

An exploration of Toontown Rewritten demographics

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January 2, 2022

Abstract

The purpose of this study was to analyze the characteristics present in the population of Toons in Toontown Rewritten both within and between various groups. Individual observations consisting of values of ten variables were collected from the first week of June 2021 through the final week of August 2021, culminating in a sample of 3,000 Toons who had entered the final area of the game. Data were recorded as randomly as possible in order to ensure a sample whose characteristics were representative of the overall population. First, a demographic analysis was performed. The most prominent findings from this analysis were the large population of cat and dog Toons, Toons falling between 100 and 109 Laff points, black as the most popular colour, and the tendency to opt to go without an organic Gag track or non-default name tag. Statistical and correlational analyses were subsequently carried out. Numerous significances were reached in this area, bringing to light multiple large bundles of co-occurring characteristics. Male Toons, Toons with organic Sound, and Toons below 110 Laff appear to be at the forefront of specific trends. Further research is needed to investigate the correlation between primary colour and leg colour among Toons with differently coloured legs.

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1 Introduction

1.1 What is Toontown Rewritten?

Toontown Rewritten, released in 2013 as a community-made reincarnation of Disney's Toontown Online, is a MMORPG in which the player creates a character known as a Toon and completes tasks in order to advance through various game areas. Toons are highly customizable, and the player is able to choose from many options for species, colours, clothing items, and weapons, known in the game as Gags.

The game's community often seems distinct in its diversity, owing most likely to the fact that Disney's original game was marketed primarily towards children and adolescents. Many individuals who were involved with the original incarnation of the game have remained active members of the community through the years and have subsequently migrated to Toontown Rewritten after the closure of the original. The developers of Toontown Rewritten additionally show a marked diligence regarding the maintenance and preservation of the vast majority of the characteristics of the original game, and it thus remains accessible to younger individuals who make up the demographic that Disney had aimed to attract with Toontown Online. In summary, the Toontown Rewritten community is a striking blend of individuals.

I have been involved with Toontown in its various forms, as well as its broader community, since 2006. Over this period, I have observed significant changes in the metagame as well as various trend cycles, both in aesthetic terms, such as the ways in which players design and dress their Toons, and in gameplay terms, such as the rise and fall of various battle strategies. I thus hypothesized that it could be very informative and interesting to perform an in-depth analysis of a set of characteristics among a subset of the Toon population in order to obtain a comprehensive picture of Toon demographics. As far as I am able to gather, no such project, or any sort of project at all, has ever been undertaken for this game. I aim to present descriptive and correlative characteristics of the population as well as to raise further questions in order to spark interest in this area, both for myself

and other members of the community, and to suggest ways in which further research will be beneficial and revealing.

1.2 Definitions of terms

MMORPG: Massively multiplayer online role-playing game. The player controls a character in a virtual world and is able to interact with other players' characters in the world.

NPC: Non-player character. NPCs often appear similar to characters played by humans, but are controlled by in-game mechanics and have preexisting sets of behaviours and possible interactions.

Toons: The protagonists of the Toontown universe. At the start of the game, the player creates their own Toon and is able to choose its gender, species, colour or colours, starting clothing, and name.

Laff: A Toon's health. Toons begin the game with a maximum of 15 Laff points and this maximum amount increases as tasks are completed in the game's storyline. Toons lose Laff when attacked in battle and it can be regained up to the Toon's Laff limit in certain safe areas in the game.

Cogs: Toontown's main antagonists, malicious business robots who aim to turn Toontown into a business utopia and use various attacks to take Laff points away from Toons. Cogs are unable to take a joke and are damaged when targeted by Gags.

Gags: Toons' weapons against the Cogs, based on slapstick jokes. There are seven varieties of Gags in total, which are referred to as Gag tracks. Toons automatically enter the game with two Gag tracks, Throw and Squirt. Five other tracks exist, namely Toon-up, Trap, Lure, Sound, and Drop, and the player is able to acquire four of them in addition to the two with which they begin the game as they progress through in-game worlds and activities (see Figure 1). When a Gag is successfully used in battle, experience is gained in its track. At certain experience thresholds, the track is leveled up and a more powerful Gag becomes available for use in that track, up to a maximum of seven levels.

Playground: A world in the Toontown universe. There are six playgrounds in Toontown, and a set of



Figure 1: All seven Gag tracks. Note that a Toon is only able to acquire six tracks in total (Source: Toontown Wiki, 2010).

tasks and objectives must be completed before the player is able to advance to the next playground. Playgrounds are safe zones where the player can heal their Toon and restock their Gags, and are surrounded by streets on which Cogs can be battled. These streets lead to other areas of the game. When a Toon loses all of their Laff in battle, colloquially referred to as dying, the Toon is automatically teleported to the playground which they most recently visited.

ToonTask: An objective given to the player by an NPC. The player must successfully complete a core set of ToonTasks in a playground in order to move forward and receive tasks in the subsequent playground. ToonTasks become progressively more challenging as the Toon gains Laff and unlocks more Gag tracks.

Organic: If the player purchases a gardening kit in the game, they are able to plant and care for Gag trees. Once a Gag tree grows to maturity, the player receives an Organic bonus for the associated Gag. Organic bonuses vary depending on the nature of the track: a Gag's accuracy, damage, or healing capacity may be increased.

Missing track: Seven Gag tracks exist in Toontown, but a Toon can only possess a maximum of six. A Toon is granted Throw and Squirt Gags at the beginning of the game when it is created, and as playgrounds are completed, the Toon acquires four more tracks through the completion of sets of Toon-

Tasks. Thus, every Toon who has made it to the game's final area is missing a Gag track. Toons are often described using this characteristic, most commonly through terms consisting of the combination of the Toon's missing track combined with the suffix “-less”. For example, a Toon who chose not to train for the Drop gag track would be referred to as “dropless”.

Jellybeans: Toontown's currency. Jellybeans can be acquired through non-combative in-game activities such as fishing and minigames, as a reward for completing certain ToonTasks, and through rewards gained from the completion of boss battles.

Cattlelog: A catalog which a Toon receives every seven days in which clothing, accessories, furniture, upgrades to existing items, such as a stronger fishing rod, and various other aesthetic items can be purchased with Jellybeans.

Name tag: A Toon's name floats above their head in a rectangular block. Different font styles for the Toon's name tag can be purchased from the Cattlelog, with more options becoming available based on how many Cattlelogs the Toon has received overall.

Flippy shirt: A rare variety of shirt modeled after that which is worn by Flippy, Toontown's mayor, which can only be found at random in the Cattlelog. Flippy shirts are unable to be purchased at playground clothing shops and cannot be selected during Toon creation. The inherent difficulty in acquiring Flippy shirts appears to have made them a status symbol for certain demographics of players.

1.3 Purpose

A comprehensive search was carried out to figure out if anything remotely similar to this study had been conducted for Toontown or Toontown Rewritten, and no evidence of Toontown-related research was found beyond brief references to the game as a whole in a handful of academic papers related to online games. This paper thus serves two primary purposes: to create a space for Toontown-related research and spark interest in this area, and to comprehensively report on the descriptive and correlative statistics of a subgroup of the game's population. As an individual who



Figure 2: A Flippy shirt available for purchase in the Cattelog, characterized by its distinctive two horizontal stripes across the torso. A Flippy shirt exists for every Toon colour except for black (Source: own image).

has been involved with Toontown since 2006 and has spent numerous hours in both the original game and its current incarnation, I have borne witness to the rise and fall of many apparent trends, and it thus seemed as though it would be both interesting and judicious to carry out a comprehensive investigation.

Data related to ten specific characteristics were recorded and analyzed: Laff, species, gender, colour, whether or not the Toon's legs were a different colour, the colour of the Toon's legs, the Toon's missing and organic Gag tracks, name tag, and whether or not the Toon was wearing a Flippy shirt.

1.4 Research questions

The following research questions were addressed:

1. What are the demographic characteristics of a sample of 3000 Toons who have trained for their final Gag track?
2. Do the distributions of variables across subgroups of the population conform to or differ

significantly from the distributions of those variables across the population as a whole?

3. Do any significant differences exist between various subgroups of the population across the levels of each variable in question? For example, are Toons of a certain species more likely to have a certain organic Gag track?

1.5 Delimitations

This study was delimited to Toons who had made it to at least the final playground of the game, i.e. Toons who had received their sixth and final Gag track. This delimitation was selected so that missing Gag track could be used as a variable. The categories of data which were collected as part of each observation were limited to black-and-white, objective characteristics which were able to be observed and recorded very quickly. When designing this study, the inclusion of a binary category describing whether the Toon's name was selected using the game's preexisting Pick-A-Name option or typed in by hand was considered, but given that a name which could be selected using the preexisting options could also be typed in, this was judged to be a far too unreliable metric.

1.6 Limitations

There were various limitations to the experimental design. Most significantly, the majority of a Toon's characteristics are mutable, with the exception of species, gender, and missing Gag track. Laff increases naturally as a player completes tasks and progresses through the game, a player is able to change their Toon's clothes and name tag, and Toontown Rewritten has implemented a purchasable opportunity to change a Toon's colour. Because of this, it was not possible to definitively determine which observations were true duplicates. To simplify this, identical observations were dropped from the data set during preprocessing despite the possibility of two different Toons having identical characteristics.

1.7 Results

In terms of demographics, cat Toons and Toons between 100 and 109 Laff appeared most frequently by far. The most common Laff value was 105. Female Toons were slightly more populous than male Toons, and the most common Toon colour was black, which presumably is linked to the status of cats as the most popular species because it is a colour available exclusively to them. Trap was the most common Gag track to go without, followed closely by Drop, and, somewhat surprisingly, it was most common to not have an organic Gag track or have selected a non-default name tag whatsoever. Toons with different coloured legs made up approximately one-sixth of the population, while Toons wearing Flippy shirts made up only slightly more than one-twentieth of the population. Among Toons who had different legs, royal blue and purple legs appeared most frequently.

In terms of statistical analysis, numerous notable results were achieved. Because of the magnitude of the analysis, specific statistical test results will not be reported in this section. Details of these analyses can be found in the statistical and correlational analysis section as well as in the discussion section. Broadly, three groups of Toons appeared to demonstrate bundles of correlated attributes, namely male Toons, Toons with organi Sound, and Toons possessing less than 110 Laff points.

1.8 Significance

The results of this study and the completion of this study as a whole are significant because this is the first time any scholarly work has been conducted in any capacity about Toontown. There exist already various bodies of academic work related to MMORPGs, but demographic analyses in this field are limited, and nonexistent in the case of Toontown. The findings of this study provided many insights about details of the Toontown universe and its population that cannot be gleaned from simply playing the game. Ideally, this paper will pave the way for future analytical work and study related to Toontown and its population and create a space for further investigation. It is a personal goal to gather further

information in this area, perform additional analysis, and apply these data to other fields, such as machine learning.

2 Methodology

2.1 Research design and data collection

An ideal population sample possesses characteristics closely mimicking those of the overall population of the game, and thus it was imperative to be as unbiased as possible during data collection. Toon observations were collected by hand from the first week of June 2021 through the final week of August 2021. The raw data have been uploaded along with this paper. Observations were recorded as randomly as possible, in the sense that every attempt was made to record all Toons who fit the delimitations of the study, regardless of their characteristics, and no efforts were made to seek out observations of any specific groups.

2.2 Population

The population for this study consisted of 3,000 Toons who had reached the final area of gameplay, and this criterion was maintained by the inclusion of solely Toons who had received their sixth and final Gag track. At certain points in the analysis, the population was split into smaller subpopulations, such as Toons with legs which were a different colour than their primary colour ($n = 524$) and black cats ($n = 174$).

2.3 Variables

The variables examined in this study were comprised of ten characteristics: Laff¹, species, gender, colour, whether or not the Toon's legs were a different colour than its principal colour, their leg colour if this was

¹Since this study began, Toontown Rewritten has released its 3.0.0 update, introducing new game content which increases the maximum amount of Laff points from 137 to 139. All data was collected prior to the release of this update. Future work in this area will take the increase into account.



Figure 3: Toontown’s original 24 Toon colours (Source: Toontown Rewritten Wiki, 2020).



Figure 4: Toontown Rewritten added ten new colours in February 2015 (Source: Toontown Rewritten Wiki, 2020).

the case, missing Gag track, organic Gag track, name tag, and whether or not the Toon was wearing a Flippy shirt at the time of observation. A description of each variable is included in Table 1. From the Laff variable, an eleventh variable was created which indicated the range of Laff, defined in increments of ten, that the Toon fell into. The interest in analyzing missing Gag track as a variable is why observations were delimited to Toons who had earned their sixth and final Gag track.

2.4 Statistical tests

Two statistical methods were utilized to carry out analysis, namely Pearson’s chi-square test of goodness of fit and the calculation of z -scores. The input for both metrics was comprised of raw frequency data. Chi-square tests were used when the variable had more than two levels and z -scores were calculated to perform post hoc analysis and to compare variables with only two levels. A chi-square goodness of fit test

Variable	Description
Laff	The Toon’s maximum Laff points. Continuous numeric variable. For this study, Laff ranged from 62 to 137, the maximum amount of Laff points a Toon can possess.
Species	Species of Toon. 11 levels (Cat, Dog, Mouse, Deer, Duck, Rabbit, Bear, Crocodile, Monkey, Pig, Horse).
Gender	Gender of Toon. Binary variable (Male and Female).
Colour	Colour of Toon. 41 levels. Refer to Figure 3, 4, 5, and 6 for Toon colours.
Different legs	A player can select colours for their Toon’s head, body, and legs, with the colour of the head being treated as the principal colour. Are the Toon’s legs a different colour than its body? Binary variable (Yes, No).
Leg colour	Colour of Toon’s legs. This variable was left blank for Toons who did not have different coloured legs.
Missing track	Gag track that the Toon does not possess. Five levels (Toon-up, Trap, Lure, Sound, Drop).
Organic	Gag track that the Toon has made organic, if any. Eight levels (Toon-up, Trap, Lure, Sound, Throw, Squirt, Drop, None).
Name tag	Which name tag the Toon is wearing. 18 levels. Refer to Figure 8, 9, 10, and 11 for visual depictions of each name tag.
Flippy shirt	Whether the Toon is wearing a Flippy shirt. Binary variable (Yes, No).

Table 1: Variables recorded during data collection



Figure 5: Cartoonval Blue, Cartoonval Pink and Spooky Purple Toons. These colours cannot be selected when creating a Toon and must be purchased during special events (Source: Toontown Rewritten Wiki, 2020).



Figure 6: Black cats can be created on Halloween and polar bears can be created on Christmas Eve and Christmas Day (Source: Toontown Rewritten Wiki, 2020).

is ideal when the researcher is attempting to determine if the observed distribution of data conforms to theoretical expectations (Yale University Department of Statistics, 1997). Calculating z -scores based on the proportions of a trait allows the researcher to determine if two groups or populations differ significantly in terms of the frequency of that trait (Glen, 2021). A z -score can be one-sample or two-sample. A one-sample z -score is yielded when the proportion of a trait among a sample population is compared to that of the entire population, which includes the sample population (Hessing, n.d.). A two-sample z -score is yielded when proportions of the same trait are compared across two different populations (Hessing, n.d.).

All chi-square tests were carried out with the same null and alternative hypotheses: H_0 = The distribution of a variable across a subgroup of the population is consistent with the distribution of the variable across the broader population, and H_a = The subgroup distribution differs significantly from the population distribution. All z -tests were also carried out with the same null and alternative hypotheses: H_0 = No significant difference exists between the pro-

portion of the variable across the subpopulation and that of the entire population and H_a = The proportions of the variable across the subpopulation and the larger population differ significantly, or H_0 = No significant difference exists between the proportions of the variable across the populations in question and H_a = The proportions of the variable across the two populations differ significantly, depending on whether the z -test was one-sample or two-sample.

In the carrying out of both chi-square and z -tests, the level of α was kept at 0.005. Given the presence of various small subpopulations, the decision was made to control more tightly for type I error than type II error. Type I error refers to a false positive result, or when the null hypothesis is rejected when it should not be, and type II error refers to a false negative result, or when the null hypothesis fails to be rejected when it is false (Bhandari, 2021). For a preliminary analysis, avoiding false positive results seemed optimal. This may be modified in future analyses in this area as the sample size is increased. Keeping the significance level quite low also functioned as a correction of sorts, given the fact that many hypotheses were tested.

2.5 Ethical considerations

There were few relevant, or possible, ethical considerations in this study. Neither names of Toons or their unique identification numbers were recorded during data collection. Very active attempts were made to collect data from every Toon who was relevant to the study without bias towards certain characteristics.

3 Results and findings

This section is devoted to the results of the analysis. It is separated into two sections: the first addresses the demographic characteristics of the sample population, and the second describes the results of statistical and correlative analysis.

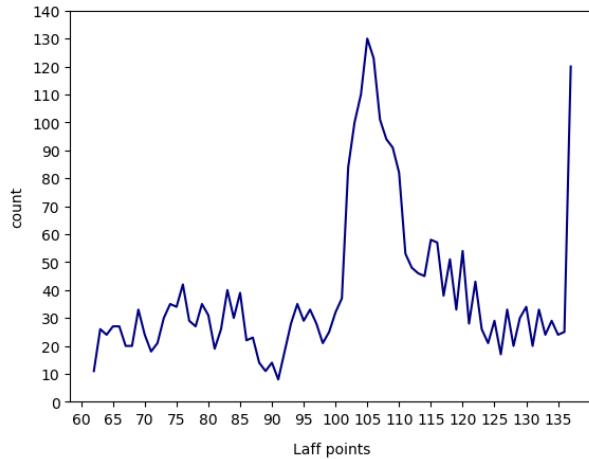


Figure 7: Continuous distribution of maximum Laff points across the sample population (Source: own image).

3.1 Demographic analysis

This section addresses the first research question: what are the demographic characteristics of a sample population of 3,000 Toons who have trained for their final Gag track?

3.1.1 Laff

Laff was recorded as a continuous variable during data collection, but was grouped into eight ranges during preprocessing. The observed values ranged from 62 to 137 ($M = 104$, $Median = 106$, $SD = 19$, $SE = 0.353$). The data displayed a skewness of -0.303, indicating a higher density of larger values. This is likely owing to the very sharp increase in frequency, as is visible in Figure 7, of Toons who have “maxed” their Laff and reached the highest amount possible.

Given the game’s task structure, the distribution detailed in Table 2 is to be expected. It is at slightly above 100 Laff, with the exact number depending on how many additional side tasks the Toon has completed for Laff, that tasks for Laff are no longer offered, and in order to gain additional Laff, the player must complete other in-game activities such as boss

Laff range	<i>n</i>	%
60-69	188	6.3
70-79	295	9.8
80-89	255	8.5
90-99	239	8.0
100-109	902	30.1
110-119	511	17.0
120-129	301	10.0
130-137	309	10.3
Total	3000	100.0

Table 2: Laff range demographics

fights, fishing, and golfing. This is likely the reason that many players hover in the 100-109 Laff range: there is no longer a clear path handed to them by which to advance.

3.1.2 Species

Toon Species were ordered by frequency due to the fact that they do not possess an inherent order of sorts like the other variables observed in this study. Cats were by far the most popular species, comprising nearly a third of the sample population.

Species	<i>n</i>	%
Cat	952	31.7
Dog	457	15.2
Mouse	302	10.1
Deer	275	9.2
Duck	260	8.7
Rabbit	222	7.4
Bear	156	5.2
Crocodile	142	4.7
Monkey	104	3.5
Pig	67	2.2
Horse	63	2.1
Total	3000	100.0

Table 3: Species demographics

3.1.3 Gender

Gender	n	%
Male	1328	44.3
Female	1672	55.7
Total	3000	100.0

Table 4: Gender demographics

Female Toons were slightly more common than male Toons. Male Toons are listed first because ordering was decided based on the layout of the interface used for the creation of a new Toon, where the option to create a male Toon is listed first.

3.1.4 Colour

Colours, as laid out in Table 5, were also ordered based on their order in the Toon creation interface, which is also the order in which they are listed on the Toontown Rewritten wiki. Exclusive colours which cannot be selected when creating a Toon are listed after basic colours. An interesting detail to note is that the most popular colour, black, is a colour exclusively available to cats.

3.1.5 Different legs

Leg colour	n	%
Same legs	2476	82.5
Different legs	524	17.5
Total	3000	100.0

Table 6: Leg colour demographics

Giving a Toon legs which are a different colour than the rest of its body has appeared to become increasingly trendy over time and may be perceived as a status symbol of sorts. Slightly above than one sixth of the sample population had opted for legs which were a different colour than their primary colour.

3.1.6 Leg colour

Leg colour data, displayed in Table 6, was collected for Toons who had different legs, and was left blank

Colour	n	%
Peach	76	2.5
Bright red	97	3.2
Red	36	1.2
Maroon	40	1.3
Sienna	19	0.6
Brown	123	4.1
Tan	50	1.7
Coral	97	3.2
Orange	54	1.8
Yellow	85	2.8
Cream	92	3.1
Citrine	25	0.8
Lime green	40	1.3
Sea green	56	1.9
Green	58	1.9
Light blue	71	2.4
Aqua	127	4.2
Blue	84	2.8
Periwinkle	105	3.5
Royal blue	104	3.5
Slate blue	67	2.2
Purple	86	2.9
Lavender	61	2.0
Pink	68	2.3
Rose pink	48	1.6
Ice blue	144	4.8
Mint green	63	2.1
Emerald	62	2.1
Teal	52	1.7
Apricot	39	1.3
Amber	55	1.8
Crimson	109	3.6
Dark green	44	1.5
Steel blue	129	4.3
Beige	91	3.0
Bubblegum	54	1.8
Black	174	5.8
White	15	0.5
Cartoonival blue	76	2.5
Cartoonival pink	41	1.4
Spooky purple	83	2.8
Total	3000	100.0

Table 5: Colour demographics

for Toons who did not. Note that Toontown Rewritten's five exclusive colours, namely black, white, Cartoonival blue, Cartoonival pink, and spooky purple, which are only available during special events, are not able to be selected only as leg colours, and Toons of these colours are not able to change the colour of their legs.

3.1.7 Missing track

The ordering for the levels of this variable was based on the order in which the tracks appear in a Toon's Gag panel. The desire to include missing track as a variable is why the sample population was limited to exclusively Toons who had entered the final area of the game, for which receiving a sixth and final Gag track is a prerequisite. Choosing to go without either Trap or Drop was overwhelmingly the most popular build.

Missing track	<i>n</i>	%
Toon-up	259	8.6
Trap	1386	46.2
Lure	191	6.4
Sound	65	2.2
Drop	1099	36.6
Total	3000	100.0

Table 8: Missing track demographics

3.1.8 Organic

Ordering for the Organic variable was once again decided by the order in which tracks appear in a Toon's Gag panel. Surprisingly, a large proportion of the population had opted to not cultivate an organic Gag track whatsoever, with organic Throw coming in as the second most popular option. Organic Throw has historically been a popular choice due to the ability of higher level organic Gags in the track to destroy specific powerful Cogs in a single hit.

Colour	<i>n</i>	%
Peach	10	1.9
Bright red	17	3.2
Red	3	0.6
Maroon	9	1.7
Sienna	2	0.4
Brown	14	2.7
Tan	5	1.0
Coral	6	1.1
Orange	13	2.5
Yellow	4	0.8
Cream	27	5.2
Citrine	3	0.6
Lime green	7	1.3
Sea green	12	2.3
Green	17	3.2
Light blue	12	2.3
Aqua	30	5.7
Blue	14	2.7
Periwinkle	23	4.4
Royal blue	37	7.1
Slate blue	14	2.7
Purple	37	7.1
Lavender	11	2.1
Pink	13	2.5
Rose pink	22	4.2
Ice blue	32	6.1
Mint green	6	1.1
Emerald	15	2.9
Teal	14	2.7
Apricot	8	1.5
Amber	5	1.0
Crimson	31	5.9
Dark green	6	1.1
Steel blue	22	4.2
Beige	16	3.1
Bubblegum	7	1.3
Total	524	100.0

Table 7: Leg colour demographics

Organic track	<i>n</i>	%
None	1218	40.6
Toon-up	47	1.6
Trap	105	3.5
Lure	279	9.3
Sound	368	12.3
Throw	872	29.1
Squirt	31	1.0
Drop	80	2.7
Total	3000	100.0

Table 9: Organic demographics

Name Tag	Image
Basic	Nights
Member	Nights
Shivering	NIGHTS
Poetic	Nights
Nautical	Nights
Boardwalk	NIGHTS
Wonky	Nights
Western	Nights
Silly	Perry
Action	Doctor Cliff
Whimsical	PRINCESS DAFFODIL
Zany	Princess Daffodil
Practical	Princess Daffodil
Fancy	Princess Daffodil
Spooky	BERMUDA

Figure 8: Toontown’s 15 original name tags (Source: Azure Swallowtail, 2015).

3.1.9 Name tag

The order of labels for name tags was decided based on the temporal order of their availability in the Catalog. Exclusive nametags, either only purchasable at certain times of the year or requiring certain in-game achievements, comprise the final four rows of Table 10 and were ordered based on how long they have been in existence in the game. Once again, a strik-

Name tag	<i>n</i>	%
Basic	873	29.1
Member	148	4.9
Shivering	259	8.6
Poetic	526	17.5
Nautical	58	1.9
Boardwalk	152	5.1
Wonky	159	5.3
Western	44	1.5
Silly	124	4.1
Action	56	1.9
Whimsical	89	3.0
Zany	47	1.6
Practical	80	2.7
Fancy	86	2.9
Spooky	165	5.5
Rigmarole	95	3.2
Frostbite	3	0.1
Triumphant	36	1.2
Total	3000	100.0

Table 10: Name tag demographics

ing amount of Toons had opted to not wear a name tag whatsoever, as the Basic name tag is the game’s default style of name display with which every Toon enters the game. Visual depictions of different name tags are included in Figure 8, 9, 10, and 11.

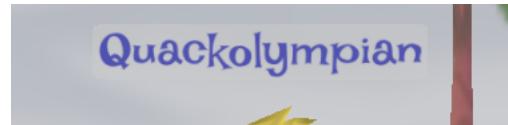


Figure 9: The Frostbite name tag was awarded to Toons who successfully completed the 2019 Laff-o-Lympics, which challenged players to reach 115 Laff points on a new Toon in the span of one month (Source: Toontown Rewritten Wiki, 2020).

Additionally, the distribution of frequencies across this variable, as well as across the species, Laff range, and organic Gag track variables, appeared to roughly follow a Zipf distribution. Originally observed for linguistic corpora, the Zipf distribution refers to a distri-



Figure 10: A promotional image for the Rigmarole name tag, available for purchase during the Cartoonival event, which takes place in September and October (Source: Toontown Rewritten Wiki, 2019).

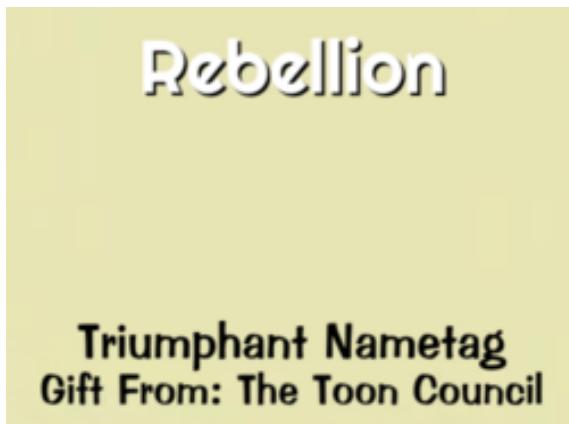


Figure 11: The Triumphant name tag was awarded to Toons who had completed the racing or golfing side activities prior to the relaxation of their completion requirements in June 2021 (Source: Toontown Rewritten Wiki, 2021).

bution in which the frequency of a word or outcome is inversely proportional to its frequency rank (“Zipf’s law”, 2021). In data which conforms to this distribution, the most common outcome appears twice as often as the second most common outcome, three times as often as the third most common outcome, and so on. A brief analysis was performed in this area for these variables and the corresponding plots and discussion are located in Appendix D.

3.1.10 Flippy shirt

Flippy shirt	n	%
No	2809	93.6
Yes	191	6.4
Total	3000	100.0

Table 11: Flippy shirt demographics

It has appeared that the wearing of Flippy shirts has gained popularity over time. Communities revolving around Flippy shirt “hunting” now exist, and some players have undertaken the task of collecting every colour variation for their Toons. It seems that the wearing of a Flippy shirt may function as a status symbol of some sort. It is a limitation that whether or not a Toon is wearing a Flippy shirt is not a consistently reliable metric of analysis due to the fact that a player can change their Toon’s clothing at will. Nonetheless, given the aforementioned suspicions regarding the shirt’s increase in popularity, the variable was maintained in the analysis. Only a very small proportion of the sample population had opted to wear a Flippy shirt.

3.2 Statistical and correlational analysis

3.2.1 Species

Z-scores of proportion were computed for gender frequencies across Toon species. Dogs ($z = 5.87$, $p < 0.001$, two-sample) and crocodiles ($z = 3.37$, $p < 0.001$, two-sample) were more likely to be male than female and cats ($z = -10.40$, $p < 0.001$, two-sample),

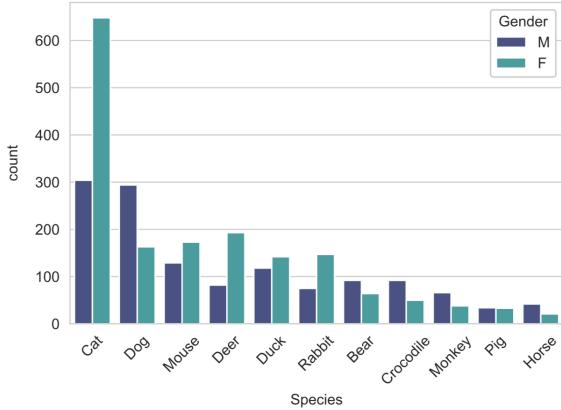


Figure 12: Gender frequencies across Toon species (Source: own image).

deer ($z = -6.12, p < 0.001$, two-sample), and rabbits ($z = -4.57, p < 0.001$, two-sample) were more likely to be female than male. Mice ($z = -2.50, p = 0.124$, two-sample), ducks ($z = -1.48, p = 0.139$, two-sample), bears ($z = 2.21, p = 0.027$, two-sample), monkeys ($z = 2.64, p = 0.008$, horses ($z = 2.49, p = 0.013$, two-sample), and pigs ($z = 0.12, p = 0.904$, two-sample) did not reach significance. Refer to Figure 12 for a visual representation of gender frequencies across Toon species.

A Pearson's chi-squared test was carried out for each species to determine if there were statistically significant differences between observed and expected frequencies for each category of Laff range. Cats ($\chi^2(7, N = 952) = 44.01, p < 0.001$), crocodiles ($\chi^2(7, N = 142) = 40.23, p < 0.001$), and deer ($\chi^2(7, N = 275) = 45.02, p < 0.001$) reached significance. Post hoc z -scores were calculated among the subgroups of the three species which displayed significance. More crocodiles than expected fell into the 60-69 ($z = 3.23, p = 0.001$, one-sample) and 70-79 ($z = 2.96, p = 0.003$, one-sample) ranges, while less were above 130 Laff than expected ($z = -3.37, p = 0.001$, one-sample). The proportion of crocodiles below 80 Laff was significantly larger than that which was above ($z = 4.11, p < 0.001$, two-sample), and the proportion of cats below 120 Laff was significantly smaller than that which was above ($z = -6.69, p <$

0.001, two-sample). A lower amount of deer than expected was found above 130 Laff ($z = -3.39, p = 0.001$, one-sample). Finally, the proportion of deer below 110 Laff was significantly larger than above ($z = 6.94, p < 0.001$, two-sample). Refer to Figure 13 for a visual representation of maximum Laff values across Toon species.

A z -score of proportion was calculated for each colour across all species. Cats were slightly less likely to be aqua than the general population ($z = -2.96, p = 0.003$, one-sample), while dogs were much more likely ($z = 6.19, p < 0.001$, one-sample). Dogs were also more likely to be Cartoonival blue than the general population ($z = 3.69, p < 0.001$, one-sample), but less likely to be ice blue ($z = -3.21, p = 0.001$, one-sample). It is likely that these are somehow correlated, in the sense that if a player wants a blue dog Toon, they are more likely to select aqua than a different blue shade. Deer were more likely than the general population to be red ($z = 2.93, p = 0.003$, one-sample) or beige ($z = 3.11, p = 0.002$, one-sample), and ducks showed strikingly high frequencies of yellow ($z = 8.03, p < 0.001$, one-sample), cream ($z = 5.69, p < 0.001$, one-sample), and amber ($z = 6.10, p < 0.001$, one-sample). The proportion of brown among bears was much higher than that of the general population ($z = 5.27, p < 0.001$, one-sample). Crocodiles showed a preference for green tones, reaching significance for lime green ($z = 4.97, p < 0.001$, one-sample), sea green ($z = 3.06, p = 0.002$, one-sample), and dark green ($z = 13.20, p < 0.001$, one-sample). Monkeys were more likely to be green ($z = 3.98, p < 0.001$, one-sample) or brown ($z = 4.97, p < 0.001$, one-sample), and horses displayed significance for orange ($z = 3.49, p < 0.001$, one-sample) and brown ($z = 4.42, p < 0.001$, one-sample). Refer to Figure C.1 in Appendix C.A for a heatmap of Toon species and colour combinations.

No species yielded significance for having different legs.

Dogs ($z = 3.36, p < 0.001$, one-sample) were more likely to be wearing Flippy shirts than the general population, and cats nearly reached significance ($z = 2.75, p = 0.006$, one-sample). Neither cats nor dogs were more likely to be wearing Flippy shirts ($z = 0.91, p = 0.363$, two-sample).

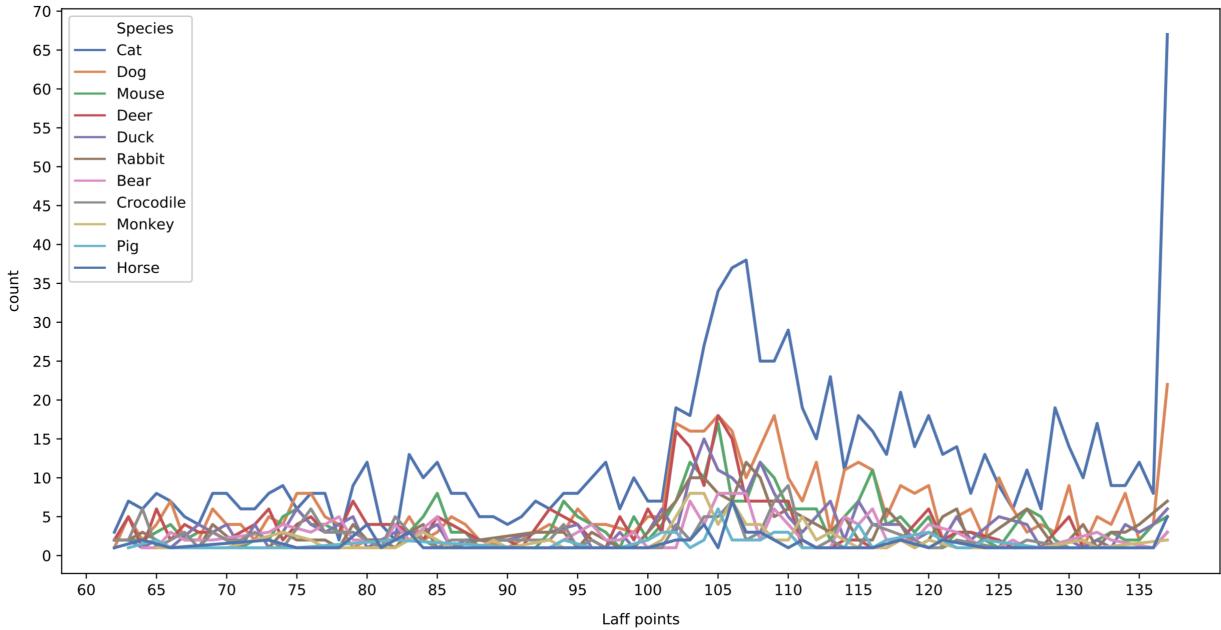


Figure 13: Distribution of maximum Laff points across each Toon species (Source: own image).

Pearson’s chi-squared tests were carried out for each species across the missing track variable. Only horses ($\chi^2(4, N = 63) = 44.01, p = 0.002$) reached significance. Post hoc z -scores were computed and they revealed that horses were more likely to be missing Toon-up than the general population ($z = 3.25, p = 0.001$, one-sample). No other z -score reached significance.

The same process as described above was carried out across the organic variable as well. Cats ($\chi^2(7, N = 952) = 18.62, p = 0.009$), deer ($\chi^2(7, N = 275) = 24.29, p = 0.001$), and crocodiles ($\chi^2(7, N = 457) = 18.93, p = 0.008$) reached significance. Although dogs did not yield a significant χ^2 statistic, they were more likely to have organic Trap than the general population ($z = 3.54, p < 0.001$, one-sample). Cats were more likely to have organic Sound ($z = 3.38, p < 0.001$, one-sample). Deer were less likely to have organic Throw ($z = -3.07, p = 0.002$, one-sample). Crocodiles ($z = 3.30, p = 0.001$, one-sample) showed a significant tendency towards organic Drop.

Finally, Pearson’s chi-squared tests were performed

for each species across the name tag variable. The null hypothesis was rejected for cats ($\chi^2(17, N = 952) = 93.98, p < 0.001$), deer ($\chi^2(17, N = 275) = 61.21, p < 0.001$), and crocodiles ($\chi^2(17, N = 142) = 46.95, p < 0.001$). Cats were much less likely than the general population to have the Basic nametag ($z = -6.11, p < 0.001$, one-sample), which means that they were more likely to have a name tag in general. Cats were also more likely to have the Spooky ($z = 3.11, p = 0.002$, one-sample) or Fancy ($z = 5.33, p < 0.001$, one-sample) name tags. Deer were also more likely to have selected a name tag in general ($z = -4.13, p < 0.001$, one-sample), although cats were more likely than deer to have one ($z = -6.46, p < 0.001$, two-sample). Deer were more likely to have the Member name tag ($z = 4.30, p < 0.001$, one-sample) and less likely to have the Fancy name tag ($z = -2.87, p = 0.004$, one-sample) than the population. Crocodiles were less likely to have a name tag whatsoever ($z = 5.48, p < 0.001$, one-sample). Refer to Figure C.2 in Appendix C.A for a heatmap of Toon species and name tag combinations.

Analyses were also performed for black cats as an independent group. Black was the most popular Toon colour, and it is a colour which is exclusively available to cats. 174 black cats were observed. If they were to be treated as a species, they would be ranked seventh in terms of population, just above bears. Given their notable population and the fact that they cannot be stratified across different species, it seemed judicious to examine them independently. This was not carried out for white bears, despite the fact that white is also only available to one single species, due to their extremely small population ($n = 15$).

Black cats were more likely to be female than male ($z = 3.50, p < 0.001$, two-sample), and the proportion of female Toons among the black cat population was much larger than the proportion of female Toons among the total population ($z = 6.64, p < 0.001$, two-sample). No significances were achieved when a chi-squared test was carried out for black cats across Laff range frequencies. This was also the case for black cats and name tag, missing Gag track, and organic Gag track frequencies, and they were not more or less likely to be wearing Flippy shirts.

3.2.2 Gender

Z-scores of proportion were calculated for each Laff range between male and female Toons. Two ranges reached significance, with the amount of male Toons in the 120-129 range ($z = 3.24, p = 0.001$, two-sample) and 130-137 range ($z = 3.27, p = 0.001$, two-sample) being significantly larger than the amount of female Toons in these ranges. Refer to Figure 14 for a visual representation of maximum Laff points between male and female Toons.

Z-scores were also calculated for each colour between genders. To a certain extent, the results conformed to stereotypical gender norms. Male Toons were more likely than female Toons to be bright red ($z = 4.81, p < 0.001$, two-sample), sienna ($z = 3.36, p = 0.001$, two-sample), orange ($z = 3.77, p < 0.001$, two-sample), lime green ($z = 3.06, p = 0.002$, two-sample), sea green ($z = 2.94, p = 0.003$, two-sample), green ($z = 3.95, p < 0.001$, two-sample), blue ($z = 4.38, p < 0.001$, two-sample), royal blue ($z = 4.25,$

$p < 0.001$, two-sample), steel blue ($z = 3.24, p = 0.001$, two-sample), or Cartoonival blue ($z = 4.71, p < 0.001$, two-sample). Female Toons were more likely than male Toons to be peach ($z = -7.09, p < 0.001$, two-sample), red ($z = -5.53, p < 0.001$, two-sample), periwinkle ($z = -2.83, p = 0.005$, two-sample), lavender ($z = -4.04, p < 0.001$, two-sample), pink ($z = -6.22, p < 0.001$, two-sample), or rose pink ($z = -4.20, p < 0.001$, two-sample). Refer to Figure C.10 in Appendix C.B for a heatmap of gender and colour combinations.

In regards to missing and organic Gag tracks, male Toons were more likely to be missing Toon-up ($z = 5.24, p < 0.001$, two-sample) and female Toons were more likely to be missing Trap ($z = -3.06, p = 0.002$, two-sample), and no z-scores calculated for organic Gag tracks reached significance.

Male Toons were less likely to be wearing a Poetic name tag than female Toons ($z = -4.06, p < 0.001$, two-sample) and were more likely to have different coloured legs ($z = 4.02, p < 0.001$, two-sample). Neither gender was more likely to be wearing a Flippy shirt ($z = 0.22, p = 0.826$, two-sample).

3.2.3 Laff

Pearson's chi-squared tests were carried out for each Laff range across colours. 60-69 Laff ($\chi^2 (40, N = 188) = 78.10, p = 0.003$) and 110-119 Laff ($\chi^2 (40, N = 511) = 69.85, p = 0.002$) reached significance. Post hoc z-scores were calculated and yielded significance for rose pink Toons in the 60-69 ($z = 4.07, p < 0.001$, one-sample) and 70-79 ($z = 3.27, p = 0.001$, one-sample) Laff ranges, teal Toons in the 90-99 range ($z = 3.17, p = 0.002$, one-sample), emerald Toons in the 100-109 range ($z = 3.26, p = 0.001$, one-sample), and spooky purple Toons in the 110-119 range ($z = 4.23, p < 0.001$, one-sample). The proportion of rose pink Toons below 80 Laff reached significance when compared to the proportion above 80 Laff ($z = 4.36, p < 0.001$, two-sample). Refer to Figure C.3 in Appendix C.A for a heatmap of Laff range and colour combinations.

Only one category for missing Gag track reached significance when compared across Laff ranges. Toons without Toon-up ($\chi^2 (4, N = 259) = 15.41, p$

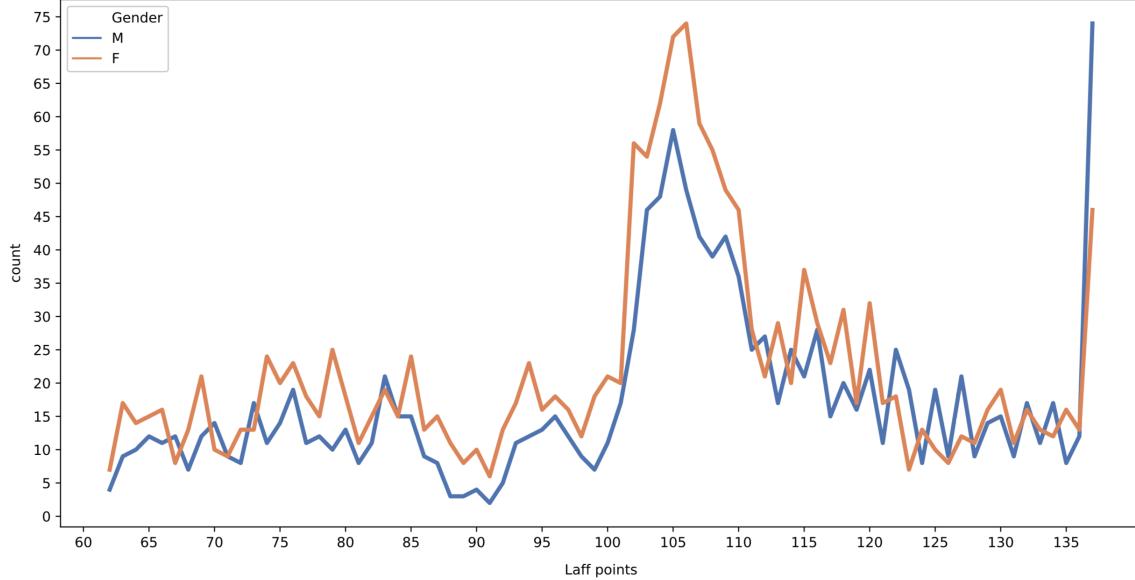


Figure 14: Distribution of maximum Laff points across genders (Source: own image).

Laff range	χ^2	p
60-69	120.11	< 0.001
70-79	84.65	< 0.001
80-89	64.52	< 0.001
90-99	44.65	< 0.001
100-109	50.38	< 0.001
110-119	70.61	< 0.001
120-129	120.90	< 0.001
130-137	328.50	< 0.001

Table 12: χ^2 values for organic Gag track frequencies for Laff ranges

= 0.004) were more likely to be found in the 130-137 Laff range ($z = 3.45, p < 0.001$, one-sample). Refer to Figure C.4 in Appendix C.A for a heatmap of Laff range and missing Gag track combinations. On the other hand, every category of Laff range reached significance when chi-squared tests were carried out with organic Gag track frequencies. Test statistics for each Laff range are reported in Table 12. Post hoc z -scores were calculated to tease apart these large values. Toons above 110 Laff were more likely than

Toons below 110 Laff to have organic Trap ($z = 5.86, p < 0.001$, two-sample), Sound ($z = 12.26, p < 0.001$, two-sample), or Throw ($z = 11.49, p < 0.001$, two-sample), but less likely to have organic Lure ($z = -6.80, p < 0.001$, two-sample). Toons below 100 Laff were overwhelmingly less likely to have an organic Gag track whatsoever than Toons above 100 Laff ($z = -47.57, p < 0.001$, two-sample). Refer to Figure C.5 in Appendix C.A for a heatmap of Laff range and organic Gag track combinations.

Once again, every category of Laff range reached significance when chi-squared tests were done for name tag frequencies. Test statistics for each Laff range are reported in Table 13. Toons below 100 Laff were much more likely to have the Basic name tag ($z = 17.53, p < 0.001$, two-sample). Toons below 120 Laff were more likely to have the Shivering name tag than Toons above ($z = 6.59, p < 0.001$, two-sample), while they were less likely to have the Fancy ($z = -9.36, p < 0.001$, two-sample), Practical ($z = -7.17, p < 0.001$, two-sample), Action ($z = -4.34, p < 0.001$, two-sample), or Zany ($z = -4.49, p < 0.001$, two-sample) name tags.

Laff range	χ^2	<i>p</i>
60-69	135.37	< 0.001
70-79	113.17	< 0.001
80-89	47.93	< 0.001
90-99	83.87	< 0.001
100-109	63.12	< 0.001
110-119	116.15	< 0.001
120-129	161.20	< 0.001
130-137	575.64	< 0.001

Table 13: χ^2 values for name tag frequencies across Laff ranges

Toons within 120 and 129 Laff showed a higher frequency of the Whimsical ($z = 4.03$, $p < 0.001$, one-sample) and Frostbite ($z = 3.18$, $p = 0.001$, one-sample) name tags than the general population, while Toons above 130 Laff showed a higher frequency of the Triumphant name tag ($z = 15.38$, $p < 0.001$, one-sample). The frequency of the Wonky name tag among Toons between 110 and 119 Laff reached significance ($z = 3.14$, $p = 0.002$, one-sample). Various trends in the 100 to 109 Laff group were observed, namely a significantly larger proportion of the Poetic name tag ($z = 2.92$, $p = 0.004$, one-sample) and a smaller proportion of the Practical ($z = -3.62$, $p < 0.001$, one-sample), Fancy ($z = -3.13$, $p = 0.002$, one-sample), and Triumphant ($z = -3.40$, $p < 0.001$, one-sample) name tags. Finally, Toons between 60 and 69 Laff showed a significantly smaller proportion of the Poetic name tag ($z = -3.64$, $p < 0.001$, one-sample). Refer to Figure C.6 in Appendix C.A for a heatmap of Laff range and name tag combinations.

Toons above 120 Laff were more likely to have opted for different legs than Toons below 120 Laff ($z = -9.48$, $p < 0.001$, two-sample), and Toons above 110 Laff were significantly more likely to be wearing a Flippy shirt ($z = -7.54$, $p < 0.001$, two-sample). Refer to Figure C.11 in Appendix C.B for a histogram of the frequency of different legs across Laff ranges and to Figure C.12 in Appendix C.B for a histogram of Flippy shirt frequency across Laff ranges.

3.2.4 Colour and leg colour

The data was filtered to include exclusively Toons who had different legs and both primary colour and leg colour were encoded numerically. A significant positive correlation between primary colour and leg colour was found, $r(522) = 0.23$, $p < 0.001$.

However, this correlation proved impossible to solidly corroborate at this stage of investigation in this area due to the combination of three factors: the large range of colours and the resulting massive amount of possible colour combinations, the relatively small amount of Toons who had different coloured legs, and the resulting low frequencies of many of the colours across both variables. More data will be necessary to explore this correlation in detail. In further Toontown-related studies, I intend to collect a much larger sample of Toons with different coloured legs and perform a comprehensive analysis of colour and leg colour. Refer to Figure C.7 in Appendix C.A for a heatmap of primary colour and leg colour combinations.

Nevertheless, various significant z -scores were achieved for other aspects of analysis in this area. Cream ($z = 4.37$, $p < 0.001$, one-sample), lavender ($z = 3.82$, $p < 0.001$, one-sample), mint green ($z = 3.30$, $p < 0.001$, one-sample), and bubblegum ($z = 3.06$, $p = 0.002$, one-sample) Toons were more likely to have different legs than the overall population. Coral ($z = 3.73$, $p < 0.001$, two-sample) and yellow ($z = 3.71$, $p < 0.001$, two-sample) were statistically more likely to appear as primary colours than as leg colours, while purple was more likely to appear as a leg colour than a primary colour ($z = -3.34$, $p < 0.001$, two-sample).

3.2.5 Missing Gag track

Toons who did not have Toon-up were more likely than the population to have different legs ($z = 5.51$, $p < 0.001$, one-sample), as were Toons without Lure ($z = 4.29$, $p < 0.001$, one-sample) or Sound ($z = 4.46$, $p < 0.001$, one-sample). Toons without Trap were less likely to have them ($z = -3.72$, $p < 0.001$, one-sample). Neither Toons without Lure nor Toons without Sound were more or less likely to have different legs than each other ($z = -1.35$, $p = 0.177$,

two-sample), and Toons without Toon-up were not more or less likely to have them than Toons without Lure ($z = 0.27, p = 0.787$, two-sample) or Sound ($z = -1.21, p = 0.226$, two-sample). Toons without Drop did not reach significance ($z = -1.48, p = 0.139$, one-sample). Toons without Toon-up were also more likely than the population to be wearing a Flippy shirt ($z = 4.93, p < 0.001$, one-sample).

Pearson's chi-squared tests yielded a significant result exclusively for Toons without Toon-up ($\chi^2 (17, N = 259) = 42.24, p < 0.001$) when carried out with name tag frequencies. No significant z -scores were calculated for Toon-upless Toons in regards to name tags, likely indicating a broad overall differentiation from the population as opposed to a strong preference for specific name tags. Trapless Toons did reach significance for a lower proportion of the Practical name tag ($z = -2.99, p = 0.003$, one-sample) and Lureless Toons managed to reach significance for a higher proportion of the Action name tag ($z = 2.83, p = 0.005$, one-sample).

3.2.6 Organic Gag track

Toons with organic Lure ($z = -3.30, p < 0.001$, one-sample), Throw ($z = -3.03, p = 0.002$, one-sample) and no organic Gag track whatsoever ($z = -3.12, p = 0.002$, one-sample) were less likely than the population to have different legs, while Toons with organic Sound ($z = 13.53, p < 0.001$, one-sample) were more likely. No other Gag tracks reached significance. Additionally, no organic Gag track among the three which yielded a significant negative z -score was more or less likely to have different legs than another in that group.

Toons with no organic Gag track were less likely than the population to be wearing a Flippy shirt ($z = -3.85, p < 0.001$, one-sample), and Toons with organic Sound were more likely ($z = 8.39, p < 0.001$, one-sample).

Three significant values were achieved for name tag frequencies across organic groups when chi-squared tests were carried out, namely those of organic Sound ($\chi^2 (17, N = 368) = 113.42, p < 0.001$), organic Throw ($\chi^2 (17, N = 872) = 64.66, p < 0.001$), and Toons without an organic track ($\chi^2 (17, N = 1218)$

$= 81.13, p < 0.001$).

Numerous significances were achieved when post hoc z -scores were calculated. Toons with organic Toon-up were more likely to have the Shivering name tag ($z = 3.11, p = 0.002$, one-sample), Toons with organic Throw were more likely to have the Whimsical name tag ($z = 2.94, p = 0.003$, one-sample), and Toons with organic Sound were more likely to have the Practical ($z = 6.75, p < 0.001$, one-sample), Fancy ($z = 4.80, p < 0.001$, one-sample), or Triumphant name tags ($z = 4.05, p < 0.001$, one-sample). Toons without an organic Gag track displayed a lower prevalence of the Fancy ($z = -3.33, p < 0.001$, one-sample) and Practical ($z = -3.45, p < 0.001$, one-sample) name tags. The Member name tag was less frequent among Toons with organic Throw ($z = -3.42, p < 0.001$, one-sample) but more frequent among Toons without an organic track ($z = 2.91, p = 0.004$, one-sample). Refer to Figure C.8 in Appendix C.A for a heatmap of organic Gag track and name tag combinations.

Toons with organic Sound ($z = -4.73, p < 0.001$, one-sample) and organic Throw ($z = -4.16, p < 0.001$, one-sample) both displayed a significantly smaller proportion of the Basic name tag. These Toons were much more likely than the other six groups to have opted for a non-default name tag ($z = -8.00, p < 0.001$, two-sample).

3.2.7 Name tag

Toons with the Basic name tag were much less likely than the population to have different legs ($z = -4.59, p < 0.001$, one-sample), while Toons with the Practical ($z = 5.01, p < 0.001$, one-sample) or Fancy ($z = 7.66, p < 0.001$, one-sample) name tags were more likely. Identical results were obtained for Flippy shirt prevalence across name tags: Toons with the Basic name tag were less likely to be wearing Flippy shirts ($z = -4.24, p < 0.001$, one-sample), while Toons with the Practical ($z = 4.08, p < 0.001$, one-sample) or Fancy ($z = 5.09, p < 0.001$, one-sample) were more likely.

3.2.8 Flippy shirt

Toons wearing Flippy shirts were much more likely to have different legs than Toons without Flippy shirts ($z = 7.26, p < 0.001$, two-sample).

4 Discussion

This study set out to comprehensively investigate the characteristics of a random sample of a certain category of Toons in Toontown Rewritten, namely those who had completed training for their final Gag track and advanced to the final part of the game. Given the multiplicity of variables and their levels, it was difficult to set many expectations prior to analysis in terms of potential findings beyond a few trends I had observed over time as an individual with a long history of involvement with the game, such as the historical popularity of cat Toons and the tendency of players to opt to go without the Trap or Drop Gag tracks. This is also the first study of its kind, as no previous research related to Toontown Rewritten exists, so there were no preexisting findings to keep in mind while formulating hypotheses and carrying out analysis.

Demographic data was reported in table format with group sizes and percentages of the overall population, and correlative statistics were calculated using Pearson's chi-squared test of goodness of fit and z -scores of proportion. From these statistical results, various conclusions regarding certain subgroups of the population were drawn and can be described in detail.

In terms of demographic observations, two thirds of the population had above 100 Laff points, with nearly one third falling between 100 and 109 Laf points. Nearly one third of the population was comprised of cats, and dogs and cats combined comprised nearly half. Additionally, black, which is exclusively available to cats, was the most frequently observed colour. Ice blue, steel blue, aqua, brown, crimson, periwinkle, and royal blue were the following most frequently observed colours after black. Approximately one sixth of the population had different coloured legs. Among Toons who had opted for different legs, the most pop-

ular leg colours were cream, aqua, royal blue, and ice blue. Male and female Toons were quite balanced, with female Toons being slightly more populous. Nearly half of the population was missing the Trap track and more than four fifths were missing either Trap or Drop. It was by far most popular to opt for no organic Gag track, followed by choosing organic Throw. The Basic name tag, or choosing not to opt for a non-default name tag, and the Poetic name tag were the most common name tag options, followed by a very sharp drop in popularity for all other name tags. Flippy shirts were very uncommon, with Toons wearing them comprising only slightly above five percent of the population.

As mentioned in the Laff subsection of the demographic analysis, given the task structure of the game, the large amount of Toons falling between 100 and 109 Laff makes sense. Between these two values, standard ToonTasks which allow the player to increase their Toon's maximum Laff points are no longer offered and the player must complete non-storyline tasks, such as fishing and golfing, in order to do so. Many of these tasks can be quite tedious. Numerous players likely stagnate in this range because they are no longer provided with a specific route by which to proceed.

In regards to species, cat Toons have always seemed to be a popular choice. The fact that black, a colour only available to this species, was the most frequently observed colour is a testament to this. However, dog Toons may have more of a right to be referred to as the iconic face of Toontown. This is owing to the fact that Toontown's mayor, Flippy, who featured prominently in advertisements and promotions for the original game and continues to do so in its current incarnation, is a dog, and the icon of the original Disney's Toontown Online desktop launcher was a dog Toon's head. Additionally, Tutorial Tom, the NPC who guides new players through the game's tutorial, stylized as the Toontorial, is a dog Toon as well.

Of the most frequently observed colours, three of them, namely ice blue, steel blue, and crimson, notably are new colours added by Toontown Rewritten in 2015. Giving your Toon different coloured legs was a surprisingly popular choice which appears to be



Figure 15: A still from a 2005 Disney's Toontown Online television advertisement featuring Flippy, Toontown's mayor (Source: Zimmer, 2016).

becoming increasingly trendy. Opting to go without Trap or Drop has historically been the norm, as much of the most popular battle strategy revolves around Toon-up, Lure, Sound, and Throw. The apparent trends of choosing to not cultivate an Organic gag track and to stick with the game's default name tag whatsoever are particularly notable. Finally, given the difficulty of acquiring Flippy shirts, their low frequency holds water.

However, the fact that a player can change the clothes that their Toon is wearing at will causes Flippy shirts to be a somewhat unreliable metric upon which to analyze data. This was one of the main limitations of the demographic analysis, as the count reflected in the population most likely does not represent the amount of Toons who possess Flippy shirts in their clothing inventory but were not wearing them at the time of observation. Additionally, Toontown Rewritten has recently implemented a metric which allows Toons to keep multiple name tags in their clothing wardrobe and switch between them at will, which causes name tags to also be a somewhat unreliable metric. Previously, purchasing a name tag would completely overwrite the name tag that the Toon was wearing.

Another primary limitation was the combination of the population size with the large amount of levels of certain variables, such as colour and name tag, which caused certain subgroups to be extremely small. This



Figure 16: Tutorial Tom, the NPC who guides Toontown's newest citizens through the game's Toontorial (Source: Disney Wiki, 2011).

leads into future plans for this project, which are to increase the sample population to be much larger and subsequently carry out analyses once again.

Extensive results were observed in the area of statistical analysis. Dogs, crocodiles, and monkeys were more likely to be male than female, while cats, deer, and rabbits were more likely to be female than male. Black cats were also more likely to be female than male. The proportion of female toons among black cats is significantly larger than the proportion of female toons among the entire population. Crocodiles were more likely to be below 80 Laff points and deer were more likely to be below 110 Laff points. Crocodile and deer Toons were not present in Disney's original name and were added by Toontown Rewritten in September 2017. This may partially explain why they are concentrated in lower Laff ranges. Cats were more likely to be above 120 Laff points. Above 120 Laff, male Toons significantly outnumbered female Toons.

The proportions of aqua and Cartoonival blue dogs, yellow, cream, and amber ducks, brown bears, green crocodiles, brown and green monkeys, red and beige deer, and orange and brown horses reached significance. As previously mentioned, blue is an iconic colour for dogs in Toontown because of Toontown's mayor Flippy, and many of these other results correspond to common colours of the Toon species's real-

world counterparts. No species reached significance for different legs, but dogs were more likely to be wearing a Flippy shirt than the population as a whole and black cats were precisely on the cusp. Horses were more likely to be missing Toon-up, cats were more likely to have organic Sound or organic Throw, and deer were less likely to have organic Throw. Dogs were more likely to have organic Trap and crocodiles were more likely to have organic Drop.

Cats and deer were much less likely than the population to be wearing the default Basic name tag, and cats were less likely than deer to be wearing it. Crocodiles were more likely to be wearing this name tag. Additionally, cats were more likely to be wearing the Spooky or Fancy name tag, and deer were more likely to have selected the Member name tag and less likely to have the Fancy name tag.

To an extent, colour results conformed to stereotypical gender norms. Male Toons were more likely than female Toons to be bright red, sienna, orange, lime green, sea green, green, blue, royal blue, steel blue, or Cartoonival blue, while female Toons were more likely than male Toons to be peach, red, periwinkle, lavender, pink, or rose pink. Male Toons were more likely to be missing the Toon-up track, while female Toons were more likely to be missing Trap. Neither gender was more likely to be wearing a Flippy shirt, but male Toons were more likely to have different legs. In addition, male Toons were less likely than female Toons to be wearing the Poetic name tag. At this point, various trends carried out primarily by groups of Toons have begun to reveal themselves, and a specific alternate aesthetic and gameplay approach adopted primarily by male Toons has started to take shape.

Rose pink Toons were more likely to be below 80 Laff than above, and the proportions of teal Toons between 90 and 99 Laff, emerald Toons between 100 and 109 Laff, and spooky purple Toons between 110 and 119 Laff reached significance. Toons without Toon-up were significantly more concentrated above 130 Laff, and Toons with organic Trap, Sound, or Throw were more concentrated above 110 Laff than the overall population, while Toons with organic Lure were concentrated below. Toons below 100 Laff were overwhelmingly less likely to have an organic Gag track

Name Tag	Image	Cattlelog Issue
Basic	Nights	Series 1 Issue #1
Member	Nights	Series 1 Issue #1
Shivering	NIGHTS	Series 1 Issue #7
Poetic	Nights	Series 2 Issue #1
Nautical	Nights	Series 2 Issue #8
Boardwalk	NIGHTS	Series 3 Issue #2
Wonky	Nights	Series 3 Issue #9
Western	Nights	Series 4 Issue #3
Silly	Perry	Series 4 Issue #10
Action	Doctor Cliff	Series 5 Issue #4
Whimsical	PRINCESS DAFFODIL	Series 6 Issue #6
Zany	Princess Daffodil	Series 7 Issue #5
Practical	Princess Daffodil	Series 7 Issue #8
Fancy	Princess Daffodil	Series 7 Issue #12
Spooky	BERMUDA	Seasonal (Halloween)

Figure 17: Figure 8 with the series and issue of the Cattlelog in which the name tag first becomes available indicated. This displays how the player must consistently log in over time in order receive more Cattelogs and thereby unlock more name tags (Source: Azure Swallowtail, 2015).

than Toons above 100 Laff. Toons below 100 Laff were also much more likely to be wearing the Basic name tag. It appears as though many Toons do not move beyond various defaults of gameplay while they are working through the task-based period of the game.

The Fancy, Practical, Action, and Zany name tags were significantly less likely to be worn by Toons below 120 Laff. Nearly all Toons wearing the Triumphant name tag were above 130 Laff. Given that new name tags become available over time as the Toon receives issues of their Cattlelog, it is to be expected that name tags appearing in later issues of the Cattlelog would appear in higher frequencies among Toons with higher Laff, as they have most likely been playing the game for much longer than Toons with lower Laff. Toons above 120 Laff were much more likely than Toons below to have different legs, and Toons above 110 Laff were much more likely than Toons below to wear Flippy shirts.

A correlation between main colour and leg colour exists statistically, but it cannot be corroborated or teased apart until the population of the study is significantly increased. This direction will be taken in future work. Certain conclusions were nonetheless reached in this area, namely that cream, lavender, and mint green Toons were more likely to have different coloured legs than the population, coral and yellow were more likely to appear as primary colours than leg colours, and purple was more likely to appear as a leg colour than a primary colour.

Toons missing Toon-up, Lure, or Sound were more likely to have different coloured legs than toons missing Trap. Among the groups of Toons who were more likely to have different legs, no group was more or less likely than another to have them. Toons missing Toon-up were also significantly more likely to be wearing Flippy shirts than the population. Trapless Toons were less likely to be wearing the Practical name tag and Lureless Toons were more likely to be wearing the Action name tag.

Toons with organic Sound were much more likely to have different coloured legs than the population, while Toons with organic Lure, Throw, or no organic track at all were less likely. Among these three groups, none was more or less likely than another to have different legs. Toons with organic Sound were more likely to be wearing Flippy shirts, while Toons without an organic track were less likely. Toons with organic Sound were also more likely to be using the Practical, Fancy, or Triumphant name tags, and were together with Toons with organic Throw in being much less likely to have the Basic name tag. Toons without an organic Gag track were less likely to wear the Practical or Fancy name tags. The Practical and Fancy name tags are the final two name tags to appear in the Cattelog, and it takes more than one year to reach them if the player consistently logs in weekly, as the Toon receives a new Cattelog every week. By the time the player is able to purchase these name tags, they have likely moved beyond the task-based section of the game and have started to explore other gameplay options, namely cultivating an organic Gag track.

Toons wearing the Basic name tag were much less likely to have different legs than the population, while



Figure 18: Deer and crocodiles were the winners of the Toontown Species Election, which lasted from September 2016 until July 2017, and the two new species were added to the game in September 2017 (Source: Toontown Rewritten Wiki, 2017).

Toons wearing the Practical or Fancy name tags were more likely. Identical results to these were achieved in terms of Flippy shirts.

There appear to be multiple large bundles of co-occurring characteristics. Cats, deer, and crocodiles all reached significance in multiple chi-square tests. The underlying reasoning for this in the case of deer and crocodiles could be the fact that they are new species which did not exist in Toontown Online, and cats appear to be divergent in many areas. Organic Sound was more common among cats, and Toons with organic Sound appear to possess a bundle of specific features which are described in detail below.

Male Toons and Toons with organic Sound appear to be the vanguard of a certain set of countercultural trends. Male Toons were more likely to have different coloured legs, and although they were not more likely to be wearing Flippy shirts, Toons above 110 Laff were much more likely to be wearing them and male Toons significantly outnumber female Toons at 120 Laff and above. Additionally, dog Toons, who were much more male than female, did reach significance for Flippy shirt frequency. It is of interest to note here that different legs were also much more common for Toons at or above 120 Laff. Male Toons were

less likely to be wearing the Poetic name tag, which was the second most common name tag, and they were more likely to be missing Toon-up as opposed to female Toons, who were more likely to be missing Trap, which was the most frequently omitted Gag track.

Toons with organic Sound seemed to have formed a subculture of sorts as well. These Toons were more concentrated above 110 Laff and showed higher frequencies of late-game name tags, and they were much more likely to have different coloured legs as well as Flippy shirts. Organic Sound was also more frequent among cats, who are concentrated above 120 Laff.

One final bundle of characteristics is evident from the analysis, namely those of Toons between 60 and 110 Laff, most of whom are still progressing through ToonTasks provided to them. These Toons were much less likely to have an organic Gag track and were much more likely to be wearing the default Basic name tag. They were also less likely to have different legs or Flippy shirts. Various observations tie into this. Toons with the Basic name tag were less likely to have different legs or Flippy shirts, and Toons without an organic track were less likely to be wearing Flippy shirts. This group was also less likely to be wearing the Practical or Fancy name tags, which are not available until after the Toon is more than one year old at the absolute minimum. Based on this, it can be inferred that Toons between 60 and 110 Laff are most likely not very old, and that many Toons do not begin to explore various non-default aesthetic and gameplay options until much later.

The aforementioned limitation of the combination of the size of the population with the large number of levels of certain variables applies for this portion of the analysis as well. The significant correlation between main colour and leg colour was unable to be corroborated because of a lack of data and extremely small subgroup sizes. The planned future direction for this data set and study is to significantly increase the population size in order to comprehensively tease apart and understand this correlation.

5 Conclusion

The goal of this study was to analyze and report on the demographics of a sample of the population of Toontown Rewritten and to draw conclusions based on these analyses. The primary demographic findings are that cat Toons and Toons between 100 and 109 Laff appear most frequently by far, black, a colour only available to cats, is the most common colour, Trap and Drop are the most common Gag tracks to go without, and it is most popular to opt to not have an organic Gag track or non-default name tag. The primary correlative findings are that multiple groups of Toons present bundles of co-occurring characteristics. Toons below 109 Laff, many of whom seem to have recently been created, are more likely to stick with default options, namely not having an organic track and using the Basic name tag, and to not engage in certain trends, such as wearing a Flippy shirt or changing their leg colour. On the other hand, male Toons and Toons with organic Sound are perpetuating an alternate culture, as they are more likely to be concentrated in higher Laff ranges, change their leg colour, wear Flippy shirts, and opt for late-game name tags. This study is significant in that it is the first of its kind for this game, and ideally it will create a space for future research and investigation related to Toontown Rewritten. There is much further work to be done in this area, most importantly dramatically increasing the sample size in order to carry out a comprehensive analysis of the significant correlation found here between main colour and leg colour. There are additionally other contexts to which this data can be applied, such as machine learning, which is a planned future direction.

Appendices

A Discussion of technical methods

Data was collected by hand in a spreadsheet and converted into a CSV file. The raw data has been uploaded along with this paper. All subsequent manipulation and analysis of the data took place in Jupyter Notebooks using Python through the use of both preexisting packages and original code. Tidying and manipulation of the data was carried out using pandas, and data visualizations were created using matplotlib and Seaborn. Numpy methods were also implemented as needed. Statistical analysis was performed using both various `scipy.stats` methods and original code written for the purpose of this study.

B Code used in implementation of methods

Original code was written at various points during analysis to create specific visualizations and accomplish particular tasks, as well as to streamline the usage of preexisting statistical methods from `scipy.stats`. Code and methods that I constructed myself have been uploaded along with this paper in a separate file with technical commentary.

C Additional data visualizations

C.A Heatmaps



Figure C.1: Species and colour

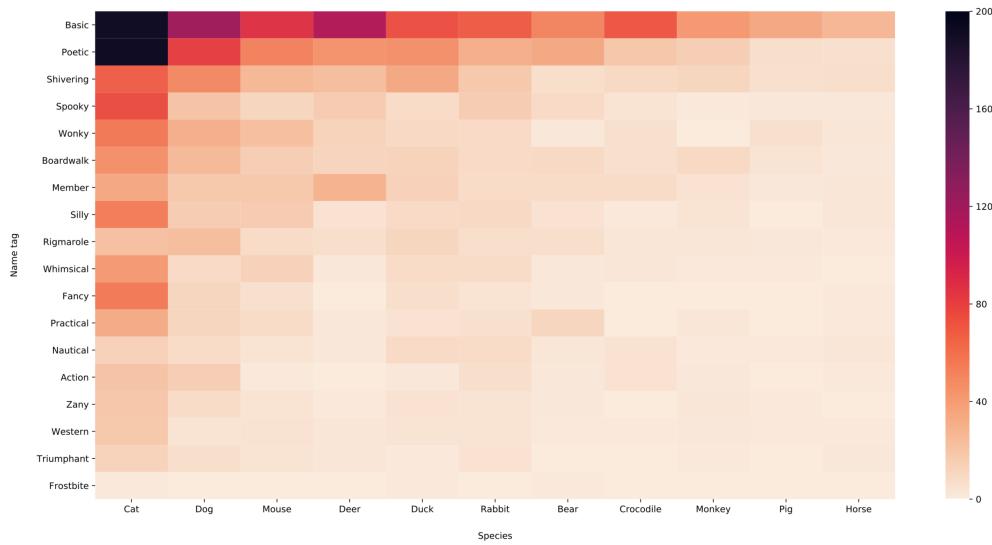


Figure C.2: Species and name tag

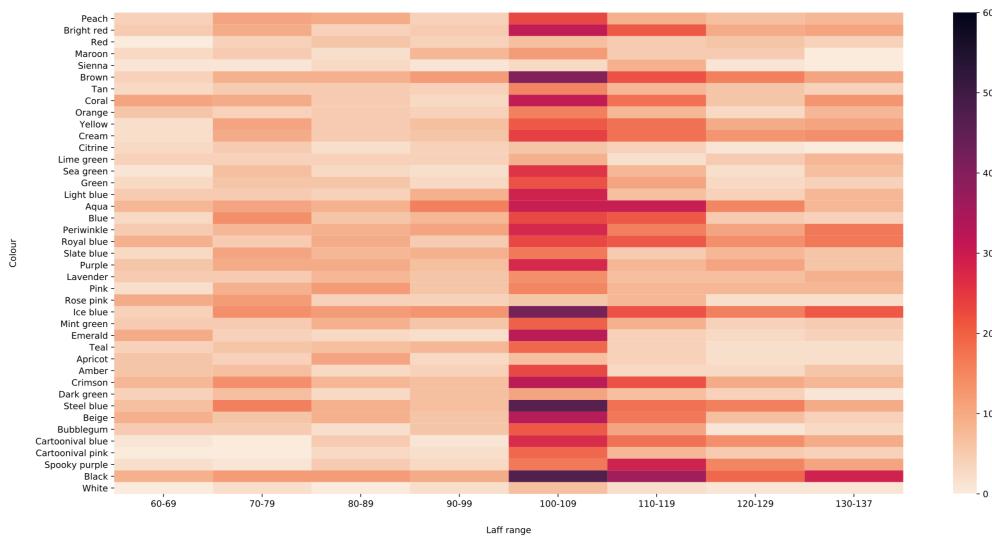


Figure C.3: Laff range and colour

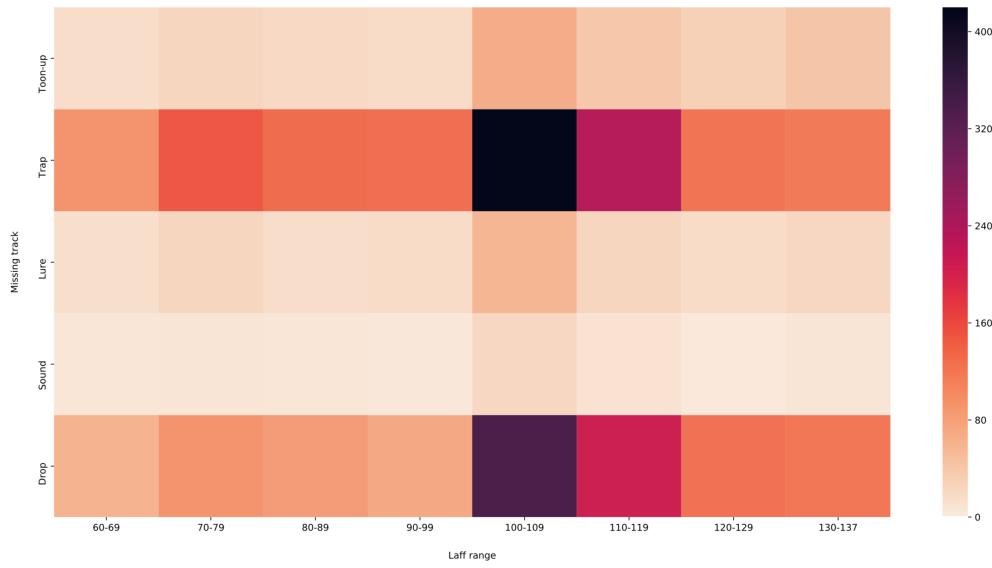


Figure C.4: Laff range and missing Gag track

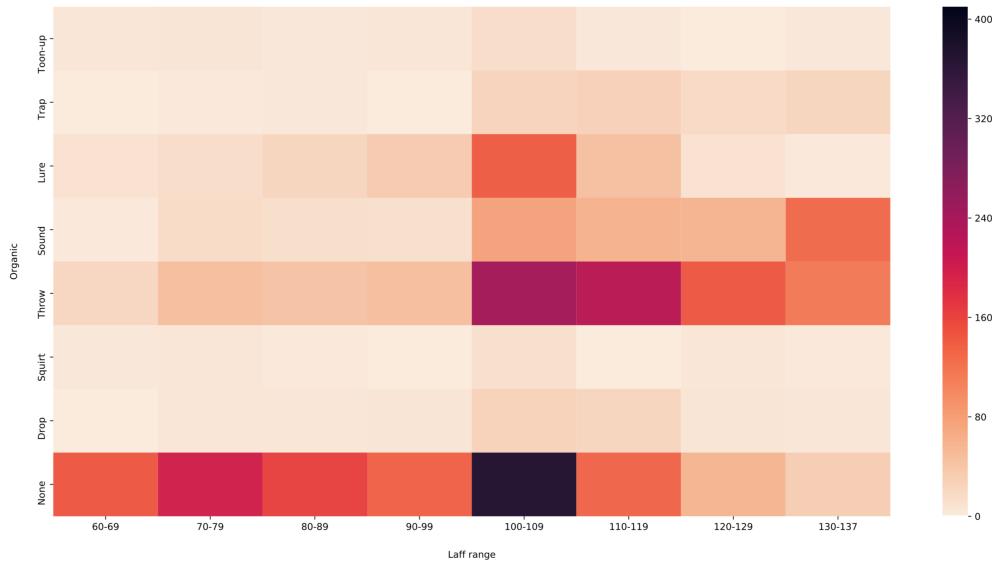


Figure C.5: Laff range and organic Gag track

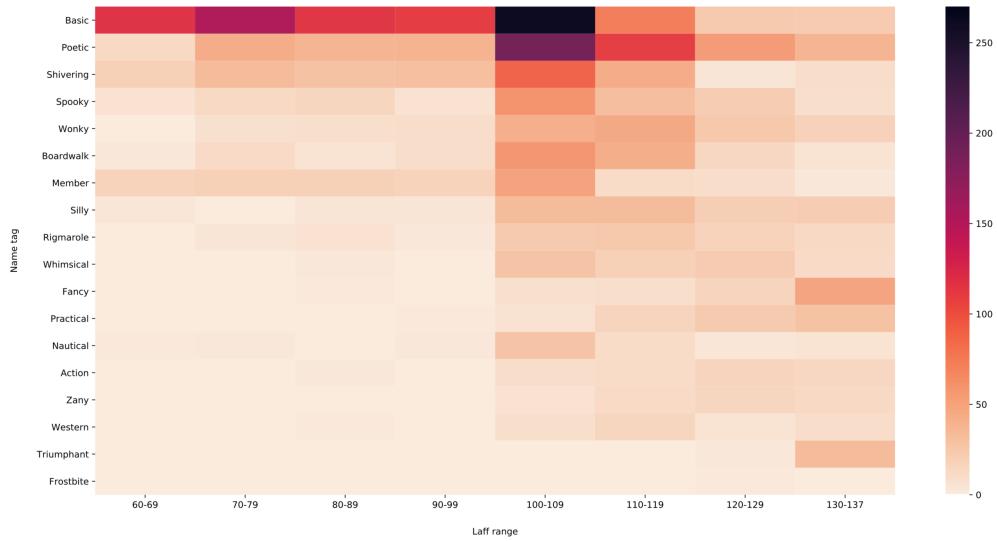


Figure C.6: Laff range and name tag

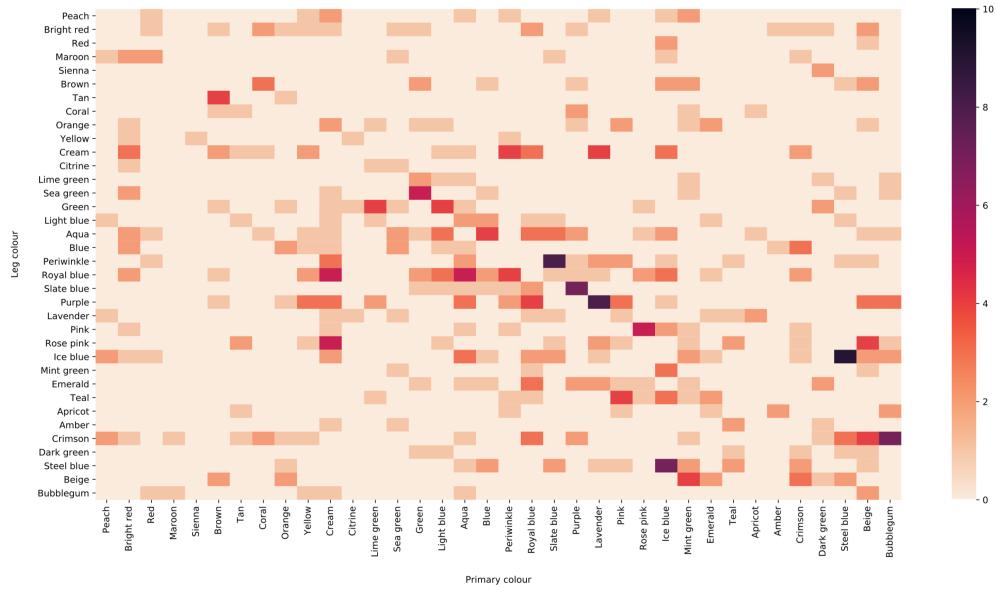


Figure C.7: Colour and leg colour

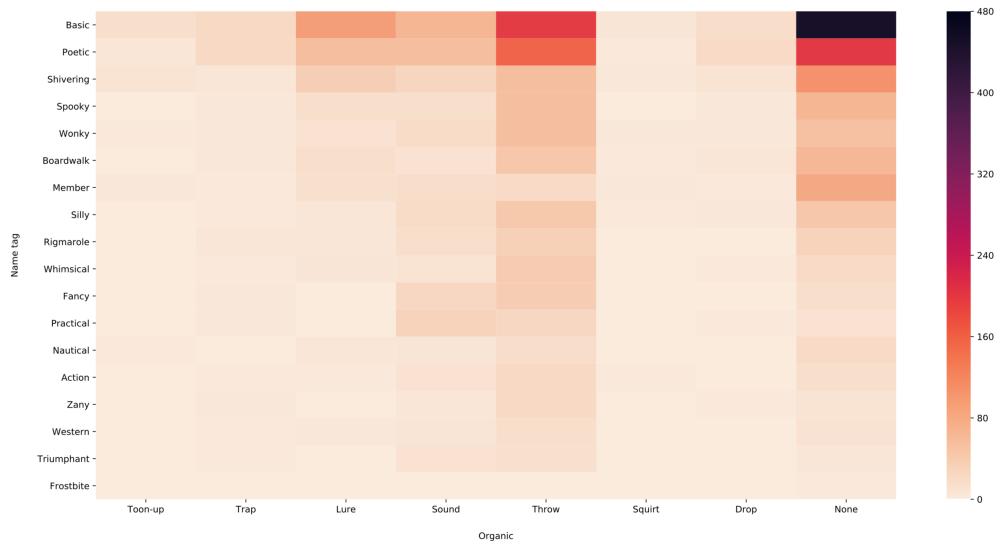


Figure C.8: Organic Gag track and name tag

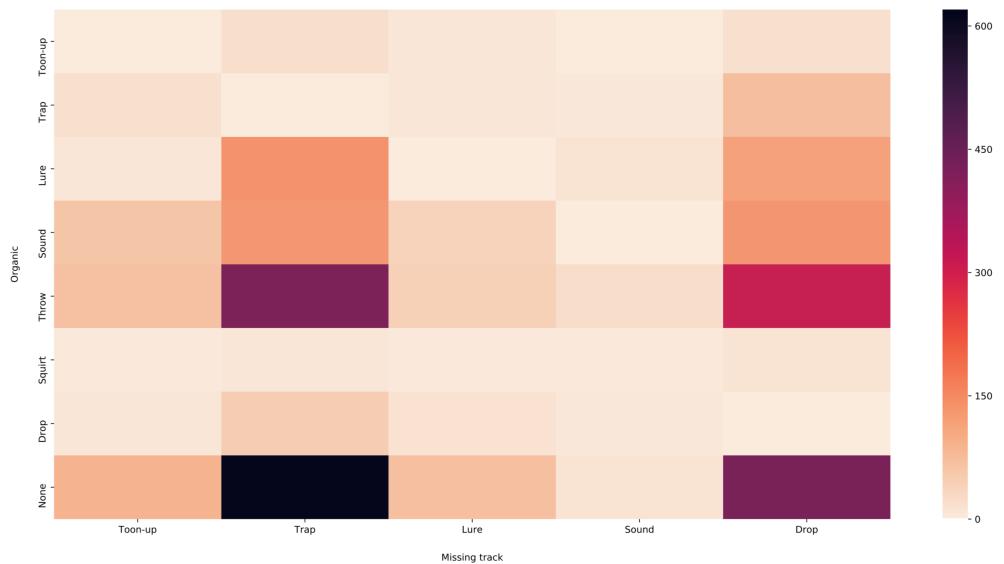


Figure C.9: Missing and organic Gag track

C.B Count plots

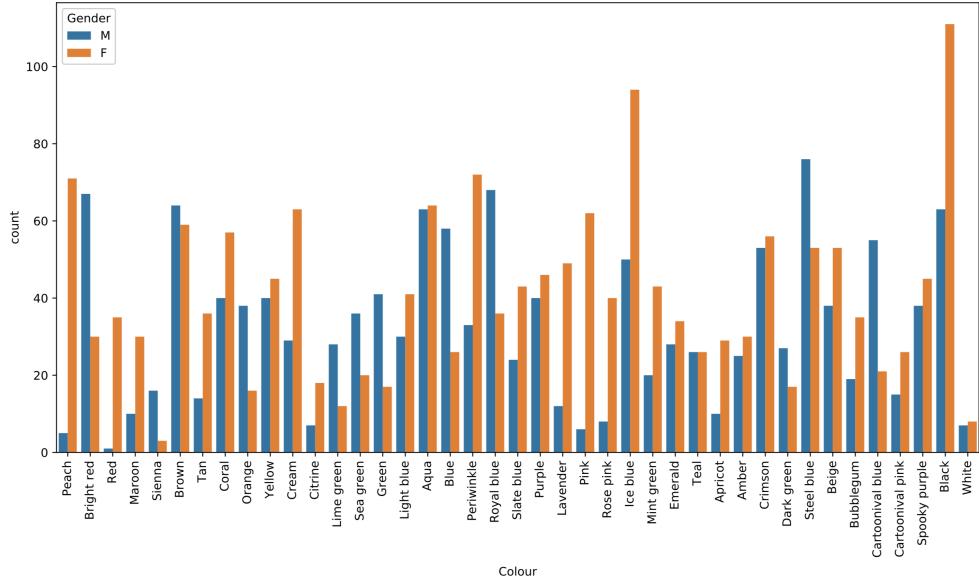


Figure C.10: Gender and colour

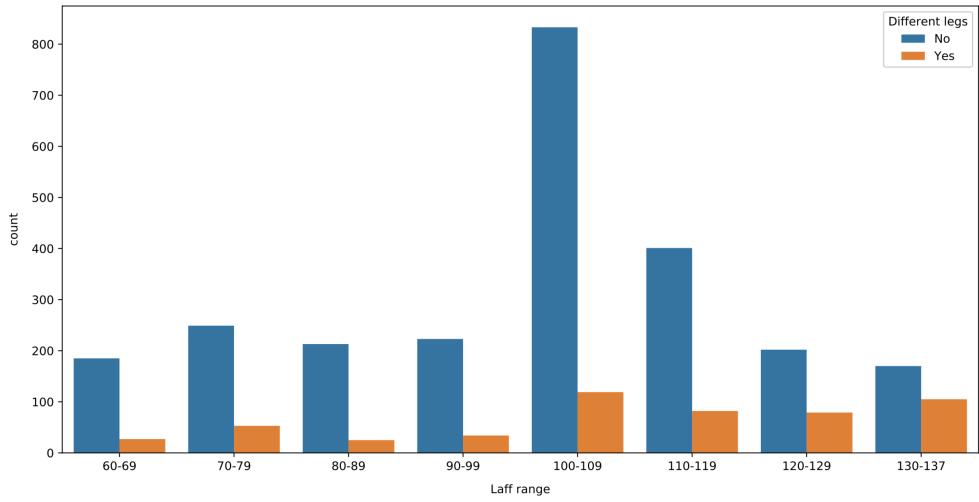


Figure C.11: Laff range and different legs

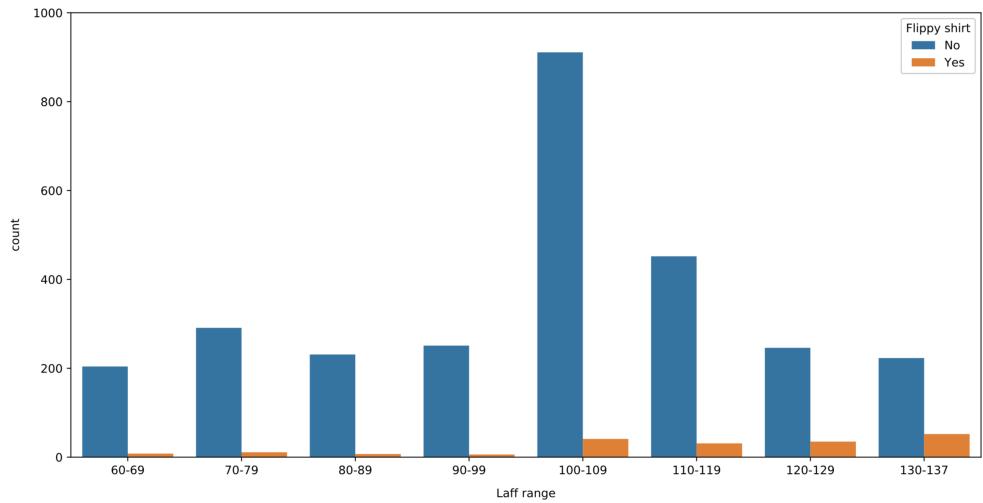


Figure C.12: Laff range and Flippy shirt

D Zipf analyses

In order to investigate observations regarding the distributions of frequencies across the species, Laff range, organic Gag track, and name tag variables, the rank and frequency were plotted on a log-log graph, which is the easiest way for a Zipf distribution to be visually observed (“Zipf’s law”, 2021).

Species and Laff range conform most closely to the law, while organic Gag track and name tag are more divergent.

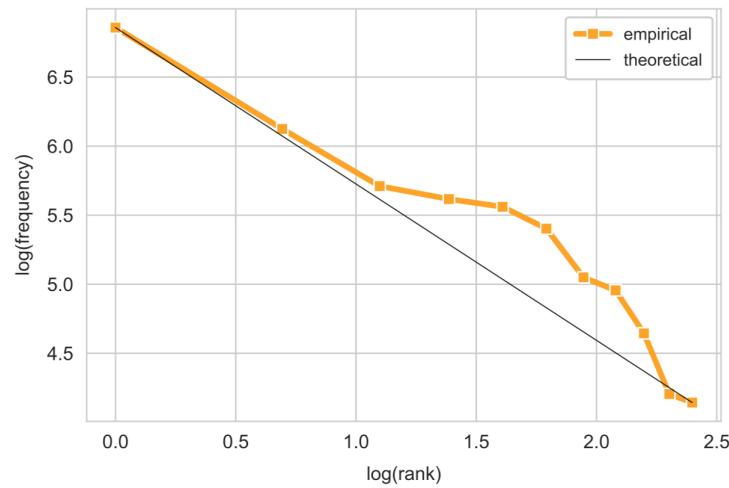


Figure D.1: Species

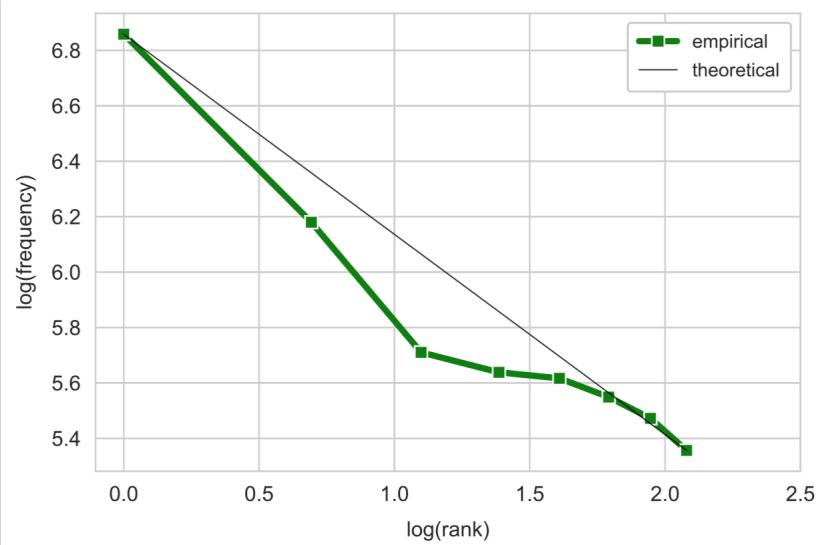


Figure D.2: Laff range

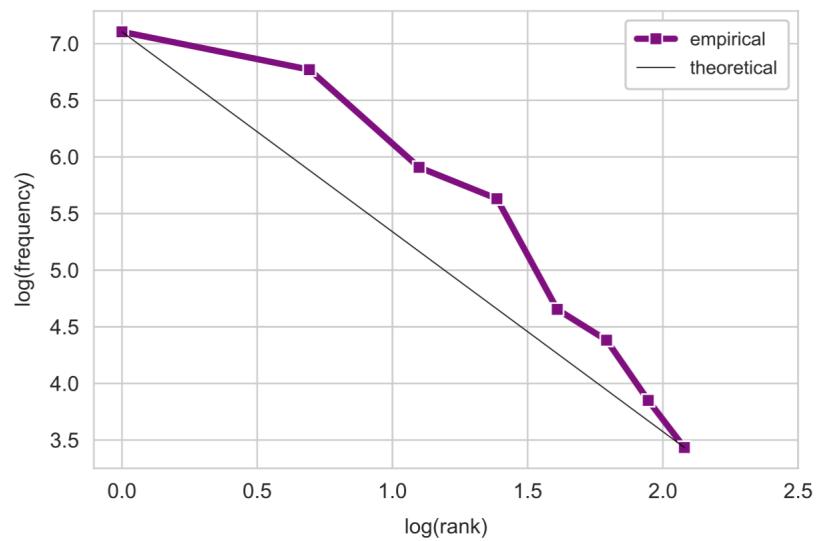


Figure D.3: Organic Gag track

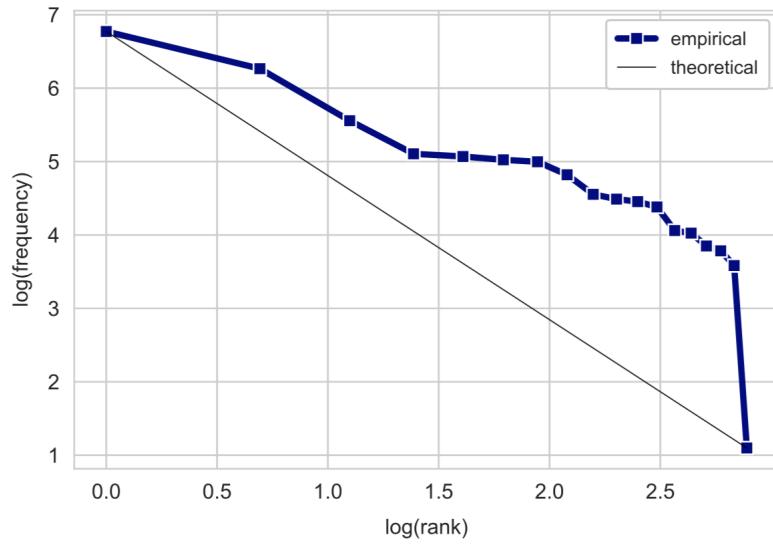


Figure D.4: Name tag

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