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When Are Chiasms Admissible as Evidence?

Boyd F. Edwards and W. Farrell Edwards

They seek him here, they seek him there,
Those Frenchies seek him everywhere.[1]

—Sir Percy Blakeney in *The Scarlet Pimpernel*

Many regard John W. Welch's 1967 discovery of chiasmus in the Book of Mormon as evidence of the ancient origins of the book, arguing that chiasmus was used by Isaiah and other Old Testament writers in Jerusalem, that Lehi grew up in Jerusalem at about this time, that he learned there about the chiastic form, and that he carried this knowledge to America, where he passed it on to Book of Mormon writers.[2] Chiasmus is an ancient literary form in which a list of elemental words, phrases, or ideas is stated in a particular order and is then repeated in reverse order.[3]

1. Baroness Emmuska Orczy, *The Scarlet Pimpernel* (New York: Grosset and Dunlap, 1905), 117.

2. John W. Welch, "Chiasmus in the Book of Mormon," *BYU Studies* 10, no. 1 (Fall 1969): 69–84; John W. Welch, "A Masterpiece: Alma 36," in *Rediscovering the Book of Mormon: Insights You May Have Missed Before*, ed. John L. Sorenson and Melvin J. Thorne (Salt Lake City: Deseret Book, 1991), 114–15; John W. Welch, "Chiasmus in Helaman 6:7–13," in *Reexploring the Book of Mormon*, ed. John W. Welch (Salt Lake City: Deseret Book; Provo, Utah: FARMS, 1992), 230–32, available online at http://maxwellinstitute.byu.edu/publications/books/?bookid=71&chapid=832 (accessed November 10, 2010); John W. Welch, "A Steady Stream of Significant Recognitions," in *Echoes and Evidences of the Book of Mormon,* ed. Donald W. Parry, Daniel C. Peterson, and John W. Welch (Provo, Utah: FARMS, 2002), 340; Jeffrey R. Lindsay, "Chiasmus in the Book of Mormon," *LDS FAQ: Mormon Answers,* http://jefflindsay.com/chiasmus.shtml (accessed November 10, 2010).

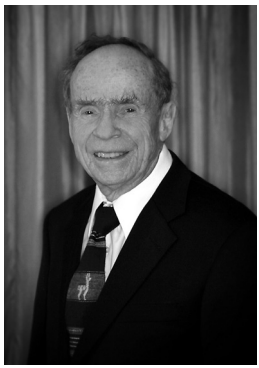
3. John W. Welch and Gerstenberg Verlag, eds., *Chiasmus in Antiquity* (Hildesheim: Gerstenberg, 1981; repr., Provo, Utah: Research Press, 1999); John W. Welch, "Chiasmus in Biblical Law," in *Jewish Law Association Studies IV: The Boston Conference Volume*, ed. B. S. Jackson (Atlanta: Scholars Press, 1990), 8; John

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W. Farrell Edwards

I was thirteen years old in 1969, when John Welch published his discovery of chiasmus in the Book of Mormon.[2] I remember the excitement of my father, Farrell Edwards, co-author of the present article, when he told me that an ancient Hebrew literary form had been discovered in the Book of Mormon. I was impressed by the symmetry and beauty of these chiasms and regarded their presence in the Book of Mormon as evidence of its authenticity.

In 2002 or thereabouts, I happened upon an essay by Curt Van Den Heuvel arguing that Book of Mormon chiasms are "a result of the incredible amount of repetition contained therein, and are well within the bounds of probability."[8] The essay supplied no statistical calculations to justify this statement, so I dismissed it as unfounded. But the statement wouldn't leave me alone, because I knew I had the training, as a theoretical physicist, to confirm or refute it, and because I felt that the LDS community had the right to know whether it was true.

I did a few preliminary calculations and discussed them with my father, also a physicist. He suggested that our study account for the likelihood that a chiasm could result from rearranging *all* of the elements in the Book of Mormon, not just the elements of a chiasm that appear in a passage, such as Alma 36. Though his suggestion meant weeks of additional calculations, I concurred because the study would be incomplete without them. We agreed to do the study together and to publish our results whether or not they confirmed the intentionality of chiasmus in the Book of Mormon. We contacted John Welch and published our results in *BYU Studies* in 2004.[22]

Since then, we have learned about Strangite and other chiasms that have been used to argue various points of view in chiasmus debates. Some of these chiasms seem quite convincing at first glance. In the present article, we summarize our studies of these chiasms and their implications for the authenticity of the Book of Mormon.

An application of this form is called a chiasm. Evidence of ancient origins rests on the assumption that Book of Mormon chiasms are deliberate constructions by ancient authors, constructions that Joseph Smith Jr. translated without knowing about the form.[4]

Welch's discovery opened a Pandora's box of chiasms that have been identified in various works—it seems that in some Mormon circles chiasms are sought "everywhere." Some chiasms are used in an attempt to uncover hidden meanings, while others are treated as evidence of particular points of view in debates about Book of Mormon origins.[5] Some people use chiasms in the Doctrine and Covenants and in letters by Joseph Smith Jr. as evidence that he knew about chiasmus.[6] Others see such chiasms as evidence that God revealed chiasmus to Joseph without his knowledge.[7]

W. Welch and Daniel B. McKinlay, eds., *Chiasmus Bibliography* (Provo, Utah: Research Press, 1999).

4. John W. Welch, "How Much Was Known about Chiasmus in 1829 When the Book of Mormon Was Translated?" *The FARMS Review* 15, no. 1 (2003): 47–80, available online at http://maxwellinstitute.byu.edu/publications/review/?vol=15&num=1&id=465 (accessed November 10, 2010).

5. A Google search on "Chiasmus Mormon" yields over 80,000 websites; Donald W. Parry, *The Book of Mormon Text Reformatted according to Parallelistic Patterns* (Provo, Utah: FARMS, 1992), 278–81; Benjamin N. Judkins, "Recent Trends in Book of Mormon Apologetics: A Critical Assessment of Methodological Diversity and Academic Viability," *The FARMS Review* 16, no. 1 (2004): 75–97, available online at http://maxwellinstitute.byu.edu/publications/review/?vol=16&num=1&id=526 (accessed November 10, 2010).

6. Brent Lee Metcalfe, "Apologetic and Critical Assumptions about Book of Mormon Historicity," *Dialogue: A Journal of Mormon Thought* 26, no. 3 (Fall 1993): 163–77; Blake Ostler, review of *Book of Mormon Authorship: New Light on Ancient Origins,* by Noel B. Reynolds, *Dialogue: A Journal of Mormon Thought* 16, no. 4 (Winter 1983): 140–44; CAM and Kerry, "Chiasmus: Deception or Ancient Evidence?" *Zion's Lighthouse Message Board (ZLMB) Archives: One on One,* http://pacumenispages.yuku.com/topic/1441/t/Chiasmus-Deception-or-Ancient-Evidence-CAM-KERRY.html (accessed November 10, 2010); Sandra Tanner, "Chiasmus and the Book of Mormon," *Utah Lighthouse Ministry,* http://www.utlm.org/onlineresources/chiasmusandthebom.htm (accessed November 10, 2010); Daniel A. Vogel, "The Use and Abuse of Chiasmus in Book of Mormon Studies," SL01374, presented at Sunstone Theological Symposium, Salt Lake City, 2001; Michael White, "Ancient Scriptures: Chiasmus in the Book of Mormon," *Zarahemla City Limits,* http://zarahemlacitylimits.com/essays/BookOfMormon/No_Longer_Believe_15.html (accessed November 10, 2010).

7. H. Clay Gorton, *Language of the Lord: New Discoveries of Chiasma in the Doctrine and Covenants* (Bountiful, Utah: Horizon, 1993), 9–10; Charles Francis King, *Doctrine and Covenants Completely Structured (including Chiasmus)* (Provo, Utah: Private Printing, 2000), 1–6; Richard C. Shipp, "Conceptual

An inadvertent chiasm in *INFORMIX—Online Database Administrator's Guide* was applied to argue that chiasms in the Book of Mormon merely demonstrate the human ability to discover patterns where none were intended.[8] A chiasm in *Green Eggs and Ham,* by Dr. Seuss, was used satirically as evidence that this book is the translation of an ancient record, the real intent, of course, being to disparage chiasmus in Book of Mormon debates.[9] A chiasm in *Hickory Dickory Dock*, a nursery rhyme originally published in 1744 in *Tommy Thumb's Pretty Song Book*, was employed for the same purpose.[10] A chiasm in *Mediation and Atonement,* by John Taylor, has been used to argue that chiasmus appears in enough places that its appearance in the Book of Mormon is not particularly noteworthy.[11] A chiasm in an online inquiry has been highlighted to show that chiasmus can appear naturally, unknown to the author.[12] A chiasm in the *Popol Vuh*, a Mayan text written in the 1550s, has been used to argue that knowledge of chiasmus was passed from Book of Mormon peoples to Mayan peoples.[13] Chiasms in texts that James Strang purportedly translated from ancient

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Patterns of Repetition in the Doctrine and Covenants and Their Implications" (master's thesis, Brigham Young University, 1975), 32–34, 158–59.

8. Curt Van Den Heuvel, http://www.lds-mormon.com/chiasm.shtml (accessed November 10, 2010).

9. Robert Patterson, "Hebraicisms, Chiasmus, and Other Internal Evidence for Ancient Authorship in 'Green Eggs and Ham,'" *Dialogue: A Journal of Mormon Thought* 33, no. 4 (Winter 2000): 163–68.

10. Tanner, "Chiasmus and the Book of Mormon"; MormonThink, "Book of Mormon Difficulties," http://www.mormonthink.com/book-of-mormon-problems.htm#responses (accessed November 10, 2010). The appeal of such inversions in proverbs and nursery rhymes was already mentioned in Welch, "Chiasmus in the Book of Mormon," 71.

11. See responses to Sharon Lindbloom, "The Book of Mormon: True or False?" *Mormon Coffee,* October 29, 2008, http://blog.mrm.org/2008/10/the-book-of-mormon-true-or-false/ (accessed November 10, 2010).

12. MormonInformation.com, "Does Chiasmus Prove the Authenticity of the Book of Mormon?" http://www.mormoninformation.com/chiasmus.htm (accessed November 10, 2010).

13. Will Anderson, ed., *All Things Common: The Communal Way of Tribal Life That Jesus Taught* (Cabool, Mo.: Will Anderson, 2001–2004), 78, available online at http://www.prophecykeepers.com/ebooks/3/prophecythreepeek.pdf (accessed November 10, 2010); Allen J. Christenson, *Popol Vuh: Sacred Book of the Quiché Maya People* (n. p.: Mesoweb Publications, 2007), available online at http://www.mesoweb.com/publications/Christenson/PopolVuh.pdf (accessed November 10, 2010); Allen J. Christenson, "Chiasmus in Mayan Texts," *Ensign* 18 (October 1988): 30–31; Allen J. Christenson, *The Use of Chiasmus by the Ancient Maya-K'iche'* (forthcoming); Allen J. Christenson, "Chiasmus in Mesoamerican Texts," in Welch, *Reexploring the Book of Mormon*, 233–35, available online at

records after Joseph's martyrdom in 1844 are regarded by some as evidence of Strang's prophetic calling and by others as a reason to question the value of chiasmus as evidence of any kind.[14] Kaimi Wenger said, "Maybe Strangites are seeing chiasm in Strang's works, while we see chiasm in Joseph Smith's, *precisely because apparent chiasms have no probative value at all*."[15]

Outside Mormon circles, numerous scholarly books, articles, and dissertations, as well as popular essays and websites, show a considerable level of wide-ranging interests in all forms of chiasmus, whether symmetrical or inverted structures. Indeed, in the recent decade alone, a number of sophisticated and imaginative studies have appeared (see chiasmus studies sidebar on page 136).

Inasmuch as chiasms are found almost everywhere, which, if any, are admissible as evidence in debates?

Judges help to resolve disputes by deciding which evidence is admissible in court. Their decisions are based on strict rules designed to promote an impartial hearing. In a similar vein, we have developed a statistical admissibility test that can help to resolve chiasmus debates by determining, in a manner grounded in standard statistical analysis, which chiasms are admissible in these debates. The purpose of this paper is to introduce this test, to apply it to chiasms in various works, and to discuss implications for Book of Mormon origins.

Others have developed nonstatistical admissibility criteria. John Welch said, "The degree to which chiasmus serves as evidence of anything specific also depends directly upon the degree to which the passage satisfies objective criteria."[16] He published a list of fifteen criteria to aid the analyst, especially

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http://maxwellinstitute.byu.edu/publications/books/?bookid=51&chapid=833 (accessed November 10, 2010).

14. http://www.strangite.org/Chiasmus.htm; Kaimi Wenger, "Further Musings of a Chiasm Doubter or 'Doubting Chiasm, Musing Further,'" *Times and Seasons,* April 12, 2005, http://timesandseasons.org/index.php/2005/04/further-musings-from-a-chiasm-doubter-or-doubting-chiasm-musing-further/ (accessed November 10, 2010), with 170 responses; Michael De Groote, "How Missionary Found Book of Mormon Secret," *Mormon Times,* June 9, 2008, http://www.mormontimes.com/article/12439/How-missionary-found-Book-of-Mormon-secret (accessed November 10, 2010), with 179 responses at http://www.deseretnews.com/user/comments/700233127/MormonTimescom-How-missionary-found-Book-of-Mormon-secret.html?pg=1. See also Lindbloom, "Book of Mormon: True or False," with 307 responses.

15. Wenger, "Further Musings of a Chiasm Doubter," emphasis in original.

16. John W. Welch, "What Does Chiasmus in the Book of Mormon Prove?" in *Book of Mormon Authorship Revisited: The Evidence for Ancient Origins,* ed. Noel B. Reynolds (Provo, Utah: FARMS, 1997), 203; posted on *Faith and*

Chiasmus Studies by Biblical Scholars in the Recent Decade

Auffret, Pierre. "Voyez les œuvres de Dieu. Étude structurelle du Psaume 66." *Vetus Testamentum* 53 (2003): 431–44; "YHWH, qui sejournera en ta tente? Etude structurelle du Psaume 15." *Vetus Testamentum* 50 (2000): 143–51.

Bauer, Uwe F. W. "Eine literarische Analyse von Psalm 114." *Vetus Testamentum* 51 (2001): 289–311.

Brouwer, Wayne. *The Literary Development of John 13–17: A Chiastic Reading.* Atlanta: Society of Biblical Literature, 2000.

Busch, Austin. "Questioning and Conviction: Double-voiced Discourse in Mark 3:22–30." *JBL* 125 (2006): 477–505.

DeSilva, David A. "X Marks the Spot? A Critique of the Use of Chiasmus in Macro-Structural Analyses of Revelation." *Journal for the Study of the New Testament* 30 (2008): 343–71.

Douglas, Mary. *Thinking in Circles*. New Haven, Conn.: Yale University Press, 2007.

Gelardini, Gabriella. "From 'Linguistic Turn' and Hebrews Scholarship to 'Anadiplosis Iterata': The Enigma of a Structure." *Harvard Theological Review* 102 (Jan. 2009): 51–73.

Hess, Richard S. "Review: A Reassessment of the Priestly Cultic and Legal Texts." Review of *Leviticus 1–16, Leviticus 17–22, and Leviticus 23–27,* by Jacob Milgrom. *Journal of Law and Religion* 17 (2002): 375–91.

Jackson, Bernard S. "Models in Legal History: The Case of Biblical Law." *Journal of Law and Religion* 18, no. 1 (2002–2003): 1–30.

Jacobs, Jonathan. "The Role of the Secondary Characters in the Story of the Anointing of Saul (I Samuel ix-x)." *Vetus Testamentum* 58 (2008): 495–509.

Lee, Dorothy. "In the Spirit of Truth: Worship and Prayer in the Gospel of John and the Early Fathers." *Vigiliae Christianae* 58 (2004): 277–97.

Levinson, Bernard M. "The Birth of the Lemma: The Restrictive Reinterpretation of the Covenant Code's Manumission Law by the Holiness Code (Leviticus 25:44–46)." *Journal of Biblical Literature* 124 (2005): 617–39.

Reymond, Eric D. "The Poetry of the Wisdom of Solomon Reconsidered." *Vetus Testamentum* 52 (2002): 385–99.

VanderWeele, Tyler J. "Some Observations Concerning the Chiastic Structure of the Gospel of Matthew." *Journal of Theological Studies* 59 (2008): 669–73.

Wenham, David. "The Sevenfold Form of the Lord's Prayer in Matthew's Gospel." *Expository Times* 121 (May 2010): 377–82.

Yudkowsky, Rachel. "Chaos or Chiasm? The Structure of Abraham's Life." *Jewish Bible Quarterly* 35 (2007): 109–14.

in assessing the likelihood that a chiasm was created intentionally by an author.[17] Several other scholars have proposed other sets of criteria for defining and describing the appearance of chiasmus, especially in biblical texts.

David Wright argues that some chiasms are "artifacts of modern analysis, not the product of ancient authorial or editorial intent,"[18] and urges scholars to be more circumspect in the analysis of chiastic structures. He lists several fallacies of chiastic analysis that include errors in symmetry, subjectivity, probability, quality, scope, purpose, and meaning, but concludes that, when strict criteria are employed, chiastic structures can provide very "solid proofs of the intentional formation of chiasmus in antiquity."[19]

We generally agree with Welch's and Wright's concerns. The admissibility of a chiasm as evidence in debates rests on evidence of its intentionality. If applied objectively and uniformly, Welch's criteria or Wright's fallacies could reduce the number of spurious chiastic proposals, but nevertheless allow room for considerable difference of opinion as to intentionality. Some consider Alma 36 to be a masterpiece of deliberate chiastic composition, while others who are familiar with Welch's criteria dismiss it as a product of random repetition that happens to fall into chiastic order.[20]

Welch also suggested an uncoached reader test: "A good test might be to give an unmarked text to ten different uncoached but knowledgeable

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Teachings, September 8, 2009, http://faithandteachings.com/?p=126 (accessed November 10, 2010); see also John W. Welch, "The Power of Evidence in the Nurturing of Faith," in *Nurturing Faith through the Book of Mormon: The 24th Annual Sidney B. Sperry Symposium* (Salt Lake City: Deseret Book, 1995), 149–86, and in Donald W. Parry, Daniel C. Peterson, and John W. Welch, eds., *Echoes and Evidences of the Book of Mormon* (Provo, Utah: FARMS, 2002), 17–53, http://maxwellinstitute.byu.edu/publications/bookschapter.php?bookid=8&chapid=60 (accessed November 10, 2010).

17. John W. Welch, "Criteria for Identifying the Presence of Chiasmus" (Provo, Utah: FARMS, 1989), expanded and updated as "Criteria for Identifying and Evaluating the Presence of Chiasmus," *Journal of Book of Mormon Studies* 4, no. 2 (1995): 1–14; Welch and McKinlay, *Chiasmus Bibliography.*

18. David P. Wright, "The Fallacies of Chiasmus: A Critique of Structures Proposed for the Covenant Collection (Exodus 20:23–23:19)," *Zeitschrift für altorientalische und biblische Rechtsgeschichte* 10 (2004): 143.

19. David P. Wright, *Inventing God's Law: How the Covenant Code of the Bible Used and Revised the Laws of Hammurabi* (New York: Oxford University Press, 2009), 378.

20. Welch, "Masterpiece: Alma 36"; Earl Wunderli, "Critique of Alma 36 as an Extended Chiasm," *Dialogue* 38 (Winter 2005): 97–112; Earl Wunderli, "Earl Wunderli Responds," E-paper no. 2, *Dialogue Paperless* (April 30, 2006), available online at http://www.dialoguejournal.com/wp-content/uploads/2010/04/WunderliRespondsPaperless.pdf (accessed November 10, 2010).

people to see whether most of them discover the same structure as the one that has been proposed. The more divergence that results, the less objective the suggested pattern would be."[21] A simple two-element chiasm might pass Welch's reader test, but two-element chiasms do not supply strong statistical evidence of intentionality because they can easily emerge unintentionally during composition.

Statistical analysis can supply evidence of intentionality. Earlier, we developed tools to calculate the likelihood *P* that a particular chiasm could have appeared in a work through random arrangements of literary elements.[22] If this likelihood is sufficiently small, then the chiasm is likely to be intentional. But when is *small* small enough to be statistically significant?

In this paper, we discuss a cutoff value of *P* considered by statisticians as strong evidence of intentionality and adopt this value as the basis of an admissibility test for chiasms, a litmus test that labels each chiasm as either admissible as evidence in debates or not. We then apply this admissibility test to the strongest known chiasms in various works and discuss implications for debates over Book of Mormon origins. Appendix A introduces an admissibility test that relies on tables of values. Appendix B gives details of calculations for the eleven chiasms below. Appendix C evaluates the admissibility of additional chiasms found in the Doctrine and Covenants. These three statistically technical appendices are available at byustudies.byu.edu.

Admissibility Test

To calculate the likelihood *P* that a chiasm could have appeared in a work by chance, we employ procedures that we developed previously.[23] These procedures include six rules for identifying and accounting for chiastic elements and ensure valid, consistent comparisons between chiasms by (a) insisting that element pairs share the same significant word or words, (b) accounting for all appearances of all repeated elements, including elements that do not fit the chiastic form, and (c) accounting for the length of the parent work from which the chiasm is taken. The validity of the

21. Welch, "What Does Chiasmus in the Book of Mormon Prove?" 217.

22. B. F. Edwards and W. F. Edwards, "Does Chiasmus Appear in the Book of Mormon by Chance?" *BYU Studies* 43, no. 2 (2004): 103–30; B. F. Edwards and W. F. Edwards, "Does Joseph's Letter to Emma of 4 November 1838 Show That He Knew about Chiasmus?" E-paper no. 4, *Dialogue Paperless* (2006), http://www.dialoguejournal.com. B. F. Edwards and W. F. Edwards, "Response to Earl Wunderli's Critique of Alma 36 as an Extended Chiasm," *Dialogue* 39, no. 3 (2006): 164, available online at https://dialoguejournal.com/wp-content/uploads/sbi/articles/Dialogue_V39N03_178.pdf (accessed November 10, 2010).

23. Edwards and Edwards, "Does Chiasmus Appear," 111–14.

analysis hinges on the care taken in this process. These six rules circumvent major pitfalls in chiastic analysis and promote statistical legitimacy in the sometimes permissive world of chiastic analysis. Because of the inevitable ambiguities of language, these rules sometimes permit more than one chiastic rendering of a passage. In such cases, it is permissible to choose the rendering with the smallest *P* value.

Let *n* represent the number of repeated elements that fit the chiastic form, *R* the number of appearances of repeated elements that do not fit the chiastic form, and *L* the likelihood that such chiastic structure could have emerged by chance in random arrangements of elements in the chiastic passage itself. As one might expect, chiasms with few chiastic elements and/or considerable extra repetition have large *L*, and chiasms with many elements and little extra repetition have small *L*.

The overall likelihood *P* that a chiasm could emerge by chance depends upon the length of the parent work from which the chiasm was taken. The longer a monkey uses a typewriter, the greater the likelihood that a sonnet will emerge. Similarly, the longer the parent work in which a chiasm is found, the greater the number of words that could potentially form chiasms and the greater the likelihood that a chiasm could have appeared by chance somewhere in the work. Accordingly, we use the likelihood *P* that a chiasm could have emerged in random arrangements of *all* literary elements in the parent work. For example, the entire Book of Mormon serves as the larger work in the case of Alma 36. The longer the parent work, the greater the number *N* of opportunities for chiasmus to emerge by chance and the larger the value of *P*. The number of opportunities *N* can be estimated as the ratio of the length of the work to the length of the chiasm, as illustrated below in Examples 1, 3, 6, 7, and 11. The number *N* of opportunities can also be estimated by reading through the work and counting the number of opportunities, as illustrated below in Example 9.

In summary, five quantities are important in characterizing the chiastic likelihood:

n Number of repeated elements in the chiasm that fit the chiastic form

R Number of appearances of repeated elements that do not fit the chiastic form

L Likelihood that the chiasm could have appeared by chance in a particular passage

N Number of opportunities for the chiasm to appear by chance in the parent work

P Likelihood that the chiasm could have appeared by chance in

the parent work

Using elementary statistical analysis, we derived a mathematical equation for L that pertains to "simple" chiasms with no extra repetition ($R = 0$).[24]

Equation 1. Individual Likelihood of Appearing by Chance for Simple Chiasms

$L = 1/(1) = 1$ for $n = 1$,
$L = 1/(1\cdot3) = 1/3$ for $n = 2$,
$L = 1/(1\cdot3\cdot5) = 1/15$ for $n = 3$,
$L = 1/(1\cdot3\cdot5\cdot7) = 1/105$ for $n = 4$,
$L = 1/(1\cdot3\cdot5\cdot7\ldots(2n\text{-}1))$ for general n

Here, the numerator is always 1 and the denominator is the product of the first n odd integers starting with 1. Clearly, L decreases rapidly as n increases.

We developed a computer program called CHIASMUS to calculate L for "complex" chiasms with extra repetition ($R > 0$), for which Equation 1 does not apply. This program, which is available for free download, randomly arranges literary elements as if drawn from a hat and counts the fraction of arrangements that are chiastic.[25] When applied to simple chiasms, CHIASMUS gives L values that agree with exact values from Equation 1. CHIASMUS also agrees with exact values of L that can be calculated in special cases for complex chiasms. This agreement validates both Equation 1 and CHIASMUS, and confirms the reliability of both methods for calculating likelihoods.

We also used elementary statistical analysis to derive an equation to calculate P for the chiasm with the smallest value of L in a parent work, assuming there are no other chiasms in the work with comparable values of L.[26]

Equation 2. Overall Likelihood of Appearing by Chance
$P = 1-(1-L)^N$

Values of P range between zero and one. The smaller the P-value of a chiasm, the stronger the evidence of its intentionality.

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24. Edwards and Edwards, "Does Chiasmus Appear," 115.

25. Edwards and Edwards, "Does Chiasmus Appear," 115, 116; The computer program CHIASMUS that calculates likelihoods is available for free download at http://byustudies.byu.edu/chiasmus/ (accessed November 10, 2010).

26. Edwards and Edwards, "Does Chiasmus Appear," 114, and appendix A of this paper available at byustudies.byu.edu.

When is the evidence strong enough to justify admission of a chiasm as evidence in debates? The standard answer in statistical analysis is to compare the *P*-value with a fixed cutoff, called the level of significance. For example, Ditlev Monrad and others state: "If the *P*-value is less than the level of significance, then the decision is to reject the null hypothesis; otherwise, the decision is not to reject the null hypothesis. The standard choice for the level of significance that is considered strong evidence is 0.05."[27]

The expression "null hypothesis" means, in our case, the hypothesis that a chiasm appeared by chance. We adopt the standard choice for level of significance and therefore consider chiasms with $P < 0.05$ to have strong evidence of intentionality and to be admissible as evidence in debates. Like a limbo dancer, a chiasm that passes *under* the bar passes the test.

Some chiasms with $P > 0.05$ have literary value and might well have appeared by design. However, such chiasms lack strong statistical evidence that they did appear by design and have little defense against claims to the contrary. These chiasms are deemed statistically inadmissible as evidence in debates. Such chiasms may have merits that compensate for the lack of strong statistical evidence of intentionality, merits that suggest intentionality and that justify further study. For example, Matthew 10:39 is a simple two-element chiasm that fails our admissibility test but whose contrasting elements suggest intentionality: "He that **findeth his life** shall **lose it**: and he that **loseth his life** for my sake shall **find it**." Such compensating merit can be subjective, though—and the literature certainly contains many subjective disagreements about the merits of various chiasms. Chiasms whose intentionality cannot be established objectively, either statistically or otherwise, serve little use because they tend to polarize debates rather than resolve them.

Chiasms with $P < 0.05$ (5 percent) have likelihoods smaller than 1 in 20 of appearing by chance and are therefore considered to have strong evidence of intentionality. Although unlikely, it is possible that a chiasm with $P < 0.05$ could appear by chance and could therefore yield a false positive result for the admissibility test. One might lower the level of significance to 0.01, say, to reduce the likelihood of such a false positive. But one can never fully eliminate this possibility, and lowering the level of significance increases the risk of rejecting chiasms that have strong evidence of intentionality. The standard choice for the level of significance, 0.05, is a time-honored

27. Ditlev Monrad and others, *Statistics: The Craft of Data Collection, Description, and Inference,* 3d ed. (Champaign, Ill.: Mobius Communications, 2002), sec. 9.2, p. 404.

compromise, and represents the cutoff value below which results are deemed statistically significant.[28]

Chiasms with values of *P* that are much smaller than 0.05 present much stronger evidence of intentionality than those with *P* values that are just barely smaller than 0.05. Of the fourteen chiasms that are considered below, two pass the admissibility test with *P* values that are smaller than 0.01, giving very strong evidence of intentionality, and eleven fail the test with *P* values that are larger than 0.10, giving little or no evidence of intentionality.[29]

Applications to Chiasms in Various Works

Results of admissibility tests for chiasms in various works are shown in Table 1 and Figure 1. The chiasms on lines 1, 2, and 3 of the table pass the test and those on lines 4–14 fail it. Each line represents the strongest chiasm (or chiasms, for line 3) of which we are aware in a parent work.

Analyses of lines 1–7 in Table 1 were published previously, together with the generalization of Equation 2 for Line 3 of the table.[30] Lines 1 and 2 give very strong evidence of intentionality for Alma 36 and Leviticus 24. Line 3 gives strong evidence of intentionality of the four strongest chiasms in the Book of Mormon, Mosiah 3:18–20, Mosiah 5:10–12, Alma 36:1–30, and Helaman 9:6–11, each of which qualifies, at minimum, as a simple five-element chiasm. As a group, these four pass the admissibility test, while the strongest chiasm in the Doctrine and Covenants (line 4), also a simple five-element chiasm, fails it. The reason is that the likelihood of a simple five-element structure appearing *four times* in the Book of Mormon is much smaller than the likelihood that such a structure could appear *once* in the Doctrine and Covenants. Lines 6 and 7 are inadmissible chiasms found in the introduction of a computer manual and in a letter of November 4, 1838 from Joseph Smith Jr. to his wife Emma.[31] Lines 8–14 in Table 1 are analyzed below.

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28. Stephen Stigler, "Fisher and the 5% Level," *Chance* 21, no. 4 (2008): 12, available online at http://www.springerlink.com/content/p546581236kw3g67/fulltext.pdf (accessed November 10, 2010).

29. Watter J. Burdette and Edmund A. Gehan, "Planning and Analysis of Clinical Studies" (Springfield, Ill.: Charles C. Thomas Publishing, 1970), 9.

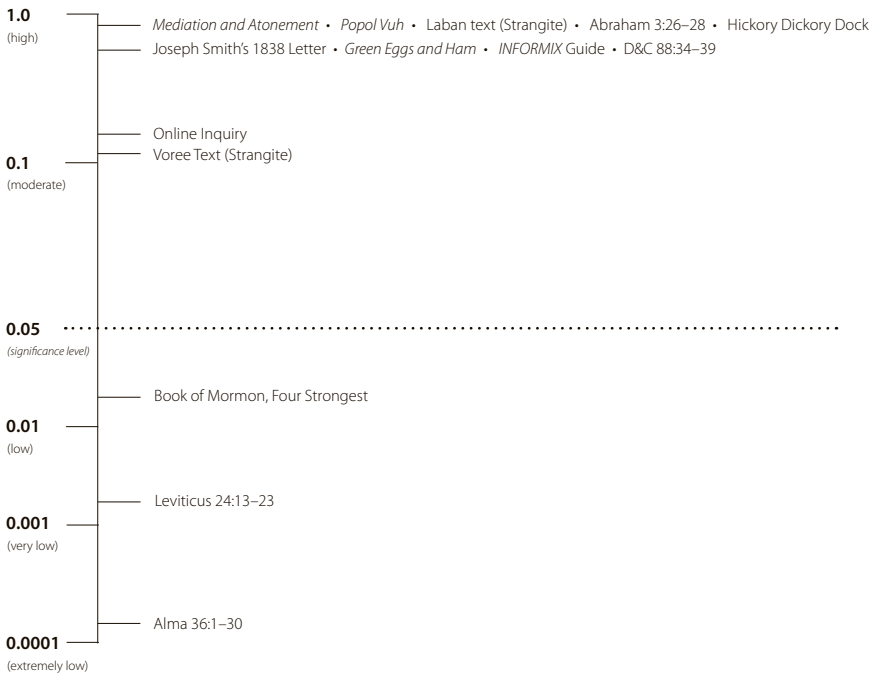
30. Lines 1–6 of table 1 are analyzed in Edwards and Edwards, "Does Chiasmus Appear," 117–23. Line 7 is analyzed in Edwards and Edwards, "Does Joseph's Letter."

31. Van Den Heuvel, http://www.lds-mormon.com/chiasm.shtml; Jared R. Demke and Scott L. Vanatter, "Letter to Emma: I Do Not Know Where It Will End," *Davidic Chiasmus and Parallelisms*, http://davidicchiasmus.com/ (accessed Nov. 11, 2010), forthcoming; Dean C. Jessee, ed. *The Personal Writings of Joseph Smith* (Salt Lake City: Deseret Book, 2002), 399–401.

Table 1. Tabulated Overall Likelihoods *P* that Chiasms Could Have Appeared by Chance

Work	Chiasm	n	R	N	L	P
1. Book of Mormon	Alma 36:1-30	8	0	359	0.00000049	0.00018
2. Pentateuch	Lev. 24:13-23	7	0	342	0.0000074	0.025
3. Book of Mormon	Four Strongest	5	0	956	0.0011	0.020
significance level						0.05
4. Doctrine and Covenants	88:34-39	5	0	686	0.0011	0.52
5. Book of Abraham	Abr. 3:26-28	3	0	54	0.067	0.98
6. INFORMIX Guide	Introduction	9	39	1	0.66	0.66
7. Joseph's 1838 Letter	entire letter	7	36	1	0.68	0.68
8. *Green Eggs and Ham*	example 1	3	0	16	0.067	0.67
9. *Mediation and Atonement*	example 3	5	6	286	0.044	1.00
10. Online Inquiry	example 5	3	4	1	0.19	0.19
11. *Pretty Song Book*	example 6	3	0	40	0.067	0.94
12. *Popol Vuh*	example 7	5	3	436	0.015	1.00
13. Voree text (Strangite)	example 9	3	0	2	0.067	0.13
14. Laban text (Strangite)	example 11	5	5	124	0.030	0.98

Figure 1. Graph of Overall Likelihoods *P* That Chiasms Could Have Appeared by Chance



Line 8. *Green Eggs and Ham.* Robert Patterson contends against chiasmus as evidence of ancient origins in a satirical argument that chiasmus supplies evidence of the ancient origins of *Green Eggs and Ham*, by Dr. Seuss. Example 1 shows the chiasm with the largest *L* value that Patterson identifies in the work.[32]

Example 1. Chiasm in *Green Eggs and Ham*

(A) I do not like them, Sam-I-am.
(B) I do not like green eggs and ham.
(C) Would you like them here or there?
(C′) I would not like them here or there.
I would not like them anywhere.
(B′) I do not like green eggs and ham.
(A′) I do not like them, Sam-I-am.[33]

This is a simple three-element chiasm with $n = 3$ and $R = 0$. Accordingly, $L = 1/15 = 0.067$ from Equation 1. Dividing the total number of words in the book *Green Eggs and Ham* by the number of words in the chiasm gives $N = 783/49 = 16$ as the number of chiastic opportunities in the book. Accordingly, Equation 2 gives $P = 0.67$, indicating a 67 percent chance that similar chiastic structure could appear in a random ordering of ideas in *Green Eggs and Ham*.

Line 9. *Mediation and Atonement.* A chiasm in *Mediation and Atonement: An Examination into and an Elucidation of the Great Principle of the Mediation and Atonement of Our Lord and Savior Jesus Christ*, by John Taylor, has been used to argue that chiasmus appears in enough places that its appearance in the Book of Mormon is not particularly special:

Example 2. Chiasm in *Mediation and Atonement*

(A) And as He IN HIS OWN PERSON
(B) BORE THE SINS OF ALL,
(C) and ATONED for them
(D) by the SACRIFICE of Himself,
(E) so there came upon Him the weight and AGONY
(F) of AGES
(F′) and GENERATIONS,
(E′) the indescribable AGONY consequent upon this great

32. Patterson, "Hebraicisms," 166.
33. Dr. Seuss, *Green Eggs and Ham* (New York: Random House, 1960), 12–16.

(D′) SACRIFICIAL
(C′) ATONEMENT wherein He
(B′) BORE THE SINS OF THE WORLD, and
(A′) suffered IN HIS OWN PERSON the consequences of an eternal law of God broken by man. [34]

This rendering displays only those repeated elements that fit the chiastic form, ignores all other repeated elements, and includes a pairing (F, F′) that is invalid because "ages" and "generations" are not forms of the same word.[35] Omitting this invalid pairing and accounting for all repeated elements leaves a five-element chiasm:

Example 3. Chiasm in *Mediation and Atonement*, Alternate Rendering

(A) And as *He* **in his own person**
(B) **bore the sins** of all,
(C) and **atoned** for them
(D) by the **sacrifice** of *Himself*,
(E) so there came upon *Him* the weight and **agony** of ages and generations,
(E′) the indescribable **agony** *consequent* upon this great
(D′) **sacrificial**
(C′) **atonement** wherein *He*
(B′) **bore the sins** of the world, and
(A′) suffered **in his own person** the *consequences* of an eternal law of God broken by man.

Appearances of the five chiastic elements ($n = 5$) are shown in bold face, while two other repeated elements that do not fit the chiastic form are shown in italics. One of these, *he/himself/him*, appears four times, and the other, *consequent/consequences*, appears twice, giving $R = 6$ appearances of repeated elements that do not fit the chiastic form. *Mediation and Atonement* contains many direct scriptural quotes that were not penned by John Taylor. We estimate the number $N = 19460/68 = 286$ to be the ratio of the estimated number of words that he penned to the number of words

34. Lindbloom, "Book of Mormon: True or False"; John Taylor, *Mediation and Atonement: An Examination into and an Elucidation of the Great Principle of the Mediation and Atonement of Our Lord and Savior Jesus Christ* (Salt Lake City: Deseret News Publishing Company, 1892), 149–50.

35. Edwards and Edwards, "Does Chiasmus Appear," 111–14.

in the chiasm.[36] Entering these data into CHIASMUS yields $L = 0.044$ and $P = 1.00$ (Appendix B).

Line 10. Online Inquiry. On March 13, 2005, a person going by "auteur55" inquired in an online discussion board about the critical response to chiasmus in the Book of Mormon. A chiastic rendering of this inquiry was posted the next day as evidence that chiasmus can appear naturally, unknown to the author:

Example 4. Online Inquiry

(A) **Hello** friends,
(B) **I am** sure **this**
(C) topic has **been debated**
(D) before but **I am really curious**
(E) as to how antis **have explained**
the discovery of chiasmus in the Book of Mormon.
(E′) I don't see how they **could rationally explain** it away
(D′) and **I was wondering** what excuses they give.
(C′) This may have all **been debated**
(B′) but **I am** new to **this** board and don't see how this doesn't authenticate the Book of Mormon very strongly.
(A′) **Cheers**.[37]

Modifications that are needed to ensure reliable statistical results include omitting pairing A, A′, modifying other pairings, and accounting for all repeated elements:

Example 5. Online Inquiry, Alternate Rendering

(A) Hello friends, **I am** sure
(B) **this** topic **has been debated**
(C) before but **I am** really curious
(D) as to how antis have **explained**
the discovery of chiasmus in the *Book of Mormon*.
(D′) I *don't see how* they could rationally **explain** it away

36. In determining *N*, we made use of an electronic copy of *Mediation and Atonement* at http://www.fldstruth.org/sysmenu.php?MParent=ARTICLES&MIndex=60 (accessed November 10, 2010).

37. MormonInformation.com, "Does Chiasmus Prove the Authenticity"; SalamanderSociety.com, "Chiasmus, Limericks and Haiku—Proofs and Spoofs of Holy Scripture," http://www.salamandersociety.com/limericks/ (accessed November 10, 2010).

(C′) and **I was** wondering what excuses they give.
(B′) **This** may **have** all **been debated**
(A′) but **I am** new to this board and *don't see how* this doesn't authenticate the *Book of Mormon* very strongly. Cheers.

This three-element, four-level rendering includes one duplicate level (levels A and C both involve the element *I am/was*, which appears four times), two appearances of *Book of Mormon* that do not fit the chiastic form, and two appearances of *don't see how* that do not fit the chiastic form. Using CHIASMUS to account for these various appearances, including the duplicate level, we obtain $L = 0.19$ (Appendix B). Since this chiasm apparently constitutes the entire text of the inquiry, $N = 1$ and $P = 0.19$ from Equation 2.

Line 11. *Tommy Thumb's Pretty Song Book*. Chiasms in nursery rhymes have been used as evidence that chiasmus appears in documents without ancient Semitic origins and as evidence that chiasmus in the Book of Mormon fails to prove its ancient origin.[38] The best example is *Hickory Dickory Dock*, a simple three-element chiasm with $L = 1/15 = 0.067$ from Equation 1:

Example 6. *Hickory Dickory Dock* Chiasm

(A) **Hickory, dickory, dock,**
(B) **The mouse ran**
(C) up **the clock.**
(C′) **The clock** struck one,
(B′) **The mouse ran** down,
(A′) **Hickory, dickory, dock.**

This nursery rhyme was originally published in 1744 in *Tommy Thumb's Pretty Song Book*, which contains forty nursery rhymes.[39] Treating each of these rhymes as one chiastic opportunity gives $N = 40$, and $P = 0.94$ follows from Equation 2.

Line 12. *Popol Vuh*. Chiasmus in Mayan texts written in the sixteenth century have been used to argue that knowledge of chiasmus was

38. Tanner, "Chiasmus and the Book of Mormon"; MormonThink, "Book of Mormon Difficulties."

39. Wikipedia, "Tommy Thumb's Pretty Song Book," http://en.wikipedia.org/wiki/Tommy_Thumb%27s_Pretty_Song_Book (accessed November 10, 2010).

passed from Book of Mormon peoples to Mayan peoples.[40] A literal translation of the strongest example in the *Popol Vuh* follows:

Example 7. *Popol Vuh* Chiasm

(A) Thus rejoiced the Quetzal Serpent: "Good you arrived,
you its **Heart Sky**: you Huracan, you as well youngest thunderbolt,
sudden thunderbolt. It shall be successful our framing, our shaping,"
they said therefore. First therefore
(B) **was created**
(C) **earth**,
(D) **Mountains**, valleys,
(E) **Divided** were its paths **water**,
made their way were their branches among *mountains*.
(E′) Merely **divided** then existed **water**,
(D′) Then were revealed great **mountains**.
(C′) Thus its *creation* **earth** this,
(B′) then it **was created** by them
(A′) The its **Heart Sky**, its Heart *Earth*, they are called.[41]

This chiasm has five chiastic elements, with *mountains*, *created/creation*, and *earth* mentioned once each outside of the chiastic structure. There are no nonchiastic elements. The chiasm occupies 20 lines of the 8,716-line literal translation, giving $N = 8716/20 = 436$. Accordingly, CHIASMUS yields $L = 0.015$ and $P = 1.00$ (Appendix B).[42]

Line 11. Voree Plates. James J. Strang claimed he was the designated successor to Joseph Smith. He formed the "Church of Jesus Christ of Latter-day Saints" and took his flock, including several former prominent followers of Joseph Smith, to Voree, Wisconsin, and later to Beaver Island in Lake Michigan.[43] In 1845, Strang published a text that he claimed to be

40. Anderson, *All Things Common,* 78.

41. Allen J. Christenson, *Popol Vuh: Literal Translation*, lines 245–64, available at http://www.mesoweb.com/publications/Christenson/PV-Literal.pdf (accessed November 10, 2010); Christenson, "Chiasmus in Mesoamerican Texts"; A literal translation is valuable for chiastic analysis because it preserves the word orders of the original K'iche' language.

42. In Christenson, *Popol Vuh, Literal,* 39, a 178-line version of this chiasm is given that has five valid chiastic elements, two invalid chiastic elements, nine nonchiastic elements, and $R = 47$, $N = 49$, $L = P = 1$.

43. Wikipedia, "James Strang," http://en.wikipedia.org/wiki/James_Strang (accessed November 10, 2010); "City of Voree" and "Opinions of the Smith Family," *Voree Herald*, June 1846, [1]; Dale R. Broadhurst, "Newspapers of James J. Strang,

his inspired translation of the Voree Plates, a record of an ancient American ruler.[44] Strangite adherents have recently identified a four-element chiasm in the Voree text as evidence of Strang's prophetic calling:

Example 8. Chiasm in the Strangite Voree Text

(A) My people ARE NO MORE.
(B) THE MIGHTY ARE FALLEN, and the young slain in battle.
(C) Their BONES bleached on the plain by the noonday SHADOW.
(D) The houses are leveled to the dust, and IN THE MOAT
are the walls. They shall be inhabited.
(D′) I have IN THE BURIAL served them,
(C′) and their BONES in the Death-SHADE,
towards the sun's rising, are covered.
(B′) They sleep with THE MIGHTY dead, and they rest with their fathers.
They have FALLEN in transgression
(A′) AND ARE NOT, but the elect and faithful there shall dwell. [45]

The pairing (D, D′) is invalid for statistical analysis because "moat" and "burial" are not forms of the same word, and because insignificant words such as "in" and "the" do not qualify, in themselves, as chiastic elements. We therefore omit this pairing, leaving a simple chiasm with three elements (n= 3), no extra repetition (R = 0), and L = 1/15 = 0.067 from Equation 1.

In order to evaluate the likelihood that this structure appeared by chance in the Voree text, we divide this text into three sections, each section having three chiastic elements:

Example 9. Complete Strangite Voree Text, Divided into Three Sections

1. My people **are no** (A) more. The **mighty are fallen** (B) and the young slain in battle. Their **bones** bleached on the plain by the noonday **shadow** (C). The houses are leveled to the dust, and in the moat are the walls. They shall be inhabited. I have in the burial served them, and their **bones** in the Death-**shade,** (C′) towards the sun's rising, are covered. They sleep with the **mighty** dead, and they rest with their fathers. They

1846–1847 Articles," *Uncle Dale's Readings in Early Mormon History (Newspapers of Iowa, Wisconsin & Minnesota),* http://sidneyrigdon.com/dbroadhu/IA/JStrang1.htm (accessed November 10, 2010).

44. Church of Jesus Christ of Latter Day Saints, "Voree Plates," http://www.strangite.org/Plates.htm (accessed November 10, 2010).

45. Church of Jesus Christ of Latter Day Saints, "Chiasmus on the Brass Plates," http://www.strangite.org/Chiasmus.htm (accessed November 10, 2010).

have **fallen** (B′) in transgression and **are not,** (A′) but the elect and faithful there shall dwell.

2. The **word** hath revealed it. **God** (E) hath sworn to give an inheritance to his people where transgressors perished. The **word of God** (E′) came to me while I mourned in the Death-shade, saying, I will avenge me on the destroyer. He shall be driven out. Other strangers shall inhabit thy land. I an ensign there will set up. The escaped of my people **there shall dwell** (D) when the flock disown the Shepherd and build not on the Rock. The forerunner men shall kill, but a mighty prophet **there shall dwell** (D′). I will be his strength, and he shall bring forth thy **record** (F). **Record** (F′) my words, and bury it in the Hill of Promise.

3. It shall come to pass **in the latter days** (H), that **my people shall hear** (I) my voice, and the truth shall speak from the earth, and **my people shall hear** (I′), and shall come and build the Temple of the Lord. My prophet, unto whom I send **my word** (J) shall lead them, and guide them in the ways of peace and salvation. In Voree the name of the Mighty One shall be heard, and the nations shall obey my law, and hear the **words of my** (J′) servant, whom I shall raise up unto them **in the latter days** (H′).

The first section involves the three elements A, B, and C in chiastic order, ABCC′B′A′. The second involves three new elements D, E, and F in nonchiastic order, EE′DD′FF′. The third involves elements H, I, and J in nonchiastic order, HII′JJ′H′. The third section was not included in Strang's published text, which he said was only part of the record, and was published in 1873 by H. V. Reed as a possible addition to the record.[46] The first section has three-element chiastic structure while the last two sections do not. Counting all three opportunities for chiastic structure gives $N = 3$ and $P = 0.19$ by Equation 2. Omitting the third section gives $N = 2$ and a smaller likelihood $P = 0.13$. For either $N = 3$ or $N = 2$, the chiasm fails the admissibility test.

Line 12. Brass Plates of Laban. In 1851, James Strang published the *Book of the Law of the Lord*, claiming it to contain both his translation of the brass plates of Laban, which we call the Laban text, and his own modern-day revelations.[47] Strangite adherents have recently proposed two chiasms from the Laban text, one with two elements and the other with six:

46. Church of Jesus Christ of Latter Day Saints, "Voree Plates."

47. Church of Jesus Christ of Latter Day Saints, "Book of the Law of the Lord," http://www.strangite.org/Law.htm (accessed November 10, 2010); 1 Nephi 3–5.

Example 10. Chiasm in the Strangite Laban Text

(A) Thou shalt not TAKE the NAME of the Lord thy God in VAIN:
(B) thou shalt not USURP dominion
(C) as a RULER; for the NAME of the Lord thy God
(D) is great and glorious ABOVE ALL OTHER NAMES:
(E) he is ABOVE ALL,
(F) and is the ONLY TRUE God;
(F′) the ONLY JUST and upright King
(E′) OVER ALL:
(D′) he ALONE hath the RIGHT
(C′) to RULE; and in his NAME, only he to whom he granteth it:
(B′) whosoever is not chosen of him, the same is a USURPER, and unholy:
(A′) the Lord will not hold him guiltless, for he TAKETH his NAME in VAIN.[48]

This rendering displays only those repeated elements that fit the chiastic form, ignores all other repeated elements, and includes an invalid element pairing (D, D′). Any of these deficiencies would invalidate statistical analysis. We omit the invalid pairing and include all appearances of all repeated elements in a five-element rendering:

Example 11. Chiasm in the Strangite Laban Text, Alternate Rendering

(A) *Thou shalt not* **take the name of the Lord thy God in vain**:
(B) *thou shalt not* **usurp** dominion
(C) as a **ruler**; for the **name** of the Lord thy *God*
(D) is great and glorious above **all** other names: he is above **all**,
(E) and is the **only** true *God*;
(E′) the **only** just and upright King
(D′) over **all**:
(C′) he alone hath the right to **rule**; and in his **name**,
only he to whom he granteth it:
(B′) whosoever is not chosen of him, the same is a **usurper**, and unholy:
(A′) the **Lord** will not hold him guiltless, for he **taketh his name in vain**.

This rendering has five chiastic elements ($n = 5$), each of which appears twice (bold face) to constitute the basic chiastic form. One of these elements (E, *only*) makes one extra appearance (italicized). Two other nonchiastic elements (*thou shalt not* and *God*, in italics) appear twice each but do not fit the chiastic form. The total number of extra repeats is $R = 5$ (one for the

48. Church of Jesus Christ of Latter Day Saints, "Chiasmus on the Brass Plates."

extra appearance of *only*, two for the two appearances of *thou shalt not*, and two for the two appearances of *God*). For this rendering, CHIASMUS yields $L = 0.030$ (Appendix B).

The 1851 edition of the *Book of the Law of the Lord* contains 16,895 words, including 12,264 words in the Laban text.[49] We estimate the number of opportunities for such five-element chiastic structure to be the ratio of this number to the number of words in the chiasm, $N = 12264/99 = 124$. Only one such opportunity is known to have structure with L comparable to, or smaller than, 0.030. Equation 2 accordingly yields $P = 0.98$. Compared with the Voree text, the extra repetition in and the extra length of the Laban text indicate a larger P value, despite the larger number of elements.

Conclusions

Because inadvertent chiasms can be found in almost any text, we consider a chiasm to have no probative value unless it is accompanied by strong evidence of intentionality. In this paper, we propose a quantitative test that can supply such evidence. This test compares the likelihood P that a chiasm could have appeared by chance with the standard level of significance $P = 0.05$ (5 percent) that is considered strong evidence in statistical analysis; chiasms with $P < 0.05$ pass the test. We consider only those chiasms that pass this objective test to be admissible as evidence in debates over Book of Mormon origins.

Reliable calculations of P require: (a) unquestionably strong associations between element pairs, (b) inclusion of all appearances of all repeated elements, and (c) consideration of the length of the work from which the chiasm is taken. Careful application of our procedures, which include six rules for selecting chiastic elements, produces reliable results.[50] Ignoring these procedures can yield misleadingly small P-values and erroneous conclusions.

Herein, we report the results of admissibility tests on the strongest examples of chiasmus of which we are aware in various works. Chiasms in Leviticus 24 and Alma 36 have seven and eight elements, respectively, with the two appearances of each element sharing the same essential words and expressing the same complete ideas. These chiasms have no extra repetition

49. Church of Jesus Christ of Latter Day Saints, "Book of the Law of the Lord." The 1851 edition of the *Book of the Law of the Lord* contains 42 chapters that are purported to be the translation of the brass plates of Laban and 5 chapters listed as modern revelations. An 1856 edition contains 10 new chapters and a series of explanatory notes.

50. Edwards and Edwards, "Does Chiasmus Appear," 111–14.

of these or other ideas and have very small likelihoods of appearing by chance ($P = 0.0025$ and 0.00018, respectively). These values give very strong evidence that the authors of these chiasms knew about the chiastic form and applied it deliberately in composing them.

This evidence narrows the Book of Mormon chiasmus debate to a single question: How did *deliberate* chiasmus come to appear in the Book of Mormon?

To explain chiasmus in the Book of Mormon, some argue that Joseph Smith knew about chiasmus and applied it deliberately in writing, rather than translating, the Book of Mormon.[51] These people cite chiasms in the Doctrine and Covenants, the Book of Abraham, and Joseph Smith's correspondence as evidence of this view, but these chiasms are inadmissible because their *P* values are too large.[52] These chiasms supply no statistical evidence either that Joseph knew about chiasmus or that God revealed chiasmus to Joseph without his knowledge.

Also inadmissible are chiasms in *INFORMIX Guide*, *Green Eggs and Ham*, *Mediation and Atonement*, the online inquiry, *Hickory Dickory Dock*, the *Popol Vuh*, and Strangite texts. Compared with chiasms in Leviticus 24 and Alma 36, such inadmissible chiasms have fewer chiastic elements or considerable extra repetition, or both. The number and variety of these inadmissible chiasms illustrates the prevalence of chiasmus of dubious intentionality. The *Popol Vuh* chiasm supplies no evidence that Book of Mormon peoples passed knowledge of chiasmus to Mayans. Our admissibility test cuts both ways, disqualifying this argument for the ancient origin of the Book of Mormon along with disqualifying the many arguments against it. Strangite chiasms supply no evidence of Strang's prophetic calling and are invalid as a reason to question the probative value of chiasmus in the Book of Mormon.

Chiastic evidence that is supported and interpreted appropriately holds an important place in debates about Book of Mormon origins. Our admissibility tests establish the intentionality of chiasmus in the Book of Mormon and refute the claim that Joseph's modern writings demonstrate his awareness of chiasmus. If Joseph Smith was indeed unaware of chiasmus, then its presence in the Book of Mormon stands as evidence of its authenticity.

While it is true that there is no single meritorious approach to the study of intentionality of chiasms, the main challenge of any approach to the study of intentionality is devising a list of criteria used to identify acceptable

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51. Metcalfe, 163–77; Ostler, 140–44; CAM and Kerry, "Chiasmus: Deception or Ancient Evidence?"; Tanner, "Chiasmus and the Book of Mormon."

52. See Appendix C at byustudies.byu.edu.

elements. Our statistical approach is quantitative, restrictive, and is based on well-established statistical methodology and strict element-selection criteria. Such strict criteria give confidence of intentionality for chiasms passing the test, even though these criteria likely exclude other intentional chiasms. More flexible criteria, such as permitting synonymous element pairs, would lead to a higher proportion of admissible chiasms, would increase the risk of admitting chiasms that were not intentional, and would introduce subjectivity into the analysis—one person's synonymous pair is another's unrelated pair. Our criteria are consistent with our statistical approach, which is capable of a higher level of quantitative rigor than other approaches. Thus, for a chiasm that passes our statistical test, the debate about its intentionality could be considered over—for it passes what might be considered the most restrictive and the least subjective test.

Failing our statistical admissibility test does not mean that a chiasm was not intentional. For such chiasms, other compensating merits and other analytical approaches, such as Welch's fifteen criteria, can be considered in reaching a judgment about intentionality. But these approaches are less restrictive and more subjective. They might be used to build a case for intentionality of a chiasm that fails our test, but such a chiasm has less probative value in resolving debates than one that passes our test, simply because it fails the strictest test of intentionality.

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