Let me Hop On That Beat: An Analysis of Hip Hop and Rap Features

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Introduction

Hip Hop and Rap culture and lyrics are amazing for Textual Analysis

- Many words, abstract concepts, events, proper nouns.

- Many rapper collaborate and feature together.

- Socially aware, often in reaction to socioeconomic issues.

- Immensely popular, diverse, evolving genre.

Similar to Academic Co-Authorship, Innovation, etc.

Can shed light on networks of artists, historical moments, innovation, etc.

Motivation

Selection of Data

I will focus on the nature of artists featuring on other's songs.
Some restrictions are necessary:

- Looking at manually selected Artists

- Looking only at published albums or mixtapes

- Only looking at songs with two or less features

- "Group" problem, individual artists from groups featuring

- Small errors from HTML scraping

Data Source: AZLyrics

- One major contribution is a tool to scrape, clean, and get features from AZLyrics.

- Only input is list of artists.

- Great speeds hindered by website restriction

- One day will be combined with listener-level and song-level data (from Spotify, Last.fm, Pandora?)

Example Data Table

X	artist	album	year	song_title	features	lyrics
11	chancetherapper	"10 Day" (2012)	2012	Fuck You Tahm Bout		10 Days?
12	chancetherapper	"10 Day" (2012)	2012	Long Time II	(feat. Nico Segal)	[Verse 1:
13	chancetherapper	"10 Day" (2012)	2012	Prom Night		[Verse 1:
14	chancetherapper	"10 Day" (2012)	2012	Hey Ma	(feat. Lili K & Peter CottonTale)	[Intro:] He
15	chancetherapper	"Acid Rap" (2013)	2013	Good Ass Intro	(feat. BJ The Chicago Kid, Lili K., Kiara Lanier, Peter Cotto...	[Hook: BJ
16	chancetherapper	"Acid Rap" (2013)	2013	Pusha Man Paranoia	(feat. Nate Fox & Lili K)	[Verse 1:
17	chancetherapper	"Acid Rap" (2013)	2013	Cocoa Butter Kisses	(feat. Vic Mensa & Twista)	[Chance
18	chancetherapper	"Acid Rap" (2013)	2013	Juice		[Intro/Bri
19	chancetherapper	"Acid Rap" (2013)	2013	Lost	(feat. Noname Gypsy)	[Hook: N
20	chancetherapper	"Acid Rap" (2013)	2013	Everybodys Something	(feat. Saba & BJ The Chicago Kid)	[Verse 1:
21	chancetherapper	"Acid Rap" (2013)	2013	Interlude Thats Love		Yeah yea
22	chancetherapper	"Acid Rap" (2013)	2013	Favorite Song	(feat. Childish Gambino)	[Verse 1 -
23	chancetherapper	"Acid Rap" (2013)	2013	NaNa	(feat. Action Bronson)	[Verse 1:
24	chancetherapper	"Acid Rap" (2013)	2013	Smoke Again	(feat. Ab-Soul)	[Intro: x2
25	chancetherapper	"Acid Rap" (2013)	2013	Acid Rain		[Verse 1:
26	chancetherapper	"Acid Rap" (2013)	2013	Chain Smoker		This is my
27	chancetherapper	"Acid Rap" (2013)	2013	Everythings Good Good Ass Outro		[Skit:][Ke
28	chancetherapper	"Coloring Book" (2016)	2016	All We Got	(feat. Chicago Childrens Choir & Kanye West)	[Intro - Ch
29	chancetherapper	"Coloring Book" (2016)	2016	No Problem	(feat. 2 Chainz & Lil Wayne)	[Ha Ha D

Example Webpage

Word Cloud

Chane the Rapper Word Cloud

Similarity Plot

Similarity Plot: Album Level

21 Savage

Noname

Feature Characteristics

- When artists decide to collaborate, what are their choice of words as decision makers?

- Look empirically for patterns of "this generation" of hip-hop artists.

- Typically, a featured verse is very stylized and unique to the featured artist.

- This ranges from strong artists with a unique sound to phoned in verses.

- So do they have a distinct, pinpointable vocabulary?

- Many interesting questions here, I focus on similarity measurements and prediction of feature behavior.

Ultralight Beam

[Chance The Rapper:]
When they come for you, I will shield your name
I will field their questions, I will feel your pain
No one can judge
They don't, they don't know
They don't know
Foot on the Devil's neck 'til it drifted Pangaea
I'm moving all my family from Chatham to Zambia
Treat the demons just like Pam
I mean I fuck with your friends, but damn, Gina
I been this way since Arthur was anteater
Now they wanna hit me with the woo wap the bam
Tryna snap photos of familia
My daughter look just like Sia, you can't see her
You can feel the lyrics, the spirit coming in braille
Tubman of the underground, come and follow the trail
I made Sunday Candy, I'm never going to hell
I met Kanye West, I'm never going to fail
He said let's do a good ass job with Chance three
I hear you gotta sell it to snatch the Grammy
Let's make it so free and the bars so hard
That there ain't one gosh darn part you can't tweet
This is my part, nobody else speak
This is my part, nobody else speak
This little light of mine
Glory be to God, yeah

Glory be to God, yeah
I'mma make sure that they go where they can't go
If they don't wanna ride I'mma still give them raincoats
Know what God said when he made the first rainbow
Just throw this at the end if I'm too late for the intro
Ugh, I'm just having fun with it
You know that a nigga was lost
I laugh in my head
Cause I bet that my ex looking back like a pillar of salt
Ugh, cause they'll flip the script on your ass like Wesley and Spike
You cannot mess with the light
Look at lil Chano from 79th

[Kanye West:]
We on an ultralight beam
We on an ultralight beam
This is a God dream
This is a God dream
This is everything
Everything

The Idea

- If we can create a notion of a prototypical "Chance the Rapper" verse from his non-featured songs (the "controlled" environment).

- We can compare that to his performance on a feature, which can be seen as "experimental environment"

- We can take it a step further and compare the original/featured artist as well, making a 4-way connection.

- So on and so forth...

Techniques for Analysis

- Traditional "Bag of Words" vector model. Aggregate occurrence of words over artists/albums/features.

- More technically, using Latent Semantic Analysis. Same intuition.

- Calculate "distance" from vectors at N-dim level.

- Multidimensional Scaling down to 2-D to plot, with notion of distance intact

- Using Quanteda, LSA, CMD, etc.

Example Results 1

"Favorite Song"
(feat. Childish Gambino)

[Verse 1 - Chance The Rapper:]
Chance, acid rapper, soccer, hacky sacker
Cocky khaki jacket jacker
Slap-happy faggot slapper
Iraqi rocket launcher
Shake that Laffy Taffy, jolly raunchy rapper
Bang, bang, bang - skeet, skeet, skeet
She do that thing for three retweets
The album feel like '92
Now take that ball 'fore he three-peat
Chance, ho, acid head, cruising on that LSD
Asked Joseph about my deal
He looked back said "hell yeah, let's eat!"

[Hook:]
This shit my favorite song, you just don't know the words
But I still fuck with you, you just ain't never heard
It go like: count that stack, pop that cap then down that Jack
All my niggas hit that zan, and all my ladies bounce that back
This my jam, this my jam, this my jam
I'm 'bout that jam, I'm 'bout that jam, I'm 'bout that jam, I'm 'bout that jam
This my jam, this my jam, this my jam, this my jam
I'm 'bout that jam, I'm 'bout that jam, I'm 'bout that jam, I'm bout that jam

[Verse 3 - Childish Gambino:]
Niggas please be focused - that 'Bino, you know this
He rep the home of Sosas, you know I'm from that Zone 6
You know I rep that Stone shit, you know your 'hood is so clit
As God as my witness, this Will Smith spit real shit
I'mma be that - CG busy gettin', where the weed at?
Bought your girl some new kneepads
You're fuckin' with the Fifi bag
My stars, egad, she said: "this my favorite song"
"Hold my purse" - now she on the floor, droppin' like it's hot
You blast this shit in Abercrombie when your work is finished
Your mom won't play it in the car cause it's got cursing in it
Your boy like: "I'm the one who showed you," he want his percentage
Cause you were like: "this ain't the nigga you said spittin', is it?"
Two-step - white dude's Harlem Shake
Why you laughing?
Cause you Harlem Shake
I was never fake, I was just too good to be true
That's acid rap, we killed the track
You had your chance, and 'Bino too

Example Results 1

chancetherapper_Favorite Song
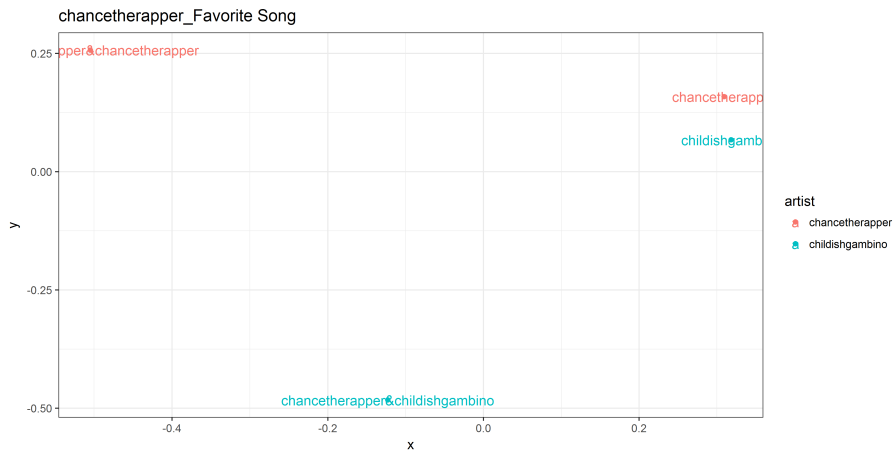
Example Results 2

[Verse 2 - Action Bronson:]
So many women wanna call me, baby
And you wonder why the fuck that I ain't call you lately
Some would say that I'm the symbol for sex and uh
Others would hate, but I don't give em no breath
Go on a date, I'm at the crib with the chef and uh, that's me
And you could order whatever
The specialty is white snake and underwear sauce
You could probably catch me somewhere where the sun is next
And I understand that's only cause I'm popular
I'm getting topped off in the front row of the opera
As Bocelli sings the celly rings
I gotta go you'll never know how good it feels to lay in bed with king
I'm not exactly flawless, but I'm gorgeous just like a horse is
I know the thought of me succeeding makes a lot of people nauseous
Still I'm on the back of the boat taking pictures with the swordfish

[Hook - Action Bronson:]
Why you always all on my back?
Why you gotta do me like that?
Why you gotta act like a bitch when I'm with you?
Baby girl I'm blue

[Verse 3 - Chance The Rapper:]
I hope you get a paper cut on your tongue
From a razor in a paper cup
I hope every soda you drink already shaken up
I hope your dreams dry like raisins in the baking sun
I hope your titties all saggy in your early 20's
I hope there's always snow in your driveway
I hope you never get off Fridays

Example Results 2

actionbronson_Baby Blue
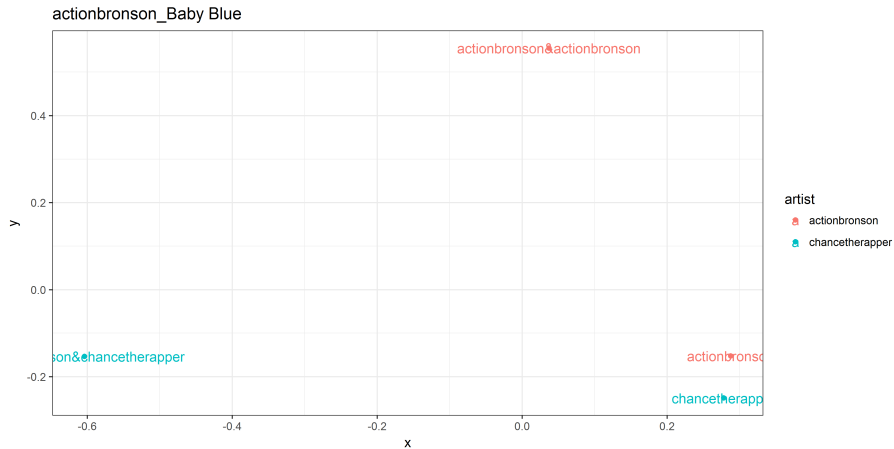
Example Results 3

"Goosebumps"
(feat. Kendrick Lamar)

[Travis Scott:]
Yeah
7:30 in the night
Ooooh ooh

I get those goosebumps every time, yeah, you come around, yeah
You ease my mind, you make everything feel fine
Worry about those comments
I'm way too numb, yeah, it's way too dumb, yeah
I get those goosebumps every time, I need the Heimlich
Throw that to the side, yeah
I get those goosebumps every time, yeah, when you're not around
When you throw that to the side, yeah
I get those goosebumps every time, yeah

7-1-3 to the 2-8-1, yeah I'm riding
Why they on me? Why they on me? I'm flyin'
Sippin' lowkey I'm sipping lowkey in Onyx
Rider, rider when I'm pullin' up right beside ya
Popstar, lil' Mariah
When I text a cute game, wildness
Throw a stack on the Bible
Never Snapchat or took molly
She fall through plenty, her and all her ginnies
Yeah, we at the top floor, right there off Doheny
Oh no, I can't fuck with y'all
Yea, when I'm with my squad I cannot do no wrong
Yeah, saucing in the city, don't get misinformed, yea
They gon' pull up on you (brr, brr, brr)
Yeah, we gon' do some things, some things you can't relate
Yeah, cause we from a place, a place you cannot stay
Oh, you can't go, oh, I don't know
Oh, back the fuck up off me (brr, brr, brr)

[Kendrick Lamar:]
I want to press my like, yeah, I wanna press my
I want a green light, I wanna be like
I wanna press my line, yeah
I want to take that ride, yeah
I'm gonna press my line
I wanna green light, I wanna be like, I wanna press my
Mama, dear, spare your feelings
I'm reliving moments, peeling more residual
building, burn the building, take your bitch, rebuild the building just to fuck some more
an) justify my love for you and touch the sky for God to stop, debating war
Put the pussy on a pedestal
Put the pussy on a high horse
That pussy to die for
That pussy to die for
Peter, piper, picked a pepper
So I could pick your brain and put your heart together
We depart the shady parts and party hard, the diamonds yours
The coupe forever
My best shots might shoot forever like (brr)

[Travis Scott:]
I get those goosebumps every time, yeah, you come around, yeah
You ease my mind, you make everything feel fine
Worry about those comments
I'm way too numb, yeah, it's way too dumb, yeah
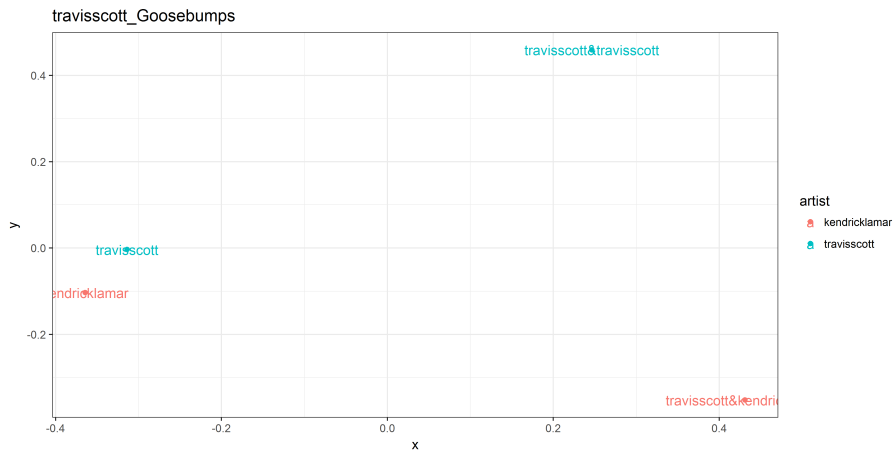I get those goosebumps every time, I need the Heimlich
Throw that to the side, yeah
I get those goosebumps every time, yeah, when you're not around
When you throw that to the side, yeah
I get those goosebumps every time

Example Results 3

Example Results 4

"Mixtape"
(feat. Lil Yachty & Young Thug)

[Intro - Young Thug and Lil Yachty:]
Chance the motherfuckin' rapper
With a capitalized, uh, times, like the times
Lil Boat
Chance
Lil Boat

[Hook - Chance the Rapper and Young Thug:]
Am I the only nigga still care about mixtapes
Am I the only nigga still care about mixtapes
I'm the only nigga still care about mixtapes
Bad little bitch, wanna know how lips taste
I swear I'm the only nigga still care about mixtapes
Bad little bitch, wanna know how the lips taste

[Verse 1 - Chance the Rapper:]
All I can hear is the third, ayy
All I can hear is the third, ayy
We don't know none of your words, ayy
We don't know none of your words, ayy
I love my women real tall, ayy
Type that can really play ball, ayy
You buy my hat at the park, ayy
Think I might really play ball, ayy
I got a link in my bio my bitch do the salsa like pico de gallo
They gotta ask if they may, Cinco de Mayo
How can they call themselves bosses
When they got so many bosses
You gotta see what your boss say
I get it straight out the faucet
I ain't felt like this since the third drought, third carter drop
Told my momma third grade I'd be in the third Barbershop
And you know momma got real worried when she heard college drop
But now I call the shots

[Hook - Chance the Rapper and Young Thug:]
I'm the only nigga still care about mixtapes
Bad little bitch wanna know how lips taste
I swear I'm the only nigga still cares about mixtapes
Bad little bitch wanna know how lips taste

[Verse 2 - Young Thug:]
Bad little mama, she gettin' it Obama
She sting like a bumble bee, hot as the sauna
She shine like a Rolex, got that from her momma
Can't see me, can't be me, I'm ridin' like a panda
That booty gon' roll and it's outta control
And these bitches gon' fuck off respect and that loyalty
All my bitches lovin' me and they spoil me
Rub me down with that lotion, baby oil me
Drinking Actavis, baby I'm showin' me
In that choppa I see your perimeter
Change the culture, cause my niggas is silent
Wait a minute I told you
Yeah, I would like to know you
Yeah, you lucky like clovers
Yeah, the clothes no good
Mama I do it, your ass I pursue it
Just look at me baby
I came from the sewers
They love all the slime ball
Like they fuck all these cats on your slime dog
I got me some *[?]* like I'm *[?]*
And I'm ballin' on you like I'm Chris Paul

[Verse 3 - Lil Yachty:]
Am I the only one who really care about cover art
ain't have my brother cause he said the streets gave him a fresh start
I ain't know what that mean
I bumped heads with my dean
Dropped out and hit the scene
Now I'm stunting like bling
Time and time again they told me no
They told me I wouldn't go
Cause in high school all I cared about was hoes
Well, maybe that shit was my interest
Now I spend more than they make at my dentist
After one night the folks thought I was finished
I pin my name to the game like a seamstress
Oh, bitch I bite like a gator
Fuck them reviews that they put in the paper
Did what I wanted, didn't care about a hater
Delivered my tape to the world as it cater
Oh, they fuck with me cause I'm different
New sound, new appearance
Bitches both from the 6
Give a fuck about a bitch
Walk out, my hand on my dick, I'm the shit

Example Results 4.5


chancetherapper_Mixtape
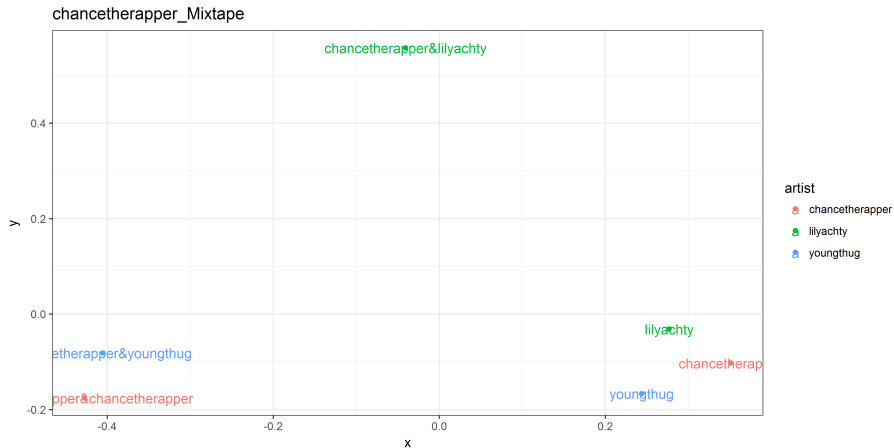
Remarks

- Difficult to quantify with a solid metric (future work), but clear patterns

- Individual songs are far from the prototypical.

- Individual verses far from each other.

- But they are typically closer to own artist than other artist

- People do have a certain type of 'style'

- Further investigation of what determines strength of style in different artists and contexts, sentiment, topic model similarity, etc.

Feature Decisions

- We've looked at the nature of vocabulary choices, but what drives people to decide to feature together?

- More 'economics' and decision making, very possible to model.

- Idea is that similar vocabulary artists would end up featuring together.

- Endogenous institutional design may confound, but we can at least find a correlation.

Network of Features
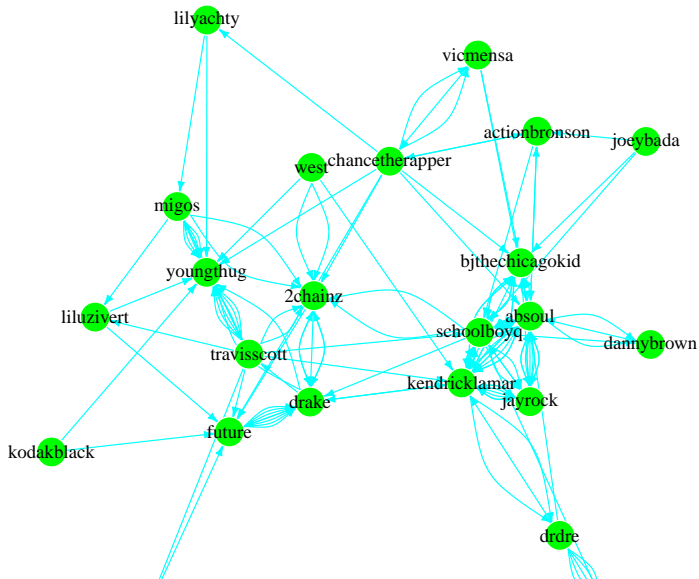
The Second Idea

- Probit model regression on feature outcomes

$$\Pr(Y_{a,b} = 1) = dist_{a,b} + \epsilon_a$$

- More 'economics' and decision making, very possible to model if there were more

- Idea is that similar vocabulary artists would end up featuring together.

- Endogenous institutional design may confound, but we can at least find a correlation.

Table: Results

	Dependent variable:
	feat
dist	-2.561^{***}
	(0.828)
Constant	-1.820^{***}
	(0.257)
Observations	433
Log Likelihood	-171.040
Akaike Inf. Crit.	346.080

Note: *p<0.1; **p<0.05; ***p<0.01

Discussion of Results

- Though the measure was significant, the term is the opposite sign of what is desired.

- Implies that MORE distanced artists tend to collaborate together.

- Possible to look at post collaborate/the collaborated album characteristics to understand artistic shifts in direction.

- More controls (artist/song/institution level) would be helpful, this is preliminary at best.

- It was disgusting to code.

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Reflection

- Created an easily updated data set of Hip Hop lyrics and features.

- Created networks, distance graphs, regressions.

- Very fun and interesting exercise, a quick quantitative look into Hip-Hop.

- A lot of intuition was supported, some not.

- Interesting set of Textual Analysis tools to analyze and quantify cultural/artistic/political notions conveyed through text.

- Thanks to Professor Fetzer for his help!

Further Work

- So many further ideas and projects...

- Music Industry de-aggregated or geo-spatially located data would be beautiful.

- POS and political word taggers, references within songs, structure of rhyming, changing complexity of lyrics, network formation of artists, tracing origins of bi-gram phrases, etc. etc. etc.