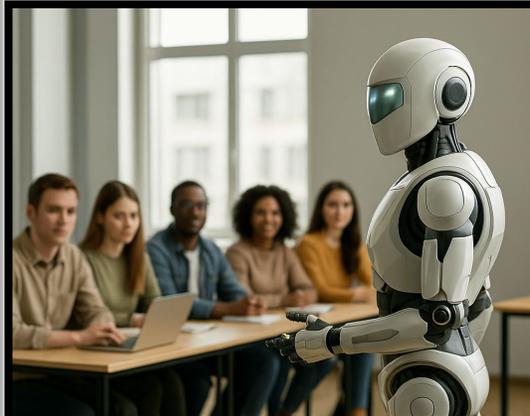


Dr Anthony Harris

A VERY SHORT INTRODUCTION TO USING (GenAI)

for Teaching and Researching in
the Sciences and Humanities

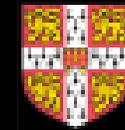


Dr. Anthony Harris

A Very Short Introduction
to Using Generative AI (GenAI)
for Teaching and Researching
in the Sciences and Humanities



Cambridge Centre for
Data-Driven Discovery



UNIVERSITY OF
CAMBRIDGE

create an image suitable for a powerpoint presentation on 'A Very Short Introduction to Using Generative AI (GenAI) for Teaching and Researching in the Sciences and Humanities' make a play on the book series of the same name

It's all about 'Prompt Engineering!'
'Think before you prompt!'

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In this presentation AI = A.I. = Artificial Intelligence

Which of these Statement(s) are Representative of where AI is today?

'People are very open-minded about new things—as long as they're exactly like the old ones.'

Charles Kettering (inventor of Freon, Unleaded petrol, and the electric starter motor)

'Every great movement must experience three stages: Ridicule, discussion, adoption.'

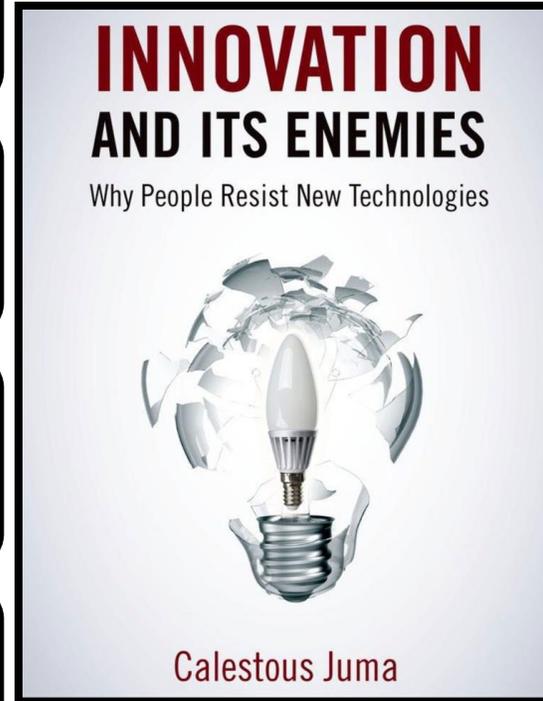
John Stuart Mill (19th century philosopher)

'Nothing will ever be attempted, if all possible objections must be first overcome.'

Samuel Johnson (18th century writer)

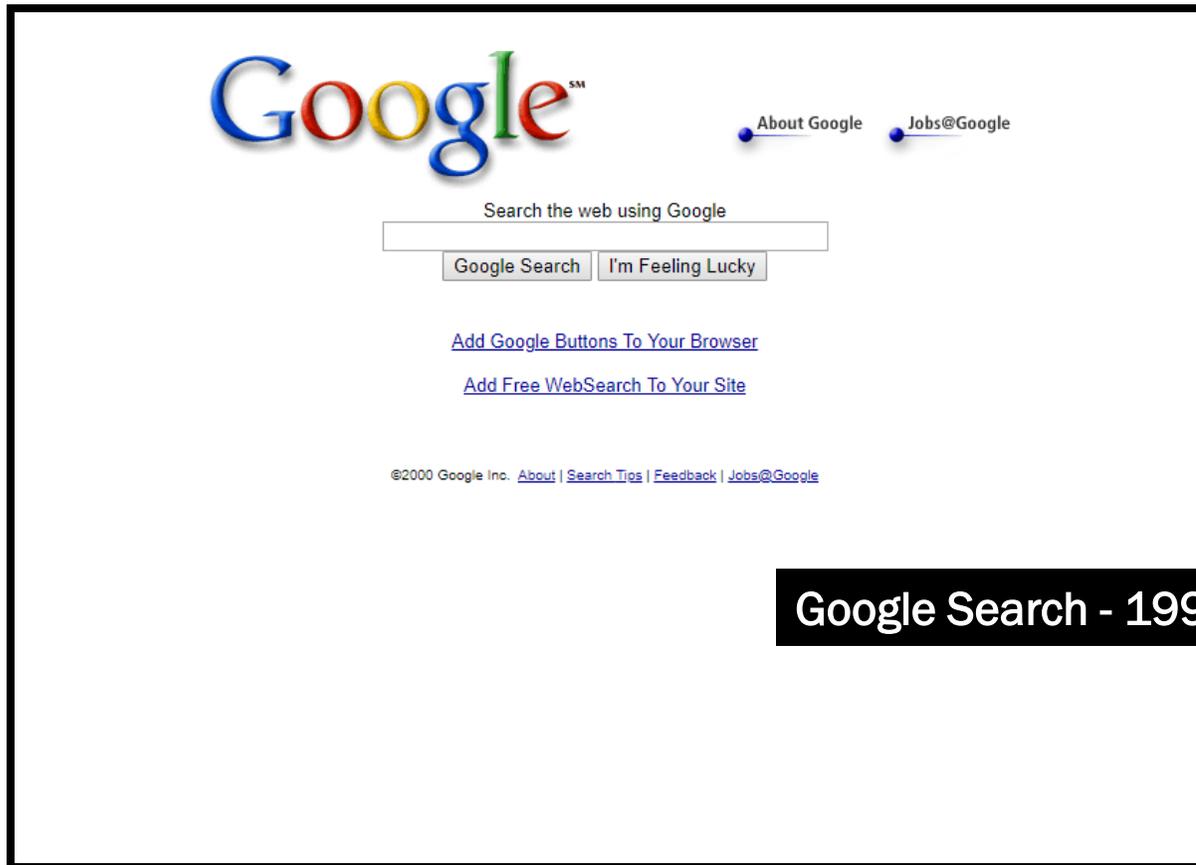
'I can't understand why people are frightened of new ideas. I'm frightened of the old ones.'

John Cage (music theorist)



Perhaps all of them?

Where we have come from: Twenty-five years ago



Google Search - 1999/2000

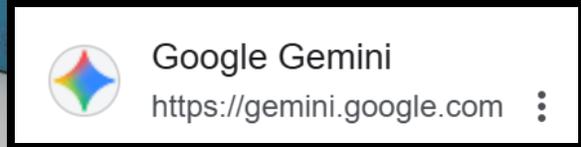


Wikipedia - 2000/2001

Google and Wikipedia were launched **a quarter of a century ago**. We are due an upgrade! GenAI is it!

Where we are now: Generative AI.

- The future of Internet Search or 'Search 2.0'.
- A set of tools we can use for searching and researching. They are *all* different!
- The direction Google, Bing and other internet search engines are all heading. We cannot ignore AI. It is already here
- If you are using Google, Bing, Facebook, Wiki, JSTOR, iDiscover (*ex libris*), Oxford SOLO ... these all use AI!



“Generate a rendered image of a handyman's toolbox. The toolbox should contain various tools such as hammer, pliers, saw, etc. Each tool should be made up of the words ChatGPT, Elicit, Gemini, Perplexity, CoPilot and other generative AI tools.”

How to avoid using AI in today's academic environment!

- If you are using any online scholarly resources at all, then you are already using AI in one form or another.
- Google and BING and other search engines have been using AI behind the scenes for search prediction for many years.



ChatGPT 5 ▾

generate an image of an academic hermit in a hut in the middle of an arctic wilderness trying to avoid using artificial intelligence

Using AI in the University: Guidance is Surprisingly Wide

Blended Learning Service

Generative AI Use Cases

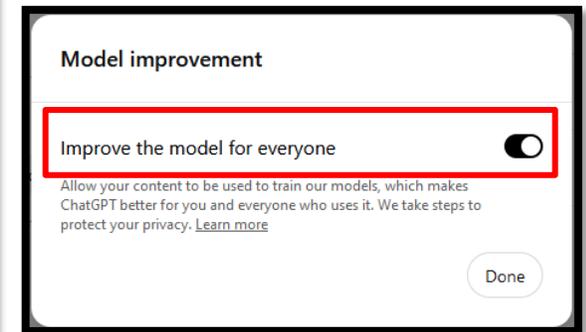
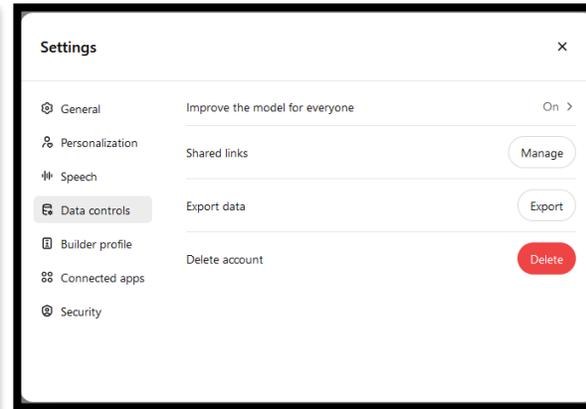
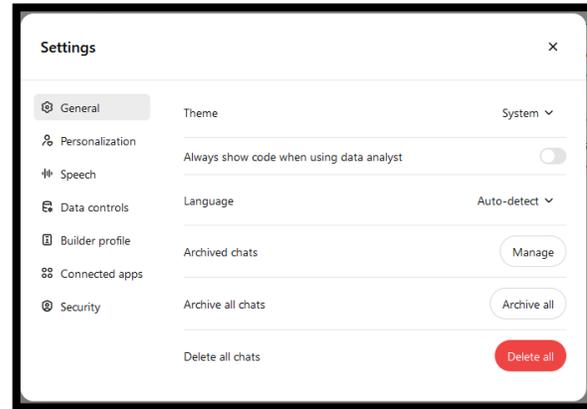
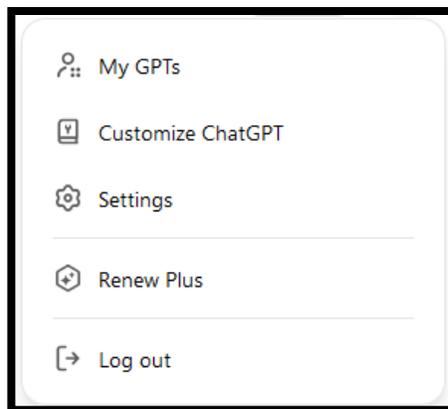
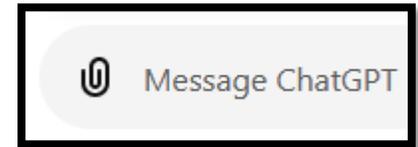
Generative AI and Education

Topic Selection	The software can suggest essay topics based on a general theme or subject area.	Editing and Proofreading	The software can suggest improvements in grammar, punctuation, sentence structure, and word choice.	Image Generation	The software can generate images and diagrams to varying degrees of accuracy.
Research Assistance	The software can collate and present information and data on a given topic.	Citation and Referencing Guidance	The software can provide guidance on how to cite sources and create a bibliography in a specified style.	Mathematical Problems	The software can be used to explain solutions to mathematical problems and, in some cases, provide solutions.
Summarising Literature	The software can summarise literature, analyse information and provide insights	Paraphrasing	The software can be used to paraphrase existing content to make it appear as original work.	Informed Feedback	The software can provide feedback on a piece of work, this can reference criteria and rubrics if provided.
Outline Creation	The software can help create a structured outline for the essay, or part of an essay.	Translation	The software can translate content from one language to another.	Inspiration & Direction Setting	The software can suggest sentences or paragraphs which are used to inspire a student's own line of thought.
Generating Text	The software can assist in writing the essay including writing introductions, body paragraphs, and conclusions.	Code Generation	The software can write feasible code in a variety of languages to meet the prompted brief.	Discussion & Development	The software can provide a critical "partner" for students to discuss ideas and ask questions to further their own understanding.
Data Analysis	The software can analyse, summarise, and visualise qualitative data, providing insights for further evaluation.	Interpret Images	The software can "read", interpret, and communicate the contents of an image including text.		

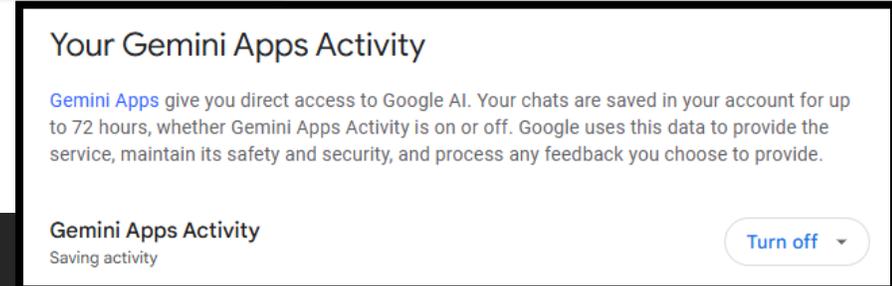
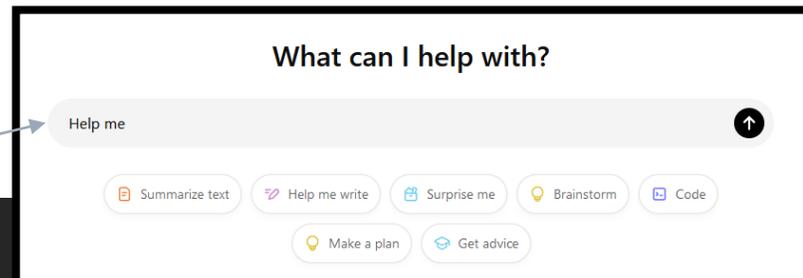
Warning!: Share confidential research data (or not)!

Similar Facilities Exist in other GenAI systems.

- If you use the free version, then the **DANGER** is that your prompts are shared with the global ChatGPT/AI community by being added back to its training data.
- If you are on the paid version, you can (optionally) control what gets shared back.



Free = No Control!
quid pro quo.



AI Responses are Probabalistic: But this can be controlled!

Customize ChatGPT

Introduce yourself to get better, more personalized responses ?

What should ChatGPT call you?

Nickname

What do you do?

University Academic

What personality should ChatGPT have? ⓘ

Default ▾

What traits should ChatGPT have? ⓘ

When doing research only use scholarly references. Avoid responses where you have a confidence level of less than 90%.

+ Chatty + Witty + Straight shooting + Encouraging + Gen Z

+ Traditional + Forward thinking

✓ Google Gemini

Paste this as your **first instruction** in a new chat or set it in *Custom Instructions*:

Use only peer-reviewed scholarly sources (journals, DOIs, Google Scholar-indexed articles). If no such sources exist, reply: "No reliable scholarly sources available." Only answer if >90% confident in accuracy; otherwise respond "uncertain".

✓ Perplexity

In **Academic Mode** (see below), paste this:

Restrict results to peer-reviewed research, DOIs, Semantic Scholar, or arXiv. Exclude blogs, news, and non-academic grey literature. If unable to cite at least one DOI or academic publisher, respond "No scholarly sources found." Only answer if >90% confident.

✓ Microsoft Copilot

Use this in your query or pin it as a note in *Copilot Custom Instructions*:

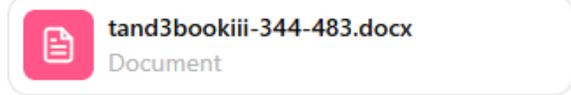
Answer only with peer-reviewed or scholarly content. Use site filters (`site:*.edu` , `site:*.ac.uk` , `site:doi.org` , `site:jstor.org`). Include a DOI in each citation. Decline if confidence is <90% or if sources are not academic.

'Hallucinations' are responses that are *probably* right but may be 100% wrong!

Teaching: Using ChatGPT to Generate Quizzes

Who mighte telle half the joye or feste
 345 Which that the soule of Troilus tho felte
 Heringe the effect of Pandarus biheste
 His olde wo, that made his herte swelte
 Gan tho for joye wasten and to melte
 And al the richesse of his sykes sore
 350 At ones fledde, he felte of hem no more
 ¶
 But right so as these holtes and these hayes
 That harp in winter dede been and dreve

Drop any DOCX or PPTX or lecture slides!



The attached file contains lines 344 to 483 from Book III of *Troilus and Criseyde* by Chaucer. Create a twenty-question multiple choice quiz for second year undergraduate students designed to ensure they have read the passage. Each question should have three possible answers. Ensure that five questions have two answers that are subtly different but only one of which is correct. Include an answer sheet at the back.

Here is a twenty-question multiple-choice quiz based on lines 344 to 483 from Book III of *Troilus and Criseyde* by Geoffrey Chaucer. I've crafted questions that focus on comprehension and subtle nuances, particularly regarding the characters' emotions, motivations, and actions. The answer key is provided at the end.

Quiz Questions

- What does Troilus feel upon hearing Pandarus's promise?
 - A) Indifference
 - B) Relief and joy
 - C) Suspicion
- What does Chaucer compare Troilus's joy to?
 - A) The blooming of flowers in spring
 - B) The warmth of summer
 - C) The renewal of trees in May
- Which god does Troilus swear by to assure his sincerity?
 - A) Zeus
 - B) Cupid
 - C) Achilles

Answer Sheet

- B
- C
- C

Teaching: Working through maths problems (saving time)

What is the value of the ray parameter s at the intersection points between the ray $[1, 1, 1] + s[-1, -1, -1]$ and the sphere centred at the origin with radius 1? Show your working and express the answer in its simplest terms.

Check very carefully!

To find the intersection of the ray

$$\mathbf{r}(s) = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} + s \begin{bmatrix} -1 \\ -1 \\ -1 \end{bmatrix}$$

with the sphere

$$\|\mathbf{x}\|^2 = 1, \quad \text{centered at the origin, radius 1,}$$

we solve

$$\|\mathbf{r}(s)\|^2 = 1.$$

Etc.

1. Plug into the sphere equation

$$\mathbf{r}(s) = \begin{bmatrix} 1-s \\ 1-s \\ 1-s \end{bmatrix}, \quad \|\mathbf{r}(s)\|^2 = (1-s)^2 + (1-s)^2 + (1-s)^2 = 3(1-s)^2.$$

So the intersection condition is

$$3(1-s)^2 = 1.$$

2. Solve for s

$$(1-s)^2 = \frac{1}{3} \implies 1-s = \pm \frac{1}{\sqrt{3}}$$

$$\begin{cases} 1-s = \frac{1}{\sqrt{3}} & \implies s = 1 - \frac{1}{\sqrt{3}}, \\ 1-s = -\frac{1}{\sqrt{3}} & \implies s = 1 + \frac{1}{\sqrt{3}}. \end{cases}$$

You can rationalize the denominators if you prefer:

$$s = 1 \pm \frac{\sqrt{3}}{3}.$$

Researching: Analysing data-sets with GenAI (structured or un-)

The attached spreadsheet contains a list of anglo-saxon charters with associated data descriptions. Analyse the data and suggest five insights and three research questions.

Here are five insights and three potential research questions based on the Anglo-Saxon charters data:

Insights:

1. Dominance of Royal Charters:

- Over 47% of the entries are classified as *Royal diplomas*. This suggests that a significant portion of the surviving Anglo-Saxon charters come from royal issuers.

2. Temporal Concentration in the 10th Century:

- The majority of charters are dated to the **10th century (108 entries)**, followed by the 11th century (94). This indicates a peak in documentary production or preservation during these periods.

3. Key Royal Figures:

- King Edward* (33 charters), *King Edgar* (29), and *King Cnut* (17) are the most frequently appearing grantors, pointing to their active roles in land grants or legal declarations.

4. Central Role of Canterbury:

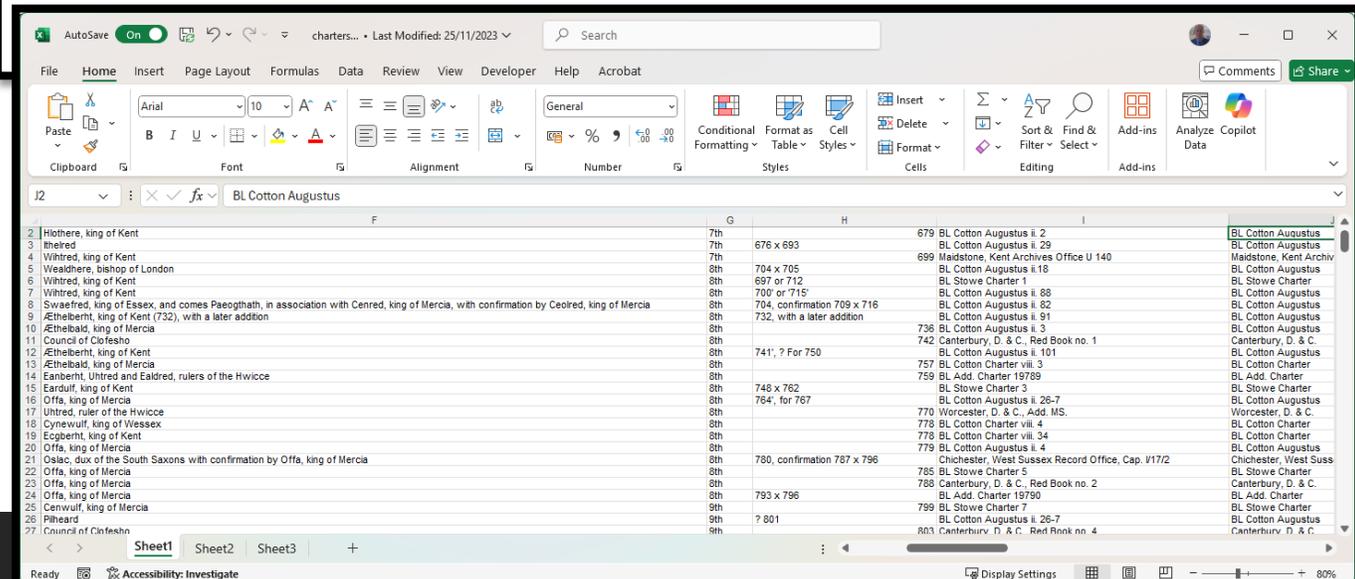
- The archive with the most charters is **Christ Church, Canterbury (110 entries)**, suggesting it was a major center for documentation and charter preservation.

5. Ninth-Century Focus in Royal Diplomas:

- The most populated "sectionone" category is *c. Royal diplomas - ninth century*, with 52 entries, reflecting a particular richness or importance of this period in royal documentation.

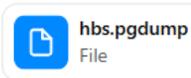
Research Questions:

- How did the role of religious institutions like Christ Church, Canterbury influence the preservation and production of charters in Anglo-Saxon England?
- Why is there a marked increase in charter production or survival during the 10th century compared to the 7th and 8th centuries?
- What are the distinguishing features (linguistic, stylistic, legal) between genuine royal diplomas and those classified as forgeries or copies?



Row	Century	Date	Description
2	7th		679 BL Cotton Augustus ii. 2
3	7th	676 x 693	BL Cotton Augustus ii. 29
4	7th		699 Madsstone, Kent Archives Office U 140
5	8th	704 x 705	BL Cotton Augustus ii. 18
6	8th	697 or 712	BL Stowe Charter 1
7	8th	700 or 715	BL Cotton Augustus ii. 88
8	8th	704, confirmation 709 x 716	BL Cotton Augustus ii. 82
9	8th	732, with a later addition	BL Cotton Augustus ii. 91
10	8th		736 BL Cotton Augustus ii. 3
11	8th		742 Canterbury, D. & C., Red Book no. 1
12	8th	741, ? For 750	BL Cotton Augustus ii. 101
13	8th		757 BL Cotton Charter vii. 3
14	8th		759 BL Add. Charter 19789
15	8th	748 x 762	BL Stowe Charter 3
16	8th	784, for 767	BL Cotton Augustus ii. 26-7
17	8th		770 Worcester, D. & C., Add. MS.
18	8th		778 BL Cotton Charter vii. 4
19	8th		778 BL Cotton Charter vii. 34
20	8th		779 BL Cotton Augustus ii. 4
21	8th	780, confirmation 787 x 796	Chichester, West Sussex Record Office, Cap. v117/2
22	8th		785 BL Stowe Charter 5
23	8th		788 Canterbury, D. & C., Red Book no. 2
24	8th	793 x 796	BL Add. Charter 19790
25	9th		799 BL Stowe Charter 7
26	9th	? 801	BL Cotton Augustus ii. 26-7
27	9th		803 Canterbury, D. & C. Red Book no. 4

Researching: Converting Odd/Old DataFiles



hbs.pgdump
File

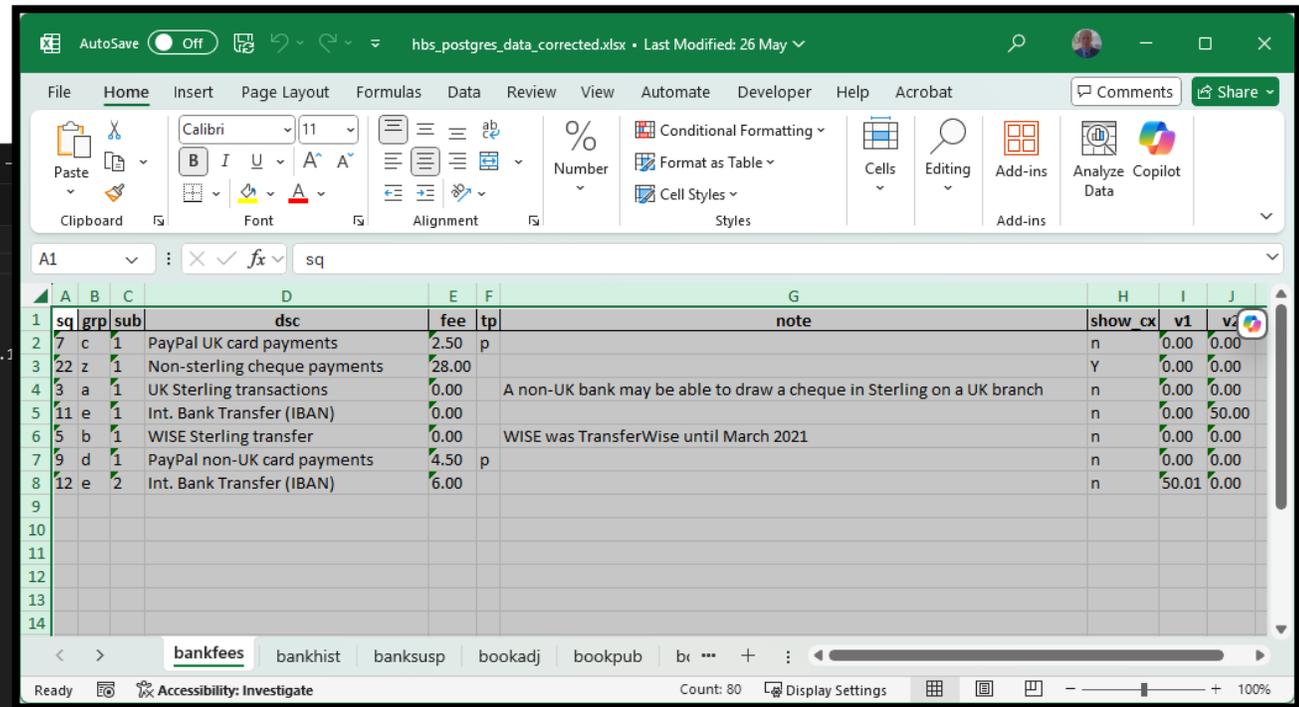
The attached file is a PostgreSQL dump file. Tables are created using the CREATE TABLE function and data is created using the COPY function. Extract the data from the dump to Excel. The data group defined by the COPY function should go to a separate worksheet in the Excel file.

```

EXPLORER
NO FOLDER OPENED
You have not yet opened a folder.
Open Folder
Opening a folder will close all currently open editors. To keep them open, add a folder instead.
OUTLINE
No symbols found in document 'hbs.pgdump'
TIMELINE hbs.pgdump
Local History will track recent changes as you save them unless the file has been excluded or is too large. Source Control has not been configured.

C: > Users > antho > OneDrive > Academic > HBS > HBSDataExtract2025 > hbs.pgdump
1 --
2 -- PostgreSQL database dump
3 --
4
5 -- Dumped from database version 16.8 (Ubuntu 16.8-0ubuntu0.24.04.1)
6 -- Dumped by pg_dump version 16.8 (Ubuntu 16.8-0ubuntu0.24.04.1)
7
8 SET statement_timeout = 0;
9 SET lock_timeout = 0;
10 SET idle_in_transaction_session_timeout = 0;
11 SET client_encoding = 'UTF8';
12 SET standard_conforming_strings = on;
13 SELECT pg_catalog.set_config('search_path', '', false);
14 SET check_function_bodies = false;
15 SET xmloption = content;
16 SET client_min_messages = warning;
17 SET row_security = off;
18
19 DROP INDEX public.nominals_key;
20 DROP INDEX public.idx_0;
21 DROP INDEX public.bankfees_sq_idx;
22 ALTER TABLE ONLY public.members DROP CONSTRAINT members_pkey;
23 ALTER TABLE ONLY public.bookpub DROP CONSTRAINT bookpub_pkey;
24 ALTER TABLE ONLY public.banksusp DROP CONSTRAINT banksusp_lr_id_key;
25 DROP TABLE public.sysdata;
26 DROP TABLE public.substat;

```



sq	grp	sub	dsc	fee	tp	note	show	cx	v1	v2
7	c	1	PayPal UK card payments	2.50	p		n		0.00	0.00
3	22	z	Non-sterling cheque payments	28.00			Y		0.00	0.00
4	3	a	UK Sterling transactions	0.00		A non-UK bank may be able to draw a cheque in Sterling on a UK branch	n		0.00	0.00
5	11	e	Int. Bank Transfer (IBAN)	0.00			n		0.00	50.00
6	5	b	WISE Sterling transfer	0.00		WISE was TransferWise until March 2021	n		0.00	0.00
7	9	d	PayPal non-UK card payments	4.50	p		n		0.00	0.00
8	12	e	Int. Bank Transfer (IBAN)	6.00			n		50.01	0.00



'The Times', Saturday 17 May

'The only limit to using (generative) AI is your own imagination!'

'It is when it is used as a prop, rather than a tool, that we have a problem.'

AI in education

Sir, I have been using Generative AI in my teaching and research for some years now as the next generation of internet search, which is the direction it is clearly heading (letters, May 16). I continue to argue that it has more utility for teachers and researchers than it does for students. AI is not just "coming", it is already here, and universities and schools must learn to adapt. Thankfully, it is not that hard because "the only limit to using AI is your own imagination". It is when it is used as a prop, rather than a tool, that we have a problem.

Dr Anthony Harris

Research fellow and tutor, Clare Hall,
Cambridge

Philosophical Questions: Something to think about later

1. A student uses Google search and Wikipedia to research their dissertation. They follow up on those searches and identify scholarly papers which they then use. Do they need to credit the fact that they used Google and Wikipedia in their footnotes/bibliography etc. (scholarly apparatus)?
2. A student uses ChatGPT 4o to analyse a big data set and develop data insights. They then check these insights and develop a narrative that incorporates them into their dissertation. Do they need to reference this approach in your scholarly apparatus?
3. A student uses Microsoft Copilot to generate some Python code which analyses a large dataset. The code generates data insights. They incorporate these insights in their dissertation as part of their own narrative. Do they need to reference this approach in their scholarly apparatus?

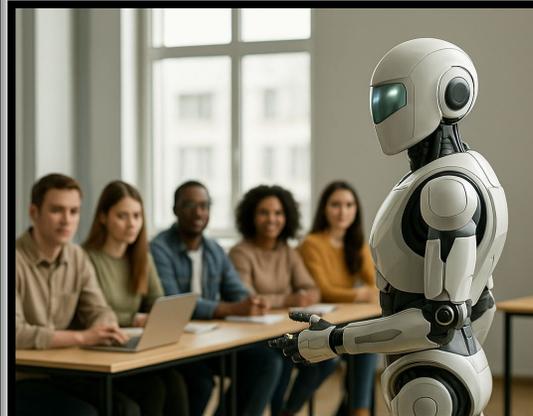
Artificial Intelligence

Students are permitted to make appropriate use of artificial intelligence tools to support their personal study, research and formative work. Where doing so, it is recommended that you discuss this with your supervisor or lecturer to understand how best to engage with these tools whilst still benefiting from the educational experience as intended.

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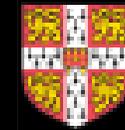


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Cambridge Centre for
Data-Driven Discovery



UNIVERSITY OF
CAMBRIDGE

**THANK
YOU!**

Typeface generated using Gemini!

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In this presentation AI = A.I. = Artificial Intelligence