Planetary Simulation

This report will run a simulation that assigns system information for every planet in the `planets.xml` database so that we can examine how well the simulation produces socio-industrial codes, population, and the like.

First, we read in the XML file. In order to assign colonization variables, we need to know the:

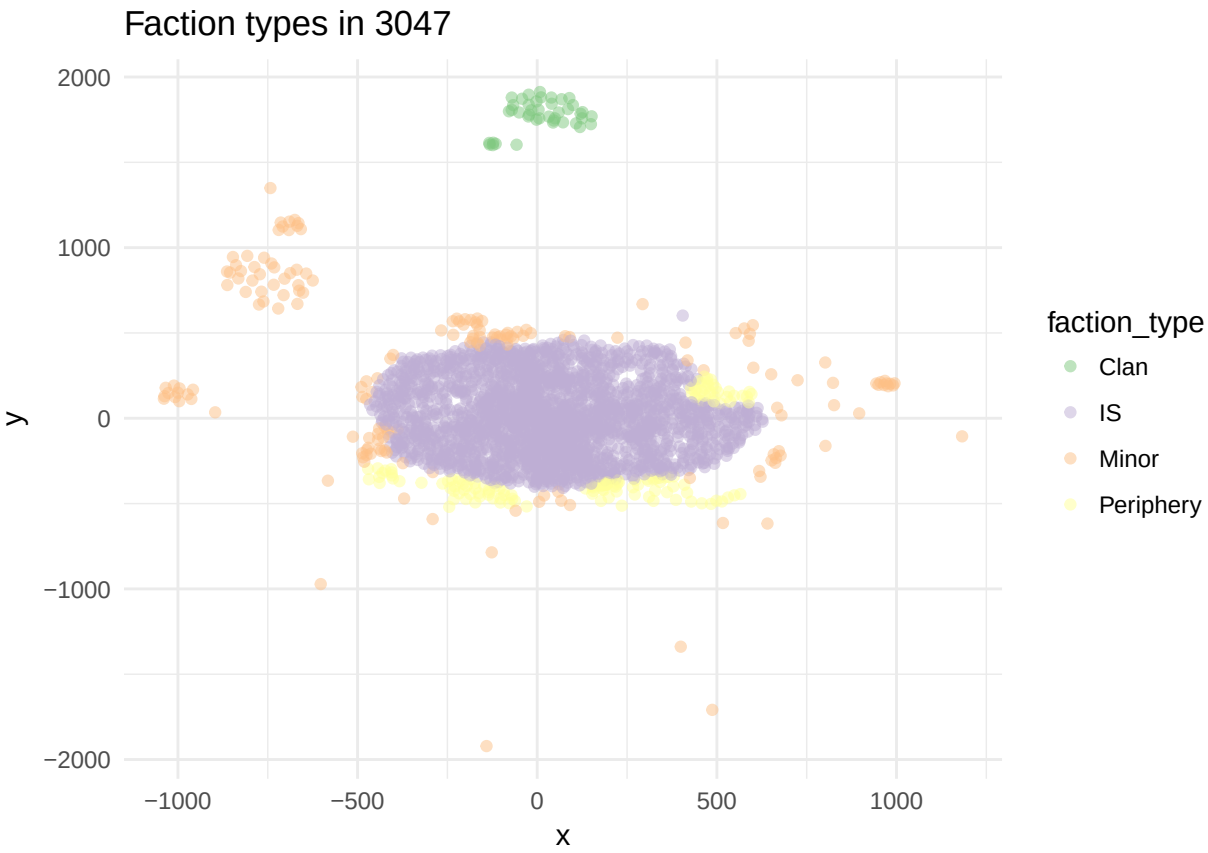
- distance from Terra
- faction type: Inner Sphere, Major Periphery, Minor Periphery, Clan
- year colony founded

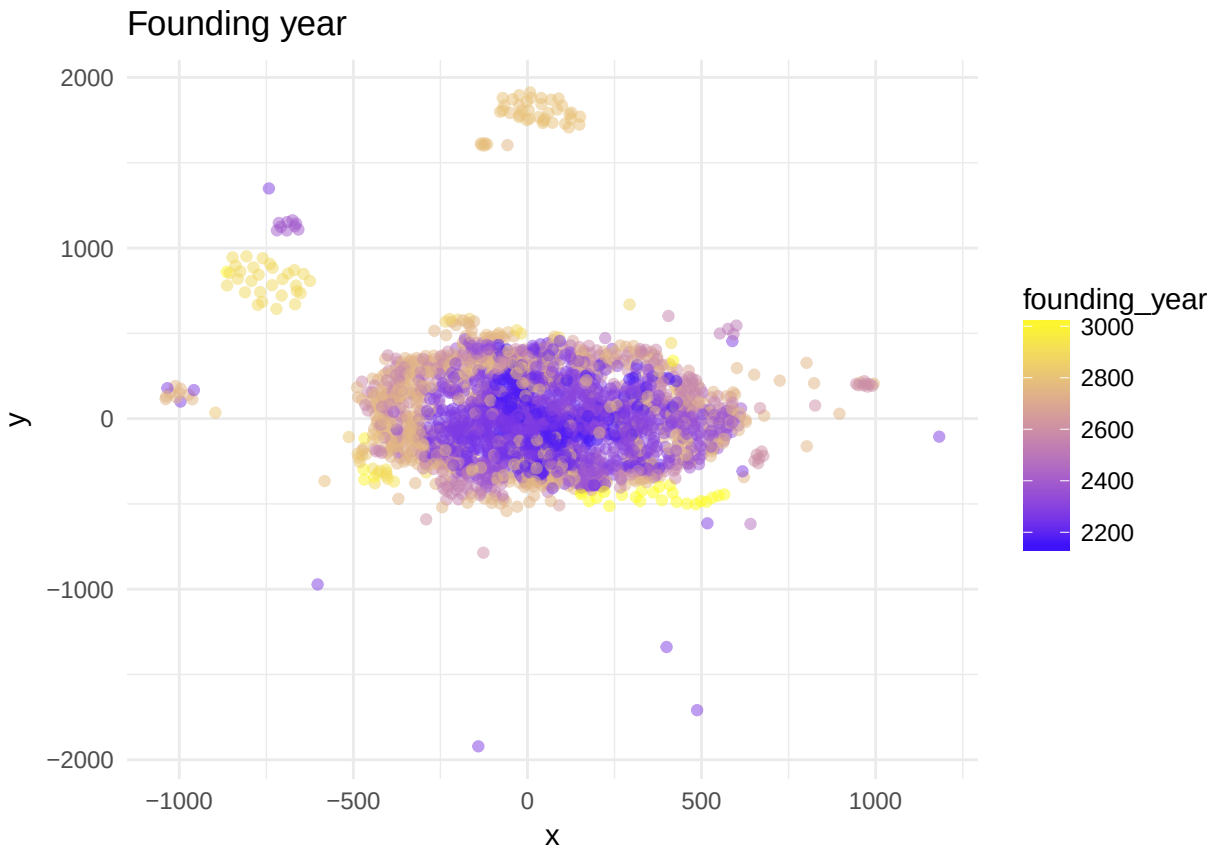
We pull data from year 3047, so that we can derive clan factions by original foundings. We determine original year of colony founding by the first faction change from the default faction of `UND`. We code faction type from specific faction codes. The method used here is not safe to be used if the date is changed from 3047 as we only code factions that existed in 3047, not all possible factions. We remove all factions that were `ABN` (abandoned), `UND`, and `NONE`. This removes all of the Exodus Road planets.

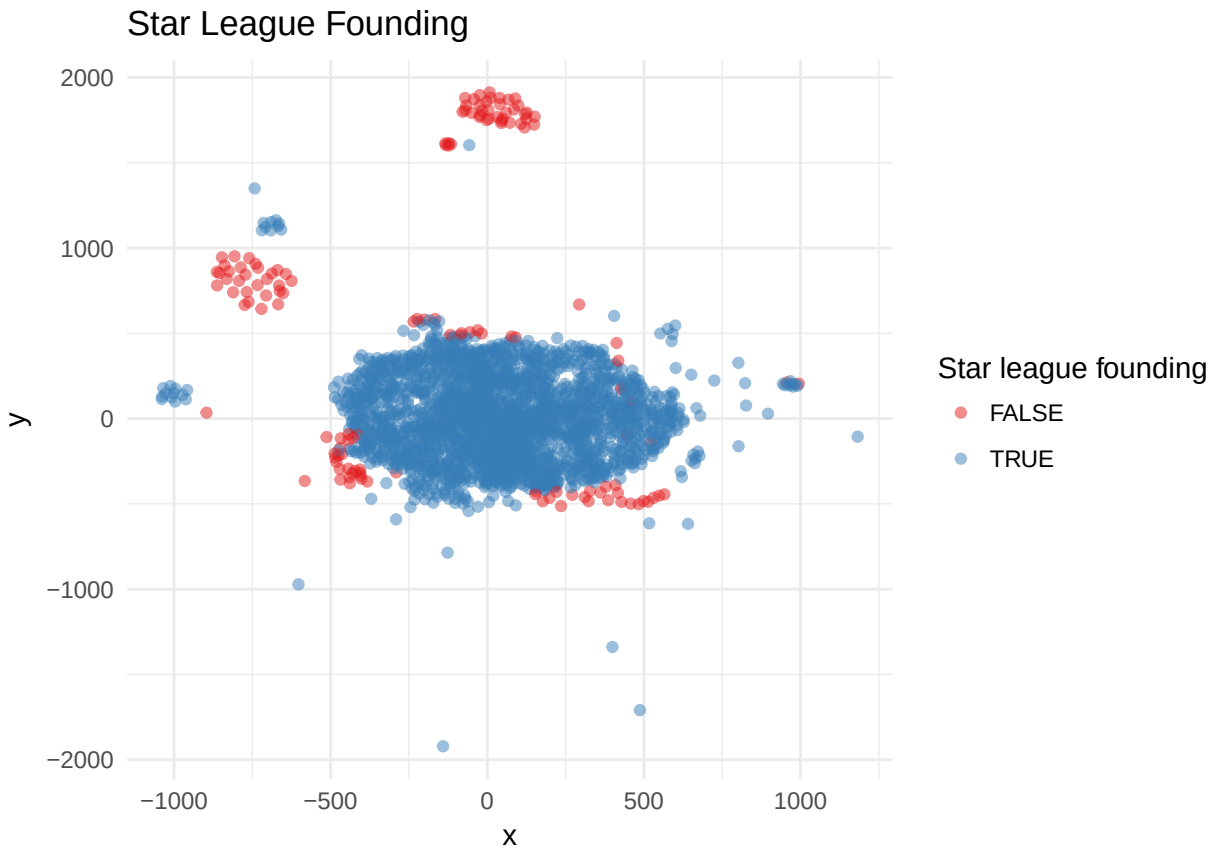
The following cases of planets were missing a founding year:

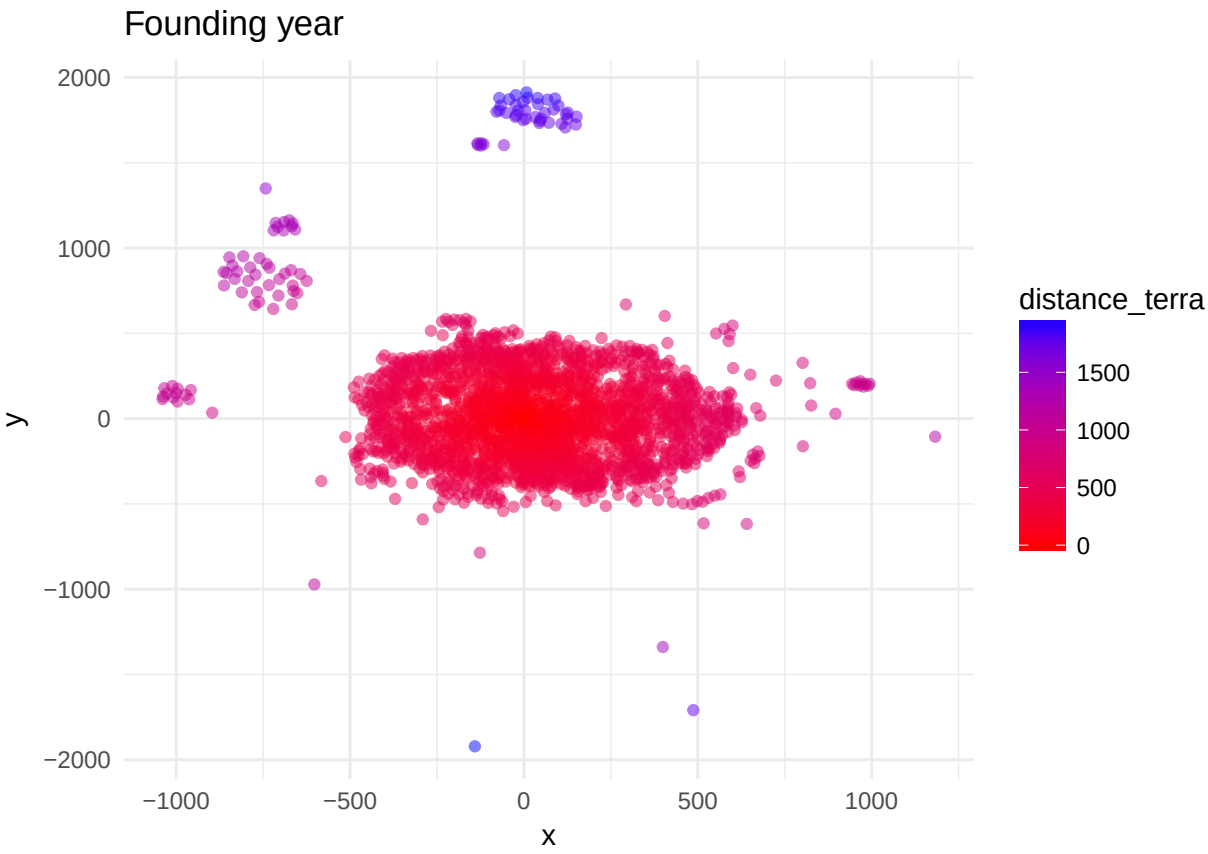
```
##        name       x       y faction  hpg founding_year tech industry  raw
## 2489 Pioche -392.36 -497.51    PIND <NA>            NA <NA>     <NA> <NA>
##      output agriculture distance_terra faction_type
## 2489   <NA>        <NA>       633.6107        Minor
```

After removing missing factions and missing founding year, we have a total of `2275` planets. The maps below show our key independent variable values across diferent planets.



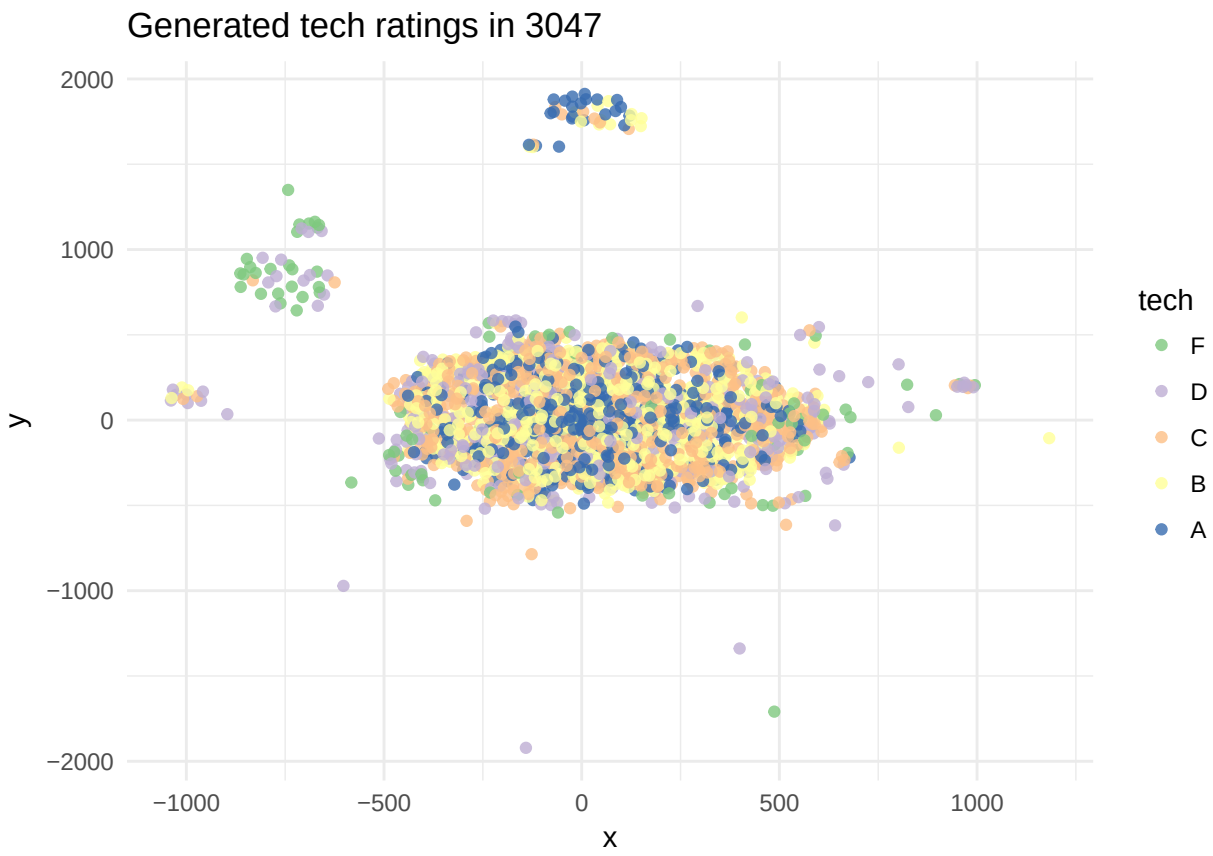

Founding year
2000
1000
0
−1000
−2000
y
−1000
−500
0
500
1000
x
founding_year
3000
2800
2600
2400
2200


Star League Founding
2000
1000
0
−1000
−2000
y
−1000
−500
0
500
1000
x
Star league founding
FALSE
TRUE

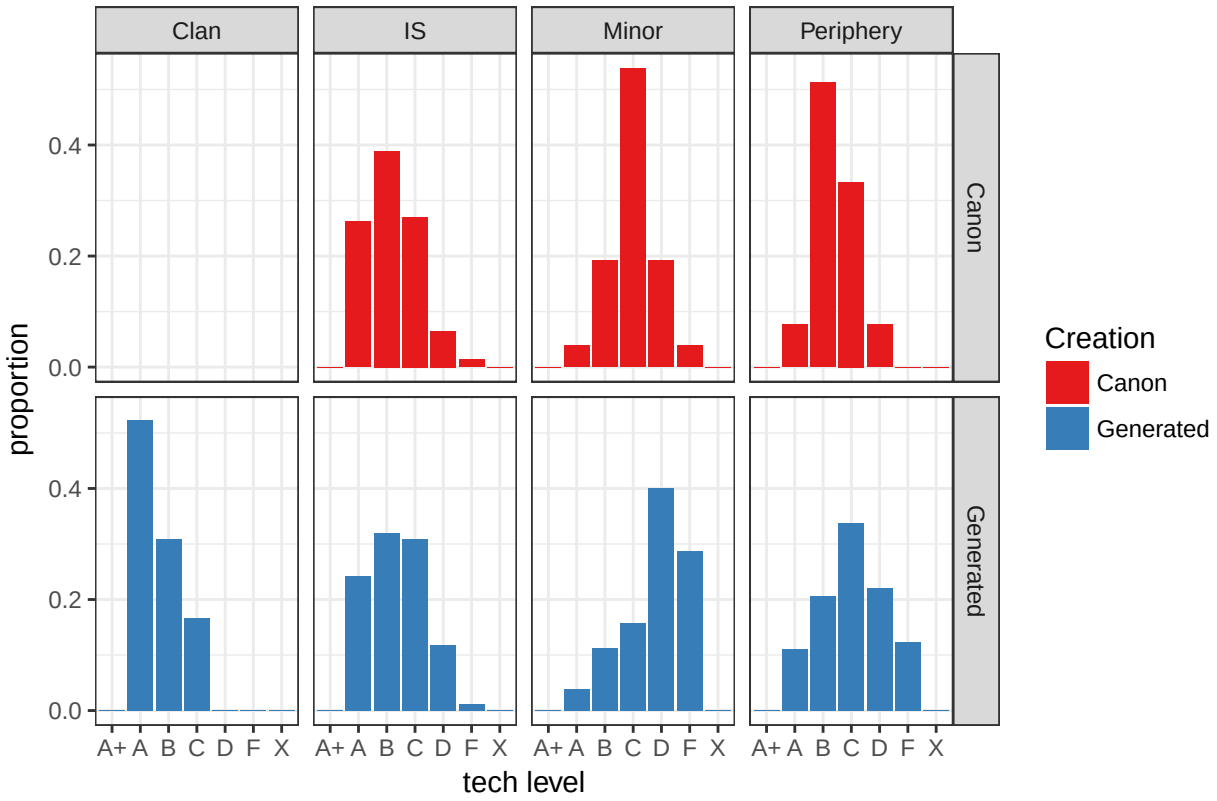


Now, we cycle through every single planet and generate a system complete with astronomical and social data. Now lets look the results.

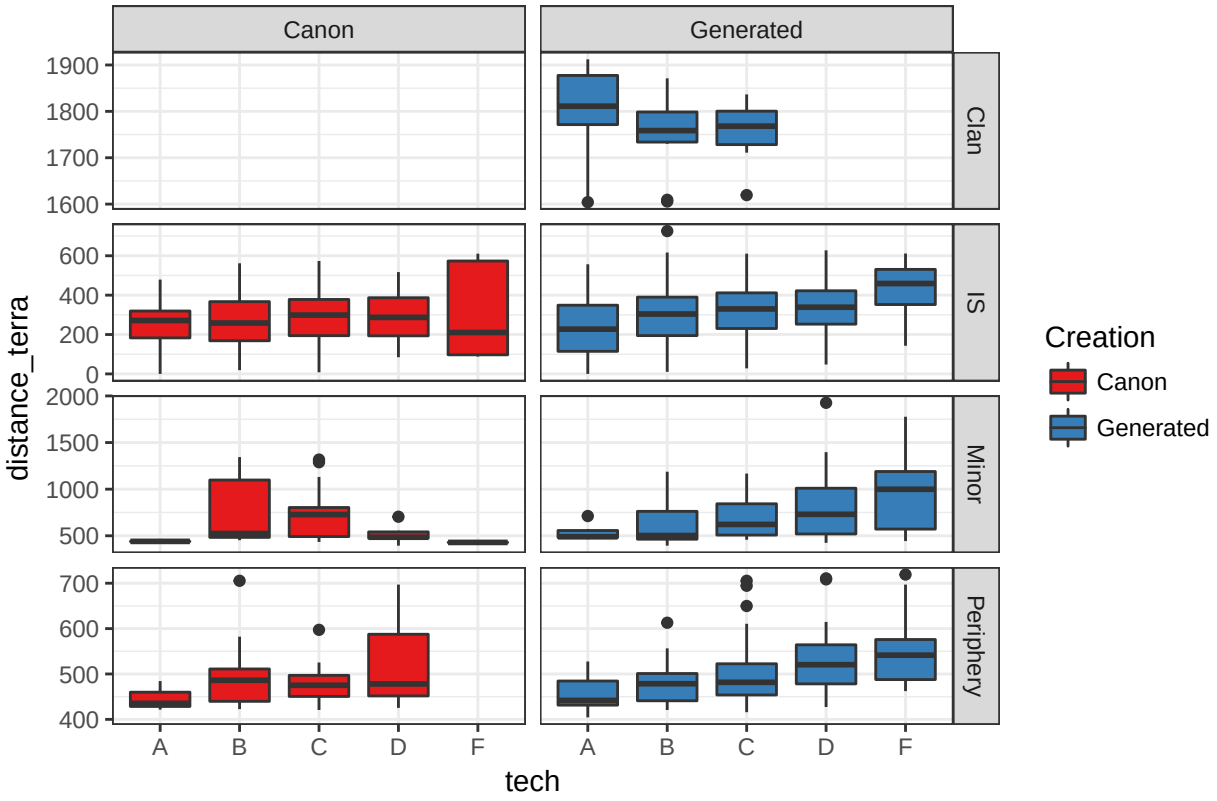
Tech Rating


Generated tech ratings in 3047
2000
1000
0
−1000
−2000
y
−1000
−500
0
500
1000
x
tech
F
D
C
B
A

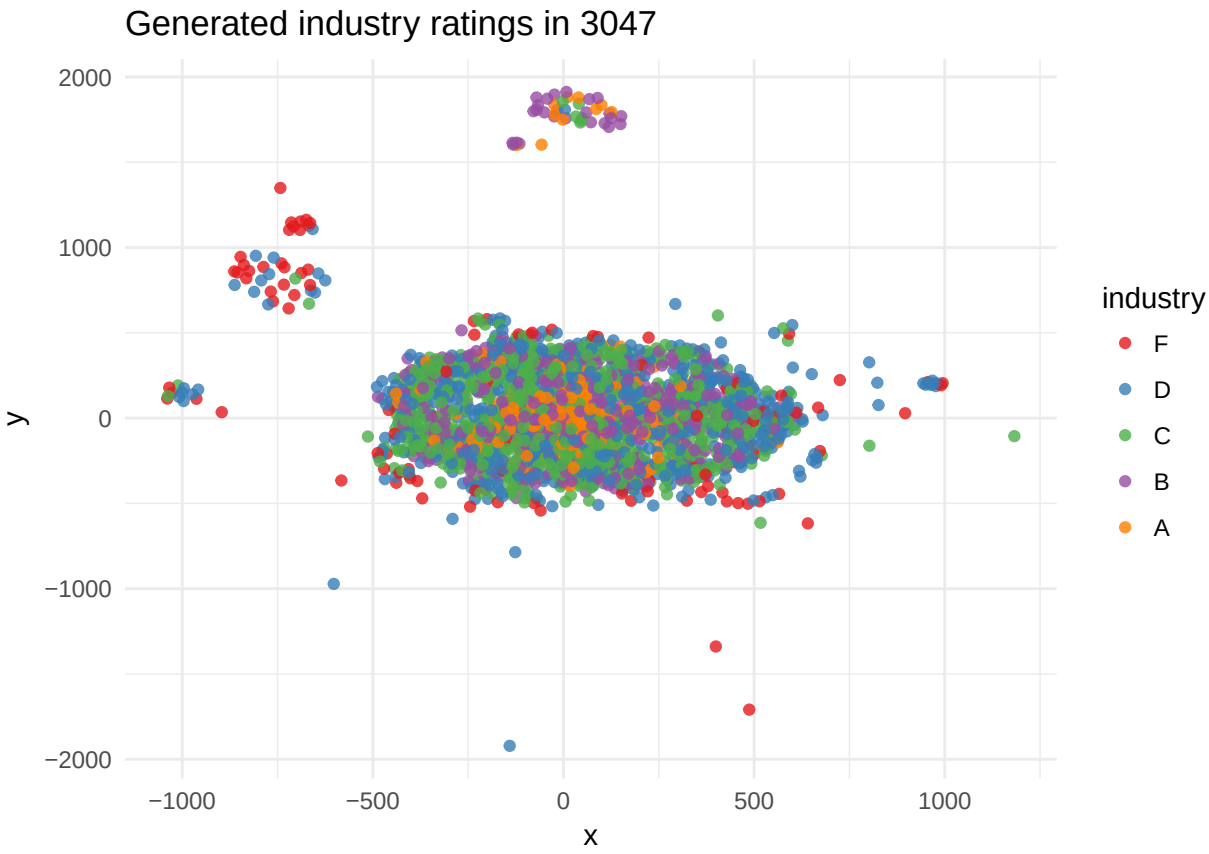
Tech rating distribution by faction type

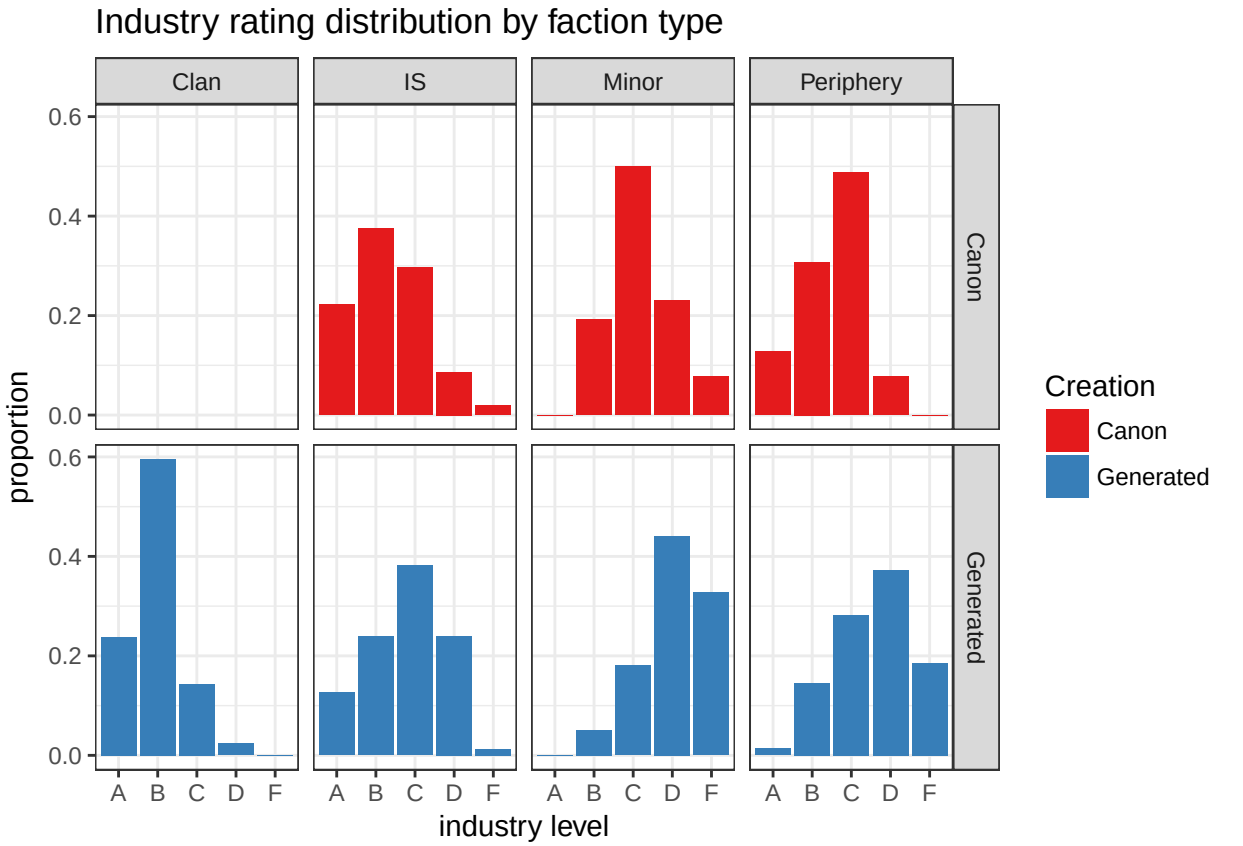


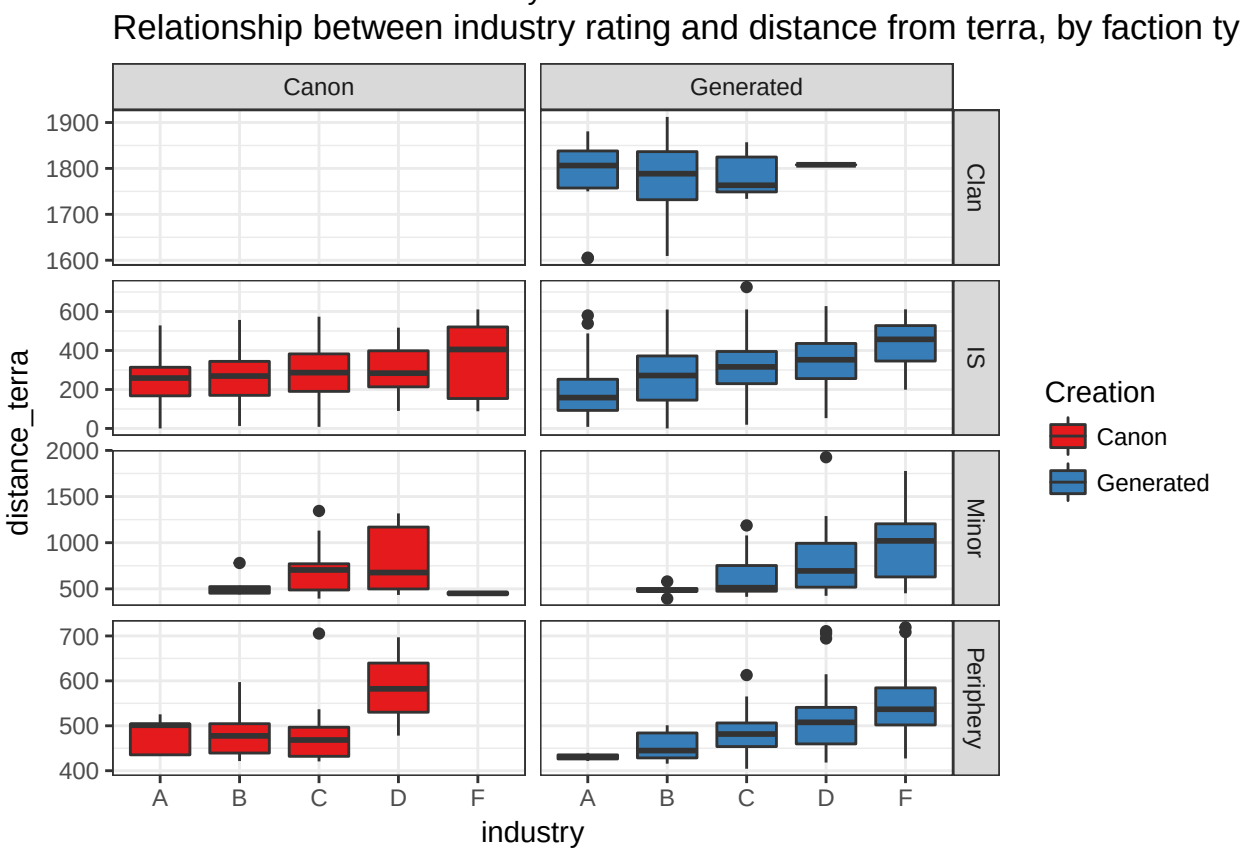
Relationship between tech rating and distance from terra, by faction type



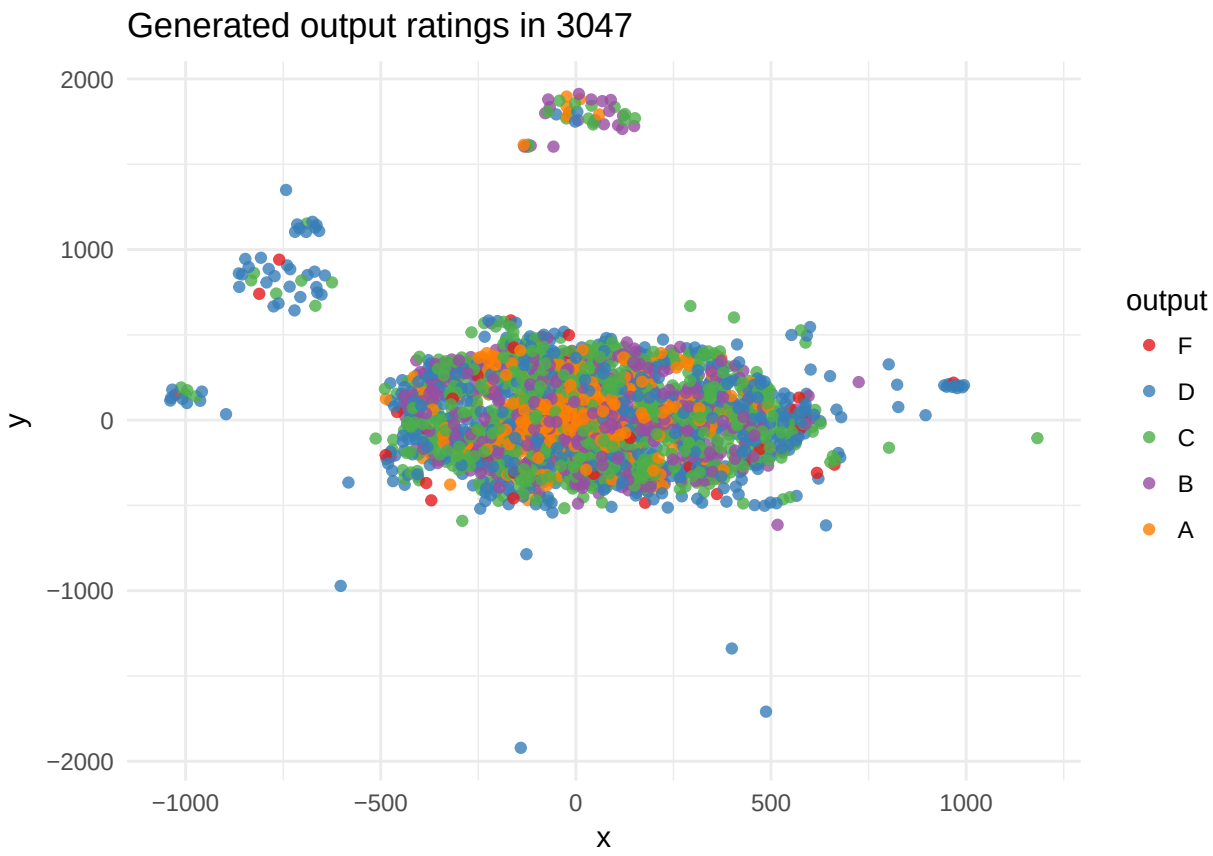
Industry Rating

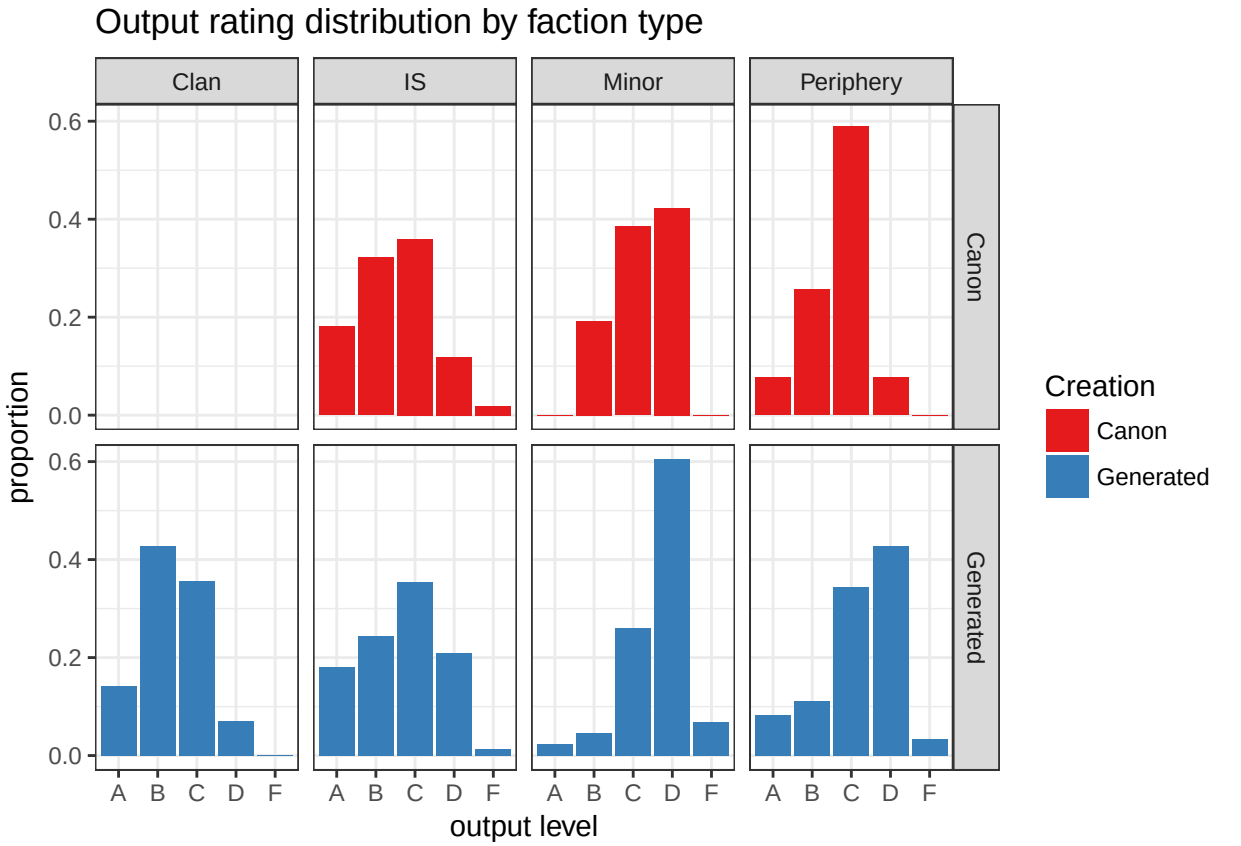


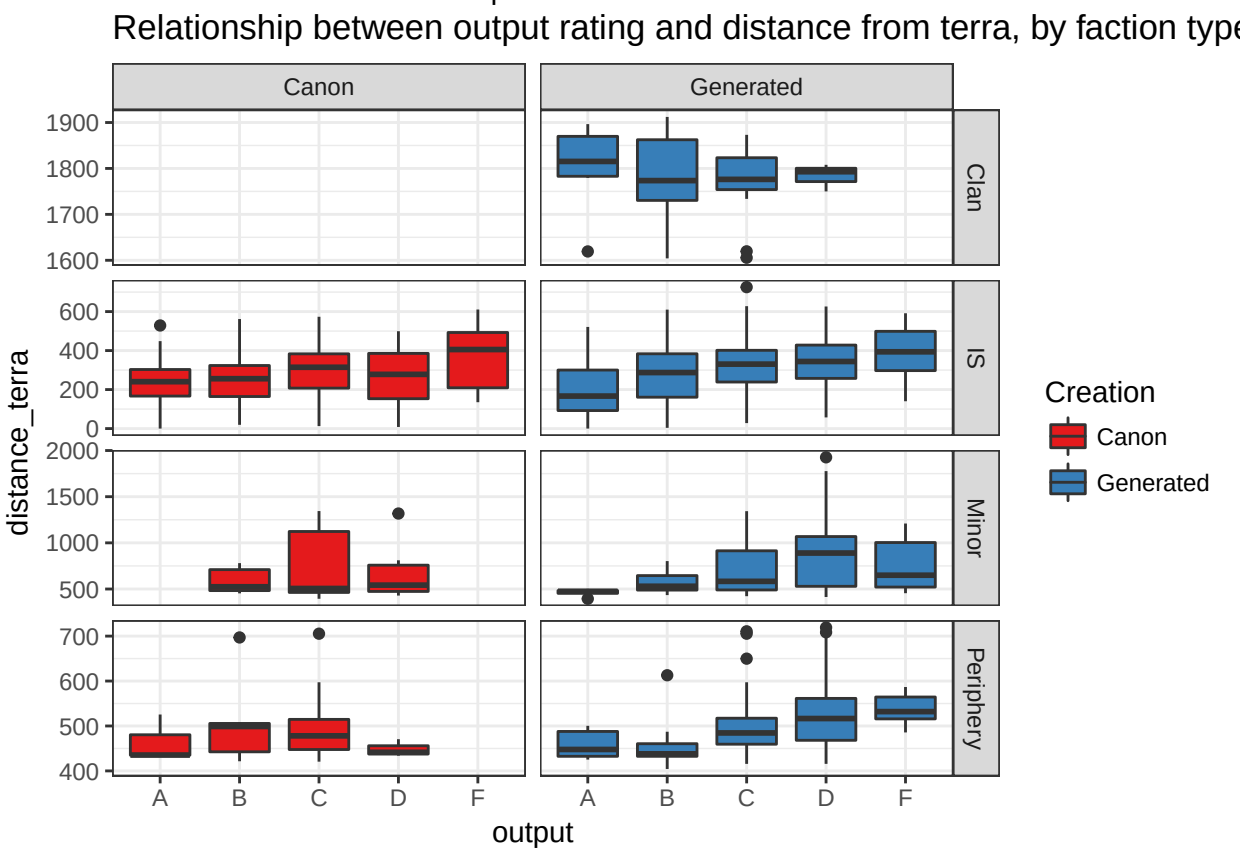

Industry rating distribution by faction type
Clan
IS
Minor
Periphery
Canon
Generated
proportion
0.0
0.2
0.4
0.6
A B C D F
industry level
Creation
Canon
Generated


Relationship between industry rating and distance from terra, by faction ty
Canon
Generated
Clan
IS
Minor
Periphery
distance_terra
1600
1700
1800
1900
0
200
400
600
500
1000
1500
2000
400
500
600
700
A B C D F
industry
Creation
Canon
Generated

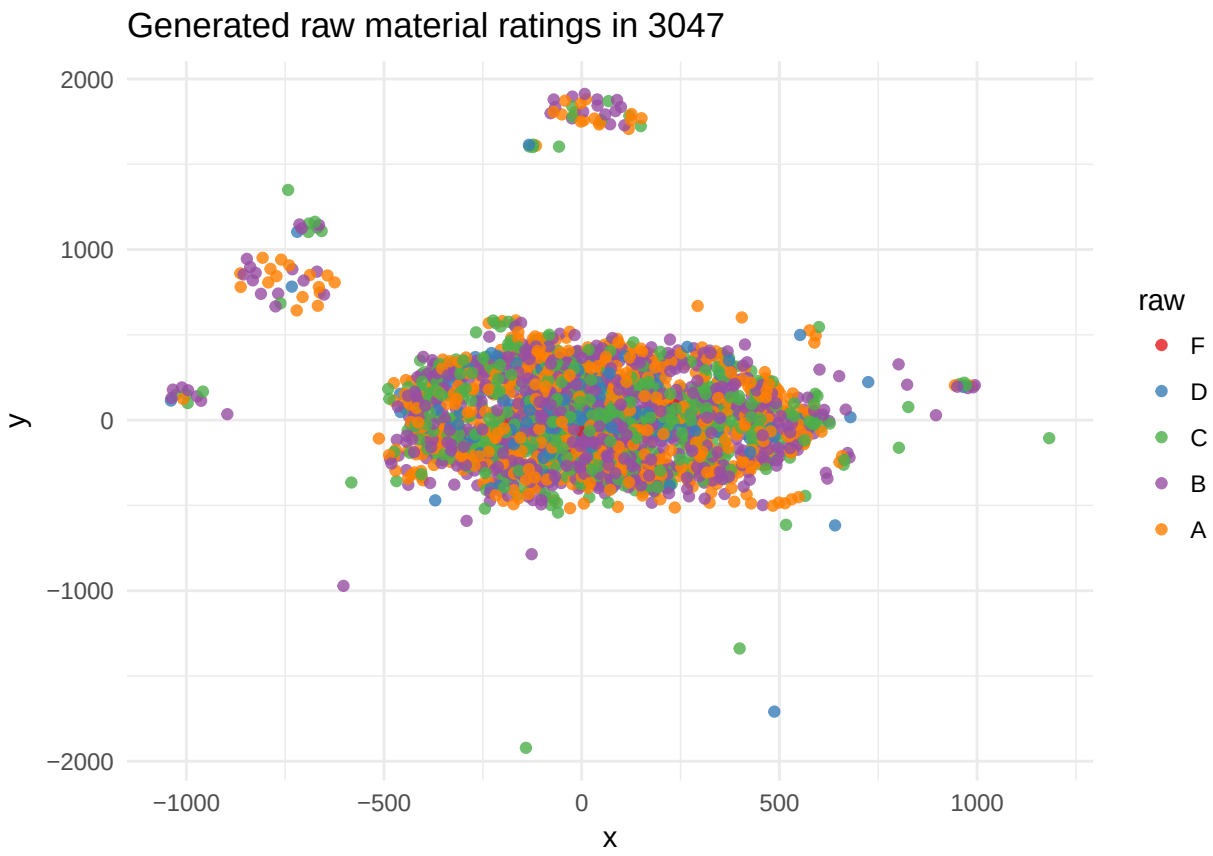
Output Rating

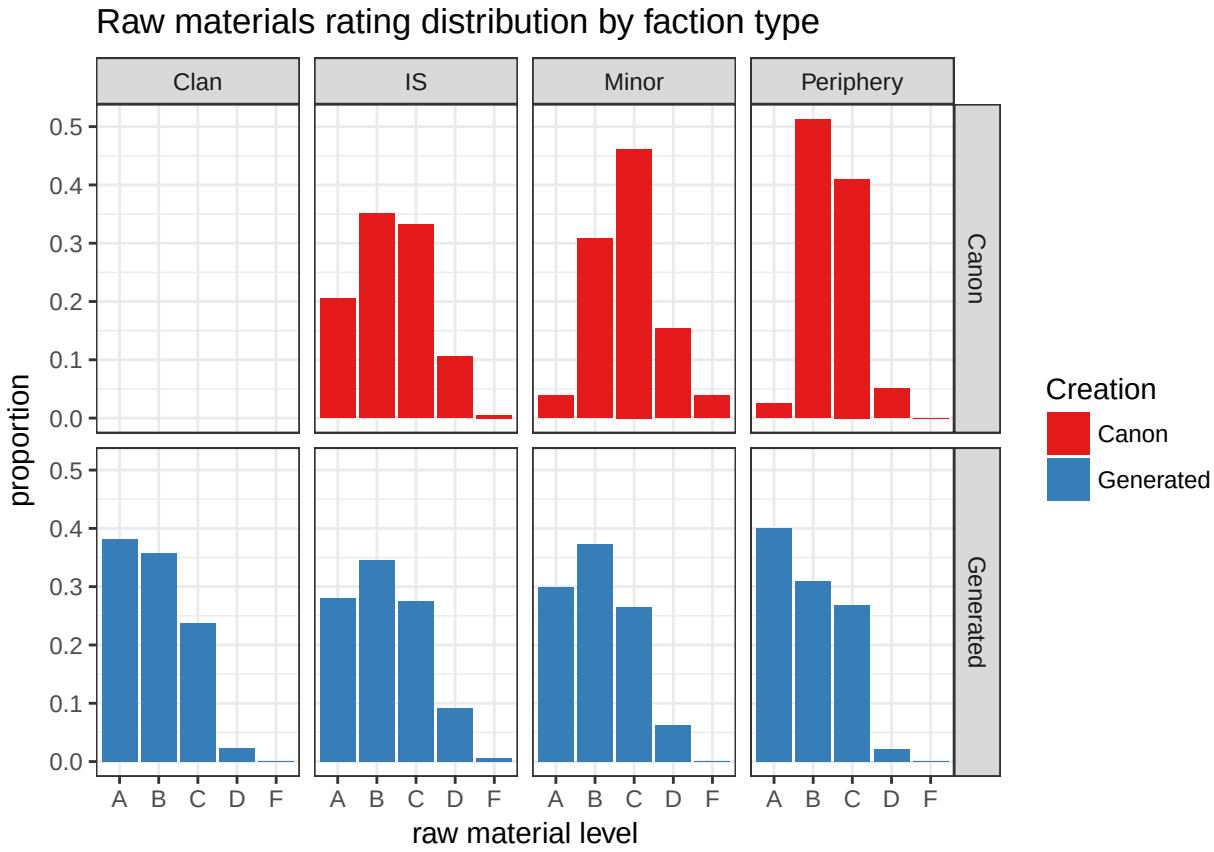


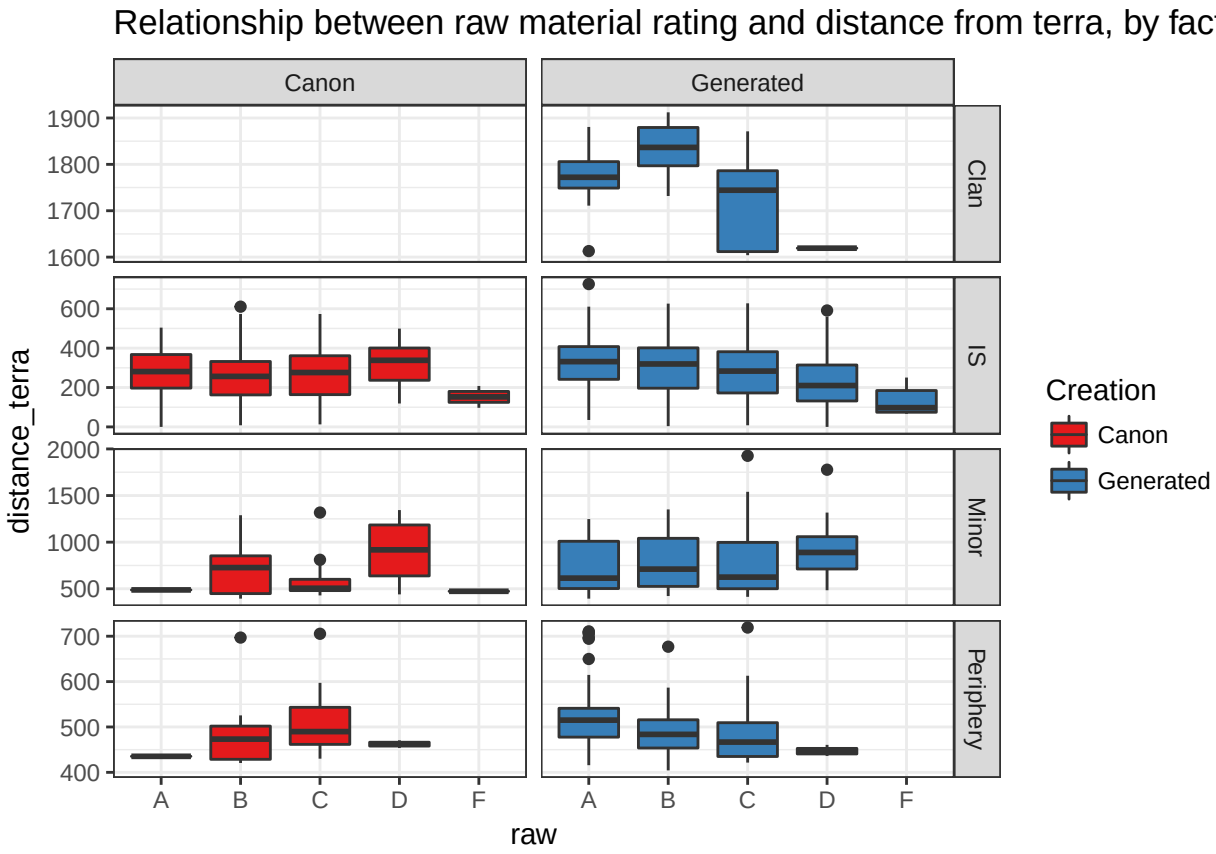

Output rating distribution by faction type
Clan
IS
Minor
Periphery
Canon
Generated
proportion
0.0
0.2
0.4
0.6
A B C D F
output level
Creation
Canon
Generated


Relationship between output rating and distance from terra, by faction type
Canon
Generated
Clan
IS
Minor
Periphery
distance_terra
1600
1700
1800
1900
0
200
400
600
500
1000
1500
2000
400
500
600
700
A B C D F
output
Creation
Canon
Generated

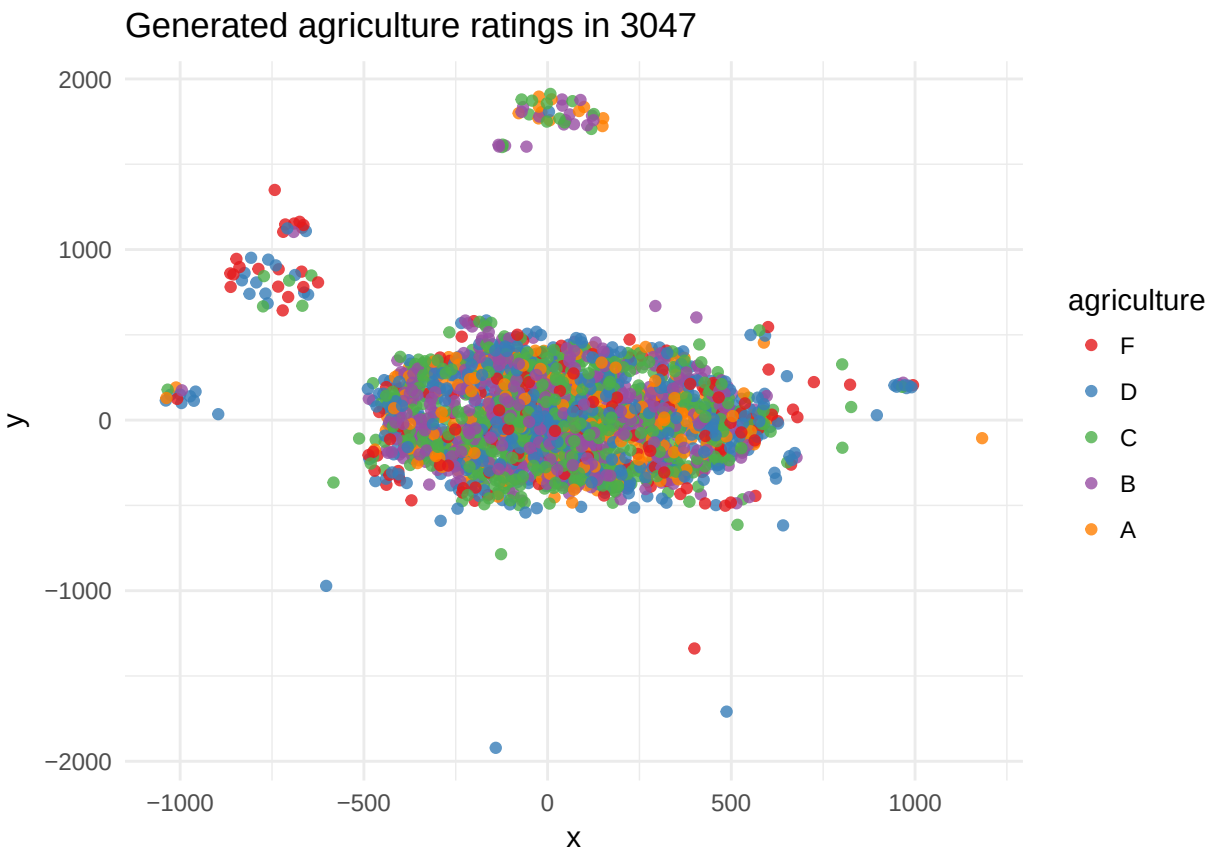
Raw Materials Rating

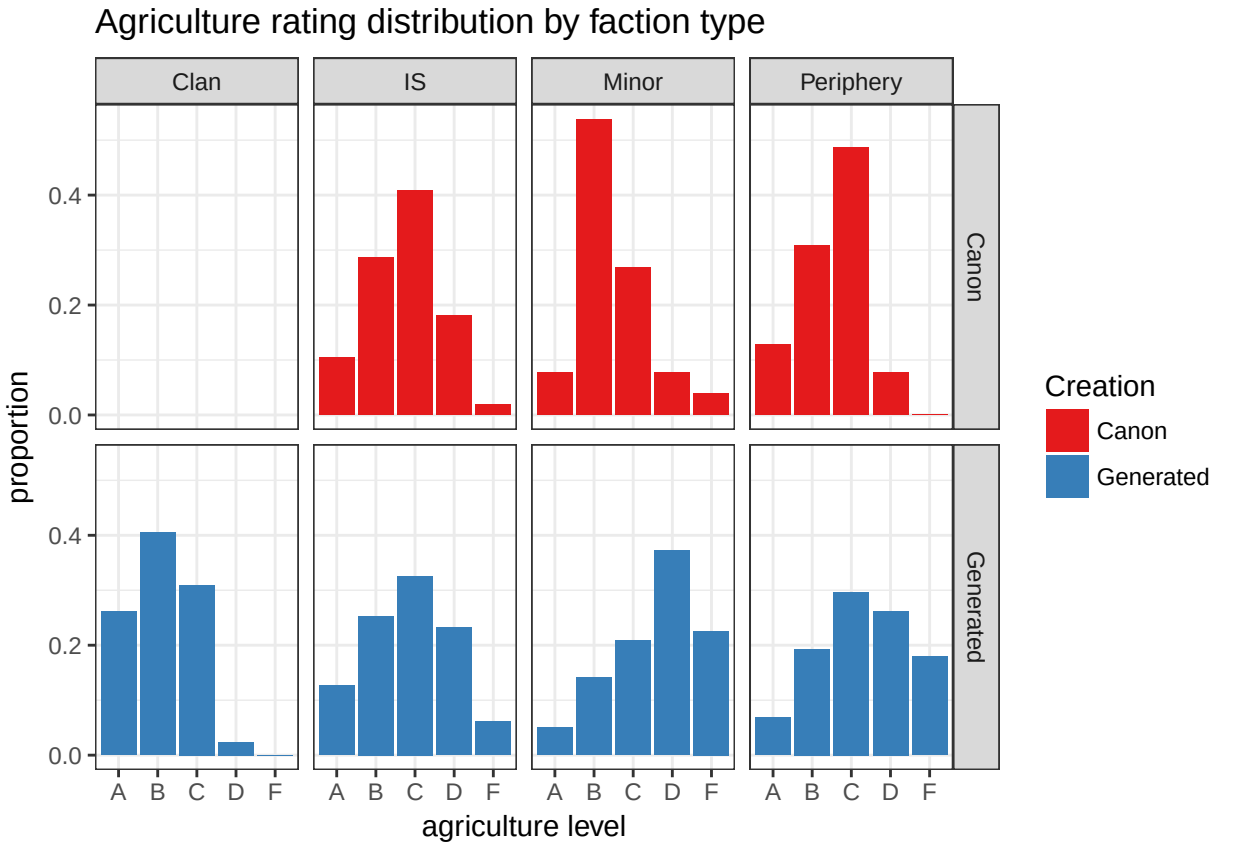


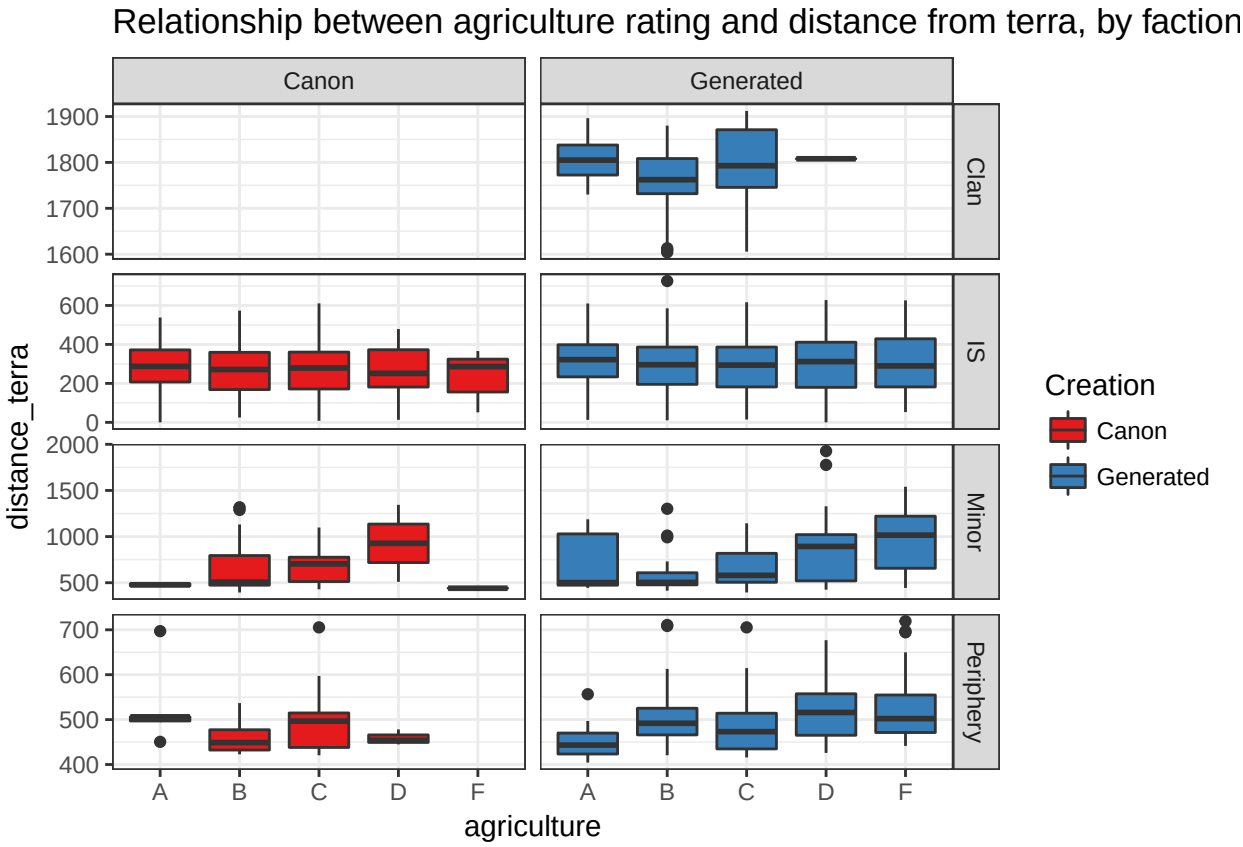

Raw materials rating distribution by faction type
Clan
IS
Minor
Periphery
Canon
Generated
proportion
0.0
0.1
0.2
0.3
0.4
0.5
A
B
C
D
F
raw material level
Creation
Canon
Generated


Relationship between raw material rating and distance from terra, by factic
Canon
Generated
Clan
IS
Minor
Periphery
distance_terra
raw
A
B
C
D
F
Creation
Canon
Generated

Agriculture Rating

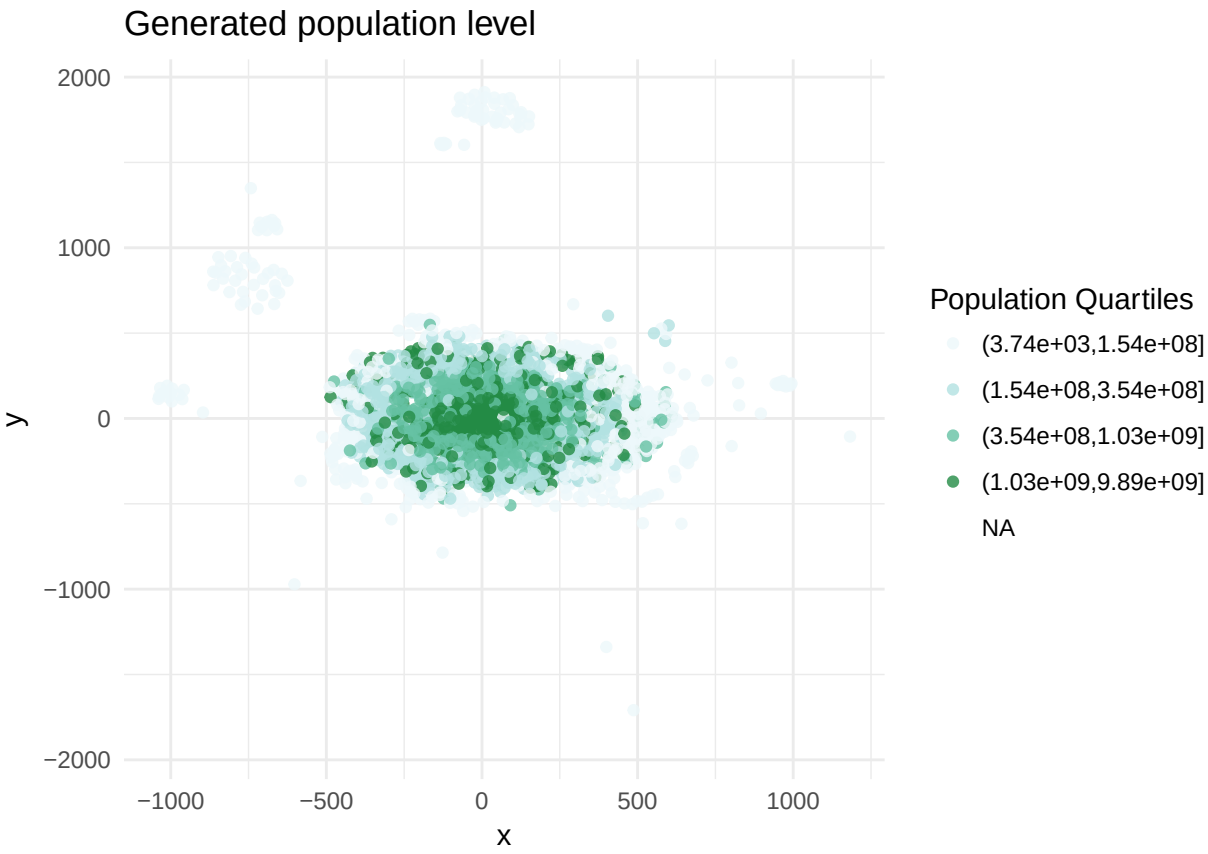



Agriculture rating distribution by faction type
Clan
IS
Minor
Periphery
Canon
Generated
proportion
0.0
0.2
0.4
A
B
C
D
F
agriculture level
Creation
Canon
Generated

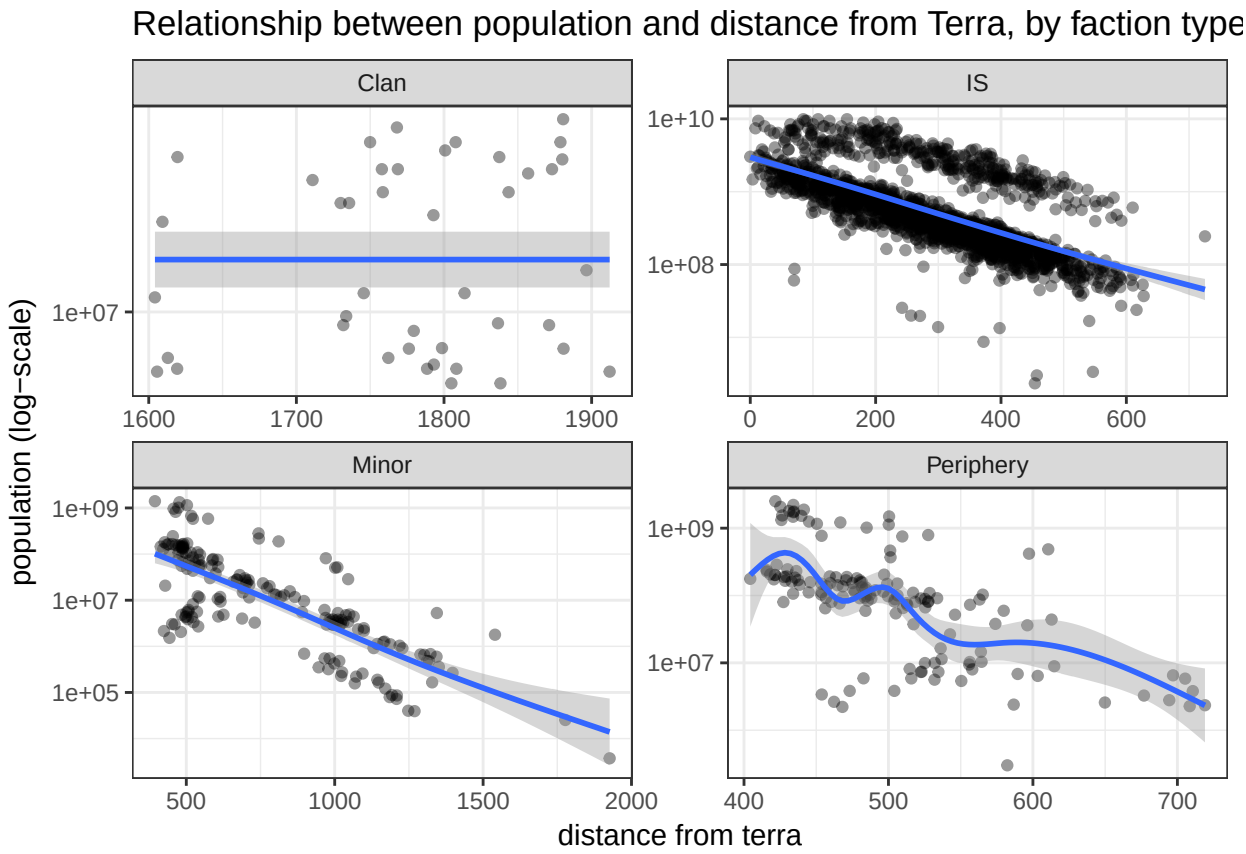

Relationship between agriculture rating and distance from terra, by faction
Canon
Generated
Clan
IS
Minor
Periphery
distance_terra
1600
1700
1800
1900
0
200
400
600
500
1000
1500
2000
400
500
600
700
A
B
C
D
F
agriculture
Creation
Canon
Generated

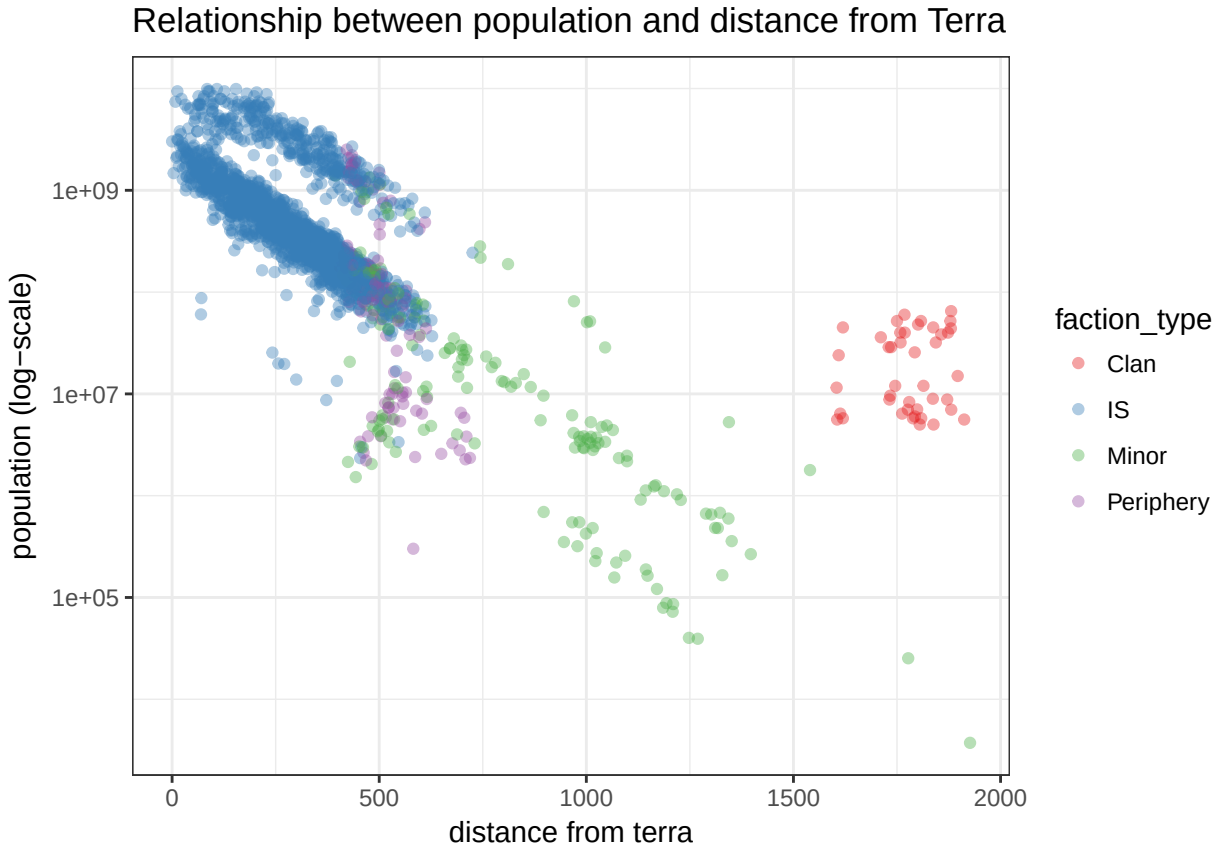
Population

```
## Warning: Removed 1 rows containing missing values (geom_point).
```

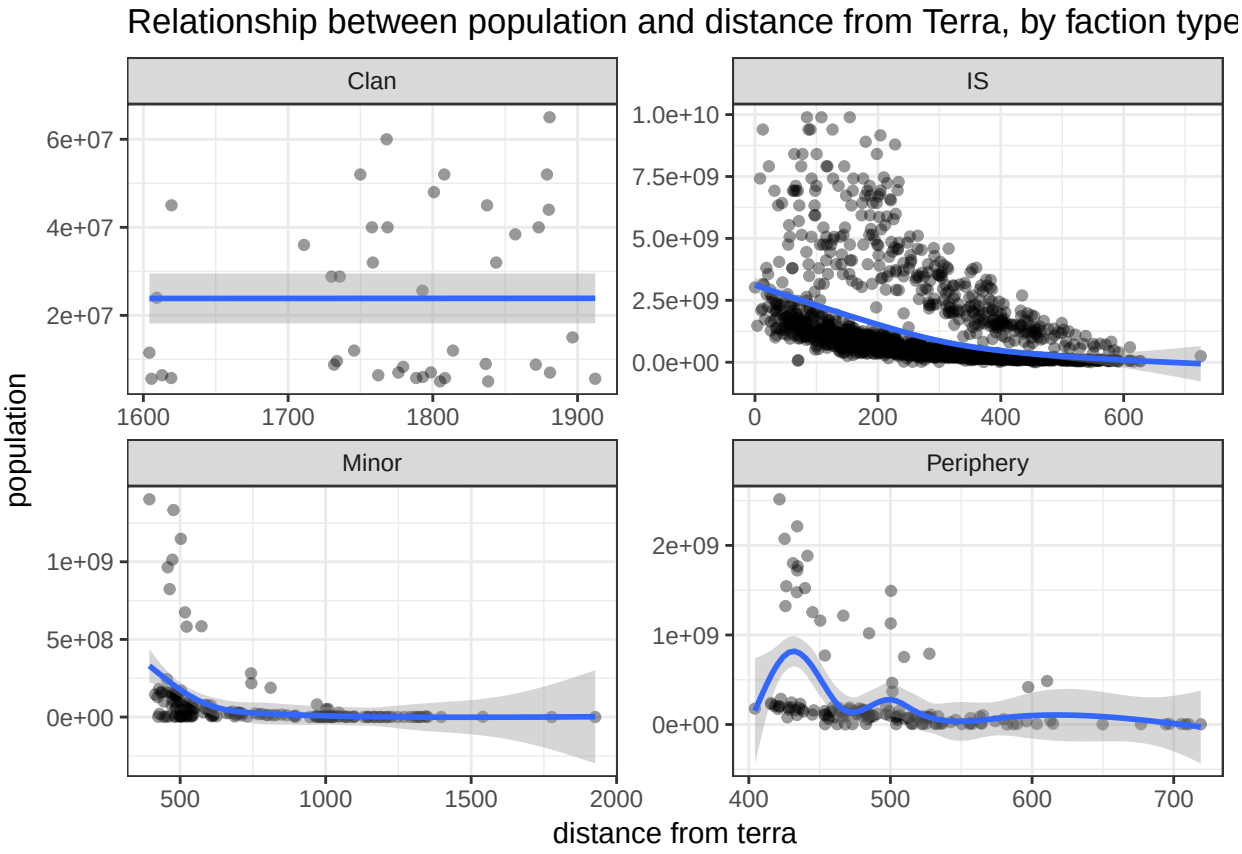


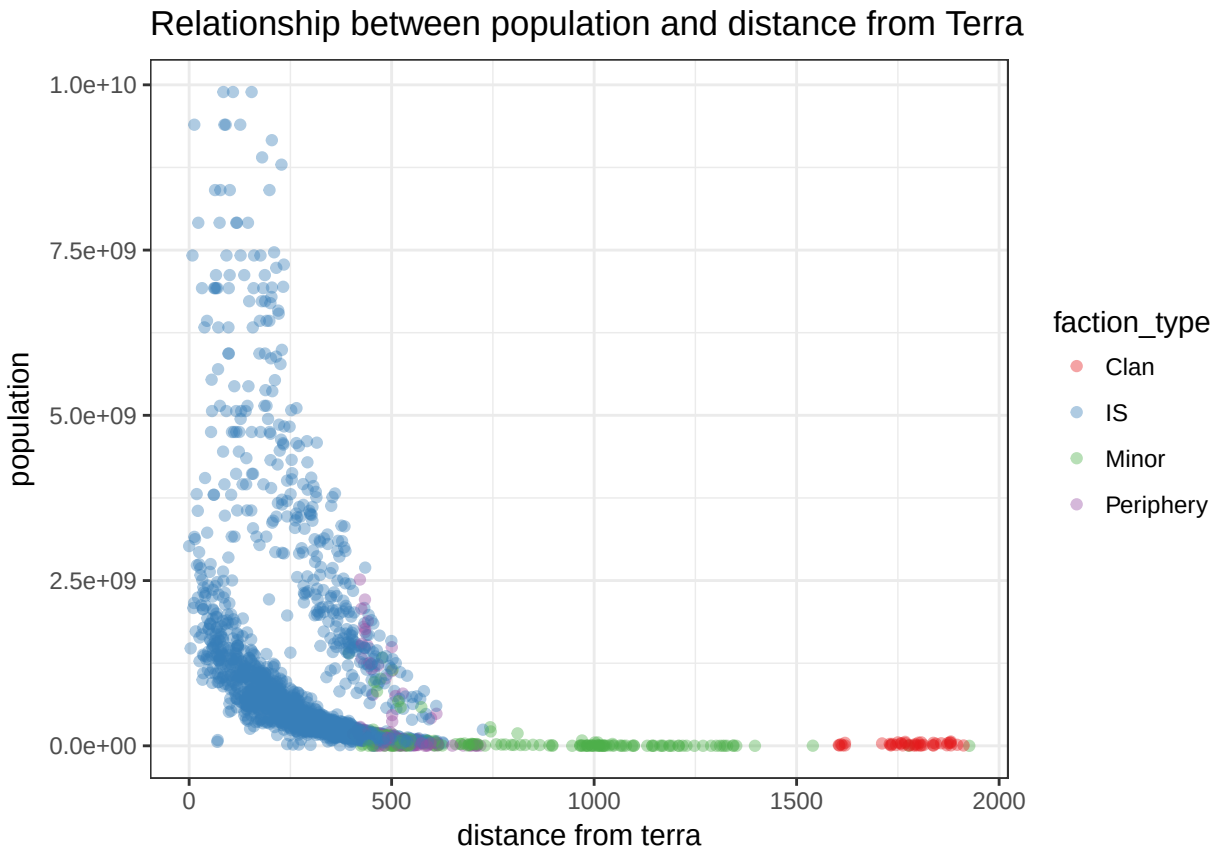

```
## `geom_smooth()` using method = 'gam'
```


Relationship between population and distance from Terra, by faction type
Clan
IS
Minor
Periphery
population (log−scale)
1e+10
1e+09
1e+08
1e+07
1e+05
1600
1700
1800
1900
0
200
400
600
500
1000
1500
2000
400
500
600
700
distance from terra

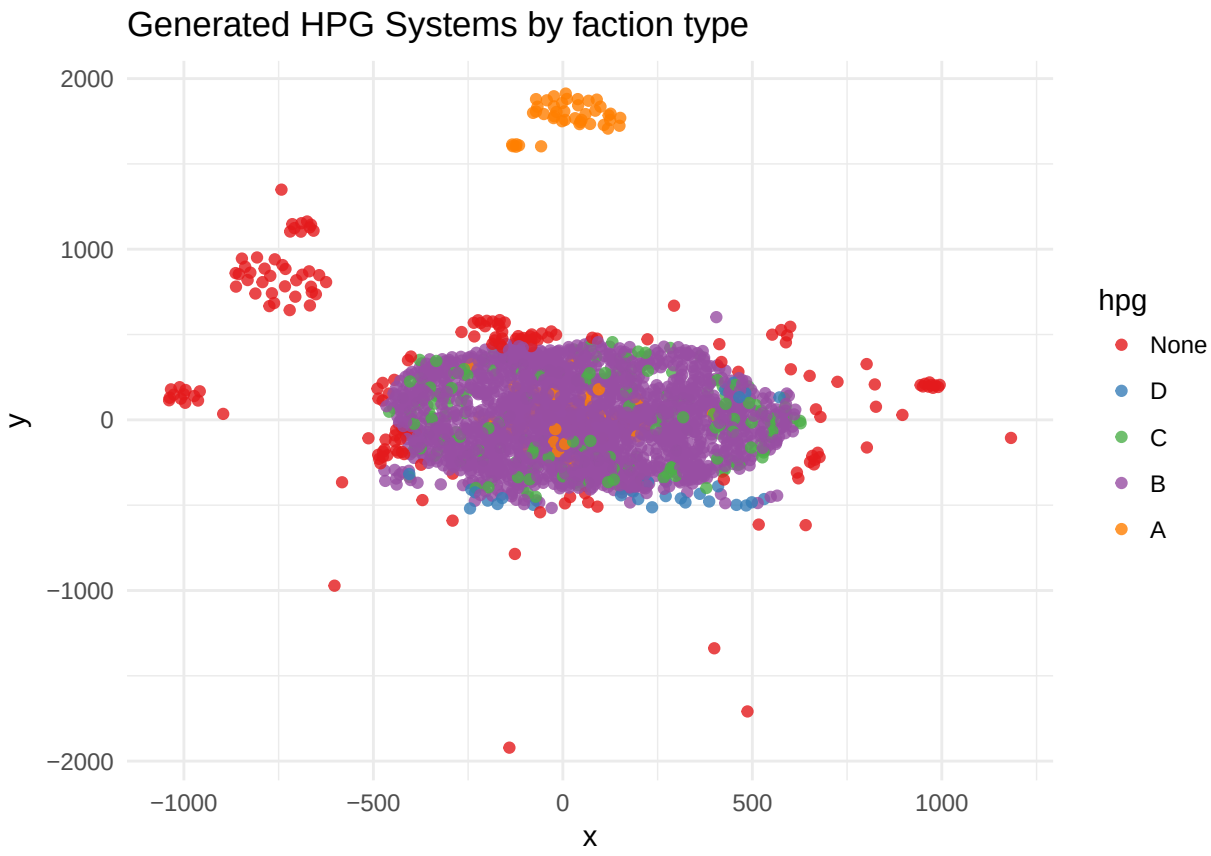

Relationship between population and distance from Terra
population (log−scale)
1e+09
1e+07
1e+05
0
500
1000
1500
2000
distance from terra
faction_type
Clan
IS
Minor
Periphery

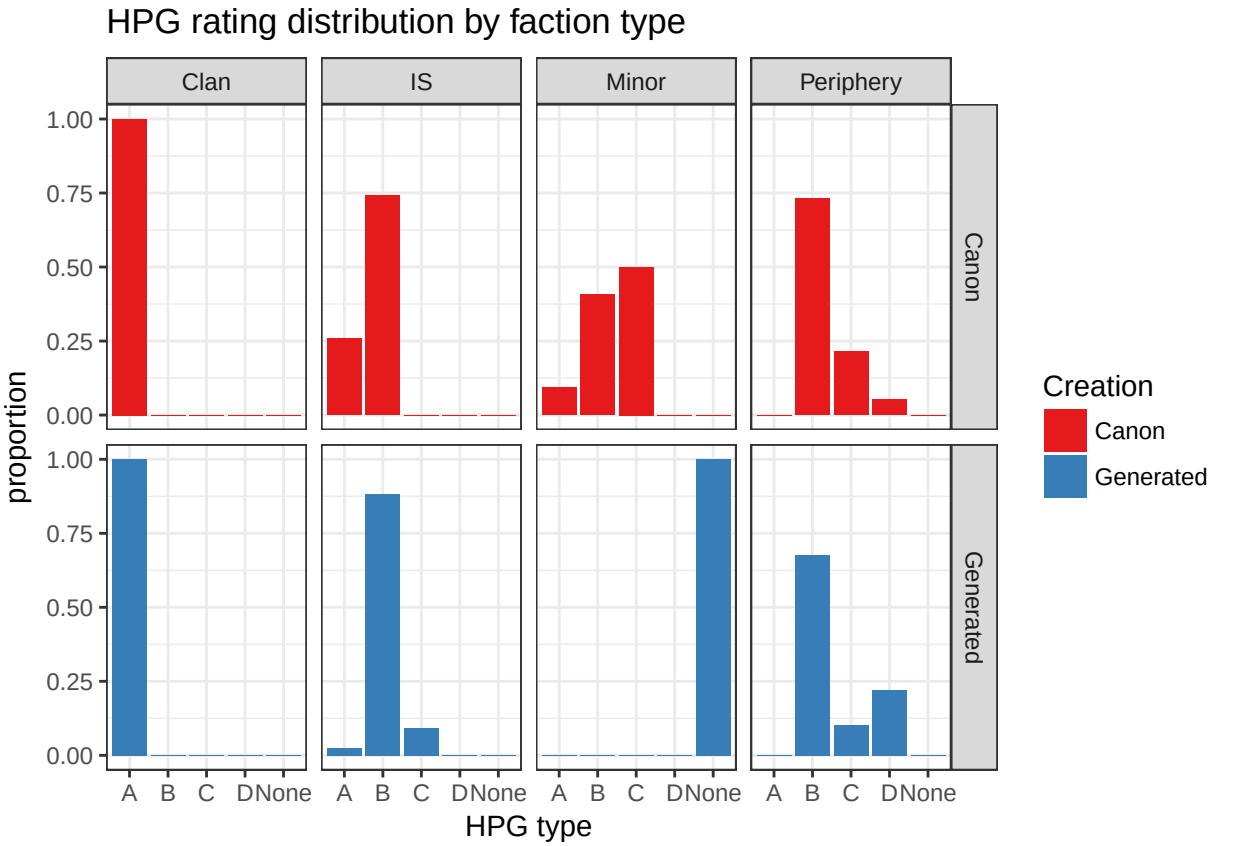
```
## `geom_smooth()` using method = 'gam'
```

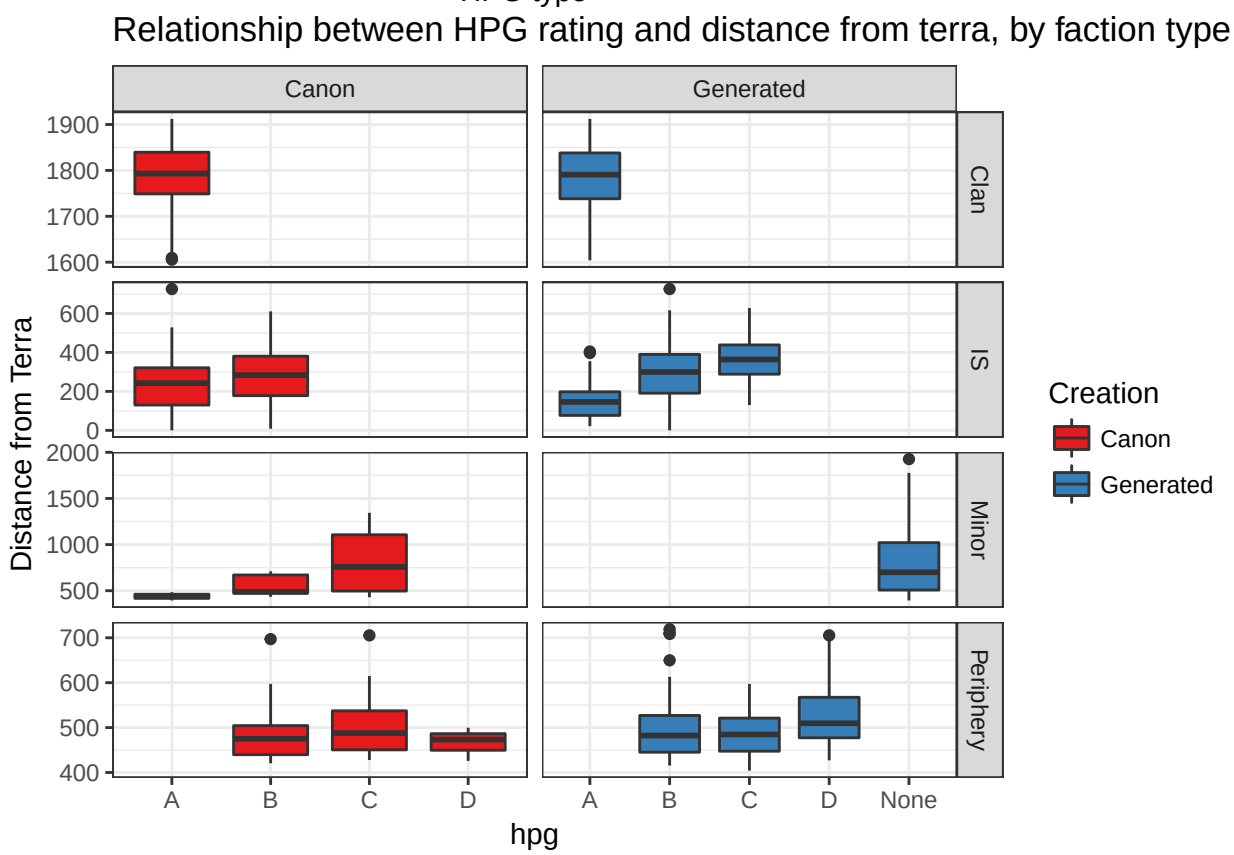



Relationship between population and distance from Terra
population
1.0e+10
7.5e+09
5.0e+09
2.5e+09
0.0e+00
0
500
1000
1500
2000
distance from terra
faction_type
Clan
IS
Minor
Periphery

HPG


Generated HPG Systems by faction type
2000
1000
0
−1000
−2000
y
−1000
−500
0
500
1000
x
hpg
None
D
C
B
A


HPG rating distribution by faction type
Clan
IS
Minor
Periphery
Canon
Generated
proportion
1.00
0.75
0.50
0.25
0.00
A
B
C
DNone
HPG type
Creation
Canon
Generated


Relationship between HPG rating and distance from terra, by faction type
Canon
Generated
Clan
IS
Minor
Periphery
Distance from Terra
1900
1800
1700
1600
600
400
200
0
2000
1500
1000
500
700
600
500
400
A
B
C
D
None
hpg
Creation
Canon
Generated