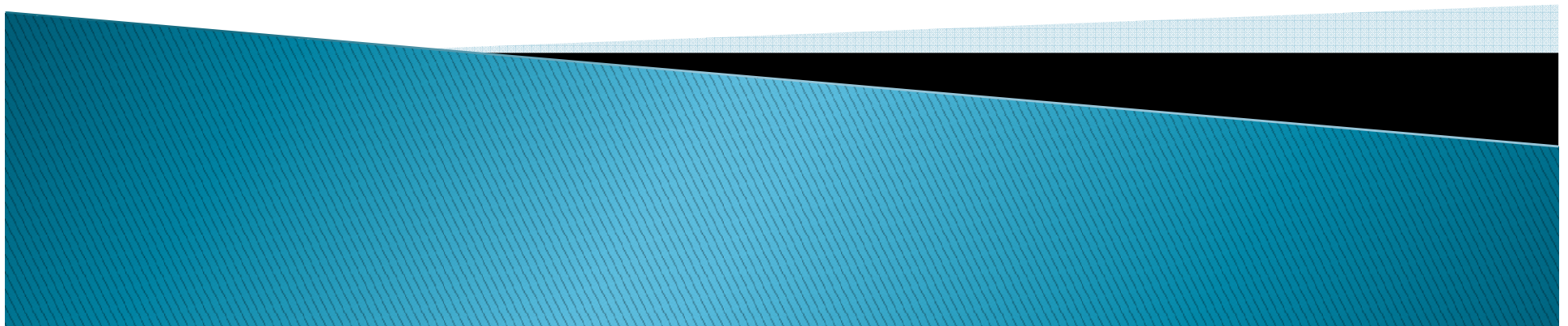


Open Problems in Pop Music

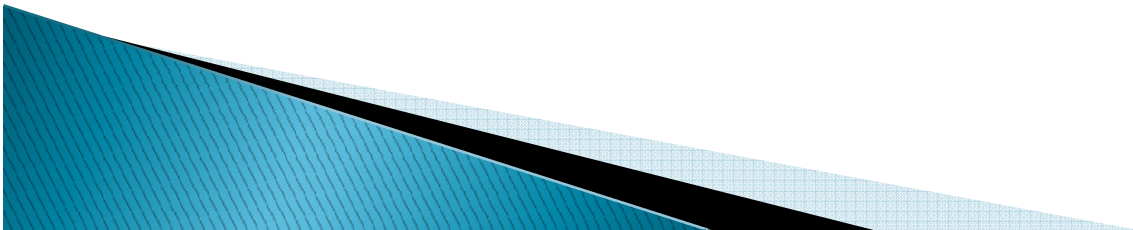
Will Ma

Jane Street 5-min Presentation



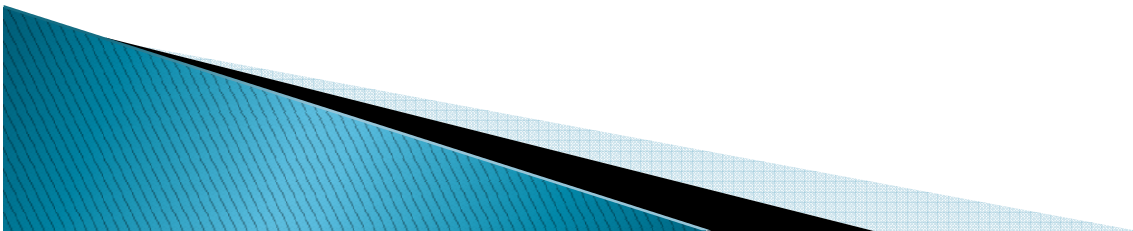
The Jist...

- ▶ Chords in pop music fall under roughly four categories, and most songs use four chord phrases
- ▶ Pop songs often choose a fixed permutation of these four chord categories for the whole song (we will ignore songs that repeat categories)
- ▶ I've followed the chord progressions in pop hits since the 90's



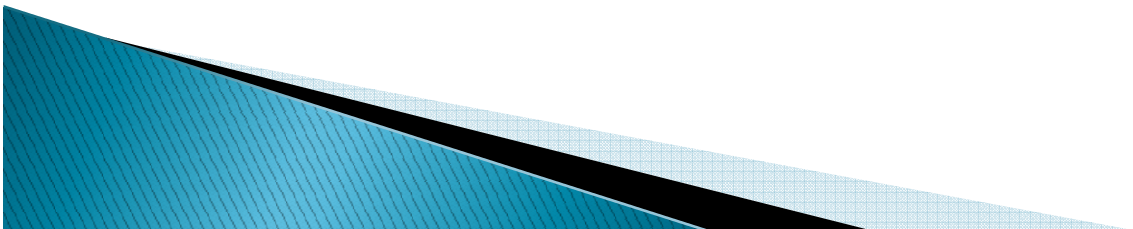
Tonic Chord, I

- ▶ Some Alternatives: I^6 , I^9 , I^9_6
- ▶ In C major, this refers to the C major triad
- ▶ Alternative Notations: C/E , C^9_6 , C^{MAJ7}



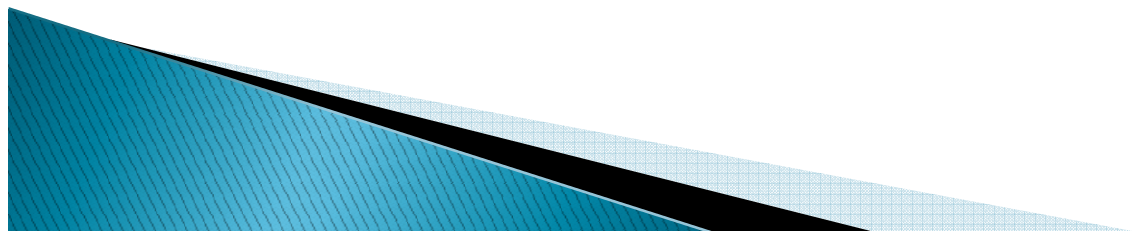
Dominant Chord, V

- ▶ Some Alternatives: V^6 , V^7 , V^9 , I^6_4 , V^{13}_7
- ▶ In C major, this refers to the G major triad
- ▶ Alternative Notations: G, G/B, G^7



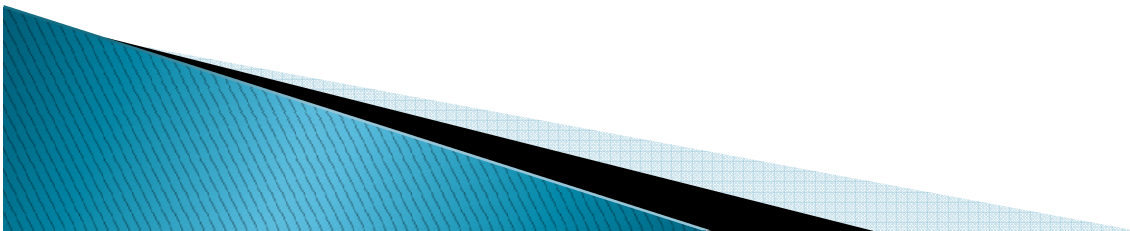
Pre-Dominant Chord, IV

- ▶ Some Alternatives: ii, ii⁶, IV⁷, ii⁷, II⁷, ii⁹
- ▶ In C major, this refers to the F major triad (or d minor/D major triad)
- ▶ Alternative Notations: F, d, D⁷/F#



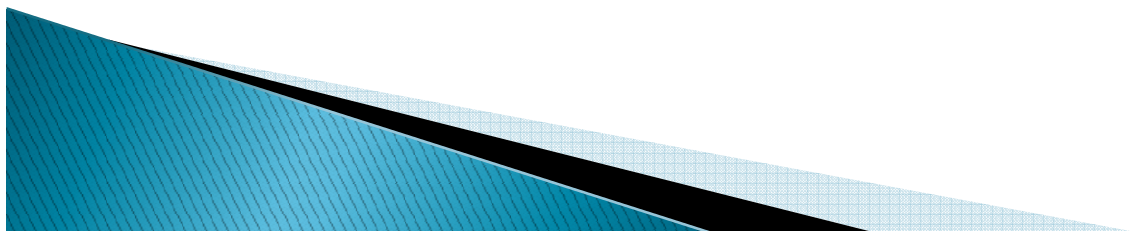
Relative Minor Chord, vi

- ▶ Some Alternatives: vi^7
- ▶ In C major, this refers to the a minor triad
- ▶ Alternative Notations: a



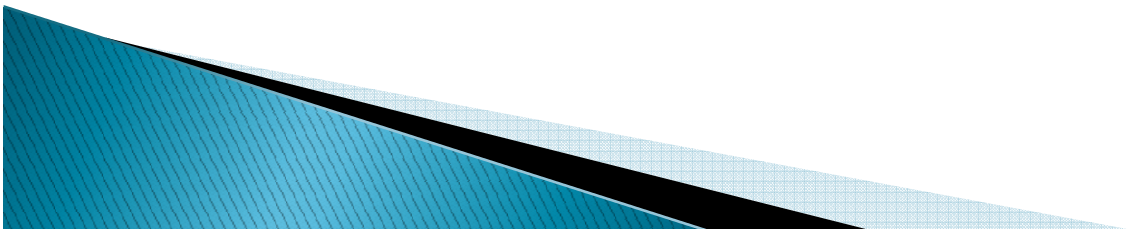
I – vi – IV – V

- ▶ Most theoretically sound by Classical music principles (I to start, pre-dominant before dominant, V is penultimate chord)
- ▶ Every OTHER chord of Pachelbel's canon
- ▶ We Are Young (Fun.)
- ▶ Baby (Justin Bieber)
- ▶ Blank Space (Taylor Swift)
- ▶ Walking in Memphis



Cycles of I – vi – IV – V

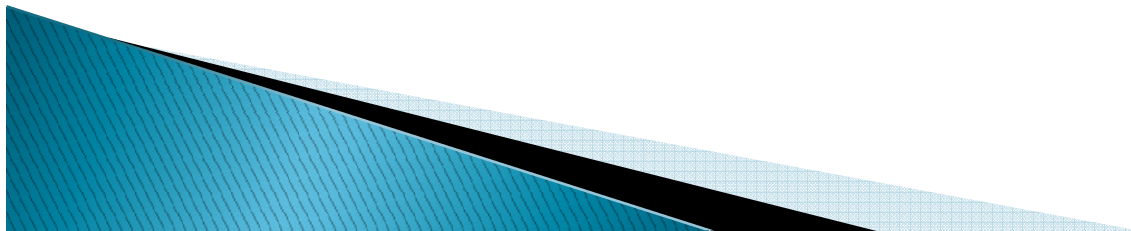
- ▶ vi–IV–V–I:
 - Barbie Girl (Aqua)
- ▶ IV–V–I–vi:
 - Viva la Vida (Coldplay)
- ▶ V–I–vi–IV:
 - OPEN!



I – V – vi – IV

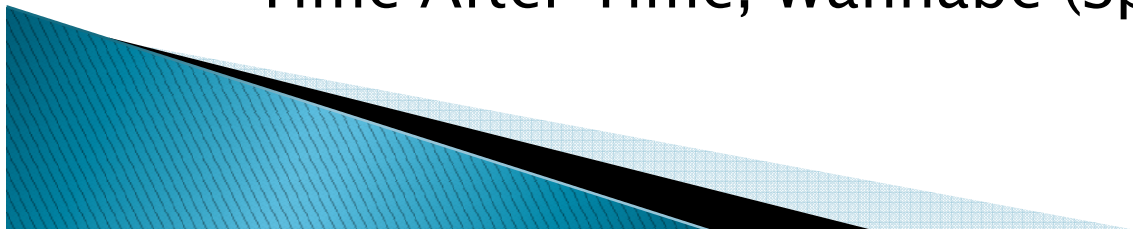
- ▶ Also very Classically sound
- ▶ Resembles the first half of Pachelbel's canon
- ▶ Probably the most popular cycle

- ▶ I'm Yours (Jason Mraz)
- ▶ Irreplaceable (Beyonce)
- ▶ Don't Stop Believing (Glee/Journey)
- ▶ Take a Bow (Rihanna)



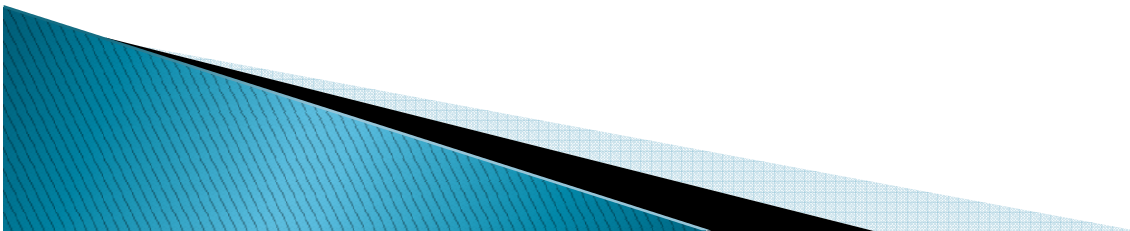
Cycles of I – V – vi – IV

- ▶ vi–IV–I–V:
 - Apologize (Timbaland), Love the Way you Lie (Rihanna), Just a Dream (Nelly), Grenade (Bruno Mars), So Sick (Ne-Yo), Stereo Hearts (Adam Levine)
 - Caught ABSOLUTE FIRE in ~2010
- ▶ IV–I–V–vi:
 - Big Girls Don't Cry (Fergie) chorus
- ▶ V–vi–IV–I:
 - Time After Time, Wannabe (Spice Girls)



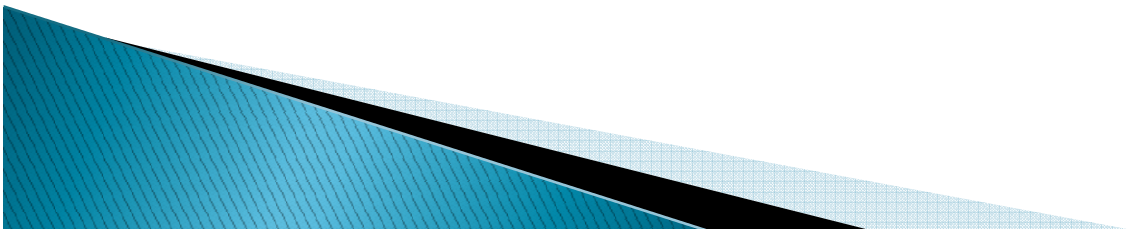
I – IV – vi – V

- ▶ Somewhat Classically sound
- ▶ What Makes You Beautiful (One Direction)
- ▶ Waving Flag (song for Haiti)
- ▶ Without You (Usher)
- ▶ For the First Time in Forever (Frozen) verse



Cycles of I – IV – vi – V

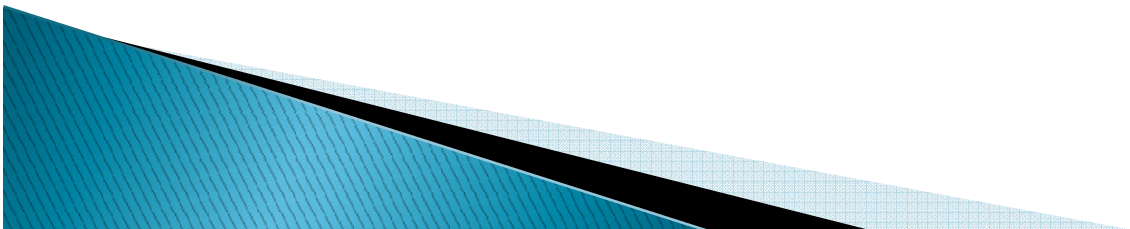
- ▶ **vi–V–I–IV:**
 - Breakeven (The Script) verse
- ▶ **IV–vi–V–I:**
 - She Likes Me For Me (Blessed Union of Souls)
- ▶ **V–I–IV–vi:**
 - OPEN!



I – vi – V – IV

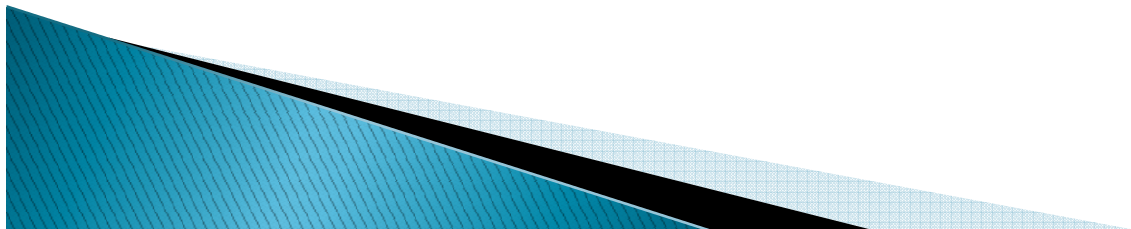
- ▶ Descending bass line
- ▶ Surprisingly unpopular given how natural it is

- ▶ Cast Away (Green Day)
- ▶ Two Princes (Spin City)



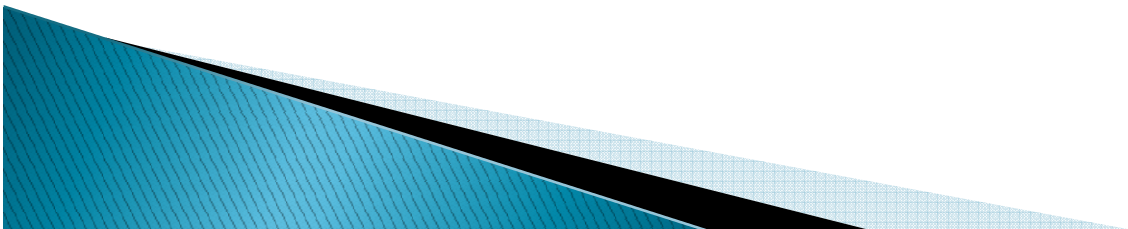
Cycles of I – vi – V – IV

- ▶ vi–V–IV–I:
 - Pray (Justin Bieber)
- ▶ IV–I–vi–V:
 - Call Me Maybe (Carly Rae Jepsen) chorus, What'cha Say (Jason Derulo), I'm Coming Home (Skylar Grey), As Long As You Love Me (Backstreet Boys)
- ▶ V–IV–I–vi:
 - OPEN!



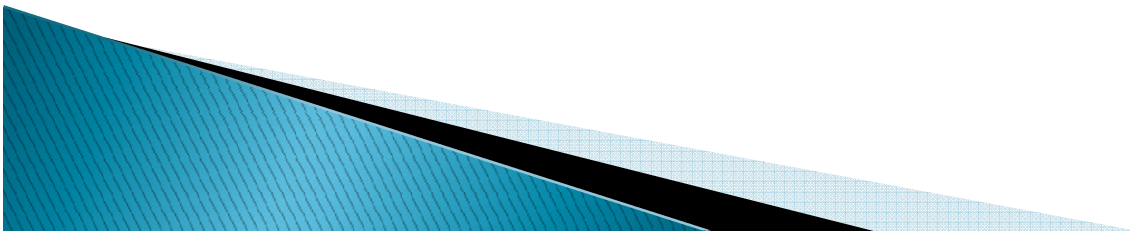
I – V – IV – vi and Cycles

- ▶ OPEN!
- ▶ vi–I–V–IV:
 - Disturbia (Rihanna), Rehab (Rihanna), Impossible (Shontelle)
- ▶ IV–vi–I–V:
 - Incomplete (Backstreet Boys)
- ▶ V–IV–vi–I:
 - A Year Without Rain (Selena Gomez)



I – IV – V– vi and Cycles

- ▶ OPEN! (Why does it sound so weird?)
- ▶ Ascending bass line
- ▶ vi–I–IV–V: OPEN!
- ▶ IV–V–vi–I:
 - Bad Romance (Lady Gaga) first half of chorus..
- ▶ V–vi–I–IV: OPEN!



Conclusion

- ▶ 7 of the 24 permutations open (to my knowledge)
- ▶ More than half of them have V to start the phrase
- ▶ Maybe you can be the next trendsetter in pop music!

