

PSALM 2, REVELATION AND AUTOMATED PHRASE ANALYSIS
SOFTWARE TO CONNECT OLD TESTAMENT AND NEW TESTAMENT

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NOVEMBER, 2008

Introduction

In this paper I want to explore how Psalm 2 is alluded to and quoted in the book of Revelation. With that, I want to present an automated method for exhaustively searching for the relationships that exist (at the lemmatized level) between two texts.

My primary interest is the development of a general method for finding connections between two texts. My test case is Psalm 2 as used in Revelation. The result is a software package called ***Phrases*** that takes two files (one for each book to be compared) and analyzes how one is quoted or alluded to by the other. The algorithm for finding such quotes, allusions and echoes is the domain of Biblical studies. The implementation belongs to computer science. I will explore the theories behind the algorithm and show some preliminary results of analyzing Psalm 2 and Revelation. These are preliminary results in the sense that this is version 1.0 of the software, and more data needs to be integrated into it.

The appendixes give a web site where the software can be downloaded, also providing sample file formats and then the C++ source code of ***Phrases***.

The Search for Connections

Biblical studies consists of finding connections -- connections between books of the Bible, between the Bible and cognate literature, or even between the events recorded in the Bible and history contemporary to those events (archaeology).

In this way, the reader of the Bible often discovers that he is playing the part of a *connectionist* linking up and joining similar or even disparate texts and events. Ultimately, finding these connections aids in our understanding and worship of the Trinity. That is the grand connection.

Humans, in general, are incurably driven to find connections. George Lakoff, professor of cognitive science at Berkley, relates this phenomenon to the very structure of the human brain. In his book, *Where Mathematics Comes From*, he develops his theory of the human mind as an organism built for analogy and metaphor:

Metaphor, long thought to be just a figure of speech, has recently been shown to be a central process in everyday thought. Metaphor is not a mere embellishment; it is the basic means by which abstract thought is made possible. One of the principal results in cognitive science is that abstract concepts are typically understood, via metaphor, in terms of more concrete concepts (Lackoff, 2000:39).¹

His entire approach is instructive. He makes the case that *metaphor* is the tool that allows us to cross domains and speak about a target topic via a familiar source topic. At its writing, the New Testament was the target topic, and the Old Testament was the familiar source.

¹ Lackoff, *Where Mathematics Comes From*. New York: Basic Books, 2000.

The mapping of one domain of thought to another domain (for the sake of understanding) is metaphor. Indeed, it is metaphor because of essential realities, and not mere simile. That is, metaphor is more than a device of literature -- it is a way of grasping, and it involves the transfer of ideas between realms. In this way, *metaphors* connect and work as the basis of conceptualization. We know our subject in the abstract (if we really know it) by having some connections with domains of discourse already familiar to us.

Applied to biblical studies, a transfer of one domain (an Old Testament context) to another (a New Testament context) is a connection.

Finding and understanding these connections is a tool for understanding. In practice, these connections often develop when researchers sit down and use bible software. They tend to search through various electronic texts in order to find relationships. These relationships are connections. Researchers are incurably *connectionists*.

This paper is about the search for connections. And that search for connections has taken a giant leap with the use of the computer. At one level, I am seeking the relationships that exist between Psalm 2 and Revelation. At another, I want to see if we can push the envelope of how software can advance our knowledge of connections.

Connecting the Septuagint to New Testament

Psalm 2 was written in Hebrew and Revelation was written in Greek. And the Septuagint (LXX) translation of the Psalms serves to bridge the two.

In determining where the New Testament is quoting, echoing or alluding to the Old Testament, the LXX is often the starting point. Mechanically, one searches for phrases or words from the LXX to see if they appear in a New Testament target text.

My purpose, then, is to develop ways for finding how one text quotes from another (how Revelation quotes Psalm 2). Of course John could have quoted from the LXX or from his own *ad hoc* translation or from a Greek OT we no longer have. Possibly, he may even have been working from a Hebrew manuscript now lost. I will confine myself to the LXX, but I will also show a way to expand beyond it by using a software tool that developed from this study.

In the case of Psalm 2, the translation from Hebrew to Greek is almost word for word (and word order is preserved so that the Greek lines up nicely with the Hebrew). The exceptions are the additions in 2:2 of the phrase αὐτοῦ διάψαλμα, 2:4 adds αὐτούς, 2:6 adds ὑπ' αὐτοῦ, 2:8 adds σοι, 2:10 adds πάντες, 2:11 adds αὐτῷ, 2:12 adds κύριος and δικαίας.

By simple inspection of the Greek, one finds that Clement of Alexandria has an identical text to that of the LXX of Psalm 2 (he employed the additions that are in the LXX).² Clement appears

² Clement of Alexandria (b. ~150 A.D.), *Exhortation to the Greeks*, Chapter VIII. In this work, Clement argues against the mythologies of Greece. In the context of quoting Psalm 2:12, the case being made is that God is

to have used the LXX. Does John, in his use of that Psalm in Revelation, likewise quote from the LXX? How would one know?³

Published lists of the use of the OT by the NT are readily available. Of special note is Carson and Beale's latest contribution to the subject, *Commentary on the New Testament Use of the Old Testament*. But in using such tools, a question occurs:

What if there are quotes that were missed?

How could someone validate that these lists are not missing entries? Validating all the connections would at least require one to exhaustively search Revelation and Psalm 2 to find any correlation. To complicate matters, a correlation could exist because of an *ad hoc* translation of the Hebrew.

Furthermore, each Hebrew word behind the Greek could have been otherwise translated. There is not a 1 to 1 correspondence between the Hebrew words and the Greek translation options. If John was making his own translation of Psalm 2, he might have arrived at a version slightly different than what is preserved in the LXX.

To help, Takamisu Muraoka has provided a list of all the ways that the LXX translates each word of the Hebrew bible. His book, *Hebrew/Aramaic Index to the Septuagint*, is ordered such that one looks up a Hebrew word and finds all the ways that the LXX translates that word.⁴

With that list, it is possible to search for Psalm 2 in Revelation using many Greek words for each Hebrew word. Each Greek word of Psalm 2 can be replaced with one of the other valid options that the translators had at their disposal.

In this way, one can connect the LXX to the NT in ways that go beyond the LXX. For example, in Psalm 2:1, the word עַוְלָה is translated as ἔθνη. According to Muraoka, עַוְלָה is translated elsewhere by such words as ἄνθρωπος, γῆ and λαός. If John made his own translation, would he have used any of these other options? Would he use only the LXX?

To find if John alludes or echoes Psalm 2 in ways that are not regularly listed by those who compile the textual uses of the OT by the NT (as in the back of the Greek editions of the NT), one can adopt Muraoka's list.

displeased with idol worshiping and that Jesus (the Word) is the antidote, restoring the truth in the first resurrection (our conversion) and ultimately restoring the whole world.

³ Lee Irons, working on his PhD at Fuller, has posed the question on his blog regarding Paul's source. Did Paul quote the Hebrew Old Testament or the LXX? The answer to that question is being pursued in relationship to Paul's understanding of the *righteous* word group as it relates to New Perspective studies. The software under consideration conceptually extends to an automated analysis of the LXX and Paul's quotes.

⁴ Muraoka, *Hebrew/Aramaic Index to the Septuagint*. Grand Rapids: Baker, 1998.

That is one thing that *Phrases* facilitates. With this software, one provides a book that is being searched (Revelation) and another book that is suspected to be a source (Psalm 2). And for each word in the source, alternatives are provided as per Muraoka's list.

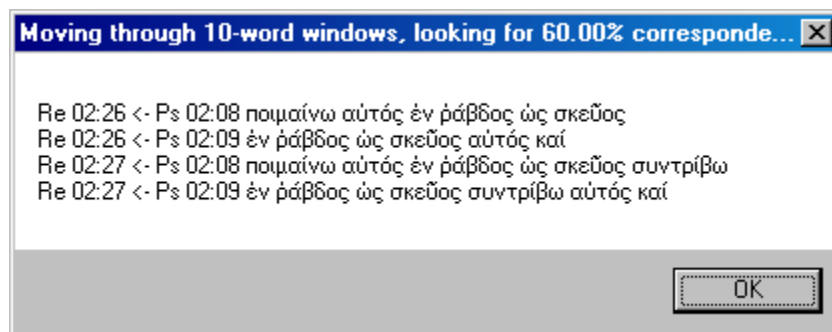
The Text-Relation between Psalm 2 and Revelation

According to Beale (Beale and Carson; 2008:1096ff.), Psalm 2:9 is found in Revelation 2:26-28, (he asserts that the "Son of God" title of Jesus is rooted in Psalm 2); the same verse (Ps 2:9) is found quoted in Revelation 19:15.⁵ *Novum Testamentum Grace* (NA27) agrees, also listing 12:5 as an allusion to Psalm 2:9.

By taking every possible permutation of Psalm 2 -- stepping through it one word at a time and taking a chunk of ten words with each step -- I analyzed the frequency in which each possible ten-word chunk appeared in Revelation.

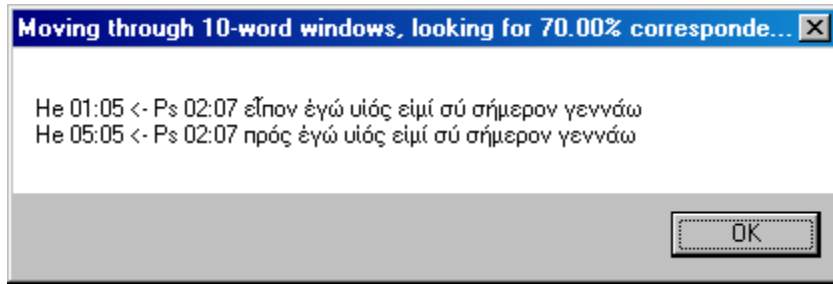
Namely, taking ten consecutive words from Psalm 2, where order does not matter, I stepped through Revelation from the first verse to the last, seeing if any of the ten-word chunks from Psalm 2 matched with consecutive ten-word windows in Revelation. If there was a 60% overlap at any time between the two windows, I noted that as a possible quote, allusion or echo.

Following this process would be quite difficult by hand. I created lemmatized copies of Psalm 2 and Revelation and wrote a C++ program, *Phrases*, which implements the basic algorithm and yielded the follow results:



Phrases found that Revelation 2:26-27 has overlap with Psalm 2:8-9. It ignores verse boundaries, so it easily spills over to the left and right in reporting what was found. More important than a precision on verse reporting is its accuracy of finding correspondence. As a validation run, the same psalm was run against the book of Hebrews (only increasing the requirement to 70% for a quote to be found):

⁵ Beale and Carson, *Commentary on the New Testament Use of the Old Testament*. Grand Rapids: Baker, 2008.



These hits correlate nicely with what is reported by NA27. The importance of this data is that it algorithmically validates lists of quotations. The software is designed to systematically seek what might have been overlooked. These results show that the lists from NA27 and Beale are reliable (as expected). Looking for 60% or 70% correspondence between books, the conclusion here is that no obvious holes exist in the already mentioned lists of OT quotes/allusions/echoes.

By turning back the correspondence requirement from 60% to 50%, we easily pick up a whole batch of other relationships that require attention:



Important to note here is that the algorithm did indeed relate Revelation 19:15 to Psalm 2. Note also that 12:5 is now a candidate for a quote or allusion as suggested by NA27. I will not examine the results at this point, but I report them as to show the utility of *Phrases*.⁶

The Context of Psalm 2

Before looking at Quotes of Psalm 2 in Revelation, a brief note about the Psalm is in order.

The Psalmist (David)⁷ relates the man on earth who rules in God's place as a son בְּנֵי of God (the one begotten יְלֵדֵי). The ancient notion of a ruler (king) being a representative – a son – of a nation's deity was not unique to Israel; such was a pattern of the ancient Near East where, for example, the king of Egypt was a son of the gods, ruling as representative of the divine will. Son of God language may not be as much an ontological statement about divinity, as it is the language of kingship. The Son of God is the King. Opposing the king on earth, in Israel or any other Iron Age nation, would be to oppose the god of that land and those people. See also Psalm 110 and 132.⁸

The Use of Psalm 2 in Second Temple Judaism

Before exploring how Psalm 2 functioned in the Revelation, it is instructive to stop and see how it was used at Qumran and within wider Second Temple Judaism. The reason this period is of such interest is because of its proximity to the writing of the New Testament.

4Q174 Midrash on the Last Days: Within these fragments, the author describes the conspiring of the enemies as an event of the last and ultimate days. The outcome will be the purification of the people of God who are the very temple (a sanctuary of men).⁹ The community becomes the holy place. The opposition to the Community will fight against the true Israel (Ps 2:1) and purify the sacred space. In those days, the branch of David will be restored as God will lift what has fallen. These fragments explore 2 Samuel 7:10-14. Verse 14, "I will be his father, and he will be my son" speaks of the Branch of David who will co-reign with the interpreter of the Law (support is derived from Amos 9:11, of which, cf. Acts 15). Psalm 2:1 is used not unlike Revelation 2:27 (see more below where the plight and victory of king and subjects merge).

⁶ Results are impacted by the common Greek article. Too many hits would occur if Greek articles were included in the searching. For that reason, there is a mechanism for excluding words from the sieving process (the analogy of sieving is one of Psalm 2 being filtered through Revelation as a sieve to see what hits emerge).

⁷ The parallels between Jesus and David include (among other things): 1. Being anointed king in the wilderness 2. Beginning their reign without recognition from rival powers 3. Having kingship in the midst of enemies, on the run, in the wilderness. The pattern is that of being the Son of God over a kingdom in warfare.

⁸ See R. Haney, *Text and Concept in Royal Psalms*. New York: Peter Land, 2002. Psalm 110 is like Psalm 2 also in the rod and ruling of a king in the midst of enemies.

⁹ This is not unlike Ephesians or 1 Corinthians where the people of God are the Temple.

1 Enoch: 1 Enoch 48:7-10 may allude to Psalm 2, even as the whole chapter speaks to the identity of one who will rule as Son of Man, opposed by the nations. Like 4Q174 it has an eschatological cast.

The Use of Psalm 2 in Revelation

I will not explore Psalm 2 in the New Testament in general, but will limit myself to Revelation. By exploring the hit-results generated by **Phrases**, Revelation 2:27, 12:5 and 19:15 prove to be the clearest allusions or quotes from Psalm 2.¹⁰

The Context of Revelation 2:27

Examining more closely the text quoted by Revelation, we find that John is making an application of Psalm 2 in a surprising way:

Revelation 2: ποιμανεῖ αὐτούς ἐν ῥάβδῳ σιδηρᾷ ὡς τὰ σκευή τὰ κεραμικά συντρίβεται
3rd Sg.

Psalm 2:9 ποιμανεῖς αὐτούς ἐν ῥάβδῳ σιδηρᾷ, ὡς σκευὸς κεραμέως συντρίψεις αὐτούς
2nd Sg.

There is a transfer of rule. Jesus gives the word of approbation to those who overcome: *they will rule* (in Psalm 2:9, it is the Son of God who will rule, *you will rule*). For the believer to remain faithful to Jesus during the present evil age (the time of the delay) is to merit the right to rule with him (cf. Revelation 20:4).

The Context of Revelation 12:5

NA27 lists Revelation 12:5 as alluding to Psalm 2. When **Phrases** was dialed-back and changed from looking for 60% correspondence to only 50% correspondence, it then found Revelation 12:5. The triumph of this software its independence: it does not rely upon any external lists of quotes, allusions and echoes. It algorithmically find connections.

Revelation 12:5

καὶ ἔτεκεν υἱὸν ἄρσεν, ὃς μέλλει ποιμαίνειν πάντα τὰ ἔθνη ἐν ῥάβδῳ σιδηρᾷ. καὶ ἠρπάσθη τὸ τέκνον αὐτῆς πρὸς τὸν θεὸν καὶ πρὸς τὸν θρόνον αὐτοῦ.

Psalm 2:8-9

αἴτησαι παρ' ἐμοῦ, καὶ δώσω σοι ἔθνη τὴν κληρονομίαν σου καὶ τὴν κατάσχεσίν σου τὰ πέρατα τῆς γῆς, ⁹ ποιμανεῖς αὐτούς ἐν ῥάβδῳ σιδηρᾷ, ὡς σκευὸς κεραμέως συντρίψεις αὐτούς.

¹⁰ The use of "rod of iron" from Psalm 2 is not found elsewhere in the Old Testament Hebrew. This is important to note when we find the "rod of iron" in the New Testament, for the likely source is Psalm 2:9. Psalm 110 speaks of the "rod of strength" which rules from Zion. Like Psalm 110, the reign of the king is in the midst of enemies.

As previously noted, “rod of iron” is not found elsewhere in the Old Testament. It is from Psalm 2. And the earlier reference to “rod of iron” in Revelation was in a quote of Psalm 2. Revelation 12:5 is thus referring back to Psalm 2.

The context here is that Jesus is the one to rule the nations. And his rule coincides with his installment on the throne of God (cf. Revelation 4 and Acts 2).

Jesus rules from heaven and he cleansed heaven -- Satan was cast out (cf. 1 Peter 3). His Rod of Iron is a real scepter. But his Rod of Iron is not fully realized on Earth, for Satan has been cast down (“I saw Satan fall like lightning”) meaning that there is “Woe to those on Earth” who now participate in warfare unseen. The Christian Community struggles against powers and principalities of the invisible realm (Ephesians 6). Satan’s combatants wage battle, but their warring is ironically used to effectively purge the Holy People (recall 4Q174) such that those who overcome are a cleansed temple. They co-reign with the Messiah (Revelation 2:27) in what turns out to be the inaugurated Last Days. Israel’s Last Day has dawned (Malachi 4:1), and the Sun of Righteousness is a blazing King who is rising to his noon-day zenith.

The Context of Revelation 19:15

Phrases, NA27 and Beale/Carson show that John quotes Psalm 2:9¹¹ in Revelation 19:15.

Revelation 19:15

καὶ ἐκ τοῦ στόματος αὐτοῦ ἐκπορεύεται ῥομφαία ὀξεῖα, ἵνα ἐν αὐτῇ πατάξῃ τὰ ἔθνη, καὶ αὐτὸς **ποιμανεῖ αὐτούς ἐν ῥάβδῳ σιδηρᾶ**, καὶ αὐτὸς πατεῖ τὴν ληνὸν τοῦ οἴνου τοῦ θυμοῦ τῆς ὀργῆς τοῦ θεοῦ τοῦ παντοκράτορος,

Psalm 2:8-9

αἴτησαι παρ’ ἐμοῦ, καὶ δώσω σοι ἔθνη τὴν κληρονομίαν σου καὶ τὴν κατάσχεσίν σου τὰ πέρατα τῆς γῆς, ⁹ **ποιμανεῖς αὐτούς ἐν ῥάβδῳ σιδηρᾶ**, ὡς σκεῦος κεραμέως συντρίψεις αὐτούς.

The quote here preserves the identity of the one who rules as the King. This is King Jesus (the larger pericope of Revelation 19):

¹¹ Then I saw heaven opened, and behold, a white horse! He who sat upon it is called Faithful and True, and in righteousness he judges and makes war. ¹² His eyes are like a flame of fire, and on his head are many diadems; and he has a name inscribed which no one knows but himself. ¹³ He is clad in a robe dipped in blood, and the name by which he is called is The Word of God. ¹⁴ And the armies of heaven, arrayed in fine linen, white and pure, followed him on white horses. ¹⁵ From his mouth issues a sharp sword with which to smite the nations, and **he will rule them with a rod of iron**; he will tread the

¹¹ *Phrases* lists Psalm 2:8 as the quoted text when it is really 2:9. The imprecision comes from the fact that καὶ is found a few words earlier in 2:8 and so the software starts detecting correspondence in verse 8. As I mentioned earlier, it is the accuracy of the results that concerns us most.

wine press of the fury of the wrath of God the Almighty. ¹⁶ On his robe and on his thigh he has a name inscribed, King of kings and Lord of lords. -- RSV

Jesus enthrones the saints who “overcome” (Rev 2:26-28), but he does not therefore relinquish his own rule. He rules as Psalm 2 explains. And his rule is during the time of opposition when nations are against him. The dawning of the Last Days was inaugurated by the enthronement of the King (Revelation 4, cf. Acts 2). The reign of Christ was established in his ascension, and the context of Revelation 19 is of his rule in the midst of opposition (not unlike the eschatological expectation of 4Q174 mentioned above).

Other Applications of Phrases

What has been suggested here is a way to comprehensively exhaust all the lexical relationships between two texts. Any two texts will work with **Phrases**. That means it is possible to compare two New Testament books. For example, 3 John was analyzed against Revelation (using the same methods described above) to see if there was any kind of quotation or parallel between the two books (none was found).

This paper has focused primarily upon Revelation and Psalm 2, but the use and application of this algorithm is greater than one instance. In the next section, additional application is shown in terms of using one of the output files generated by **Phrases**.

Words in LXX Psalm 2 not Found in Revelation

Below is the Greek of Psalm 2 from the LXX. I have inverted the colors on the words that do not exist in Revelation:

ἵνα τί ἐφφύραξαν ἔθνη καὶ λαοὶ ἐμελέτησαν κενά; ² παρέστησαν οἱ βασιλεῖς τῆς γῆς, καὶ οἱ ἄρχοντες συνήχθησαν ἐπὶ τὸ αὐτὸ κατὰ τοῦ κυρίου καὶ κατὰ τοῦ χριστοῦ αὐτοῦ διάψαλμα ³ Διαρρήξωμεν τοὺς δεσμοὺς αὐτῶν καὶ ἀπορρίψωμεν ἀφ’ ἡμῶν τὸν ζυγὸν αὐτῶν. ⁴ ὁ κατοικῶν ἐν οὐρανοῖς ἐκγελάσεται αὐτούς, καὶ ὁ κύριος ἐκμυκτηριεῖ αὐτούς. ⁵ τότε λαλήσει πρὸς αὐτούς ἐν ὀργῇ αὐτοῦ καὶ ἐν τῷ θυμῷ αὐτοῦ ταραξεί αὐτούς ⁶ Ἐγὼ δὲ κατεστάθην βασιλεὺς ὑπ’ αὐτοῦ ἐπὶ Σιών ὄρος τὸ ἅγιον αὐτοῦ ⁷ διαγγέλλων τὸ πρόσταγμα κυρίου Κύριος εἶπεν πρὸς με Υἱός μου εἶ σύ, ἐγὼ σήμερον γεγέννηκά σε, ⁸ αἴτησαι παρ’ ἐμοῦ, καὶ δώσω σοι ἔθνη τὴν κληρονομίαν σου καὶ τὴν κατάσχεσίν σου τὰ πέρατα τῆς γῆς, ⁹ ποιμανεῖς αὐτούς ἐν ῥάβδῳ σιδηρᾶ, ὡς σκεῦος κεραμέως συντριψεῖς αὐτούς. ¹⁰ καὶ νῦν, βασιλεῖς, σύνετε, παιδεύθητε, πάντες οἱ κρίνοντες τὴν γῆν. ¹¹ δουλεύσατε τῷ κυρίῳ ἐν φόβῳ καὶ ἀγαλλιᾶσθε αὐτῷ ἐν τρόμῳ. ¹² δράξασθε παιδείας, μήποτε ὀργισθῇ κύριος καὶ ἀπολεῖσθε ἐξ ὁδοῦ δικαίας. ὅταν ἐκκαυθῇ ἐν τάχει ὁ θυμὸς αὐτοῦ, μακάριοι πάντες οἱ πεποιθότες ἐπ’ αὐτῷ.

John does not use the words indicated in inverted color, but that does not mean that he does not have those ideas in his Revelation. While he does not use the word νῦν (Ps 2:10) he does use the word ἄρτι. Muraoka (1998:116) lists ἄρτι as a valid option for הַיְתָּוּ, the Hebrew of Ps 2:10 which νῦν translates. To facilitate this fact, **Phrases** was programmed to search on both ἄρτι and

νῶν. Likewise, John expresses the idea of “never”, but he does not use the μήποτε of Psalm 2:12 to say it. He uses οὐ μή.

Words that are used in Psalm 2 but not in Revelation could lead one to miss possible connections between the two. Looking at the above visual of Psalm 2 with the inverted colors, one can see the percentage of holes that could be filled if we were to analyze John’s use of those ideas.

Phrases allows for filling in the holes. By supplying the LXX text of Psalm 2, along with alternates for each word of the Psalm (those alternates are pulled from Muraoka), a more complete search for correspondence between the two texts can be done.

The way this is facilitated in the software is that the input file for Psalm 2 has alternative words within the tags <ALT> and </ALT>. Thus, where “nations” of Psalm 2:1 could be ἔθνος, ἄνθρωπος, γῆ or λαός (Muraoka, 1998:33), the text file contains this:

ἔθνος <ALT> ἄνθρωπος γῆ λαός </ALT>

The first word, ἔθνος, is the LXX entry, and following <ALT> list is a list of alternative translations for עַמִּים.

This analysis resulted from looking at one of the output files generated by *Phrases* (the file called Unique.txt).

Conclusion

This paper has sought to explore the science of connections and correspondence (or linkage). It has used the entire book of Revelation as a test for sieving how Psalm 2 is quoted and used by John. The result has been that a new software tool, *Phrases*, has the potential of developing into a *bona fide* means of ongoing research into textual connections.

Phrases verified the quotes of Psalm 2 by Revelation, and presented a list of further options for investigation. Through an examination of the established quotes, we discover that Psalm 2 carried in it eschatological expectation for the Last Days (not only in Christianity, but in wider Judaism). That eschatology takes on a decidedly already-not-yet hew when the inaugurated glorious rule of Christ is factored into our understanding of the present evil age.

Appendix A

Obtaining Phrase Analysis Software

The software explored in this paper can be downloaded from the web site:

www.MrRives.com/Phrases/index.htm

Phrases and Connections
Phrases Version 1.0 November 2008

If you are here, it is because I told you about my work on connections and links in the Bible.

One powerful method of our study of the Bible involves finding connections – connections between books of the Bible, and connections to other literature written at the same time.

We also seek connections between the world of the Bible and the cultural climate in which its events took place. This is the field of archaeology and history. In those studies, we are seeking connections between the Bible and its world.

To that end, I wrote the Windows software **Phrases**. I wrote this in C++ in November 2008 as another attempt at trying to explore the Bible.

Basic Instructions:

Download **Phrases** (link to left) and each Bible file you want. Put all the files in the same directory then run:

```
phrases Revelation.txt Psalm2.txt 10 .6
```

Where .6 means to locate matches that have 60% in common, and 10 is the number of words within which that 60% must occur.

Download each file (Phrases.exe, Revelation.txt and Psalm2.txt) and save them to the same directory. Run the program from that directory via the command prompt (following the instructions given on the web site).

Appendix B

Preparing the Files for Processing

Each file that is input into *Phrases* needs to be converted to all stems. Below is Psalm 2 (as it is the most interesting in term of its use of special tags). Tags are XML like codes that allow for the control of the software (as commented upon in the file itself). Psalm2.txt is saved as UTF-8 so as to preserve font information:

```
#Psalm 2
# Greek version of Psalm 2 (note that the Greek follows the Hebrew word order
#
# Format of this file:
# Lines starting with # are comments
# Chapter:Verse or simply verse numbers mark verse division
# In this text, I have it so that each lines corresponds to one word or phrase in Hebrew
# One Hebrew word or phrase can have many optional Greek translations
# Each line has the LXX translation.
# Note: See E. Tov for mappings from Hebrew to LXX
# See T. Muradoka for possible translations
# Lines with the <LXX> </LXX> tags do not map back to a Hebrew word
# That is, they stand for Greek that does not translate the Hebrew
#
# Note: "NUIR" = Not used in Revelation
# I notice that the Hebrew word (the root lexical idea) is surrounded by articles and pronouns.
# If we could strip away those, then the atomic structure may emerge. To that end,
# words between the <I> and </I> tags will be words that do not factor into our searching
# and in fact which will be ignored in the loading of this Psalm
# Ignore These: <I> ὁ καὶ δὲ αὐτός ἐν ἐγώ </I>
#
<I> ὁ </I>

2:1 ἵνα τίς
φρυάσσομαι
ἔθνος <ALT> ἄνθρωπος γῆ λαός </ALT>
καὶ λαός <ALT> ἔθνος φυλή </ALT>
μελετέω <#> take thought, care for </#>
κενός <#> empty, bare, vain </#>
2 παρίστημι <#> to make to stand or stand beside </#>
ὁ βασιλεύς ὁ γῆ καὶ ὁ ἄρχων συνάγω ἐπὶ ὁ αὐτόςκατὰ ὁ κύριος καὶ κατὰ ὁ Χριστός
<ALT> χριστός </ALT>
<LXX> αὐτός διάψαλμα </LXX>
3 διαρρήγνυμι ὁ δεσμός αὐτός καὶ ἀπορρίπτω <#> to throw away </#>
ἀπὸ ἐγώ ὁ ζυγός αὐτός
4 ὁ κατοικέω ἐν οὐρανός ἐκγελάω <#> to laugh out </#>
```

<LXX> αὐτός </LXX>
 καὶ ὁ κύριος ἐκμυκτηρίζω αὐτός
 5 τότε <#> NUIR </#>
 λαλέω πρὸς αὐτός ἐν ὀργῇ αὐτός καὶ ἐν ὁ θυμός αὐτός ταράσσω αὐτός
 6 ἐγὼ δέ καθίστημι <#> NUIR </#>
 Βασιλεύς <LXX> ὑπὸ αὐτός </LXX>
 ἐπὶ Σιών ὄρος ὁ ἅγιος αὐτός
 7 διαγγέλλω <ALT> κιαγγέλλω </ALT>
 ὁ πρόσταγμα <#> an ordinance, command </#>
 κύριος κύριος εἶπον πρὸς ἐγὼ υἱός ἐγὼ εἶμι σύ ἐγὼ σήμερον <#> NUIR </#>
 γεννάω <ALT> γίνομαι </ALT> <#> NUIR </#>
 σύ
 8 αἰτέω <#> NUIR </#>
 παρὰ ἐγὼ καὶ δίδωμι <LXX> σύ </LXX>
 ἔθνος ὁ κληρονομία <#> NUIR </#>
 σύ καὶ ὁ κατάσχεσις <#> NUIR </#>
 σύ ὁ πέρας <#> NUIR </#>
 ὁ γῆ
 9 ποιμαίνω αὐτός ἐν ῥάβδος σιδήρεος ὡς σκεῦος κεραμεύς <#> NUIR </#>
 συντρίβω αὐτός
 10 καὶ νῦν <ALT> ἄρτι </ALT>
 βασιλεύς συνίημι παιδεύω <LXX> πᾶς </LXX>
 ὁ κρίνω ὁ γῆ
 11 δουλεύω <ALT> λατρεύω </ALT> <#> NUIR </#>
 ὁ κύριος ἐν φόβος καὶ ἀγαλλιάω <LXX> αὐτός </LXX>
 ἐν τρόμος <#> NUIR: Trembling </#>
 12 δράσσομαι <#> NUIR: To grasp, lay hold of </#>
 παιδεΐα <#> NUIR: child instruction </#>
 μήποτε <#> NUIR: never, lest ever -- οὐ μή </#>
 ὀργίζω <LXX> κύριος </LXX>
 καὶ ἀπόλλύω <ALT> ἀποκτείνω ἀποθνήσκω </ALT> <#> NUIR </#>
 ἐκ ὁδός <LXX> δίκαιος </LXX>
 ὅταν ἐκκαίω <#> To have strong desire </#>
 ἐν ταχύς ὁ θυμός αὐτός
 μακάριος πᾶς ὁ πείθω ἐπὶ αὐτός

Appendix C

The C++ Source Code

```
// Stephen S. Rives, November 2008
//
// Phrases.cpp -- A program to find phrases that are related across documents
//                according to density of matches, without respect to word order
//
// To Do:
//   Store a dictionary of "Alternates" so that they need not be presented within a text file.
//   I.e., create something equivalent to Muraoka's text, Hebrew Amaramic Index to the Septuagint
//   Check for malformed documents (i.e., no closing tags).
//
#include "stdafx.h"
#include "Phrases.h"
#include "conv.h"
#include <vector>
#include <iostream>
#include <fstream>
#include <map>

#ifdef _DEBUG
#define new DEBUG_NEW
#endif

CWinApp theApp;
using namespace std;
```

...

Intentionally removed C++ code for Internet copy of this document