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Finnemann, Niels Ole

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Niels Ole Finnemann

## Note on the complexities of simple things such as a timeline

On the notions text, e-text, hypertext, and origins of machine translation.<sup>1</sup>  
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The composition of a timeline depends on purpose, perspective, and scale – and of the very understanding of the word, the phenomenon referred to, and whether the focus is the idea or concept, an instance of an idea or a phenomenon, a process, or an event and so forth.

The main function of timelines is to provide an overview over a long history, it is a kind of a mnemotechnic device or a particular kind of Knowledge Organization System (KOS)<sup>2</sup>. The entries in the timeline should be brief and indisputable. Therefore, timelines often identify the first occurrences rather than the most widespread or most qualified instances leaving the fuller and more complex, and possibly disputable story out. But even first occurrences are often difficult to establish.

The first occurrence is most often only the first finding of an instance. Older instances may be found and competing definitions develop either within a field or in different fields.

This is further complicated since the phenomena, their names, and their meanings may change over time. Former meanings may become redundant, or they must accommodate and coexist with new meanings. The time and place of the composition of the timeline are to be considered in interpreting the things listed.

The following note will discuss these issues as they occur in the development of the notions of text, e-text and hypertext, and the origin of machine translation.

### *Notions of Text*

The word ‘text’ is simple, but the phenomena referred to has a long and complex history. In the Middle Ages it was used for the main body of a manuscript as distinct from additional notes and illustrations.<sup>3</sup> Later, it was applied to printed texts rather than written manuscripts. Over the years different definitions occur in linguistics, in literary studies, critical bibliographic theory concerned with scholarly editions, among historians, and - after the invention of e-text - in a variety of fields in computer- and communication sciences.<sup>4</sup>

In 20<sup>th</sup> century critical bibliographic theory, the text was understood as an expression of the intention of the author (Greg, 1951). In linguistics and literary theory, the focus moved from the author intention to inner structures of autonomous works based on ‘close reading’ (I.A. Richards 1929). Linguistic theory maintains the use of text for linguistic expressions, while in literary and semiotic theories the notion is expanded to include images (Barthes, 1957), all sorts of multimedia expressions (Gunther Kress & Van Leeuwen, 2006), dissolved in intertextuality (Eco, 1962), and/or in reader interpretations (Stuart Hall, 1980 & Stanley Fish, 1982). The word ‘text’ furthermore overlaps wordings as script, writing, document, linguistic expression, and other written, externalized expressions. Spoken language is usually excluded.

A History of Text timeline thus depends on both explicit and implicit and everchanging ideas of 'text' and related wordings. The notion is also influenced of historical changes in the material dimensions concerning production (carved, hand-written, typed, printed, electronic and so forth), storage and reproduction (stone, wood, papyrus, parchment, paper, rolls, books etc.), dissemination, and reception.

Changes in physical dissemination of texts – for instance due to new mechanical and electrical techniques – are accompanied by developments of new genres such as the printed daily newspaper made possible by telegraph and rotary press in mid 19<sup>th</sup> century. If we list the first modern newspaper one might suggest that 'forerunners' of weeklies and non-periodic news media whether handwritten or printed should also be listed. But what about texts in other media and materials such as runestones, and graffiti on the city walls? Which aspects of this broad - and far too short - story should be included in a 'History of Text Timeline'?

Even if it may be possible to list the major material innovations genres becomes really intriguing. The notion of genre is difficult to define, but useful for our orientation in the huge universe of texts. Novels, short stories, poetry, essays, historical documents and diploma, news, drama, audio, video, and hypertext genres with subgenres in all categories. The issue of genre is complicated for at least three reasons. To identify a genre always take more than one instance, usually a series of texts sharing a set of – eventually also changing – characteristics. It is a relational term. The second reason is that the same text often can be included in a hierarchy of genres and subgenres as well as in a set of network relations to other texts (intertextuality). We may for some purposes distinguish between the media as materiel conveyors of content (shared physical characteristics of a set of texts) and genres which can be identified only by looking into the content (shared meaning characteristics and style of a set of texts). Third, a recent shift in both functionalist and cultural historical genre theory away from focusing on the similarities "between documents" to examine social action seen as "typified rhetorical actions based in recurrent situations" further complicates the issues of recording genre history within a history of text timeline (Miller, C., 1984, Russel & Fischer, 2009, Andersen, J., 2015).

Opening for genres also opens for an endless number of issues which is maybe more relevant within the humanities than in the sciences, at least until the sciences enters the fields of the humanities recognizing that where you have text, you have ambiguities and troubles.

### *The text and hypertext in the binary alphabet*

Today, text has also become a verb, to text a message which marks the arrival of a new medium of text. Texting refers only to a particular e-text format, as written and possibly real time interactive network communication rather than longer documents to be read at a later – possibly unknown – time in the future.<sup>5</sup> The special form of texting, however, reveals a more far-reaching transition away from the array of static (written, typed, or printed) texts to e-texts in which the time dimension is always incorporated as an editable option.

The potentials of this emerge gradually in many different areas. Since there is no general history of digital materials yet, it's not possible to give a full overview. It is possible though to depict a few major steps since Roberto Busa's pioneering project on digitizing Thomas Aquinas' works (Index Thomisticus) in 1949. A print version (sic) appeared in the 1970's, and a digital version in the 1990's (Jones, 2016).<sup>6</sup>

Efforts to develop a standard for e-texts appeared only in the 1960's. In 1969 the IBM employed Charles F. Goldfarb coined the notion 'Mark Up Language' and created an (aimed to be) general markup language, GML (Goldfarb, 1989). The idea of establishing standard formats for e-text was carried further also within the critical scholarly edition community and the now established

Humanities Computing community, resulting in new mark-up languages such as SGML (1980) and TEI (1990).<sup>7</sup> There is a gradual change from computational theory to new sorts of text theory as foundation for these efforts culminating in the development of OHCO, a general model of text as 'Ordered Hierarchy of Content Objects' in the 1990's.<sup>8</sup>

Thus, there is a development from the interpretation of text as expression of the intentions of the author over formal and structural text theory to a modularized and hierarchically ordered theory initiated by the efforts to create digitized versions of static texts whether written, typed or printed.

Despite the differences all these ideas aimed to provide a digital edition as a copy of the original. The text would be stored as a file, and could be copied, processed, retrieved, edited, and searched in a main frame computer – considered either as a logical machine which would facilitate the development of more consistent and rational 'scientific' text analysis, or as a toolbox with a range of retrieval features to deal with the text. The sequences of bits in which the text as well as the codes and functionalities was embedded, were not considered part of the content.

In the 1980's the mainframes were supplemented with distributed terminals allowing access across distance and - even more far-reaching - with small, but high-capacity, stand-alone desktop computers and graphical user interfaces. The door for utilizing the binary sequences, including codes, and instructions for semiotic purposes as part the work was opened. The clear distinction between tool and text became an editable variable. The new perspectives relate most fundamentally to a change in the utilizations and conceptualizations of hypertext.

The notion hypertext was coined in 1965 of Ted Holm Nelson who first defined hypertext as 'non-sequentially read text, as links were inserted in a primary text as references.' (Nelson, 1965, Barnet 2013). Later he gave a dynamic version defining hypertext as 'branching and responding text. Best read at a computer screen' (Nelson, 1993).

In between the French author Gerard Genette had introduced the word hypertext for a quite different type of relation between texts, namely for a text (denoted hypotext) used as template for a later text (Genette, *Architext* 1979). According to Genette James Joyce's *Ulysses* was a hypertext because it used the Homeric Odysseus as its hypotext. However, Nelson and Genette worked in different academic cultures, which were probably not aware of each other which leaves the question how such cultural limitations should be manifested in a timeline of text?

Ted Nelsons – very influential – definitions focus on the reader perspective and are in accordance with the idea that digital features are external to the content of the text. These notions are still useful in some cases, but the later development is mainly based on the inclusion of hypertext features as part of the content. So, the notion of hypertext is gradually widened, Alan Kay & Goldberg (1977) focused on the flexibility and the capacity to include and manipulate all sorts of symbolic expressions in the hypertext. Michael Joyce introduced the use of links as narrative component within the story (*Afternoon. A story.* 1987), and produced the software *Storyspace*, to write hypertext fiction with Jay D. Bolter, who also gave an elaborate theoretical analysis of the reconceptualization of the computer in his *Writing Space: The Computer, Hypertext, and the History of Writing* (1991). Bolter described the computer as a fourth type of writing technology in human history and hypertext as the fundamental semiotic operating mechanism of digital computers since it was rooted in the editable relation 'between the address of a location in the storage and the value stored at that address' allowing that both the address and its content can be edited via the interface. This again provides the computer with an invisible but editable space behind the visible representation of the text. Thus, in Bolter's analysis hypertext replaced the program as the basic operating principle of computers.

George P. Landow focused on the approximation of writer and reader modes, denoted a 'wreader' (Landow 1992), and Jerome McGann, added to the new interpretation of hypertext with his notion of 'Radiant Text' (1995), aiming to include several interpretations of a work in the same critical scholarly edition. A related reinterpretation of hypertext develops within computer science in the rise of Human-Computer interaction Studies (HCI) utilizing hypertext to facilitate users to access to the system architecture and programs via the interface. Later, Katrin Hayles (2002) summarizes the range of signifying components of e-text utilized in this second-generation hypertext as 'including sound, animation, motion, video, kinaesthetic involvement, and software functionality, among others'.<sup>9</sup> Most of these features are based on the inherent time dimension fundamental to digital materials which - due to this and contrary to printed materials - remains open for changes as links can always be inserted deliberately with instructions for change any sort of content.

This again leads to ambiguities of what is meant by 'e-text'? Should it refer only to digital materials which are replicas of printed/static materials eventually including born digital materials if they are intended and coded to be closed? Or should it be extended to include all sorts of digital materials due to their manifestation in the very same, binary alphabet and independent of whether these sequences functions as text, images, sounds, processes, programs, instructions, coded links, and so forth and independent of whether they are intended to stay closed or to be continuously edited eventually, partly based on real-time updating?

Both meanings make sense, and the former can be included as a particular case within the latter though they have quite different implications. In the first sense the notion includes only what can be made visible as reproduction or simulation of a text produced in a static material form. The digital representation is external to the text "itself". Hypertext is necessary to access, navigate, search, and read the text, but not part of the content. In the second sense the notion may include all sorts of manifestations in the binary alphabet, independent of visual appearance, and in which both the Latin alphabet, other alphabets, musical scores, speech, and images as well as the lay out, and a wide range of processes, and not least the scripts, instructions and programs are manifested. If manifested they can also be used as semiotic elements in the composition of a born digital text including the invisible parts of the e-text. Hypertext is always necessary for dealing with an e-text, but now it may also be part of its content.

There is no doubt that Ted Nelson's notion of hypertext is still the first known articulation of the term (Nelson 1965, Barnet 2013). However, the feature 'mechanical linking' was already there, included for instance in Paul Otlet's *Mundaneum* (1934), and in Vannevar Bush' idea of a 'Memex' (1945). The basic functionality of hypertext includes an anchor point from which a command is send to a destination, an address, with an instruction telling what to do to the content stored on that address. These functions were also included - though not named - in Alan Turing's theoretical description of the operation mode of the universal computer (Turing, 1936). Similarly, the optional choice of the next step formed the basis for Alan Turing's notion of a choice machine. Together this is in fact hypertext and were inherited in Alan Turing's theoretical model, but the features were not combined and made into a notion. The model aimed to demonstrate the universality in respect to computability only, and not the full scale of the semiotic potentials. It also lacked for instance multiple timescales, and the codable relation between interface and storage.

The development goes further. In the late 1980's hypertext is also reinterpreted in another field and as a response to the question how to establish a digital communications platform which allow people to communicate between computers with incompatible architectures. This question found a solution with the development of the www protocols, first presented at CERN (Conseil Européen pour la Recherche Nucléaire) in 1989 by Tim Berners Lee.<sup>10</sup>

While the use of a fast-growing array of signifying hypertext features widens the semiotic enrichment, the web protocols widen the reach and range of possible link connections as they allow any computer to interfere with the functional architecture of any other computer on a given network. Together, the inclusion of hypertext features as intrinsic, semiotic components within the text and the extension of network interaction to a global scale opens for a range of new issues in the history of text.

So far, an e-text was generally considered to be a closed work stored in a file on a stand-alone computer. After the spread of the www-protocols, including the HTML early in the 1990's the conceptualizations of text and hypertext gradually moved on to the landscapes of interconnected computers and interactive and networked texts. The platforms for social media and interactive universes such as Second Life and a range of other new network genres was established. A repertoire of new terms emerges. Jill Walker (2005:47) described the 'unleashing' of hypertext into the world wide web as a transition in which the concept 'goes feral' as these texts '*refuse to stay put within boundaries we have defined*'. Thus, feral hypertext structures, cannot be restricted as navigational features outside a work – as originally imagined by Ted Nelson – or kept within the closure as in the literary hypertext tradition. For networked digital media, hypertext is both inside and outside and the connection in between. Henry Jenkins (2006) analyses how the interactive networked texts are entering into popular culture, and Axel Bruns (2008) analyses the rise of remix cultures, "produsage" and virtual communities in his '*Blogs, Wikipedia and Second Life*'. While they are writing, Facebook trespasses its own local base in the American university world and becomes a global standard for written social interaction across distance.

So, the question what is meant by e-text and hence to be included in a history of text timeline is now further expanded to include textual and intertextual relations distributed across the internet.

Among the far-reaching implications are the development of multiple source knowledge systems. Such systems are today used to organize inputs from a wide range of channels – and users – due to a wide range of different purposes, be it monitoring climate, weather, market transactions, financial systems, and any other relevant matters. Each parameter can be adjusted in real time or in deliberately chosen timescales (Karina Knorr Cetina (with the notions synthetic situations and windows of interaction), 2009; Finnemann, 2017). They also include a growing range of collections of digital materials to be analyzed for patterns by means of statistical methods (e.g. F. Moretti, *Distant reading*, 2013). If combined with automated transactions, they may include 'machine intelligence' which consequently also qualify to be included in the timeline for the history of text.

Such Knowledge Organization Systems are needed to deal with contemporary issues on both local, regional, and global scale. They are among the most central knowledge formats in 21st century characterized by the Anthropocene condition, that human activities have global reach and impacts within any single culture and has become a natural force impacting biodiversity, climate, and the biosphere.

The use of multiple timescales may also be applied to the Timeline itself, as it allows for inclusion of layered in-more-depth information made visible on user request only. So, a question is how these complications concerning hypertext should be manifested in the timeline? How should the unfolding of still new forms of applications and usages be included?

### *Finally - Machine Translation - When did it start?*

"Claims about the actual starting point of a field of study are notoriously inexact" wrote Sergei Nirenburg and Yorick Wilks in their 1987-paper on the development of the field of Machine

Translation.<sup>11</sup> Until then the starting point was often assumed to be Warren Weaver's idea, presented in a personal mail to Norbert Wiener (1947) and later as a Memorandum called "Translation" circulated in 1949. However, they added, there was evidence that Andrew Booth and his colleagues started such work in Britain in 1946, and that the Soviet Engineer Petr Petrovitch Smirnov-Troyanski (1894-1950) and others had worked on machine translation and filed several patent applications since 1933. This work is discussed in John Hutchins and Evgenii Lovtskii (2000).

Who then, should be included in a timeline of the history of text? It may be argued that Warren Weaver was the one who spread the idea of Machine Translation and made it grow, but he was not a founding father. Booth came first in the west. It may also be argued that Smirnov-Troyanski had no influence on the early development in the years prior to his recognition in the West in the late 1950-es. Still, today he is the first known researcher in the field of Machine Translation.

This brief history of the advent of Machine Translation illustrates the development of science towards a more global scope. Thus, it also illustrates a very basic question concerning timelines: what part of the history is to be indexed? Smirnov-Troyanski's work in the 1930'es was not known in the west. But similar stories can be told in other areas. In many years it was assumed that the use of movable types to print was an invention of Johan Gutenberg in the mid 15<sup>th</sup> century but use of movable types was found in Korea and China around the 11<sup>th</sup> century or before. For a History of Text timeline, it also raises the issue which alphabets are to be included? Should the timeline be delimited to focus on alphabetic texts whether written, printed, or digitized? What then to do with Chinese history of text? Since digital media transcend and transform these borderlines into editable distinctions, it will be difficult to maintain a clear exclusion of other sorts of texts. For e- texts the question will always be which parts of the binary sequences belong to the text and which do not (Fischer 2001, Sahle 2013, Brügger & Finnemann, 2013)?

For the History of Text timeline, the question is to identify major trajectories to be pursued if the timeline should be further developed. To those indicated above one might also want to include the communication networks throughout history from the Egyptian postal system (known from 2000 B.C.) through the four major European networks of the Middle Ages (the communication networks of the church, the kings and nobles, the merchants, and wandering groups of musicians, beggars, actor troupes (John B. Thompson 1995.)) to the modern system of newspapers, postal services, phone-services, cable networks, broadcast and streaming services and the global internet.

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- <sup>1</sup> The note a comment to a ‘Timeline of the History of Text’ project within The Future of Text project. <https://futuretextpublishing.com> and draws Finnemann, N.O. 2018. ‘E-text’. In P. Rabinowitz (red.), *Oxford Research Encyclopedia: Literature* Oxford: Oxford University Press. Preprint with list of references available here: [https://komm.ku.dk/ansatte/?pure=da%2Fpublications%2Fetext\(e31c62ac-96d4-46fd-b505-efed6d6fb34c\).html](https://komm.ku.dk/ansatte/?pure=da%2Fpublications%2Fetext(e31c62ac-96d4-46fd-b505-efed6d6fb34c).html)
- <sup>2</sup> KOS see [https://www.isko.org/cyclo/knowledge\\_organization](https://www.isko.org/cyclo/knowledge_organization)
- <sup>3</sup> [https://www.etymonline.com/word/text?ref=etymonline\\_crossreference#etymonline\\_v\\_10699](https://www.etymonline.com/word/text?ref=etymonline_crossreference#etymonline_v_10699)
- <sup>4</sup> Terminology: In the following ‘e-text’ is used as standard notion for electronic and digital text covering a variety of interpretations of these notions.
- <sup>5</sup> For a brief overview of the development of the ingredients in texting see: <https://www.zipwhip.com/blog/video-a-history-of-texting/>
- <sup>6</sup> INDEX THOMISTICUS by Roberto Busa SJ and associates are today available at <https://www.corpusthomicum.org/it/index.age> (2005)
- <sup>7</sup> SGML, Standard Generalized Markup Language. First working draft 1980. <http://www.sgmlsource.com/history/sgmlhist.htm>. TEI, Text Encoding Initiative established in 1987 ‘to develop, maintain, and promulgate hardware- and software-independent methods for encoding humanities data in electronic form.’ <https://tei-c.org/about/history/> First draft of guidelines, 1990.
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- <sup>9</sup> Hayles, 2002:20
- <sup>10</sup> <https://www.w3.org/History/1989/proposal.html>. Published on a USENET forum for hypertext: alt.hypertext in August 1991. (<http://www.ngrblog.com/famous-usenet-posts/>).
- <sup>11</sup> Sergei Nirenburg and Yorick Wilks, *Machine Translation* (1987). Not paginated, section 5, footnote 3. “The Evolution of MT Over its 50-year History”. [https://www.academia.edu/1033975/Machine\\_translation](https://www.academia.edu/1033975/Machine_translation). The paper is reprinted in Marvin Zelkowitz: *Advances in Computers. 40<sup>th</sup> Anniversary Volume: Advancing in to the 21<sup>st</sup> Century*. Vol 51. Pp. 159-188.