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Working Paper

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EHES Working Paper, No. 242

Provided in Cooperation with:

European Historical Economics Society (EHES)

Suggested Citation: Ford, Nicholas Martin; Ranestad, Kristin; Sharp, Paul (2023) : Not the best fillers in of forms? The Danish and Norwegian graduate biographies and "upper tail knowledge", EHES Working Paper, No. 242, European Historical Economics Society (EHES), s.l.

This Version is available at:

<https://hdl.handle.net/10419/298555>

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EHES Working Paper | No. 242 | November 2023

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and “Upper Tail Knowledge”

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Abstract

“Upper tail knowledge”, embodied by knowledge elites, has been suggested to be a driving force of industrialization and development, yet measuring it remains problematic. Despite some recent innovations, much empirical work continues to rely on measures of “average” or “non-upper tail” human capital such as literacy and years of schooling. We thus turn to perhaps unique sources from Denmark and Norway. From the early nineteenth century until after the Second World War, these countries had the tradition of publishing biographies of all high school graduates, usually 25 and 50 years after graduation. These were effectively mini-CVs covering entire careers, including work positions, travel, achievements, and more. We discuss these sources and their potential for furthering our understanding of the role of upper tail knowledge and human capital for development. Source criticism reveals strengths and weaknesses, but importantly confirms promising perspectives for improving the measurement of upper tail knowledge.

JEL Codes: E24, I20, J24, N33, N34

Keywords: Biographies, Denmark, Norway, human capital, source criticism, upper tail knowledge

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* We would like to thank the Carlsberg Foundation (project no. CF19-0225) and Jan Wallanders och Tom Hedelius stiftelse (project no. P20-0030) for generous research funding, without which this work would not have been possible. We would also like to thank our partners at the Digital Cultural Heritage and Media section of the Royal Library in Copenhagen, who organized scanning of the material and provided invaluable advice. We are grateful to Leif Eskedal, Christian Larsen, Jørgen Modalsli, Barbara Revuelta-Eugercios and Hilde Leikny Sommereth (and the whole team at the Norwegian Historical Data Centre, UiT The Arctic University of Norway) for advice and support. Finally, we would like to thank participants at the following for valuable suggestions and feedback: the Social Science History Association annual meeting in Chicago, 21-24 November 2019; BI Norwegian Business School, 20 May 2021; Centre for Business History Seminar, Copenhagen Business School, 27 May 2021; 9th CEPR Economic History Symposium in Odense, 9-10 June 2022; and the XIX World Economic History Congress in Paris from 25-29 July 2022.

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“It turns out that graduates are not the best fillers in of forms. Many have not submitted forms at all, and many have filled them in very incompletely. It is interesting to note, in particular in this circle of people, such an aversion to modern form design, and I have neither wanted to challenge the opinion of my graduate cohort, nor take on the major task of attempting to correct and add information where the information is not complete. I have taken the forms as they were, although I have often known or had the feeling that something has been left out.” GN25 1926³

1. Introduction

The role of human capital for development today is rarely doubted (see e.g. Benhabib and Spiegel, 1994; Goldin, 1998; Bils and Klenow, 2000; Ljungberg and Nilsson, 2009), but for the process of industrialization itself has been disputed, at least for the iconic English case (see e.g. Mitch, 1993; Allen, 2003; Clark, 2005⁴). A possible reason for this is that measures of “average” human capital, such as years of schooling or literacy, fail to capture what Joel Mokyr has termed “upper tail” human capital, embodied by knowledge elites (Mokyr, 2002, 2005a,b; Mokyr and Voth, 2009). Squicciarini and Voigtländer (2015) presented an ingenious way of measuring the “thickness” of this upper tail for mid-eighteenth-century France, however: subscribers to the *Encyclopédie*, a mixture of “enlightened” noblemen, administrative elites, and entrepreneurs (see also Darnton 1979; Blom 2004). This correlates with measures of subsequent local development, but not with literacy. In a similar vein, Koschnick et al. (2022) consider members of German economic societies, demonstrating that regions with more members were more innovative in the late-nineteenth century. Both the *Encyclopédie* and the economic societies might also facilitate “catch up” growth, by learning from more advanced economies, as might immigration of knowledge elites (Hornung, 2014, Boberg-Fazlic et al., 2023) or migrant networks (Boberg-Fazlic and Sharp, 2023). Others have stressed the importance of specific professions, e.g. engineers (Hanlon, 2022; Maloney and Valencia Caicedo, 2022). Modern studies also suggest an important role for even small elites, such as those with high and/or scientific education (Hanushek and Kimko 2000; Acemoglu et al. 2011), or with entrepreneurial skills (Gennaioli et al. 2013). A complete measure of upper tail knowledge, not to mention the tacit knowledge acquired for example through on-the-job training, remains elusive, however, with much research still relying on more basic measures.

³ We refer to the graduate yearbooks as GD (Graduate Yearbook, Denmark) and GN (Graduate Yearbook, Norway) with the year of the student cohort covered, *not* the year of publication. We also note the anniversary year for the publication (for example, 25 or 50). Hence, “GN25 1926” is the 25th anniversary yearbook for Norway’s high school graduates of 1926. Own translation.

⁴ Although see Becker et al. (2011) and Cinnirella and Streb (2017) for late-nineteenth-century Prussia.

Thus, we ask: what is upper tail knowledge⁵ and how should it be measured? We start with high school graduates, as a reasonable proxy for formal upper tail knowledge.⁶ In an ideal world, we would construct a questionnaire, send it to the people living before, during and after the industrialization process, and ask them about their education, career, and travels – anything which might conceivably contribute to their human capital. Even better, if it was possible to ensure that the vast majority of questionnaires were returned, we might avoid issues of selection. It is exactly such sources which are available for Denmark and Norway, from the early nineteenth century until the middle of the twentieth century. Thus, graduates from all high schools in Denmark and Norway, most of whom were seeking to enrol at the respective national universities in Copenhagen and Oslo, typically 25 and 50 years after graduation, were presented with volumes containing biographies of the entire national graduate cohort. The information contained, in effect mini-CVs, was based on such questionnaires, and provide annual coverage of the graduate cohorts of 1850-1923 for Denmark and 1851-1943 for Norway.

If such biographies might potentially provide a superior indication of upper tail knowledge, in all its facets, one is left with the questions which should always precede modern empirical work. Can we trust these sources? If we can, what information do they provide? The potential use of the biographies for the analysis of the determinants and impact of upper tail knowledge requires us to reflect on the strengths and weaknesses of the questionnaires employed by the editors for gathering information⁷. The present work thus presents a thorough source critical appraisal. For this, we follow Scott (1990) and consider four key aspects: meaningfulness, authenticity, representativeness, and credibility. We conclude that the biographies represent a reliable and comprehensive survey of upper tail knowledge. Moreover, they represent a case, Scandinavia, which is often presented as a poster child for the role of knowledge for rapid development in the late-nineteenth century and present-day prosperity (see e.g. Sandberg (1979) on Sweden). Others have used the biographies to provide simple biographical information on individuals (see for example Blom, 1957), but we are the first to suggest using them to construct a comprehensive individual-level dataset.

⁵ Since we focus on “upper tail knowledge”, we abstract in the following from broader aspects of human capital such as primary education and health.

⁶ Or, if they stopped acquiring human capital upon graduation from high school, what Diebolt et al. (2021) term “intermediate human capital”.

⁷ See Possing (2015) for more on the opportunities and challenges of biographies as a historical source.

With this as motivation, we proceed in the following section to discuss the background to the biography tradition. In Section 3, we turn to a thorough source critical analysis. Finally, Section 4 discusses the potential use for the study of upper tail knowledge and concludes.

2. Background: A description of the sources and the graduate biography tradition

2.1 Content

Denmark and Norway were united under a common monarch until the latter was ceded to Sweden in 1814 as just one of the many upheavals resulting from the Napoleonic Wars. Nevertheless, they continued for some time to share a common written language, as well as cultural and institutional similarities. The University of Copenhagen lost its domestic monopoly in both countries in 1813 with the founding of the Royal Frederik's University in Christiania, later the University of Oslo, explicitly modelled on its Danish predecessor.⁸ Denmark and Norway continued to enjoy close cultural and scientific connections after 1814, and it is therefore not surprising that many institutions evolved along similar lines over the course of the nineteenth century. Here, we explore an example of one which sprang out of the two higher educational systems, namely the regular publication of graduate biographies for complete annual cohorts of high school ("*gymnasium*") students who in a particular year had taken exams to qualify for study at both universities. These "mini-CVs" provide a valuable insight into the life and career of the educated elites of Denmark and Norway.

Table 1 summarizes the range of graduate cohorts whose yearbooks we have currently located, by decade, for Denmark and Norway. Not all yearbooks contain biographies, however, with particularly those published earliest giving only lists of names, or only simple details about fathers or schools attended. While we do not yet have a complete account, a rough estimate suggests that the total number of Danish and Norwegian high school graduates with yearbook biographies, based on questionnaires, are around 110,000-116,000.⁹

⁸ Kiel University, founded in 1665 as the *Academia Holsatorum Chiloniensis* by Christian Albert, Duke of Holstein-Gottorp, was, from 1773 when the city came under Danish rule and until 1864 when it was lost again, the second oldest university in the Danish realm, catering to the German-speaking population of the duchies of Schleswig and Holstein.

⁹ The high school yearbooks for Norway include in total around 76,000 graduates with (one or more) biographies from 1831 to 1943; and the yearbooks for Denmark include in total around 40,000 graduates with (one or more) biographies from 1810 to 1923 (from 1850 to 1923, when the biographies were more extensive, the biographies total around 34,000).

Table 1: Summary of cohorts with available yearbooks, totals by decade

	1810-19	1820-29	1830-39	1840-49	1850-59	1860-69	1870-79	1880-89	1890-99	1900-09	1910-19	1920-29	1930-39	1940-49
Denmark					3	4	8	10	10	10	7	3		
<i>Partial*</i>	1	9	9	10	7	6	2				1			
Norway			1		7	9	10	10	10	10	10	10	10	4

*As discussed in the text, the earliest Danish yearbooks included only partial biographical information of graduates. The headline row for Denmark counts only full biographies; the ‘Partial’ row refers to the less detailed (though still relevant) sources. See Appendix A for a more detailed breakdown of cohorts and the anniversary yearbooks (for example, 25 and 50 years) we have accounted for.

For Denmark, all volumes published prior to 1867 were simple lists of graduates, usually with name, high school, and current job. In that year, a volume with short descriptions of the students was published for the 25th anniversary of the 1842 cohort. It was first with yearbooks published in the late 1870’s — and principally for 50th anniversary yearbooks for cohorts from the late 1820’s onwards — that yearbooks with brief passages of text including birth and educational profile were published annually.¹⁰ Similar volumes were also published in 1878 for the 50th anniversary of the 1828 cohort, edited by the customs officer L.J. Bruun and others, and then again for the 50th anniversary of the cohorts of 1829 and 1830, in 1879 and 1880 respectively, edited by the noted genealogist Sofus Elvius. The earliest cohort covered by a Danish yearbook with true biographies is that for the cohort of 1850, published in 1875, and edited by the priest PJW Bruun, and from 1894 (GD25 1869) these become almost annual publications, usually for 25th, but sometimes for 40th and 50th anniversaries. The last yearbook was published in 1949 for the cohort of 1923, although other institutions and branches continued publishing similar works, such as the prestigious boarding school, the Sorø Academy, until 1986.

In the Norwegian case, apart from earlier lists of students, the earliest volumes are from 1881 for the cohort of 1831, edited by another noted genealogist (who we also return to below), Wilhelm Theodor Alexander Lassen, and from 1887 for the cohort of 1851, edited by the teacher Mikael Sundt. These include simple biographical information. The annual 25th and 50th anniversary volumes with fuller

¹⁰ An early exception is the 25th anniversary yearbook for the class of 1842 — published in 1867. This yearbook is the first example of short text graduate profiles rather than table-based summaries.

biographies begin in 1893 for the cohort of 1868, edited by the archivist and genealogist Erik Andreas Thomle, although earlier cohorts are covered based on 50th anniversaries, published on an almost annual basis from 1904 onwards (i.e. starting with the cohort of 1854). The biographies generally became shorter over time, as the student body expanded, with the final yearbook published in 1968 for the cohort of 1943. Based on this, one can conclude that the annual tradition of publishing 25th anniversary yearbooks began almost simultaneously in Denmark and Norway in 1894 (GD25 1869) and 1893 (GN25 1868) respectively, although similar information is available for many earlier years and cohorts.

ANDERSEN, BERNHARD HAAVE.



underdirektor, Oslo, bor Jar. F. i Skåtøy 8/7 1898. Sønn av gårdbruker Jacob Andersen, f. s.st. 10/3 1860, d. s.st. 14/10 1941, og Birthe Marie Haave, f. i Bamble, d. i Skåtøy 12/5 1922. Gift i Skien 27/10 1931 med Margot Nilssen, f. s.st. 13/8 1902. Datter av kjøpmann Thv. Nilssen, f. s.st. 4/9 1878, og Anna Juul, f. s.st. 17/6 1878. Barn: Anne Haave, f. i Philadelphia, Pennsylvania, U.S.A., 14/8 1935. *Skien, real.* Eksamen fra N.T.H., skipsingeniør-linjen, 1924. Utenriksfart 1925–27, opphold i U.S.A. 1927–39. Ansatt som dieselmaskinkonstruktør ved Cooper-Bessemer Corp., Grove City, Pennsylvania, 1927–31, som research engineer for dieselmotorer ved Baldwin-Southwark Corp., Philadelphia, 1931–39, ved dieselmotoravd. ved Nylands Verksted, Oslo, 1939–46, assistent for adm. direktør s.st. 1946–48. Fra febr. 1948 underdirektor s.st. Var i U.S.A. oppnevnt som medlem av teknisk komité nedsatt av Diesel Engine Manufacturers Association og National Electrical Mfg. Association. Div. tekniske publikasjoner i norske tidsskrifter. Viseformann i skipsingeniørenes gruppe av Den Norske Ingeniørforening, Osloavd.

“vice director, Oslo, lives in Jar. Born in Skåtøy 8 July 1898. Son of farmer Jacob Andersen, born same place 10 March 1860, died same place 14 October 1941, and Birthe Marie Haave, born in Bamble, died in Skåtøy 12 May 1922. Married in Skien 27 October 1931 to Margot Nilssen, born same place 13 August 1902. Daughter of grocer Thv. [Thorvald] Nilssen, born same place 4 September 1878, and Anna Juul, born same place 17 June 1878. Child: Anne Haave, born in Philadelphia, Pennsylvania, USA, 14 August 1935. *Skien, real.* [*reallinje*, i.e. the science track at high school]. Graduated from NTH [Norwegian Institute of Technology, Trondheim], marine engineering track, 1924. Travels abroad 1925-27, resident in USA 1927-39. Employed as diesel mechanical engineer at the Cooper-Bessemer Corp., Grove City, Pennsylvania, 1927-31, as research engineer for diesel motors at the Baldwin-Southwark Corp., Philadelphia, 1931-39, at the diesel motor section of Nylands Verksted, Oslo, 1939-46, assistant to CEO same place 1946-48. From February 1948 vice director same place. Was in USA appointed member of the technical committee set up by the Diesel Engine Manufacturers Association and the National Electrical Manufacturing Association. Various technical publications in Norwegian journals. Vice-chairman of the marine engineers’ group of the Norwegian Association of Engineers, Oslo section.” [own translation, text in square brackets gives our own explanatory notes]

Figure 1: An example of a biography, with translation

Source: GN25 1918

Figure 1 provides a biography for the graduate Bernhard Haave Andersen, who graduated from the high school in Skien, Norway in 1918, and is found in GN25 1918. As this example illustrates, the graduate biographies usually include some or all of the following: 1) first and last name; 2) birthplace; 3) date of birth; 4) high school (name and graduation date); 5) tertiary education (institution, study program, exam date, sometimes exam grade) 6) parents' names; 7) father's occupation; 8) spouse (name and family); 9) children (names, sometimes birthplace and date of birth); 10) study travels (purpose of travels, countries, organizations visited, and travel period); 11) scholarships (names); 12) work abroad (countries, organizations, often work positions and period of work); 13) work in home country (organizations, often work positions and period of work); 14) memberships (associations, professional organizations etc.), and 15) publications.

The context within which the yearbooks were produced is of course important when considering their value as sources. They were published in connection with anniversary reunions, where graduating cohorts met decades after completing high school. The anniversary arrangements and yearbooks were funded partly or wholly by graduates, while the generosity of suppliers (for example, book publishers and paper manufacturers) in some cases contributed to lowering overall costs (see e.g. GD25 1883; GD25 1887; GN50 1854; GN50 1864). The struggle, both to publish the book, and to organize the party, could be quite dramatic, as best illustrated by GD25 1920, published in 1946 but compiled during the difficult days at the end of the Second World War. In both Denmark and Norway, each high school cohort appointed a "party committee" (to organize reunions) and a "book committee" (who were given the task of producing the yearbooks). The book committee typically consisted of two or three people, and there was sometimes an overlap with the party committee. Book committees often consisted of previous students and in some cases also external people, notably "professional historians", who were hired to assist (GN50 1921; Tuxen and Tuxen 1979). In both countries, the Genealogical Society played an important role from the late nineteenth century, as we will discuss more below. The book committee typically spent a year — or more — collecting information about each and every graduate, then systematizing, editing and formatting the information as individual biographies.

The biographical information that appears in the yearbooks was principally collected from graduates themselves by way of questionnaires distributed by the book committee to all members of the cohort. The questionnaires (see Appendix B for an example) varied slightly over time, in line with the overall changes described above. In addition to key biographical information (family, education, career), additional questions — especially in the Norwegian yearbooks — would ask for graduates' opinions about contemporary societal and cultural issues. In cases where a graduate had died, friends or family

might be contacted, or information taken from other public records. The outcome was an exceedingly detailed and complete record of each graduate cohort, covering, among other things, indicators which we argue reflect upper tail knowledge and human capital.

2.2 Origin, Tradition and Decline

Before turning to our source critical analysis, we first need to understand the background upon which the tradition behind the biographies rested. Its origins proved rather hard to trace, but we combined information from the introductions to the original volumes, some secondary material, as well as an interview with the editor of a similar publication, the 100-year anniversary book of Bergen Engineering Technology School (1975), Leif Eskedal¹¹, about where he got the idea to make such a publication, and whether he knew about the origin of the tradition. He answered that he did not know, but that he was aware that other engineering and technical associations had produced similar works for their members. Moreover, he had performed genealogical research on his own family for years, and thus came up with the idea of making a biographical work for the school he had attended. Such an interest in genealogy and preserving information for future generations seems to be a unifying theme already in yearbooks from the nineteenth century. Eskedal stressed that when he put forward his thoughts to the members of the school administration, they immediately liked the idea and organized a finance committee with the school, the Norwegian Engineers and Technology Organization (NITO) and the Confederation of Norwegian Enterprise (NHO) in Bergen. However, the money they received did not cover all the expenses and so according to Eskedal the principal offered to guarantee half a million Norwegian kroner personally (Interview LE 25/08/2020), mirroring the willingness to go to great lengths to implement such publication projects we found in the historical yearbooks.

The yearbook tradition appears to have developed gradually and been linked to older traditions of collecting individual level information. Graduate lists and student registers (*“matrikler”*) were published by universities in Europe from the very beginning of their establishment. Graduate lists from the University of Bologna can be traced back to 1289, and from the University of Oxford back to 1318 (Foster 1891-92), typically with information about the graduates’ background, parents and studies. The University of Copenhagen also kept *“kommunitetsmatrikler”* (community registers) and *“universitetsmatrikler”* (university registers) from 1592. Although they mostly served an administrative role, these lists might be a forerunner to the volumes we consider here, and keeping

¹¹ We interviewed Leif Eskedal 25 August 2020. We have tried to arrange interviews with editors of the high school yearbooks, but most of them are deceased, or they are too old to be interviewed. A couple of editors might be alive, but we have not found their contact information.

such information about each enrolled student and graduate seems to have evolved into (or at least made easier) the more elaborate biographies with information about what the graduates did after graduation, in addition to biographical information.

From the mid-nineteenth century in Denmark, historians and researchers seem to have given increased attention to collecting information about historical groups of professionals and publishing such information in small individual biographies. There are several examples of such publications. F.C. Hundrup, for example, who taught at the University of Copenhagen, published in 1854 his “Biographical reports on those who have received the highest academic honours at the University of Copenhagen” (*Biographiske efterretninger om dem, der ved Kjøbenhavns universitet have erholdt de høieste akademiske Værdigheder*), which include biographies of important scholars going back to the late fifteenth century.¹² We also see similar trends in Sweden and Finland based on the use of registers of members of student “nations” (local associations of students based on which part of the country they came from) going back to when some of the first universities opened (Sjöstrom, 1901; 1907).¹³ It is perhaps within the context of this new, or increased, focus on collecting individual level information about certain professionals linked to universities and schools in the Nordic countries more generally, that the tradition began of publishing books of each and every high school graduate. Moreover, the nineteenth century in Denmark marked the emergence of a new educated middle class in Denmark, which, as the National Liberal movement, was to play a decisive role for Danish society and politics, at least until 1864 when defeat in the Second Schleswig War ended its power. The biographies can thus also represent a monument to the power and influence of that class.¹⁴

Indeed, the Nordic graduate biography tradition seems to stand out in terms of how extensive it was; most middle and higher-level educational institutions in these countries published one or more books with biographies of their former students. Part of the reason for this was perhaps that Denmark and

¹² See also Emil Hundrup (1843-45), *Skolekalender*, which included biographies of graduates who had taken “embedsexamen” in philosophy and received doctorates in theology, law and medicine, as well as his later works on teaching staff at the Latin schools e.g. Hundrup (1871); S.V. Wiberg’s priest history, published first in 1870; the lists of Danish students at foreign universities, e.g. Becker (1860-62) and Rørdam (1901-03); and S. Birket Smith (1889) who published a *matrikel* of the University of Copenhagen.

¹³ Outside the Nordic countries, see also for example small biographies of mining technician graduates from Escuela de minas de Copiapó in Chile: Escuela de Minas de Copiapó (1957). Harvard University in the United States published several yearbooks of its former students with biographies which resemble the Nordic biographies, also 25 years after graduation, e.g. Harvard College (1882).

¹⁴ Interestingly, graduates from the more practically oriented “*realskoler*” did not publish such volumes, and do not appear therefore to have had the same strong sense of identity. They did however often organize themselves into “*stater*” [states], and volumes were published by some branches. We are grateful to Christian Larsen for this information.

Norway are small population-wise, and had, from 1813, just one university each, which made finding people and collecting information easier to organize (although this was certainly counteracted by the largescale migration to the United States in particular for many years), and was perhaps also due to long traditions of formal schooling and the presence of highly literate populations from early on (Hodne, 1981; O'Rourke and Williamsen, 1995; Cipolla, 1969).

We can also place the graduate biography tradition within the wider historical practice of collecting, organizing and classifying information. Compilations of information on "notable" people seem to have become increasingly popular from the mid-nineteenth century, such as the UK's *Who's Who*, first published in 1849, itself following the *Almanach de Gotha*, a directory of Europe's royalty and nobility, first published in 1763.¹⁵ Scientists began systematizing and classifying their findings, and wrote down their analyses and results to a larger degree than earlier (e.g., Agricola 1556; Linnaeus 1758) and business accounting and public organization increased in importance (Carruthers and Espeland 1991; Oldroyd and Dobie 2008). Regarding accounting and bookkeeping, Danish agriculture was somewhat precocious (Lampe and Sharp 2017, 2019). The Danish and Norwegian high school yearbook tradition paralleled initiatives on the national level to collect and organize information (see for example Henriques et al. 2023), culminating in national statistical bureaus in the mid- to late nineteenth century.

What seems to have been central to the development of the annual tradition was the aforementioned genealogical society, the Society for Danish-Norwegian Genealogy and Biographical History (*Samfundet for dansk-norsk genealogi og Personalhistorie*), which was established in 1879 (and divided into separate national societies in 1926). From the following year, it was (and still is) responsible for publishing the journal *Personalhistorisk tidsskrift*, as well as numerous other publications. It is no coincidence that the more detailed biographies in the two countries emerge around the same time: some of the first editors of the biographies were on the board of the society, including the aforementioned life insurance registrar in Denmark Sofus Hellenos Elvius, and the administrator from the Norwegian Ministry of Marine and Posts Wilhelm Theodor Alexander Lassen (Huitfeldt-Kaas, 1905). The book committees frequently noted that their work would not have been possible without the society (e.g. GD25 1883). Genealogists were referred to several times as

¹⁵ <https://www.ukwhoswho.com/page/about> [retrieved 26-07-2023]. Interestingly, *Who's Who* originally published simple lists of individuals, but later compiled biographies based on questionnaires from 1897 following its acquisition by A&C Black the previous year. This paralleled earlier developments for the Danish and Norwegian student biographies, the latter of which was based on questionnaires from DN25 1868, published in 1893.

potentially important readers, especially since they include rich biographical information for those who had a higher education: “For those interested in biographical history, the significance of these sober, unedited messages will be clear” (GN25 1854; GN50 1921).

The interest of the genealogists (many of whom were graduates themselves) requires little explanation. But why did the graduates care? Leif Eskedal answered briefly that the anniversary book he made for Bergen Engineering Technology School was “for the graduates” (interview, LE, 25/08/2020). The editors of the high school yearbooks also explained in their introductions that the books were intended as a celebration and memorial to those who took high school together. A representative of the National Archives, E. A. Thomle for instance, the editor of the yearbook of the 1868 cohort for Norway, stated that “I believe that it could be interesting for others than myself to know a little about the later life and fate of those classmates with whom we in our youth entered into student life” (GN25 1892). A sense of nostalgia and desire to know what had happened with one’s cohort played an important role.

Moreover, the yearbooks seem to have been considered highly prestigious among the graduates themselves, and embodied a certain degree of status. In both Denmark and Norway, the volumes were normally distributed at celebratory parties to which the entire cohort and their partners were invited. The publications were thus part of larger anniversary commemorations, which were often covered by newspapers, with articles describing in detail the dinner, activities, songs and speeches given (GN 1872; GN 1873; Tuxen and Tuxen 1979). The graduates partly funded these parties and publications through donations. In connection with this, we have found information about three Norwegian foundations, which are directly linked to the 25th and 50th anniversaries of the high school cohorts, namely “1840 Aars Studenternes Legat”, “25-aars-Studenternes Legat” and “50-aars Studenternes Stipendiefond”. In the letters to the graduates, which included the questionnaire that they were supposed to fill out, and which were the bases for the biographies, the editors often pointed out that they should donate money to the foundations, thus linking them directly to the publication of the yearbooks.¹⁶ The foundations aimed to collect money from previous students, so that once a year one or more students at the university could be given a grant: “The interest is distributed one or more times a year to the university’s students, worthy and needy academic citizens without regard to family or studies.” Donating to the student foundations might have added to the prestige of this tradition. Similar fundraising initiatives are mentioned by the editors for Denmark. In fact, the famous author

¹⁶ See e.g. Arkiv: PA 1322 Det Norske studentersamfund, arkivskaper: Det norske studentersamfund, serie: Gf – Jubileer, Gf – 0010, 25årsjubileum studentene fra 1871

Hans Christian Andersen wrote in his autobiography about the tradition of holding 25th anniversary celebrations, which he attended in 1853, 25 years after his graduation in 1828, and that he was subsequently contacted to be informed about the establishment of the “Andersen-Paludan-Müllerske Legat” by the 1828 cohort, which, on receipt of sufficient donations, was to fund a Danish poet (Andersen, 2000).

Eskedal emphasized that he almost exclusively received positive feedback from the surviving graduates and emphasized that people wanted to be included in the publication. According to him, it was not difficult to get in touch with the graduates living abroad, since the former students kept contact with each other. He added that he thought that perhaps “in the old days” (i.e. the 1970s) writing biographies — and “being in a book” — probably meant more than it does today. He argued that it was more important in the past “to promote yourself” (Interview LE 25/08/2020). Similarly, Tuxen and Tuxen point out that the high school graduates constituted an “exclusive group” in the nineteenth century (Tuxen and Tuxen 1979). Indeed, in the early and mid-nineteenth century, when the cohorts in both Denmark and Norway totalled a couple of hundred graduates, the feeling of being part of an exclusive student “club”¹⁷ was strong, but declined as the number of high school graduates increased to several hundred, and thereafter several thousand, and the cohorts became more diverse, going from less than one per cent of the relevant age range in both countries before the First World War to around 2-3 per cent by the Second World War (own calculations and Tuxen and Tuxen 1979).

As the exclusivity declined, Danish editors reported ambivalence and even hostility towards the questionnaires in later volumes (GD25 1886; GD25 1893). The introduction to the final yearbook (GD25 1923) mentions that there had been some debate about whether to publish the book, but less so about whether a reunion should be organized – only one dissented, and this was apparently treated as a joke. The increasing number of graduates is used as an argument as to why the tradition stopped with the 1943 cohort in Norway. Editors in 1971 wrote that: “The rapidly increasing number of students in the post-war years has broken all records for the 25th anniversary books, and the last edition was for the 25th anniversary in 1968, for the cohort of 1943. The number of students was growing even in our time, albeit gradually. Thus, the task ... has become complicated” (GN50 1921). In the same introduction they noted that the new central registry that everyone was being entered into “with the eleven-digit numbers” would solve part of the task and thus most of the difficulty. Yet, they

¹⁷ In the introduction to the 1831 Norwegian yearbook, it is pointed out that the committee had cancelled the planned dinner after the party. So instead, some of the graduates “agreed to have a simple dinner together at the Masonic Lodge” (GN 1831). Early Danish celebrations took place on the premises of the elite Royal Copenhagen Shooting Society, which until today counts the reigning monarch among its members.

still questioned whether the practice would continue. The Danish high school tradition ended before that of Norway, with the 1923 cohort.¹⁸ One very speculative reason for this, beyond the impracticability of documenting the ever-expanding student body (which editors complained about since at least DK25 1906), is that the decision to establish a second Danish university in Aarhus (opened in 1928) complicated the process and led to a further decline in exclusivity. Another perhaps more likely possibility, since it relates to the point made by the Norwegian editors about the establishment of register data, is the passing of the law establishing this for Denmark on March 14, 1924 – on card records of course, rather than computers, at that time (Willumsen, 1999). Although the Norwegian editors noted the advantages of such data, one might imagine that its easy availability, combined with the increasing number of students, would skew the cost-benefit of such genealogical and biographical works more and more against making the effort needed to compile them. Indeed, computing and the internet would eventually make them effectively obsolete, notwithstanding the survival of works such as the UK's *Who's Who*, which celebrated its 175th edition in 2023¹⁹.

3. Source criticism: The reliability of the high school graduate biographies

3.1 Questionnaires as a historical source

The range of information contained in the graduate yearbooks offers significant potential for research, even beyond the upper tail knowledge which is the focus here. We have discussed the origins of the tradition and how it ended. We have also documented the information contained in the biographies. But is it reliable? Certainly, this cannot be taken as given. The main source was the graduates themselves, based on questionnaires. There might be all sorts of reasons for inaccuracies, ranging from poor memory, to deliberate attempts to deceive. Editors might also have edited the information in ways which changed its meaning. Fortunately, there is a large literature on the use of questionnaires for collecting information, which we discuss briefly, before embarking on an extensive source critical appraisal.

Questionnaires are defined as “a data collection ‘tool’ for collecting and recording information about a particular issue of interest” (Bolarinwa, 2015). They are widely used in social sciences and medical

¹⁸ Volumes for the individual “*stater*” did continue to be published, however, such as that for *Magister* (with master’s degrees in humanities or natural sciences) until 1967.

¹⁹ <https://www.ukwhoswho.com/> [retrieved 26-07-2023]. In Denmark, *Kraks Blå Bog* has been published annually since 1910, but the Norwegian version first published in 1912, *Hvem er Hvem?*, was last published in 2008.

research by typically giving respondents identical forms and requiring them to answer the same set of questions. The main objective of questionnaires related to research is to obtain relevant information in a reliable and valid manner (Taherdoost, 2016), for example on incidences of disease and their causes, quality of life, opinions on different issues, and predicting aspects of behaviour (Eaden, Mayberry and Mayberry, 1999; Kember and Leung, 2008). The literature addresses several questions related to questionnaire design, the use of questionnaires and surveys, how to formulate questions, how to ensure high response rates, and the limitations connected to the use of questionnaires.

There is a general consensus that questionnaires can be an effective method of collecting data from large samples (see, for example, Eaden, Mayberry and Mayberry, 1999; Wong, Ong and Kuek, 2012; Bölenius et al., 2012; Anderson et al., 2001; Mackison et al., 2010; Liang et al., 2014; Polikandrioti, 2011; Deniz and Alsaffar, 2013). Nevertheless, there are some key concerns relating to design and use which must be considered. These include how questions are phrased and how respondents interpret the questions, as well as the extent to which answers call on respondents' memory, with the risk of results being compromised by memory losses (Eaden, Mayberry and Mayberry, 1999; Wong, Ong and Kuek, 2012). In their comparison of the reliability of questionnaires and self-recording diaries seeking to collect organizational communications data, Conrath et al. (1983) note that questionnaires can be less reliable because they rely on the perceptions and memory of the respondents, and that this often leads to inaccuracies.

We are not able to re-test the questionnaires used to prepare the graduate biographies: the source material is historical, and most of the respondents are no longer alive. Yet we might note three aspects which strengthen the reliability. First, that the questions that were asked remained comparable over time, and thus similar surveys were made repeatedly in two countries over more than a century. Second, although the editors complained that some graduates did not answer all the questions in the forms, the vast majority of them did so. Third, the response rate was, based on information we have, around 80 per cent for Denmark and 90 per cent for Norway.²⁰ For most of the remaining graduates, biographies were made using completed forms submitted by family members or information gathered from alternative sources. This led to an almost perfect match between the total number of graduates and the total number of biographies (see Appendix C for details).

Nevertheless, we seek to answer how reliable the biographies are. In this regard, it is important to have in mind that there were several actors involved in the publication process who might have had

²⁰ For Denmark, the years we have information about response rates are 1884, 1885, 1887, 1892, 1893, 1894, 1895, 1897, 1905, 1908, and for Norway, the years 1930-1937 and 1939 and 1940.

different reasons to report, or not report, accurately; the graduates who filled out the questionnaires, and family and friends who filled out questionnaires for the deceased, and the editors who collected the questionnaires. Furthermore, the data collections were the completed questionnaires and additional information found by editors in other sources. Finally, the published recordings of the graduates were biographies based on 1) questionnaires, 2) partly questionnaires and partly additional information and 3) solely based on other sources.

Addressing the reliability of the biographies has several dimensions, but there are general principles that can be applied to all (Scott, 1990, p. 19). Scholars present slightly different principles, but generally they include questions such as: is the source reliable? Is it neutral? Are there traces of cheating or negligence? We draw on the criteria provided by Scott (1990): (i) Meaningfulness: Do the biographies provide relevant information for our purposes? (ii) Authenticity: Are we confident about the origin of the yearbooks and the information contained in the biographies? Do the published biographies match the details provided by graduates themselves? (iii) Representativeness: Are there graduates who are excluded from the biographies? If so, what effect do such omissions have on the overall completeness of the yearbooks? (iv) Credibility: Is there evidence of error or bias in the biographies and how they are presented?

3.2 Meaningfulness

“Meaningfulness” can be considered along at least two dimensions: does the information presented makes sense in the context in which it is presented; and is the information relevant and useful for the proposed application. Regarding the former, the graduate yearbooks were publications to commemorate anniversaries of high school graduation, and the information is clear in its purpose. The yearbooks provide a snapshot of the lives of graduates many years after completing high school. While there is variation in the level of detail provided, there is consistency in the unambiguous and factual presentation of graduates’ post-school endeavours. Indeed, had the yearbooks not served their purpose, it is unlikely the tradition would have continued as long as it did.

As for our proposed application — that is, constructing richer measures of human capital — we are satisfied that the yearbooks provide a meaningful source. The key benefit from our perspective is that they document where they and their families were from, what graduates studied at university (if they progressed from high school to tertiary education) and where graduates went on to work (demonstrating in broad terms how they gained and applied the skills they acquired).

3.3 Authenticity

“Authenticity” refers to the idea that the source should be what it claims to be and whether the source is genuine and of unambiguous origin (Thurén 1997, p. 27), and whether there are significant errors in spelling and grammar (Scott 1990, p. 19). We can establish the authenticity of the biographies by comparing graduates’ submitted questionnaire responses to the biographies that appear in the published yearbooks. In the archive of the 1896 high school graduate anniversary for Denmark and the archive of the Genealogical Institute, we have found seven questionnaires.²¹ In Norway, in personal archives for two of the editors, we found 34 questionnaires for graduates, or family members or friends of deceased graduates, for the cohorts of 1854, 1856, 1872, 1905 and 1912.²² In general, the information filled out in the questionnaires is reproduced in the biographies, though with some variations between Denmark and Norway, as well as over time. For example, in the Norwegian biographies, responses to the questionnaires are often reproduced word-for-word, and a range of personal details, such as causes of death and births of children, are included. The Danish biographies, by contrast, typically exhibit greater editorial standardization, even if the key information remains intact. Deaths are reported, but causes of death and births of children are rarely included in the Danish biographies. That said, both Norwegian and (at least the later) Danish biographies record details of marriages.

The information about name, parents, high school, and higher education provided in the Norwegian biographies corresponds in its entirety to that found in the register of students, “*studentmatrikkelen*”, published by the University of Oslo. Likewise, the Danish yearbooks take high school records as their starting point in identifying the graduates who were members of the relevant cohort. Information about date and place of birth of the graduates, and in some cases examiners, is often not asked for in the questionnaires and therefore not supplied directly by graduates. Yet, this information still appears in the biographies. This implies that editors acquired this information from other sources, such as grade lists (see Ford et al., 2022) or other student records.

While there is a high degree of correspondence between the questionnaires and the biographies, certain information in the questionnaires is omitted. Such “excessive information” could include exam grades, names of grandparents, the name of a school principal or other personal reflections.²³ In

²¹ 1896-Studenternes Jubilæer, Korrespondance m.m. vedr. festerne 1921, 1936 og 1946, Rigsarkivet, København; SG-327 Genealogst Institut 1887-1909 Sager vedr. Udgivne og planlagte trykte værker. Landarkivet for Sjælland m.m.; Ny kgl. Saml. 3962.4 Sophus Möller Studenterne 1859. Haandskriftsafd. København.

²² Studenterne fra 1853, Riksarkivets manuskriptssamling, nr 124, 4, Ra,j, 1128/1924; PA 1322, Det norske studentersamfund, Gf – Jubileer, 0012, 25-årsjubileer, studentene fra 1872 (opplysninger til biografi), 1897.

²³ For example, Martin Christian Vilhelm Larsen wrote in his questionnaire in relation to a study trip to Munich that he went “at the expense of the family”, and this is left out in the biography.

addition, minor edits and corrections were routinely made in the biographies, including changes in word order and the use of pronouns (converting from first to third person), or removing over expressive or expansive language.²⁴

3.4 Representativeness

“Representativeness” relates to the coverage of the yearbooks: in particular, how many graduates were not included? As the quote included in the introduction suggests, convincing graduates to complete the questionnaires used to compile the yearbooks was far from easy. The editorial comments from organizing committees published in yearbook introductions point to two categories of individuals: those who were eager to have their biographies included and prompt to respond to initial enquiries; and those who were laggards, requiring multiple reminders to complete the questionnaires or supply additional information. We do not have direct evidence on the relative size of these two categories but, encouragingly, the editorial remarks indicate that the laggards were a minority.²⁵

Nevertheless, there is a small subset of all graduates who chose not to be included in the yearbooks at all. In these cases, graduates could specifically request that they not be listed. Nevertheless, such requests were a rare occurrence. For example, of the 2113 graduates in Norway’s 1935 cohort, only 3 asked not to be mentioned (GN25 1935, p. 502). In Norway’s 1921 cohort, 10 did not want to be mentioned in the 50th anniversary book (GN50 1921). Danish biographies reflect similar patterns. For example, the editors of GD25 1886 explain that they managed to compile biographies for 413 out of 414 graduates, although some required frequent reminders, and for GD25 1890 411 out of 417 were included. The First World War seems to have marked a turning point, and editors faced increasing difficulties and even hostility, and from GD25 1892 (published in 1917) they introduced a system whereby those who they could not find or who refused to be included were noted. For GD25 1905 around 40 failed to reply out of ca. 400, despite multiple reminders sent by post as well as telephone calls, and for GD25 1908, despite two reminders, the editors received no response from 75 graduates out of 529. From GD25 1910 the editors note that no one wished to take on the task of collecting the 687 biographies, but they didn’t wish to break with tradition, and contacted the book publisher Arnold Busck, who provided an editor. From that point on only factual information was included, with no personal anecdotes and the like. The difficulties were made worse by the Spanish flu. The editors of

²⁴ For example, expressions such as “dearly loved”, “painfully missed” are commonly omitted in the biographies. Excess sentences such as “it might be of interest that...” are also left out.

²⁵ Although such remarks themselves might of course also be biased to emphasize the completeness of the work.

GD25 1910 note that 63 of 687 had died, and for GD25 1912, 79 out of 827. Leif Eskedal confirmed that only two graduates requested to be excluded from the Bergen Engineering Technology School anniversary book which he edited.²⁶ He also stated that biographical books published after the Second World War excluded certain individuals who “for that reason” [i.e. due to their activities during the war] did not want to be included (Interview LE 25/08/2020).

To the extent that individuals neither requested exclusion nor submitted complete questionnaire responses, editors were left to construct biographies using other sources. In some cases, this included drawing on other biographical publications. Alternatively, these biographies required detailed research using reference works, obituaries, graduate lists, tax records, pension lists, official offices, libraries, population registers, government institutions, trade union membership lists, among other records. The editor of the 1868 Norwegian high school cohort gave a special thanks to the Norwegian Vice-Consul in Milwaukee for the information he provided about the graduates who had migrated to the United States (GN50 1868, p. v). In general, however, the response rate among the graduates, supplemented by the biographies written by friends, family, and the editors themselves, independently of year, seems to have been very high.

3.5 Credibility

“Credibility” (sincerity and accuracy) involves an assessment of how distorted the source’s content is likely to be and the question of whether the author of the document actually believed what he or she recorded (Scott, 1990, p. 22). It is fair to say that of the four dimensions of reliability, the question of credibility is the most challenging for us to verify, and where much of our critical analysis efforts have been focused. Although the biographies are based on primary sources, there are two categories of issues which we must consider: first, errors in the information, ranging from typographical errors to factual mistakes (for example, due to memory loss); and second, bias in the presentation of the information, either on the part of the graduates themselves or due to editorial choices.

With respect to the first category — errors — asking anyone to recall the events of their lives over a span of decades is a test of their memory. It is almost inevitable that mistakes will result, although memoirs written down 20 to 30 years after events of note can be credible in terms of the main features of the course of events depicted, but not in terms of details (Thurén 1997, p. 27). One might report the wrong year for starting in a job, or potentially even forget a particular position if it was sufficiently fleeting and unmemorable. Key biographical details such as date of birth or parents are necessarily

²⁶ One of them was a nun, the other is unknown.

harder to forget. Such information is also easy to verify from other sources. In fact, even in terms of career, memory loss might not be a significant problem. As Leif Eskedal emphasized, most graduates prepared curriculum vitae — updated regularly over time — which they might have consulted when completing the questionnaires.

The credibility, or reliability, of the completed questionnaires is addressed by several editors in their introductions to the yearbooks. The editor of the GN25 1935, for example, wrote that it was not possible to fully accept the information provided by the graduates “without criticism”. He noticed that there were questionnaires where it was stated that a person’s wife was born in 1949, or even in 1959 (and thus a child at the time), and where children were born to the same wife four months apart. He pointed out that such examples were due to “memory error”, often on the part of the male spouse (GN25 1935). Such mistakes might appear in biographies, even frequently, either due to memory loss or misspelling.

We were assured by Leif Eskedal that the completed questionnaires by the graduates, or the descendants of deceased, were “mostly correct.” He made the point that the questions presented in the questionnaire were generally short and simple, and that he had the impression that the graduates remembered the information about family and career correctly. Eskedal also emphasized that he checked the information given in the completed forms with other sources, and drew from other sources when information was missing. One peculiarity he noted with those who had worked in the United States was that they claimed to have switched jobs very often, and normally more often than those who had only worked in Norway. He compared the information given for some of graduates about work in the United States in other publications which he had access to, and said that he did not find any discrepancies. One thing that the graduates sometimes left out, perhaps due to modesty, he noted, was “positions of responsibility” (*tillitsverv*). Some graduates had many positions, but did not report them, and in those cases Eskedal supplemented with information from other places (Interview LE, 25 Aug, 2020).

We performed an analysis of the first Norwegian yearbook (for the 1831 cohort, available on request), cross-checked against information about each student found in the student registers of the University of Oslo.²⁷ In most cases (91) the information in the biographies is identical to that found in the registers, and in 25 of the cases, some of the information differs. Usually, the errors can be considered typographical in nature: for example, a date that is off by one year. Some discrepancies are more

²⁷ We thank Frida Emilie Moss for having made this comparison.

substantive, though not necessarily evidence of error. For example, different occupations of the father are registered in two cases (for example “master dyer” and “goldsmith”²⁸). This may be a mistake, but it might also be that the father changed his profession between the time when the son was enrolled at the university and the yearbook was published. Two graduates are registered in the yearbook with biographies but were not registered in the student registers, and two students in the student registers are not found in the yearbook.²⁹ In sum, we find no evidence of major discrepancies between the information in the university student registers and the biographies. In most cases, the two sources reveal the same information; to the extent there are differences, these are relatively minor in nature.

A further challenge is the risk of biased information, such that the biographies provide only a partial and misleading picture of graduates, and there are many potential reasons why this might be an issue. Any source bias risks carrying through to any subsequent analysis, resulting in skewed results and flawed conclusions. The obvious starting point in considering bias is that graduates might have an incentive to present themselves in a particularly positive way, and avoid providing information which would put them in a “bad light”. Encouragingly, in reviewing the biographies, we find many that include unfavourable information — for example, on not acquiring jobs and periods when they were unemployed. This suggests that the graduates were open and willing to publish less-than-ideal information about themselves, and we see no obvious pattern in terms of those students who did so. We see not infrequent references to periods of unemployment (e.g. GN25 1904; GN25 1914; GN25 1923), and the editors of GD25 1906 (published close to the beginning of the Great Depression, in 1931) note that, following an explosion in the number of graduates, and based on the replies they received, not all had an easy life, and having graduated was no longer a “patent on a career”. The following year, the editors noted that more than a few graduates were struggling, and that some chose suicide, the latter information presumably provided by colleagues, friends, or family members (GD25 1907).

This does not mean that *all* graduates were inclined to include negative information, but it does indicate that such information was, and could be, included. Also, graduates probably had little incentive to lie or wilfully mislead in their biographies, given that the information would be available to people who already knew them and there was thus a high probability of any deception being

²⁸ *Farvemester versus Guldsmestemester*.

²⁹ This may be due to name changes or because they were registered as graduates in different year. Some graduates failed the high school exam and took the exam again the year after – or some years later. In those cases, the graduates could choose to be registered in the yearbook corresponding to the first time they took the exam or the year they passed the exam.

detected — with ostracization a possible, even probable, consequence. A further concern pertains to potential editorial biases: that is, did the organizing committees and editors for each yearbook influence the overall presentation of biographical information? We have examined the editorial remarks contained in each yearbook's introduction. These typically describe the process of organizing anniversary reunions and compiling the yearbooks. But in some cases, they also comment on major political and social events, including wars, which may reveal bias.

In addition to conscious editorial decisions, broader social factors might introduce (unconscious) bias in the yearbooks. More precisely, the concern may be that certain groups of graduates are presented differently, or that certain relevant information is discounted or exaggerated systematically. For example, a reasonable suspicion could be that certain people and minority groups would be presented differently to others. As Table 2 summarizes, we have focused on three distinct groups that we consider plausible candidates for biased presentation: women, Jews, and politicians. The documentation for our review of potential bias is also available on request. The headline finding is that across these groups of graduates (with one key exception — discussed below), we find little evidence of structural bias. That is not to say there was no societal discrimination against these groups — for example, the opportunities for women both in terms of education and careers were (relative to men) typically more limited. Women were allowed to take the university entrance exam in Denmark from 1875 and in Norway from 1882 and they gradually increased in number and share over time.³⁰ Rather, there is nothing to suggest that women, Jews and politicians were treated any differently when it came to the content and presentation of their biographies.

The major exception foreshadowed above relates to one category of politician. Specifically, we considered how the Second World War and the Nazi occupation of Norway might have influenced the presentation of politically active figures of that time. To that end, we compared the biographies of members of the Nazi-aligned *Nasjonal Samling* administration in Norway with those of Johan Nygaarsvold's cabinet-in-exile.³¹ There is evident bias associated with how certain high-profile Nazis were portrayed after the Second World War. In particular, the presentation of Vidkun Quisling —

³⁰ In 1921, around 22 per cent of the high school cohort in Denmark were women. In Norway in 1940, this was around one third. A review of selected women's biographies suggest that they were sent the same questionnaires as the men and that their biographies were generally organised and set up in the same way. There are examples of information given of divorces, both for men and women. A simple analysis of the length of selected biographies suggests that women's biographies were not different or shorter than those of men.

³¹ We have also considered a similar analysis of prominent members of the National Socialist Workers' Party of Denmark (DNSAP). However, as only a small number of Danish yearbooks were published during or after World War II (the last being for the class of 1923, whose 25th anniversary yearbook was published in 1949), the pool of potential candidates is limited.

leader of the *Nasjonal Samling* administration — is a striking case study. Quisling graduated high school in 1905. The 25th anniversary yearbook (published before the war in 1930) included a long and detailed biography of Quisling. By contrast, the 50th anniversary yearbook (published ten years after the war in 1955) includes only a short account of Quisling’s life, with a reference to the period “he called himself ‘prime minister’” and his later title as minister-president likewise reported in quotation marks (GN50 1905).

Notwithstanding this, the biographical details of *Nasjonal Samling* members included in the yearbooks remain broadly consistent with other graduates. The biographies are neutral in their presentation, containing a factual account of family background, education and their careers (including during the war). The clearest evidence of any difference comes from comparing biographies of the same individuals in different yearbooks before and after the war (for example, as with Quisling: the 25th and 50th anniversaries). Here it becomes apparent that the level of detail regarding known Norwegian Nazi sympathizers is typically sparser in the post-war publications.

Bias need not be contained to the well-defined groups we have identified. Hence, as a further check, we have examined two groups of graduates based on their university studies to test whether there is any other evidence of systematic bias, using censuses, company records, reports and other independent sources. The chosen groups are *magister* (a type of master’s degree) graduates in Denmark, and engineering graduates in Norway. Again, we found nothing of note to suggest bias, and our detailed notes are available on request.

Table 2: Summary of credibility checks performed

	Danish yearbooks	Norwegian yearbooks
Yearbook introductions	Yes	Yes
Female graduates	Yes	Yes
Jewish graduates	Yes	Yes
Politicians	Yes	Yes (Nazi occupation)
Selected profession	Magister graduates	Engineers

Further details on the checks performed are available on request.

In sum, our conclusion is that the yearbooks are a generally reliable source of information on high school graduates in both Denmark and Norway. That is not to say they are perfect: there are small errors, and there is evidence of bias in limited circumstances. But the scope and scale of the deficiencies identified are sufficiently modest (and in many cases can be addressed in combination with other sources) such that we feel confident in suggesting them as important sources for the study of upper tail knowledge.

4. Conclusion and the potential of the biographies

We have presented the historical Nordic graduate biography tradition and addressed questions related to the reliability of the Danish and Norwegian high school biographies, which were published for each national cohort in yearbooks for more than a century. The biographies, and additional sources, provide an opportunity to make highly detailed measures of human capital and comprehensive historical analyses of the role of education in industrial and economic development in Scandinavia. The Danish and Norwegian high school biographies include detailed individual level information about immediate family, background, high school and higher education, exam grades, and life and work career after graduation.

We have established to the extent possible the origins of the Danish-Norwegian tradition, and have reviewed the high school yearbooks to establish their reliability using methods of source criticism. We have compared a selection of completed questionnaires found in archives to the published version of the respective biographies. We find generally that information from the questionnaires was consistently and accurately conveyed in the yearbooks — in many cases copied almost word-for-word. Furthermore, we have compared information in some of the biographies to information given in independent sources. Notwithstanding small discrepancies, we have not found any information in independent sources which directly contradicts information given in the biographies. Finally, we have considered potential sources of bias and the expectation that certain groups of graduates might be presented differently, with the main outlier being political figures involved with the Nazi occupation of Norway. We cannot exclude the possibility that certain information about family, education and life after graduation was not included in the biographies — either because a graduate did not wish to provide it or because the editors left it out, and an obvious exception might be due to social stigma

and rejection of homosexuality³². However, in general our impression is that editors were active and meticulous in validating supplied information and obtaining additional information as required.

Thus, the yearbooks were not intended for analytical studies, yet we consider that they are fit to be used for this purpose. In particular, the high coverage rate of graduates — with usually over ninety per cent of each cohort responding to questionnaires — ensures an especially rich and reasonably complete record of those who pursued secondary and tertiary education in Denmark and Norway. The immediate challenge is to convert this information from paper records into usable data. To this end, colleagues at the University of Southern Denmark are applying machine learning techniques to digitize the yearbooks and make them into an easily accessible database for use in quantitative and qualitative analyses. In broad terms, this involves using sophisticated AI models that can read and interpret text, identify the relationships between different elements in the text, and convert these to variables. We then aim to design a quality-adjusted measure of skill acquisition rather than simply counting years sitting in a classroom. Furthermore, the biographical information about graduates' careers can provide evidence of additional human capital acquired from work experience and — combined with earnings data or approximations — can be used to estimate the direct private returns to education at the individual level. The possibilities seem almost endless.

³² See for example the discussion initiated by Kjærgaard (1987) in *Personalthistorisk Tidsskrift* regarding bias in *Dansk Biografisk Leksikon*.

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Appendix A

Table A1: Danish and Norwegian graduate yearbooks, by cohort

Columns refer to anniversary year of graduation. Detailed biographies are denoted by full circles, while yearbooks with limited biographical information are denoted by hollow circles. Selected yearbooks were published in connection with atypical anniversary years — these are denoted in parentheses. * The Danish graduating classes of 1812 and 1837 were celebrated in a joint yearbook, marking their 50th and 25th anniversaries respectively.

Cohort	Denmark				Norway				
	25th	40th	50th	60th	25th	30th	40th	50th	60th
1812			○*						
...									
1820		○							
1821		○							
1822	○	○	○						
1823		○							
1824			○						
1825	○		○						
1826									
1827	○								
1828	○	○	○						
1829	○		○						
1830		○	○						
1831	○							●	
1832	○								
1833	○			○					
1834	○	○	○						
1835									
1836	○		○						
1837	○*	○	○						
1838	○	○	○						
1839			○						
1840	○	○	○	○					
1841	○	○	○						
1842	○		○						
1843			○						
1844	○								
1845			○						
1846	○	○	○						
1847	○		○						
1848	○	○	○						
1849	○		○						
1850	●	○							

Cohort	Denmark				Norway				
	25th	40th	50th	60th	25th	30th	40th	50th	60th
1851	○	○ (36)						●	
1852	○		○						
1853	○		○						
1854			○					●	
1855	○	○	●					●	
1856	○		○					●	
1857	○		●					●	
1858	○	○						●	
1859	○	○	○				●	●	
1860	○	○						●	
1861	○		●					●	
1862	○		●					●	
1863			●						
1864		○	○					●	
1865	○	○	○					●	
1866		●	●					●	
1867	○							●	
1868	○				●			●	
1869	●							●	
1870	●							●	
1871		●						●	
1872		○			●			●	
1873	●				●			●	
1874	●							●	
1875	●							●	
1876	●				●			●	
1877			○		●			●	
1878	●							●	
1879	●				●			●	
1880			○		●			●	
1881	●		○		●			●	
1882	●				●			●	
1883	●	○	○		●			●	
1884	●	○	○	○	●			●	
1885	●				●			●	●
1886	●	○	○		●	●	●	●	
1887	●		○		●			●	
1888	●				●			●	
1889	●				●			●	
1890	●				●			●	
1891	●				●			●	
1892	●				●			●	
1893	●				●			●	
1894	●				●			●	

Cohort	Denmark				Norway				
	25th	40th	50th	60th	25th	30th	40th	50th	60th
1895	•				•			•	
1896	•				•			•	
1897	•				•			•	
1898		○			•			•	
1899	•				•			•	
1900	•				•			•	
1901	•				•			•	
1902	•				•			•	
1903	•				•			•	
1904	•				•			•	
1905	•				•			•	
1906	•				•			•	
1907	•	○			•			•	
1908	•	○	○		•			•	
1909	•				•			•	
1910	•				•			•	
1911	•				•			•	
1912	•				•			•	
1913	•				•			•	
1914	•				•			•	
1915					•			•	
1916	•				•			•	
1917						•			
1918	○					•			
1919	○					•			
1920	•				•			•	
1921	•				•			•	
1922					•				
1923	•				•				
1924					•				
1925					•				
1926					•				
1927					•				
1928					•				
1929					•				
1930					•				
1931					•				
1932					•				
1933					•				
1934					•				
1935					•				
1936					•				
1937					•			•	
1938					•				

Cohort	Denmark				Norway				
	25th	40th	50th	60th	25th	30th	40th	50th	60th
1939					•				
1940					•				
1941					•				
1942					•				
1943					•				

Appendix B: Example of a questionnaire (used for the Norwegian 1872 cohort)

Original

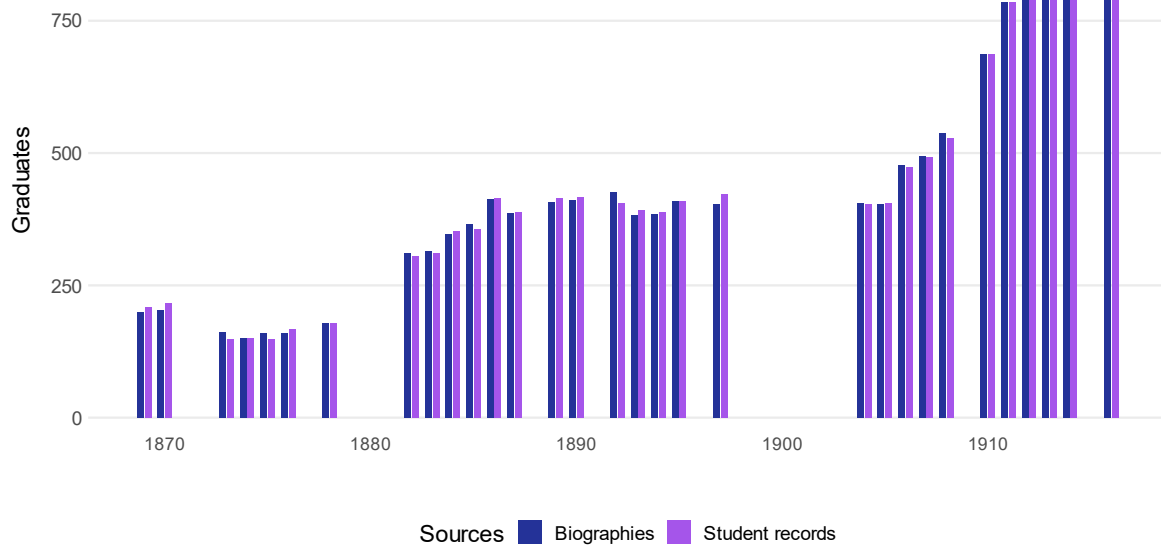
- 1) Deres faders fulde navn og borgerlige stilling.
- 2) Deres moders fulde navn (pigenavn).
- 3) Hvor og i hvilke tidsrum har De gaaet paa skole eller hvis har havt privat information, da af hvem og hvorlænge.
- 4) Af hvem De blev demitteret.
- 5) Examina og offentlig aflagte prover (doktorgrad, advokatur etc.); naar disse blev aflagte, aar og maaned.
- 6) Hvor De har været bosat, siden de forlod Universitetet, hvilken Deres livsstilling har været siden den tid (offentlig eller privat, konstitutioner, private gjøremaal, offentlige og kommunale hverv, medlem af kommissioner, af bestyrelser for banker, foreninger etc), alt med angivelse af tid (aar og dato) for udnævnelsen af embedet (ordener og medaljer) etc.
- 7) Har de inden studenter verdenen havt noget tillidshverv (med angivelse af aar) eller er De bleven tildelt akademiske dekorationer?
- 8) Hvor og naar (aar og dato) De er gift.
- 9) Deres hustrus (hustruers) fulde navn (pigenavn).
- 10) Deres hustrus (hustruers) faders fulde navn og stilling.
- 11) Deres hustrus (hustruers) moders fulde navn (pigenavn).
- 12) Samtlige Deres børns fulde navne, fodested, dag og aar samt i tilfælde dødssted, dag og aar.
- 13) Har de foretaget studiereiser (paa offentlig eller privat bekostning, reisens varighed og formaal).
- 14) Om literær og kunstnerisk virksomhed udbedes udførlige meddelelser.
- 15) Ligesaa om oplevelser af mere almeninteressant karakter.
- 16) Fotografi saavel fra russeaaret som fra nutiden bedes indsendt.

Translated

- 1) Your father's full name and occupation.
- 2) Your mother's full name (maiden name).
- 3) Where and during which periods did you attend school, or if you had private instruction, who was the instructor and for how long?
- 4) By whom were you examined/graduated?
- 5) Examinations and public tests taken (doctorate, legal profession exam, etc.); when were these taken (year and month)?
- 6) Where have you resided since leaving the university, and what has been your occupation during that time (public or private, positions held, personal affairs, public and municipal duties, membership in commissions, boards of banks, associations, etc.), all with dates (year and date) of appointment to the office (orders and medals) etc.
- 7) Did you hold any official positions or receive academic distinctions before entering university (with dates), or have you been awarded any academic honors?
- 8) Where and when (year and date) did you get married?
- 9) Your spouse's full name (maiden name).
- 10) Your spouse's father's full name and occupation.
- 11) Your spouse's mother's full name (maiden name).
- 12) Full names, birthplaces, dates of birth, and in the case of death, place, day, and year, of all your children.
- 13) Have you undertaken any study trips (at public or private expense, duration, and purpose of the trips)?
- 14) Detailed information is requested regarding your literary and artistic activities.
- 15) Likewise, any experiences of general interest.
- 16) Please submit a photograph from your student years as well as a current photograph.

Appendix C

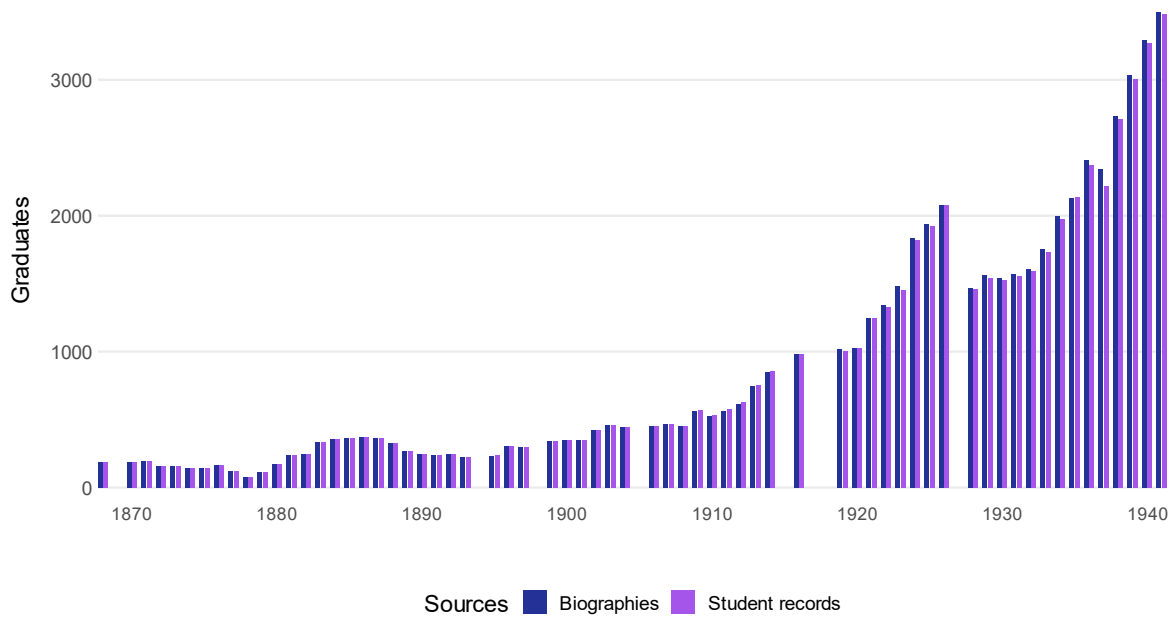
Figure C1: Number of graduates and biographies in the 25 anniversary yearbooks, Denmark (various years, 1869–1916)



Sources: GD. *Studenterne fra..., personhistoriske oplysninger, jubilæer... (1812-1921)*. København.

The figure shows only a sample of years for which we have compared biographies with student records. Note that in some years there were more biographies than graduates. This is because some graduates took the exam several times and considered themselves as belonging to another student cohort than the one when they actually passed the exam.

Figure C2: Number of graduates and biographies in the 25 anniversary yearbooks, Norway (various years, 1868–1941)



Sources: GN. Studenterne/Studentene fra..., biografiske oplysninger, jubilæer/jubileum... (1831-1943). Kristiania/Oslo.

The figure shows only a sample of years for which we have compared biographies with student records. Note that in some years there were more biographies than graduates. This is because some graduates took the exam several times and considered themselves as belonging to another student cohort than the one when they actually passed the exam.

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