

# Making Audit Trails Accessible for the CE Quarterly Interview Survey

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CE Methods Symposium  
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# 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)

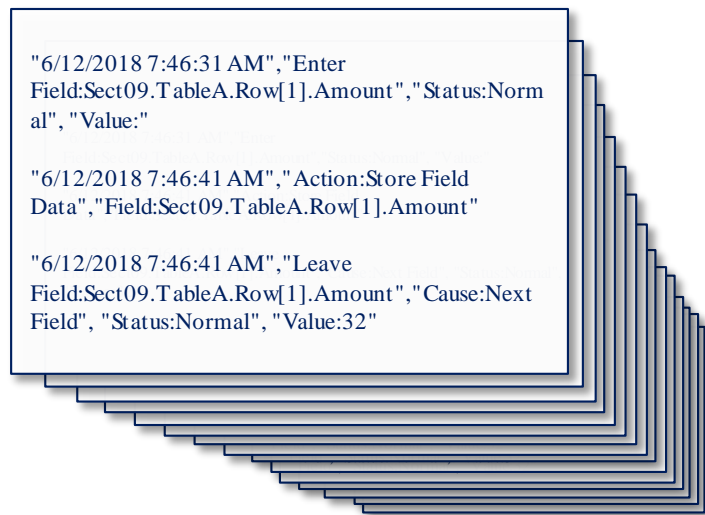
- Used SAS to parse audit trail files into four tables
- Prepared documentation for the audit trail tables
- Conducted several analyses
- Explored the idea of creating a long-term storage for future months of audit trail files

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

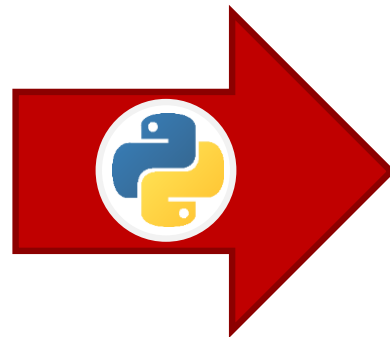


# Making Audit Trails Accessible

- 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"
```

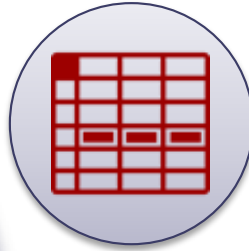


# Five Linked Tables



## Case Table

Consumer unit for one month



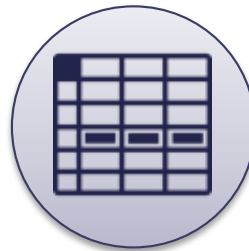
## Form Table

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_entrer | 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          |
|  | <b>Total</b> | <b>2,133,219</b> | <b>259.0 MB</b> |

# 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)

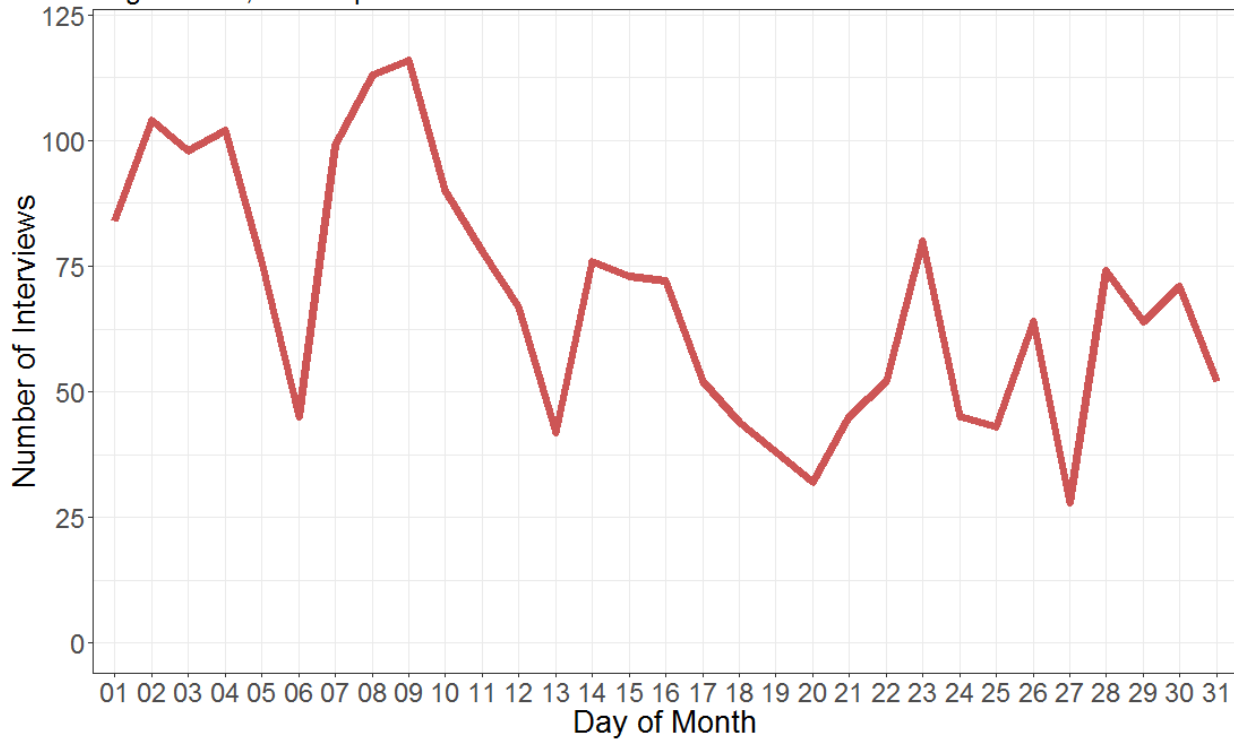




# Form Table

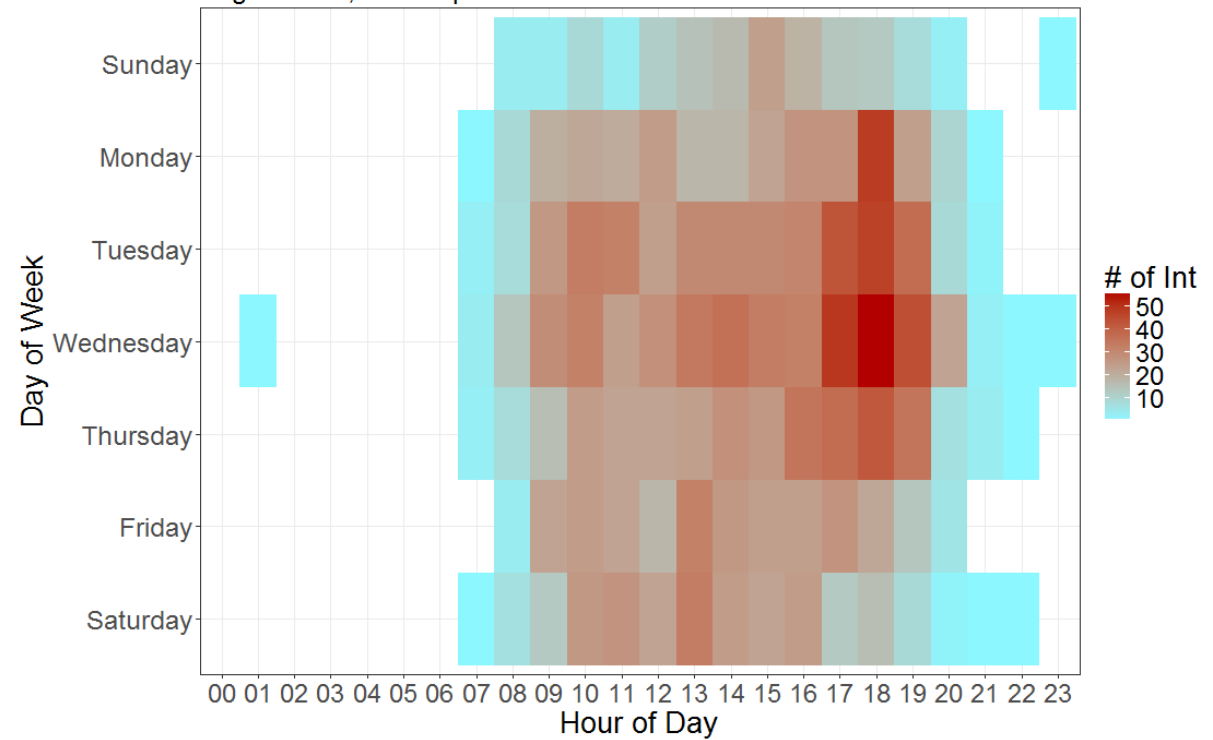
### Long Case Work by Day of the Month

August 2017, Form Open > 30 Mins.



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

August 2017, Form Open > 30 Mins.

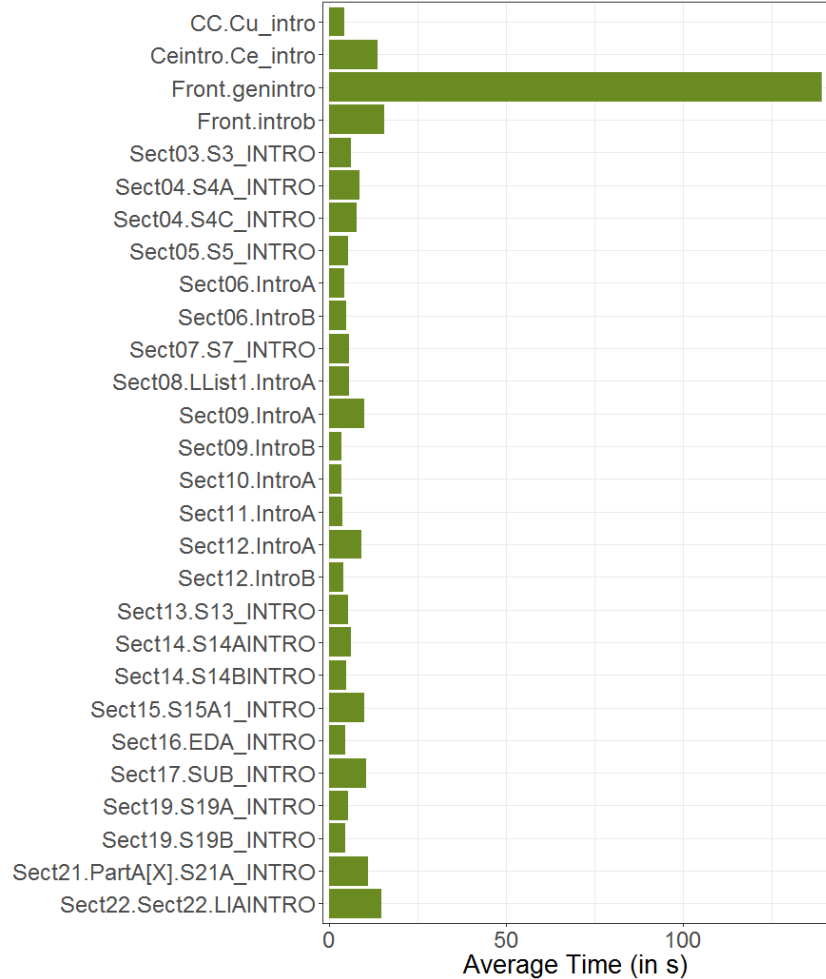






# Field Table

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.

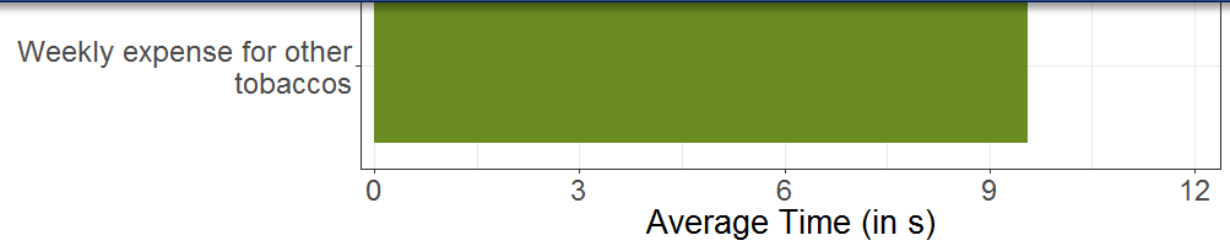
Did you receive our letter?

1. Yes

2. No

3. Non-interview

Have  
W  
Have  
p  
tot





# Action Table

## Ford-Related Search Terms

| Question  | Count |      |          |      |               |      |             |      |             |      |                |      |            |      |                 |      |              |      |                     |      |                     |      |                     |      |          |      |           |      |           |      |          |      |      |
|---|-------|------|----------|------|---------------|------|-------------|------|-------------|------|----------------|------|------------|------|-----------------|------|--------------|------|---------------------|------|---------------------|------|---------------------|------|----------|------|-----------|------|-----------|------|----------|------|------|
| <table border="1"> <thead> <tr> <th>Name</th> <th>Code</th> </tr> </thead> <tbody> <tr><td>FORD 500</td><td>FORB</td></tr> <tr><td>FORD AEROSTAR</td><td>FORA</td></tr> <tr><td>FORD ASPIRE</td><td>FORA</td></tr> <tr><td>FORD BRONCO</td><td>FORA</td></tr> <tr><td>FORD BRONCO II</td><td>FORA</td></tr> <tr><td>FORD C-MAX</td><td>FORB</td></tr> <tr><td>FORD CLUB WAGON</td><td>FORA</td></tr> <tr><td>FORD CONTOUR</td><td>FORA</td></tr> <tr><td>FORD COUNTRY SQUIRE</td><td>FORA</td></tr> <tr><td>FORD CROWN VICTORIA</td><td>FORA</td></tr> <tr><td>FORD E-SERIES (VAN)</td><td>FORB</td></tr> <tr><td>FORD ECO</td><td>FORA</td></tr> <tr><td>FORD EDGE</td><td>FORB</td></tr> <tr><td>FORD ESCA</td><td>FORB</td></tr> <tr><td>FORD ESC</td><td>FORA</td></tr> </tbody> </table> | Name  | Code | 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 |
| Name  | Code  |      |          |      |               |      |             |      |             |      |                |      |            |      |                 |      |              |      |                     |      |                     |      |                     |      |          |      |           |      |           |      |          |      |      |
| 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  |      |          |      |               |      |             |      |             |      |                |      |            |      |                 |      |              |      |                     |      |                     |      |                     |      |          |      |           |      |           |      |          |      |      |
| <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>Search:</p> <input type="text" value="ford"/> </div>  | 14    |      |          |      |               |      |             |      |             |      |                |      |            |      |                 |      |              |      |                     |      |                     |      |                     |      |          |      |           |      |           |      |          |      |      |

Case-Level Notes Editor

File Edit Help

F1 Help Exit -F10

00000102.txt

# CAPI NOTE: 01:08 PM 2018/07/02 MON USER: 22

These are Case Level Notes for a fictitious user

Calculator

View Edit Help

0

MC MR MS M+ M-

← CE C ± √

7 8 9 / %

4 5 6 \* 1/x

1 2 3 - =

0 . +

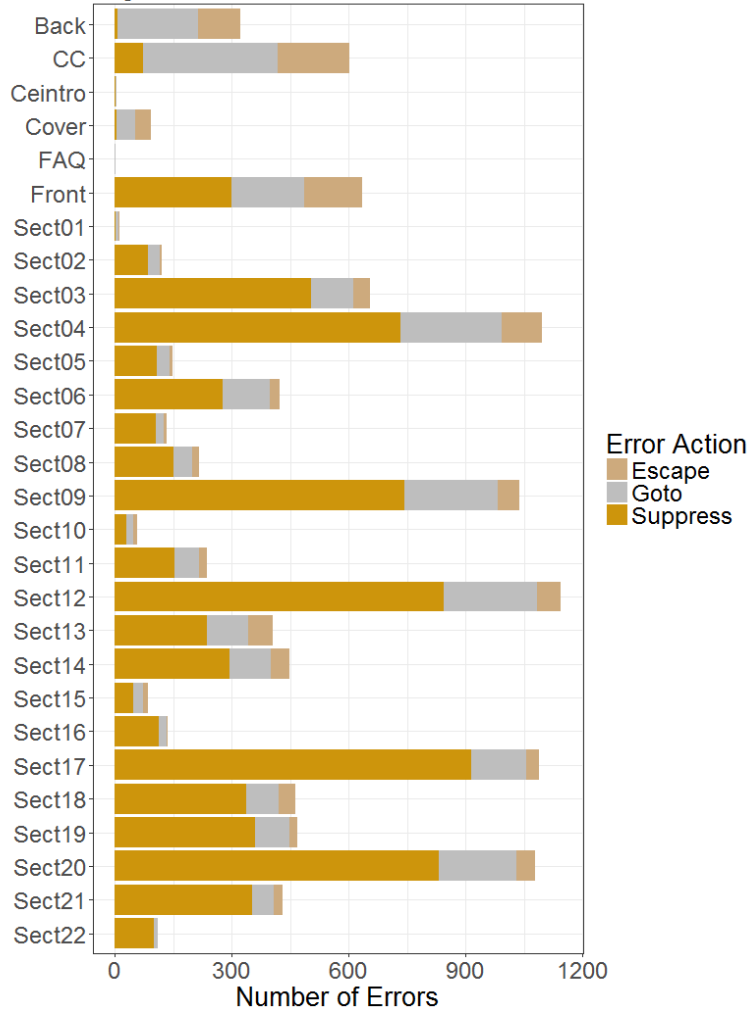
|              |               |
|--------------|---------------|
| fo           | ford f1502    |
| for          | ford focus    |
| ford         | ford free     |
| ford 150     | ford freestar |
| ford 500     | ford fs       |
| ford edg     | ford fusio    |
| ford escape  | ford mus      |
| ford 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

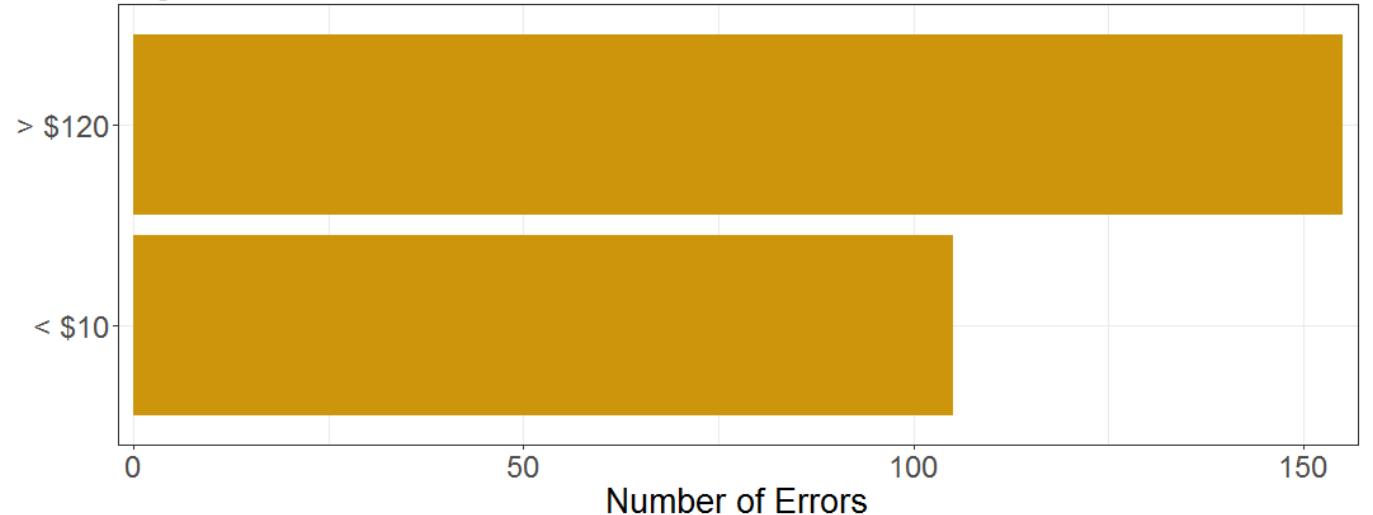
Count of Errors by Section  
August 2017



## 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.OTHSTUFY             | THE VALUE ENTERED IS UNUSUALLY HIGH OR LOW PLEASE VERIFY | 157   |

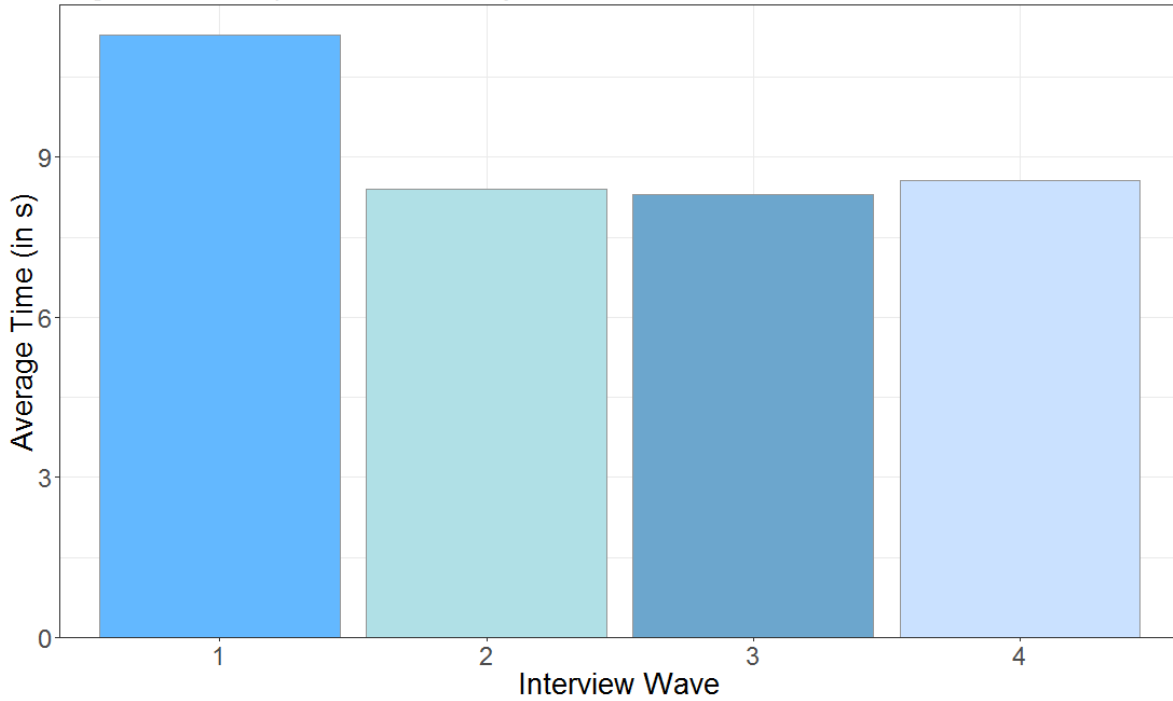
Range Errors for DINE\_WKX  
August 2017



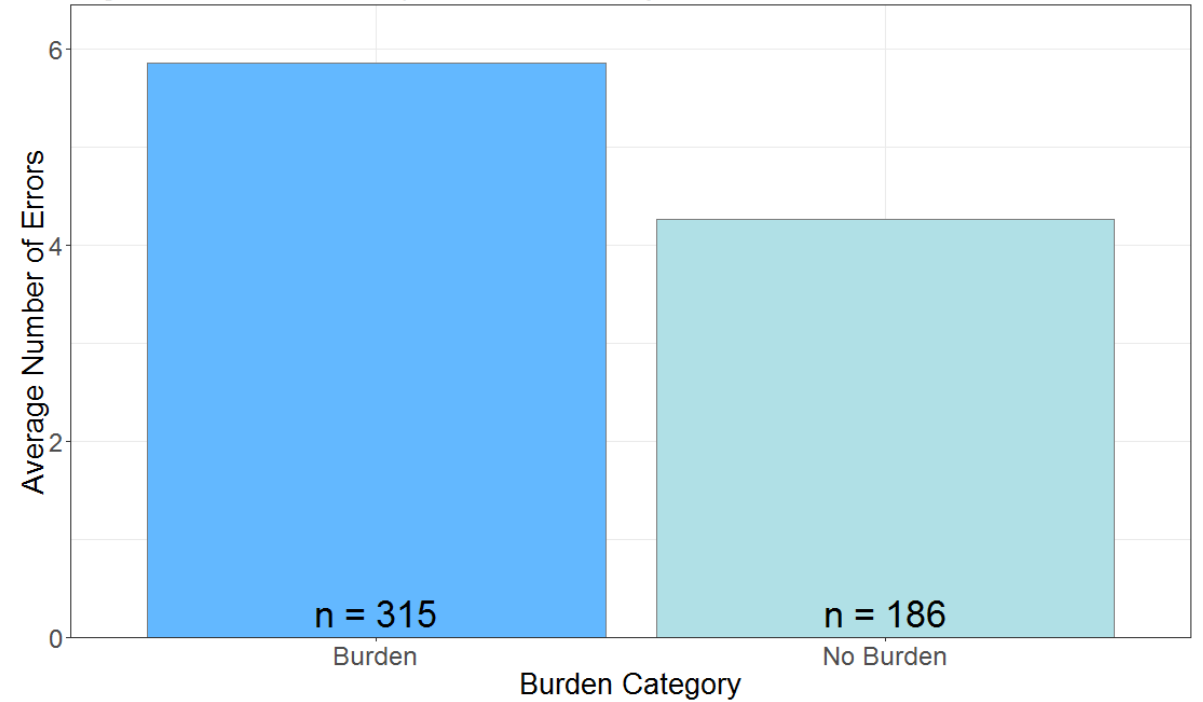


# Case Table

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



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



# Contact Information

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