



A3: BUSINESS INSIGHT REPORT

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I. Introduction

The video games industry has been booming in the past few years with the last year bringing in a revenue close 37 billion U.S. dollars (Clement, 2021) and one of the most popular genres being the MMO (Massively Multiplayer Online) category, with it having the largest playerbase among the others. For this paper we will research into the Twitter feeds regarding the games Destiny, World of Warcraft, and Final Fantasy XIV, each one of them having a total playerbase of 38.01 million, 116.67 million and 35.27 million, respectively (MMO POPULATIONS, 2021). Throughout the analysis of this paper, it is intended to analyze the general feeling and what the regular user is talking or concerned about, ultimately making a recommendation from the perspective of World of Warcraft in how it could revitalize its game by not only looking at its own feed but also at some of its other competitors.

II. Analysis

For the purpose of this paper, the analysis will be conducted by applying the following frameworks:

- Bigram Analysis
- Sentiment Analysis
- TF-IDF

1. Bigram Analysis

When separating the bigrams and looking their results (Figure 1), the most important words coming regarding Destiny are as follow:

- Space, horse

-Horse, sparrow

-Witch, queen

-30th, anniversary

-Eva, dear

-trust, savathun

-Butt, stallion

Network of Bigrams - Destiny



Figure 1 Network of Bigrams - Destiny

The first two pairs indicating a common complaint among the users that the space allocated for each player is insufficient for their storage needs, in this case the fact that they cannot put their sparrows(vehicles) in the bank. The next three pairs refer to an expansion set,

anniversary event, and a character who only appears in events, indicating that there is currently a drought in game content and players are itching for more events or new activities. The next one refers to a weapon and enemy in the game, probably indicating that there might a new strategy in the game to use this weapon to defeat this boss in particular. While the last pair is odd as it refers to a character from a different game, possibly indicating that the playerbase for this game is migrating to a different game, Borderlands 3.

Regarding Final Fantasy XIV, when extracting the bigrams (Figure 2), is more interesting as there are particular central nodes linked to most of the words present in the diagram, the most important central nodes are:

-ffxiv_news_en

-hours

-2002

-free

-endwalker

Network of Bigrams - FFXIV



Figure 2 Network of Bigrams - FFXIV

The first relates to the official news portal, being visited by many different users trying to find out information about the game as well as consulting the encyclopedia included in the game itself "protopa". The next two indicate one commonality, being the presence of error 2002 which is basically a delay in logging into the game due to an overflow of players and low server capacity (Harris, 2021), while the "hours" node may indicate the time of the day in which the peak hours are happening in the game, those being from 2 to 5. The last node "endwalker" refers to the latest expansion coming in soon and indicates that users are trying to find out as much information as possible before its release.

In the case of World of Warcraft (Figure 3), the most important pairs are as follow:

-patch, 9.2

-lich, king

-token, price

-riotgames, league

-final, fantasy

Network of Bigrams - Wow



Figure 3 Network of Bigrams - WoW

The first three indicating content that is popular among the users, patch 9.2 the final one in the latest expansion, the second referring to a still popular expansion in the game and third a mechanic to buy in-game currency with real cash. The last two pairs refer to a company that produces a different and the last a different MMORPG, Final Fantasy XIV. Ultimately suggesting that based on the previous and current analysis, create ongoing events that appeal to the playerbase, ensure that the servers have enough capacity to host their players and take some

cues from rival for mechanics that could be applied in WoW, such as minigames that present an opportunity to play a similar MOBA session.

2. Sentiment Analysis

When looking at the different sentiments from the games (Figures 4-6), we can see that among the three, Destiny shows a mediocre scoring as the AFINN and NRC scoring even themselves out with Bing being almost 0, FFXIV shows a negative value as the Bing has an overwhelming lower score in comparison to the AFINN and Bing, while Wow is the most popular as the NRC scoring is higher than the others. With this we can state that even though players may consider moving to a different game, they hold normally positive feelings regarding WoW, while they may not be as satisfied with the other two.

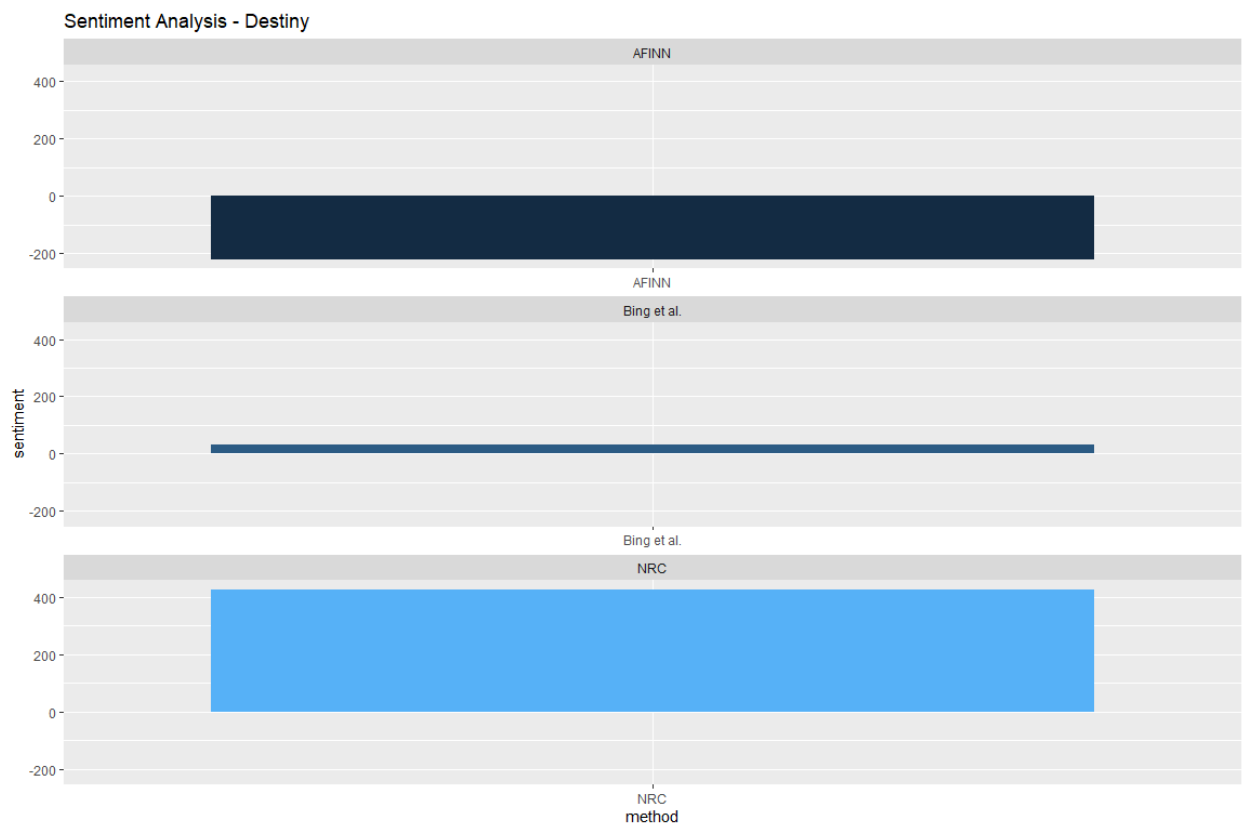


Figure 4 Sentiment Analysis - Destiny

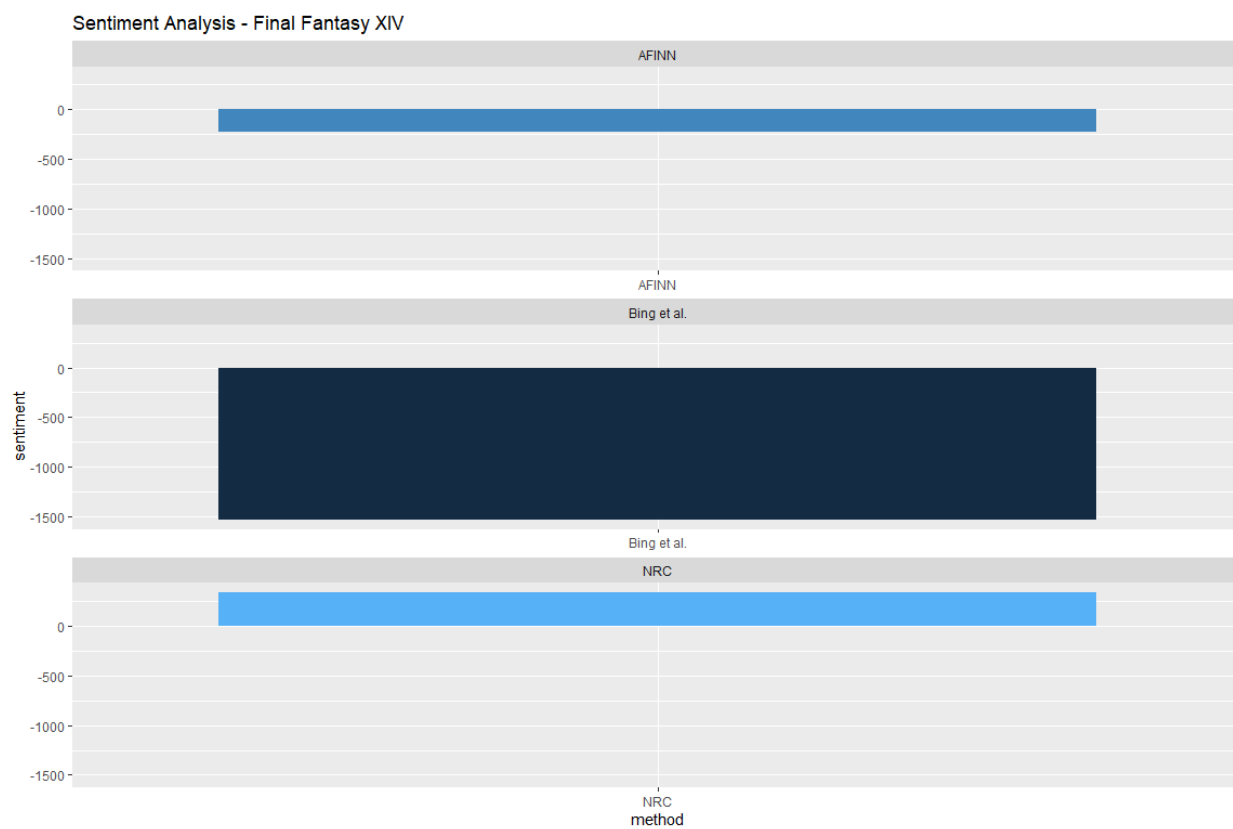


Figure 5 Sentiment Analysis – Final Fantasy XIV

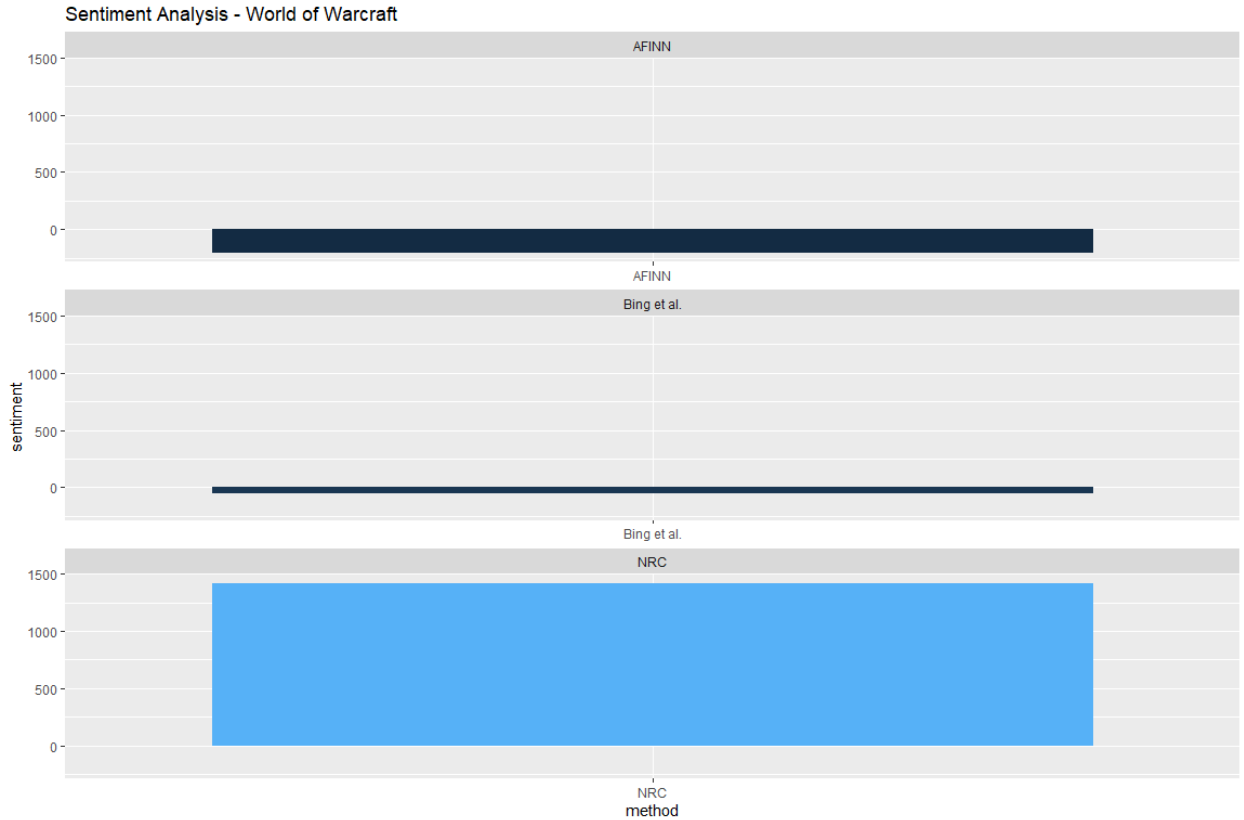


Figure 6 Sentiment Analysis - World of Warcraft

3. TF-IDF

The TF-IDF also shows an interesting story (Figure 7), as from the graphs, we can see that streamers are particularly popular in destiny, the server capacity continues to be a topic of interest for the users, while in WoW the most important topics relate to game characters, classes, or content itself. By looking at these charts it would be suggested to invite streamers into the game to revitalize some of the game current state, as well as make sure that the server capacity won't be an issue in the future for the WoW servers as it is in the FFXIV servers.

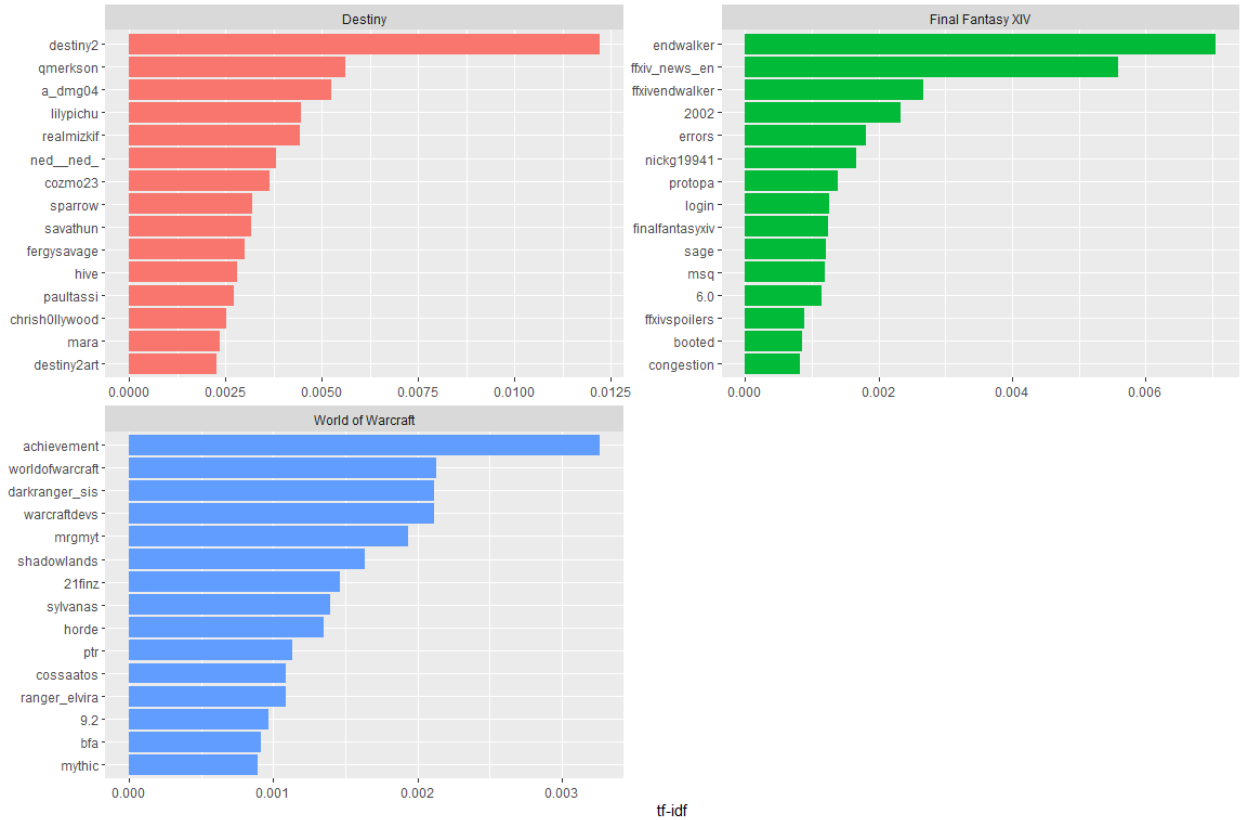


Figure 7 TF-IDF Analysis - all games

III. Conclusion

In conclusion we can state that despite the age of WoW, it remains to be the most popular MMORPG in the eyes of users as it has the most positive sentiments in comparison to the other two but has some areas of improvement that can learn from the others. The most important one is avoiding content drought as it happens with Destiny possibly bringing in seasonal events that can led to the game remain being relevant to the users and making sure their servers have enough capacity to avoid the problems that happen in FFXIV. Other recommendations are the revitalization of the game with possible a partnership with streamers or a heavier inclusion such as in the case of Destiny and creating new mechanics that can present from other that can appeal to new players or old players who have left the game and encouraging to join back.

IV. Bibliography

Clement, J. (2021, November 19). Video game industry - Statistics & Facts. Retrieved October 4, 2021, from <https://www.statista.com/topics/868/video-games/>

Harris, I. (2021, December 3). FFXIV Error 2002 – what it is, and how to fix it. Retrieved December 5, 2021, from <https://www.pcgamesn.com/final-fantasy-xiv-a-realm-reborn/ffxiv-error-2002>

MMO POPULATIONS. (2021, December 5). MMO POPULATIONS. Retrieved December 5, 2021, from <https://mmo-population.com/>

V. Appendix

```
> # load twitter library - the rtweet library is recommended now over twitteR
```

```
> library(rtweet)
```

```
> # plotting and pipes - tidyverse!
```

```
> library(ggplot2)
```

```
> library(dplyr)
```

```
> # text mining library
```

```
> library(tidytext)
```

```
> # plotting packages
```

```
> library(igraph)
```

```
> library(ggraph)
```

```
> library(tidyverse)
```

```
> library(httr)
```

```
> library(tidytext)
```

```
> library(tidyr)
```

```
> library(stringr)
```

```
> data("stop_words")
```

```
> custom_stop_words <- tribble(
```

```

+ ~word, ~lexicon,

+ "http", "CUSTOM",

+ "https", "CUSTOM",

+ "destinythegame", "CUSTOM",

+ "wow", "CUSTOM",

+ "ffxiv", "CUSTOM",

+ "warcraft", "CUSTOM",

+ "bungie", "CUSTOM"

+ )

> stop_words_rev <- stop_words %>%

+   bind_rows(custom_stop_words)

> destiny_df <- search_tweets(q = "DestinyTheGame", n = 5000,

+   lang = "en", since = '2018-01-01',

+   include_rts = FALSE)

Downloading [=====] 100%

> destiny_text <- as.data.frame(destiny_df$text)

> destiny_text$Game <- "Destiny"

> names(destiny_text)[names(destiny_text) == "destiny_df$text"] <- "Text"

```

```

> wow_df <- search_tweets(q = "Warcraft", n = 5000,

+                           lang = "en", since = '2018-01-01',

+                           include_rts = FALSE)

Downloading [=====] 100%

> wow_text <- as.data.frame(wow_df$text)

> wow_text$Game <- "World of Warcraft"

> names(wow_text)[names(wow_text) == "wow_df$text"] <- "Text"

> ffxiv_df <- search_tweets(q = "FFXIV", n = 5000,

+                           lang = "en", since = '2018-01-01',

+                           include_rts = FALSE)

Downloading [=====] 100%

> ffxiv_text <- as.data.frame(ffxiv_df$text)

> ffxiv_text$Game <- "Final Fantasy XIV"

> names(ffxiv_text)[names(ffxiv_text) == "ffxiv_df$text"] <- "Text"

> game_texts <- rbind(destiny_text, wow_text, ffxiv_text)

> game_tokens <- game_texts %>%

+   unnest_tokens(word, Text) %>%

+   anti_join(stop_words_rev)

```


Joining, by = "word"

```
> game_bigrams <- game_texts %>%

+   unnest_tokens(bigram, Text, token = "ngrams", n = 2)

> game_bigrams_clean <- game_bigrams %>%

+   separate(bigram, c("word1", "word2"), sep = " ")

> game_bigrams_clean <- game_bigrams_clean %>%

+   filter(!word1 %in% stop_words_rev$word) %>%

+   filter(!word2 %in% stop_words_rev$word)

> bigrams_destiny <- game_bigrams_clean %>%

+   filter(Game == "Destiny")

> destiny_bigrams_count <- bigrams_destiny %>%

+   count(word1, word2, sort = TRUE)

> bigram_graph_destiny <- destiny_bigrams_count %>%

+   filter(n > 15) %>%

+   graph_from_data_frame()

> set.seed(123)

> a <- grid::arrow(type = "closed", length = unit(.15, "inches"))

> ggraph(bigram_graph_destiny, layout = "fr") +
```

```

+ geom_edge_link(aes(edge_alpha = n), show.legend = FALSE,
+               arrow = a, end_cap = circle(.07, 'inches')) +
+ geom_node_point(color = "lightblue", size = 5) +
+ geom_node_text(aes(label = name), vjust = 1, hjust = 1) +
+ theme_void()+ggtitle("Network of Bigrams - Destiny")

> bigrams_wow <- game_bigrams_clean %>%

+ filter(Game == "World of Warcraft")

> wow_bigrams_count <- bigrams_wow %>%

+ count(word1, word2, sort = TRUE)

> bigram_graph_wow <- wow_bigrams_count %>%

+ filter(n > 15) %>%

+ graph_from_data_frame()

> gggraph(bigram_graph_wow, layout = "fr") +

+ geom_edge_link(aes(edge_alpha = n), show.legend = FALSE,
+               arrow = a, end_cap = circle(.07, 'inches')) +
+ geom_node_point(color = "lightblue", size = 5) +
+ geom_node_text(aes(label = name), vjust = 1, hjust = 1) +
+ theme_void()+ggtitle("Network of Bigrams - Wow")

```

```

> wow_bigrams_count <- bigrams_wow %>%

+   count(word1, word2, sort = TRUE)

> bigram_graph_wow <- wow_bigrams_count %>%

+   filter(n > 15) %>%

+   graph_from_data_frame()

> ggraph(bigram_graph_wow, layout = "fr") +

+   geom_edge_link(aes(edge_alpha = n), show.legend = FALSE,

+     arrow = a, end_cap = circle(.07, 'inches')) +

+   geom_node_point(color = "lightblue", size = 5) +

+   geom_node_text(aes(label = name), vjust = 1, hjust = 1) +

+   theme_void()+ggtitle("Network of Bigrams - Wow")

> bigrams_ffxiv <- game_bigrams_clean %>%

+   filter(Game == "Final Fantasy XIV")

> ffxiv_bigrams_count <- bigrams_ffxiv %>%

+   count(word1, word2, sort = TRUE)

> bigram_graph_ffxiv <- ffxiv_bigrams_count %>%

+   filter(n > 15) %>%

+   graph_from_data_frame()

```

```

> ggraph(bigram_graph_ffxiv, layout = "fr") +

+   geom_edge_link(aes(edge_alpha = n), show.legend = FALSE,

+               arrow = a, end_cap = circle(.07, 'inches')) +

+   geom_node_point(color = "lightblue", size = 5) +

+   geom_node_text(aes(label = name), vjust = 1, hjust = 1) +

+   theme_void()+ggtitle("Network of Bigrams - FFXIV")

> afinn <- get_sentiments("afinn")

> nrc <- get_sentiments("nrc")

> bing <- get_sentiments("bing")

> sentiments <- bind_rows(mutate(afinn, lexicon="afinn"),

+               mutate(nrc, lexicon="nrc"),

+               mutate(bing, lexicon="bing")

+ )

> tokens_destiny <- game_tokens %>%

+   filter(Game == "Destiny")

> destiny_bing_word_counts <- tokens_destiny %>%

+   inner_join(get_sentiments("bing")) %>%

+   count(word, sentiment, sort = TRUE) %>%

```

```
+ ungroup()
```

```
Joining, by = "word"
```

```
> destiny_bing_word_counts
```

	word	sentiment	n
1	trust	positive	386
2	destiny	positive	331
3	love	positive	121
4	free	positive	83
5	amazing	positive	73
6	shit	negative	65
7	dungeon	negative	62
8	scorn	negative	57
9	fuck	negative	54
10	hell	negative	54
11	fucking	negative	53
12	cool	positive	48
13	pretty	positive	44
14	bad	negative	43

15	nice	positive	42
16	vex	negative	38
17	enemy	negative	37
18	flawless	positive	36
19	darkness	negative	35
20	fun	positive	35
21	lies	negative	32
22	ready	positive	31
23	top	positive	29
24	fallen	negative	27
25	enemies	negative	26
26	kill	negative	26
27	awesome	positive	25
28	hard	negative	25
29	holy	positive	25
30	wrong	negative	24
31	damn	negative	22
32	favorite	positive	22

33	happy	positive	22
34	beautiful	positive	20
35	lost	negative	20
36	super	positive	20
37	glad	positive	19
38	excited	positive	18
39	funny	negative	18
40	loot	negative	18
41	win	positive	18
42	break	negative	17
43	dark	negative	16
44	hot	positive	16
45	lie	negative	16
46	weird	negative	16
47	cute	positive	15
48	fine	positive	15
49	fortune	positive	15
50	grind	negative	15

51	hate negative 15
52	miss negative 15
53	sick negative 15
54	stupid negative 15
55	dead negative 14
56	deception negative 14
57	die negative 14
58	forsaken negative 14
59	worst negative 14
60	crazy negative 13
61	enjoy positive 13
62	fast positive 12
63	joke negative 12
64	lying negative 12
65	magic positive 12
66	trash negative 12
67	trusted positive 12
68	worth positive 12

69	chill negative	11
70	issue negative	11
71	killed negative	11
72	lack negative	11
73	losing negative	11
74	mad negative	11
75	master positive	11
76	sad negative	11
77	strike negative	11
78	sucks negative	11
79	support positive	11
80	sweet positive	11
81	trustworthy positive	11
82	betray negative	10
83	celebrate positive	10
84	dungeons negative	10
85	missed negative	10
86	poor negative	10

87	saint	positive	10
88	strange	negative	10
89	wild	negative	10
90	worse	negative	10
91	boring	negative	9
92	deceit	negative	9
93	doubt	negative	9
94	glimmer	positive	9
95	honest	positive	9
96	lose	negative	9
97	loved	positive	9
98	suck	negative	9
99	begging	negative	8
100	dishonest	negative	8
101	fool	negative	8
102	helped	positive	8
103	hurt	negative	8
104	hype	negative	8

- 105 issues negative 8
- 106 legendary positive 8
- 107 nicely positive 8
- 108 prison negative 8
- 109 supporting positive 8
- 110 tired negative 8
- 111 trusting positive 8
- 112 broken negative 7
- 113 brood negative 7
- 114 celebration positive 7
- 115 complaining negative 7
- 116 concerned negative 7
- 117 confused negative 7
- 118 disgusting negative 7
- 119 error negative 7
- 120 fair positive 7
- 121 fall negative 7
- 122 helping positive 7

123	lied	negative	7
124	stuck	negative	7
125	bitch	negative	6
126	clears	positive	6
127	death	negative	6
128	dope	negative	6
129	dust	negative	6
130	easier	positive	6
131	evil	negative	6
132	fantastic	positive	6
133	gross	negative	6
134	hang	negative	6
135	insane	negative	6
136	killing	negative	6
137	lead	positive	6
138	likes	positive	6
139	luck	positive	6
140	perfect	positive	6

141	plot	negative	6
142	sadly	negative	6
143	tangle	negative	6
144	toxic	negative	6
145	trap	negative	6
146	avarice	negative	5
147	benefit	positive	5
148	cry	negative	5
149	dying	negative	5
150	fans	positive	5
151	flaw	negative	5
152	fresh	positive	5
153	incredible	positive	5
154	lucky	positive	5
155	mess	negative	5
156	misfortune	negative	5
157	mistake	negative	5
158	neat	positive	5

159	redeem	positive	5
160	reward	positive	5
161	skill	positive	5
162	solid	positive	5
163	strong	positive	5
164	tangled	negative	5
165	triumph	positive	5
166	twist	negative	5
167	useless	negative	5
168	waste	negative	5
169	wonderful	positive	5
170	worthy	positive	5
171	attack	negative	4
172	bait	negative	4
173	bug	negative	4
174	bullshit	negative	4
175	burn	negative	4
176	chaos	negative	4

177	cheating	negative	4
178	clash	negative	4
179	clean	positive	4
180	covenant	positive	4
181	crap	negative	4
182	cringe	negative	4
183	decent	positive	4
184	died	negative	4
185	disappoint	negative	4
186	drought	negative	4
187	dumb	negative	4
188	easy	positive	4
189	enjoying	positive	4
190	excellent	positive	4
191	excuse	negative	4
192	fail	negative	4
193	false	negative	4
194	faster	positive	4

195	fault	negative	4
196	freaking	negative	4
197	friendly	positive	4
198	garbage	negative	4
199	gold	positive	4
200	golden	positive	4
201	gorgeous	positive	4
202	grand	positive	4
203	heck	negative	4
204	hostage	negative	4
205	impossible	negative	4
206	lag	negative	4
207	liar	negative	4
208	loves	positive	4
209	mediocre	negative	4
210	prize	positive	4
211	progress	positive	4
212	promise	positive	4

213	proud	positive	4
214	recover	positive	4
215	shame	negative	4
216	smash	negative	4
217	split	negative	4
218	steal	negative	4
219	suspicious	negative	4
220	threat	negative	4
221	winning	positive	4
222	wins	positive	4
223	won	positive	4
224	accurate	positive	3
225	addicted	negative	3
226	afford	positive	3
227	afraid	negative	3
228	awful	negative	3
229	badly	negative	3
230	betrays	negative	3

231	blame	negative	3
232	bother	negative	3
233	broke	negative	3
234	burned	negative	3
235	cheap	negative	3
236	cold	negative	3
237	complain	negative	3
238	confident	positive	3
239	consistent	positive	3
240	crash	negative	3
241	damage	negative	3
242	deceiving	negative	3
243	defeat	positive	3
244	difficult	negative	3
245	dim	negative	3
246	discord	negative	3
247	dump	negative	3
248	exile	negative	3

249	explosive	negative	3
250	famous	positive	3
251	fanatic	negative	3
252	fancy	positive	3
253	fat	negative	3
254	finest	positive	3
255	frozen	negative	3
256	gain	positive	3
257	glitch	negative	3
258	glow	positive	3
259	goodness	positive	3
260	grateful	positive	3
261	greed	negative	3
262	hack	negative	3
263	harm	negative	3
264	harmless	positive	3
265	heresy	negative	3
266	hug	positive	3

- 267 idiot negative 3
- 268 ignore negative 3
- 269 incredibly positive 3
- 270 inspiration positive 3
- 271 kills negative 3
- 272 lazy negative 3
- 273 lovely positive 3
- 274 loving positive 3
- 275 murder negative 3
- 276 noble positive 3
- 277 positive positive 3
- 278 proper positive 3
- 279 protect positive 3
- 280 quiet positive 3
- 281 rage negative 3
- 282 recommend positive 3
- 283 respect positive 3
- 284 rip negative 3

285	ruined	negative	3
286	ruins	negative	3
287	safe	positive	3
288	scars	negative	3
289	shiny	positive	3
290	smoke	negative	3
291	smooth	positive	3
292	spoiled	negative	3
293	stole	negative	3
294	survival	positive	3
295	talented	positive	3
296	tease	negative	3
297	thankful	positive	3
298	twisted	negative	3
299	untrustworthy	negative	3
300	warm	positive	3
301	winner	positive	3
302	worried	negative	3

- 303 worry negative 3
- 304 wrath negative 3
- 305 abusive negative 2
- 306 achievements positive 2
- 307 ambitious positive 2
- 308 annoying negative 2
- 309 anomaly negative 2
- 310 antagonist negative 2
- 311 appreciated positive 2
- 312 bankrupt negative 2
- 313 blah negative 2
- 314 bless positive 2
- 315 bonus positive 2
- 316 bored negative 2
- 317 breaking negative 2
- 318 bright positive 2
- 319 bs negative 2
- 320 capable positive 2

321 champion positive 2

322 classic positive 2

323 cloud negative 2

324 comfort positive 2

325 complained negative 2

326 complex negative 2

327 conflicting negative 2

328 correct positive 2

329 creative positive 2

330 creepy negative 2

331 criticize negative 2

332 dawn positive 2

333 decency positive 2

[reached 'max' / getOption("max.print") -- omitted 598 rows]

```
> destiny_bing_word_counts %>%
```

```
+ group_by(sentiment) %>%
```

```
+ slice_max(n, n = 10) %>%
```

```
+ ungroup() %>%
```

```
+ mutate(word = reorder(word, n)) %>%
+ ggplot(aes(n, word, fill = sentiment)) +
+ geom_col(show.legend = FALSE) +
+ facet_wrap(~sentiment, scales = "free_y") +
+ labs(x = "Contribution to sentiment",
+      y = NULL)
```

```
> destiny_afinn <- tokens_destiny %>%
+ inner_join(get_sentiments("afinn")) %>%
+ mutate(method = "AFINN") %>%
+ count(word,value, sort = TRUE) %>%
+ ungroup()
```

Joining, by = "word"

```
> destiny_afinn %>%
+ group_by(value) %>%
+ slice_max(n, n = 10) %>%
+ ungroup() %>%
+ mutate(word = reorder(word, n)) %>%
+ ggplot(aes(n, word, fill = value)) +
```



```

+ geom_col(show.legend = FALSE) +

+ facet_wrap(~value, scales = "free_y") +

+ labs(x = "Contribution to sentiment",

+      y = NULL)

> destiny_bing_and_nrc <- bind_rows(

+   tokens_destiny %>%

+   inner_join(get_sentiments("bing")) %>%

+   mutate(method = "Bing et al."),

+   tokens_destiny%>%

+   inner_join(get_sentiments("nrc")) %>%

+   filter(sentiment %in% c("positive",

+                           "negative"))

+   ) %>%

+   mutate(method = "NRC")) %>%

+   count(method, sentiment) %>%

+   pivot_wider(names_from = sentiment,

+               values_from = n,

```

```

+       values_fill = 0) %>%

+   mutate(sentiment = positive - negative)

Joining, by = "word"

Joining, by = "word"

> destiny_afinn_sentiment <- destiny_afinn %>%

+   summarise(sentiment = sum(value)) %>%

+   mutate(method = "AFINN")

> bind_rows(destiny_bing_and_nrc, destiny_afinn_sentiment) %>%

+   ggplot(aes(method, sentiment, fill = sentiment)) +

+   geom_col(show.legend = FALSE) +

+   facet_wrap(~method, ncol = 1, scales = "free_x") +

+   ggtitle("Sentiment Analysis - Destiny")

> tokens_ffxiv <- game_tokens %>%

+   filter(Game == "Final Fantasy XIV")

> ffxiv_bing_word_counts <- tokens_ffxiv %>%

+   inner_join(get_sentiments("bing")) %>%

+   count(word, sentiment, sort = TRUE) %>%

+   ungroup()

```

Joining, by = "word"

```
> ffxiv_bing_word_counts
```

	word	sentiment	n
1	error	negative	243
2	love	positive	163
3	bad	negative	115
4	free	positive	115
5	fucking	negative	111
6	shit	negative	90
7	issues	negative	81
8	errors	negative	79
9	fun	positive	76
10	pretty	positive	57
11	fuck	negative	54
12	hard	negative	52
13	nice	positive	49
14	issue	negative	48
15	amazing	positive	43

16	damn negative	43
17	cute positive	40
18	dungeon negative	40
19	break negative	36
20	congestion negative	36
21	favorite positive	36
22	enjoy positive	35
23	fine positive	35
24	worse negative	35
25	glad positive	34
26	sucks negative	33
27	hate negative	32
28	hell negative	32
29	enjoying positive	31
30	cry negative	30
31	happy positive	30
32	super positive	27
33	worst negative	27

34	chill negative 26
35	insane negative 26
36	mad negative 25
37	sad negative 25
38	worth positive 25
39	ready positive 24
40	savage negative 24
41	stuck negative 24
42	acclaimed positive 23
43	cool positive 23
44	excited positive 23
45	funny negative 23
46	holy positive 23
47	lose negative 23
48	miss negative 23
49	pain negative 23
50	shortage negative 22
51	fast positive 21

- 52 lost negative 21
- 53 ridiculous negative 21
- 54 wrong negative 21
- 55 crashes negative 19
- 56 die negative 19
- 57 frustrating negative 19
- 58 losing negative 19
- 59 luck positive 19
- 60 complaining negative 18
- 61 crashed negative 18
- 62 grind negative 18
- 63 hang negative 18
- 64 loving positive 18
- 65 patience positive 18
- 66 top positive 18
- 67 winning positive 18
- 68 dark negative 17
- 69 excuse negative 17

70	annoying negative 16
71	crash negative 16
72	dead negative 16
73	hot positive 16
74	joke negative 16
75	progress positive 16
76	stupid negative 16
77	tired negative 16
78	beautiful positive 15
79	discord negative 15
80	easy positive 15
81	popular positive 15
82	support positive 15
83	award positive 14
84	awesome positive 14
85	crashing negative 14
86	impossible negative 14
87	incredible positive 14

88	poor negative 14
89	slow negative 14
90	upset negative 14
91	weird negative 14
92	crazy negative 13
93	hype negative 13
94	lucky positive 13
95	recommend positive 13
96	tank negative 13
97	attack negative 12
98	suffer negative 12
99	bitch negative 11
100	complain negative 11
101	excuses negative 11
102	fair positive 11
103	fault negative 11
104	perfect positive 11
105	refund positive 11

106	strong	positive	11
107	suffering	negative	11
108	worry	negative	11
109	angry	negative	10
110	blame	negative	10
111	bullshit	negative	10
112	crap	negative	10
113	death	negative	10
114	pretend	negative	10
115	rip	negative	10
116	sick	negative	10
117	spoiled	negative	10
118	suck	negative	10
119	unable	negative	10
120	waste	negative	10
121	delayed	negative	9
122	fear	negative	9
123	honest	positive	9

124	horrible	negative	9
125	hurt	negative	9
126	limited	negative	9
127	mess	negative	9
128	missed	negative	9
129	positive	positive	9
130	randomly	negative	9
131	struggle	negative	9
132	terrible	negative	9
133	trust	positive	9
134	warning	negative	9
135	annoyed	negative	8
136	awful	negative	8
137	broken	negative	8
138	bs	negative	8
139	calm	positive	8
140	delay	negative	8
141	difficult	negative	8

142	dumb	negative	8
143	fans	positive	8
144	frustrated	negative	8
145	inability	negative	8
146	incredibly	positive	8
147	kill	negative	8
148	killing	negative	8
149	lack	negative	8
150	lie	negative	8
151	loved	positive	8
152	mistake	negative	8
153	patient	positive	8
154	plot	negative	8
155	refuse	negative	8
156	sweet	positive	8
157	unacceptable	negative	8
158	wild	negative	8
159	afford	positive	7

160	chaos	negative	7
161	congested	negative	7
162	enjoyed	positive	7
163	fail	negative	7
164	frustration	negative	7
165	heck	negative	7
166	hilarious	positive	7
167	insult	negative	7
168	loss	negative	7
169	rough	negative	7
170	smooth	positive	7
171	trouble	negative	7
172	wasted	negative	7
173	afraid	negative	6
174	blind	negative	6
175	broke	negative	6
176	cheap	negative	6
177	classic	positive	6

178	destiny	positive	6
179	destroy	negative	6
180	doubt	negative	6
181	dying	negative	6
182	easier	positive	6
183	fall	negative	6
184	faster	positive	6
185	fav	positive	6
186	friendly	positive	6
187	instantly	positive	6
188	limit	negative	6
189	loud	negative	6
190	nightmare	negative	6
191	prefer	positive	6
192	promise	positive	6
193	safe	positive	6
194	scared	negative	6
195	scream	negative	6

196	sexy positive	6
197	shame negative	6
198	spoil negative	6
199	stable positive	6
200	stress negative	6
201	success positive	6
202	toxic negative	6
203	wonderful positive	6
204	yay positive	6
205	accurate positive	5
206	addicted negative	5
207	attacks negative	5
208	boring negative	5
209	bother negative	5
210	breach negative	5
211	bug negative	5
212	clean positive	5
213	cleared positive	5

- 214 complaints negative 5
- 215 damage negative 5
- 216 difficulty negative 5
- 217 disappointed negative 5
- 218 enemies negative 5
- 219 fantastic positive 5
- 220 fell negative 5
- 221 freaking negative 5
- 222 goodness positive 5
- 223 gorgeous positive 5
- 224 grateful positive 5
- 225 helped positive 5
- 226 helping positive 5
- 227 insulting negative 5
- 228 lag negative 5
- 229 lying negative 5
- 230 precious positive 5
- 231 proper positive 5

232	regret	negative	5
233	risk	negative	5
234	sadly	negative	5
235	shiny	positive	5
236	split	negative	5
237	ugh	negative	5
238	useless	negative	5
239	utterly	negative	5
240	wise	positive	5
241	absurd	negative	4
242	anxiety	negative	4
243	anxious	negative	4
244	beg	negative	4
245	blow	negative	4
246	bored	negative	4
247	burn	negative	4
248	cold	negative	4
249	cozy	positive	4

250	creative	positive	4
251	cringe	negative	4
252	dick	negative	4
253	dies	negative	4
254	disappointing	negative	4
255	drain	negative	4
256	dungeons	negative	4
257	exciting	positive	4
258	failed	negative	4
259	fave	positive	4
260	handsome	positive	4
261	hurts	negative	4
262	impressed	positive	4
263	incompetence	negative	4
264	joy	positive	4
265	laughable	negative	4
266	likes	positive	4
267	miserable	negative	4

- 268 monster negative 4
- 269 outstanding positive 4
- 270 overwhelmed negative 4
- 271 painful negative 4
- 272 pure positive 4
- 273 respect positive 4
- 274 ruined negative 4
- 275 satisfying positive 4
- 276 skill positive 4
- 277 slowly negative 4
- 278 smart positive 4
- 279 struggling negative 4
- 280 successful positive 4
- 281 sucked negative 4
- 282 supporting positive 4
- 283 understandable positive 4
- 284 vague negative 4
- 285 win positive 4

286	won	positive	4
287	abuse	negative	3
288	addict	negative	3
289	awards	positive	3
290	awe	positive	3
291	blah	negative	3
292	blessing	positive	3
293	bonus	positive	3
294	boom	positive	3
295	bright	positive	3
296	brutal	negative	3
297	bugs	negative	3
298	bumped	negative	3
299	cloud	negative	3
300	complaint	negative	3
301	complex	negative	3
302	confident	positive	3
303	consistently	positive	3

- 304 dawn positive 3
- 305 delicious positive 3
- 306 delusional negative 3
- 307 depressing negative 3
- 308 depression negative 3
- 309 desperately negative 3
- 310 devastation negative 3
- 311 died negative 3
- 312 disastrous negative 3
- 313 dread negative 3
- 314 ease positive 3
- 315 effective positive 3
- 316 evil negative 3
- 317 excitement positive 3
- 318 faith positive 3
- 319 fallout negative 3
- 320 fat negative 3
- 321 festive positive 3

322 fleeting negative 3

323 fool negative 3

324 forsaken negative 3

325 garbage negative 3

326 genius positive 3

327 gifted positive 3

328 grand positive 3

329 greed negative 3

330 greedy negative 3

331 honor positive 3

332 hurting negative 3

333 idiot negative 3

[reached 'max' /getOption("max.print") -- omitted 767 rows]

```
> ffxiv_bing_word_counts %>%
```

```
+ group_by(sentiment) %>%
```

```
+ slice_max(n, n = 10) %>%
```

```
+ ungroup() %>%
```

```
+ mutate(word = reorder(word, n)) %>%
```

```

+ ggplot(aes(n, word, fill = sentiment)) +

+ geom_col(show.legend = FALSE) +

+ facet_wrap(~sentiment, scales = "free_y") +

+ labs(x = "Contribution to sentiment",

+      y = NULL)

> ffxiv_afinn <- tokens_destiny %>%

+ inner_join(get_sentiments("afinn")) %>%

+ mutate(method = "AFINN") %>%

+ count(word,value, sort = TRUE) %>%

+ ungroup()

Joining, by = "word"

> ffxiv_afinn %>%

+ group_by(value) %>%

+ slice_max(n, n = 10) %>%

+ ungroup() %>%

+ mutate(word = reorder(word, n)) %>%

+ ggplot(aes(n, word, fill = value)) +

+ geom_col(show.legend = FALSE) +

```

```

+ facet_wrap(~value, scales = "free_y") +

+ labs(x = "Contribution to sentiment",

+      y = NULL)

> ffxiv_bing_and_nrc <- bind_rows(

+   tokens_ffxiv %>%

+   inner_join(get_sentiments("bing")) %>%

+   mutate(method = "Bing et al."),

+   tokens_ffxiv%>%

+   inner_join(get_sentiments("nrc")) %>%

+   filter(sentiment %in% c("positive",

+                           "negative"))

+   ) %>%

+   mutate(method = "NRC")) %>%

+   count(method, sentiment) %>%

+   pivot_wider(names_from = sentiment,

+               values_from = n,

+               values_fill = 0) %>%

+   mutate(sentiment = positive - negative)

```

Joining, by = "word"

Joining, by = "word"

```
> ffxiv_afinn_sentiment <- ffxiv_afinn %>%

+ summarise(sentiment = sum(value)) %>%

+ mutate(method = "AFINN")

> bind_rows(ffxiv_bing_and_nrc, ffxiv_afinn_sentiment) %>%

+ ggplot(aes(method, sentiment, fill = sentiment)) +

+ geom_col(show.legend = FALSE) +

+ facet_wrap(~method, ncol = 1, scales = "free_x") +

+ ggtitle("Sentiment Analysis - Final Fantasy XIV")

> tokens_wow <- game_tokens %>%

+ filter(Game == "World of Warcraft")

> wow_bing_word_counts <- tokens_wow %>%

+ inner_join(get_sentiments("bing")) %>%

+ count(word, sentiment, sort = TRUE) %>%

+ ungroup()

Joining, by = "word"

> wow_bing_word_counts
```


word sentiment n

- 1 achievement positive 406
- 2 love positive 153
- 3 fun positive 78
- 4 bad negative 73
- 5 classic positive 72
- 6 horde negative 62
- 7 shit negative 61
- 8 pretty positive 47
- 9 cool positive 41
- 10 favorite positive 41
- 11 free positive 36
- 12 top positive 36
- 13 dark negative 35
- 14 hard negative 33
- 15 amazing positive 32
- 16 happy positive 32
- 17 fucking negative 30

18	death	negative	29
19	gold	positive	29
20	nice	positive	29
21	heroic	positive	27
22	mastery	positive	27
23	enjoy	positive	26
24	honor	positive	26
25	hate	negative	24
26	sad	negative	24
27	super	positive	24
28	awesome	positive	23
29	dead	negative	23
30	miss	negative	23
31	wrong	negative	23
32	damn	negative	22
33	fuck	negative	22
34	rogue	negative	22
35	evil	negative	20

36	support	positive	20
37	weird	negative	20
38	discord	negative	19
39	grind	negative	19
40	excited	positive	18
41	funny	negative	18
42	lost	negative	18
43	win	positive	18
44	die	negative	17
45	hell	negative	17
46	issues	negative	17
47	ready	positive	17
48	kill	negative	16
49	master	positive	16
50	wrath	negative	16
51	chill	negative	15
52	cute	positive	15
53	loved	positive	15

54	worry	negative	15
55	beautiful	positive	14
56	bug	negative	14
57	crack	negative	14
58	fans	positive	14
59	holy	positive	14
60	worse	negative	14
61	broken	negative	13
62	dungeons	negative	13
63	hang	negative	13
64	lucky	positive	13
65	mad	negative	13
66	magic	positive	13
67	missed	negative	13
68	poor	negative	13
69	wild	negative	13
70	arcane	negative	12
71	boost	positive	12

72	dungeon negative 12
73	fine positive 12
74	hero positive 12
75	issue negative 12
76	joke negative 12
77	loot negative 12
78	slow negative 12
79	stupid negative 12
80	boring negative 11
81	crazy negative 11
82	cry negative 11
83	easy positive 11
84	glad positive 11
85	killing negative 11
86	trash negative 11
87	worst negative 11
88	worth positive 11
89	burning negative 10

90	covenant	positive	10
91	desperate	negative	10
92	hype	negative	10
93	intelligence	positive	10
94	luck	positive	10
95	perfect	positive	10
96	slowly	negative	10
97	sucks	negative	10
98	terrible	negative	10
99	yay	positive	10
100	bonuses	positive	9
101	frozen	negative	9
102	hot	positive	9
103	lose	negative	9
104	modern	positive	9
105	pathetic	negative	9
106	positive	positive	9
107	rich	positive	9

108	shame	negative	9
109	break	negative	8
110	bugs	negative	8
111	demon	negative	8
112	destiny	positive	8
113	died	negative	8
114	dumb	negative	8
115	excuse	negative	8
116	fair	positive	8
117	fallout	negative	8
118	fav	positive	8
119	healthy	positive	8
120	horrible	negative	8
121	insane	negative	8
122	killed	negative	8
123	lead	positive	8
124	legendary	positive	8
125	loss	negative	8

126	lovely	positive	8
127	pain	negative	8
128	respect	positive	8
129	sick	negative	8
130	upset	negative	8
131	attack	negative	7
132	awful	negative	7
133	cataclysm	negative	7
134	complaining	negative	7
135	correct	positive	7
136	fall	negative	7
137	fear	negative	7
138	fresh	positive	7
139	honest	positive	7
140	kills	negative	7
141	monster	negative	7
142	renowned	positive	7
143	solid	positive	7

- 144 threat negative 7
- 145 acclaimed positive 6
- 146 achievements positive 6
- 147 afford positive 6
- 148 award positive 6
- 149 bonus positive 6
- 150 crap negative 6
- 151 creepy negative 6
- 152 cringe negative 6
- 153 damage negative 6
- 154 dawn positive 6
- 155 difficult negative 6
- 156 doubt negative 6
- 157 enjoyed positive 6
- 158 error negative 6
- 159 fast positive 6
- 160 fault negative 6
- 161 forsaken negative 6

162	harassment	negative	6
163	heck	negative	6
164	helping	positive	6
165	likes	positive	6
166	mess	negative	6
167	mists	negative	6
168	proper	positive	6
169	protection	positive	6
170	soft	positive	6
171	stole	negative	6
172	stuck	negative	6
173	success	positive	6
174	suck	negative	6
175	toxic	negative	6
176	trophy	positive	6
177	ugly	negative	6
178	winning	positive	6
179	woo	positive	6

- 180 abuse negative 5
- 181 addicted negative 5
- 182 adorable positive 5
- 183 appreciated positive 5
- 184 badly negative 5
- 185 begging negative 5
- 186 beloved positive 5
- 187 bitch negative 5
- 188 breaking negative 5
- 189 broke negative 5
- 190 bullying negative 5
- 191 burden negative 5
- 192 clean positive 5
- 193 complex negative 5
- 194 confused negative 5
- 195 dedicated positive 5
- 196 embarrassing negative 5
- 197 enjoying positive 5

198	famous	positive	5
199	flawless	positive	5
200	garbage	negative	5
201	genocide	negative	5
202	harassed	negative	5
203	impossible	negative	5
204	joy	positive	5
205	killer	negative	5
206	losing	negative	5
207	loving	positive	5
208	moron	negative	5
209	mystery	negative	5
210	perfection	positive	5
211	popular	positive	5
212	prefer	positive	5
213	rage	negative	5
214	safe	positive	5
215	scared	negative	5

216	sin	negative	5
217	skill	positive	5
218	smart	positive	5
219	stunning	positive	5
220	successfully	positive	5
221	tired	negative	5
222	ugh	negative	5
223	useless	negative	5
224	won	positive	5
225	worried	negative	5
226	affordable	positive	4
227	assault	negative	4
228	beauty	positive	4
229	blame	negative	4
230	brilliant	positive	4
231	bullshit	negative	4
232	calm	positive	4
233	champion	positive	4

- 234 chore negative 4
- 235 cold negative 4
- 236 complicated negative 4
- 237 congratulations positive 4
- 238 conspiracy negative 4
- 239 correctly positive 4
- 240 corrupted negative 4
- 241 creative positive 4
- 242 delay negative 4
- 243 doom negative 4
- 244 dying negative 4
- 245 engaging positive 4
- 246 enjoys positive 4
- 247 exalted positive 4
- 248 fantastic positive 4
- 249 fat negative 4
- 250 frustrating negative 4
- 251 genuine positive 4

252	glory	positive	4
253	golden	positive	4
254	gorgeous	positive	4
255	hated	negative	4
256	helped	positive	4
257	idiot	negative	4
258	ignore	negative	4
259	imbalance	negative	4
260	incredible	positive	4
261	insecure	negative	4
262	integrated	positive	4
263	meaningful	positive	4
264	neat	positive	4
265	passion	positive	4
266	plot	negative	4
267	powerful	positive	4
268	promise	positive	4
269	properly	positive	4

270	proud	positive	4
271	proving	positive	4
272	redemption	positive	4
273	risk	negative	4
274	ruin	negative	4
275	scourge	negative	4
276	silent	positive	4
277	sparkle	positive	4
278	strike	negative	4
279	strong	positive	4
280	sweet	positive	4
281	talented	positive	4
282	twisted	negative	4
283	victory	positive	4
284	waste	negative	4
285	wonderful	positive	4
286	addict	negative	3
287	angel	positive	3

288	barbarian	negative	3
289	bashing	negative	3
290	beg	negative	3
291	benefit	positive	3
292	blah	negative	3
293	bored	negative	3
294	burn	negative	3
295	chaos	negative	3
296	courage	positive	3
297	critical	negative	3
298	criticism	negative	3
299	delayed	negative	3
300	delusional	negative	3
301	depressing	negative	3
302	difficulty	negative	3
303	disaster	negative	3
304	effectively	positive	3
305	elite	positive	3

306	enchanted	positive	3
307	enemy	negative	3
308	fake	negative	3
309	false	negative	3
310	fame	positive	3
311	fascinating	positive	3
312	fever	negative	3
313	fictional	negative	3
314	fierce	negative	3
315	frost	negative	3
316	fury	negative	3
317	gaining	positive	3
318	gems	positive	3
319	genius	positive	3
320	glorious	positive	3
321	grateful	positive	3
322	guarantee	positive	3
323	hack	negative	3

324 harmonious positive 3

325 heaven positive 3

326 hilarious positive 3

327 honorable positive 3

328 humor positive 3

329 idiots negative 3

330 improve positive 3

331 incredibly positive 3

332 infiltrators negative 3

333 insult negative 3

[reached 'max' / getOption("max.print") -- omitted 813 rows]

```
> wow_bing_word_counts %>%
```

```
+ group_by(sentiment) %>%
```

```
+ slice_max(n, n = 10) %>%
```

```
+ ungroup() %>%
```

```
+ mutate(word = reorder(word, n)) %>%
```

```
+ ggplot(aes(n, word, fill = sentiment)) +
```

```
+ geom_col(show.legend = FALSE) +
```

```

+ facet_wrap(~sentiment, scales = "free_y") +

+ labs(x = "Contribution to sentiment",

+      y = NULL)

> wow_afinn <- tokens_wow %>%

+ inner_join(get_sentiments("afinn")) %>%

+ mutate(method = "AFINN") %>%

+ count(word,value, sort = TRUE) %>%

+ ungroup()

Joining, by = "word"

> wow_afinn %>%

+ group_by(value) %>%

+ slice_max(n, n = 10) %>%

+ ungroup() %>%

+ mutate(word = reorder(word, n)) %>%

+ ggplot(aes(n, word, fill = value)) +

+ geom_col(show.legend = FALSE) +

+ facet_wrap(~value, scales = "free_y") +

+ labs(x = "Contribution to sentiment",

```

```

+   y = NULL)

> wow_bing_and_nrc <- bind_rows(

+   tokens_wow %>%

+   inner_join(get_sentiments("bing")) %>%

+   mutate(method = "Bing et al."),

+   tokens_wow%>%

+   inner_join(get_sentiments("nrc") %>%

+     filter(sentiment %in% c("positive",

+     "negative")))

+   ) %>%

+   mutate(method = "NRC")) %>%

+   count(method, sentiment) %>%

+   pivot_wider(names_from = sentiment,

+     values_from = n,

+     values_fill = 0) %>%

+   mutate(sentiment = positive - negative)

```

Joining, by = "word"

Joining, by = "word"

```

> wow_afinn_sentiment <- wow_afinn %>%

+ summarise(sentiment = sum(value)) %>%

+ mutate(method = "AFINN")

> bind_rows(wow_bing_and_nrc, wow_afinn_sentiment) %>%

+ ggplot(aes(method, sentiment, fill = sentiment)) +

+ geom_col(show.legend = FALSE) +

+ facet_wrap(~method, ncol = 1, scales = "free_x") +

+ ggtitle("Sentiment Analysis - World of Warcraft")

> game_tokens_count <- game_tokens %>%

+ count(Game, word, sort=TRUE) %>%

+ ungroup()

> total_words <- left_join(game_tokens, game_tokens_count)%>%

+ group_by(Game) %>%

+ summarize(total=sum(n))

Joining, by = c("Game", "word")

> game_words <- left_join(game_tokens_count,total_words)

Joining, by = "Game"

> freq_by_rank <- game_words %>%

```

```

+ group_by(Game) %>%

+ mutate(rank = row_number(),

+       `term frequency` = n/total)

> ggplot(freq_by_rank, aes(n/total, fill = Game))+

+   geom_histogram(show.legend=FALSE)+

+   xlim(NA, 0.000009) +

+   facet_wrap(~Game, ncol=2, scales="free_y")

`stat_bin()` using `bins = 30`. Pick better value with `binwidth`.

```

Warning messages:

1: Removed 229 rows containing non-finite values (stat_bin).

2: Removed 3 rows containing missing values (geom_bar).

```

> freq_by_rank %>%

+   ggplot(aes(rank, `term frequency`, color=Game))+

+   geom_abline(intercept=-0.62, slope= -1.1, color='gray50', linetype=2)+

+   geom_line(size= 1.1, alpha = 0.8, show.legend = FALSE)+

+   scale_x_log10()+

+   scale_y_log10()

> game_tf_idf <- game_words %>%

```

```
+ bind_tf_idf(word, Game, n)
```

```
> game_tf_idf %>%
```

```
+ arrange(desc(tf_idf))
```

	Game	word	n	total	tf	idf	tf_idf
1	Destiny	destiny2	396	3795440	0.0111173498	1.0986123	0.0122136571
2	Final Fantasy XIV	endwalker	836	7949539	0.0174112257	0.4054651	0.0070596445
3	Destiny	qmerkson	182	3795440	0.0051094891	1.0986123	0.0056133475
4	Final Fantasy XIV	ffxiv_news_en	663	7949539	0.0138081849	0.4054651	0.0055987372
5	Destiny	a_dmg04	170	3795440	0.0047725997	1.0986123	0.0052432366
6	Destiny	lilypichu	145	3795440	0.0040707468	1.0986123	0.0044721724
7	Destiny	realmizkif	144	3795440	0.0040426727	1.0986123	0.0044413299
8	Destiny	ned__ned_	124	3795440	0.0034811903	1.0986123	0.0038244785
9	Destiny	cozmo23	118	3795440	0.0033127456	1.0986123	0.0036394231
10	World of Warcraft	achievement	406	11528059	0.0080461365	0.4054651	0.0032624276
11	Destiny	sparrow	104	3795440	0.0029197080	1.0986123	0.0032076271
12	Destiny	savathun	103	3795440	0.0028916339	1.0986123	0.0031767846

13	Destiny	fergysavage	97	3795440	0.0027231892	1.0986123	0.0029917291
14	Destiny	hive	91	3795440	0.0025547445	1.0986123	0.0028066737
15	Destiny	paultassi	88	3795440	0.0024705222	1.0986123	0.0027141460
16	Final Fantasy XIV	ffxivendwalker	117	7949539	0.0024367385	1.0986123	0.0026770309
17	Destiny	chrish0llywood	82	3795440	0.0023020775	1.0986123	0.0025290906
18	Destiny	mara	76	3795440	0.0021336328	1.0986123	0.0023440352
19	Final Fantasy XIV		2002	276	7949539	0.0057482037	0.4054651
							0.0023306960
20	Destiny	destiny2art	74	3795440	0.0020774846	1.0986123	0.0022823501
21	Destiny	threadsoflight	73	3795440	0.0020494104	1.0986123	0.0022515075
22	World of Warcraft	worldofwarcraft	265	11528059	0.0052517886	0.4054651	0.0021294170
23	World of Warcraft	darkranger_sis	97	11528059	0.0019223528	1.0986123	0.0021119204
24	World of Warcraft	warcraftdevs	97	11528059	0.0019223528	1.0986123	0.0021119204
25	Destiny	papa_haunts	68	3795440	0.0019090399	1.0986123	0.0020972947
26	Destiny	theomengod	67	3795440	0.0018809657	1.0986123	0.0020664521

39 World of Warcraft sylvanas 64 11528059 0.0012683565 1.0986123
0.0013934320

40 Destiny dl 44 3795440 0.0012352611 1.0986123 0.0013570730

41 Destiny guardiansmh 44 3795440 0.0012352611 1.0986123 0.0013570730

42 World of Warcraft horde 62 11528059 0.0012287203 1.0986123
0.0013498873

43 Final Fantasy XIV login 149 7949539 0.0031031969 0.4054651
0.0012582381

44 Final Fantasy XIV finalfantasyxiv 147 7949539 0.0030615433 0.4054651
0.0012413490

45 Destiny drifter 40 3795440 0.0011229646 1.0986123 0.0012337027

46 Final Fantasy XIV sage 53 7949539 0.0011038217 1.0986123 0.0012126721

47 Destiny scorn_stalker 39 3795440 0.0010948905 1.0986123 0.0012028602

48 Final Fantasy XIV msq 141 7949539 0.0029365823 0.4054651
0.0011906817

49 Destiny symbol 38 3795440 0.0010668164 1.0986123 0.0011720176

50 Destiny vex 38 3795440 0.0010668164 1.0986123 0.0011720176

51 Final Fantasy XIV 6.0 50 7949539 0.0010413412 1.0986123 0.0011440303

52 World of Warcraft ptr 141 11528059 0.0027943479 0.4054651
0.0011330106

53	Destiny	xur	99	3795440	0.0027793375	0.4054651	0.0011269244
54	World of Warcraft	cossaatos	50	11528059	0.0009909035	1.0986123	0.0010886188
55	World of Warcraft	ranger_elvira	50	11528059	0.0009909035	1.0986123	0.0010886188
56	Destiny	br_uh113	35	3795440	0.0009825940	1.0986123	0.0010794899
57	Destiny	gambit	35	3795440	0.0009825940	1.0986123	0.0010794899
58	Destiny	rdestnycreation	35	3795440	0.0009825940	1.0986123	0.0010794899
59	Destiny	tomfromtheweb	35	3795440	0.0009825940	1.0986123	0.0010794899
60	Destiny	destinygamees	34	3795440	0.0009545199	1.0986123	0.0010486473
61	Destiny	painthisice	34	3795440	0.0009545199	1.0986123	0.0010486473
62	Destiny	bungiehelp	33	3795440	0.0009264458	1.0986123	0.0010178048
63	Destiny	destinygameuk	33	3795440	0.0009264458	1.0986123	0.0010178048
64	Destiny	oreowithvex	33	3795440	0.0009264458	1.0986123	0.0010178048
65	Destiny	bungielove	32	3795440	0.0008983717	1.0986123	0.0009869622
66	Destiny	exotic	32	3795440	0.0008983717	1.0986123	0.0009869622
67	Destiny	lies	32	3795440	0.0008983717	1.0986123	0.0009869622

68	World of Warcraft			9.2	120	11528059	0.0023781684	0.4054651	0.0009642643
69	Destiny	crucible	31	3795440	0.0008702976	1.0986123	0.0009561196		
70	Destiny	dfpsheikh	31	3795440	0.0008702976	1.0986123	0.0009561196		
71	Destiny	osiris	31	3795440	0.0008702976	1.0986123	0.0009561196		
72	Destiny	savathûn	31	3795440	0.0008702976	1.0986123	0.0009561196		
73	Destiny	thislukesmith	31	3795440	0.0008702976	1.0986123	0.0009561196		
74	Destiny	va_11hall_ae	31	3795440	0.0008702976	1.0986123	0.0009561196		
75	Destiny	honse	30	3795440	0.0008422235	1.0986123	0.0009252771		
76	Destiny	jayjaymarinn	30	3795440	0.0008422235	1.0986123	0.0009252771		
77	Destiny	metpach420	30	3795440	0.0008422235	1.0986123	0.0009252771		
78	World of Warcraft	bfa	42	11528059	0.0008323589	1.0986123	0.0009144398		
79	Destiny	activity	29	3795440	0.0008141494	1.0986123	0.0008944345		
80	World of Warcraft	mythic	41	11528059	0.0008125409	1.0986123			0.0008926674
81	Final Fantasy XIV	ffxivspoilers	39	7949539	0.0008122462	1.0986123			0.0008923436
82	World of Warcraft	kirbyau	40	11528059	0.0007927228	1.0986123			0.0008708950

83	World of Warcraft	payowow	40	11528059	0.0007927228	1.0986123	0.0008708950
84	Destiny	twab	28	3795440	0.0007860752	1.0986123	0.0008635919
85	Final Fantasy XIV	booted	37	7949539	0.0007705925	1.0986123	0.0008465824
86	Destiny	destinyart	27	3795440	0.0007580011	1.0986123	0.0008327493
87	World of Warcraft	mkaem1	38	11528059	0.0007530867	1.0986123	0.0008273503
88	Final Fantasy XIV	congestion	36	7949539	0.0007497657	1.0986123	0.0008237018
89	Destiny	crow	26	3795440	0.0007299270	1.0986123	0.0008019068
90	Destiny	stallion	26	3795440	0.0007299270	1.0986123	0.0008019068
91	Final Fantasy XIV	stormblood	35	7949539	0.0007289389	1.0986123	0.0008008212
92	Final Fantasy XIV	envtuber	34	7949539	0.0007081120	1.0986123	0.0007779406
93	Destiny	d2	68	3795440	0.0019090399	0.4054651	0.0007740491
94	Destiny	vaulted	25	3795440	0.0007018529	1.0986123	0.0007710642
95	Final Fantasy XIV	gposers	90	7949539	0.0018744142	0.4054651	0.0007600096

96 Final Fantasy XIV finalfantasy14 33 7949539 0.0006872852 1.0986123
0.0007550600

97 Final Fantasy XIV mikusfeet 33 7949539 0.0006872852 1.0986123
0.0007550600

98 World of Warcraft arthas 34 11528059 0.0006738144 1.0986123
0.0007402608

99 World of Warcraft watcherdev 34 11528059 0.0006738144 1.0986123
0.0007402608

100 Destiny djxyz0 24 3795440 0.0006737788 1.0986123 0.0007402216

101 Destiny pijinnn_ 24 3795440 0.0006737788 1.0986123 0.0007402216

102 Destiny witch 64 3795440 0.0017967434 0.4054651 0.0007285168

103 World of Warcraft taliesinevitel 33 11528059 0.0006539963 1.0986123
0.0007184884

104 Destiny eva 23 3795440 0.0006457047 1.0986123 0.0007093791

105 Destiny mrloic23 23 3795440 0.0006457047 1.0986123 0.0007093791

106 Destiny oryx 23 3795440 0.0006457047 1.0986123 0.0007093791

107 Final Fantasy XIV disconnected 31 7949539 0.0006456316 1.0986123
0.0007092988

108 Final Fantasy XIV ffxivscreenshots 31 7949539 0.0006456316 1.0986123
0.0007092988

109 Final Fantasy XIV stitchymitchy 31 7949539 0.0006456316 1.0986123
0.0007092988

110 World of Warcraft deadmagictv 32 11528059 0.0006341782 1.0986123
0.0006967160

111 World of Warcraft reformed 32 11528059 0.0006341782 1.0986123
0.0006967160

112 World of Warcraft wowhead 32 11528059 0.0006341782 1.0986123
0.0006967160

113 Final Fantasy XIV compensation 30 7949539 0.0006248047 1.0986123
0.0006864182

114 Destiny gjallarhorn 22 3795440 0.0006176305 1.0986123 0.0006785365

115 Final Fantasy XIV ffxivsnaps 29 7949539 0.0006039779 1.0986123
0.0006635376

116 Destiny cabal 58 3795440 0.0016282987 0.4054651 0.0006602183

117 Destiny hunter 58 3795440 0.0016282987 0.4054651 0.0006602183

118 Destiny trials 58 3795440 0.0016282987 0.4054651 0.0006602183

119 World of Warcraft druid 30 11528059 0.0005945421 1.0986123
0.0006531713

120 World of Warcraft som 30 11528059 0.0005945421 1.0986123
0.0006531713

121	World of Warcraft	warcraftart	30	11528059	0.0005945421	1.0986123	0.0006531713
122	Destiny	consigno10	21	3795440	0.0005895564	1.0986123	0.0006476939
123	Destiny	protheon_	21	3795440	0.0005895564	1.0986123	0.0006476939
124	Destiny	swvevo	21	3795440	0.0005895564	1.0986123	0.0006476939
125	Destiny	mynameisbyf	20	3795440	0.0005614823	1.0986123	0.0006168514
126	World of Warcraft	orcs	28	11528059	0.0005549060	1.0986123	0.0006096265
127	Final Fantasy XIV	_mrsquall	26	7949539	0.0005414974	1.0986123	0.0005948958
128	World of Warcraft	heroic	27	11528059	0.0005350879	1.0986123	0.0005878541
129	World of Warcraft	mortis	27	11528059	0.0005350879	1.0986123	0.0005878541
130	World of Warcraft	zereth	27	11528059	0.0005350879	1.0986123	0.0005878541
131	Destiny	darkxolyoutube	19	3795440	0.0005334082	1.0986123	0.0005860088

132 Final Fantasy XIV thazguy 25 7949539 0.0005206706 1.0986123
0.0005720151

133 World of Warcraft wowclassic 26 11528059 0.0005152698 1.0986123
0.0005660818

134 Destiny misleadingttv 18 3795440 0.0005053341 1.0986123 0.0005551662

135 Destiny soul8118 18 3795440 0.0005053341 1.0986123 0.0005551662

136 Final Fantasy XIV 5000 23 7949539 0.0004790170 1.0986123
0.0005262539

137 Final Fantasy XIV sskrn2032 23 7949539 0.0004790170 1.0986123
0.0005262539

138 Destiny callejasgr80 17 3795440 0.0004772600 1.0986123 0.0005243237

139 Destiny destinyfashion 17 3795440 0.0004772600 1.0986123 0.0005243237

140 Destiny dstinynewslatam 17 3795440 0.0004772600 1.0986123
0.0005243237

141 Destiny realsuperrom 17 3795440 0.0004772600 1.0986123 0.0005243237

142 Destiny trialsofosiris 17 3795440 0.0004772600 1.0986123 0.0005243237

[reached 'max' / getOption("max.print") -- omitted 35508 rows]

> game_tf_idf %>%

+ arrange(desc(tf_idf)) %>%

```
+ mutate(word=factor(word, levels=rev(unique(word)))) %>%  
  
+ group_by(Game) %>%  
  
+ top_n(15) %>%  
  
+ ungroup %>%  
  
+ ggplot(aes(word, tf_idf, fill=Game))+  
  
+ geom_col(show.legend=FALSE)+  
  
+ labs(x=NULL, y="tf-idf")+  
  
+ facet_wrap(~Game, ncol=2, scales="free")+  
  
+ coord_flip()
```

Selecting by tf_idf