Response to Earl Wunderli's "Critique of Alma 36 as an Extended Chiasm"

Boyd F. Edwards and W. Farrell Edwards[1]

In his "Critique of Alma 36 as an Extended Chiasm,"[2] Earl Wunderli argues that the chiastic structure of Alma 36, which was first published in 1969 by John W. Welch,[3] was not intended by the author of Alma 36. Wunderli also dismisses our recent statistical calculations, which indicate that the chiastic structure of Alma 36 is likely to be intentional.[4] The purpose of this statement is to respond to Wunderli's critique.

Background

Ancient Hebrew writers often employed chiasmus, a literary form that introduces a number of literary elements in one order and then reemploys them in the reverse order.[5] Since 1969, chiasmus in the Book of Mormon has attracted considerable attention because the book purports to be a translation of a record written anciently by Hebrew descendants. No direct evidence exists that Joseph Smith knew about chiasmus when he translated the Book of Mormon in 1829.[6]

Many people regard examples of chiasmus in the Book of Mormon as deliberate applications of the chiastic form. This group includes both proponents and critics of the authenticity of the Book of Mormon. Whereas proponents regard chiasmus as evidence of this authenticity,[7] critics suggest that Joseph Smith or some other modern author must have known about chiasmus and incorporated it in writing, rather than in translating, the Book of Mormon.[8]

Others, including Wunderli, hold that the proposed chiasms in the Book of Mormon are not deliberate applications of the chiastic form, and

ascribe their chiastic structure to the ingenuity of the analyst, rather than to the intent of the author.[9] This group regards chiastic structure in the Book of Mormon as nothing more than repeated occurrences of words and ideas that fall inadvertently into chiastic patterns, and that are identified only through the scrutiny of the analyst.

Alma 36

Alma 36 has received considerable attention in this connection. Many regard this chapter as a deliberate application of the chiastic form because of the large number of literary elements that fit the chiastic pattern, the strength of the associations between paired elements, and the importance of the chapter's focal point.[10] Others, including Wunderli, argue that multiple appearances of key ideas within the chapter opens the door for analysts to pick from among these appearances and to adjust the boundaries of chiastic sections in order to impose chiastic structure where none was intended. Because of these multiple appearances, even those who regard this chapter as a deliberate application of the chiastic form disagree on some of the details of its structure.[11] No one knows for sure, of course, whether the author of Alma 36 intended it to be chiastic.

Some imprecision in the chiastic form does not preclude it from being deliberately chiastic. An author may deliberately apply the chiastic form while at the same time taking some liberties with the form, such as repeating key elements outside of their intended chiastic sections or varying the length of certain sections for dramatic emphasis.

If Alma 36 is *not* the result of some deliberate application of the chiastic form, then its apparent chiastic structure must have come about inadvertently, that is to say, as a result of unintentional pairings of repeated ideas. In other words, as the chapter was written, its author would have unintentionally employed literary elements in an order that just happened to be chiastic and this order would have been revealed only later by the analyst.

In an effort to aid analysts in assessing the degree of deliberateness behind specific chiastic proposals, Welch proposed fifteen indices of chiastic strength and used them to argue that Alma 36 reflects a high degree of chiasticity.[12] Wunderli applies and extends these fifteen criteria to argue the opposite, maintaining that Alma 36 violates literary standards that he expects deliberate chiasmus to obey.

On the basis of such violations, Wunderli also dismisses our recent

statistical calculations, which indicate that the chiastic structure of Alma 36 is likely to be intentional. However, this dismissal is flawed because *meaningful statistical results do not require adherence to the literary standards devised by Welch or Wunderli.* While we acknowledge the importance of their literary analyses, we emphasize that their approaches are fundamentally different from our statistical approach, and emphasize that most of Welch's fifteen criteria and Wunderli's extensions of these criteria have little bearing on the validity of our statistical results. Exceptions include Welch's quantifiable criteria of length, density, mavericks, and reduplication, which are embodied implicitly in our statistical approach. Wunderli imposes his particular set of literary standards in an attempt to discredit our statistical approach, implying that one can't use statistics to analyze a text unless it obeys his or Welch's literary standards. We disagree.

While valid statistical results do not require adherence to these particular literary standards, valid results do require careful attention to identifying and strictly accounting for all of the important elements in a passage, both those paired elements that participate in the basic chiastic structure of the passage, called chiastic elements, and those that do not, called non-chiastic elements. Statistical results are meaningless unless this crucial requirement is met. Ignoring it leads to the mistaken statistical conclusion that unintentional chiastic structure identified in a computer manual is likely to have been intentional.[13]

We developed six rules to ensure adherence to this requirement and to enable a uniform comparative analysis of various texts: (Rule 1) chiastic boundaries must be located at the ends of sentences or significant phrases; (Rule 2) two or more appearances of a single literary element must share the same essential word or words; (Rule 3) the significance of an element is judged against the significance of other elements in the same passage; (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; (Rule 5) extra appearances of chiastic elements must be accounted for in the analysis; and (Rule 6) non-chiastic elements must be accounted for in the analysis.[14] We adopted these rules not as a new definition of chiasmus but as a set of standards to be used for the sole purpose of ensuring valid evaluations of the likelihood of inadvertent chiasmus.

We used these rules to identify and account for all chiastic and non-chiastic elements in each passage studied. We then used elementary

statistics to calculate the likelihood L of chiastic structure in random rear-
rangements of these elements, and to calculate the corresponding likeli-
hood P that chiastic structure could have appeared anywhere in its parent
work by chance rather than by design, by estimating the number of oppor-
tunities for chiastic structure in the parent work. The likelihood P will be
small (a) if the number of paired chiastic elements is large, (b) if the num-
ber of extra appearances of these chiastic elements is small, (c) if the num-
ber of appearances of non-chiastic elements is small, and (d) if the number
of opportunities in the parent work for similar chiastic structure is not ex-
cessively large. If P is small, one can infer that the author of the passage
was likely to have deliberately applied the chiastic form in composing the
passage. On the other hand, if P is moderate or large, nothing can be in-
ferred about intentionality. Welch's and Wunderli's literary standards are
largely irrelevant to this process.

We validated our approach by confirming that it yields very small
likelihoods P for well-known many-element deliberate chiasms such as Le-
viticus 24:13–23 and that it yields moderate or large likelihoods for spuri-
ous chiastic structure such as that found in a computer manual. Although
authors do not select words at random as if from a hat when composing
passages of text, the ordinary composition process yields passages having
likelihoods that are comparable to those for random word selection when
the author has no intention of writing chiastically. This observation
further validates our statistical approach.

We analyzed dozens of chiastic structures proposed by others in the
Standard Works and elsewhere. We found that the vast majority, includ-
ing all of those in the Doctrine and Covenants and the Book of Abraham,
could easily have appeared by chance because they have few chiastic ele-
ments or many non-chiastic elements, or both. On the other hand, a few
chiasms in the Book of Mormon and the Bible stand out as having small
likelihoods P of having appeared by chance because they possess many chi-
astic elements and few non-chiastic elements.[15] One of these is Alma 36,
whose ten-element chiastic rendering has a likelihood of less than one in
100,000 of having appeared in the Book of Mormon by chance.[16] Our cal-
culations do not absolutely preclude the conclusion that the chiastic struc-
ture of Alma 36 appeared inadvertently, but indicate less than one chance
in 100,000 that it could have.

We agree that Alma 36, because of its length and complexity, pres-
ents special challenges to the analyst, but we nevertheless judge the statis-

tical evidence as sufficient to justify the conclusion that Alma 36 was the result of the deliberate application of the chiastic form. We find nothing in Wunderli's study that threatens to overturn this conclusion.

Beyond Alma 36

Wunderli's critique focuses exclusively on Alma 36 and ignores other chiasms in the Book of Mormon that have small likelihoods of appearing by chance. Some of these satisfy Wunderli's literary standards better than Alma 36 because they are shorter and simpler. Accordingly, *the case for the significance of chiasmus in the Book of Mormon does not rest on Alma 36 alone.*

Those desiring to reach an informed judgment regarding the significance of chiasmus in the Book of Mormon will include Mosiah 3:18–19, Mosiah 5:10–12, Alma 36:1–30, and Helaman 9:6–11 in their investigations. These four chiasms have likelihoods that are less than or equal to that of a simple chiasm with five chiastic elements and no non-chiastic elements. The likelihood that four such chiasms could have appeared in the Book of Mormon by chance is less than 1 in 50.[17] This result strengthens the case that the appearance of chiasmus in the Book of Mormon was intentional.

Detailed Responses to Wunderli's Arguments

1. In general, Wunderli points out what he considers to be flaws in balance and symmetry in various proposals of the chiastic structure of Alma 36, and argues on this basis that the chiastic structure of Alma 36 was inadvertent. Wunderli focuses on Alma 36 exclusively and neglects to apply his criteria to chiasms in the Bible and other ancient texts in an effort to establish these criteria as valid measures of chiastic strength. As is discussed below, many ancient chiasms that are regarded as authentic would fail Wunderli's tests. In his analysis, Wunderli utilizes his own extensions of Welch's fifteen criteria, extensions that are reminiscent of criteria adopted by Vogel.[18] Wunderli largely ignores the much wider body of chiastic literature and scholarly criticism which generally acknowledges some presence of chiasmus in the Book of Mormon.[19]

2. Wunderli builds much of his case around the *Mavericks* criterion. He points out that Welch's seventeen-element rendering of Alma 36[20] incorporates appearances of terms and phrases that fit best into the chiastic structure. Wunderli lists instances where other appearances of these same

terms and phrases are not factored into the structure. As do others,[21] Wunderli views such extra repetitions as an opportunity for the analyst to impose chiastic structure that was never intended by the author of the passage, and concludes; "In short, Alma 36 seems hardly a carefully crafted masterpiece by Alma but a creatively fashioned chiasm imposed on the text by Welch."[22]

We agree with many of the points that Wunderli makes about selectivity, but strongly disagree that these points justify his conclusion. Since many instances of extra repetition can convert what might have been a very impressive chiasm into something that could easily have appeared inadvertently,[23] we insist on full disclosure of all appearances of chiastic and non-chiastic elements when evaluating the strength of chiastic proposals. According to our six rules of analysis, appearances of chiastic terms and phrases outside of a proposed chiastic structure must be accounted for as maverick appearances, and terms and phrases that appear at least twice in the passage but do not fit into the chiastic structure must be accounted for as non-chiastic elements. Accounting for such elements raises the likelihood P that a chiasm could have appeared by chance.

Because Welch's seventeen-element rendering of Alma 36 contains violations of our six rules, our calculations focus instead on our more conservative eight-element and ten-element renderings, which do satisfy these rules. The eight-element rendering, which has no maverick appearances, has less than one chance in 5000 (P = 0.00018) of appearing inadvertently in the Book of Mormon. The ten-element rendering has less than one chance in 100,000 (P = 0.0000027) of appearing inadvertently in the Book of Mormon, despite its two maverick appearances outside of the chiastic structure.[24] These two maverick appearances are not ignored, but are accounted for explicitly in the statistical analysis. Thus, a small number of maverick appearances does not preclude a small likelihood of inadvertent chiasmus.

We ask: how much extra repetition would be needed before the likelihood of inadvertent chiasmus would become moderate or large? More than appears in Alma 36, it transpires. For example, a spurious nine-element chiasm that we identified in a computer manual involves 34 maverick appearances of chiastic elements and 5 appearances of non-chiastic elements. Without these appearances, this nine-element chiasm would have a very small likelihood L = 0.000000029 of appearing by chance. With them, this chiasm has a high likelihood L = 0.66 of appearing by

chance. This likelihood indicates that this chiastic structure is unlikely to have been deliberate[25] and is typical of non-chiastic text. The value indicates that 66% of random rearrangements of the chiastic and non-chiastic elements in this passage would yield such nine-element chiastic structure, and agrees with the notion that the author of this computer manual likely did not invoke the chiastic form in writing it.

This example underscores the importance of carefully accounting for all maverick appearances of chiastic elements and all appearances of non-chiastic elements in the statistical analysis. The main difference between the computer manual example and the ten-element rendering of Alma 36 is in the extent of extra repetition; the ten-element rendering involves only two extra appearances of chiastic elements and involves no non-chiastic elements, which account for its extremely small value L = 0.000000008. Both the number of chiastic elements and the extent of extra repetition are important in determining the likelihood of a proposed chiasm appearing inadvertently. Alma 36 has a large number of chiastic elements and comparatively little extra repetition, and therefore has a very small likelihood of appearing inadvertently.

Incidentally, Welch's seventeen-element rendering of Alma 36 does not qualify strictly for our statistical analysis as it stands. Does this fact imply that our eight- or ten-element renderings are in any way preferable over Welch's seventeen-element structure, or that the author of Alma 36 necessarily crafted it as an eight- or ten-element structure? No. In fact, it might be possible to perform our statistical tests on a close cousin of the seventeen-element rendering by carefully identifying and accounting for all maverick appearances of chiastic elements and all appearances of non-chiastic elements. This would be a formidable analytical and computational task because the resulting structure would involve many, many elements consisting of single words and short phrases rather than complete ideas in order to bring it into conformity with our six rules. We have not attempted to carry out this analysis, and do not feel compelled to do so because our calculations for the eight- and ten-element renderings are sufficient to show that Alma 36 likely did not result by chance, and we do not expect a calculation for the seventeen-element rendering to alter this conclusion.

3. Wunderli devotes considerable attention to discussing and extending Welch's balance criterion and applying it to Alma 36.[26] This criterion, as applied by Welch, refers to the similarity in the total lengths of

the first and second halves of a chiasm—the more similar these lengths, the better.[27] Welch and Wunderli both understand this basic definition to include the similarity between the numbers of specific words in the first and second halves.[28] Wunderli, however, extends the application of this criterion to include the similarity between the lengths of paired chiastic sections.[29]

What rules governed ancient authors in composing chiasms? Did they count the number of specific words in the first and second halves? Did they only value paired chiastic sections that were similar in length? No one knows for sure. Under Wunderli's extended balance criterion, standard chiasms in the Bible would fail. For example, element d in Leviticus 24:13–33[30] has 57 words, and element d' has 26. This imbalance does not tarnish scholarly regard for this passage as a deliberate application of the chiastic form. This regard is based on the strengths of the associations between the seven detailed paired elements, the absence of extra appearances of these elements, and the absence of non-chiastic elements in this text. Evidently, chiasms need not be balanced precisely, with every element exactly measured, in order to be deemed chiastic. Writers have the liberty to work within the constraints of structural forms and still enjoy some degree of license in composition.

Whether or not ancient authors attempted to balance their paired chiastic sections, the relative lengths of paired chiastic sections has no effect on the *statistical* likelihood of inadvertent chiastic structure as long as the extra length involves no extra appearances of chiastic elements, and involves no appearances of non-chiastic elements.

4. Wunderli also discusses and redefines Welch's boundaries criterion and then applies it to Alma 36.[31] This criterion, as defined by Welch, demands that the beginning and ending points of an entire chiastic passage occur at natural breaks in the text from which the chiasm was extracted.[32] It does not refer to the divisions between sequential chiastic sections within a chiasm. Yet Wunderli lists instances where Welch's full-text Alma 36 chiasm divides sentences in half between chiastic sections, and misleadingly ascribes these divisions to violations of Welch's boundaries criterion. Furthermore, each of three ancient chiasms quoted as examples by Wunderli (Matt. 20:16, Isaiah 55:8, and Psalms 3:7–8)[33] divides sentences in half, as does Leviticus 24:13–33, discussed above. Wunderli singles out what he considers to be a particularly unnatural mid-sentence division, between sections G' and F' in Welch's 11-element rendering of

Alma 36. We regard this division to be no more unnatural than some of the divisions present in his biblical examples.

5. Wunderli holds that the connections between Alma 36 and Alma 37 suggest that Alma 36 does not serve as a stand-alone chiastic literary unit.[34] By turning attention to Alma 37, however, Wunderli invites readers to consider the relationship of Alma 36 with other passages written by Alma. Wunderli ignores Mosiah 27 and Alma 38, which offer significant evidence of intentionality behind the structure of Alma 36, as discussed by Welch:[35] In Mosiah 27, Alma tells his conversion story in short antithetical parallelisms. In Alma 36, Alma uses the same phrases, but he splits these parallelisms so that their first elements appear in the first half of Alma 36 and their second elements appear in the second half of Alma 36. Changing from antithetical parallelism to introverted parallelism seems to be a clear, deliberate choice. Then, in Alma 38, speaking to Shiblon, his second son, Alma includes only the first half of the account in Alma 36 which he gave to Helaman, his first son. In Alma 38:8, Alma comes right up to the turning point of Alma 36, and there he stops; he does not chiastically work his way back out of the story as he does in Alma 36. This gives evidence that Alma consciously saw that point as a literary focal point. Accordingly, we judge the evidence of Mosiah 27 and Alma 38 to indicate that Alma 36 does indeed operate as a stand-alone literary unit.

6. Wunderli ignores evidence of intentionality provided by Welch's criteria of objectivity, centrality, and length. The number of chiastic elements in Alma 36 is large compared with many Biblical chiasmus, which rarely have more than seven elements. Our analysis indicates that the likelihood of unintentional chiastic structure decreases precipitously with increasing numbers of chiastic elements, as long as there are few extra appearances of these elements and few appearances of non-chiastic elements. Thus, Welch's length criterion provides strong evidence of intentionality. His centrality criterion does also, since the turning point of the chiasmus coincides with the turning point in Alma's life, his appeal to Jesus Christ. Welch's objectivity criterion rewards strong ties between paired chiastic elements. Wunderli argues that Welch labels two pairings creatively to convey more precision than is present in the text.[36] In our contrasting view, each of these two pairings, "God delivered our fathers from bondage" and "I longed / feared to be with God," not only satisfies the objectivity criterion, but represents a powerful linkage of themes and

ideas, with differences between the first and second appearances bringing out additional meaning in Alma's experience.

Alma 36 contains remarkable contrasting pairings. One of these is the pair just mentioned (H, H'), contrasting Alma's fear to be with God against his longing to be with him. Others include the pair contrasting Alma's being harrowed up by the memory of his sins before the focal point to his being harrowed up no more by these memories (I, I') and the pair contrasting Alma's falling and losing the use of his limbs and his standing and regaining their use (G, G'). These pairings strike us as powerful literary cross-references that provide important evidence of intentionality.

7. Wunderli also invokes his extended balance and boundaries criteria in an attempt to dismiss our ten-element chiastic rendition of Alma 36, and suggests that this rendition violates our own boundaries criterion (Rule 1).[37] This rendition does not violate this criterion, which clearly refers only to the starting and ending points of the entire chiastic passage,[38] but does indeed violate Wunderli's extended boundaries criterion, which refers to the divisions between chiastic sections. We are unconcerned about this violation because well-known ancient chiasms also violate it (see Item 4 above).

Either way, Wunderli's extended criteria are extraneous to the statistical likelihood of inadvertent chiastic structure.

8. Wunderli objects to our including multiple occurrences of key ideas within a chiastic section.[39] Multiple occurrences of a key idea within a chiastic section represent a higher degree of organization, and yield lower likelihoods of inadvertent chiastic structure, than if no such multiple occurrences had been present. For example, adding a single extra occurrence of a chiastic element to a two-element chiasmus and insisting that multiple occurrences appear within chiastic sections lowers the chiastic likelihood from $L = 0.33$ (six orderings aabb, bbaa, abab, baba, abba, and baab, with the last two being chiastic) to $L = 0.30$ (ten orderings aaabb, aabab, abaab, ababa, bbaaa, baaba, babaa, abbaa, aabba, and baaab, with the last three being chiastic). Accordingly, our conclusions regarding Alma 36 are not invalidated by multiple occurrences of key ideas within a chiastic section. Though perhaps counter-intuitive, such multiple occurrences strengthen the case that Alma 36 is a deliberate application of the chiastic form.

Wunderli argues that repeated elements within chiastic sections do

not seem to represent a higher degree of organization from a literary standpoint. He doubts whether Alma would have repeated *born of God* three times in section F' to strengthen his chiastic element, and argues that the corresponding imbalance in the overall lengths of sections F and F' weakens the case for Alma 36 as an extended chiasm. Whether or not one agrees with his literary arguments, the fact remains that the confinement of the four appearances of *born of God* to sections F and F' does indeed represent a higher degree of organization from a statistical standpoint; it is less likely in random rearrangements of this structure for these multiple appearances to appear side by side in their proper chiastic sections than it is for them to be sprinkled about in various sections.

9. Wunderli asks why the appearance of the word "joy" in two unpaired sections (I' and F') would not constitute a violation of Rule 4.[40] The reason is embodied in Rule 6:[41] Since the smallest building block that is used in the ten-element chiastic structure of Alma 36 is a complete idea, individual words such as "joy" and even short word pairs such as "exceeding joy" do not violate the statistical independence of chiastic elements, and need not be accounted for in the analysis. On the other hand, had complete ideas in I' matched complete ideas in F', then such pairings would indeed have constituted a violation of Rule 4. Furthermore, had we instead analyzed Welch's eleven-element full-text chiastic structure, Rule 6 would have required that individual words such as "joy" be accounted for, because one of the chiastic elements of this eleven-element structure is a single word.

Wunderli mistakenly claims that we ignored the three appearances of *joy* in verses 20 and 21. Although accounting for such individual words and short phrases is not necessary when the chiastic building blocks are complete ideas, we did indeed search the chapter for instances of extra repetition of such words and phrases, including the word "joy."[42] Our search uncovered 23 key words and short phrases that conform to the chiastic structure and only four that didn't. We therefore concluded that our eight-element structure not only confines all complete ideas to their appropriate sections, but confines many individual words and short phrases to these sections as well.

10. While we concur with Wunderli's statement that there is some flexibility in rendering Alma 36 as a chiasm,[43] we disagree that this flexibility implies that the chiastic structure of this chapter was unintentional or that the form is non-existent. Analysis of our two renderings shows that

the chiastic structure of Alma 36 was likely to have been intentional, despite the differences between these renderings.

11. Wunderli presents no justification for his statement that our ten-element rendition of Alma 36 has little chiastic strength under Welch's criteria.[44] As discussed above, Wunderli actually applies his own extensions of Welch's balance and boundaries criteria in his study of our ten-element chiasm. These extensions are dubious measures of chiastic strength since they are violated by ancient chiasms. Be that as it may, as discussed above, the validity of our statistical analysis of the ten-element rendering of Alma 36 does not rely on its adherence to the literary standards devised by Welch or Wunderli.

Discussion

We consider the evidence to justify fully the conclusion that Alma 36 is likely to be the result of a deliberate application of the chiastic form. This evidence is, for us, both qualitative and quantitative. Qualitative evidence includes the elegance of the symmetries and parallels that are present in the text of Alma 36, the large number of strongly associated chiastic pairs, and the significance of the focal point as a turning point in Alma's life. Once taught the rudiments of chiasmus, many readers readily and independently identify the main qualities of this pattern in Alma 36.

Quantitative evidence includes the observation that the entire chapter of Alma 36 can be divided into sixteen (2 x 8) well-defined sections, with all key ideas confined strictly to paired chiastic sections, and with no extra appearances of key ideas outside of these sections. In the following brief outline of this eight-element rendering, numbers in square brackets refer to verse numbers in Alma 36:

(a) Inasmuch as ye shall keep the commandments of God ye shall prosper in the land [1]

(b) Ye should do as I have done, in remembering the captivity of our fathers. [2]

(c) God delivered our fathers from bondage. [2]

(d) Those who trust God will be supported in their trials and lifted up at the last day. [3]

(e) I received knowledge of God, and was born of God. [4–5]

(f) I fell and lost the use of my limbs. [6–11]

(g) I was harrowed up by the memory of my sins,
and feared to be with God. [12–14]

(h) I remembered Jesus Christ, son of God.
[17]

(h') I appealed to Jesus Christ, son of God. [18]

(g') I was harrowed up by the memory of my sins
no more, and longed to be with God.
[19–22]

(f') I stood and regained the use of my limbs. [23]

(e') I and others received knowledge of God, and were
born of God. [23–26]

(d') I put my trust in God, have been supported under tri-
als, and will be raised up at the last day. [27–28]

(c') God delivered our fathers from bondage. [28–29]

(b') Ye should do as I have done, in remembering the captivity
of our fathers. [29]

(a') Inasmuch as ye shall keep the commandments of God ye shall
prosper in the land. [30]

The likelihood that such an eight-element structure could have ap-
peared inadvertently in Alma 36 is comparable to the likelihood that eight
pairs of objects (two apples, two bananas, two pears, two oranges, two
cherries, two strawberries, two grapes, and two lemons, for example) could
be drawn randomly out of a bushel basket in a precisely chiastic order (or-
ange, pear, banana, grape, strawberry, apple, lemon, cherry, cherry,
lemon, apple, strawberry, grape, banana, pear, and orange, for example).
This likelihood L = 0.00000049 is easy to calculate, and amounts to less
than one chance in two million.

This likelihood is very small because the chiastic ordering is very re-
strictive for eight elements; the vast majority of random orderings are not
precisely chiastic. Those who are disinclined to believe this result are en-
couraged to do the experiment with labeled pieces of paper. Those who
draw all sixteen pieces randomly from a hat a few times may begin to ap-
preciate the exceedingly small likelihood that the sixteen elements will
emerge from the hat in a perfect chiastic ordering, with eight elements ap-
pearing once each in some order in the first half of the chiasm, and then
reappearing in the second half in exactly the reverse order.

Conclusions

We have demonstrated that our statistical approach, which differs fundamentally from the literary approaches of Welch and Wunderli, can reliably identify chiastic structures that are likely to be the result of the deliberate application of the chiastic form, as well as structures that are not. We have shown that applying our approach to Alma 36 leads to the conclusion that its chiastic structure is likely to be the result of the deliberate application of the chiastic form. We have shown that well-known biblical chiasms violate some of the literary standards for chiastic analysis used by Wunderli in his efforts to dismiss Alma 36 as a deliberate application of the chiastic form. We have demonstrated that Wunderli misrepresented or misapplied some of Welch's criteria in these efforts. We have pointed out that the validity of our statistical results does not rely on adherence to literary standards devised by Welch and Wunderli. Wunderli alleges that we violate our own rules for statistical analysis. We have shown these allegations to be false. Whereas Wunderli regards some chiastic pairings in Alma 36 to be imprecise, we regard its chiastic pairings to be remarkably strong. In short, we find nothing in Wunderli's study that threatens to overturn the evidence that Alma 36 was likely the result of a deliberate application of the chiastic form.

We have also argued that in restricting his study to Alma 36, Wunderli presents an incomplete view of the significance of chiasmus in the Book of Mormon, which contains several other compelling examples of chiasmus. Furthermore, Wunderli fails to apply his chiastic literary standards to well-known biblical chiasmus, which contain violations of these standards.

We invite interested analysts to perform their own independent tests of the validity of our statistical procedures and conclusions. Having analyzed dozens of chiasms, some of which are generally regarded as deliberately chiastic, we are convinced that our statistical tools can indeed differentiate deliberate chiasms from inadvertent ones. However, we acknowledge that others may desire additional evidence and invite these to perform the following test: Compose or select five deliberate chiasms containing many chiastic elements (5–8, say), few or no extra "maverick" appearances of these elements (0–2, say), and few or no appearances of non-chiastic elements (0–2, say). In addition, compose or select five other passages of text that involve some repeated elements but have no readily

discernible chiastic pattern and did not result from a deliberate application of the chiastic form (a paragraph from a novel, for example).

Or better yet, ask another person to compose or select the ten passages and to supply them for analysis without saying which five have deliberate chiastic structure. Analyze all ten passages using our six rules to identify and account for the appearances of all chiastic and non-chiastic elements and calculate the likelihoods L that their chiastic structures could have appeared by chance, using the tools described in our BYU Studies article, which tools include a freely downloadable computer program to help with the mathematical calculations.[45] If the five deliberate examples have small values of L less than about 0.05 and if the five unintentional examples have moderate to large values of L between about 0.05 and 1, then our statistical tools will have passed the validity test.

Interested analysts are also invited to use our statistical tools to perform their own independent statistical analyses of Alma 36 or other chiasms that we have analyzed, in order to test our conclusions regarding these chiasms.

We emphasize strongly that obtaining valid statistical results in any of these tests requires care in identifying all instances of all significant literary elements in a passage, whether these take part in the basic paired chiastic structure or not. This requirement can be met by adhering carefully to our six rules.

Notes

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2. Earl Wunderli, "Critique of Alma 36 as an Extended Chiasm," *Dialogue: A Journal of Mormon Thought* 38, no. 4 (Winter 2005): 97–110.

3. John W. Welch, "Chiasmus in the Book of Mormon," *BYU Studies* 10, no.1, (1969): 69–84. You can download a free copy of this article at https://byustudies.byu.edu/Products/MoreInfoPage/MoreInfo.aspx?Type=7&ProdID=884 Users of Microsoft Explorer may have difficulty ac-

cessing this site. In that case, an alternate browser such as Foxfire, available in free download, is advised.

4. Boyd F. Edwards and W. Farrell Edwards, "Does Chiasmus Appear in the Book of Mormon by Chance?" *BYU Studies* 43, no. 2, (2004): 103–130; available online, with supplemental materials, at http://byustudies.byu.edu/chiasmus/

5. John W. Welch and Daniel B. McKinlay, editors, *Chiasmus Bibliography* (Research Press at Brigham Young University, Provo, 1999).

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10. Welch, "Chiasmus in Alma 36"; Welch, "A Masterpiece: Alma 36"; Lindsay, "Chiasmus in the Book of Mormon."

11. See Anonymous, http://www.lds-mormon.com/chiasm.shtml;

Metcalfe, "Apologetic and Critical Assumptions," 162–171; Hamblin, review of "Apologetic and Critical Assumptions," 434–523.

    12. John W. Welch, "Criteria for Identifying and Evaluating the Presence of Chiasmus", *Journal of Book of Mormon Studies* 4, no.2 (1995); copy available at Foundation for Ancient Research and Mormon Studies, Brigham Young University (2005), http://farms.byu.edu/viewauthor.php?authorID=64

    13. Edwards and Edwards, 117.

    14. Ibid., 111-114.

    15. Ibid., 110-111.

    16. Ibid., 123.

    17. Ibid., 110-111. The likelihood that these particular four chiasms could have appeared by chance in the Book of Mormon is actually much smaller than 1 in 50 because three of these four have likelihoods that are lower than that of a simple five-element chiasm.

    18. Vogel, "Use and Abuse."

    19. Welch and McKinlay, *Chiasmus Bibliography*; John W. Welch, ed. *Chiasmus in Antiquity*, (Hildesheim: Gerstenbert, 1981; reprinted Provo, Utah: Research Press, 1998); Vogel, "Use and Abuse"; Ostler, "Responsible Apologetics"; John S. Kselman, "Ancient Chiasmus Studied," *Dialogue: A Journal of Mormon Thought* 17, no. 4 (Winter 1984): 146–148.

    20. Welch, "A Masterpiece: Alma 36," 117.

    21. Vogel, "Use and Abuse"; Jerald and Sandra Tanner, Jerald and Sandra Tanner, *Salt Lake City Messenger*, No. 72; Metcalfe, "Apologetic and Critical Assumptions"; Hamblin, review of "Apologetic and Critical Assumptions."

    22. Wunderli, 106.

    23. Edwards and Edwards, 117–118.

    24. Ibid.

    25. Ibid.

    26. Wunderli, 106–110.

    27. Welch, "Criteria for Evaluating Chiasmus."

    28. Welch, "Chiasmus in Alma 36," 32; Wunderli, 107.

    29. Wunderli, 108. Welch is aware of the imbalance between some of the sections, as he displays the entire text of Alma 36 in "A Masterpiece," 119–24. In that rendition, section H is longer than H', but D is shorter than D', and thus an overall balance is achieved. It makes sense that Alma would have intentionally emphasized his sins in section H in the first half and the idea of deliverance in section D in the second half.

30. Edwards and Edwards, 120.

31. Wunderli, 108–111.

32. Welch, "Criteria;" Welch, "Chiasmus in Alma 36," 28.

33. Wunderli, 99–100.

34. Ibid.

35. Welch, "Chiasmus in Alma 36," 35–43; Welch, "A Masterpiece: Alma 36," 130–131.

36. Wunderli, 102–105.

37. Ibid., 110–111 and footnote 33; Edwards and Edwards, 122–123.

38. Edwards and Edwards, 111–112.

39. Wunderli, 110–111.

40. Ibid.

41. Edwards and Edwards, 113, 122.

42. Ibid., Supplemental Material 7.

43. Wunderli, 112.

44. Ibid.

45. Edwards and Edwards, computer program links at http://byustudies.byu.edu/chiasmus/.