# DATA 201 – Assignment 3

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## Cleaning 1: Unnecessary Punctuation Marks

Before:

| | event | venue | place | physical_description | occasion | notes |
|---|---|---|---|---|---|---|
| | BREAKFAST | COMMERCIAL | HOT SPRINGS, AR | CARD; 4.75X7.5; | EASTER; | |
| | [DINNER] | COMMERCIAL | MILWAUKEE, [WI]; | CARD; ILLUS; COL; 7.0X9.0; | EASTER; | WEDGEWOOD BLUE CARD; |
| | FRUHSTUCK/BREAKFAST; | COMMERCIAL | DAMPFER KAISER WILHELM DER G | CARD; ILLU; COL; 5.5X8.0; | | MENU IN GERMAN AND EN |
| | LUNCH; | COMMERCIAL | DAMPFER KAISER WILHELM DER G | CARD; ILLU; COL; 5.5X8.0; | | MENU IN GERMAN AND EN |
| | DINNER; | COMMERCIAL | DAMPFER KAISER WILHELM DER G | FOLDER; ILLU; COL; 5.5X7.5; | | MENU IN GERMAN AND EN |
| ?AN | [DINNER] | COMMERCIAL | R.M.S. EMPRESS OF CHINA | CARD; ILLUS; COL; 4.75X7.25; | | ILLUS, RED AND WHITE CHE |
| | SUPPER | COMMERCIAL | NEW YORK, [NY]; | CARD; ILLUS; COL; 6.0X8.75; | | HOTEL CREST IN BLUE; PRIC |
| | FRUHSTUCK/BREAKFAST | COMMERCIAL | SCHNELL DAMPFER KAISER WILHE | BROADSIDE; ILLUS; COL; 5.5X8.50; | | MENU IN GERMAN AND EN |
| | LUNCH | COMMERCIAL | DAMPFER KAISER WILHELM DER G | BROADSIDE; ILLUS; COL; 5.5X8.50; | | MENU IN GERMAN AND EN |
| | [DINNER] | COMMERCIAL | DAMPFER KAISER WILHELM DER G | FOLDER; ILLUS; COL; 5.5X7.5; | | MENU IN GERMAN AND EN |
| | CAFE LUNCHEON | COMMERCIAL | [NEW YORK, NY] | CARD; ILLUS; COL; 4.25X5.5; | | HOTEL CREST IN BLUE; |

After:

| | event | venue | place | physical_description | occasion | notes |
|---|---|---|---|---|---|---|
| | BREAKFAST | COMMERCIAL | HOT SPRINGS, AR | CARD; 4.75X7.5; | EASTER | |
| | DINNER | COMMERCIAL | MILWAUKEE, WI | CARD; ILLUS; COL; 7.0X9.0; | EASTER | WEDGEWOOD BLUE CARD; |
| | FRUHSTUCK/BREAKFAST | COMMERCIAL | DAMPFER KAISER WILHELM DER G | CARD; ILLU; COL; 5.5X8.0; | | MENU IN GERMAN AND EN |
| | LUNCH | COMMERCIAL | DAMPFER KAISER WILHELM DER G | CARD; ILLU; COL; 5.5X8.0; | | MENU IN GERMAN AND EN |
| | DINNER | COMMERCIAL | DAMPFER KAISER WILHELM DER G | FOLDER; ILLU; COL; 5.5X7.5; | | MENU IN GERMAN AND EN |
| ANY | DINNER | COMMERCIAL | R.M.S. EMPRESS OF CHINA | CARD; ILLUS; COL; 4.75X7.25; | | ILLUS, RED AND WHITE CHE |
| | SUPPER | COMMERCIAL | NEW YORK, NY | CARD; ILLUS; COL; 6.0X8.75; | | HOTEL CREST IN BLUE; PRIC |
| | FRUHSTUCK/BREAKFAST | COMMERCIAL | SCHNELL DAMPFER KAISER WILHE | BROADSIDE; ILLUS; COL; 5.5X8.50; | | MENU IN GERMAN AND EN |
| | LUNCH | COMMERCIAL | DAMPFER KAISER WILHELM DER G | BROADSIDE; ILLUS; COL; 5.5X8.50; | | MENU IN GERMAN AND EN |
| | DINNER | COMMERCIAL | DAMPFER KAISER WILHELM DER G | FOLDER; ILLUS; COL; 5.5X7.5; | | MENU IN GERMAN AND EN |
| | CAFE LUNCHEON | COMMERCIAL | NEW YORK, NY | CARD; ILLUS; COL; 4.25X5.5; | | HOTEL CREST IN BLUE; |

**Data Quality Issue:** Data Integration Error

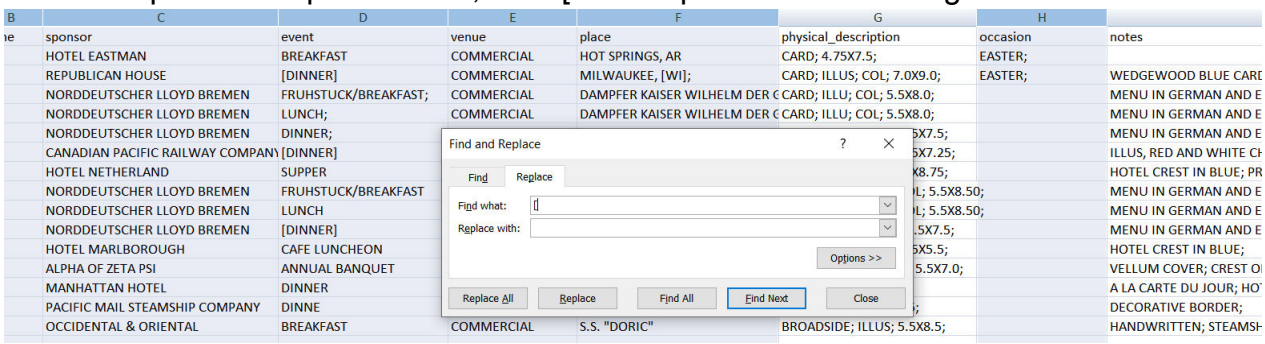
It looks like some sources of data use semicolons to mark the end of lines, and square brackets to highlight certain elements. There are many semicolons at the end of certain points of data that seem to have come from the same source, while various data points are surrounded by square brackets that could denote a differing source of data. An example of this would be the difference between "[DINNER], DINNER;, and LUNCH"

**Why these entities need to be cleaned:**

These entities should be cleaned as their presence makes it more difficult to read and compare data. As with the above example, different tuples contain the same information ("DINNER" and "[DINNER]") should be formatted the same way. Cleaning these entities will make them clearer without erroneous punctuation marks, make them easier to group together as identical elements will be formatted the same way, and will be easier to analyze and compare different rows that have the same elements.

**Steps to Clean:** (Excel)

1. Select each column not including physical_description and notes.
2. Ctrl-H to open the Replace menu, find "[" and replace it with nothing



| B | C | D | E | F | G | H | |
|---|---|---|---|---|---|---|---|
| ıe | sponsor | event | venue | place | physical_description | occasion | notes |
| | HOTEL EASTMAN | BREAKFAST | COMMERCIAL | HOT SPRINGS, AR | CARD; 4.75X7.5; | EASTER; | |
| | REPUBLICAN HOUSE | [DINNER] | COMMERCIAL | MILWAUKEE, [WI]; | CARD; ILLUS; COL; 7.0X9.0; | EASTER; | WEDGEWOOD BLUE CARD |
| | NORDDEUTSCHER LLOYD BREMEN | FRUHSTUCK/BREAKFAST; | COMMERCIAL | DAMPFER KAISER WILHELM DER G | CARD; ILLU; COL; 5.5X8.0; | | MENU IN GERMAN AND E |
| | NORDDEUTSCHER LLOYD BREMEN | LUNCH; | COMMERCIAL | DAMPFER KAISER WILHELM DER G | CARD; ILLU; COL; 5.5X8.0; | | MENU IN GERMAN AND E |
| | NORDDEUTSCHER LLOYD BREMEN | DINNER; | | | 5X7.5; | | MENU IN GERMAN AND E |
| | CANADIAN PACIFIC RAILWAY COMPANY | [DINNER] | | | 5X7.25; | | ILLUS, RED AND WHITE CH |
| | HOTEL NETHERLAND | SUPPER | | | X8.75; | | HOTEL CREST IN BLUE; PR |
| | NORDDEUTSCHER LLOYD BREMEN | FRUHSTUCK/BREAKFAST | | | L; 5.5X8.50; | | MENU IN GERMAN AND E |
| | NORDDEUTSCHER LLOYD BREMEN | LUNCH | | | L; 5.5X8.50; | | MENU IN GERMAN AND E |
| | NORDDEUTSCHER LLOYD BREMEN | [DINNER] | | | .5X7.5; | | MENU IN GERMAN AND E |
| | HOTEL MARLBOROUGH | CAFE LUNCHEON | | | 5X5.5; | | HOTEL CREST IN BLUE; |
| | ALPHA OF ZETA PSI | ANNUAL BANQUET | | | 5.5X7.0; | | VELLUM COVER; CREST O |
| | MANHATTAN HOTEL | DINNER | | | | | A LA CARTE DU JOUR; HO |
| | PACIFIC MAIL STEAMSHIP COMPANY | DINNE | | | ; | | DECORATIVE BORDER; |
| | OCCIDENTAL & ORIENTAL | BREAKFAST | COMMERCIAL | S.S. "DORIC" | BROADSIDE; ILLUS; 5.5X8.5; | | HANDWRITTEN; STEAMSH |



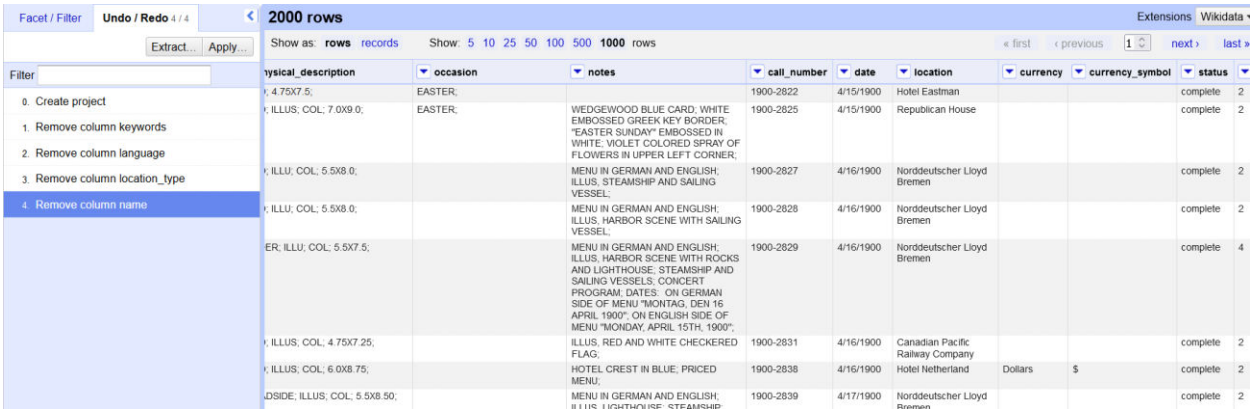
3. Do the same with "]" and ";"

## Cleaning 2: Empty Columns

Before:

| es | call_number | keywords | language | date | location | location_type | currency | currency_symbol | status | page_count | dis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1900-2822 | | | 4/15/1900 | Hotel Eastman | | | | complete | 2 | 67 |
| :WOOD BLUE CARD; WHITE SED GREEK KEY BORDER; R SUNDAY" EMBOSSED IN VIOLET COLORED SPRAY OF RS IN UPPER LEFT CORNER; | 1900-2825 | | | 4/15/1900 | Republican House | | | | complete | 2 | 34 |
| N GERMAN AND ENGLISH; STEAMSHIP AND SAILING -; | 1900-2827 | | | 4/16/1900 | Norddeutscher Lloyd Bremen | | | | complete | 2 | 84 |
| N GERMAN AND ENGLISH; HARBOR SCENE WITH SAILING -, | 1900-2828 | | | 4/16/1900 | Norddeutscher Lloyd Bremen | | | | complete | 2 | 63 |
| N GERMAN AND ENGLISH; HARBOR SCENE WITH ROCKS GHTHOUSE; STEAMSHIP AND VESSELS; CONCERT AM; DATES: ON GERMAN MENU "MONTAG, DEN 16 900"; ON ENGLISH SIDE OF MONDAY, APRIL 15TH, 1900"; | 1900-2829 | | | 4/16/1900 | Norddeutscher Lloyd Bremen | | | | complete | 4 | 33 |
| RED AND WHITE CHECKERED | 1900-2831 | | | 4/16/1900 | Canadian Pacific Railway Company | | | | complete | 2 | 37 |
| CREST IN BLUE; PRICED | 1900-2838 | | | 4/16/1900 | Hotel Netherland | | Dollars | $ | complete | 2 | 144 |
| N GERMAN AND ENGLISH; | 1900-2839 | | | 4/17/1900 | Norddeutscher Lloyd | | | | complete | 2 | 80 |

After:




**Data Quality Issue:** Distillation Error

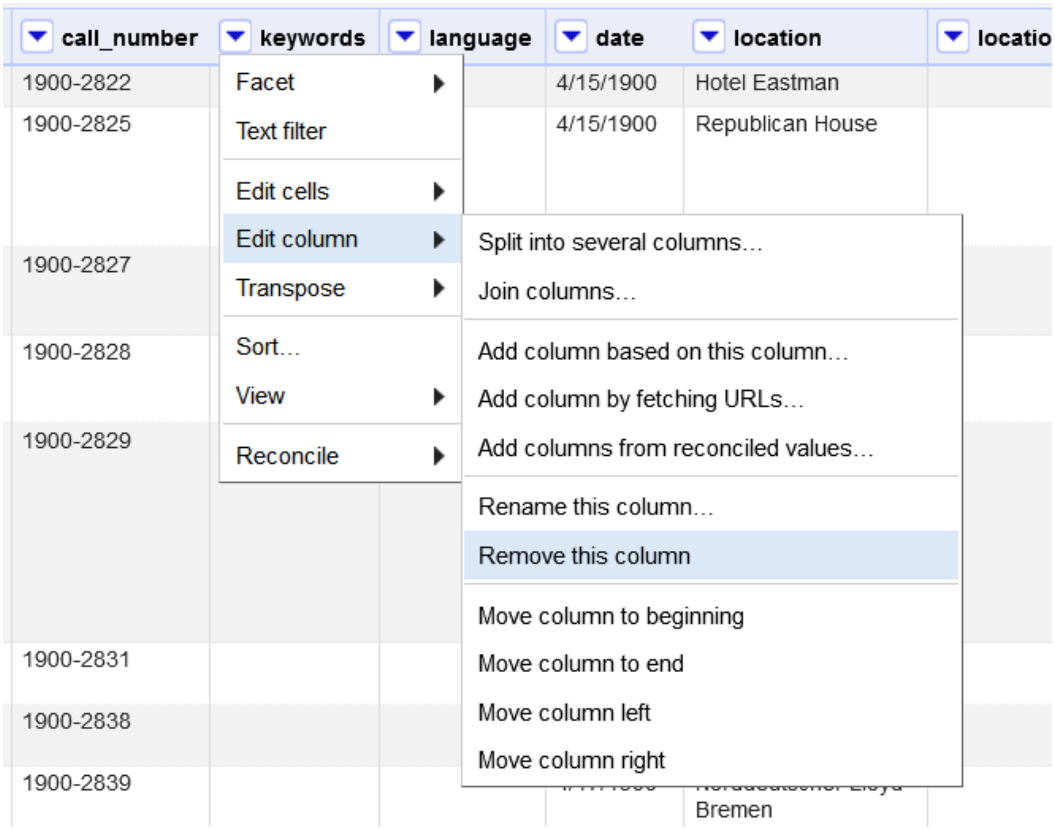
It looks like the data set was supposed to contain the attributes name, keywords, language, and location_type. At some point this data was lost or removed after being collected as zero entries have any of these fields populated.

**Why these entities need to be cleaned:**

These columns are unnecessary and clutter up the data with random empty attributes, making it more difficult to read. Particularly as there are so many other fields that could be important to a user. Additionally, if you are taking a look at a small amount of rows at once, the existence of these columns implies that other rows will have that data available and that the current rows are not complete.

**Steps to Clean:** (OpenRefine)

1. Click the name of an unnecessary column (name, keywords, language, and location_type)
2. Click Edit Column
3. Click Remove This Column

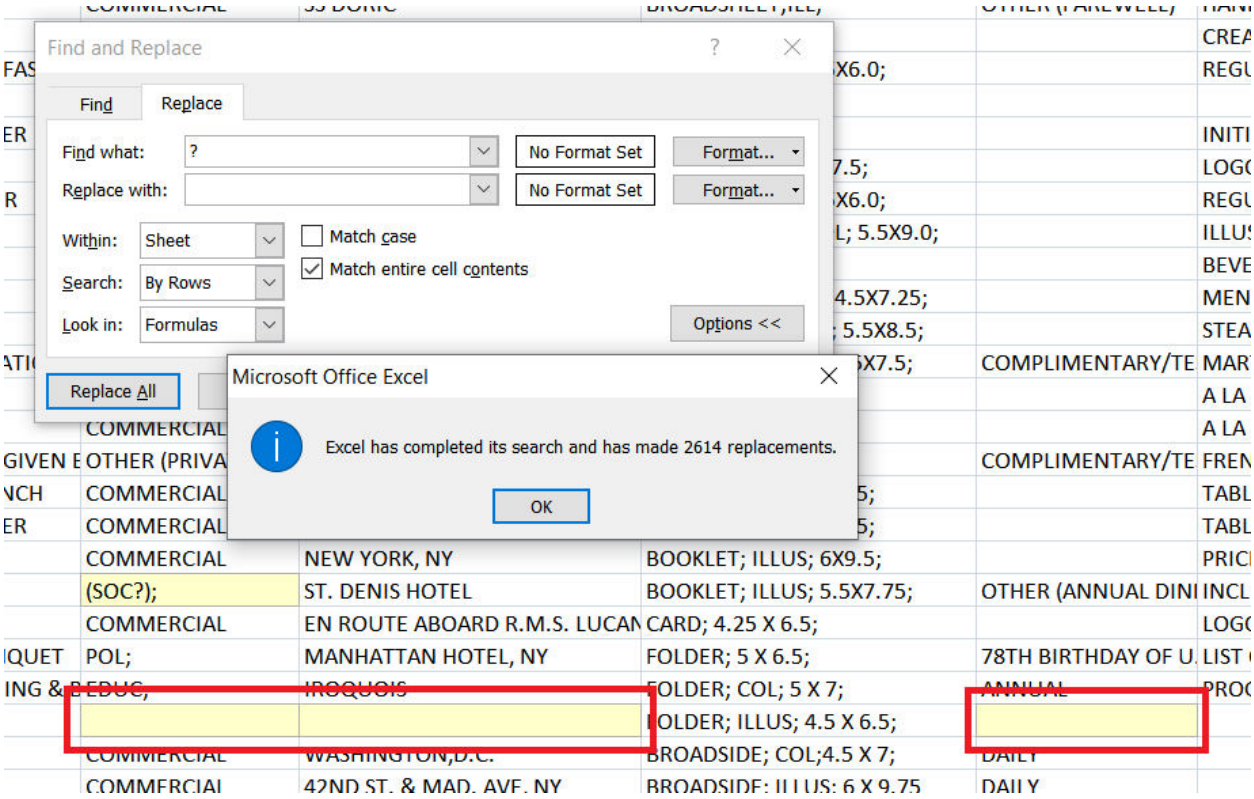


## Cleaning 3: Unknown Fields

Before:

| | | | | | | |
|---|---|---|---|---|---|---|
| | MENU | COMMERCIAL | | FOLDER; 6X12; | | A LA CARTE MEN |
| | MENU | COMMERCIAL | NEW YORK, NY | FOLDER; 6.75X10; | | A LA CARTE MEN |
| | [FAREWELL DINNER GIVEN E | OTHER (PRIVATE PAR | SHERRY'S, NEW YORK, NY | CARD; ILLUS; 4.5X7; | COMPLIMENTARY/TE | FRENCH; HOST'S |
| DE | BUSINESS MEN'S LUNCH | COMMERCIAL | NEW YORK, NY | CARD; ILLUS; 4.5X5.75; | | TABLE D'HOTE L |
| DE | TABLE D'HOTE DINNER | COMMERCIAL | NEW YORK, NY | CARD; ILLUS; 4.5X5.75; | | TABLE D'HOTE D |
| | MENU | COMMERCIAL | NEW YORK, NY | BOOKLET; ILLUS; 6X9.5; | | PRICED MENU; I |
| | SPRING DINNER | (SOC?); | ST. DENIS HOTEL | BOOKLET; ILLUS; 5.5X7.75; | OTHER (ANNUAL DINI | INCLUDES PHOT |
| | BREALFAST | COMMERCIAL | EN ROUTE ABOARD R.M.S. LUCAN | CARD; 4.25 X 6.5; | | LOGO; WINE LIS |
| | 11NTH ANNUAL BANQUET | POL; | MANHATTAN HOTEL, NY | FOLDER; 5 X 6.5; | 78TH BIRTHDAY OF U | LIST OF WINES S |
| OI | 25TH ANNUAL MEETING & B | EDUC; | IROQUOIS | FOLDER; COL; 5 X 7; | ANNUAL | PROGRAM & SPE |
| A. | BANQUET | ? | ? | FOLDER; ILLUS; 4.5 X 6.5; | ? | |
| | BREAKFAST | COMMERCIAL | WASHINGTON,D.C. | BROADSIDE; COL;4.5 X 7; | DAILY | |
| | DINNER | COMMERCIAL | 42ND ST. & MAD. AVE, NY | BROADSIDE; ILLUS; 6 X 9.75 | DAILY | |
| | BREAKFAST | COMMERCIAL | EN ROUTE | BROADSIDE; ILLUS; COL; 5 X 8; | DAILY; | MENU HANDWR |
| | LUNCH | COMMERCIAL | EN ROUTE | BROADSIDE; ILLUS; COL; 5 X 8; | DAILY | MENU HANDWR |
| | LUNCH OR DINNER | COMMERCIAL | TAOEMINA, SICILY | BROADSIDE; 3.75 X 6; | | MENU IN ITALIA |

After:



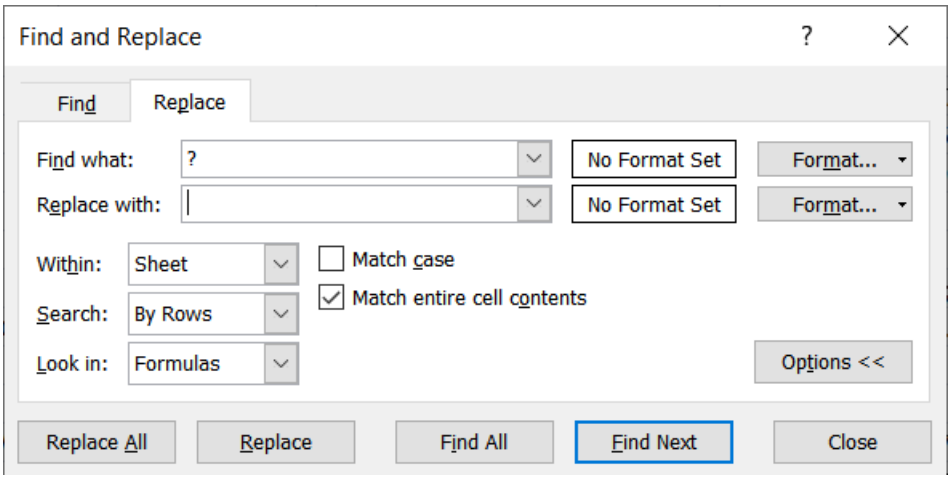

**Data Quality Issue:** Human Error

Some unknown entries in the database are labelled with “?”, while others are left blank. You can also see that this issue is not consistent per row, as some rows have several question marks along with several empty attributes. This would be human error, as they may have input a question mark for unknown fields rather than leave them blank. I don’t think this is a data integration error as the error is not consistent within individual rows.

**Why these entities need to be cleaned:**
These entities consisting of "?" should simply be deleted as their presence adds nothing to the dataset but inconsistency. There are many blank fields that denote information that is not available, two different formats to explain the same thing is unnecessary and confusing. Removal of these entities should help with analysis by reducing confusion, making the format of unknown fields consistent, and make it obvious when a field is unknown without a dubious question mark.
Note that in the screenshots above, the entry (SOC?); is highlighted in yellow. This is to make sure that not all question marks are removed, only the ones that fill the entire cell on their own.

**Steps to Clean:** (Excel)

1. Ctrl-H to open the Replace menu
2. Find “?” and replace it with nothing
3. Click Options to see the advanced options
4. Make sure that Match entire cell contents is checked, this will prevent the necessary question marks from being removed




5. Click Replace All

# Cleaning 4: Breaking Big Attributes into Multiple Columns

Before:

| place | physical_description | occasion | notes | call_number |
|---|---|---|---|---|
| HOT SPRINGS, AR | CARD; 4.75X7.5; | EASTER; | | 1900-2822 |
| MILWAUKEE, [WI]; | CARD; ILLUS; COL; 7.0X9.0; | EASTER; | WEDGEWOOD BLUE CARD; WHITE EMBOSSED GREEK KEY BORDER; "EASTER SUNDAY" EMBOSSED IN WHITE; VIOLET COLORED SPRAY OF FLOWERS IN UPPER LEFT CORNER; | 1900-2825 |
| DAMPFER KAISER WILHELM DER GROSSE; | CARD; ILLU; COL; 5.5X8.0; | | MENU IN GERMAN AND ENGLISH; ILLUS, STEAMSHIP AND SAILING VESSEL; | 1900-2827 |
| DAMPFER KAISER WILHELM DER GROSSE; | CARD; ILLU; COL; 5.5X8.0; | | MENU IN GERMAN AND ENGLISH; ILLUS, HARBOR SCENE WITH SAILING VESSEL; | 1900-2828 |
| DAMPFER KAISER WILHELM DER GROSSE; | FOLDER; ILLU; COL; 5.5X7.5; | | MENU IN GERMAN AND ENGLISH; ILLUS, HARBOR SCENE WITH ROCKS AND LIGHTHOUSE; STEAMSHIP AND SAILING VESSELS; CONCERT PROGRAM; DATES: ON GERMAN SIDE OF MENU "MONTAG, DEN 16 APRIL 1900"; ON ENGLISH SIDE OF MENU "MONDAY, APRIL 15TH, 1900"; | 1900-2829 |
| R.M.S. EMPRESS OF CHINA | CARD; ILLUS; COL; 4.75X7.25; | | ILLUS, RED AND WHITE CHECKERED FLAG; | 1900-2831 |
| NEW YORK, [NY]; | CARD; ILLUS; COL; 6.0X8.75; | | HOTEL CREST IN BLUE; PRICED MENU; | 1900-2838 |
| SCHNELLDAMPFER KAISER WILHELM DER GROSSE; | BROADSIDE; ILLUS; COL; 5.5X8.50; | | MENU IN GERMAN AND ENGLISH; ILLUS, LIGHTHOUSE; STEAMSHIP; FISHING DORY; | 1900-2839 |
| DAMPFER KAISER WILHELM DER GROSSE; | BROADSIDE; ILLUS; COL; 5.5X8.50; | | MENU IN GERMAN AND ENGLISH; ILLUS, SAILING SHIP/SHEETS FURLED; STEAMSHIP; | 1900-2840 |
| DAMPFER KAISER WILHELM DER GROSSE; | FOLDER; ILLUS; COL; 5.5X7.5; | | MENU IN GERMAN AND ENGLISH; ILLUS, HARBOR; LIGHTHOUSE; ROCKS; STEAMSHIP; SAILING SHIPS; CONCERT PROGRAM; | 1900-2841 |
| [NEW YORK, NY] | CARD; ILLUS; COL; 4.25X5.5; | | HOTEL CREST IN BLUE; | 1900-2843 |
| DELMONICO'S, [NEW YORK, NY]; | BOOKLET; ILLUS; COL; 5.5X7.0; | | VELLUM COVER; CREST OF ZETA PSI; TIED WITH BLUE SATIN RIBBON; PRICED WINE LIST; ALPHA CHAPTER OFFICERS; BANQUET COMMITTEE; TOASTS; LYRICS TO "ZETA PSI WE | 1900-2844 |

After:

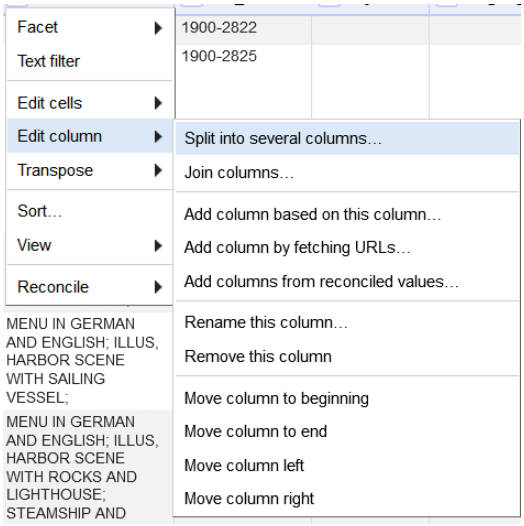
| scription 3 | physical_description 4 | physical_description 5 | occasion | notes 1 | notes 2 | notes 3 | notes 4 | notes 5 | notes 6 | notes 7 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | EASTER; | | | | | | | |
| | 7.0X9.0; | | EASTER; | WEDGEWOOD BLUE CARD | WHITE EMBOSSED GREEK KEY BORDER | "EASTER SUNDAY" EMBOSSED IN WHITE | VIOLET COLORED SPRAY OF FLOWERS IN UPPER LEFT CORNER; | | | |
| | 5.5X8.0; | | | MENU IN GERMAN AND ENGLISH | ILLUS, STEAMSHIP AND SAILING VESSEL; | | | | | |
| | 5.5X8.0; | | | MENU IN GERMAN AND ENGLISH | ILLUS, HARBOR SCENE WITH SAILING VESSEL; | | | | | |
| | 5.5X7.5; | | | MENU IN GERMAN AND ENGLISH | ILLUS, HARBOR SCENE WITH ROCKS AND LIGHTHOUSE | STEAMSHIP AND SAILING VESSELS | CONCERT PROGRAM | DATES: ON GERMAN SIDE OF MENU "MONTAG, DEN 16 APRIL 1900" | ON ENGLISH SIDE OF MENU "MONDAY, APRIL 15TH, 1900"; | |
| | 4.75X7.25; | | | ILLUS, RED AND WHITE CHECKERED FLAG; | | | | | | |
| | 6.0X8.75; | | | HOTEL CREST IN BLUE | PRICED MENU; | | | | | |
| | 5.5X8.50; | | | MENU IN GERMAN AND ENGLISH | ILLUS, LIGHTHOUSE | STEAMSHIP | FISHING DORY; | | | |
| | 5.5X8.50; | | | MENU IN GERMAN AND ENGLISH | ILLUS, SAILING SHIP/SHEETS FURLED | STEAMSHIP; | | | | |
| | 5.5X7.5; | | | MENU IN GERMAN AND ENGLISH | ILLUS, HARBOR | LIGHTHOUSE | ROCKS | STEAMSHIP | SAILING SHIPS | CONCERT PROGRAM; |
| | 4.25X5.5; | | | HOTEL CREST IN BLUE; | | | | | | |
| | 5.5X7.0; | | | VELLUM COVER | CREST OF ZETA PSI | TIED WITH BLUE SATIN RIBBON | PRICED WINE LIST | ALPHA CHAPTER OFFICERS | BANQUET COMMITTEE | TOASTS |

**Data Quality Issue:** Distillation Error
This is a distillation error because the data has been collected, but is stored in a confusing and difficult to parse way. Both physical_description and notes have several entries for many different rows, however all of those entries are listed off in a impenetrable block of capitalized text.

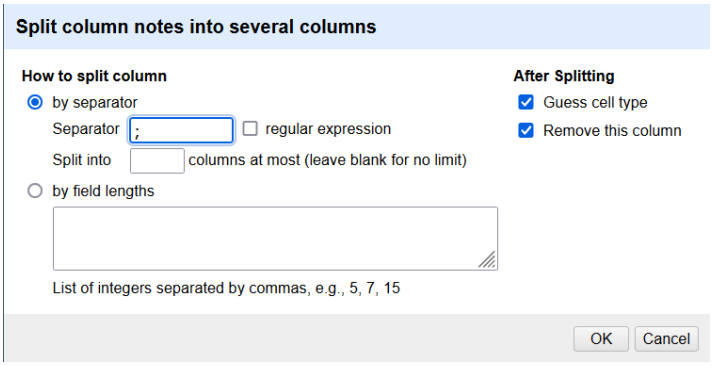
**Why these entities need to be cleaned:**
It should be useful to break these two fields into multiple columns. Both of them consistently have 2+ entries separated by semicolons, which makes it difficult to read and understand the data provided. By separating each entry into its own column, it will become clearer and easier to compare the different tuples.
As it is now, users have to read the entire line of notes/physical descriptions in order to find specific ones that they are looking for as it is just a line of capitalized text. By breaking it into their own columns you are able to skim those fields and quickly find what you are looking for, while also being able to compare different rows more easily.

**Steps to Clean:** (OpenRefine)

1. Click the name of the column to edit, Edit Column, and Split into several columns

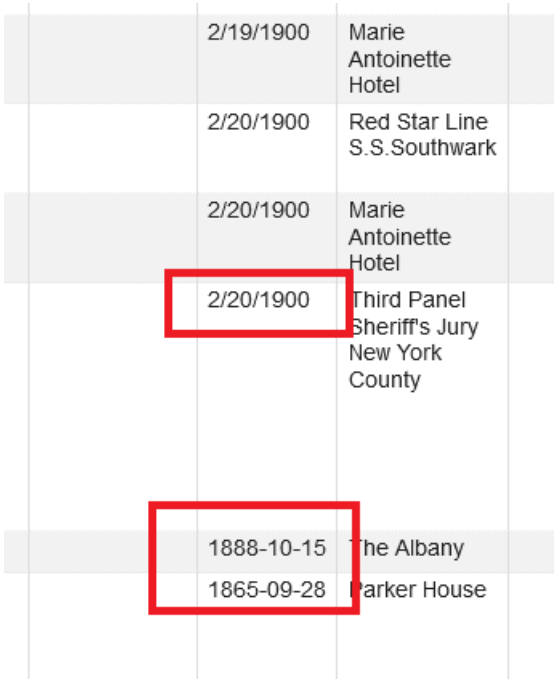



2. The separator should be ";" as that is what denotes the separation of list elements in the data



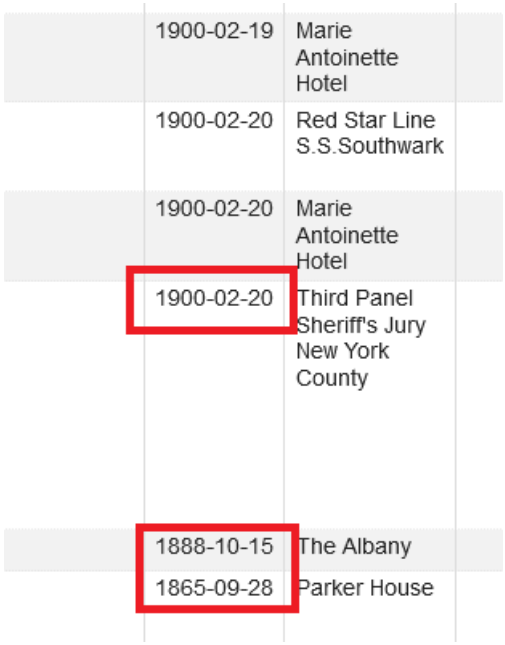
## Cleaning 5: Differing Date Formats

Before:



| | | |
|---|---|---|
| | 2/19/1900 | Marie Antoinette Hotel |
| | 2/20/1900 | Red Star Line S.S.Southwark |
| | 2/20/1900 | Marie Antoinette Hotel |
| | 2/20/1900 | Third Panel Sheriff's Jury New York County |
| | 1888-10-15 | The Albany |
| | 1865-09-28 | Parker House |

After:



| | | |
|---|---|---|
| | 1900-02-19 | Marie Antoinette Hotel |
| | 1900-02-20 | Red Star Line S.S.Southwark |
| | 1900-02-20 | Marie Antoinette Hotel |
| | 1900-02-20 | Third Panel Sheriff's Jury New York County |
| | 1888-10-15 | The Albany |
| | 1865-09-28 | Parker House |

**Data Quality Issue:** Data Integration

It looks like there are two different date formats used in this data set. This implies either that the data has come from at least two different sources that use different date formats, or that the schema has changed over time to use a different date format.

**Why these entities need to be cleaned:**

The current date formats can be confusing to readers when they look over multiple tuples with different formats. In the screenshots above we see two different date formats in use. This requires more work to parse the data as a human reader or a program, as they will need to account for both formats.

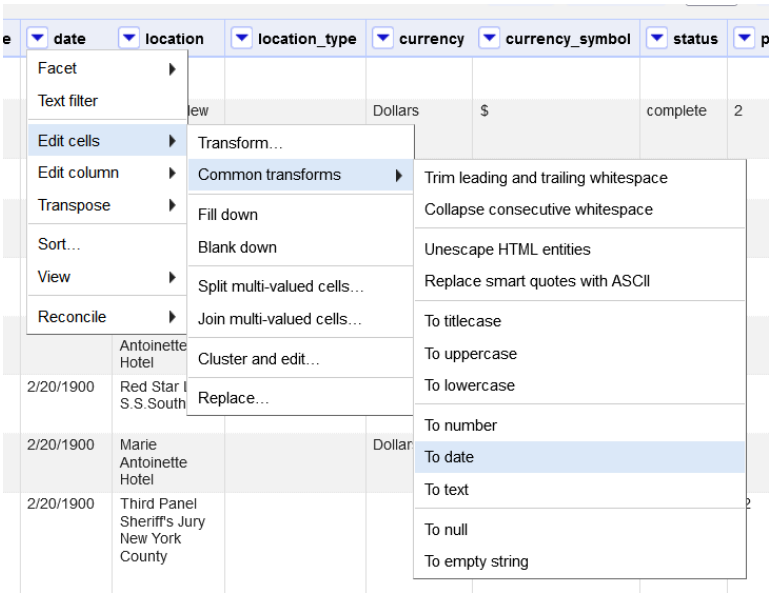
There are also potential uncertainties between the ordering of months and days in the data. An example of this is 9/5/2000, that could denote either May 9$^{th}$ or September 5$^{th}$.

These different date formats should all be made consistent to prevent confusion and uncertainty as to what the data means.

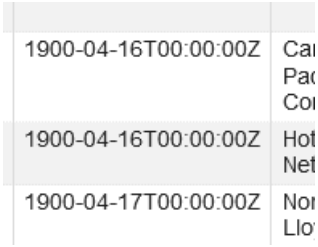
Additionally, leading zeros should be added to the month and day sections of the dates, to make each date uniform and easier to compare with one another as the length of the dates will all be consistent

**Steps to Clean:** (OpenRefine)

1. Click the date column header, select Edit Cells, Common Transforms, To date, to transform the data in the column to a date object.




2. Do the same as step 1, but transform the column into text.
   This step is necessary as the Dates object seems to store additional text than what is displayed
3. Each date should now look like this:




4. Click the date column header, select Edit Cells and Replace, replacing the string "T00:00:00Z" with nothing.