Does Chiasmus Appear in the Book of Mormon by Chance?

Boyd F. Edwards  
W. Farrell Edwards

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Chiasmus is an inverted-parallel literary form that was employed by ancient Hebrew biblical writers, among others. An instance of this form, called a “chiasm,” presents two or more literary elements, and then restates them in reverse order. For example, Matthew 10:39 is a two-element chiasm:

**EXAMPLE 1**

He that (a) findeth his life shall (b) lose it:
And and he that (b) loseth his life for my sake shall (a) find it.

Short chiasms are not uncommon in literature. In some cases, the authors undoubtedly intended to use that form for literary effect (that is, by design); in other cases, the elements fell into that form without author intent (that is, by chance).

In 1969, John W. Welch reported his discovery of many-element chiasms in the Book of Mormon, which Joseph Smith testified to have translated from plates written anciently by Hebrew descendants. One of Welch’s discoveries is Mosiah 5:10–12, displayed here as a seven-element chiasm (boldface words are chiastic elements; italicized words are extra appearances of chiastic elements or appearances of nonchiastic elements):

**EXAMPLE 2**

(a) whosoever shall not take upon them him the name of Christ
(b) must be called by some other name;
(c) therefore, he findeth himself on the left hand of God.
(d) And I would that ye should remember also, that this is the name

*BYU Studies* 43, no. 2 (2004)
(e) that I said I should give unto you
(f) that never should be blotted out,
(g) except it be through transgression;
(g') therefore, take heed that ye do not transgress.
(f') that the name be not blotted out of your hearts.
(e') I say unto you,
(d') I would that ye should remember to retain the name written always
in your hearts,
(c') that ye are not found on the left hand of God.
(b') but that ye hear and know the voice by which ye shall be called,
(a') and also, the name by which he shall call you.

The historical record has yielded no direct evidence that Joseph Smith actually knew about chiasmus when he translated the Book of Mormon in 1829, although some other people at that time did. If he did not know about chiasmus, then its presence in the book might be considered as evidence for the authenticity of the book as a modern translation of a record written anciently by those familiar with the chiastic style.

Sandra Tanner and Daniel Vogel argue against any such use of chiasmus as evidence of ancient origins by pointing out that the chiastic style was present in the Bible and other works for Joseph Smith to notice in his own study. As evidence that he knew about this style, they point out that chiasms can be found in the Doctrine and Covenants, which Joseph Smith published in 1835, not as a translation of ancient text, but as a collection of modern instructions. Tanner cites Blake Ostler, who lists chiasms in the Doctrine and Covenants and in the Book of Abraham. One of these is a five-element chiasm in Doctrine and Covenants 88:34–39, which was examined earlier by Richard Shipp.

**Example 3**

(a) And again, verily I say unto you, that which is governed by law is also preserved by law and perfected and sanctified by the same. That which breaketh a law, and abideth not by law, but seeketh to become a law unto itself, and willeth to abide in sin, and altogether abideth in sin, cannot be sanctified by law, neither by mercy, justice, nor judgment. Therefore, they must remain filthy still.
(b) All kingdoms have a law given;
(c) And there are many kingdoms;
(d) for there is no space
(e) in the which there is no kingdom,
(e') and there is no kingdom
(d') in which there is no space.
(c') either a greater or a lesser kingdom.
Welch argues in favor of ancient origins for Book of Mormon chiasmus, demonstrating that public awareness of this style was slight in America when the Book of Mormon was translated. He maintains that it is unlikely that Joseph Smith knew of scholarly biblical works published in the 1820s that explored or described this style, three having been published and reviewed in England and one reprinted in America. He argues further that it would have been quite remarkable if Joseph Smith had noticed chiasmus on his own and had fluently incorporated it into his writing style. Welch regards instances of chiasmus in the Doctrine and Covenants as less compelling than those in the Book of Mormon and as likely to be arrangements of words that happen to fall into chiastic order by chance or as a secondary characteristic of some other mode of expression.

Others agree that Joseph Smith likely did not know about chiasmus but argue that chiasms even in the Book of Mormon are likely to be arrangements of words that happen to fall into chiastic order by chance and are revealed only by the ingenuity of the analyst. Brent Metcalfe has said, “Organizing these ideas into chiasms may be the result of subsequent interpreters rather than the intention of the original author.”

An anonymous author similarly suggests that chiasms in the Book of Mormon are the “result of the incredible amount of repetition contained therein, and are well within the bounds of probability.” That person maintains that it should not be surprising to find chiasmus in the Book of Mormon because unintentional chiastic structure can be found in almost any passage of text, as long as it involves some repetition of literary elements. The author illustrates this claim with a four-element “chiasm” found in the introduction to a computer manual, the iNFORMIX-OnLine Database Administrator’s Guide.

Our analysis of the same text proffers a nine-element chiastic structure, albeit with considerable extra repetition (in italics). The original four-element chiasm contained elements a, c, f, and h.

**EXAMPLE 4**

(a) OnLine is a server for client applications.

(b) More specifically, OnLine is a database server that processes requests for data from client applications.

(c) It accesses the requested information from its databases, if possible, and sends back the results.
Accessing

The database includes activities such as coordinating concurrent requests from multiple clients, performing read and write operations to the databases, and enforcing physical and logical consistency on the data.

The client

is an application program that a user runs to request information from a database.

Client applications use Structured Query Language (SQL) to send requests for data to OnLine.

Client programs include the DB-Access utility and programs that you write using INFORMIX-ESQL/C, INFORMIX-4GL, or INFORMIX-NewEra.

Client processes are independent of OnLine processes.

Database users run client applications as the need arises to access information.

The OnLine administrator starts the OnLine processes by executing the oninit utility.

OnLine processes are presumed to execute continuously during the period that users access the databases. See Chapter 10, “What is the Dynamic Scalable Architecture” for a description of the OnLine processes, and the methods by which they serve client applications.

Shipp argues that Joseph Smith did not know about chiasmus but regards chiastic and parallel structures in the Doctrine and Covenants as significant, deliberate constructions that originated in the mind of God and were communicated to Joseph Smith by revelation. He points out as evidence that Joseph Smith dictated structured revelations publicly, without the opportunity for premeditated organization of thought or text. He maintains that other prophets, including Book of Mormon prophets, received structured passages from God in the same way. H. Clay Gorton and Charles Francis King adopt a similar philosophy.

Loftes Tryk agrees that Joseph Smith did not know about chiasmus, praises the sophistication and elegance of the chiastic structure in the Book of Mormon, and ascribes this structure to Satan.

Evidently, what some deem to be instances of intentional chiasmus, others dismiss as arrangements of words that fall into unintentional chiastic order by chance. In an effort to standardize the discussion, Welch published in 1988 fifteen criteria to aid the analyst in assessing the likelihood that the chiastic structure of a passage in any body of literature was created intentionally by its author. Some of these factors are objectivity (the strength of...
the associations between the paired elements), boundaries (the extent to which the passage operates as a well-defined literary unit within the context of the larger work from which it was taken), and centrality (the importance of the focal point of the chiasm). Four of his other criteria can be quantified numerically, namely: length (number of chiastic elements), density (the fraction of the passage that is devoted to chiastic elements), mavericks (the number of extra appearances of chiastic elements, such as the italicized appearances of “name” and “call” in Mosiah 5:10–12, Example 2), and reduplication (the extent of repetition of nonchiastic elements). Here, a “nonchiastic element” is a literary element that appears at least twice but does not participate in the chiastic structure, such as the word “hearts” in Mosiah 5:10–12.

A Mathematical Approach

In this study, we develop additional quantitative tools for calculating the likelihood that the chiastic structure of a passage of text could have emerged by chance. From this statistical analysis, one can infer, in some cases, that chiastic structure was likely created intentionally by its author, that is, by design. We distill Welch’s four quantitative criteria into a single quantity $L$, the “reordering” likelihood that $n$-element chiastic structure could have appeared by chance in a particular passage, such as Mosiah 5:10–12 (Example 2). We also calculate the chiastic probability, $P$, that such structure could have appeared by chance anywhere in the larger work from which the passage was taken, such as the Book of Mormon in the case of Mosiah 5:10–12.

The longer the work from which a chiastic passage is taken, the greater the number of words that could potentially form unintentional chiastic structure and the greater the likelihood $P$ that such structure could have appeared by chance somewhere in this work; the longer a monkey sits at a typewriter, the greater the likelihood that a sonnet will emerge. In order to calculate $P$, we must therefore estimate the number $N$ of opportunities for chiastic structure in the larger work, and the number $M$ of such opportunities that are actually chiastic. The greater the number $N$ of opportunities for structure, the greater the likelihood that one of these would happen to have chiastic structure.16

As an illustration of how this is done, we consider Matt. 10:35–39 as the “larger work,” and Matt. 10:39 (Example 1) as the particular chiastic passage found within it. This chiastic passage has no extra repetition and has two elements, hence in this case $n = 2$. Our goal is to determine the
likelihood \( P \) that such structure would emerge by chance somewhere in Matt. 10:35–39:

**Example 5**

For I am come to set a man at variance against his father, and the daughter (a) against her mother (b), and the daughter (a') in law against her mother (b') in law. And a man's foes shall be they of his own household.

He that loveth (c) father or mother more than me is not worthy of me (d): and he that loveth (c') son or daughter more than me is not worthy of me (d'). And he that taketh not his cross, and followeth after me, is not worthy of me. He that findeth his life (e) shall lose it (f): and he that loseth his life (f') for my sake shall find it (e').

To determine the number \( N \) of opportunities for two-element chiastic structure in this example, we read through the example from the beginning, noting the appearances of all significant literary elements (defined below). As soon as some element appears for a second time (“daughter,” in this case), it has the potential to participate in the chiastic structure, and its first and second appearances are designated by a and a'. We then continue through the passage until a second element (“mother”) appears for the second time, and designate its appearances as b and b' (see labeling of lines 2 and 3 of Example 5). These two pairs of appearances together constitute a single opportunity for two-element chiastic structures. We then continue looking for other opportunities for two-element structures through the end of the example. In this manner, we identify \( N = 3 \) opportunities for two-element chiastic structures, because three matching pairs (a-b, c-d, e-f) are present in the passage. The first two of these opportunities are not chiastic, having the form aba'b' or cdc'd', whereas the third (Example 1) is chiastic, having the form eff'e'. Thus \( M = 1 \) for this example because only one of the \( N = 3 \) opportunities is chiastic. Were the elements within each of these opportunities to be rearranged at random, any of the three might have produced a chiasm with two elements and no extra repetition. The presence of three opportunities increases the likelihood that chiastic structure would emerge by chance somewhere in the larger work, in the same way that flipping a coin three times increases the likelihood that at least one coin toss will give “heads.”

The value of \( P \) for a passage is the likelihood that its chiastic structure would emerge by chance from random rearrangements of the literary elements in the larger work from which it was taken. A small value of \( P \) near
zero supports the notion that the structure appeared by design, that is, by deliberate application of the chiastic form. A moderate value near $P = 0.5$ indicates that approximately 50 percent of random rearrangements would yield chiastic structure, whereas a large value of $P$ near to 1.0 indicates that most such rearrangements would yield chiastic structure. Though a moderate or a large value of $P$ for a passage implies that its chiastic structure could easily be replicated by random rearrangements, this does not imply that chiastic structure is likely to have been unintentional on the part of the author. Moderate and large values of $P$ say absolutely nothing about intentionality. The author of a passage with a moderate or large value of $P$ may well have intentionally invoked the chiastic form in composing the passage, but such a value simply provides no evidence that she did, nor does it provide evidence that she did not. In such cases, one may resort to Welch’s remaining criteria to assess the likelihood of unintentional chiastic structure. On the other hand, passages with small values of $P$ have small likelihoods of emerging by chance and are therefore likely to have appeared by design.

Yehuda Radday included some statistical analysis in his extensive studies of biblical chiasms. His analysis (1) excludes extra appearances of chiastic elements (such as the italicized appearances of “name” and “call” in Mosiah 5:10–12, Example 2) by assuming that each element appears exactly twice in a passage, (2) excludes unbalanced orderings (such as aabb and bbaa in the discussion of Example 5) by constraining each element to appear once in the first half and once in the second half of the chiasm and (3) ignores the increase in the chiastic likelihood due to multiple opportunities for chiastic structure within the larger work (see Example 5). Our analysis takes each of these factors into account.

Daniel Vogel allows for the possibility that complex chiasms might occasionally appear in the Book of Mormon, but he argues that “the multitude of near-misses points to what statisticians call the fallacy of the enumeration of favorable circumstances, or emphasizing the successes while disregarding the failures.” Our analysis accounts for such failures by including an estimate of the total number of opportunities for chiastic structure in the Book of Mormon, not just the successful ones, and therefore allows for reliable estimates of the likelihood that chiasms appeared in the Book of Mormon—and in other books—by chance. Our analysis also accounts for such failures on a different level, by accounting for nonchiastic elements within each chiasm (such as the word “hearts” in Mosiah 5:10–12), which might have participated in the chiastic structure but did not.
TABLE 1

Likelihoods $P$ that Chiasms in Various Works Could Have Appeared by Chance

<table>
<thead>
<tr>
<th>Work</th>
<th>Chiasm</th>
<th>Example</th>
<th>$n$</th>
<th>$L$</th>
<th>$N$</th>
<th>$M$</th>
<th>$P$</th>
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<td>2. Matt. 10:35-39</td>
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<td>5</td>
<td>2</td>
<td>31</td>
<td>1</td>
<td>0.70</td>
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<td>3. INFORMIX Guide</td>
<td>Introduction</td>
<td>4</td>
<td>9</td>
<td>66</td>
<td>1</td>
<td>1</td>
<td>0.66</td>
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<td>4. Doctrine and Cov.</td>
<td>88:34-39</td>
<td>3</td>
<td>5</td>
<td>0.0111</td>
<td>866</td>
<td>1</td>
<td>0.52</td>
</tr>
<tr>
<td>5. Book of Mormon</td>
<td>four strongest</td>
<td>2,8,9,11</td>
<td>5</td>
<td>0.0111</td>
<td>956</td>
<td>4</td>
<td>0.020</td>
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<tr>
<td>6. Pentateuch</td>
<td>Lev. 24:13-23</td>
<td>10</td>
<td>7</td>
<td>0.0000074</td>
<td>342</td>
<td>1</td>
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<td>7. Book of Mormon</td>
<td>Alma 36:1-30</td>
<td>11</td>
<td>8</td>
<td>0.00000049</td>
<td>359</td>
<td>1</td>
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Summary of Mathematical Results

Our calculations, explained further below, shed light on the significance of chiasmus in the Book of Mormon. To evaluate this significance, we identified the strongest chiasms known to us that appear in the Book of Mormon, the Doctrine and Covenants, and other works. These chiasms are pertinent to assessing the likelihood that chiasmus appeared in these works by chance. We computed $P$ for each of these strongest candidates. Our results are displayed in Table I in order of decreasing values of $P$, with results for the strongest chiasms in the Book of Abraham, the Doctrine and Covenants, the Pentateuch, and the Book of Mormon listed respectively on lines 1, 4, 6, and 7 of this table. Although other results in this table rely on computer simulations, the results for $L$ and $P$ on these four lines follow directly from explicit mathematical equations (Equations 1 and 2, see below) using a hand calculator and do not require the services of a computer, except to use a word processor to search for instances of literary elements within various text passages. Thus, our principal results and conclusions do not rely on computer calculations.

These results establish a high likelihood that the chiastic structure of Leviticus 24:13–23 appeared in the Pentateuch by design and that the chiastic structure of Alma 36:1–30 appeared in the Book of Mormon by design. These results rule out, with 99.98 percent certainty, the claim that Alma 36:1–30 is simply an arrangement of words that happen to fall into chiastic order by chance. The small upper bound $P = 0.020$ on the likelihood that four of the strongest chiasms in the Book of Mormon, Mosiah 3:18–19, Mosiah 3:10–12, Alma 36:1–30, and Helaman 9:6–11, could have appeared by chance further confirms the intentionality of chiasmus in the
Book of Mormon. Our results do not prove that the Book of Mormon is a translation of an ancient document, but they do establish that chiastic passages in the Book of Mormon likely appeared by design, that is, by the deliberate application of the chiastic form by the author(s) of these passages.

The results shown in Table 1 indicate that the strongest chiastic structure in the Doctrine and Covenants, the Book of Abraham, and the INFORMIX Guide could easily have emerged from random rearrangements of their literary elements. Our results do not support the claim that chiasms appeared by design—be it Joseph Smith’s, God’s, or Satan’s—in the Doctrine and Covenants or in the Book of Abraham. Neither do our results rule out this claim, since the corresponding values of $P$ provide no evidence either way. Our results are consistent with the idea that chiasms in the Doctrine and Covenants and the Book of Abraham are simply patterns of words that happen to fall into chiastic order by chance, patterns that are recognized only after the fact through the diligence of the analyst. Our results do not rule out the possibility that Joseph Smith knew about the chiastic style when he translated the Book of Mormon but do rule out the use of chiasms in the Doctrine and Covenants and the Book of Abraham as possible evidence of that knowledge.

The tools developed for this study help analysts to make quantitative judgments regarding the intentionality of chiasmus. These judgments are based only on the order of words and ideas and disregard the overall integrity and literary merit of chiasms. Accordingly, our tools may add to, but not replace, Welch’s nonquantitative criteria and other indices of chiastic strength.26

In the remaining sections of this article, we state and justify the criteria we have used for the selection of literary elements and chiastic boundaries; we then show how we arrived at an exact equation for $P$; we next introduce an exact equation for $L$ in cases of “simple” chiasms, such as Matthew 10:39 (Example 1) and Doctrine and Covenants 88:34–39 (Example 3), which involve no nonchiastic elements and involve exactly two appearances of each chiastic element, and we describe our Monte Carlo simulations for “complex” chiasms, such as Mosiah 5:10–12 (Example 2) and INFORMIX (Example 4), which fail to qualify as simple. Following our application of these tools to obtain the values reported in Table 1, we discuss the results shown in Table 1 and then draw conclusions.

**Selection of Literary Elements and Chiastic Boundaries**

The first steps in assessing the chiastic likelihood $P$ for a particular passage are (1) to choose the starting and ending points, or “boundaries,” of
the passage; (2) to identify all of the literary elements that appear at least twice between these boundaries (elements appearing only once do not affect the statistical results); and (3) to determine which of these elements form part of the chiastic structure. This process requires judgment calls about which words or word combinations are significant enough to be identified as literary elements and which pairs of literary elements are associated strongly enough to be considered different appearances of the same literary element. Since valid statistical results depend crucially on the care with which this is done, we have adopted a set of strict selection rules to guide this process:

Rule 1: Chiastic boundaries must be located at the ends of sentences or significant phrases. This is a form of Welch’s “boundaries” criterion and precludes contrived boundaries that are chosen to maximize the number of chiastic elements without regard to interruptions of grammatical structure.

Rule 2: Two or more appearances of a single literary element must share the same essential word or words. Different tenses (receive, received), pluralities (receive, receives), negatives (receive, not receive), and speech forms (receive, receipt) of a word are allowed, but synonyms (receive, accept) are not. This rule promotes strong associations between the paired elements in a chiastic structure, is a strict form of Welch’s “objectivity” criterion, and corresponds approximately to a class of chiasms called “antimetabole” by Vogel, which restate, in the second half, the exact words or identical ideas of the first half, in reverse order. Because the human mind can find a logical tie between almost any two ideas, many proposed chiastic structures include weak associations that cast doubt upon the validity of statistical analysis. We adopt this rule to preclude such weak associations, acknowledging that the rule also precludes some strong synonymous associations (see Isaiah 60:1–3), in order to set a strict and easily enforced standard that is consistent with the tools developed in this paper. For our statistical purposes, we firmly reject the suggestion that strong overall chiastic structure justifies the inclusion of a few weakly associated chiastic pairs within that structure.

Rule 3: The significance of an element is judged against the significance of the other elements in the same passage. Insignificant words such as “the” are excluded as literary elements. We favor significant ideas or phrases, such as elements c, d, and f in Mosiah 5:10–12 (Example 2), as literary elements but employ individual words, such as elements a, b, and g, if ideas or phrases cannot be identified. This rule acknowledges that a repeated phrase or idea represents a stronger association than a repeated word.
Rule 4: Inclusion of more than one word or idea in a chiastic section and its twin are permitted, as are multiple appearances of such elements within sections. For example, see the multiple appearances of “law” and “abide” in sections a and a’ in Doctrine and Covenants 88:34–39 (Example 3) above. Nonchiastic elements are allowed to appear more than once within a single chiastic section, as long as they do not appear outside this section. For example, in Doctrine and Covenants 88:34–39, the word “sin” appears twice within section a, and the word “conditions” appears twice within section a’. We do not designate these words as nonchiastic elements because they make no appearances outside of these sections.

Rule 5: Extra appearances of chiastic elements must be accounted for in the analysis. “Extra appearances” of an element means appearances of that element outside of its proper places in the chiastic structure. (See, for example, the italicized extra appearances of “name” in Mosiah 5:10–12, Example 2.) If a chiastic element is a single word, then extra appearances of that word must be accounted for in the analysis. If a literary element is a phrase or an idea, then we do not account for extra appearances of individual words used in this phrase or idea but do account for extra appearances of the entire phrase or idea. As will be seen, accounting properly for such extra appearances in chiasms with considerable extra repetition, such as the INFORMIX example (Example 4), often leads to the conclusion that their chiastic structure could easily have resulted by chance. On the other hand, failing to account for such extra repetition by considering only those appearances that fit into the chiastic structure and by ignoring all others can lead mistakenly to the opposite conclusion.

Rule 6: Nonchiastic elements must be accounted for in the analysis. The smallest building blocks (words, phrases, or ideas) that are used to define the chiastic structure itself must be applied consistently in identifying and accounting for “nonchiastic” elements that appear at least twice in the passage but do not participate in its chiastic structure. If at least one of the chiastic elements in a passage is a single word, then other significant single words that are not part of the chiastic structure must be accounted for. For example, since Mosiah 5:10–12 (Example 2) employs both single words (“name”) and phrases (“I would that ye should remember”) as chiastic building blocks, we also identify and account for other single words (such as “hearts”) that appear at least twice in the passage but do not participate in its chiastic structure. In a similar way, if the smallest chiastic building block is a phrase or an idea, then other phrases or ideas that appear at least twice in the passage but do not participate in its chiastic structure are identified and accounted for as nonchiastic elements.
We do not suggest that these rules exhaustively define what can or cannot be called a chiasm. We simply adopt them as enforceable standards consistent with the statistical tools developed in this paper, to be applied uniformly to all chiasms considered herein. Many chiasms proposed in the literature must be modified to conform fully to these rules so that we can evaluate, in a manner that allows consistent comparisons between chiasms, the likelihood that such chiasms could have appeared by chance.

For the chiasms considered herein, boundaries and literary elements have been selected by hand rather than by computer, except that we have used the word search feature of a word processor to identify all appearances of all literary elements.

**Calculation of the Chiastic Likelihood P**

In this section, we develop an equation for $P$ that is valid when the chiastic structure of interest appears only once in the larger work from which it was taken—that is, when $M = 1$. This equation applies only to the chiasm with the smallest value of $L$ in a work and only if there are no other chiasms with comparable values of $L$ in the work. The equation holds for all but one listing in Table 1 (Line 5), which will be treated separately below.

If $L$ is the likelihood that chiastic structure would emerge by chance in one opportunity, then $1 - L$ is the likelihood that such structure would not emerge in that opportunity, and $(1 - L)^N$ is the likelihood that none of the $N$ opportunities would have such structure. Finally,

**Equation 1**

\[ P = 1 - (1 - L)^N \]

follows as the likelihood that at least one of the $N$ opportunities would have this structure.

Most of the effort required to evaluate $P$, and most of the discussion that follows, will be devoted to finding $L$ and $N$, since $P$ follows immediately from $L$ and $N$ using Equation 1.

**Reordering Likelihood $L$ for Simple Chiasms**

It is straightforward to calculate the reordering likelihood $L$ for simple chiasms, for which each of $n$ independent literary elements in a passage appears exactly twice in the passage and contributes to its chiastic structure; simple chiasms have no nonchiastic elements or extra
appearances of chiastic elements. The likelihood that such structure will emerge by chance is

$$L = \frac{1}{(2n-1)!!}$$

where $$(2n - 1)!! = 1 \cdot 3 \cdot 5 \cdots (2n - 1)$$ is a product of $n$ odd integers called "$2n - 1$ double factorial." If $n = 2$, then $$(2n - 1)!! = (2 \cdot 2 - 1)!! = 3!! = 1 \cdot 3 = 3,$$
and $L = 1/3 = 0.33.$ (For a derivation of this equation, see Appendix B online at http://byustudies.byu.edu/chiasmus.) This is the value obtained in Example 5. If $n = 3$, then $$(2n - 1)!! = (2 \cdot 3 - 1)!! = 5!! = 1 \cdot 3 \cdot 5 = 15,$$ and 
$L = 1/15 = 0.067.$ As can be seen from Table 2, $L$ becomes tiny for large $n$, indicating that only a tiny fraction of random orderings will be chiastic when the number of elements in a simple chiasm is large.

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</table>

Reordering Likelihood $L$ for Complex Chiasms

Many chiasms, including Mosiah 5:10–12 (Example 2), do not qualify as simple chiasms because they involve nonchiastic elements and/or extra appearances of chiastic elements. Consequently, for these chiasms, Equation 2 cannot be used to determine $L$, and we instead resort to a Monte Carlo technique,32 which uses a computer to generate random arrangements of the orders of the appearances of elements, as if they were drawn from a hat.
Whereas $L$ is known exactly for simple chiasms, Monte Carlo estimates of $L$ are not exact. For the result $L = 2/3 = 0.67$ above, the margin of error is plus or minus $\sqrt{2/3} = 0.47$, which is the ratio of the square root of the numerator of $L$ to its denominator. This margin of error means that the estimate $L = 0.67 \pm 0.47$ will include the exact value, whatever that is, 68 percent of the time. The larger the number of random rearrangements, the smaller the margin of error and the more accurate the estimate of the exact value, in the same way that public opinion polls involving larger numbers of people yield more accurate results. The computer program that we wrote to carry out these Monte Carlo simulations, which is available for free download, has been validated by comparing with exact results. For a simple chiasm with $n = 5$, a simulation involving ten million random orderings gives $L = 0.00105 \pm 0.00001$, which agrees with the exact result $L = 1/945 = 0.00106$ from Table 2.

Some chiasms in the literature, such as Matthew 13:13–18, employ a single chiastic element at two different levels in the chiastic structure. For example, consider:

**Example 6**

(a) A boy
(b) saw a dog,
(c) who followed the boy.
(c') The boy
(b') fed the dog.
(a') The boy was happy.

This chiasm is not simple because levels (a) and (c) involve the same element, “boy,” and because simple chiasms require independent elements at each level. Accordingly, the value $L = 0.067$ for a simple three-element chiasm (Table 2) underestimates the actual likelihood of this structure appearing by chance. The correct likelihood $L = 0.20$ may be obtained by Monte Carlo simulation with 10,000 random orderings, by demanding one duplicate level (level c) in the chiastic structure.

For closely related elements used at different levels of a chiasm to be considered as independent, there must be a clear point of distinction. For example, elements b, c, and e in Doctrine and Covenants 88:34–39 (Example 3) share some of the same words, but each element is a distinct combination of these words.
Applications

We now explain how we applied the tools developed above to investigate the likelihood of the appearance of chiastic structure by chance for the examples listed in Table 1 (page 110 above).

Line 1. Book of Abraham. In order to assess the significance of chiasmus in the Book of Abraham, we examined all of the chiasms in the book that have been proposed by Peterson, Ostler, and Metcalfe and have calculated $L$ for those involving at least three chiastic elements that satisfy Rule 2. The strongest of these is Abraham 3:26–28, a simple three-element chiasm with $L = 0.067$ (Table 2) and the only one of its kind in the book ($M = 1$):

Example 7

(a) And they who keep their first estate shall be added upon; and they who keep not their first estate shall not have glory in the same kingdom with those who keep their first estate; and they who keep their second estate shall have glory added upon their heads for ever and ever.

(b) And the Lord said: Whom shall I send?

(c) And one answered like unto the Son of Man: Here am I, send me.

(c') And another answered and said: Here am I, send me.

(b') And the Lord said: I will send the first.

(a') And the second was angry, and kept not his first estate; and, at that day, many followed after him.

We estimate the number of opportunities for simple three-element chiastic structure to be $N = 54$ in the Book of Abraham. Inserting these values for $L$ and $N$ into Equation 1 yields $P = 0.98$. This high likelihood makes it statistically indefensible to argue that simple three-element chiastic structure appeared by design in the Book of Abraham.

Line 3. INFORMIX-OnLine Database Administrator’s Guide Introduction. The INFORMIX example (Example 4) has nine chiastic elements: applications (appearing 6x), OnLine (8x), processes (6x), information (3x), access (5x), database (7x), client (9x), program (3x), and request (5x) and two nonchiastic elements: server (2x) and data (3x). A Monte Carlo simulation involving ten thousand random orderings of these elements gives $L = 0.66 \pm 0.01$ for this nine-element chiastic structure. This value greatly exceeds the value $L = 0.000000029$ (Table 2) for a simple nine-element chiasm, indicating that the extra appearances of chiastic elements and the appearances of nonchiastic elements make what might have been a very impressive chiasm into something that could easily have appeared by chance.
We do not have access to the larger work from which Example 4 was taken and accordingly treat it as if it were the entire work, so that $N = 1$. According to Equation 1, the likelihood that nine-element chiastic structure would result by chance in this work is $P = L = 0.66 \pm 0.01$. This value does not rule out the possibility that this chiastic structure appeared by design, neither does it establish this as being likely. This value is consistent with the notion that authors of computer manuals do not normally employ poetic forms deliberately. This consistency helps to confirm our analytical tools—a small value of $P$ might have indicated some flaw in these tools.

**Line 4. Doctrine and Covenants.** In order to assess the significance of chiasmus in the Doctrine and Covenants, we examined all of the chiasms in the book that have been proposed by Shipp, Ostler, Gorton, Metcalfe, and King and have calculated $L$ for those involving at least five chiastic elements satisfying Rule 2.\(^{36}\) The strongest of these is Doctrine and Covenants 88:35–39 (Example 3), a simple five-element chiasm with $L = 0.0011$ (Table 2) and the only one of its kind in the book ($M = 1$). We do not suggest that Doctrine and Covenants 88:35–39 is the most important chiasm in the Doctrine and Covenants but simply report that it has the smallest likelihood of appearing by chance of all the chiasms that we have analyzed in this book. Using this value of $L$ and the estimated number $N = 686$ of opportunities for five-element chiastic structure in the Doctrine and Covenants,\(^{37}\) we use Equation 1 to determine the likelihood $P = 0.52$ that the simple five-element structure of Doctrine and Covenants 88:35–39 could have appeared by chance anywhere in the Doctrine and Covenants. This value of $P$ indicates that such structure could easily result by chance and does not support the notion that such structure emerged by design. Although the specific value of $P$ will vary somewhat with the estimate of $N$, our basic conclusion about the Doctrine and Covenants would not change even for $N$ as small as 50.

**Line 5. Book of Mormon.** In order to assess the significance of chiasmus in the Book of Mormon, we examined all of the chiasms in the book that have been proposed by Welch and Parry and have calculated $L$ for those involving at least five chiastic elements satisfying Rule 2.\(^{38}\) The strongest four of these chiasms, Mosiah 3:18–20, Mosiah 5:10–12, Alma 36:1–30, and Helaman 9:6–11, have values of $L$ that are less than or equal to $L = 0.0011$ for a simple five-element chiasm.

Mosiah 3:18–19 is a simple five-element chiasm with $L = 0.0011$:  

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[1][https://scholarsarchive.byu.edu/byusq/vol43/iss2/4]
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Example 8

(Men will drink damnation to their souls unless)
(a) they humble themselves
(b) and become as little children,
(c) believing and believe that salvation was, and is, and is to come, in and through is in the atoning blood of Christ, the Lord Omnipotent.
(d) For the natural man is an enemy to God,
(e) and has been from the fall of Adam,
(e') and will be, forever and ever,
(d') unless he yieldeth yields to the enticings of the Holy Spirit, and put-theth off the natural man
(c') and becometh a saint through the atonement of Christ the Lord,
(b') and becometh as a child,
(a') submissive, meek, and humble . . .

Mosiah 5:10–12 (Example 2)\(^\text{39}\) is a complex seven-element chiasm with a value \(L = 0.00078 \pm 0.00001\) (obtained by Monte Carlo simulation with ten million random orderings) that is only slightly smaller than \(L = 0.0011\) because Mosiah 5:10–12 involves extra appearances of chiastic elements as well as appearances of nonchiastic elements.

Helaman 6:9–11\(^\text{40}\) is a simple six-element chiasm with the smaller value \(L = 0.000096\):

Example 9

(a) And it came to pass that they became exceedingly rich, both the Lamanites and the Nephites;
(b) and they did have an exceeding plenty of gold, and of silver, and of all manner of precious metals, both in the land south and in the land north.
(c) Now the land south
(d) was called Lehi,
(e) and the land north
(f) was called Mulek, which was after the son of Zedekiah;
(f') for the Lord did bring Mulek
(e') into the land north,
(d') and Lehi
(c') into the land south.
(b') And behold, there was all manner of gold in both these lands, and of silver, and of precious ore of every kind; and there were also curious workmen, who did work all kinds of ore and did refine it;
(a') and thus they did become rich.

Alma 36:11–30 qualifies as a simple eight-element chiasm with \(L = 0.00000049\), as shown in the discussion of Line 7 below.

Each of the four strongest chiasms in the Book of Mormon has a value of \(L\) that is less than or equal to \(L = 0.0011\) for a simple five-element chiasm.
and is therefore at least as strong as a simple five-element chiasm. This observation allows us to calculate an upper bound on the likelihood that these four chiasms could have appeared in the Book of Mormon by chance. Approximately $N = 956$ opportunities for simple five-element structure exist in the Book of Mormon. The likelihood that at least $M = 4$ simple five-element chiasms would emerge by chance in these 956 tries is $P = 0.020$, obtained by generalizing Equation 1. Had each of the four strongest chiasms in the Book of Mormon been a simple five-element chiasm, then $P = 0.020$ would have represented the likelihood that these four could have appeared in the book by chance. Since three of the four are stronger than simple five-element chiasms, the actual likelihood that these four could have appeared in the Book of Mormon by chance is much smaller than $P = 0.020$. This result establishes firmly that the four strongest chiasms in the Book of Mormon are unlikely to have appeared in it by chance.

**Line 6. Bible—Pentateuch.** Most agree that Hebrew biblical writers occasionally employed chiastic structure deliberately in their writing. Finding small $P$ values for chiastic passages in the Bible would confirm this. Of the biblical examples that we have analyzed, which include Ezekiel 34:2–16 and Philemon, the strongest is the celebrated “blasphemer” chiasm, Leviticus 24:13–23:

**Example 10**
(a) And the LORD spake unto Moses, saying,
(b) Bring forth him that hath cursed without the camp; and let all that heard him lay their hands upon his head, and let all the congregation stone him.
(c) And thou shalt speak unto the children of Israel, saying,
(d) Whosoever curseth his God shall bear his sin. And he that blasphemeth the name of the LORD, he shall surely be put to death, and all the congregation shall certainly stone him: as well the stranger, as he that is born in the land, when he blasphemeth the name of the LORD, shall be put to death.
(e) And he that killeth any man shall surely be put to death.
(f) And he that killeth a beast shall make it good; beast for beast.
(g) And if a man cause a blemish in his neighbour; as he hath done, so shall it be done to him; Breach for breach, eye for eye, tooth for tooth:
(g’) as he hath caused a blemish in a man, so shall it be done to him again.
(f’) And he that killeth a beast, he shall restore it.
(e’) and he that killeth a man, he shall be put to death.
(d’) Ye shall have one manner of law, as well for the stranger, as for one of your own country: for I am the LORD your God.
Does Chiasmus Appear in the Book of Mormon by Chance?

And Moses spake to the children of Israel,
that they should bring forth him that had cursed out of the camp, and stone him with stones.

And the children of Israel did as the LORD commanded Moses.

This chiasm involves seven paired ideas and no pairings of single words. Accordingly, pursuant to Rules 5 and 6, the search for nonchiastic elements and extra appearances of chiastic elements is limited to ideas rather than individual words. Since this search bears no fruit, the chiasm is simple and has \( L = 0.0000074 \) from Table 2. We estimate the number of opportunities for simple seven-element structure in the Pentateuch, the five books of Moses comprising the first five books in the Old Testament, to be \( N = 342.46 \). Inserting these values into Equation 1 gives the small likelihood \( P = 0.0025 \) that seven-element chiastic structure appeared by chance in the Pentateuch.

**Line 7. Book of Mormon.** Alma 36:1–30 covers an entire chapter. Various proposed structures for this chiasm\(^47\) agree on the boundaries (the beginning and end of the chapter) and the focal point (the cry for mercy to Jesus Christ in v. 18) but differ in the number of chiastic elements, which varies from 11 to 17. To some, this lack of consensus indicates that the author of this chapter (be it Alma, Joseph Smith, God, Satan, or someone else) took some liberty with the chiastic form. To others, this lack of consensus indicates that any chiastic structure stems from the ingenuity of the analyst, not the author, and likely resulted by chance.\(^48\)

We calculated the likelihood that the Alma 36 chiasm appeared in the Book of Mormon by chance for two different renderings of its structure in order to assess the robustness of our conclusions. Short summaries of these renderings are presented here; their full text is available online at http://byustudies.byu.edu/chiasmus. The first is a simple chiasm with eight chiastic elements, appearing first in the following order and then repeated in reverse order:

**Example 11**

\[
\begin{align*}
(a) & \text{ Inasmuch as ye shall keep the commandments of God ye shall prosper in the land. [1, 30]} \\
(b) & \text{ Ye should do as I have done, in remembering the captivity of our fathers. [2, 29]} \\
(c) & \text{ God delivered our fathers from bondage. [2, 28–29]} \\
(d) & \text{ Those who trust God will be supported in their trials and lifted up at the last day. [3, 27–28]} \\
(e) & \text{ I (and others) received knowledge of God, and were born of God. [4–5, 23–26]} 
\end{align*}
\]
Here, numbers in square brackets refer to verse numbers in Alma 36. The second rendering is a complex chiasm with ten elements:

- (A) Inasmuch as ye shall keep the commandments of God ye shall prosper in the land. [1, 30]
- (B) Ye should do as I have done, in remembering the captivity of our fathers. [2, 29]
- (C) God delivered our fathers from bondage. [2, 28–29]
- (D) Those who trust God will be supported in their trials and lifted up at the last day. [3, 27–28]
- (E) I received knowledge of God. [4, 5, 26]
- (F) I (and others) were born of God. [5, 23–26]
- (G) I fell (stood) and lost (regained) the use of my limbs. [6–11, 23]
- (H) I feared (longed) to be with God. [14–15, 22]
- (I) I was harrowed up by the memory of my sins (no more). [12–14, 16–17, 19–21]
- (J) I remembered (appealed to) Jesus Christ, son of God. [17–18]

This ten-element structure is a close cousin of eleven-element structures displayed in full text by Welch, Parry, and others. We excluded Welch’s first element, “word(s).” This is the only chiastic element of his eleven that consists of a single word rather than a complete idea. Including this element would, by Rules 5 and 6, require us to account for single words that appear at least twice anywhere in the chiasm because it is statistically inconsistent to include a single word in the chiastic structure without also accounting for extra appearances of this and other single words throughout the work, including those words that do not participate in this structure. Excluding Welch’s first element accordingly allowed us to confine our attention to complete ideas as the building blocks of chiastic structure.

The eight-element structure has the advantage of confining all appearances of chiastic elements strictly to their chiastic sections—there are no extra appearances. For example, all of the appearances of being “harrowed up by the memory of my sins” are confined to sections g and g’. Furthermore, there are no nonchiastic elements, because other significant ideas are confined to particular chiastic sections (such as the confinement of “seeking to destroy the church of God” to section f), according to Rule 4.
As an eight-element chiasm (Example 11), Alma 36 yielded $L = 0.00000049$, which qualifies it as the strongest of the four strongest chiasms in the Book of Mormon. Applying Equation 1 with this value of $L$ and the estimate $N = 359$ of the number of opportunities for simple eight-element structure in the Book of Mormon gives $P = 0.00018$. This very low likelihood leads us to conclude that the chiastic structure of Alma 36 likely appeared in the Book of Mormon by design. Although the specific value $P = 0.00018$ would likely change if more refined estimates of $N$ were made, our basic conclusion would not, even for values of $N$ as large as 100,000, which is approximately ten times the actual number of verses in the Book of Mormon.

The ten-element arrangement of Alma 36 lacks any nonchiastic elements but does involve one extra appearance each of elements E (in verse 5) and I (in verses 12–14). A Monte Carlo simulation involving 400,000,000 random orderings resulted in only three orderings with ten-element chiastic structure, which yields $L = 0.000000008 \pm 0.000000004$. Using $N = 359$ as before, we obtain $P = 0.0000027 \pm 0.0000016$, which is much lower than the value obtained for the more conservative eight-element structure. Accordingly, analysis of the ten-element structure strongly confirms the conclusion reached with the eight-element structure, that the likelihood is very high that the chiastic structure of Alma 36 appeared in the Book of Mormon by design.

Conclusions

Table 1 (page 110 above) summarizes our results for the statistical likelihood $P$ that chiasmus appearing in various literary works could have appeared by chance. Based on these estimates, we conclude that the likelihood is high that chiastic structure appeared by design in the Pentateuch and in the Book of Mormon. Our estimates do not support such a conclusion for the Doctrine and Covenants, the Book of Abraham, and the INFORMIX Guide Introduction, indicating instead that chiasms could have appeared in these works by chance. This conclusion might be altered by the discovery of simple chiasms with larger numbers of elements in these works but is unlikely to be altered by more refined estimates of $N$.

Line 7. Our small value $P = 0.00018$ for the strongest chiasm in the Book of Mormon, Alma 36, establishes with 99.98 percent certainty that this chiasm appeared in this book by design and rules out the hypothesis that it appeared by chance. Who the designer might be—Joseph Smith or another modern author with preknowledge of chiasmus, God, Satan,
or ancient authors with connections to the old world—cannot be deter-
mined using our statistical analysis. The value $P = 0.00018$ implies that
only one instance of eight-element chiastic structure comparable to
Alma 36 would be found, on average, in 5,000 random rearrangements
of the literary elements in all 359 estimated opportunities for such structure
in the Book of Mormon.

**Line 6.** Our small value $P = 0.0025$ for the strongest chiasm in the Pen-
tateuch, Leviticus 24:13–23, establishes with 99.75 percent certainty that this
chiasm appeared by design in the Pentateuch. This result is consistent with
the general belief that Hebrew biblical writers sometimes chose to express
themselves using chiasmus.

**Line 4.** Our moderate value $P = 0.52$ for the strongest chiasm in the
Doctrine and Covenants, Doctrine and Covenants 88:34–39, does not rule
out the appearance of chiasmus in this book by design nor does it establish
this as being likely. This value implies that about half of random rearrange-
ments of the literary elements in all 91 estimated opportunities in the book
would yield at least one simple five-element chiasm. Accordingly, this value
renders the suggestion 52 that Joseph Smith employed the chiastic form
deliberately in the Doctrine and Covenants statistically indefensible.

Simple five-element chiastic structure appears once in the Doctrine
and Covenants, whereas it, or stronger structure, appears four times in
the Book of Mormon (line 5). The larger the number of times chiastic
structure actually appears in a work, the smaller the likelihood that
such structure could have appeared by chance. Accordingly, the likeli-
hood $P = 0.020$ that simple five-element structure would appear at least
four times in the Book of Mormon is much smaller than the likelihood
$P = 0.52$ that simple five-element structure would appear at least once in
the Doctrine and Covenants.

Metcalfe proposes a four-element chiasm in Mosiah 5:9–10 that over-
laps asymmetrically with Mosiah 5:10–12 (Example 2). 53 Many such
overlapping structures have been found in the Doctrine and Covenants. 54
Only simple chiasms are free of such overlapping structures. Such over-
lapping structures do not, in themselves, necessarily imply lack of inten-
tional design.

**Line 3.** Weak unintentional chiastic structure, which can be found in
almost any text, is typically accompanied by moderate or large values of
$P$ and considerable extra repetition of literary elements. We have demon-
strated this with the INFORMIX Guide example, for which $P = 0.66$, despite
its having nine chiastic elements. This chiastic structure was likely
identified first by readers of this passage and was not intended by its author. On the other hand, the vastly smaller value $P = 0.00018$ for Alma 36 indicates that its chiastic structure was likely intended by its author and is not simply an unintended pattern within apparently random data.\textsuperscript{95}

**Line 1.** Our large value $P = 0.98$ for the strongest chiasm in the Book of Abraham, Abraham 3:26–28, leads to the same basic conclusion as for the Doctrine and Covenants. Even this large value does not rule out the possibility that the chiastic structure appeared by design in the Book of Abraham, though it does not establish this as being likely or statistically defensible.

Figure 1 displays, on a number line, the values of $P$ for chiasms appearing in Table 1, including word descriptions of the likelihoods that such values could have resulted by chance. The lower the value of $P$ for a chiasm, the smaller the likelihood that it appeared by chance and the greater the likelihood that it appeared by design. Thus the moderate and large values of $P$ for chiasms in the Book of Abraham, the *Informix Guide*, and the Doctrine and Covenants indicate that these chiasms could easily have appeared by chance, whereas the small values of $P$ for chiasms in the Book of Mormon and the Pentateuch indicate that these chiasms likely appeared by design.

Statistical analysis, of course, is incapable of absolutely refuting the hypothesis that a chiasm appeared by design in a literary work. Such analysis is limited to either supporting such a hypothesis or rendering it statistically indefensible. Our results support the hypothesis that chiasmus appeared by design in the Book of Mormon and render the hypothesis that

![Figure 1](image-url)

Values of $P$ for Chiasms Appearing in Table 1

- **Abraham 3:26-28**
  - Likelihood $P$: 1.0 large
- **Informix**
  - Likelihood $P$: 0.1 moderate
- **D&C 88:34-39**
  - Likelihood $P$: 0.01 small
- **B of M, four strongest**
  - Likelihood $P$: 0.001 very small
- **Lev. 24:13–23**
  - Likelihood $P$: 0.0001 extremely small
- **Alma 36:1–30**
  - Likelihood $P$: 0.0001 extremely small
Chiasmus appeared by design in the Doctrine and Covenants statistically indefensible. Our results do not rule out this latter hypothesis; they simply rule out the argument that chiasms in the Doctrine and Covenants provide evidence that Joseph Smith knew about chiasmus.

As mentioned earlier, the historical record is silent about whether Joseph Smith knew about chiasmus. Given our evidence that chiasmus likely appeared in the Book of Mormon by design, would the discovery of historical evidence that Joseph Smith actually knew about chiasmus imply that Joseph Smith deliberately wrote and incorporated chiastic passages into the Book of Mormon? Not necessarily. Such a discovery would imply only that Joseph Smith could have done so and would not necessarily imply that he did so. Using chiasmus to strengthen the claim of the authenticity of the Book of Mormon as an ancient historical record is based on the assumption that Joseph Smith was unaware of chiasmus.

Chiastic patterns in the Doctrine and Covenants may have been incorporated intentionally by the Lord into the text revealed to Joseph Smith. However, the evidence is insufficient to show that such patterns were incorporated intentionally into the text rather than being unintentional patterns discovered in later analysis. In the absence of such evidence, the insights gleaned from the study of such patterns may be highly subjective and may not reflect the intended emphasis of passages in the Doctrine and Covenants.

In carrying out this study, we have developed several tools that may be applied to evaluate the likelihood of chiastic structure in any passage of text. To obtain a rough idea about this likelihood without performing detailed calculations, one may count the total number of appearances of each chiastic and nonchiastic element within a passage. In general, the greater the numbers of extra appearances of chiastic elements and of appearances of nonchiastic elements, the greater the likelihood that chiastic structure appeared by chance; chiasms with fewer nonchiastic elements and with many chiastic elements that appear exactly twice each have smaller likelihoods of appearing by chance.

Boyd F. Edwards (bedwards@wvu.edu) is Professor of Physics at West Virginia University. He obtained a PhD in Applied Physics from Stanford University.

W. Farrell Edwards (farrell@cc.usu.edu) is Professor of Physics at Utah State University. He obtained a PhD in Physics from California Institute of Technology.
The authors gratefully acknowledge John W. Welch for perspective, support, and communicating results of his published and unpublished research; Nadine W. Edwards for chiastic structure analysis, technical and editorial assistance, and encouragement; and Claire E. Grover for commenting on a draft of the manuscript and for assistance in securing reference materials.

5. Blake T. Ostler, “Responsible Apologetics,” review of Book of Mormon Authorship: New Light on Ancient Origins, ed. Noel B. Reynolds, Dialogue: A Journal of Mormon Thought 16 (Winter 1983): 140–44. Ostler lists the scriptural references of his proposed chiasms only, without pointing out the chiastic structure itself. One of these references is Doctrine and Covenants 93:18–38. The strongest chiastic structure that we were able to find within this passage involves only verses 23–38 (see Appendix E online at http://byustudies.byu.edu/chiasmus).


16. For an illustration of how this statistical analysis is performed, see the longer version of this paper posted on http://byustudies.byu.edu/chiasmus.

17. There are rare exceptions to this in which the subject matter itself has natural many-element chiastic order, such as a story of a person who travels from the ground floor to the tenth floor and back again, with each floor mentioned in the story as it is passed. In this case, a small value of $P$ would result not from deliberate ordering of ideas by the author, but from the natural order of ideas in the subject matter itself.


25. John W. Welch, “Chiasmus in Helaman 6:9–11,” in Reexploring the Book of Mormon, ed. John W. Welch (Salt Lake City: Deseret Book; Provo, Utah: FARMS, 1992), 230–32. Helaman 6:9–11 (Example 9) is the six-element central portion of the complex eight-element chiasm in Helaman 6:7–13 discussed in this reference. This latter chiasm has these chiastic elements: peace (2x), land (3x), they became rich (2x), plenty of gold, silver, and precious metals in both lands (2x), land south (2x), Lehi (2x), land north (2x), Mulek (2x). It also has these nonchiastic elements: Nephites (4x), Lamanites (4x). Random rearrangements of all of these elements gives $L = 0.00052$ for eight-element structure, which is larger than the value $L = 0.000096$ obtained for Helaman 6:9–11 but is smaller than the value $L = 0.0011$ for a simple five-element chiasm. Thus, either way the Helaman 6 chiasm is
rendered, it has a lower value of $L$ than a simple five-element chiasm and therefore qualifies to be among the strongest four chiasms in the Book of Mormon.

27. Welch, “Criteria for Identifying.”
29. Vogel, “Use and Abuse of Chiasmus.”
31. King, Doctrine and Covenants Completely Structured, 5.
33. The computer program that we wrote to calculate $L$ and $P$ is available for free download at http://byustudies.byu.edu/chiasmus. This program allows the tools developed in this paper to be applied to the analysis of other chiasms.
35. See Appendix D online at http://byustudies.byu.edu/chiasmus for details.
36. See Appendix E online at http://byustudies.byu.edu/chiasmus for details.
37. See Appendix F online at http://byustudies.byu.edu/chiasmus for details.
38. See Appendix G online at http://byustudies.byu.edu/chiasmus for details.
41. See Appendix I online at http://byustudies.byu.edu/chiasmus for details.
42. See Appendix A online at http://byustudies.byu.edu/chiasmus for details.
43. Nadine W. Edwards, private communication with Boyd F. Edwards, April 1, 2000, regarding her discovery of chiastic structure in Ezekiel 34:2–16.
45. See Welch, “Chiasmus in Biblical Law,” 8; and Welch, “How Much Was Known about Chiasmus.”
See Appendix J online at http://byustudies.byu.edu/chiasmus for details.

Welch, Chiasmus in Alma 36.


Welch, “A Masterpiece: Alma 36,” 114–15; Parry, Book of Mormon Text Reformatted, 278–81, which displays the words of the entire chapter.

See Appendix H online at http://byustudies.byu.edu/chiasmus for the full text of our eight- and ten-element renderings of Alma 36.


