The Virtual Lab for Prior Studies

An Example of a Closed Collaborative Community

Jørgen Albretsen[1], Per Hasle[2], and Peter Øhrstrøm[3]

Abstract

This paper presents the background and development of The Virtual Lab for Prior Studies (VL), with a perspective on information science. It suggests and defines the concept of the VL as a Closed Collaborative Community (3C). Further developments of this VL-3C form part of the research project **The Primacy of Tense: A.N. Prior Now and Then**[4]
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The paper further seeks to position this VL-3C within the framework of Digital Humanities. (*Draft, to be expanded*)

Background

Arthur Norman Prior (1914-69) is the founder of modern temporal logic. It is not the aim of the present report to explain the life and work of A.N. Prior in detail. This 'background' is included to briefly sketch the research within the field of temporal logic, to serve as a good example of the demands a research community puts on an it-system developed to support its work – in this case "The Virtual Lab for Prior Studies".

The work and research of A.N. Prior secured the discipline temporal logic as a theoretical subject within philosophy, theology, and mathematical logic. In

[1] University of Copenhagen, Copenhagen, Denmark. E-mail jalb@hum.ku.dk
[2] University of Copenhagen, Copenhagen, Denmark. E-mail per.hasle@hum.ku.dk
[3] Aalborg University, Aalborg, Denmark. E-mail poe@hum.aau.dk
[4] Project summary: Arthur Norman Prior (1914-69) developed tense logic. In particular, he articulated the 'internal' and the 'external' views of time, showing how both could be treated formally. Most metaphysicians think there is a 'real' difference between these two views, that only one describes the real nature of time. Prior too thought there is a difference, and argued that the internal view is the 'right' one: that the correct view takes 'the present' as metaphysically privileged, and that all aspects of time could be studied from this perspective. The debate here remains heated, and today many metaphysicians support the external view, arguing that the present is not fundamentally different from other instants of time. The philosophical ramifications of this internal/external distinction need to be fully explored and our project is to explain: 1) the extent to which it drove Prior's work, 2) what other uses the distinction might have (Prior gave us tools whose full force he himself was not always aware of). http://ufm.dk/forskning-og-innovation/tilskud-til-forskning-og-innovation/hvem-har-modtaget-tilskud/2016/bevillinger-fra-det-frie-forskningsrad-kultur-og-kommunikation-til-dff-forskningsprojekt-2-juni-2016

more recent years it has shown its power as an application oriented tool in verification of parallel processes in chip design as well as program verification of temporal aspects in software, a discipline within theoretical computer science.

Shortly after the all to early and sudden death of A.N. Prior in 1969 – he died from a heart attack in Trondheim, Norway, during a lecture tour – his widow Mary Prior (1922-2011) together with close friends and colleagues went through all his written material, sorted it into archival boxes, and entrusted this 'Prior Archive' to the Bodleian Libraries in Oxford. Upon request to and with written permission from the Prior family, the archive is made available for researchers to use it in the Special Collections Reading Room (SCRR).

From a Danish perspective, the research within temporal logic and with that into the works of A.N. Prior was initiated by professor Peter Øhrstrøm, Aalborg University. His first visit to Oxford and the Bodleian Libraries dates back to 1989. Through contacts with Mary Prior and Martin Prior, the son of Mary and Arthur Prior, he obtained permission to use the archive for research purposes. Later professor Per Hasle, University of Copenhagen, joined this research. Through annual visits to Oxford, Hasle and Øhrstrøm worked in the SCRR to research the work of A.N. Prior. An important work was made by Per Hasle to produce so called box lists of the content of each archival box. This meant a much better overview of the Prior Archive and made it very easy for researchers to locate manuscripts, letters, and notes, without having to do this more or less at random or by memory. Another important tool for the research done in the Prior Archive is the bibliography of the works of A.N. Prior. This work was started by the Norwegian librarian and bibliographer Olav Flo (1922-89) during the 1970ies, completed by Øhrstrøm and Hasle in 1996, with later additions 2011 by now assistant professor David Jakobsen, Aalborg University.

These indispensable tools formed an integral part of "The World-Wide-Web Site for Arthur Norman Prior Studies", launched in 1999, present day web address www.priorstudies.org and now a part of the project "The Virtual Lab for Prior Studies".

The Virtual Lab for Prior Studies

In 2007, Hasle and Øhrstrøm negotiated a new agreement with Mary Prior for the use of the Prior archive specifically giving permission "to edit and publish, separately or jointly, all scientifically relevant material by my late husband Arthur N. Prior, of which I am the copyright holder." (Typed statement, signed Dr. Mary Prior, Oxford, 15 September 2007). This meant that access to the archive was to be more elaborate and frequent for the research taking place, since it would now be of greater interest to publish material from the archive. To complement this, Prior researchers from around the world were more and more aware of the Prior research centred in Denmark, and were keen to join this growing 'Prior Community'.

One initiative was the idea to have the complete 'Nachlass' of Prior, i.e. hitherto unpublished manuscripts, letters, and notes be published. It was obvious that modern web technology could somehow be used to facilitate the access and it was further quickly realised that the publication of Prior's Nachlass was to be a collaborative effort which could attract even more researchers to the Prior community, some of them new to the field.

2010 work was initiated to gain permission from the Bodleian Libraries to use digital cameras to photo the archival material. A new policy by the library had made it possible to take digital photos but only for personal use.

It must be stressed that the digital photos taken legally remain the property of Bodleian Libraries and they must not be copied to any third party without permission. Furthermore, Bodleian Libraries retain the right to ask for free copies of the digital photos. These demands in themselves meant that some sort of access control had to be imposed.

During spring 2011, computer scientist Jørgen Albretsen started the development of the prototype of "The Virtual Lab for Prior Studies" (VL), and he is currently main responsible for the VL. After two research visits to Oxford, a huge number of digital photos was available and a pilot system was put together. After successful tests, researchers from the Prior Community were allowed to use the VL, which has now been developed into a stable system in permanent use. PHP is used as main programming language with extensive use of its ease of integration with SQL databases, forming the basis of the VL. JavaScript is used to a minor extend. The VL is running on a Linux server, hosted by Aalborg University.

Such a system must also encompass the obvious need to annotate the digital photos, and not the least facilitate the transcription based on the digital photos, of the text and formulae in the original documents. The transcribed text must then be searchable and the entire system must be made like a laboratory in the sense of a researcher's workplace when dealing with the Prior Archive.

How the VL is structured – a Closed Collaborative Community

The VL is reached via login at the web address research.prior.aau.dk (figure 1):

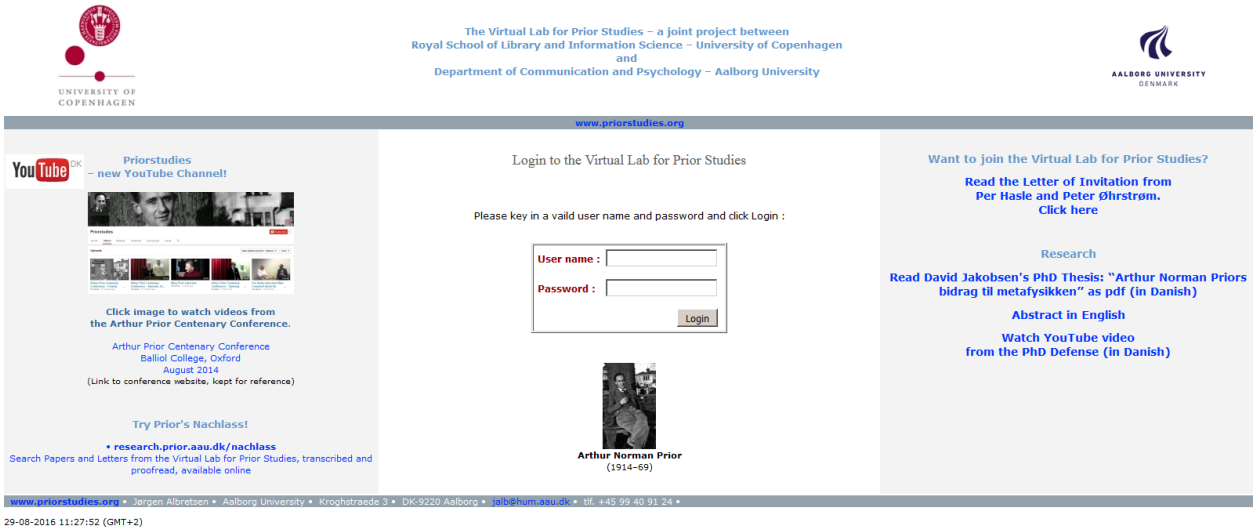

Figure 1.

Status as of September 1, 2016: 48 researchers from around the world have been granted a login to the VL. The VL is logically divided into a papers section and a letters section. 6242 digital photos classified into 297 papers (200 papers by Prior and 97 papers by others – probably send to Prior) and 1102 letters (247 from Prior and 829 to Prior, remaining 26 are letters between other persons, that Prior received in copy as well as notes attached to letters). A total of 152 papers and 91 letters have been transcribed, and of these 37 papers and 5 letters are now in the Nachlass (explained later).

The whole idea behind such a setup for a VL may not seem new. Within the Digital Humanities, a collaborative process as the present can be classified as crowdsourcing. What makes it special is the closed character imposed by two restrictions:

1. the demand by Bodleian Libraries that the digital photos are not distributed freely but only to persons having a professional research-based interest.
2. the researchers commit themselves to contribute to the Nachlass by signing up to transcribe texts that fit into the overall goal to do research on the life and work of A.N. Prior, with the benefit that they are credited for their work and can use it for publishing within their own field of research.

This Prior Community of roughly 50 persons made the step to label it 'closed' rather easy. Almost everybody knows everybody, newcomers are often Ph.D.-students of senior researchers with a keen eye on what needs to be transcribed and made available for comment.

The term 'Virtual Lab for a Closed Collaborative Community' (VL-3C) was then coined by Jørgen Albretsen. Recent literature list evaluation terms like the following, which the VL-3C easily fulfils – the relation to VL-3C added in parentheses:

- High Concept, Good Title (A.N. Prior, the need to be virtual)
- Small Autonomous Tasks (transcribing texts and adding comments)
- Use Custom and Open Tools (PHP, SQL, JavaScript, open standards)
- Recognize Community (aiming at the Prior Community)
- Organizational Team (centred in Denmark)
- Small Crowds Work Too (50 people, growing to maybe 100)

(source: Deegan, Marylin & McCarty, Willard (eds.). 2012. "Making Crowdsourcing Work", from chapter 9 "Crowdsourcing the Humanities" in *Collaborative Research in the Digital Humanities*, 147-9. Abingdon: Ashgate – Taylor & Francis Group Ltd.)

A typical use of the VL-3C

Upon registering as a member of the VL-3C, the user chooses any number of texts to transcribe. This is done by e-mail to the VL-3C administrator who then assigns the user to the texts in question by updating relevant databases. It is not compulsory that a user must sign up for transcription of texts. The digital photos that make up a digital document in the VL can be read by any user, and any user can add her or his own comments to a digital document. However, to get credit for transcribing, the user is required to sign up for this.

The user can use a search facility to have documents – papers or letters – listed, as shown in figure 2.

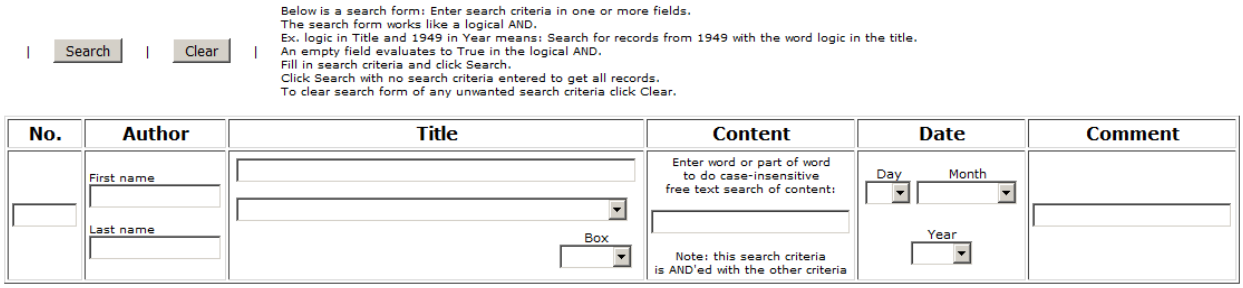

Figure 2.

A search without criteria gives all documents available. The search facilities is rather standard: VL identification number, author, title, date. More specific for this VL is the possibility to combine with the following criteria: box number, content, and comment. A word about "Content": this applies to digital documents where transcribed text is available, which means that any digital document without transcription will be excluded in searches where a search criteria is entered in the content field.

In figure 3, an extract from the list of papers in the VL-3C is shown. The numbers inset in the buttons in the leftmost column are the VL identification numbers. Each new entry in the VL is automatically assigned a VL identification number when the system administrator enters it into the VL. In the third column, the titles of the digital documents are marked using three colours: red, yellow, and green.

1. Red means that the digital photos are available, but transcribed text has NOT been entered.
2. Yellow means that transcribed text HAS been entered but the transcription is still being worked on. Typically this means that a VL user has signed up to transcribe the text. The user in question is then credited in the (general) comments field on the right, maintained by the VL administrator.
3. Green means that the text has been fully transcribed, proof read, and APPROVED by the editorial board of the VL, to be published in the Nachlass – explained further on page 9.

63	Arthur N. Prior	The Fable of the Four Preachers Box 6	Transcribed and proofread Display transcription	1962	This text has been transcribed and edited by Julie Ravn, Peter Øhrstrøm, and Ulrik Sandborg-Petersen, proofread by Jørgen Albretsen. TU. Synthese (2012) 188:455-457.
331	Charles L. Hamblin	The Logic of Tenses Box 15		1962	16) Hamblin, C.L., The Logic of Tenses. MS. 20 p. [Latest reference 1962].
343	Nuel D. & Richmond H. - Belnap, Jr. & Thomason	A Rule Completeness Theorem Box 13		July 1962	
344	Alonzo Church	Logic, Arithmetic, and Automata Box 13		August 20 1962	A lecture delivered to the International Congress of Mathematicians at Stockholm on August 20, 1962. Probably published, but not in a readily accessible place.
111	Arthur N. Prior	The History of Logic: II Terms and Sentences Box 6		October 25 1962	Typed version of paper from History of Logic on BBC Manchester, 3rd programme, tape id YMR (YMK?) 25278
59	Arthur N. Prior	The History of Logic I: The End of a Myth Box 6	Display	October 25 1962	This text has been transcribed and proofread by Chrissy van Hulst and Max Cresswell, Victoria University of Wellington, New Zealand, e-mails Max.Cresswell@vuw.ac.nz and chrissyvanhulst@hotmail.com. The History of Logic Containing the following sections: 1. The End of a Myth, HWU, 16 p. 2. Terms and Sentences, TU(?), 8 p.+ HWU 20 p. 3. Words and Things, HWU, 19 p. A "header" to the typewritten version of II: 'Terms and sentences' contains the following information: recorded 04.10.62. in Manchester, broadcast 25th October [1962?], 9.20-9.40 p.m., producer T.S. Gregory, Third programme. --- Per Hasle
1267	Arthur N. Prior	Names Box 7		1963	DATE? YEAR guessed from text quotes compared to letter, see note.TU (34 p.) First page handwritten note "Unpublished".
84	Arthur N. Prior	Indirect Speech Again Box 5		February 1963	With Rejoinder by L. Jonathan Cohen. Philosophical Studies Volume XIV, January-February 1963, Numbers 1-2.
78	Arthur N. Prior	Existence in Lesniewski and in Russell Box 5	Display	July 1963	Reprinted from Studies in Logic. Proceedings of the eighth logic colloquium Oxford, July 1963. This text has been transcribed by: Zuzana Rybaříková, Palacky University, Olomouc, Czech Republic zuzka.rybarikova@gmail.com

Figure 3.

To access a document in the VL, a user clicks on the button with the VL identification number. If the user has been signed up for transcription of a text, a typical view of the screen during transcription is shown in figure 4.

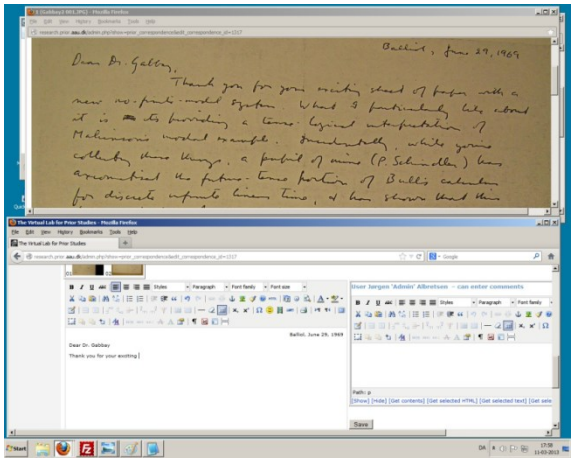

Figure 4.

The top window in figure 4 contains one of the digital photos making up the digital document in question. In another window, below the digital photo, the editor on the left is ready to accept the transcribers input – the text being read from the digital photo. On the right a comment editor assigned the user is opened for the user to enter e.g. remarks on the transcription. Earlier comments that the user may have entered in earlier sessions will appear in that editor for the user to evaluate, edit and maybe delete.

Other users can add comments under their own name. Of course, they cannot change the comments of other users, only enter comments in their own comment editor as shown in figure 5.

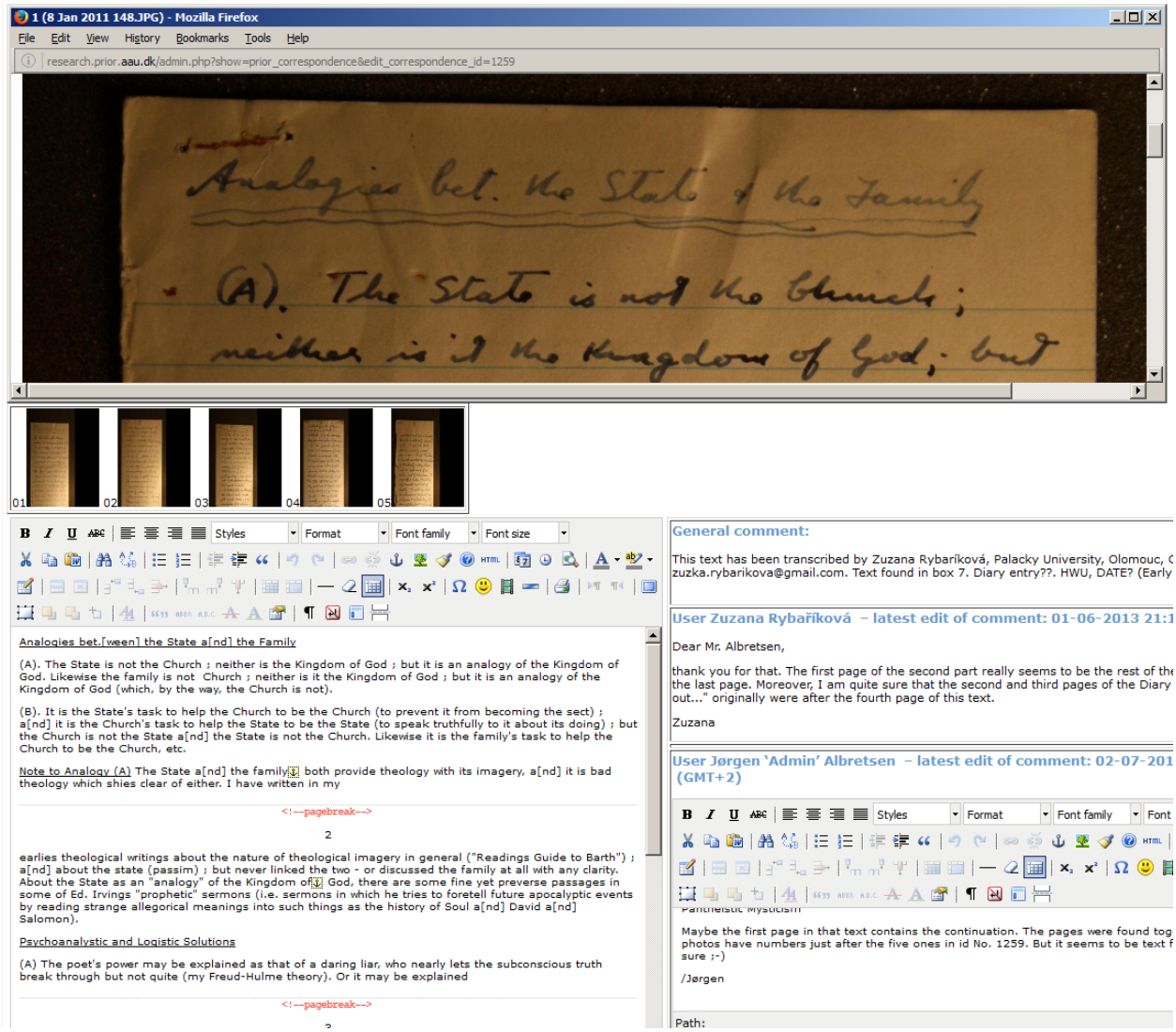

Figure 5.

Further to figure 5: The digital photos forming the pages of the digital document are visible as thumbnails. A click on a thumbnail opens up a window with the digital photo in appropriate size to be read for transcription.

If a user has not signed up to transcribe a text in the VL, a "READONLY" will appear in place of the editor. Text from the transcription – if a transcription is available – appears as text that can be copied as shown in figure 6.

A slightly different display of transcribed text and comments is shown in figure 7. If a record is marked yellow in the list in figure 3, a click on the

button “Display” will open a window with the transcribed text together with comments in a more compact manner.

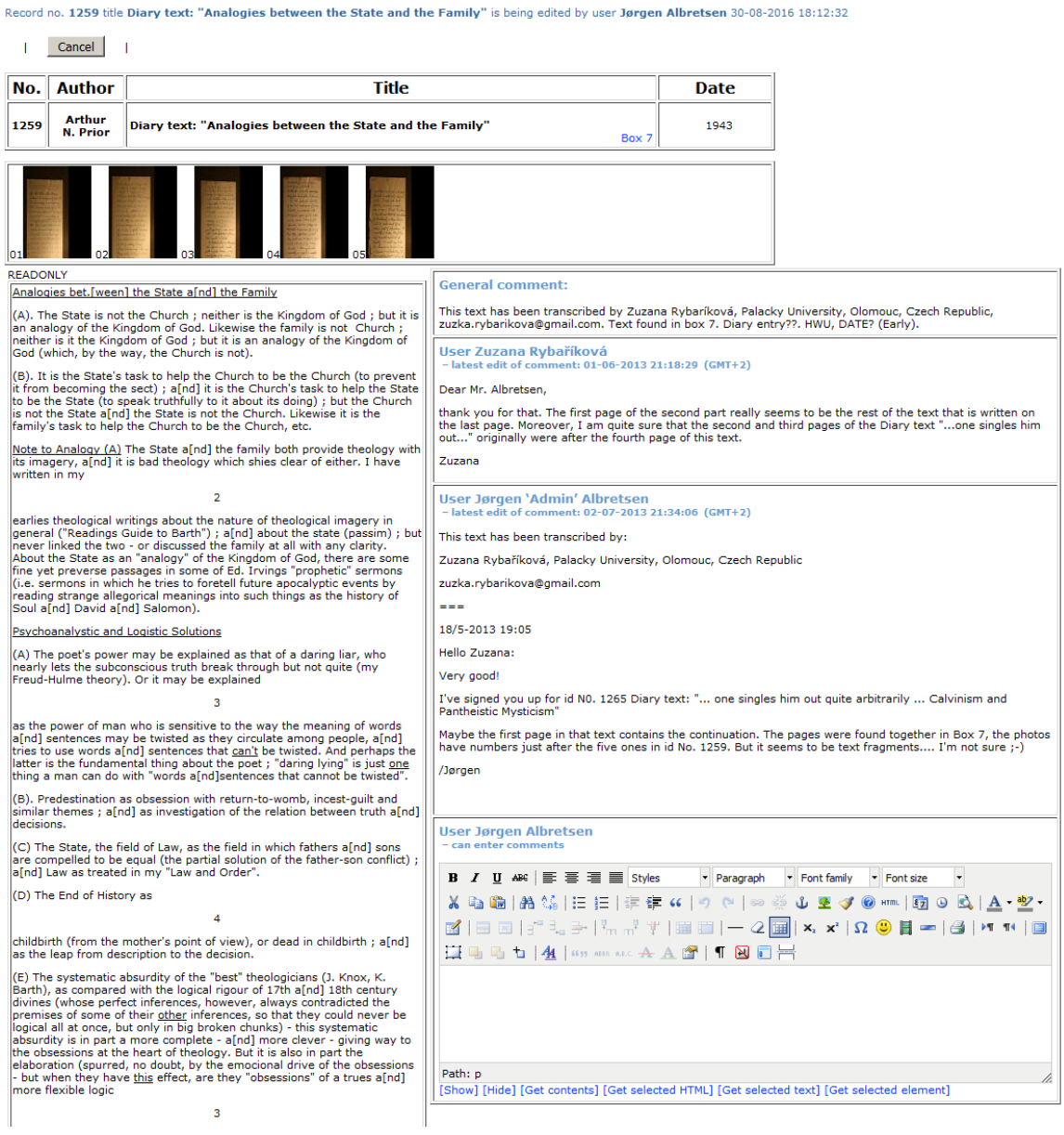

Figure 6.

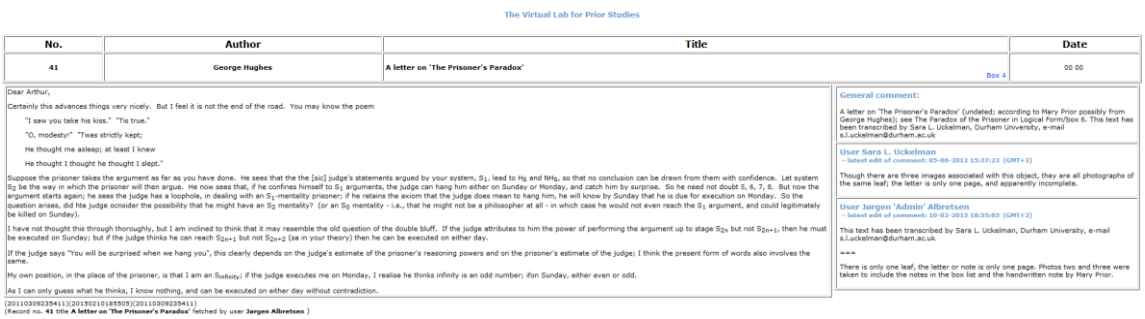

Figure 7.

Once transcribed – what then – the Nachlass

Text that has been transcribed does not appear in the Nachlass before it has been through an editorial process and quality control as follows. The Closed Collaborative Community assures that any discussion on the transcription takes place among very few people with knowledge on the subject. A part of the academic tradition is that review of one's work is a peer process, this is mirrored in the VL. Transcribed text along with the comments are evaluated by an editorial board. Comments deemed important and relevant are converted to footnotes. The text is proof read and again compared to the digital photos. A PDF is generated and saved separately. The database behind the VL stores the transcribed text so to speak in parallel to the PDF.

The Nachlass website nachlass.prior.aau.dk, available without login, has a search facility in the following rather simple form, shown in figure 8:

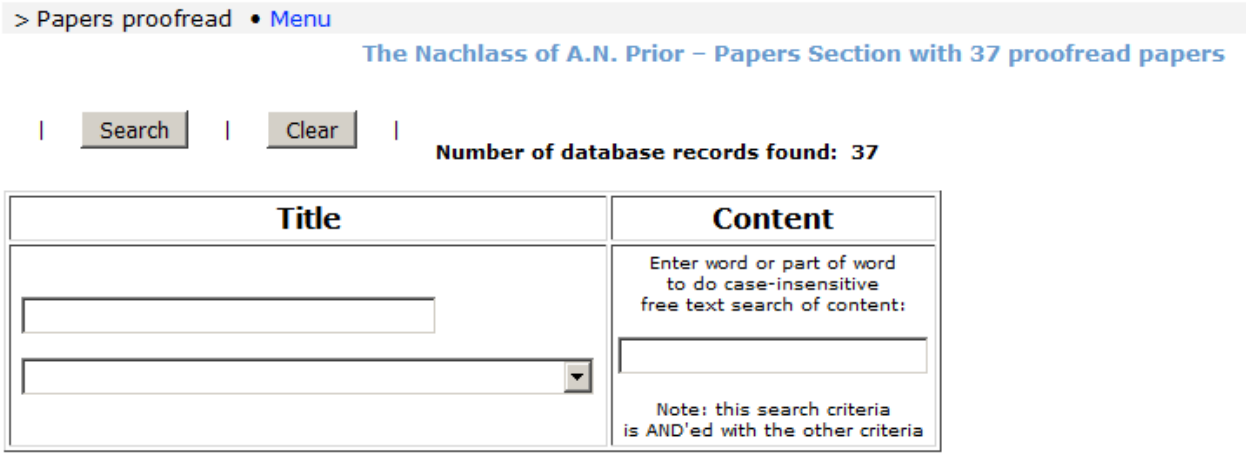

Figure 8.

Links to the PDFs of all available texts – in figure 8 the 37 papers – are listed (not shown here) below the search facility when the user of the Nachlass first enters the webpage. The idea is to show what is available for the user to choose from without a search being necessary. Title and/or Content can be searched. In the Title part a drop down list is provided to choose a particular title if the user prefers that. In the box above the drop down list the user can instead type parts of the title – maybe a word or parts of a word from the title – to broaden the search.

The "Content" field makes it possible for a Nachlass user to search the contents of the transcribed texts stored in the database, and thus also the corresponding 'parallel' PDFs. The present Nachlass thus ensures an easy but simple access to a transcribed text and does make it easy to compare the hits in the text with the more 'clean' view of the corresponding PDF. After a search, any hits are shown in a KWIC (Key Word In Context) style concordance with the hits marked in red. In figure 9, a search for papers with the word "logic" in the title and the word "consequence" in the text (here added in the search facility and marked in green for clarity) yields three texts:

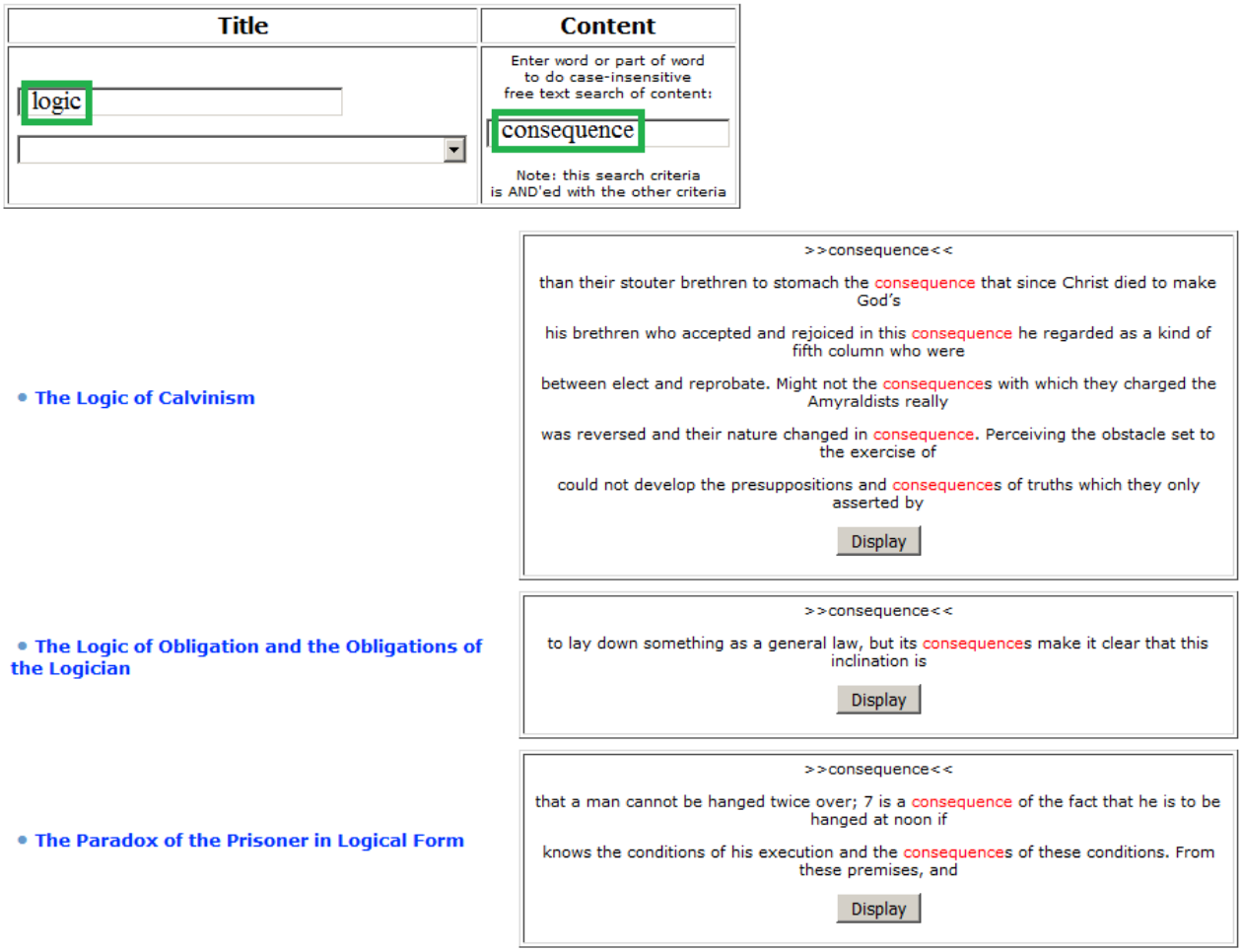

Figure 9.

By clicking on the "Display" button for a given text, a window opens with the hits marked in red and shown in capitals. In figure 10, a part of the text "The Paradox of the Prisoner in Logical Form" is shown with the two occurrences of "consequence". The text remains of course unchanged in the database and

the PDF, these typographical changes are done merely to make it easier for the user to locate the occurrences in the transcribed text.

5. CNHsHm ('If the prisoner is not hanged on Sunday he will be on Monday').
6. CHmNHs ('If the prisoner is hanged on Monday he will not be hanged on Sunday').
7. CNHsGsNHs ('If the prisoner is not hanged on Sunday he will know on Sunday that he is not to be hanged on Sunday').
8. CHt NG^tHt ('If the prisoner is hanged on the day t he will know on the day before t that he is to be hanged on the day t').

Here 5 expresses the judge's sentence; 6 expresses the fact that a man cannot be hanged twice over; 7 is a **CONSEQUENCE** of the fact that he is to be hanged at noon if at all on a given day; and 8 expresses the judge's stipulation. In deriving theorems we shall use the ordinary rules of substitution and detachment, together with these two special rules:

RGt: Cαβ →CGtαGtβ, i.e. if it is a law of the system that if α then β, then it is a law of the system that if the prisoner knows on the day t that α, he knows on the day t that β.

RG^s: α → G^sα, i.e. if it is a law of the system that α, then it is a law of the system that the prisoner knows on Saturday ('the day before Sunday') that α.

RG^s expresses the assumption that so long as the prisoner is alive he knows the conditions of his execution and the **CONSEQUENCE**s of these conditions. From these premises, and with these rules, we may make the following deductions:

9. CHmGsNHs. 1p/Hm, q/NHs, r/GsNHs = C6 - C7 - 9
10. CGtNHsGtHm. 5[5] × RGt = 10
11. CHmGsHm 1 p/Hm, q/GsNHs, r/GsHm = C9 - C10 t/s - 11
12. CHmG^mHm 11 × Df.s = 12
13. CG^tHtNHt 2[6] p/Ht, q/G^tHt = C8 - 13
14. CHmNHm. 1p/Hm, q/G^mHm, r/NHm = C12 - C13 t/m - 14.
15. NHm. 4p/Hm = C14 - 15.
16. Hs. 3p/Hs, q/Hm = C5 - C15 16.
17. G^sHs. 16 × RG^s = 17.
18. NHs. 13 t/s = C17 - 18.

Figure 10.

Conclusion

The VL-3C and the Nachlass have formed and will form an interesting test bed for a much more elaborate it-system to be developed. This process will invariably address the general problem of how to present the professional works of a writer in digital form. In the present case, the substance – the Prior Archive – is of a scientific nature. But the ideas and experiences thus gained can most certainly be used in any setup where an archive, more or less structured and maybe containing many kinds of material, is photographed and/or scanned, structured into logical entities, written or printed text transcribed (if print quality permits, run through an Optical Character Recognition – OCR – to produce a text to work from) to produce machine readable text to markup and add comments or indeed add inline annotations to. Many perspectives present themselves. The case presented here forms the basis.