the significance levels are always higher for section 3 than for sections 1 and 2. For example, right-hand side baseline comparisons for the top 90 ranks is [.2184] for section 3 (same authorship), while it is [.0263] for section 1 and [.0065] for section 2.

On the intra-sectional judgment analysis in the upper rows of Table 5 (as well as judgment vs hope comparisons in Table 4) section 3 differs from sections 1 and 2. In Table 5, Isaiah sections 1 and 2 reject the null hypothesis of a relatively homogeneous judgment word pattern *within* each of these subsections, except at the 100 top rank level. This is a rejection of hypothesis 2, the homogeneity of judgment word patterns within each respective section of Isaiah. Section 3, however, seems to provide some relative support for intra-sectional homogeneity. Hypothesis 2 for judgment is supported only in Isaiah section 3.

Table 5. JUDGMENT tests: Probability significance for nodal similarity in random forest regressions, based on Comparison of Nodal-ordering, with reduced list of judgment indicators

Intra-Section Homogen. Subgroup Differences	J_1_19	J_20_39	J_40_48	J_49_55	J_56_61	J_62_66
Wilcoxon signed rank: Top 75 ranks	(<.0001)	[0.0054]	(0.0005)	[0.0005]	(0.0092)	[0.0024]
Wilcoxon signed rank: Top 80 ranks	(0.0002)	[0.0143]	(0.0038)	[0.0005]	(0.0212)	[0.0142]
Wilcoxon signed rank: Top 85 ranks	(0.0038)	[0.0206]	(0.0125)	[0.0025]	(0.0591)	[0.0450]
Wilcoxon signed rank: Top 90 ranks	(0.0112)	[0.0263]	(0.0407)	[0.0065]	(0.1515)	[0.2184]
Wilcoxon signed rank: Top 95 ranks	(0.0569)	[0.0755]	(0.0569)	[0.0362]	(0.1515)	[0.2184]
Wilcoxon signed rank: Top 100 ranks	(0.1846)	[0.2856]	(0.2588)	[0.1379]	(0.3891)	[0.3922]
Inter-Section Homogen. Subgroup Differences	J_1_39	J_40_55	J_1_39	J_56_66	J_40_55	J_56_66
Wilcoxon signed rank: Top 75 ranks	(0.0053)	[0.0037]	(<.0001)	[0.0001]	(0.0003)	[0.0010]
Wilcoxon signed rank: Top 80 ranks	(0.0069)	[0.0086]	(0.0002)	[0.0002]	(.0003)	[0.0013]
Wilcoxon signed rank: Top 85 ranks	(0.0155)	[0.0294]	(0.0023)	[0.0023]	(0.0044)	[0.0027]
Wilcoxon signed rank: Top 90 ranks	(0.0291)	[0.0681]	(0.0093)	[0.0082]	(0.0350)	[0.0132]
Wilcoxon signed rank: Top 95 ranks	(0.1768)	[0.1169]	(0.0528)	[0.0267]	(0.1456)	[0.0345]
Wilcoxon signed rank: Top 100 ranks	(0.3823)	[0.2926]	(0.1514)	[0.1115]	(0.2995)	[0.1402]

Note. “J” prefix indexes judgment nodal rankings, with subsequent beginning and ending chapters subsequently indicated. “H” prefix indexes hope nodal rankings. Hence, J_1_39 vs H_1_39 tests in the left hand columns test if the nodal-ordering for instruments given in the left hand side samples are similar to the right hand side samples when drawing nodes from the top 75 to 100 nodal ranks as indicated. Statistical significance levels from two tailed, Wilcoxon signed rank tests are indicated in the respective rows and columns. These results are based on the NIV translation of Isaiah. (with top left-hand nodes) [with top right-hand nodes].

Inter-sectional comparisons of the *judgment verses* by section in the last six rows of Table 5, tests differences between section 1 and 2 in the left-hand column, bottom left hand 6 rows; test differences between section 1 and section 3 in the bottom central columns; and tests differences between sections 2 and 3 in the bottom right hand column of the Table. Examining the significance values as the number of top ranks considered increases (going from 75 top ranks to 100 top ranks), it appears that section 1 vs. section 2 (bottom left-hand comparisons) have a relatively homogeneous word structure as does sections 2 vs. 3 (bottom right hand side comparisons). However, the bottom central comparisons indicate heterogeneity in the judgment word structures between section 1 vs section 3—statistically significant differences persist up to, and including, the top 95 rank comparisons. The third null hypothesis is supported in the section 1 vs section 2 comparison and in the section 2 vs section 3 comparison. However, the alternative hypothesis H3b appears to be supported for the section 1 vs section 3 comparison: section 1 definitely differs from section 3 in its linguistic structure.

3.3 Intra-Sectional and Inter-Sectional Analysis of Isaiah's Hope Verses

Table 6 for hope verses is structured just like Table 5 for judgment verses. The upper 6 rows of Table 6 offer intra-sectional comparisons of Isaiah's hope verses, again by contrasting the RFR nodal-orderings of the instruments using the dual-baseline comparisons of top ranks (top 75, top 80, top 85, top 90, top 95 and top 100 ranks), within the three sections of Isaiah in the upper rows, and between the three sections in the lower rows. Table 6 indicates that Isaiah sections 2 and 3 are quite similar in their *intra-sectional similarity* with respect to the hope word patterns, indicating relative homogeneity within each section respectively (intra-sectional homogeneity). On the other hand, Isaiah section 1, with greater average levels of statistical significance, indicates a bit more heterogeneity within its section. These sectional distinctions, however, are not quite as pronounced as the judgment differences in the upper 6 rows of Table 5.

Table 6. HOPE tests: Probability significance for nodal similarity in random forest regressions, based on Comparison of Nodal-ordering

Intra-Section Homogen. Subgroup Differences	H_1_19	H_20_39	H_40_48	H_49_55	H_56_61	H_62_66
Wilcoxon signed rank: Top 75 ranks	(0.0011)	[0.0003]	(0.0190)	[<.0001]	(0.0145)	[0.0053]
Wilcoxon signed rank: Top 80 ranks	(0.0039)	[0.0017]	(0.0398)	[0.0002]	(0.0132)	[0.0320]
Wilcoxon signed rank: Top 85 ranks	(0.0124)	[0.0037]	(0.0992)	[0.0008]	(0.0102)	[0.0266]
Wilcoxon signed rank: Top 90 ranks	(0.0294)	[0.0125]	(0.1677)	[0.0083]	(0.0426)	[0.1238]
Wilcoxon signed rank: Top 95 ranks	(0.1022)	[0.0469]	(.3112)	[0.0196]	(0.0727)	[0.1562]
Wilcoxon signed rank: Top 100 ranks	(0.2523)	[0.1414]	(0.4560)	[0.0552]	(0.3033)	[0.2580]
Inter-Section Homogen. Subgroup Differences	H_1_39	H_40_55	H_1_39	H_56_66	H_40_55	H_56_66
Wilcoxon signed rank: Top 75 ranks	(0.0114)	[0.0064]	(0.0017)	[0.0004]	(0.0027)	[<.0001]
Wilcoxon signed rank: Top 80 ranks	(0.0244)	[0.0044]	(0.0042)	[0.0004]	(0.0100)	[<.0001]
Wilcoxon signed rank: Top 85 ranks	(0.0573)	[0.0070]	(0.0130)	[0.0089]	(0.0237)	[0.0003]
Wilcoxon signed rank: Top 90 ranks	(0.1065)	[0.0168]	(0.0492)	[0.0123]	(0.0865)	[0.0016]
Wilcoxon signed rank: Top 95 ranks	(0.2527)	[0.0510]	(0.1545)	[0.0486]	(0.2354)	[0.0100]
Wilcoxon signed rank: Top 100 ranks	(0.4719)	[0.1779]	(0.3228)	[0.1846]	(0.4240)	[0.0395]

Note. “J” prefix indexes judgment nodal rankings, with subsequent beginning and ending chapters subsequently indicated. “H” prefix indexes hope nodal rankings. Hence, J_1_39 vs H_1_39 tests in the left hand columns test if the nodal-ordering for instruments given in the left hand side samples are similar to the right hand side samples when drawing nodes at from the top 75 to 100 nodal ranks as indicated. Statistical significance levels from two tailed, Wilcoxon signed rank tests are indicated in the respective rows and columns. These results are based on the NIV translation of Isaiah. (with top left-hand nodes) [with top right-hand nodes].

As for *inter-sectional homogeneity* in the lower 6 rows of Table 6, the most consistent result is the relative homogeneity between section 1 and section 2 of Isaiah in the sense that these comparisons are more statistically insignificant than for section 1 vs section 3 comparisons in the central bottom rows, or the section 2 vs section 3 comparisons in the bottom right-hand rows.

Overall, the results from these judgment and hope analyses indicate that sections 1 and 2 are generally more alike each other (bottom, left-hand rows in Tables 5 and 6) than they are to section 3. The hypotheses of inter-sectional homogeneity that includes section 3 of Isaiah is rejected.

In an Appendix available from the author upon request, we provide another analysis, where the ‘judgment’ and ‘hope’ indicators are expanded further to see if that clarifies the resulting patterns: judgment indicators in that extended version now include 37 words (up from 20 here), and hope now includes 31 words (up from 19 here). The results follow the same general patterns as exhibited here, based on hope-verses’ top ranks. But the overall pattern suggesting section 3 differs particularly from section 1, continues to hold.

4. Conclusions

The judgment discourses in Isaiah 1-39 have always been the fundamental building block for scholarly structures of Isaiah, as indicated by the research references to it listed in the introductory section and by our Random Forest Regression analysis of it. While we find that judgment RFR word structures are not always internally consistent in Isaiah 1-39 (section 1), there is more general inter-sectional homogeneity between (internally RFR-consistency) between sections 1 and 2 than between 1 and 3 or between 2 and 3, with respect to both judgment and hope word structures. Moreover, analysis of judgment vs hope word structure in Table 4 indicate that section 3’s heterogeneity differs significantly from sections 1 and 2’s homogeneity, suggesting that there is indeed a post-exilic authorship of Isaiah 56-66.

Margaret Barker notes: “[The third section of Isaiah] raise several questions of date and authorship. There is great variety of tone and material within them, and several parts resemble the Second Isaiah... If they were written by another [author other than Second Isaiah], he was a prophet who reused the earlier writings as a basis for his polemic. We know from the dated and parallel prophecies of Haggai and Zechariah that it was possible for one prophet to comment upon another. It is possible the Third Isaiah was doing this. It is also possible that he spoke for a later generation. If the Second Isaiah had seen the end of the exile, then these final chapters probably came from the period of the return to Jerusalem, and the question which must be answered by anyone attempting to reconstruct the period is ‘How did the bitterness in these prophecies arise from the events of the period?’ The earlier prophecies have been reused in an extraordinary way, yet they survived as an appendix to the Isaiah corpus.” (Barker, 1985, p. 201).

Perhaps with a little more scholarship-based analyses employed for ‘judgment’, ‘hope’, and instrumental word predictor choices, more refined analyses of Isaiah will be under taken to examine more specific hypotheses. At the least, however, the Random Forest Regression approach suggested here may well be found useful elsewhere in future literary and scriptural analyses.

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References

- Achtemeier, P. J. (1990). Harper’s Bible dictionary. *Journal of the American Oriental Society*, 110(3). <https://doi.org/10.2307/603236>
- Adams, L. L. (1972). *A statistical analysis of the book of Isaiah in relation to the Isaiah problem*. Brigham Young University.
- Adams, L. L., & Rencher, A. C. (1974). A computer analysis of the Isaiah authorship problem. *Brigham Young University Studies*, 15(1), 95-102.
- Adamu, H., Lutfi, S. L., Malim, N. H. A. H., Hassan, R., Di Vaio, A., & Mohamed, A. S. A. (2021). Framing twitter public sentiment on Nigerian government COVID-19 palliatives distribution using machine learning. *Sustainability*, 13(6), 3497. <https://doi.org/10.3390/su13063497>
- Angelopoulou, A., Mykoniatis, K., & Smith, A. E. (2022). Analysis of Public Sentiment on COVID-19 Mitigation Measures in Social Media in the United States Using Machine Learning. *IEEE Transactions on Computational Social Systems*. <https://doi.org/10.1109/TCSS.2022.3214527>
- Barker, K. L., Burdick, D., Stek, J., Wessel, W., & Youngblood, R. (1995). *NIV Study Bible*. Zondervan, Grand Rapids, MI.
- Barker, M. (1987). *The Older Testament: The Survival of Themes from the Ancient Royal Cult in Sectarian Judaism and Early Christianity*. SPCK.
- Bastian, T. (2022). *Statistical methods to predict future risk of suicidal ideation from social media data*. Kansas State University.
- Brown, R. E., Joseph, A. F., & Roland, E. M. (1990). *The New Jerome Biblical Commentary*. NJ, Prentice Hall: Englewood Cliffs,
- Charles, M. L. (1971). *The Interpreter’s One-Volume Commentary on the Bible*. New York, NY: Abingdon Press.
- Göktürk, G. (2022). *Do Fraudulent Companies Employ Different Linguistic Features in Their Annual Reports? An Empirical Study Using Logistic Regression and Random Forest Methodologies* (Master’s thesis, Norwegian School of Economics).
- Goldingay, J. (2010). The “Isaiah” entry. In D. L. Petersen, B. R. Gaventa, & R. L. C. Patton (Eds.), *The New Interpreter’s Bible One-Volume Commentary*. Abingdon Press.
- Gupta, K., Sharma, A., & Mohapatra, A. K. (2021). Comparative analysis of machine learning algorithms on gender classification using Hindi speech data. In *Artificial Intelligence and Speech Technology* (pp. 363-370). CRC Press. <https://doi.org/10.1201/9781003150664-40>
- Hajek, P., & Henriques, R. (2017). Mining corporate annual reports for intelligent detection of financial statement fraud—A comparative study of machine learning methods. *Knowledge-Based Systems*, 128, 139-152. <https://doi.org/10.1016/j.knosys.2017.05.001>
- James, G. D., Witten, T. H., & Tibshirani, R. (2013). *An Introduction to Statistical Learning: With Applications in R*. New York: Springer. <https://doi.org/10.1007/978-1-4614-7138-7>
- Khan, M. S. S., Akbar, M. O., Malik, H., Khan, A. H., & Akbar, Z. (2021). November. Variable Generalization Evaluation of Supervised Learning Models for Detection of Spam Messages. In *2021 International Conference on Innovative Computing (ICIC)* (pp. 1-7). IEEE. <https://doi.org/10.1109/ICIC53490.2021.9692957>
- Lagutina, K., & Lagutina, N. (2021). A survey of models for constructing text features to classify texts in natural

- language. In *2021 29th Conference of Open Innovations Association (FRUCT)* (pp. 222-233). IEEE. <https://doi.org/10.23919/FRUCT52173.2021.9435512>
- Nissim, D. (2022). Big data, Accounting Information, and Valuation. *The Journal of Finance and Data Science*, forthcoming. <https://doi.org/10.1016/j.jfds.2022.04.003>
- Peurieku, Y. M., Noyum, V. D., Feudjio, C., Goktug, A., & Fokoue, E. (2021). A Text Mining Discovery of Similarities and Dissimilarities Among Sacred Scriptures.
- Shah, K., Patel, H., & Sanghvi, D. (2020) A comparative analysis of logistic regression, random forest and KNN models for the text classification. *Augment Human Res.*, 5(1), 1-16. <https://doi.org/10.1007/s41133-020-00032-0>
- Shahzad, A., Zafar, B., Ali, N., Jamil, U., Alghadhban, A. J., Assam, M., Ghamry, N. A., & Eldin, E. T. (2022). COVID-19 vaccines related user's response categorization using machine learning techniques. *Computation*, 10(8), 141. <https://doi.org/10.3390/computation10080141>
- Usmani, S., Saboor, A., Haris, M., Khan, M. A., & Park, H. (2021). Latest research trends in fall detection and prevention using machine learning: A systematic review. *Sensors*, 21(15), 5134. <https://doi.org/10.3390/s21155134>
- Wang, R., Asghari, V., Hsu, S. C., Lee, C. J., & Chen, J. H. (2020). Detecting corporate misconduct through random forest in China's construction industry. *Journal of cleaner production*, 268, 122266. <https://doi.org/10.1016/j.jclepro.2020.122266>
- Wilcoxon signed Sum Rank tests. Retrieved from https://publichealth.lsuhsu.edu/Faculty_Pages/Bios6222/Lectures/lecture03_sas.pdf

Appendix A

Table A1. Means by Isaiah Sections (relevant to main text estimation)

	1. Isaiah 1-39	2. Isaiah 40-55	3. Isaiah 56-66
judgment	0.6684	0.5255	0.6010
hope	0.5248	0.7867	0.8290
BABYLON ASSYRIA	0.0770	0.1171	0
SWORD	0.1906	0.0360	0
GARMENTS	0.1449	0.1741	0.1191
GARMENT	0.0052	0.0450	0.1347
ISRAEL	0.0221	0.0630	0.0466
JERUSALEM	0.3381	0.6096	0.1658
FOREIGNERS	0.3485	0.1741	0.1709
JUDAH	0.0848	0	0.1658
JACOB	0.3472	0.1441	0.0880
ZION	0.1422	0.4864	0.2072
EGYPT	0.2545	0.2282	0.2176
COVENANT	0.1671	0.1501	0
TEMPLE	0.0443	0.1741	0.0725
HEAVENS	0.1083	0.0060	0.2331
EARTH	0.1449	0.3633	0.1243
PROPHECY	0.2806	0.5615	0.3108
HEART	0.0313	0	0
HEARTS	0.2454	0.1801	0.3212
ISLANDS	0.1462	0	0.1243
NATIONS	0.0195	0.3393	0.1243
NATION	0.3798	0.5915	0.4352
KING	0.2375	0.1201	0.3419
HEZEKIAH	0.3276	0.1381	0
SPIRIT	0.1566	0	0
PROPHETS	0.1605	0.2672	0.3316
PROPHET	0.0704	0.0120	0

PHAROAH	0.1174	0	0
ROCK	0	0	0
VOICE	0.0979	0.1381	0
ARM	0.0822	0.1591	0.0725
TONGUE	0.0052	0.2852	0.2797
BLIND	0.0378	0.0360	0.1917
DEAF	0.0287	0.1801	0.0777
FIRE	0.0169	0.0870	0
FIRES	0.1997	0.1291	0.2176
STREAM	0.0039	0.0510	0
STREAMS	0.0300	0	0.0673
SUN	0.1070	0.1501	0
MOON	0.0600	0.1261	0.0362
DESERT	0.0522	0	0.0310
VINEYARD	0.1083	0.2042	0
VINEYARDS	0.1031	0	0
RAIN	0.0261	0	0.0621
SEED	0.0848	0.1111	0
FEED	0.0443	0.0120	0
EARS	0.0365	0.0540	0.0362
EYES	0.0979	0.1471	0
PARCHED	0.2898	0.3153	0.2124
SOVEREIGN	0.0639	0.0390	0
RESTORE	0.0744	0.1681	0.1502
WILDERNESS	0.0078	0.0720	0.0621
PRIEST	0.0391	0.1621	0
PRIESTS	0.0561	0	0.0103
GOD	0.0783	0	0.0518
LORD	0.4125	0.7447	0.5336
WORSHIP	0.8642	0.8768	0.7823
ALMIGHTY	0.0483	0.0240	0
DEATH	0.4281	0.2732	0
SIGN	0.0809	0.0120	0.1606
JUSTICE	0.0652	0.0030	0.0310
WORD	0.2532	0.1351	0.1761
CREATOR	0.2180	0.1141	0.1191
CREATION	0.0039	0.1171	0
ATTACK	0	0	0
REMNANT	0.0613	0.0090	0
MOUNTAINS	0.1214	0.0330	0
RULE	0.1436	0.3333	0.1606
RULES	0.1514	0.0330	0
DEAD	0.0156	0.0660	0
BIRTH	0.1279	0	0.1347
WORLD	0.1331	0.1441	0.1865
ALTARS	0.1475	0.0270	0
INCENSE	0.0365	0	0.1191
SERVANT	0.0404	0.0180	0.3212
SERVANTS	0.0509	0.4504	0
PRAYER	0.0561	0.0120	0.2020
PRAYERS	0.0535	0	0.0310
PRAY	0.0221	0	0
FORSAKEN	0.0496	0.0180	0.0207
FEAR	0.0443	0.0390	0.1088
CALLED	0.1409	0.2522	0.0725
BREATH	0.1462	0.5135	0.3367

CHILDREN	0.0561	0.1381	0.0621
CITY	0.2232	0.2492	0.3419
CITIES	0.3224	0.2132	0.1502
DESCENDANTS	0.1436	0.0450	0.0569
HOLY	0.0796	0.3093	0.1917
SACRIFICE	0.2062	0.4624	0.3316
SACRIFICES	0.0156	0	0.0880
DAVID	0.0339	0.0180	0.3419
DAUGHTER	0.1266	0.0330	0
CREATED	0.0900	0.0870	0.0103
GODS	0	0.2402	0.0310
KINGDOMS	0.0535	0.0990	0
KINGS	0.1201	0.0330	0
OFFERINGS	0.1736	0.2222	0.1606
HAND	0.0339	0.0660	0.2227
HANDS	0.2963	0.5765	0.3005
HEAR	0.1879	0.1711	0.2901
LOVE	0.2702	0.2222	0.2227
SIN	0	0	0
SINS	0.1148	0.0990	0.1191
SPLENDOR	0.0600	0.1591	0.3108
SHAME	0.0678	0.1471	0.2694
OPPRESSED	0.0744	0.2132	0.1968
OPPRESSION	0.0835	0.0540	0.0466
OPPRESSIVE	0.0287	0.0150	0.0777
OPPRESSOR	0.0443	0	0
OPPRESSORS	0.0757	0.0330	0
FAITHFULNESS	0.0483	0.0030	0.0466
	0.0509	0.1471	0.0207

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