WriteTree.py family tree writer

WriteTree.py is an extremely efficient recursive program which writes family tree data to a text file in a format suitable for display as a transposed generation table. The program is written in Python; the source data are stored using MySQL; the output data are written as comma-separated values (CSV) in a text file; and all operations are undertaken in an Ubuntu Linux (UL) environment running on a Windows 11 (W11) computer by means of the Microsoft Windows Subsystem for Linux (WSL) utility. These various features and developments are summarised in four appendices:

- 1. W11 installation and initial setup of WSL, UL, MySQL, and Python
- 2. Source data preparation
- 3. WriteTree.py script
- 4. Sample output

R D Kingdon

Windows 10 implementation March 2022, revised December 2022 Windows 11 implementation April 2024

Appendix 1. W11 installation and initial setup of WSL, UL, MySQL, and Python

The following prompts refer to: Windows 11 desktop (W11); Powershell as Administrator (PA); Powershell as User (PU); Ubuntu Linux shell (UL); and MySQL command environment (MS).

WSL activation

W11: Start icon; Search for Powershell; Select Run as Administrator

PA: dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux /all /norestart

PA: dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart

W11: Exit all processes; Restart; Start icon; Settings; Find a setting; Turn Windows features on or off; Verify that Windows Subsystem for Linux and Virtual Machine Platform are checked W11: Start icon; Search for Windows Powershell; Run as User

 $PU: \texttt{wsl.exe} \mbox{ --update} \rightarrow \texttt{The most recent version of Windows Subsystem for Linux is already installed.}$

PU:wsl --status \rightarrow Default Distribution: Ubuntu | Default Version: 2

Ubuntu installation and initial setup

W11: Start icon; Search for and select Windows Store; In Windows Store, search for and get Ubuntu; When prompted, launch Ubuntu

UL: Specify new UNIX username and password as required

UL: sudo apt-get update

UL: sudo apt-get upgrade; Implement updates as required

UL: sudo apt update \rightarrow All packages are up to date

UL: lsb_release $-a \rightarrow Ubuntu 22.04.4 LTS$

Accessing UL filespace from W11, and vice versa

W11 File Explorer: Ctrl-1 then \\wsl\$ in the address box enables direct access to UL filespace UL: cd /mnt/c/Users likewise enables direct access to W11 user filespace UL: sudo apt install dos2unix; This utility must be used to reformat any text files that have been prepared in W11 and ported to UL, using syntax dos2unix filename

MySQL installation and initial setup

 $\begin{array}{l} UL: \mbox{sudo apt install mysql-server} \\ UL: \mbox{mysql --version} \rightarrow \mbox{mysql Ver 8.0.36-0ubuntu0.22.04.1 for Linux on x86_64} \\ ((Ubuntu)) \\ UL: \mbox{sudo service mysql start} \\ UL: \mbox{sudo mysql} \\ MS: \mbox{CREATE DATABASE FamilyDB;} \\ MS: \mbox{CREATE USER 'Genealogist'@'localhost';} \\ MS: \mbox{GRANT ALL PRIVILEGES ON *.* TO 'Genealogist'@'localhost' WITH GRANT OPTION;} \\ MS: \mbox{exit} \rightarrow \mbox{Bye} \end{array}$

Python installation and initial setup

UL: python3 -V \rightarrow Python 3.10.12 UL: sudo apt install python3-pip UL: pip install mysql-connector-python \rightarrow Successfully installed mysql-connectorpython-8.3.0 UL: exit

Appendix 2. Source data preparation

For testing purposes I used the same dataset (based on *The Kingdon Family* Charts I-VIII) as my older Microsoft Access 2000 application, see <u>https://idealectic.com/idealectic/Genealogy.htm</u> This was read into Microsoft Excel 2000 in order to further refine the data model, resulting in worksheets {Persons, Spouses, Childes}:

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52 Kingdon01.4 Kingdon01.4.4 4 53 Kingdon01.4 Kingdon01.4.5 5 54 Kingdon01.4 Kingdon01.4.5 6 55 Kingdon01.4 Kingdon01.4.7 7 56 Kingdon01.4.8 8 5 57 Kingdon01.4.1 1 1 58 Kingdon01.4.2 2 4 4 >> I 1 58 Kingdon01.4.2 2 4	51 Kingdon01.4	Kingdon01.4.3	3								
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54 Kingdon01.4 Kingdon01.4.6 6 55 Kingdon01.4 Kingdon01.4.7 7 56 Kingdon01.4 Kingdon01.4.8 8 57 Kingdon01.4.81 Kingdon01.4.1 1 58 Kingdon01.4.81 Kingdon01.4.2 2 (▲)) Persons / Spouses \ Childes / ↓	53 Kingdon01.4	Kingdon01.4.5	5								
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Image: Antiperson of the state of the st	58 Kingdon01.4&1	Kingdon01.4.2	2								-
Poady	H + H Persons / Spouses) Child	es		•						•	
NCOUY	Ready								_		

These three worksheets were then saved as CSV files {Persons.csv, Spouses.csv, Childes.csv}:

Persons - Notepad				_		×
File Edit Format View Help						
Kingdon01.JK-11.Kingdon.John.John.1.1540.1596	5					^
Kingdon01&1. JoK-11.X. Joan. Joan.0. 1601						
Kingdon01.1.CK-10.Kingdon.Christopher.Christo	opher.1.1564.					
Kingdon01.1&1.EK-10.X.Elizabeth.Elizabeth.0	, , , , , , , , ,					
Kingdon01.1.1.EK-9.Kingdon.Elizabeth.Elizabet	h.0					
Kingdon01.2. JoK-10. Kingdon, Joanne, Joanne, 0, 15	67.					
Kingdon01.2&1.PG-10.Glade.Peter.Peter.1	· ·					
Kingdon01.3, JaK-10, Kingdon, Jane, Jane, 0, 1569,						
Kingdon01.4, JK-10, Kingdon, John, John, 1, 1572, 16	572					
Kingdon01.4&1,AK-10,X,Agnes,Agnes,0,,						
Kingdon01.4.1, E1K-9, Kingdon, Elizabeth, Elizabe	th,0,1621,					
Kingdon01.4.2, JK-9, Kingdon, John, John, 1, 1623, 1	691					
Kingdon01.4.2.1,CK-8,Kingdon,Christopher,Chri	stopher, 1, 1665, 1	685				
Kingdon01.4.2.2, JK-8, Kingdon, John, John, 1, 1670	,1710					
Kingdon01.4.2.2.1, ChK-7, Kingdon, Christopher, C	hristopher,1,169	7,1779				
Kingdon01.4.2.2.1&1,MC-7,Comyns,Mary,Mary,0,,	1783					
Kingdon01.4.2.2.1.1, JnK-6, Kingdon, John, John, 1	,1719,172x					
Kingdon01.4.2.2.1.2, MyK-6, Kingdon, Mary, Mary, 0	,1721,					
Kingdon01.4.2.2.1.2&1,WT-6,Tucker,William,Wil	liam,1,,					
Kingdon01.4.2.2.1.3,C1K-6,Kingdon,Christopher	,Christopher,1,1	723,17	2x			
Kingdon01.4.2.2.1.4, PK-6, Kingdon, Peter, Peter,	1,1725,1779					
Kingdon01.4.2.2.1.4&1,SR-6,Reedwood,Sarah,Sar	ah,0,,					
Kingdon01.4.2.2.1.4.1, JnK-5, Kingdon, John, John	1,1,1776,1862					
Kingdon01.4.2.2.1.4.1&1, EmiK-5, X, Emilia, Emili	a,0,,					
Kingdon01.4.2.2.1.4.1.1, EmiK-4, Kingdon, Emilia	,Emilia,0,1806,1	823				
Kingdon01.4.2.2.1.4.1.2, CarK-4, Kingdon, Caroli	ne,Caroline,0,18	07,				
Kingdon01.4.2.2.1.4.1.3,SCK-4,Kingdon,Stephen	na,Stephena Charl	otte,0	,1816,			
Kingdon01.4.2.2.1.4.1.4,DCK-4,Kingdon,Deborah	,Deborah Clariss	a,0,18	17,			~
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Spouses - Notepad				-	×
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Kingdon01,Kingdon01&1,1,1564					^
Kingdon01&1,Kingdon01,1,1564					
Kingdon01.1,Kingdon01.1&1,1,					
Kingdon01.1&1,Kingdon01.1,1,					
Kingdon01.2,Kingdon01.2&1,1,					
Kingdon01.2&1,Kingdon01.2,1,					
Kingdon01.4,Kingdon01.4&1,1,					
Kingdon01.4&1,Kingdon01.4,1,					
Kingdon01.4.2,Rowe.1,1,					
Kingdon01.4.2.2,Pooke.1,1,1695					
Kingdon01.4.2.2.1,Kingdon01.4.2.2.1&1,1,					
Kingdon01.4.2.2.1&1,Kingdon01.4.2.2.1,1,					
Kingdon01.4.2.2.1.2,Kingdon01.4.2.2.1.2&1,1,					
Kingdon01.4.2.2.1.2&1,Kingdon01.4.2.2.1.2,1,					
Kingdon01.4.2.2.1.4,Kingdon01.4.2.2.1.4&1,1,					
Kingdon01.4.2.2.1.4&1,Kingdon01.4.2.2.1.4,1,					
Kingdon01.4.2.2.1.4.1,Kingdon01.4.2.2.1.4.1&	1,1,				
Kingdon01.4.2.2.1.4.1&1,Kingdon01.4.2.2.1.4.	1,1,				
Kingdon01.4.2.2.1.5,Kingdon01.4.2.2.1.5&1,1,					
Kingdon01.4.2.2.1.5&1,Kingdon01.4.2.2.1.5,1					
Kingdon01.4.2.2.1.7,Kingdon01.4.2.2.1.7&1,1					
Kingdon01.4.2.2.1.7&1,Kingdon01.4.2.2.1.7,1					
Kingdon01.4.2.2.1.7.1,Kingdon01.4.2.2.1.7.1&	1,1				
Kingdon01.4.2.2.1.7.1&1,Kingdon01.4.2.2.1.7.	1,1				
Kingdon01.4.2.2.1.7.1.01,Kingdon01.4.2.2.1.7	.1.01&1,1				
Kingdon01.4.2.2.1.7.1.01&1,Kingdon01.4.2.2.1	.7.1.01,1				
Kingdon01.4.2.2.1./.1.01.3,Kingdon01.4.2.2.1	./.1.01.3&1,1				
Kingdon01.4.2.2.1.7.1.01.3&1,Kingdon01.4.2.2	.1./.1.01.3,1				~
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Childes - Notepad						×
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Kingdon@1 Kingdon@1 1 1						
Kingdon01, Kingdon01, 2, 2						-
Kingdon01, Kingdon01.2,2,						
Kingdon01, Kingdon01, 4, 4						
Kingdonel, Kingdonel, 4,4,						
Kingdon01, Kingdon01.5,5,						
Kingdon01, Kingdon01.6,6,						
Kingdon01, Kingdon01.7,7,						
Kingdon@1,Kingdon@1.0,0,						
Kingdonelai, Kingdonel.i,i,						
Kingdonolai, Kingdonol.2,2,						
Kingdonolai, Kingdonol. 5, 5,						
Kingdonolai, Kingdonol.4,4,						
Kingdonolai, Kingdonol.5,5,						
Kingdonolai, Kingdonol. 6,6,						
Kingdonolai, Kingdonol. 7, 7,						
Kingdonolai, Kingdonol. 8, 8,						
Kingdonol.1, Kingdonol.1.1, J. Default						
Kingdonol.lal, Kingdonol.l.l, j. Detault						
Kingdon01.4, Kingdon01.4.1, 1						
Kingdon01.4, Kingdon01.4.2,2						
Kingdon01.4, Kingdon01.4.5,5						
Kingdon01.4, Kingdon01.4.4,4						
Kingdon01.4, Kingdon01.4.5,5						
Kingdonol.4,Kingdonol.4.6,6						
Kingdonol.4, Kingdonol.4.7,7						
Kingdonol.4, Kingdonol.4.6, 6						
Kingdon01.401,Kingdon01.4.1,1						
KINGUONDI.401, KINGUONDI.4.2,2						~
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These three CSV files were then copied to the UL environment where they were uploaded to the MySQL database by means of Bash script FamilyDBSetup.sh, as follows:

UL: dos2unix * UL: chmod a+x * UL: sudo service mysql start UL: ./FamilyDBSetup.sh

#! /bin/bash # # What: Bash script FamilyDBSetup.sh # Where: FamilyDB # When: 8 March 2022 # Who: Roger Kingdon # Why: Script to create and populate FamilyDB tables # How: ./FamilyDBSetup.sh [rtn] # echo -e "SET GLOBAL local_infile = 1;" > tmp1.bat echo -e "USE FamilyDB;\n"\ "CREATE TABLE Persons (PerID VARCHAR(50) PRIMARY KEY, Mnemonic VARCHAR(50) NOT NULL, "\ "Surname VARCHAR(50) NOT NULL, KnownAs VARCHAR(50) NOT NULL, GivenNames VARCHAR(50) NOT NULL, "\ "Male BOOLEAN NOT NULL, Birth VARCHAR(50) DEFAULT '', Death VARCHAR(50) DEFAULT '');\n"\ "CREATE TABLE Spouses (Perid VARCHAR(50) NOT NULL, Spid VARCHAR(50) NOT NULL, "\ "Seq INTEGER NOT NULL, Notes VARCHAR(50) DEFAULT ''); $n^{(-)}$ "CREATE TABLE Childes (PerID VARCHAR(50) NOT NULL, ChID VARCHAR(50) NOT NULL, "\ "Seq INTEGER NOT NULL, Notes VARCHAR(50) DEFAULT '');\n"\ "LOAD DATA LOCAL INFILE 'Persons.csv' INTO TABLE Persons FIELDS TERMINATED BY ',';\n"\ "LOAD DATA LOCAL INFILE 'Spouses.csv' INTO TABLE Spouses FIELDS TERMINATED BY ',';\n"\ "LOAD DATA LOCAL INFILE 'Childes.csv' INTO TABLE Childes FIELDS TERMINATED BY ',';"\ > tmp2.bat mysql --local_infile=1 -u Genealogist < tmp1.bat</pre> mysql --local_infile=1 -u Genealogist < tmp2.bat</pre> rm tmp*.bat

Appendix 3. WriteTree.py script

WriteTree.py may be executed in the UL environment as follows: UL: sudo service mysql start UL: ./WriteTree.py

```
#! /usr/bin/python3
# What: Python script WriteTree.py
# Where: FamilyDB
# When: 8 March 2022
# Who: Roger Kingdon
# Why: Writes family tree for nominated person to nominated output file
# How: Specify user-defined parameters; ./WriteTree.py [rtn]
#
# User-defined parameters
# blnTree = True or False generates family tree headed by an ancestor or a
descendant respectively
# strHead is the head person ID (e.g. "Kingdon01" or "Kingdon06.1.2.2.2" for
blnTree = True or False respectively)
# strFile is the output file name
#
blnTree = True
strHead = "Kingdon01"
strFile = "Family.txt"
# End of user-defined parameters
#
#
# Spouses: Returns a text string naming nominated person and their spouse(s)
#
def Spouses(strID):
  strQ = "SELECT * FROM Persons WHERE Persons.PerID='" + strID + "'"
  cursor.execute(strQ)
  strRT = cursor.fetchall()
  for strR in strRT:
    strS = "[" + strR[1] + "] " + strR[4] + " " + strR[2]
    strB = strR[6]
    strD = strR[7]
   blnBD = False
    if (strB != ""):
      strB = strB[-4:]
      blnBD = True
    if (strD != ""):
      strD = strD[-4:]
      blnBD = True
    if (blnBD):
      strS = strS + " (" + strB + "-" + strD + ")"
#
  strQ = "SELECT Persons.*, Spouses.Seq FROM Spouses INNER JOIN Persons ON
Spouses.SpID = Persons.PerID WHERE Spouses.PerID='" + strID + "' ORDER BY
Spouses.Seq"
  cursor.execute(strQ)
  strRT = cursor.fetchall()
  for strR in strRT:
    strS = strS + " m" + str(strR[8]) + " [" + strR[1] + "] " + strR[4] + " " +
strR[2]
   strB = strR[6]
   strD = strR[7]
   blnBD = False
    if (strB != ""):
      strB = strB[-4:]
```

```
blnBD = True
    if (strD != ""):
      strD = strD[-4:]
      blnBD = True
    if (blnBD):
      strS = strS + " (" + strB + "-" + strD + ")"
#
 return strS
#
# End of Spouses
#
#
# WriteGens: Recursively writes related generations of nominated person to
nominated output file
#
def WriteGens(strGen0, strID0):
 strGen = strGen0 + ","
  if (blnTree):
   strQ = "SELECT Childes.ChID FROM Childes WHERE Childes.PerID='" + strID0 +
" ' ORDER BY Childes.Seq"
  else:
    strQ = "SELECT Childes.PerID FROM Childes INNER JOIN Persons ON
Childes.PerID = Persons.PerID WHERE Childes.ChID='" + strIDO + "' ORDER BY
Persons.Male DESC"
 cursor.execute(strQ)
  strRT = cursor.fetchall()
  for strR in strRT:
   strID = strR[0]
    txtOut.write(strGen + Spouses(strID) + "\n")
   WriteGens(strGen, strID)
#
# End of WriteGens
#
#
# Start of WriteTree.py execution
#
from mysql.connector import connect
connection = connect(host="localhost", user="Genealogist", database="FamilyDB")
cursor = connection.cursor()
txtOut = open(strFile, "a+")
#
strGen = ""
strQ = "SELECT PerID FROM Persons WHERE Persons.PerID='" + strHead + "'"
cursor.execute(strQ)
strRT = cursor.fetchall()
for strR in strRT:
 strID = strR[0]
  if (strID == strHead):
    txtOut.write(strGen + Spouses(strID) + "\n")
    WriteGens(strGen, strID)
#
txtOut.close()
cursor.close()
connection.close()
#
# End of WriteTree.py execution
#
```

Appendix 4. Sample output

Running Python script WriteTree.py generates output file Family.txt:



Family - Notepad				-		×
File Edit Format View Help						
[JK-11] John Kingdon (1540-1596) m1 [JoK-1 ,[CK-10] Christopher Kingdon (1564-) m1 [E	1] Joan X (-1601 K-10] Elizabeth) X				^
[]oK 10] looppo Kingdon (1567) m1 [PC 10	1 Poton Glada					
[]aK_10]]ane Kingdon (1569_)	J receir diade					
[JK-10] John Kingdon (1572-1672) m1 [AK-1	01 Agnes X					
[E1K-9] Elizabeth Kingdon (1621-)	of ABres A					
.[JK-9] John Kingdon (1623-1691) m1 [JR-9] Jane Rowe					
,,,[CK-8] Christopher Kingdon (1665-1685)	,					
,,,[JK-8] John Kingdon (1670-1710) m1 [MP-	8] Mary Pooke					
,,,,[ChK-7] Christopher Kingdon (1697-1779) m1 [MC-7] Mary	Comyns (-1783)			
,,,,,[JnK-6] John Kingdon (1719-172x)						
,,,,,[MyK-6] Mary Kingdon (1721-) m1 [WT-6] William Tucker					
,,,,,[C1K-6] Christopher Kingdon (1723-172	x)					
,,,,,[PK-6] Peter Kingdon (1725-1779) m1 [SR-6] Sarah Reed	wood				
,,,,,[JnK-5] John Kingdon (1776-1862) m1	[EmiK-5] Emilia	X				
,,,,,,[EmiK-4] Emilia Kingdon (1806-1823)						
,,,,,,[CarK-4] Caroline Kingdon (1807-)	(1916)					
[DCK 4] Debeneh Clamissa Kingdon (1	(1010-)					
[GK_6] Grace Kingdon (1727_) m1 [RC_6	1 Rogen (nemen					
[AK-6] Ann Kingdon (1733-173x)	J Roger cremer					
[C2K-6] Christopher Kingdon (1739-) m	1 [CD-6] Charity	Dark				
[JhnK-5] John Kingdon (1793-) m1 [TM	-51 Thomasin Mau	nder				
,,,,,,[SaCK-4] Samuel Comyns Kingdon (181	9-) m1 [BR-4] Be	tsy Redda	way			
,,,,,,,[WRK-3] William Reddaway Kingdon (1851-)					
,,,,,,,[ElJK-3] Elizabeth Jane Kingdon (1	853-)					
,,,,,,,[LyK-3] Lucy Kingdon m1 [WF-3] Wil	liam Fisher					~
	Ln 1, Col 1	100%	Unix (LF)	UTF	-8	

Once it has been copied to the W11 user filespace, Family.txt may be opened in Microsoft Excel (with comma-delimited fields) to display the family tree as a transposed generation table:

Micro	osoft Excel - Famil	у										- 0	×
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0 🚅	8 8 R V	X 🖻 f	1 🝼 🗠	- C4 - 🧕	Σ f* 2		4 100%	• 🛛 🗸	10 - B		🕭 - <u>A</u>	· •	» •
A1	-	= [JK-11]	John Kingo	lon (1540-1	1596) m1 [J	oK-11] Joan	X (-1601)						
	A B	С	D	E	F	G	Н	I	J	K	L	М	N
1 [JK-1	11] John Kingdor	(1540-159	6) m1 [JoK-	11] Joan X	(-1601)								
2	[CK-10] C	hristopher I	Kingdon (15	64-) m1 [E	K-10] Eliza	beth X							
3		[EK-9] Eli	zabeth King	don									
4	[JoK-10] J	loanne King	don (1567-)	m1 [PG-1	0] Peter Gla	ade							
5	[JaK-10] J	lane Kingdo	on (1569-)										
6	[JK-10] Jo	hn Kingdor	n (1572-1672	2) m1 [AK-	10] Agnes)	<							
7		[E1K-9] E	lizabeth Kir	gdon (162	1-)								
8		[JK-9] Joh	in Kingdon (1623-1691) m1 [JR-9]	Jane Rowe							
9			[CK-8] Ch	ristopher K	ingdon (166	5-1685)							
10			[JK-8] Joh	n Kingdon	(1670-1710) m1 [MP-8]	Mary Pook	te					
11		_		[ChK-7] C	hristopher I	Kingdon (16	97-1779) m	1 [MC-7] N	Mary Comy	ns (-1783)		_	
12					[JnK-6] Jo	hn Kingdon	(1719-172x	:)					_
13					[MyK-6] N	lary Kingdo	n (1721-) m	1 [WT-6] \	Villiam Tuo	ker			
14		-			[C1K-6] C	hristopher k	Kingdon (172	23-172x)					
15					[PK-6] Pe	ter Kingdon	(1725-1779) m1 [SR-	6] Sarah R	eedwood			
16						[JnK-5] Jo	hn Kingdon	(1776-186	2) m1 [Em	iK-5] Emilia X	(
17							[EmiK-4] E	milia King	don (1806-	1823)			
18							[CarK-4] C	aroline Kir	ngdon (180	7-)			
19							[SCK-4] St	ephena C	harlotte Kir	igdon (1816-)			
20					101/ 01 0	10.1	[UCK-4] De	eborah Cla	arissa King	don (1817-)			
21					[GK-6] Gr	ace Kingdoi	1 (1/2/-) m	1 [RC-6] R	oger Crem	er			
22					[AK-6] An	n Kingdon (1/33-1/3x)			-			
23					[C2K-6] C	hristopher H	Lingdon (17.	39-) m1 [C	D-6 Charit	y Dark			
24						[JNNK-5] J	onn Kingdor	1 (1/93-) r	n1 [INI-5] I	nomasin Ivia	under		
25							[SaUK-4] S	samuel Co	myns King	aon (1819-) n	n1 [BR-4]	Betsy Red	Jaway
20								[VVRK-3]	vvilliam Re	ddaway Kingo	4962 \)	
21								[EIJK-3] E	zuzabeth Ja	arie Kingdon (1053-)		
20	a) e d. ([Lyn-3] L	ucy Kingao	n mi [VVF-3]	vvillam F	sner	▼
	Family/						Le						
Ready													

This is the required output.