

## How Technology Means: Texts, History, and Their Associated Technologies

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### Abstract

Technologies used to study and represent the past are not hermeneutically neutral. Since technologies have illocutionary force, we should ask of any representation of history, *In what ways are the associated technologies conveying meaning?* In this article, the question will be asked of a particular kind of history, textual history, taking biblical texts as an illustrative example. The goal is to better understand how textual technologies of yesterday, today, or tomorrow capture or obscure the material history of their texts. The article proceeds in two main parts. First, two kinds of technologies commonly used are examined and compared: the non-digital book and its familiar digital counterparts. Second, we will consider ways in which augmented reality and virtual reality have been used and might be used to represent texts. It will be suggested that these new technologies may overcome some of the limitation of previous book technologies in capturing a text's history. In conclusion, practical suggestions will be made for those who read, study, or produce digital textual objects.

## Introduction

People worked together to make the Bible. I can tell because of all the names. (Naomi (age 5))

[1]

...forms effect meaning [McKenzie 2005, 13]

[Digital Humanities'] tool-building enterprise risks falling into a binary in which digital tools represent innovation, dynamism, and provocative instability, while the materials they operate upon — very often literary texts — represent availability, continuity, and unproblematic stability. [Galey 2010, 100]

It should come as no surprise that technologies used to study and represent the past are not hermeneutically neutral. To state this positively: the technologies themselves *mean* something; they have illocutionary force. In considering technologies through which the past might be apprehended, it is important to remember that the past is only ever *approximately* apprehended: one cannot simply “go back,” but must rely on constructed memories, artifacts, written

accounts, recordings, etc. Further, as these examples indicate, most of our means of apprehending the past rely on technology, broadly defined. Consider Ferré's broad understanding of technology: "...technology involves (i) implements used as (ii) means to practical ends that are somehow (iii) manifested in the material world as (iv) expressions of intelligence" [Ferré 1995, 25].

Thus when history is studied or represented, one must ask, *In what ways are the associated technologies conveying meaning?*

This article will direct the question toward a particular kind of history, textual history, taking biblical texts as an illustrative example. The goal is to better understand how textual technologies of yesterday, today, or tomorrow capture or obscure the material history of their texts. Biblical texts are particularly useful since they feature prominently during major media shifts in the past two millennia (from scroll to codex, script to print, print to digital). First, two technologies widely used are considered and compared: the (non-digital) book and its digital counterparts. This analysis will suggest ways in which the associated paratexts affect the reader's understanding of the text's past. Second, technologies increasingly available but less commonly used for texts, augmented reality (AR) and virtual reality (VR), will be considered along the same lines. These technologies are particularly interesting because, although they are digital, they represent 3D physical space quite realistically. It will be seen that each technology examined conveys certain elements of textual history while obscuring others. These observations will lead to more general considerations for those creating, using, and studying texts.

It should be said at the outset that in order to understand and describe what is or is not unique about a text mediated by *this* or *that* technology, we necessarily describe features of texts that are normally taken for granted. As Willard McCarty reminds, this is a difficult exercise: "In consequence of the rigours of using this language, which requires complete and explicit specification, there arises...the struggle to articulate what normally goes without saying in our editions and editing practices" [McCarty 2013, 2]. To aid in the task, we will look through the lens of *paratext*.

## The Paratexts of Book Technology

Roughly, paratexts are to texts what a frame is to a picture. Gérard Genette, who has coined the literary use of the term, explains:

A literary work consists, entirely or essentially, of a text, defined (very minimally) as a more or less long sequence of verbal statements that are more or less endowed with significance. But this text is rarely presented in an unadorned state, unreinforced and unaccompanied by a certain number of verbal or other productions, such as an author's name, a title, a preface, illustrations. And although we do not always know whether these productions are to be regarded as belonging to the text, in any case they surround it and extend it, precisely in order to *present* it, in the usual sense of this verb but also in the strongest sense: to *make present*, to ensure the text's presence in the world, its "reception" and consumption in the form (nowadays, at least) of a book. These accompanying productions, which vary in extent and appearance, constitute what I have called elsewhere the work's *paratext*.... [Genette 1997, 1]

The key is that paratexts themselves have meaning; they are hermeneutically significant: "Far from being an issue that preoccupies only the theoretically minded, the matter of the paratext is always — albeit often imperceptibly — already at work in the hermeneutic process" [Jansen 2014, 1].

In considering *digital* paratexts, we will deviate from Genette in two respects: (1) It matters very little in the following analysis whether or not the "author" legitimates (or accepts responsibility) for a paratext;<sup>[2]</sup> and (2) the *para* of *paratexts* receives the emphasis, not the *texts*. In other words, paratexts are framing features of the text but not necessarily texts themselves.<sup>[3]</sup> For the purposes of this article, then, paratexts are the productions that accompany, present, or contain the text, including productions that facilitate the engagement of a reader.<sup>[4]</sup> Paratexts may be produced by an author, publisher, software developers, editors, and the like, and also include visual features associated with typography, page

layout, book design or, in software, the interface. These paratexts affect readerly expectations of encountering a text and, indeed, the encounter itself. In the following section, we begin to explore how paratexts affect the reader's sense of a text's history.

## Technologies and the History of Biblical Texts

The purpose here is to sufficiently explore the subtle “messages” various book technologies send a reader of biblical texts; that is, to consider the illocutionary force of the various paratexts. For heuristic purposes, let us begin by considering the form of biblical texts that most people encounter today: The printed Bible in translation. Such a book is generally a collection of 66 or more ancient documents bound together in a single volume (Figure 1)<sup>[5]</sup>.

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**Figure 1.** A typical black-leather bound Bible. Image copyright owned by the author.

Right away we should note that the binding itself is significant. The binding is a paratext that conveys a message: these documents *belong* together. But in terms of the text's history, the binding paratext of a codex potentially obscures the fact that the documents within were completed at various times over the course of 1,500 or more years by authors who almost certainly did not envision that their work would be read alongside of these other works. Indeed, the texts of these documents were transmitted by copying and came to be collected together and assorted in various ways over the centuries by diverse groups, many of whom did not agree about the documents' relation to one another.<sup>[6]</sup> Even where an introduction or marginal note gives an account of the composition of a particular document, the paratextual message of *belonging* remains.

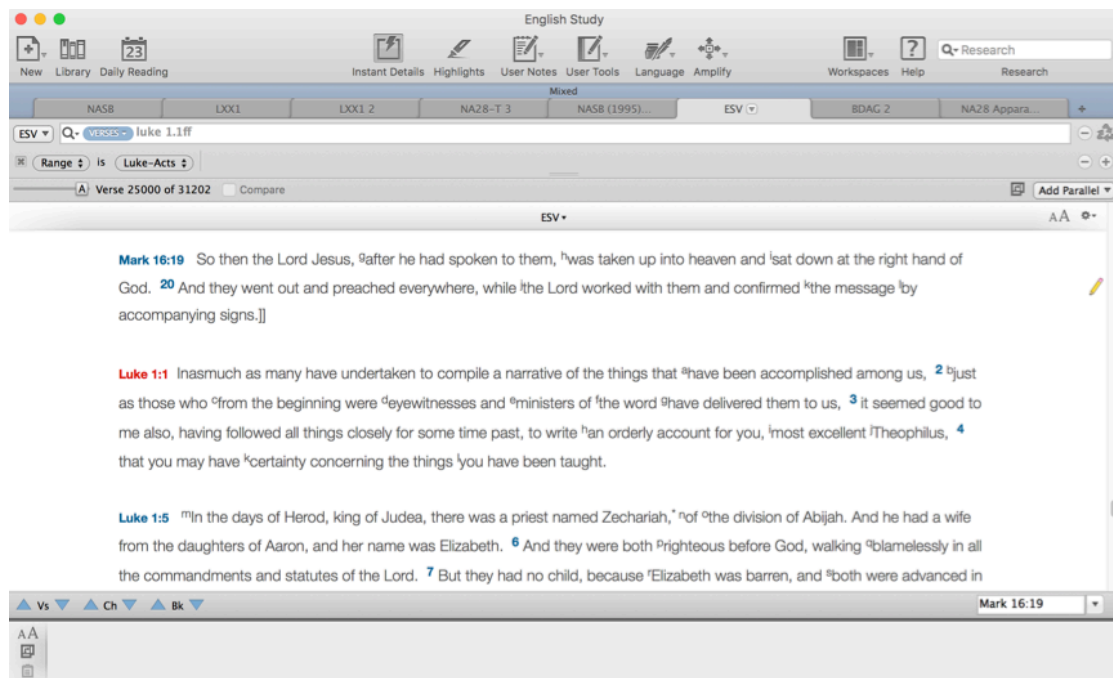
Early in the textual history of many of the biblical texts, however, especially those of the Hebrew Bible, the scroll, not the codex, was the book technology of choice.<sup>[7]</sup> We might therefore ask: Does a scroll have a similar binding or boundary paratext as a codex? Of course, each end of the scroll serves as a boundary, and if multiple texts are contained in a single scroll, these texts are related to one another by virtue of the boundary paratext analogous to the binding of a codex. Perhaps a closer equivalent to the binding paratext of the codex would be the receptacle of a group of scrolls, perhaps a shelf, a chest, or a jar.<sup>[8]</sup> For example, the *Torah Ark*, a special receptacle for Torah scrolls used in some synagogues, represents a similar kind of canonical paratext as the binding of the Bible earlier described. But note that a collection of scrolls is far less fixed than a collection of texts bound in a codex, and the paratextual message of belonging is less overt. Thus a canonical collection of scrolls captures the distinctiveness of individual documents, obscuring to a lesser extent the collection's textual history.

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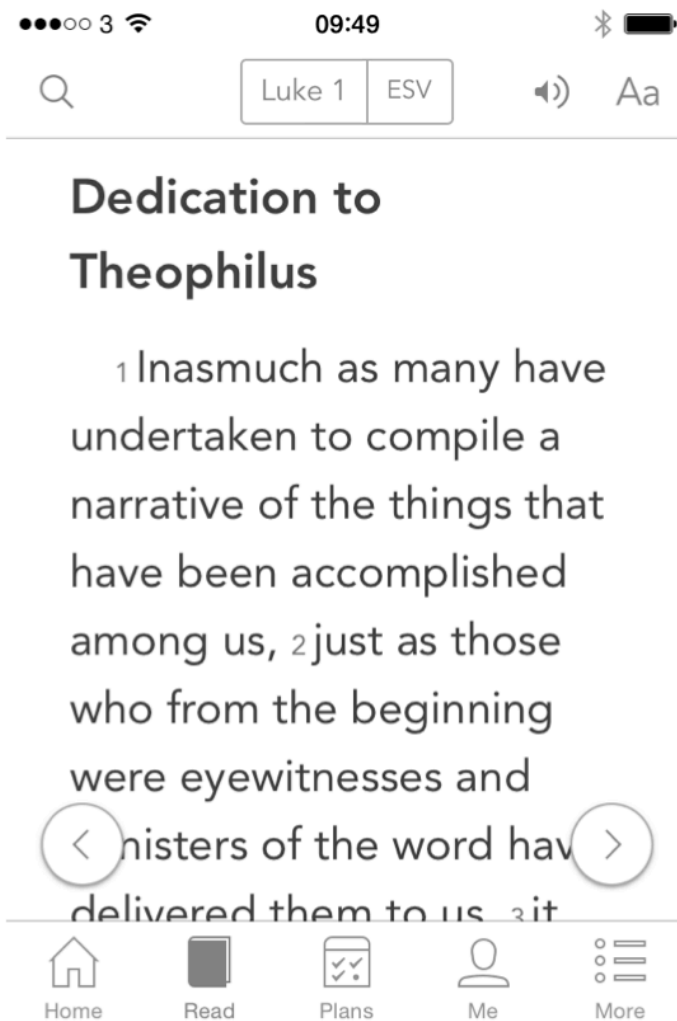
What, then, is the binding or boundary paratext of a *digital* biblical text? Technically, a computer file containing the text exists, usually marked (or tagged) at document boundaries. Since a reader is generally unaware of this technical boundary, its hermeneutical significance is more difficult to discern.<sup>[9]</sup> In terms of the electronic display of a biblical text, boundaries might include title pages and chapter or page numbers that indicate a beginning or a scroll bar that indicates

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the user's relative location within the document.<sup>[10]</sup> It is instructive to compare the boundary paratexts illustrated in Figures 2 and 3 below. In Accordance Bible Software, if a user navigates to the beginning of the Gospel of Luke — a distinct ancient document — scrolling up will display the ending of the Gospel of Mark — another distinct document, usually bound just before Luke in a print Bible — with little indication of a boundary between them (Figure 2).<sup>[11]</sup> But in YouVersion's popular Bible app, navigating to the beginning of the Gospel of Luke, the user is presented with the first chapter of that document, unable to scroll up to any previous text (Figure 3).<sup>[12]</sup> To advance within the text of chapter one, the user must scroll down. To advance to chapter two, the user must tap the right arrow button. However, pressing the left arrow button *will* take the user to the last chapter of the Gospel of Mark (similar to the scrolling navigation in Accordance). Thus in both examples, the user can navigate back one chapter *in canonical sequence*, from Luke 1 to Mark 16, not unlike most printed Bibles. YouVersion's app presents more of a boundary between the two documents, the Gospels of Mark and Luke, by virtue of its chapter boundaries. But in both cases, the canonical sequence is fixed and the boundaries between documents are not overt.



**Figure 2.** The beginning of the Gospel of Luke in Accordance Bible Software. Screenshot taken by the author.



**Figure 3.** YouVersion's iOS app, open to the beginning of the Gospel of Luke. Screenshot taken by the author.

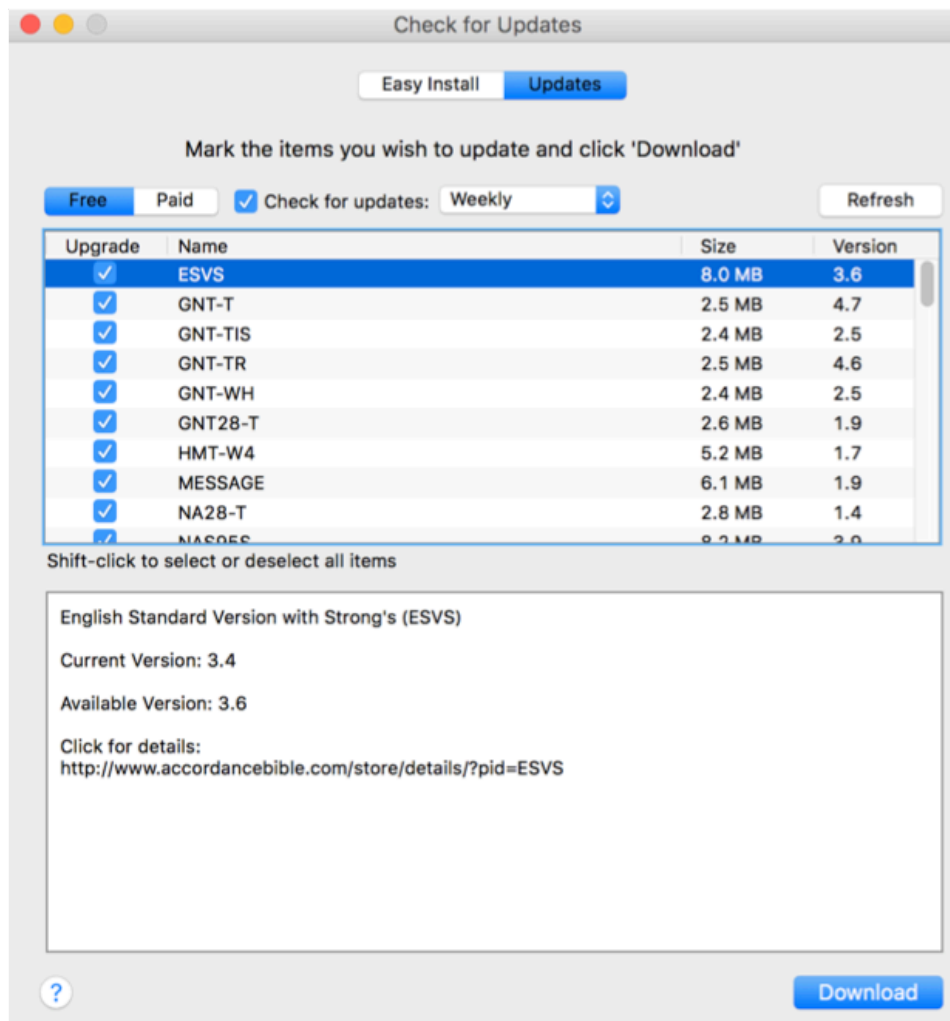
Consider also the uniformity of modern printed books in terms of typography, page layout, and other elements of book design — paratextual properties according to my definition — reinforcing the message that the documents are related and belong together since each document (or “book” within) looks and feels exactly the same.<sup>[13]</sup> Similarly, printed Bibles typically have consecutive page numbering *across* the bound collection, another paratextual message suggesting the unity and progression of its contents.<sup>[14]</sup> An additional numbering system is commonly used for referencing larger units of each document (consecutively numbered “chapters”) under which are smaller units (consecutively numbered “verses”, per chapter).<sup>[15]</sup> The consistency of this reference system across biblical texts, including various editions, versions, and translations of modern Bibles, and even anachronistically used in online editions of digitized manuscripts, subtly suggests readerly, possibly even authorial, agreement about the unit - delineation, and therefore the argument, of the texts. These numbering systems are intentionally absent in some printed Bibles, often called Reader’s Bibles, in order to present the reader a text formatted like familiar modern books. Some Bible applications likewise allow the user to “hide” verse and chapter numbers (and manipulate certain other visual paratextual features). Even so, print and digital versions alike present an extremely uniform text which subtly obscures its textual history.

The physical binding of a Bible also fixes the sequence (or canonical order) of the documents. Imagine the hermeneutical difference, for example with a Protestant Bible, if a reader had a series of 66 unnumbered volumes on a shelf, each corresponding to one ancient document (e.g., Genesis, Exodus, etc.), rather than a one-volume bound collection. At a glance, it would become immediately clear that the documents vary greatly in size, which reduces the sense of uniformity, even if slightly. The reader could also then order the collection in a multitude of ways: by putative

date of composition, by genre, by size, and so on.<sup>[16]</sup> While digital biblical texts often utilize hyperlinking in such a way that navigation is not linear, they nevertheless retain traditional canonical sequencing through the prominent navigational features (e.g., scrolling, contents menu, etc.).

Similarly, there is finality to a printed Bible, like any printed book — a paratextual message that suggests a pure, original text. This “finality” enabled by the printing press was celebrated by science and religion alike from an early period. In 1702, Bishop Thomas Sprat could say: “[Both the Royal Society and the Church]...have taken a like cours[e] to bring this about; each of them passing by the corrupt Copies, and referring themselves to the perfect Originals for their instruction; the one to Scripture, the other to the large Volume of the Creatures” [Sprat 1702, 371]; cf. [Eisenstein 1979, 696].<sup>[17]</sup> That sense of finality is far less acute in Bible software.<sup>[18]</sup> Accordance Bible Software, for example, periodically alerts the user to available updates, listing specific modules that might include a biblical text — a text that is updated, changed with the click of a button!

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**Figure 4.** Update window in Accordance Bible Software. Screenshot taken by the author.

Not only does this diminish the sense of finality present in a printed text; it also reminds the user that textual transmission of the Bible is perpetual. One is, as it were, standing in it. As David Parker, a New Testament textual critic, once observed after creating an electronic transcription of Codex Sinaiticus: “...textual critics, under the guise of reconstructing original texts, are really creating new ones” [Parker 2003, 401].<sup>[19]</sup> Parker suggests that as technologies give more ability to the user to manipulate a scholarly edition of a text (like the New Testament), “The result will be a weakening of the status of standard editions, and with that a change in the way in which users of texts perceive their tasks” [Parker 2003, 404]. Note, however, that even in Parker’s advanced software, Collate, there is a smoothing over of textual materiality for the sake of the machine. This “smoothing over” is the effect of any attempt to produce a critical



edition, creating the tension, described by Alan Galey, “...between the surface orderliness of scholarly resources and the stubborn irregularity of textual materials” [Galey 2010, 93].

How else might the “stubborn irregularity of textual materials” be represented and their paratexts captured? Images have for a long time been an important means of capturing the materiality of manuscripts. Given the scope of this article, we limit ourselves to considering *digital* images. For a manuscript of more than a few pages, most digitized versions present a series of images, one per page (of a codex) or per section (of a scroll). For example, the Center for the Study of New Testament Manuscripts provides a web interface that simply presents thumbnail images of the pages of a manuscript.<sup>[20]</sup> Clicking on a thumbnail will open a larger version of the same image in a viewer in which the user can zoom to view even greater detail. Other interfaces juxtapose manuscript images, transcriptions, and translations. One Bible software program, BibleWorks, links manuscript sigla, transcriptions, and images of select manuscripts.<sup>[21]</sup> In an example of one of the more sophisticated web interfaces, the Codex Sinaiticus Project displays a zoomable manuscript image (per codex page), a transcription formatted in columns corresponding to the manuscript, and a translation in one of a few languages — each linked to the other word by word.<sup>[22]</sup> Navigation is possible either by book/chapter/verse (like a modern printed Bible) or quire/folio/verso-recto. The latter method is a good example of a navigational paratext that captures the materiality of the manuscript. In spite of the sophistication, however, the user’s relative location within the document is not obvious. Contrast this limitation with a series of digitized scrolls in The Digital Dead Sea Scrolls project by The Israel Museum, Jerusalem.<sup>[23]</sup> The Isaiah Scroll, for example, can be read by moving a slider at the bottom of the window — a scroll bar that is itself an image of the scroll, rolled out, and numbered, column by column (Figure 5). The greater part of the window is taken by a zoomable image of the scroll, each end of which appears to be unrolled or rolled up, depending on the direction of navigation. Hovering over a line of the original text causes a shaded box to appear which, upon clicking, displays a pop up English translation of the highlighted text. This interface, more than any other I have encountered online, captures the original paratexts of the object.<sup>[24]</sup>

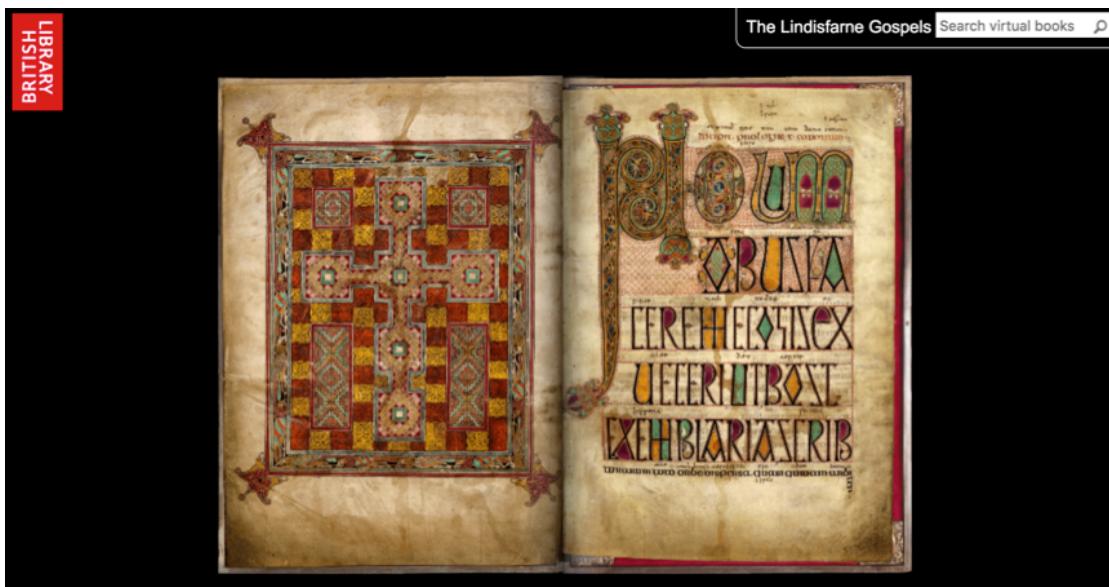
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Figure 5. The Isaiah Scroll, The Israel Museum, Jerusalem. Screenshot taken by the author.

A final interesting example to consider is the British Library’s virtual display of the Lindisfarne Gospels.<sup>[25]</sup> Here individual images of select pages of the manuscript appear to turn. Shading and lighting effects are also used to create a 3D feel, not unlike the Isaiah Scroll interface in Figure 5.

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**Figure 6.** The British Library's virtual display of the Lindisfarne Gospels. Screenshot taken by the author.

In summary, a number of paratextual features of the codex book form, especially in print, obscure the textual history of the Bible by inviting assumptions about the unity and cohesion of the various documents contained therein. Most digital counterparts to the book similarly smooth over the variegated history of the texts. Critical editions suffer from this tendency, even as they explicitly represent the details of the text's history. Digitized manuscripts, however, are increasingly produced in a way that preserves their original paratextual properties and material features, and may help overcome the tendency of printed texts to obscure textual history. This leads us to consider the potential of two image-based technologies, AR and VR.

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## The Potential of Augmented and Virtual Reality for Textual History

Growing interest in consumer VR technology since the release of the Oculus Rift DK1 in 2012 has been matched by the development of many consumer VR applications and VR (360) videos, including some that relate to the biblical text. During roughly this same period, the proliferation of mobile devices with accelerometers and ever-faster processing capabilities has been met with the development of consumer-level AR applications, including some related to the Bible. The trajectory of this 3D technology development suggests that scholars begin seriously, if cautiously, considering its deployment for their own activities.

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It is perhaps unsurprising to find the Bible being taken up in these new technologies in light of its own textual history. However, most of the "biblical" AR and VR applications appear to be less *textual* and more related to providing immersive experiences of the stories of the Bible. For example, the Bible VRX Lite, a proof-of-concept app available for iOS and Android devices, lets a user experience a handful of relatively well known biblical scenes, such as the moment before Adam and Eve eat the forbidden fruit, Moses facedown before the burning bush, Jonah submerged in the sea with a whale-like creature nearby, or the nativity.<sup>[26]</sup>

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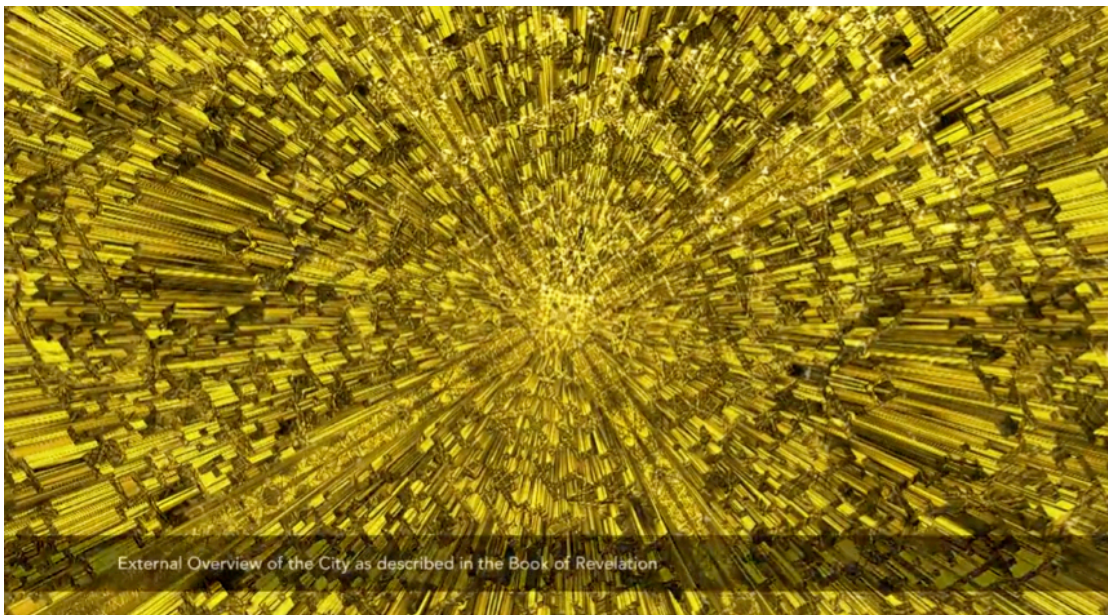




**Figure 7.** In one scene from the Bible VRX app, Eve is depicted as reaching out for the forbidden fruit as Adam turns, as if to see if God is watching. This iOS screenshot was taken by the author.

Similarly, in the Immersive Faith Project app, one can experience an imagined scene from Jesus' "Sermon on the Mount".<sup>[27]</sup> One large publisher recently developed an AR app for use with a Children's storybook Bible.<sup>[28]</sup> The mobile app is used to scan an illustration from the physical book, thereby causing the illustration to "pop up" virtually on the screen. Simultaneously, an audio narration of the story begins to play. Likewise, a Shanghai company has recently released a number of AR products for children, including the "Children's First AR Bible," a coloring book of 40 well-known biblical scenes that "come to life" with the corresponding app.<sup>[29]</sup> Another company attempted a Kickstarter campaign to raise funds for an AR app that displays a short Bible text when one of its 3D printed objects (such as a cross) is scanned.<sup>[30]</sup>

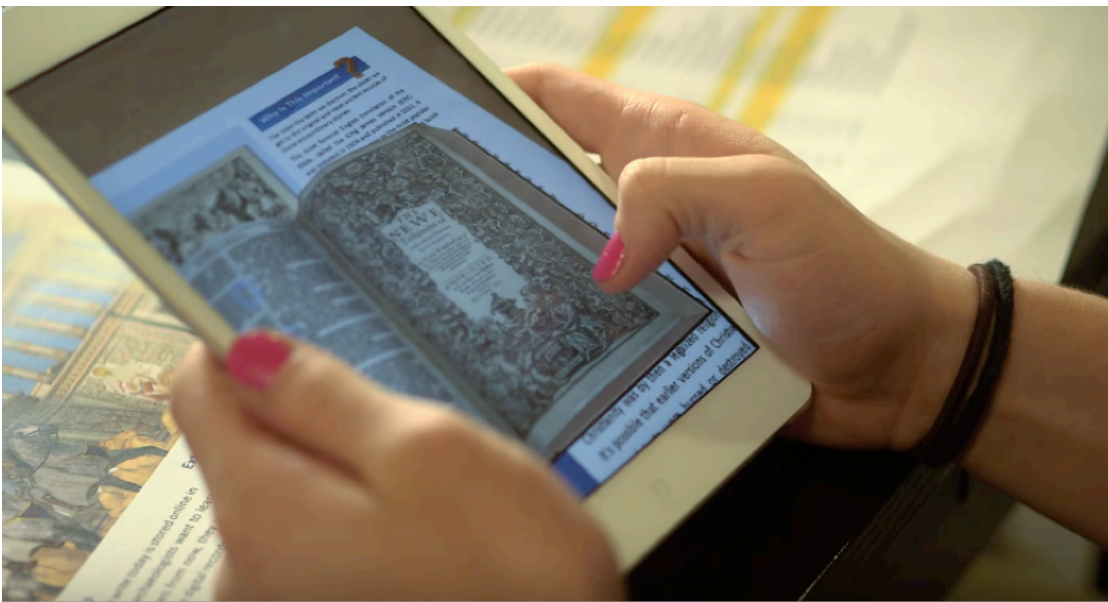
Three other examples of AR and VR call for greater attention. First, and slightly difficult to classify, is The New Jerusalem Virtual Reality exhibit by Michael Takeo Magruder (Figure 8).<sup>[31]</sup> In a sense it is *unreal*, an intentional "virtual unreality" that attempts to represent both the text of Revelation 21 (a biblical text), as well as a significant event described by that text: the descent of the heavenly New Jerusalem, described in Revelation 21 as a cube-like city.



**Figure 8.** The New Jerusalem Exhibition by Michael Takeo Magruder. Screenshot taken by the author.

The biblical text was divided into 16 units and translated into 16 corresponding QR codes that, as the cube-shaped city descends, appear as 3D skyscraper-like edifices through which the user can navigate. The kaleidoscopic texture for the city is derived from Google map data of present day Jerusalem. There is little indication of the text's history — only the subtle clue that textual information is contained in the QR codes. What is useful about this example, however, is the challenge it presents us when considering how a text may be represented and experienced. The exhibit is visual, multi-sensory, and may tap into something of the *emotion* of the biblical scene, perhaps in a way not unlike the illuminations of ancient or medieval manuscripts.

Second, the Museum of the Bible in the USA has contracted a Jerusalem-based software developer, Compedia, to create an AR app that is designed to be used with a Bible curriculum. This app has not been publically released, but a demo available online indicates some of the ways that the textual history of the Bible might be represented.<sup>[32]</sup> In one example, a user scans a printed icon in a textbook using the camera of an iPad, causing the printed image of the 1611 King James Bible title page to transform itself on the screen into a 3D 1611 King James Bible (Figure 9).

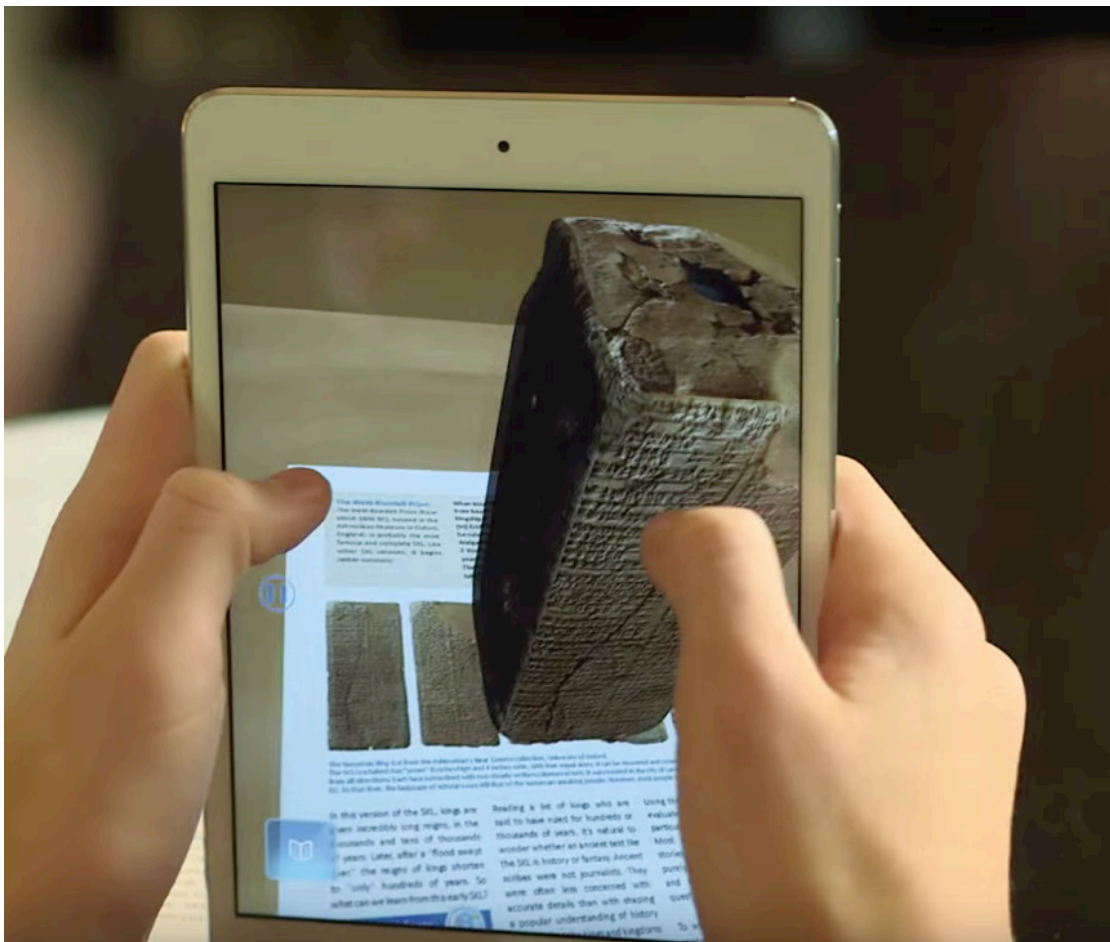


**Figure 9.** A 1611 King James Bible rendered in an AR app on the iPad. The image is a screenshot taken by the author from the YouTube video referenced above.

In the video, the user then “flips” the pages using gestures on the touchscreen, causing the pages to flip, bend, and fall realistically. Eventually the Bible falls open to the New Testament title page, slightly rounded as one would expect of a thickly bound book. Notice in Figure 9 the ways in which the paratexts are virtually presented: The binding, the thickness of the book, the presence of other pages, etc. One can further imagine that in a VR environment, the relative size of the object could be more realistically rendered by the added depth perception.

In another example from the same app demo, a cuneiform prism is displayed and appears to be “standing up” relative to the page displayed on the iPad through the camera. The artifact is the Weld-Blundell Prism which contains a Sumerian King-List on four roughly equal sides.





**Figure 10.** The Weld-Blundell Prism represented on the iPad in an AR app. The screenshot was taken by the author from the demo video.

In Figure 10, notice the details captured in the AR representation of the prism in contrast to the four 2D images on the textbook page.

Third, Adi Keinan-Schoonbae, a Fellow at the British Library who specializes in Hebrew Manuscripts, has created a number of 3D models available on SketchFab, a publishing platform for such projects (see Figure 11).<sup>[33]</sup> These models can be viewed and manipulated on most digital devices, as well as rendered in VR on appropriate mobile devices.



**Figure 11.** Depiction of the Esther Scroll in ivory case, modelled by Adi Keinan-Schoonbaert. Screenshot taken by the author.<sup>[34]</sup>

In early 2016, new models of ancient texts appear to be uploaded to SketchFab every week, and major cultural institutions are beginning to explore the platform. The Harvard Semitic Museum, for example, has recently uploaded a number of models, including a Cuneiform tablet from its collection.<sup>[35]</sup> These models showcase the potential of creating publically accessible 3D models of textual objects. One limitation is that, as far as I can tell, the objects cannot be manipulated in a way that would represent the opening of a scroll or the turning of the pages of a book.<sup>[36]</sup>

Finally, it is worth imagining a few other possibilities that could be realized given current technology. Stephen Smith, a developer for Bible Gateway, recently envisioned the use of AR akin to Microsoft's HoloLens, an untethered (wearable) holographic computer.<sup>[37]</sup> With the HoloLens, a user looks through a lens, seeing the real world, while the computer projects images upon the lens in 3D, creating a holographic effect. In Smith's example, a physical desk upon which sits an open Bible is overlaid with holographic digital texts and tools that a user can manipulate (Figure 12). It is not difficult to also imagine a holographic display of a scroll, a codex, or even the site of a manuscript's discovery.

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**Figure 12.** Holographic display of reference helps projected onto a desk (hypothetical). Photo modified by Stephen Smith, used with permission.<sup>[38]</sup>

Imagine a virtual reading room in which is stored all of the extant manuscripts of the biblical text that have been digitized

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— a kind of virtual critical edition. The user, seated at a desk, can “open” and read any of the objects, perhaps using a printed Bible in translation as the point-of-entry. When selected, Codex Sinaiticus appears on the desk, rendered in 3D and in true-to-life relative size to the Bible, the desk, and, say, a measure on the desk. If a particular manuscript is, in reality, distributed in various parts across different libraries, then in the virtual world, a user could either view each part separately or view a virtual reconstruction of the whole. A fully fledged critical edition seems technically feasible, although the computing power required may be beyond the capacity of today’s personal VR devices.

What these real and hypothetical AR and VR examples suggest is that these technologies have the potential to capture textual history in a way that current book technologies do not. These also show that the employment of AR and VR for the texts creates engagement that is not only more visual (in the sense of added depth perception and dimensionality) but auditory and kinesthetic.

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## Conclusion

This exploration leads us to make some practical suggestions. First, we must not underestimate the *meaningfulness* of paratexts, not least on our apprehension of the text’s past. Thus, when creating any representation of a text or manuscript (a digital representation, a critical edition, etc.), care should be taken in preserving the original paratexts, and consideration should be given to the new paratexts created in the production of the digital representation. For digitized manuscripts especially, representations should attempt to imitate the original paratexts as closely as possible (an excellent example is the Isaiah Scroll in Figure 5 above).

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Second, those undertaking digitization projects should consider cutting edge technologies and their future trajectories and, accordingly, capture as much information as possible in their digitization work. Along these lines, David Parker says:

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In transcribing Codex Sinaiticus, I found myself seeking new ways of indicating just what I found. ...Should I indicate which letters were written smaller at the end of a line? How should I indicate punctuation, paragraphing, the Eusebian apparatus, and the running titles? ...At the end of this process it was clear that the activity on which I was engaged was quite different in character from collating. I was trying to decide what features in the manuscript I could and should represent in my transcription, and then finding ways of doing so. And I was thinking not only about the possibilities immediately available to me, but also about possibilities that might be available to scholars at a future date, if only I had the forethought to set out my material in such a way that they could capture it for their own ends. [Parker 2003, 398]

In view of AR, VR, and other 3D applications, this means that digital photos of manuscripts and books should include the outside of the book at multiple angles. Related to this, efforts to establish digital standards that directly or indirectly affect texts (e.g., protocols, file types, markup languages, etc.) would likewise benefit from such future-looking considerations.

Third, textual critics should consider the potential of 3D technologies like AR and VR for the analysis of textual objects. VR and holographic AR especially have the potential to represent manuscripts in a compelling real-to-life and true-to-size manner. Fourth, we have seen that many AR applications are used in educational contexts. Educators will thus want to think critically about how AR and VR may enhance and restrict the learning experiences they wish to create, and for texts, the ways in which the technology captures or obscures textual history.

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Finally, design specialists should have a crucial role in the productions of digital texts. As Alan Galey rightly says:

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If textual scholars tend to position themselves at the threshold between the surfaces of texts and their mysterious depths...then digital materials may lead them to new kinds of thresholds. As in bibliography, questions about preserving and reading digital artefacts lead inevitably to the topic of their design. Reading the human presence in a digital artefact requires knowledge of markup, encoding, and even programming, raising the problem of negotiating multiple fields: on the one



hand, textual scholarship (which some take to include book history, or at least to overlap substantially with it); and on the other, *interface design* as a catch-all term for a practice that brings together human-computer interaction, information design, usability studies, and programming. Textual scholarship's close ties with book history significantly complicate its relationship with design — though such complexity can be productive. [Galey 2010, 107]

In sum, we have sought to demonstrate a few ways in which technology *means*. This was done by observing some of the ways that book technologies, by virtue of their paratexts, convey meaning about their texts' histories, often obscuring that history. In real and hypothetical examples, it was suggested that AR and VR technologies have great potential for overcoming, or at least offsetting, some of the limitations of common textual technologies.

## Notes

[1] As reported by a colleague, shared with permission.

[2] Cf. [Genette 1997, 2]: "By definition, something is not a paratext unless the author or one of his associates accepts responsibility for it..."

[3] Whereas Genette seemed to envision that most paratexts were themselves textual (e.g., table of contents, publisher's name, etc.). For a similar approach as I take for digital paratextuality, see [van Dijk 2014].

[4] Compare a recent narrow definition in reference to the paratexts of biblical manuscripts: "...all contents in biblical manuscripts except the biblical text itself are a priori paratexts" [Wallraff 2015, 239].

[5] The number of documents or "books" vary by tradition, e.g., Hebrew (Jewish Rabbinic) Canon (24), Protestant Canon (66), Roman Catholic Canon (73). For simplicity, this article will use the Protestant Canon unless otherwise stated.

[6] For an introduction to the textual history and criticism of biblical texts, for the Hebrew Bible see [Tov 2012], and for the New Testament see [Metzger 2005].

[7] In spite of literary preference for the scroll in the first few centuries CE, the codex was very quickly and extensively taken up by early Christian communities, perhaps as they sought to collect multiple documents, such as the Apostle Paul's letters or the Gospels, into a bound collection. Scholars have offered various explanations for why Christians preferred the codex. See [Gamble 1995]; [Richards 1998]; [Skeat 1994]. For our purposes, we need not determine the reason.

[8] See [Small 1997, 43, 48].

[9] I do not deny that the code *is* hermeneutically significant. For the purposes of this article, however, I am focusing on the readerly encounter with a text.

[10] Note that the interface typically includes a "window" within which one scrolls or otherwise moves through the text, but this boundary is not *binding* in the same way.

[11] I am using Accordance Bible Software version 11.1.5 on Mac OS X El Capitan.

[12] I am using YouVersion Bible app version 6.5 on iOS 7.1.2. It has been installed on over 200 million smart devices worldwide (<https://www.youversion.com/> [accessed 14 Jan 2016]).

[13] Note that while it is true that "...early printed copies were not all precisely alike...[t]hey were sufficiently uniform for scholars in different regions to correspond with each other about the same citation and for the same emendations and errors to be spotted by many eyes" [Eisenstein 1979, 81]; and further: "[Standardization] also involved the 'subliminal' impact upon scattered readers of repeated encounters with identical type-styles, printers' devices, and title page ornamentation" [Eisenstein 1979, 82].

[14] The covers of a Bible, usually made of durable material like leather, also reinforce that the bound collection is significant and belongs together.

[15] These paratexts invite a reader to make reference to quite small units of text, a subtle paratextual message that the details are important.

[16] In the textual history of biblical texts, the canonical sequence of documents varies somewhat, but has remained relatively fixed in recent

times. Interestingly, one Protestant organization, Biblica, has recently produced a curriculum which includes printed biblical texts without chapter and verse numbers, without columns, and in a different canonical order, in an attempt to alter the engagement of the reader (see <http://www.biblica.com/en-us/cbe/>).

[17] This notion of a pure “original” text persists in many quarters, but most textual critics of the biblical texts have for some time dropped the language of “original text” and prefer to speak of the “earliest recoverable text”, “initial text”, or *Ausgangstext* [Ehrman et al. 2012].

[18] Outside the scope of this discussion is a consideration of the longevity of any given digital (biblical) text in terms of data storage. It is worth noting, however, that researchers at the University of Southampton recently demonstrated 5D data storage using a laser on quartz, a technology that they estimate will outlast humanity. Among the four “headlining” digital documents recorded by the team is the King James Bible. Interestingly, the quartz disc of the Bible contains the imprint “Holy Bible” on its surface — a fitting but hermeneutically loaded paratext. See: <http://spie.org/newsroom/technical-articles/6365-eternal-5d-data-storage-via-ultrafast-laser-writing-in-glass>.

[19] Along these lines Claire Clivaz has recently suggested some of the ways that digital texts are challenging modern assumptions about “text” inherited from the printing press, especially an assumed stability of the text [Clivaz 2015].

[20] See, e.g., [http://www.csntm.org/Manuscript/View/Rahfs\\_961](http://www.csntm.org/Manuscript/View/Rahfs_961).

[21] See, e.g., a screenshot available at the company's website: <http://www.bibleworks.com/content/ss/macss5.png>.

[22] See: <http://codexsinaiticus.org/en/manuscript.aspx>. Cf. the New Testament Virtual Manuscript Room by the Institut für Neutestamentliche Textforschung: <http://ntvmr.uni-muenster.de/manuscript-workspace>.

[23] See: <http://dss.collections.imj.org.il/>.

[24] Note that capturing and representing the original paratexts of these texts may be more obviously useful for scholars than, say, the popular readership of the YouVersion Bible app. However, the point here is to simply show that the paratexts themselves indicate (or obscure) much about the text's history, impacting upon our apprehension of the past.

[25] See <http://www.bl.uk/turning-the-pages/?id=fdbcc772-3e21-468d-8ca1-9c192f0f939c&type=book>. The interface uses “Turning the Pages” software developed by Armadillo Systems. See <http://tp.onlineculture.co.uk/history/>.

[26] See <http://biblevr.com/>; demo: <https://youtu.be/w6CgdDVfRKw>.

[27] See <http://www.immersivefaith.com/>; demo: <https://youtu.be/D3UApkgjIk>.

[28] See <http://www.bhpbublishinggroup.com/press-release/augmented-reality-hits-the-bible-bh-kids-announces-the-big-picture-interactive-bible-storybook>; demo: <https://youtu.be/nArrZ4gr7gE>.

[29] See <http://www.prnewswire.com/news-releases/childrens-first-ar-bible-lets-children-bring-bible-stories-to-life-300211437.html>; demo: [https://www.youtube.com/watch?v=d\\_vSBL2p6o4](https://www.youtube.com/watch?v=d_vSBL2p6o4).

[30] See <https://www.kickstarter.com/projects/692439852/proven-reality>.

[31] See: <http://www.takeo.org/npace/2014-dta-new-jerusalem/index.html>. For a demo: <https://vimeo.com/131471303>. Note a panel discussion of the exhibit at Kings College London: <https://vimeo.com/114447276>.

[32] Demo: <https://youtu.be/~mbP88oQLgc>.

[33] Keinan-Schoonbae's profile may be found at <https://sketchfab.com/adiks>.

[34] Available on sketchfab: <https://sketchfab.com/models/95b1c036b67a43aab027a8a024fb4c7c>.

[35] See <https://sketchfab.com/models/e33282e3992f43fd9dc1b0161ecffd29>.

[36] Another concern about SketchFab is the sustainability of the platform as it is something of a startup, having begun in 2012 and dependent, it appears, on venture capital. See <https://sketchfab.com/about>.

[37] See <https://www.microsoft.com/microsoft-hololens/>; cf. the similar technology being developed by Magic Leap, a secretive but much-hyped “Mixed Reality” start-up (<https://www.magicleap.com>; <http://www.wired.com/2016/04/magic-leap-vr/>).

## Works Cited

- Clivaz 2015** Clivaz, C. 2015. "New Testament in a Digital Culture: A *Biblaridon* (Little Book) Lost in Web?" *The Journal of Religion, Media and Digital Culture* 3 (3): 20–38.
- Ehrman et al. 2012** Ehrman, B.D. and Holmes M. W. 2012. *The Text of the New Testament in Contemporary Research: Essays on the Status Quaestionis. Second Edition*. Brill.
- Eisenstein 1979** *The Printing Press as an Agent of Change: Communications and Cultural Transformations in Early Modern Europe* Cambridge: Cambridge University Press.
- Ferré 1995** Ferré, F. 1995. *Philosophy of Technology*. Athens: University of Georgia.
- Galey 2010** Galey, A. "The Human Presence in Digital Artefacts." *Text and Genre in Reconstruction: Effects of Digitalization on Ideas, Behaviours, Products and Institutions*, edited by Willard McCarty, Open Book Publishers, 2010, pp. 93–117.
- Gamble 1995** Gamble, H.Y. "Introduction". *Books and Readers in the Early Church: A history of Early Christian Texts*. Yale University Press, 1995.
- Genette 1997** Genette, G. *Paratexts: Thresholds of Interpretation Literature, Theory, Culture*, Cambridge University Press, 1997.
- Jansen 2014** Jansen, L. "Introduction: Approaches to Roman Paratextuality". *The Roman Paratext: Frame, Texts, Readers*, edited by Jansen L. Cambridge, 2014, pp. 1–19.
- McCarty 2013** McCarty, W. "Introduction". *Text and Genre Reconstruction: Effects of Digitalization on Ideas, Behaviours, Products and Institutions* Cambridge University Press, 2013.
- McKenzie 2005** McKenzie, D.F. *Bibliography and the Sociology of Texts*. Cambridge University Press, 1999.
- Metzger 2005** Metzger, B.M. and B.D. Ehrman. *The Text of the New Testament: Its Transmission, Corruption, and Restoration*. 4th ed. New York: Oxford University Press, 2005.
- Parker 2003** Parker, D.C. "Through a Screen Darkly: Digital Texts and the New Testaments". *Journal for the Study of the New Testament* 25 (4), 2003, pp. 395–411.
- Richards 1998** Richards, E.R. "The Codex and the Early Collection of Paul's Letters". *Bulletin for Biblical Research* 8, 1998, pp. 151–166.
- Skeat 1994** Skeat, T.C. "The Origin of the Christian Codex". *Zeitschrift fur Papyrologie und Epigraphik*. 1994. pp. 263–268.
- Small 1997** Small, J.P. *Wax Tablets of the Mind: Cognitive Studies of Memory and Literacy in Classical Antiquity*. London: Routledge, 1997.
- Sprat 1702** Sprat T. *The History of the Royal Society of London for the Improving of Natural Knowledge*. London: T.R., 1702.
- Tov 2012** Tov E. *Textual Criticism of the Hebrew Bible*. Fortress Press, 2012.
- Wallraff 2015** Wallraff, M. and P. Andrist. "Paratexts of the Bible: A new Research Project on Greek Textual Transmission". *Early Christianity* 6 (2), pp. 237–243.
- van Dijk 2014** van Dijk, T. "The Margins of Bookishness: Paratexts in Digital Literature". *Examining Paratextual Theory and its Applications in Digital Culture*. Edited by N. Desrochers and D. Apollon, Hersey, PA: IGI Global, 2014, pp. 24–45.



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