

Making Audit Trails Accessible for the CE Quarterly Interview Survey

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CE Methods Symposium
July 17, 2018



Making **Audit Trails** Accessible

- Record of all navigation and data transactions within the instrument
- Built into the Blaise programming language
- Raw audit trail files are provided for each case for a given month

```
"6/12/2018 7:46:31 AM","Enter Field:Sect09.TableA.Row[1].Amount","Status:Normal","Value:"
```

```
"6/12/2018 7:46:41 AM","Action:Store Field Data","Field:Sect09.TableA.Row[1].Amount"
```

```
"6/12/2018 7:46:41 AM","Leave Field:Sect09.TableA.Row[1].Amount","Cause:Next Field",  
"Status:Normal", "Value:32"
```

Example Audit Trail

"6/12/2018 7:34:45 AM", "Leave Field:Sect03.Sect3A2.OTHERHOM", "Cause:Next Field", "Status:Normal", "Value:2"

"6/12/2018 7:34:45 AM" "Enter Field:Sect03.Sect3A2.BUSPROP3", "Status:Normal", "Value:2"

"6/12/2018 7:34:45 AM" "Leave Field:Sect03.Sect3A2.BUSPROP3", "Cause:Next Field", "Status:Normal", "Value:2"

"6/12/2018 7:34:45 AM" "Enter Field:Sect03.Sect3A2.RESBUSPR", "Status:Normal", "Value:2"

"6/12/2018 7:34:45 AM", "Leave Field:Sect03.Sect3A2.RESBUSPR", "Cause:Next Field", "Status:Normal", "Value:2"

"6/12/2018 7:34:45 AM" "Enter Field:Sect03.Sect3A2.SECHOME", "Status:Normal", "Value:1"

"6/12/2018 7:34:45 AM" "Leave Field:Sect03.Sect3A2.SECHOME", "Cause:Next Field", "Status:Normal", "Value:1"

"6/12/2018 7:34:45 AM" "Enter Field:Sect03.Sect3A2.SEC_NUM", "Status:Normal", "Value:1"

"6/12/2018 7:34:46 AM", "Leave Field:Sect03.Sect3A2.SEC_NUM", "Cause:Next Field", "Status:Normal", "Value:1"

"6/12/2018 7:34:46 AM" "Enter Field:Sect03.Sect3A2.NOBUILD", "Status:Normal", "Value:2"

"6/12/2018 7:34:46 AM" "Leave Field:Sect03.Sect3A2.NOBUILD", "Cause:Next Field", "Status:Normal", "Value:2"

"6/12/2018 7:34:46 AM" "Enter Field:Sect03.Sect3A2.NOLONGER", "Status:Normal", "Value:1"

"6/12/2018 7:34:46 AM", "Leave Field:Sect03.Sect3A2.NOLONGER", "Cause:Next Field", "Status:Normal", "Value:1"

"6/12/2018 7:34:46 AM" "Enter Field:Sect03.Sect3A2.NUMPRPTY", "Status:Normal", "Value:1"

*Does not contain actual respondent data

In what month did you make the first payment on this mortgage?

- 1. January
- 2. February
- 3. March
- 4. April
- 5. May
- 6. June
- 7. July
- 8. August
- 9. September
- 10. October
- 11. November
- 12. December

Section 3, Part F - Mortgages and Lump Sum Home Equity Loans

Prop #	<input type="text" value="1"/>	Mortgage Term	<input type="text"/>	Current Interest	
Prop Desc.	<input type="text" value="Sample Unit"/>	Other Mortgage		Fixed Rate	
Loan Number	<input type="text" value="101"/>			Loan Type	
Continue/Delete	<input type="text" value="1"/>			Other loan type	
Refinance	<input type="text" value="2"/>				
Payment Year	<input type="text" value="2018"/>			Payment Includes	
Payment Month	<input type="text" value="2"/>			Payments Specify	
Original Mortgage	<input type="text"/>				



What was the amount of this mortgage when you obtained it, not including any interest?

What Happened

Datetime Stamp

"6/12/2018 7:24:12 AM", "Enter Field: Sect03.Properties[1].Sect3E.MORTGAGES[1].ORGMRTX", "Status:Normal", "Value:"

Status

Value

Which Field

Section 3, Part F - Mortgages and Lump Sum Home Equity Loans

Prop #	1	Mortgage Term	
Prop Desc.	Sample Unit	Other Mortgage	
Loan Number	101		
Continue/Delete	1		
Refinance	2		
Payment Year	2018		
Payment Month	2		
Original Mortgage	\$250,000		



Is this a 30 year mortgage, a 15 year mortgage, or something else?

- 1. 30-year
- 2. 15-year
- 3. Something else

Entered Field

Section 3, Part F - Mortgages and Lump Sum Home Equity Loans

Prop #	1	Mortgage Term	
Prop Desc.	Sample Unit	Other Mortgage	
Loan Number	101		
Continue/Delete	1		
Refinance	2		
Payment Year	2018		
Payment Month	2		
Original Mortgage	\$250,000		

Data Were Recorded

Exited Field

"6/12/2018 7:24:12 AM", "Enter Field:
Sect03.Properties[1].Sect3E.MORTGAGES[1].ORGMRTX",
"Status:Normal", "Value:"

"6/12/2018 7:24:47 AM", "Action:Store Field Data",
"Field:Sect03.Properties[1].Sect3E.MORTGAGES[1].ORGMR
TX"

"6/12/2018 7:24:47 AM", "Leave Field:
Sect03.Properties[1].Sect3E.MORTGAGES[1].ORGMRTX", "
Cause:Next Field", "Status:Normal", "Value:250000"

Making Audit Trails Accessible

- How long did it take to answer the question?
- Was the answer changed?
- Were any errors triggered?
- Did the interviewer access any help materials?
- Did the interviewer come back to this question later?

"6/12/2018 7:24:12 AM Sect03.Properties[1].Sect3E.MORTGAGE [1].ORGMRTX", "Status:Normal", "Value:"

"6/12/2018 7:24:47 AM" "Action:Stop 250000 ta", "Field:Sect03.Properties[1].ORGMR TX"

"6/12/2018 7:24:47 AM Sect03.Properties[1].Sect3E.MORTGAGES[1].ORGMRTX", "Cause:Next Field", "Status:No Value:250000"

Yes.
Value was added



Making Audit Trails Accessible

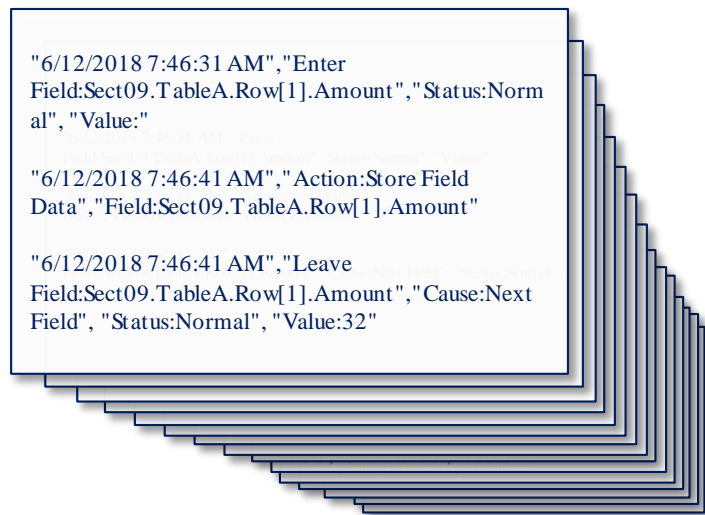
■ Chan, Ho, Kang, Smith, & Tan (2004)

- Used SAS to parse audit trail files into four tables
- Prepared documentation for the audit trail tables
- Conducted several analyses
- Explored the idea of creating a long-term storage for future months of audit trail files

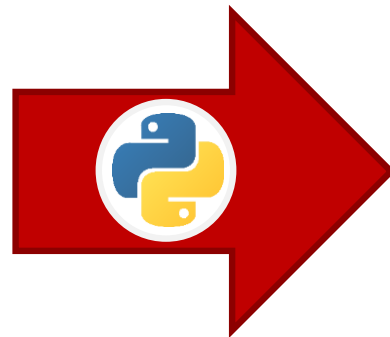
■ Priorities changed and no further work was completed using the parsing program or the created datasets

Making Audit Trails Accessible

- This project looked to reprise the Chan et al. (2004) work with some modern updates
- The goal is to encourage researchers in the CE program to make use of the audit trail data to answer questions related to their branch
- Wrote a script that converts raw audit trail files into five rectangular datasets for easier analysis



"6/12/2018 7:46:31 AM", "Enter
Field:Sect09.TableA.Row[1].Amount", "Status:Normal", "Value:"
"
"6/12/2018 7:46:41 AM", "Action:Store Field
Data", "Field:Sect09.TableA.Row[1].Amount"
"
"6/12/2018 7:46:41 AM", "Leave
Field:Sect09.TableA.Row[1].Amount", "Cause:Next
Field", "Status:Normal", "Value:32"



Five Linked Tables



Case Table

Consumer unit for one month



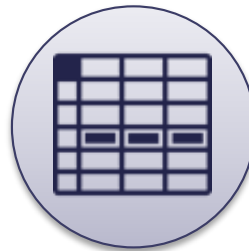
Form Table

Instance where the instrument was opened and closed for a case



Field Table

Interaction with a data field in the instrument



Action Table

Audit trail line containing the "Action" keyword



Error Table

Triggered error and its resolution

Making Audit Trails Accessible

00000102.adt

"1/11/2018 10:06:57 AM","Enter Form:1","Key:00000102"
... *Stuff happening*
... *Stuff happening*
"1/11/2018 10:09:56 AM","Leave Form:1",
"Key:00000102"

"1/13/2018 11:19:56 AM","Enter Form:1","Key:00000102"
... *Stuff happening*
... *Stuff happening*
"1/13/2018 12:45:18 AM","Leave
Form:1","Key:00000102"

00000103.adt

"1/09/2018 06:19:56 PM","Enter Form:1","Key:00000103"
... *Stuff happening*
... *Stuff happening*
"1/09/2018 08:45:18 PM","Leave Form:1","Key:00000103"

Form Table

fprimary	month	year	order_entr	datetime_enter	order_leave	datetime_leave
p00000102	1	2018	1	1/11/2018 10:06:57 AM	42	1/11/2018 10:09:56 AM
p00000102	1	2018	43	1/13/2018 11:19:56 AM	1092	1/13/2018 12:45:18 AM
p00000103	1	2018	1	1/9/2018 06:19:56 PM	2832	1/9/2018 08:45:18 PM

Making Audit Trails Accessible






■ Some Quick Stats (August 2017)

■ Raw Audit Trail Files:
3,993

■ Recorded Events:
3,756,625

■ Mean Events per Case:
▶ Complete: 1,662
▶ Incomplete: 163

■ Time to Parse:
8h 39m 24s

		Number of Rows	File Size
	Case Table	3,993	0.7 MB
	Form Table	16,950	1.4 MB
	Field Table	1,247,006	181.6 MB
	Action Table	853,618	73.2 MB
	Error Table	11,652	2.1 MB
	Total	2,133,219	259.0 MB

Making Audit Trails Accessible

- In addition to the parsing script, we have produced documentation for the newly created data tables
- Five tables will be produced for each month going forward
- Past months/years could be converted upon request or when time permits (more than 10 years' worth)
- Tables will be stored as .csv files on secured share drive
- Establish code repository
 - ▶ Reading in files
 - ▶ Simple calculations (e.g., section/question timing)



Keeping Audit Trails Going

- We don't want this project to suffer the same fate as Chan et al.
- We are building this pipeline for parsing audit trail files for CE Staff
- We are committed to knocking down barriers to CE Staff working with the parsed audit trails tables
 - ▶ Education/orientation
 - ▶ Providing sample analysis code
 - ▶ Generating research ideas



Making Audit Trails Useful

(Some Examples)

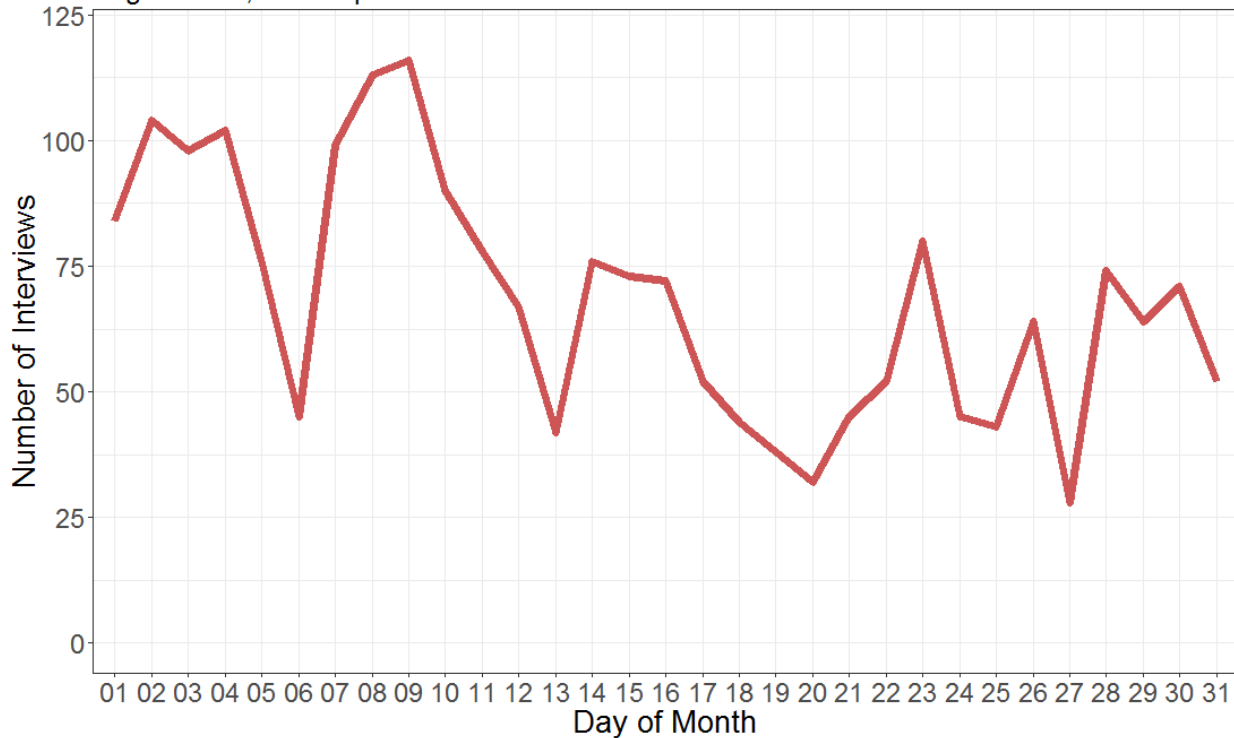




Form Table

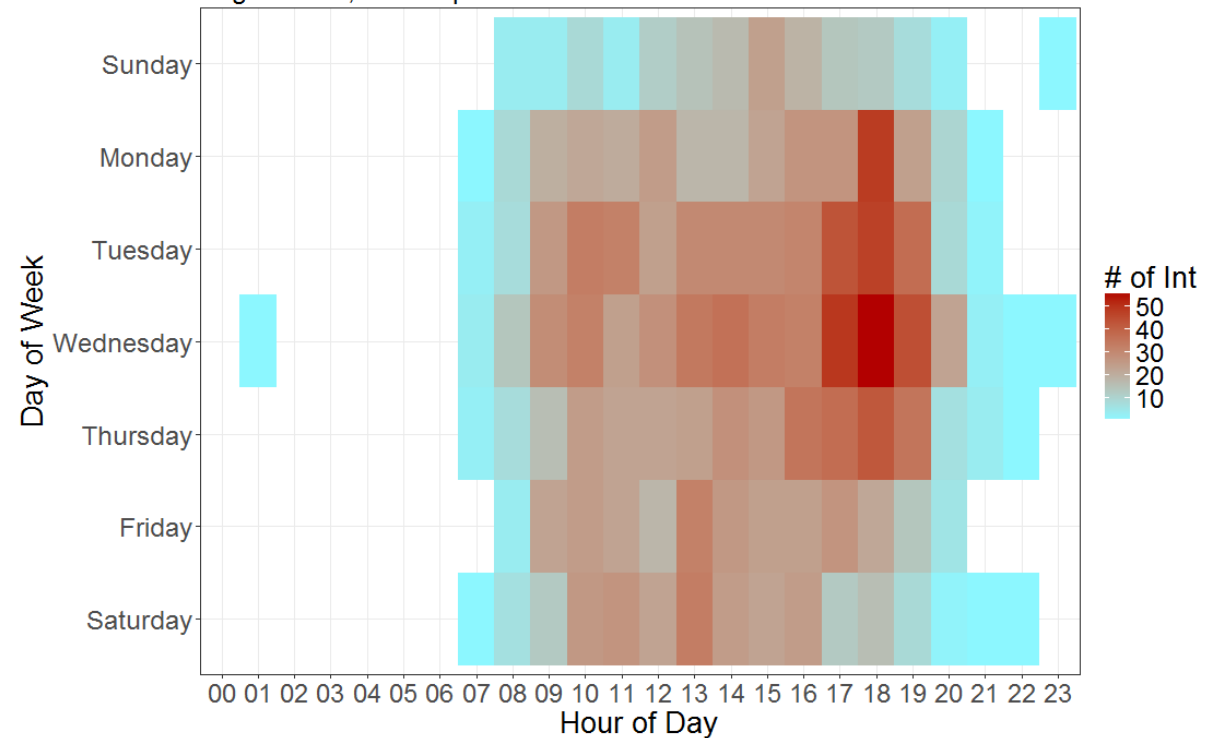
Long Case Work by Day of the Month

August 2017, Form Open > 30 Mins.



Long Case Work by Day of the Week and Hour of Day

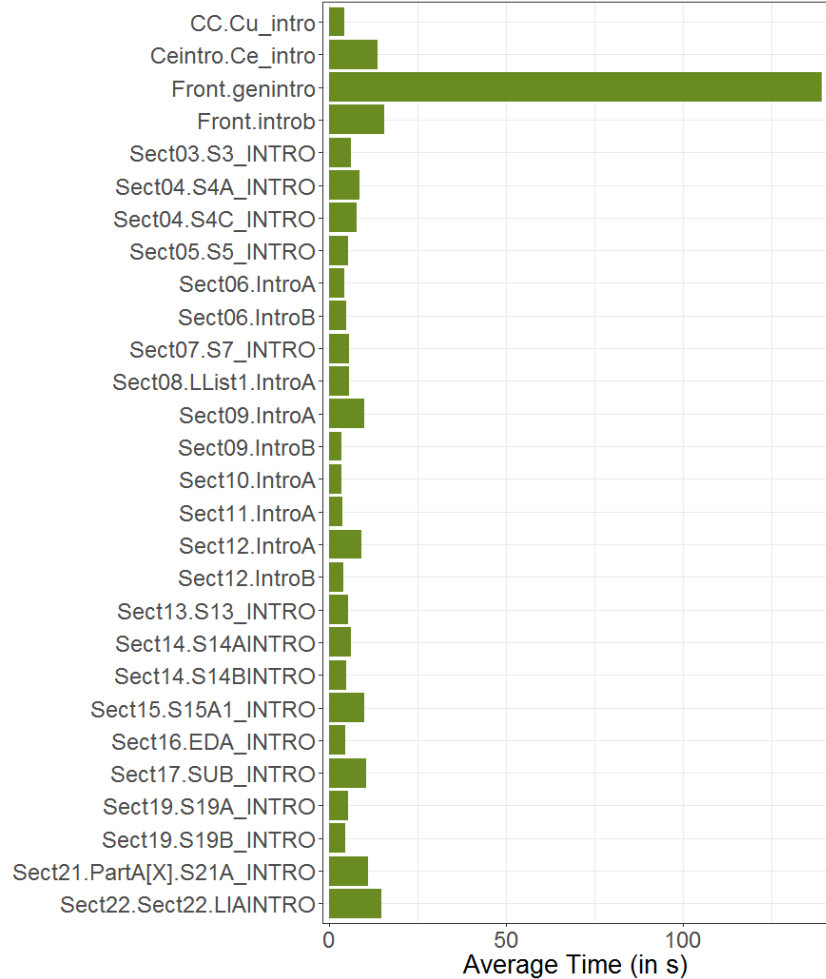
August 2017, Form Open > 30 Mins.





Field Table

Time Spent Reading Instructions
August 2017



◆ Do not read as worded below

◆ Identify yourself - show I.D.

◆ Ask for eligible respondent

◆ Introduce survey - adjust introduction to last interview's status and respondent

◆ The Household address is:
5034 Blue Ct

◆ Read if necessary

I am (your name) from the US Census Bureau. Here is my identification card. We are conducting a Consumer Expenditure survey for the Bureau of Labor Statistics. I have some questions I would like to ask you.

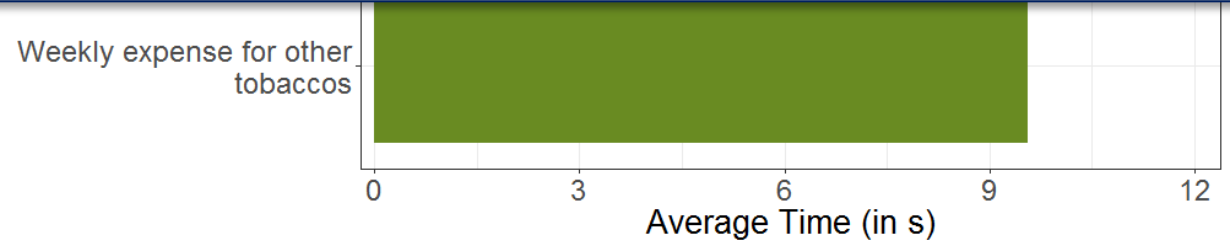
Did you receive our letter?

1. Yes

2. No

3. Non-interview

Have
W
Have
p
tot

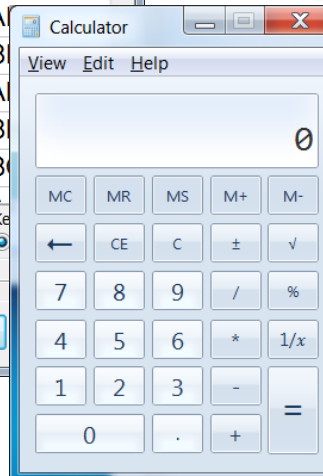
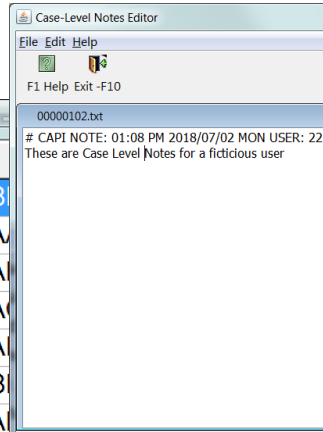




Action Table

Ford-Related Search Terms

Question	Count
FORD 500	FORB
FORD AEROSTAR	FORA
FORD ASPIRE	FORA
FORD BRONCO	FORA
FORD BRONCO II	FORA
FORD C-MAX	FORB
FORD CLUB WAGON	FORA
FORD CONTOUR	FORA
FORD COUNTRY SQUIRE	FORA
FORD CROWN VICTORIA	FORA
FORD E-SERIES (VAN)	FORB
FORD ECO	FORA
FORD EDGE	FORB
FORD ESCA	FORB
FORD ESC	FORA
1073	14



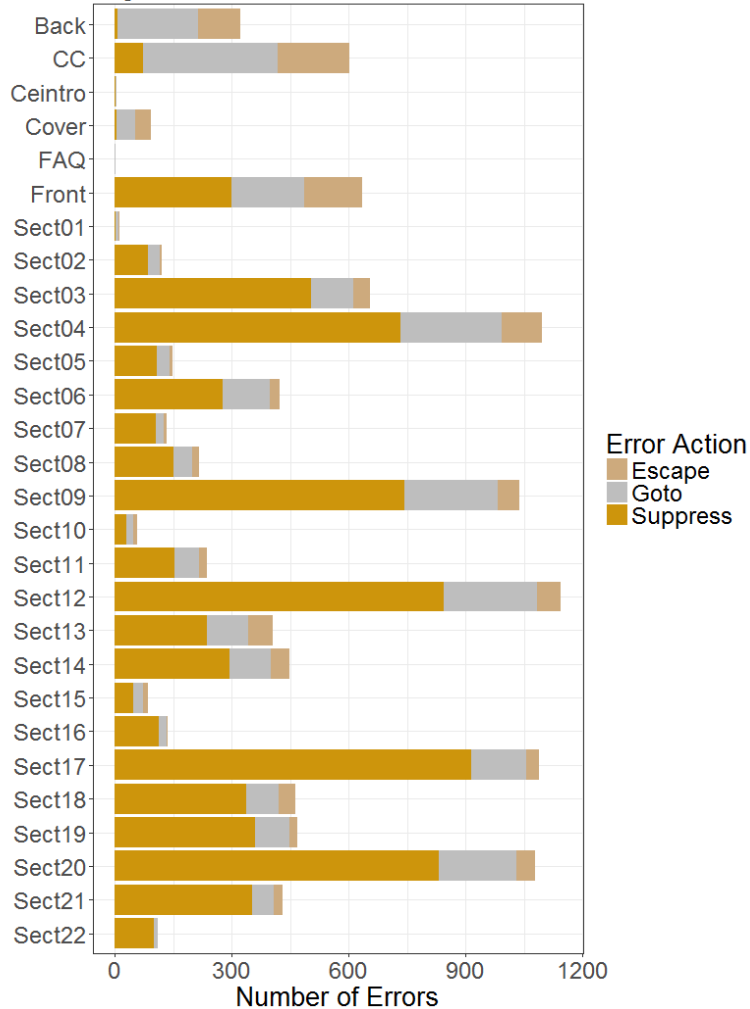
fo	ford f1502
for	ford focus
ford	ford free
ford 150	ford freestar
ford 500	ford fs
ford edg	ford fusio
ford escape	ford mus
ford ex	ford pick
ford excurs	ford ran
ford excursi	ford rang
ford exp	ford suber
ford explor	ford t
ford f	ford ta
ford f-250	ford tau
ford f 250	ford u





Error Table

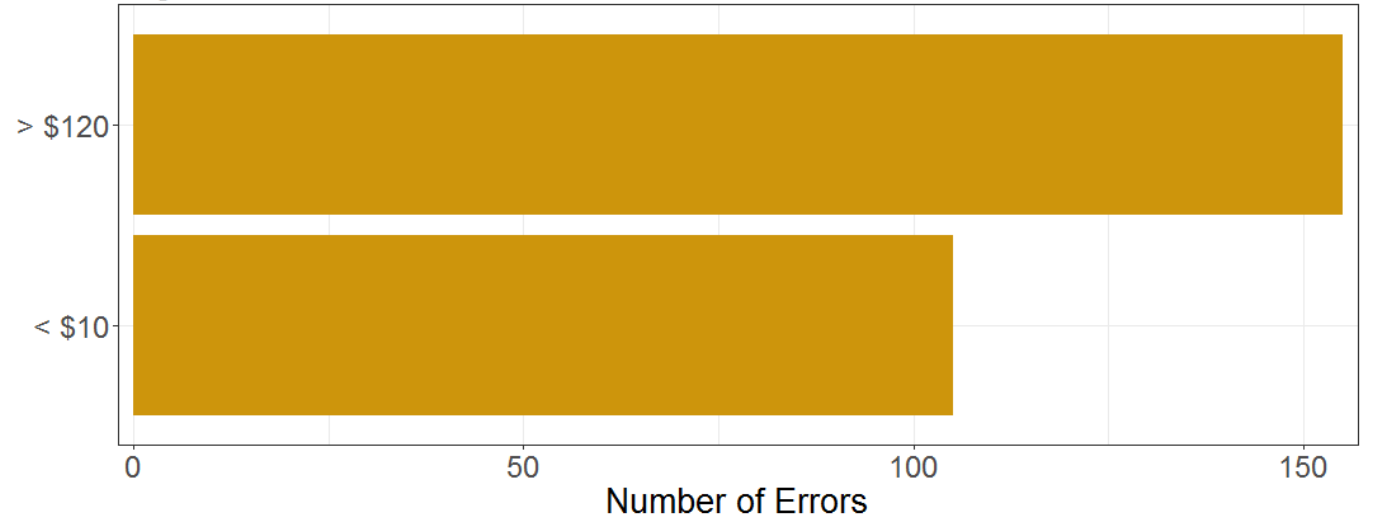
Count of Errors by Section
August 2017



Questions That Trigger the Most Errors

Question	Error Text	Count
Sect20.DINE_WKX	THE VALUE ENTERED IS UNUSUALLY HIGH OR LOW PLEASE VERIFY	260
Sect09.TableA.Row[1].Amount	THE VALUE ENTERED IS UNUSUALLY HIGH OR LOW PLEASE VERIFY	254
Sect12.TableA.Row[1].Amount	THE VALUE ENTERED IS UNUSUALLY HIGH OR LOW PLEASE VERIFY	247
Sect20.SECT20B.SALONX	THE VALUE ENTERED IS UNUSUALLY HIGH OR LOW PLEASE VERIFY	162
Sect20.OTHSTUF	THE VALUE ENTERED IS UNUSUALLY HIGH OR LOW PLEASE VERIFY	157

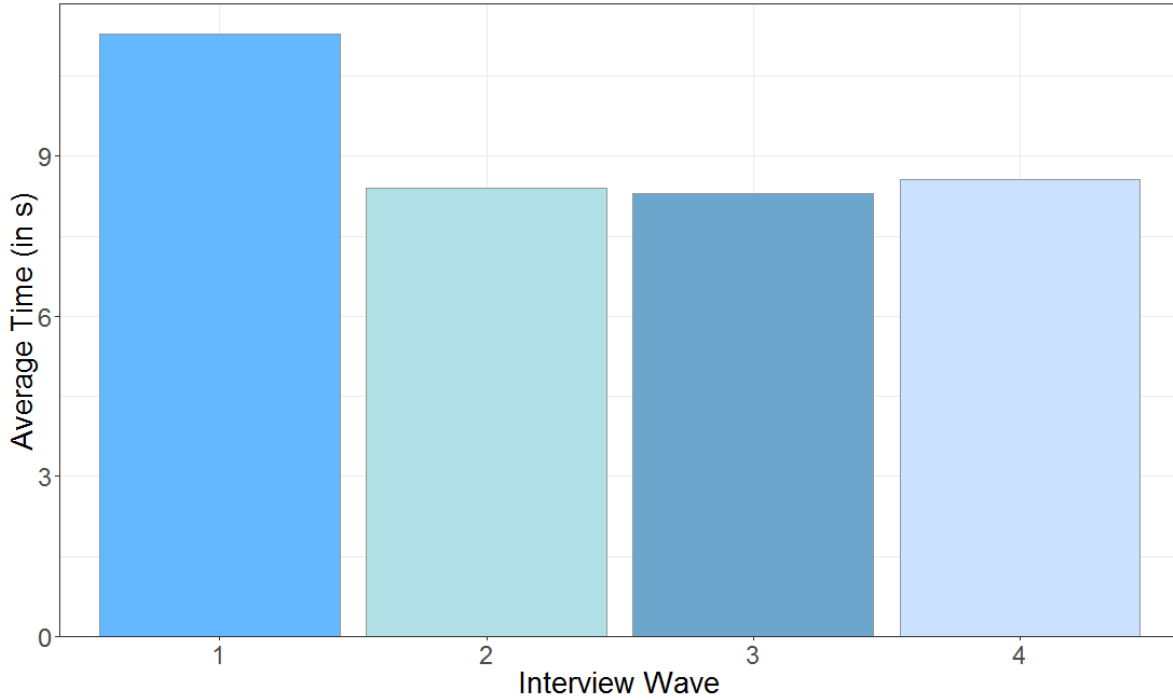
Range Errors for DINE_WKX
August 2017



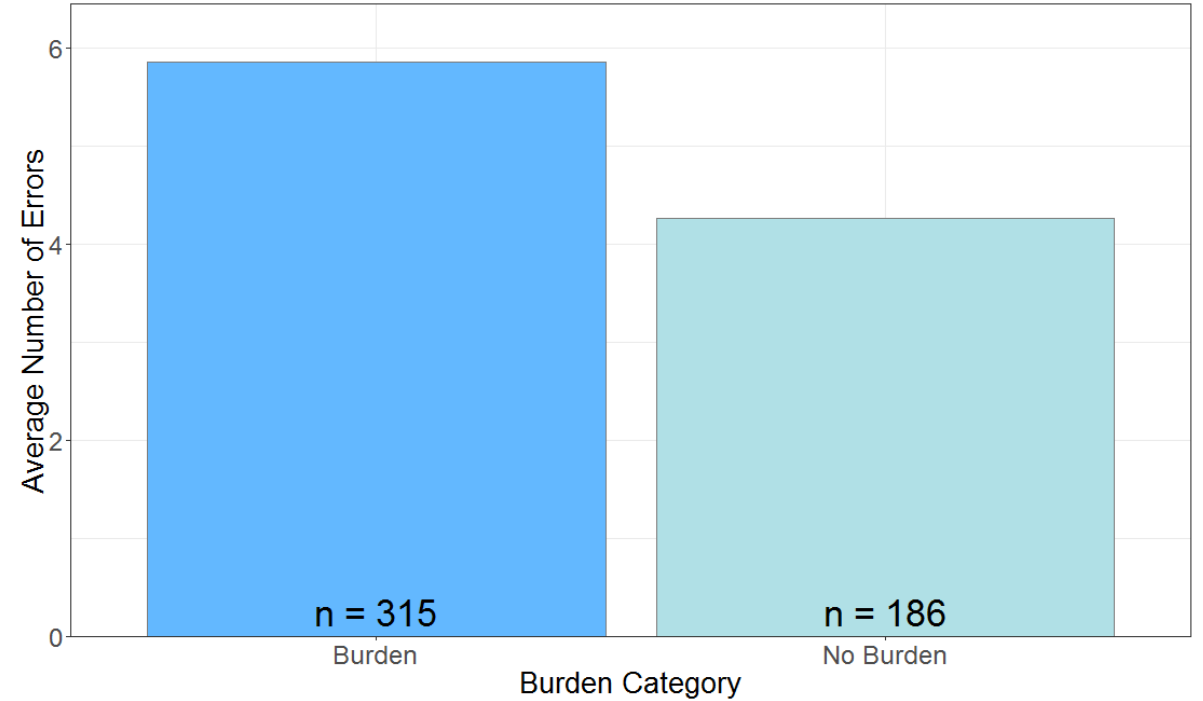


Case Table

Average Time Spent Reading Instructions by Wave
August 2017, Complete Interviews Only



Errors Triggered by Burden Category
August 2017, 4th Wave Completed Interviews Only



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