

RANDOM WALK, MARKOV, AND RHYTHMIC PATTERNS

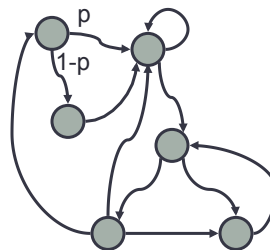
Melody Using Random Walk

- What kinds of pitches create interesting melody?
- Uniform random pitch has too many large intervals. 🎧
- Lots of small intervals is more typical. 🎧
- Melodies are said to have fractal properties.

```
begin
  with small-pat = make-random(
    {0 0 -1 -1 -1 -1 -2 -2 -2 -2 -3 -3 -3 -4 -4
     -5 -5 -6 1 1 1 1 2 2 2 2 3 3 3 4 4 5 5 6}),
    pitch-pat = make-accumulate(
      make-line(list(57, small-pat)))
end
```

Markov Algorithm

- Generate sequence of “states”
- Probability of being in a state depends only upon probability of being in previous state (First Order)
- Or previous 2 states (Second Order)
- Etc.
- See example code



Rhythmic Pattern Generation

- Of course there are many techniques; here's one:
 - Generate a sequence length from some probability distribution or just by your choice
 - Generate a random number with that number of bits, e.g. length $N \rightarrow (\text{random } 2^N)$
 - Translate 0 to rest, 1 to event

Rhythmic Pattern Example

```
function rhythm-pattern-demo(n, freq)
begin
  with pat = make-cycle(list(random(2), random(2),
                             random(2), random(2), random(2),
                             random(2), random(2), random(2)))
  return score-gen(score-len: n,
                  ioi: 0.15,
                  name: quote(s-pop-kwp),
                  hi: freq, lo: freq,
                  pitch: #?(next(pat) = 1, c4, nil))
end
```



Three instances of this function, each with different resonance frequency:

