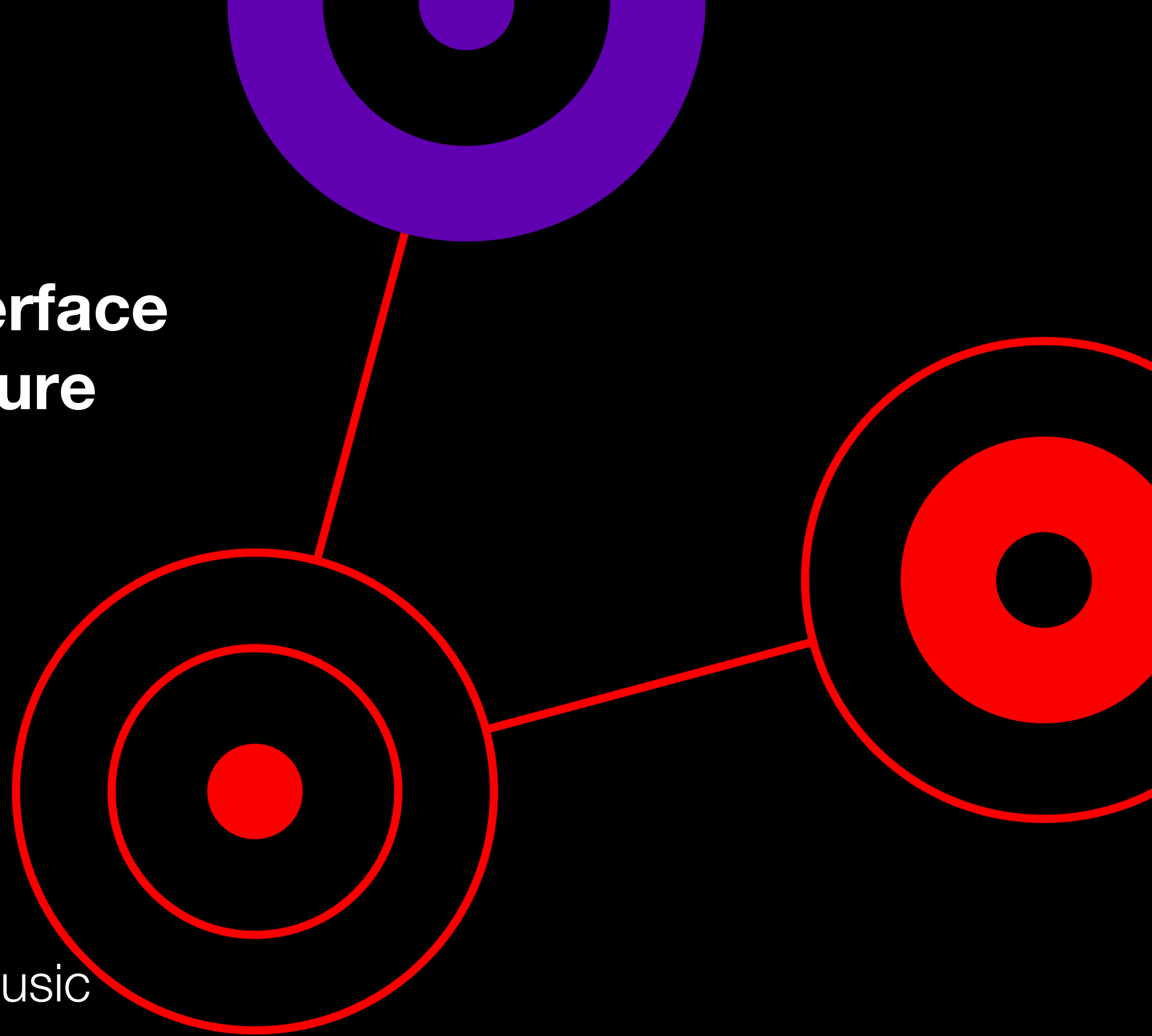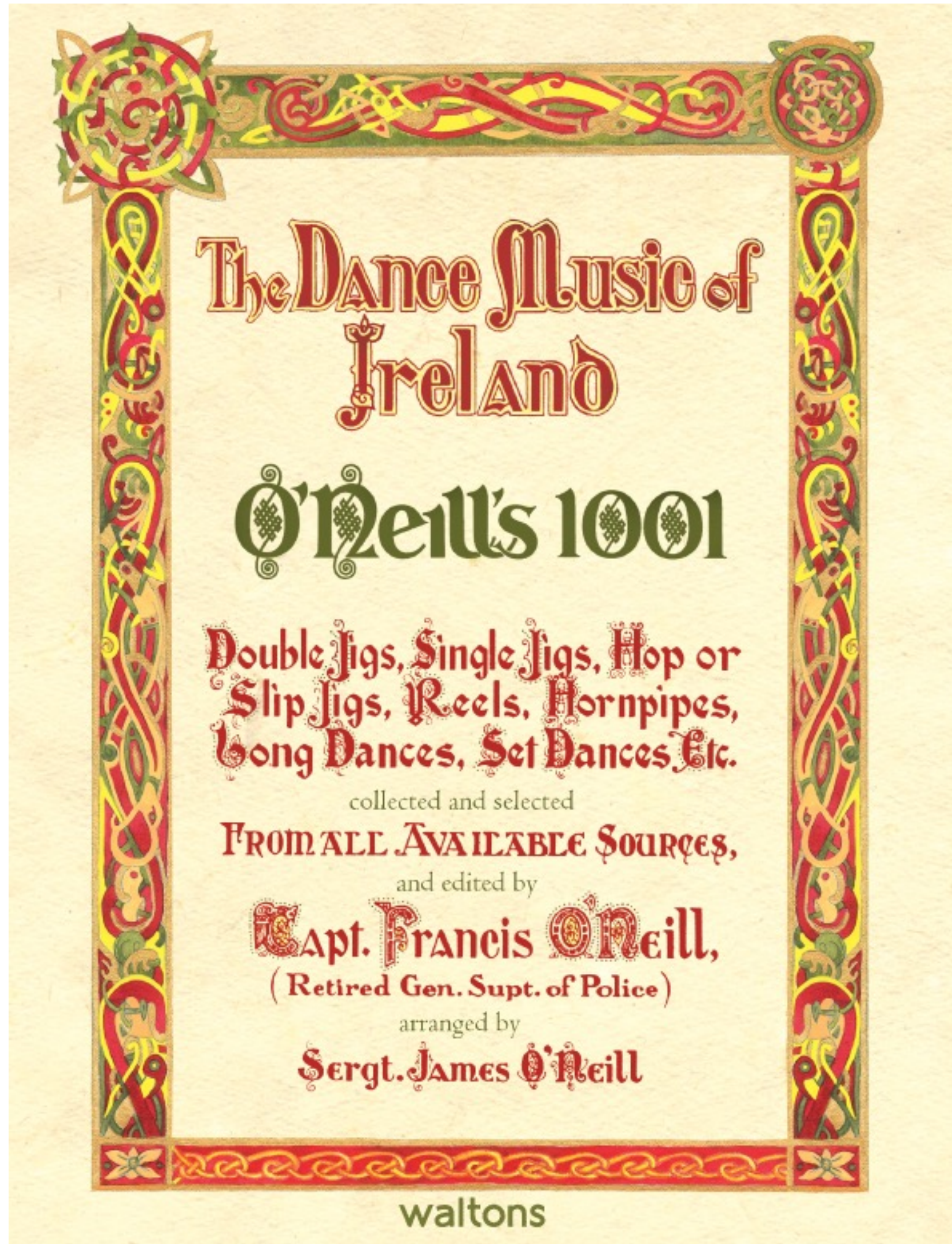**Polifonia**

# A prefix tree-based user interface for exploring abstract structure in Irish folk tunes

Kieran Jayes & James McDermott
School of Computer Science
University of Galway, Ireland

Seán Doherty
School of Theology, Philosophy, and Music
Dublin City University, Ireland

**"The book", "the bible": O'Neill's *1001 Gems***

Melodic Structures in the Double Jigs of O'Neill's *The Dance Music of Ireland: 1001 Gems* (1907)

SEÁN DOHERTY

- **Proposed an annotation scheme**
- **Applied that scheme to 365 double jigs (later expanded to all 1001)**
- **Analysed types of structure ("period", "sentence", "hybrid", "allied", "non-standard")**

There are usually 2 or 3 main parts, of 8 bars each, possibly repeated, possibly with alternate endings.

The first bar is labelled a. For each subsequent bar:

- If it's the same or almost the same as a previous bar, it gets the same label.

- If it's similar to a previous bar (50% or more, or a transposition), it's labelled as a variation, eg $a^1$.

- Otherwise, it gets the next sequential letter.

- If a bar is similar to a bar in a previous part, the label is prefixed with the part name, eg Ad.

Showing A parts only

Shandon Bells: $\quad$ a b $\quad$ a$^1$c $\quad$ a b $\quad$ d e

The Pipers' Picnic: $\quad$ a b $\quad$ a c $\quad$ a b $\quad$ a$^1$d

The Yellow Flail: $\quad$ a b $\quad$ c d $\quad$ e c$^1$ $\quad$ f g

Johnny's Wedding: $\quad$ a a$^1$ $\quad$ a b $\quad$ a a$^1$ $\quad$ c d

Lough Allen: $\quad$ a a$^1$ $\quad$ a b $\quad$ a a$^1$ $\quad$ c d

**Observations:**
- **Focus on A part for now**
- **Distinct tunes may have same structure**
- **Always begins with 'a'**
- <u>**Prefix**</u> **structure**

# Prefix tree

Also known as "trie". A tree structure where every node's label is the prefix of the label of each of its children.
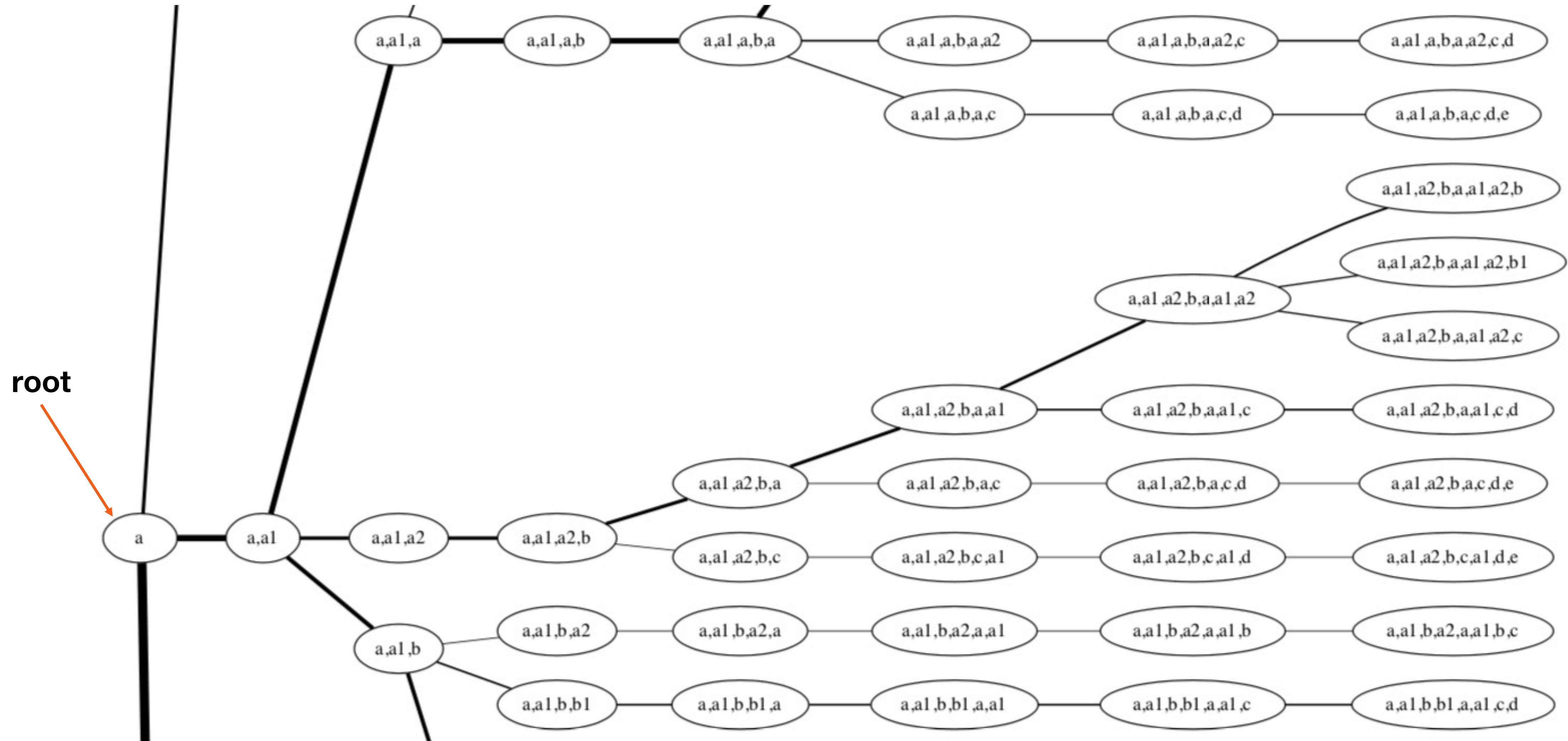
**The full prefix tree (1001 tunes)**

Now rotated, ie root at the top

root

**Problems:**
- **Unwieldy**
- **Text too small**
- **Tune titles not shown**
- **No search / filter**

**Idea: a user interface for exploring the prefix tree data structure**

Kieran Jayes (final-year computer science student, University of Galway) co-designed and implemented
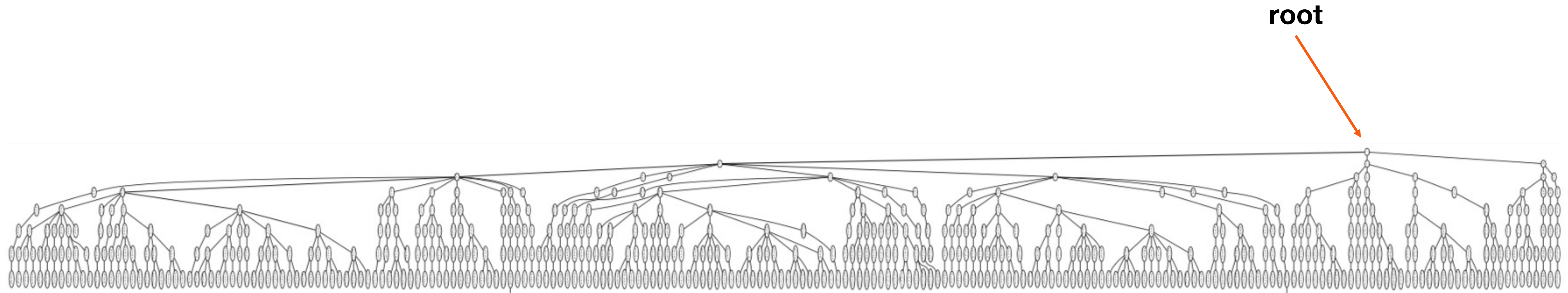
## Requirements:

- **Display the prefix tree structure**
- **Nodes labelled with structure or structure prefix**
- **Final nodes labelled with tune title**
- **Zoom / collapse / expand levels of the tree**
- **Search / filter**
- **Can work on new corpora**
- **Show and play score for each tune**

**The application was implemented and hosted using Firebase, Node, Typescript, React, and D3.**

**User interface: https://fyproject-98a82.firebaseapp.com/**
**Data files: https://gist.github.com/jmmcd/7fefb0fea2a4d00d74f6a3a8eaab81cf**

## User interface: preparing the graph

We can choose just A parts or all parts; and choose tune type, eg Double Jig. Search by title also available.

| Expand Level | Collapse Level | Galway | | Prepare Graph.. | Part: A | Classifications: Double Jig | Tune Count: 365 |

Doherty (2002) went on to analyse main structure types (left). The prefix tree enables a different view (collapsed view, right).
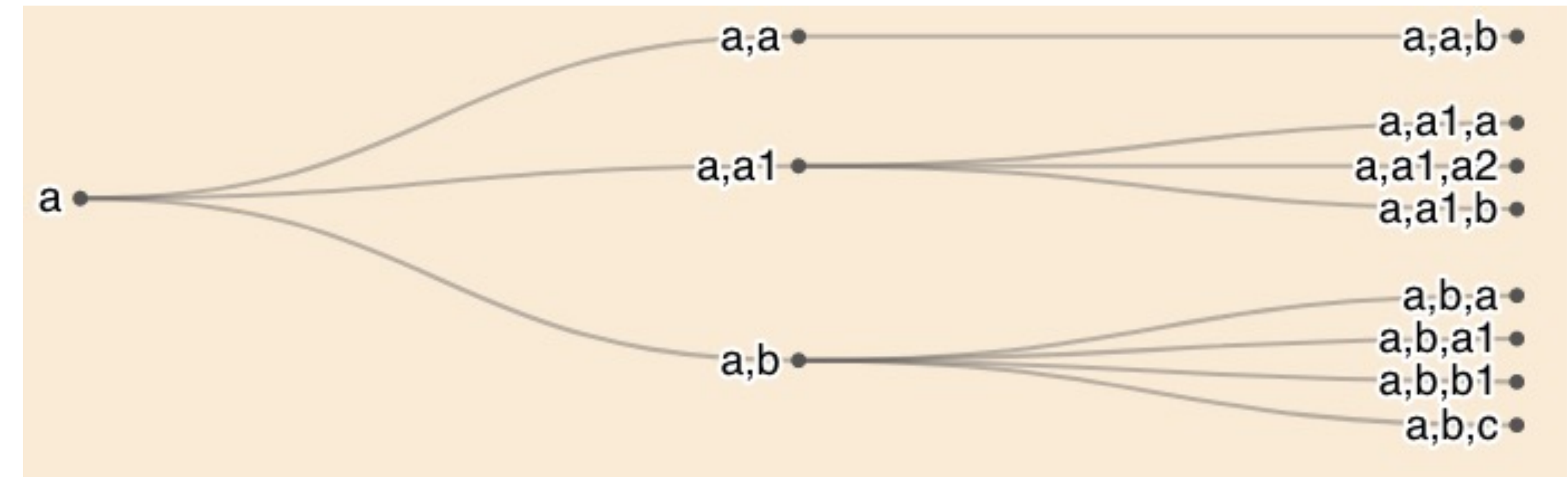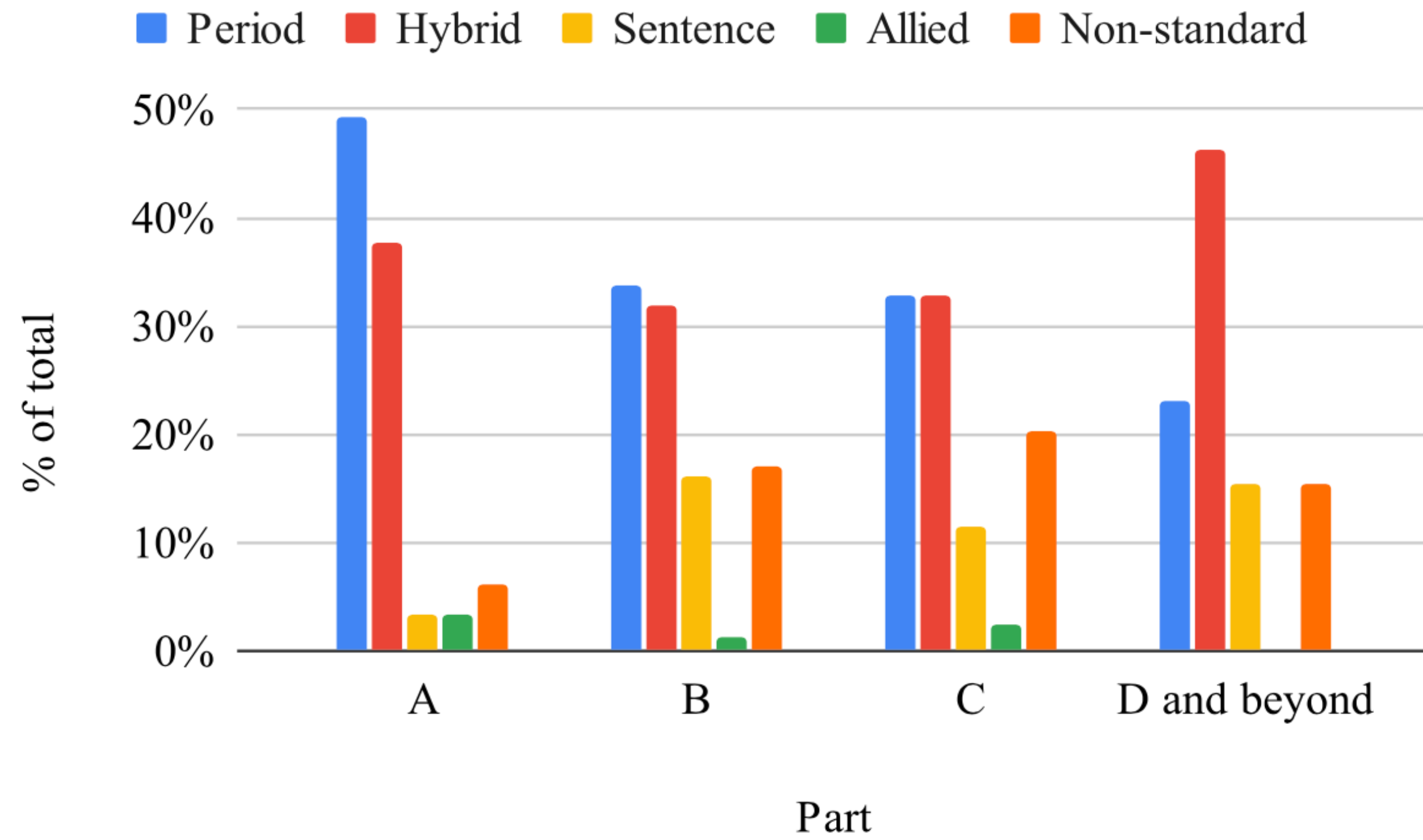
# Structure occurrences

Some structures are unique; others occur many times

# Most common structures

abacabde (33 occurrences), abcdabce (37), abcdabef (37)



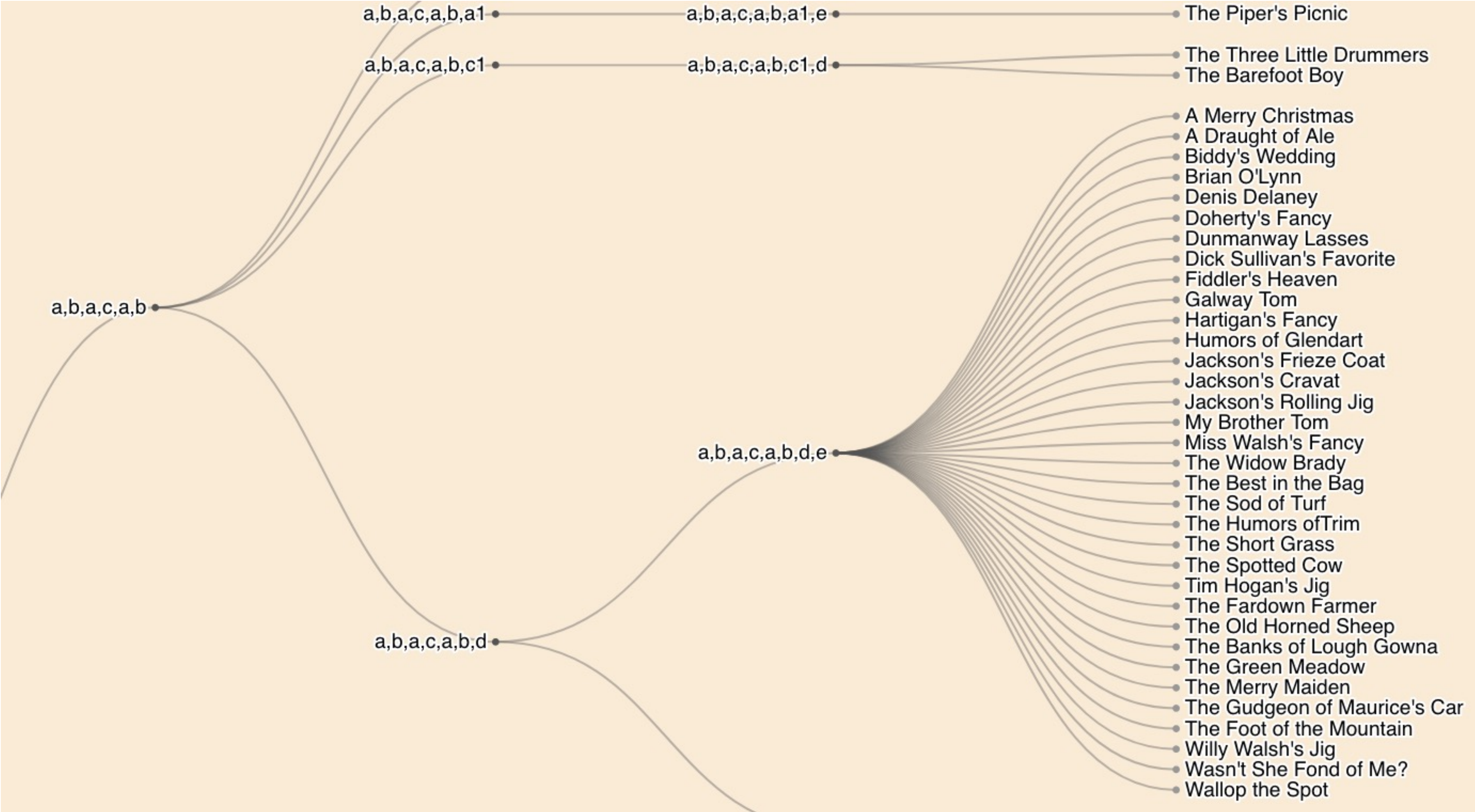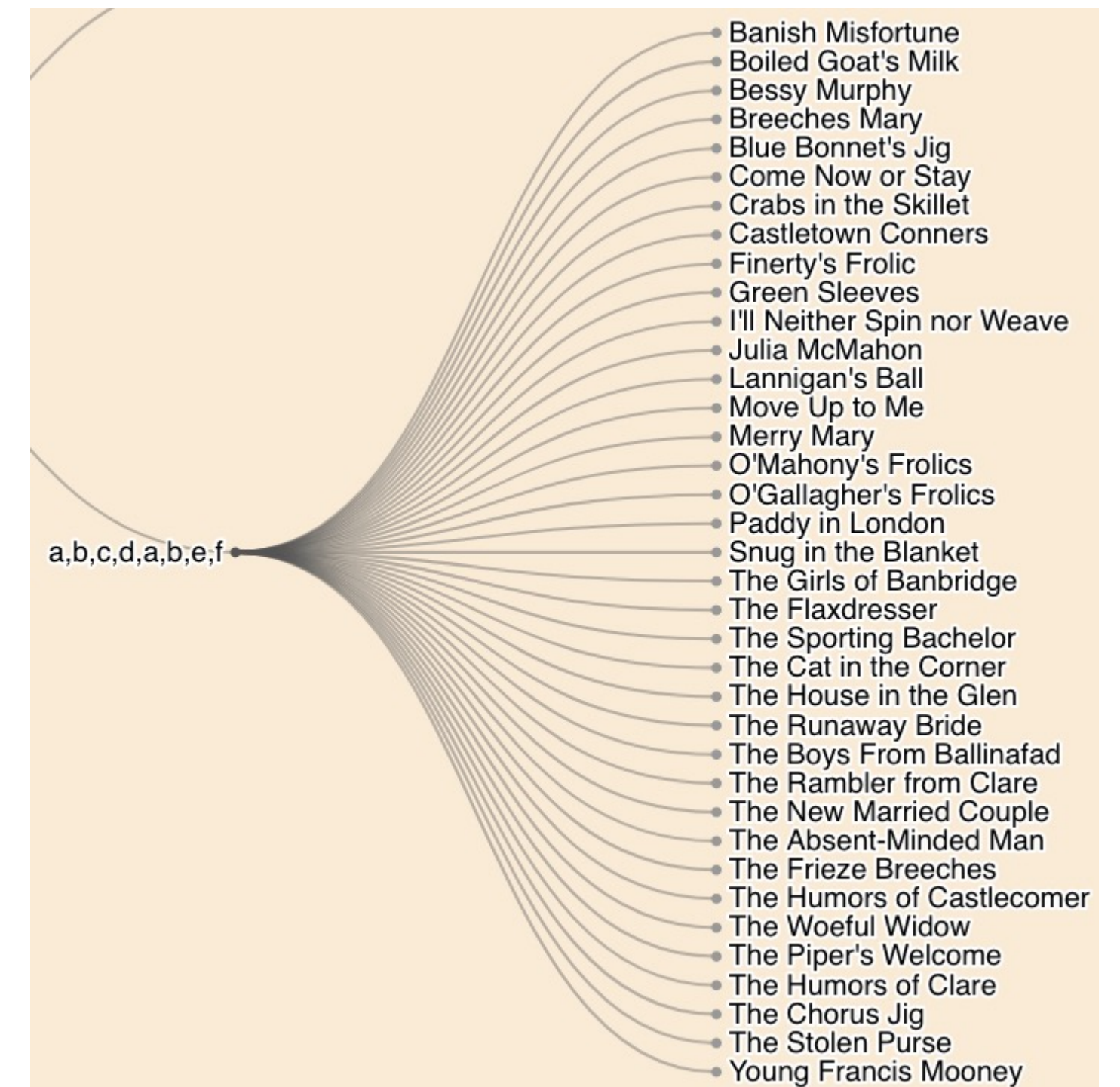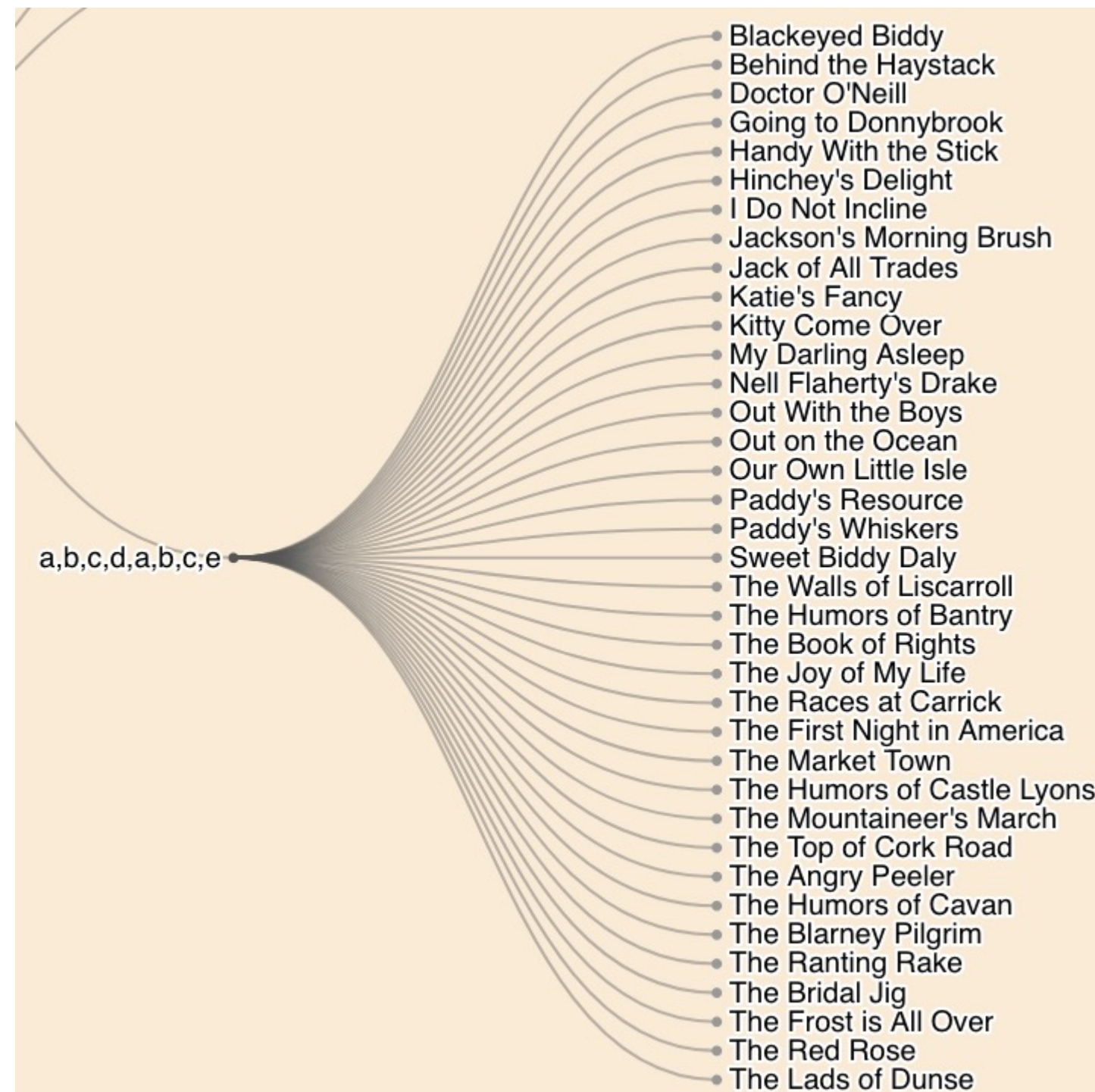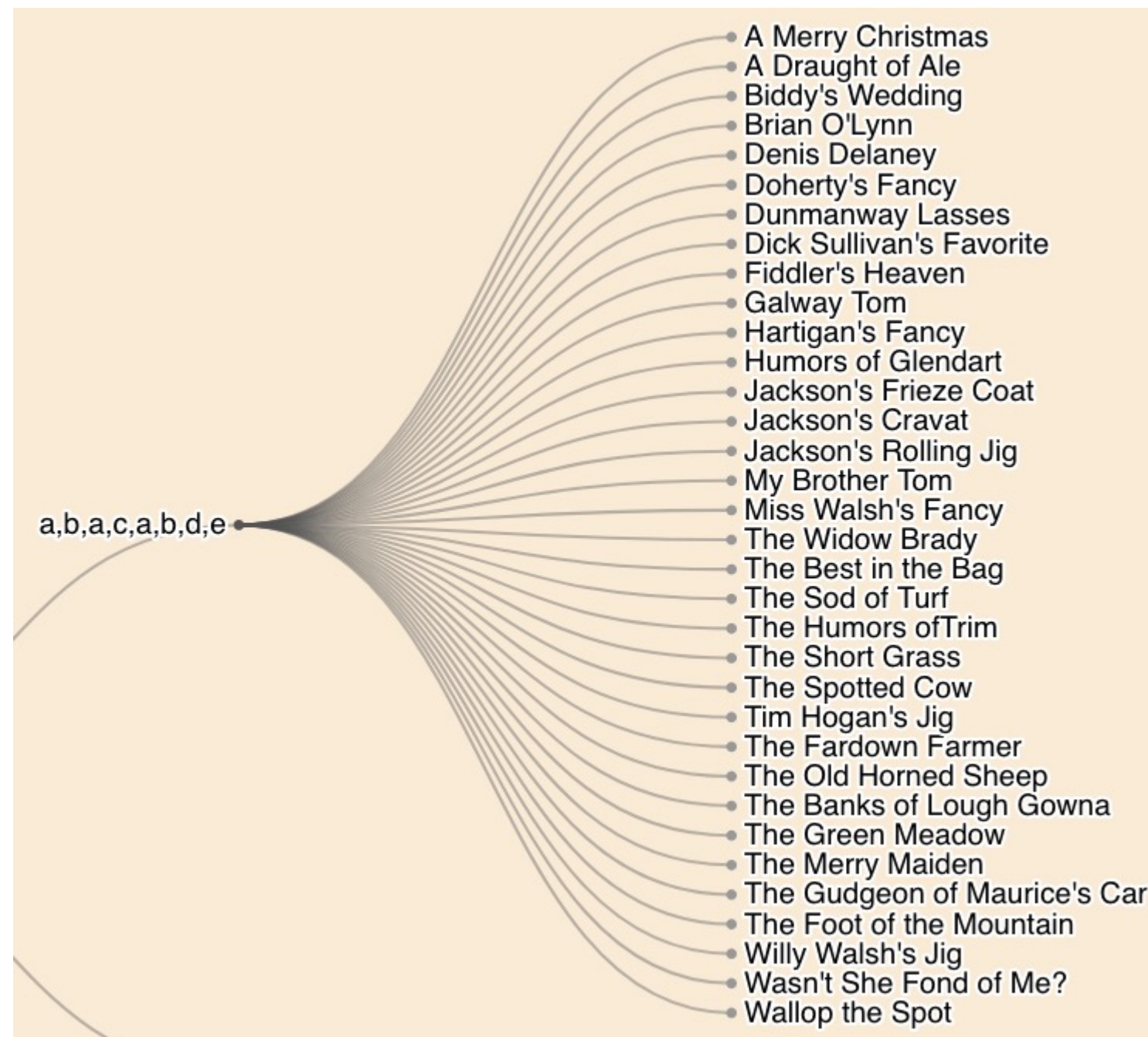| a,b,a,c,a,b,d,e | a,b,c,d,a,b,c,e | a,b,c,d,a,b,e,f |
|---|---|---|
| A Merry Christmas | Blackeyed Biddy | Banish Misfortune |
| A Draught of Ale | Behind the Haystack | Boiled Goat's Milk |
| Biddy's Wedding | Bessy Murphy | Bessy Murphy |
| Brian O'Lynn | Doctor O'Neill | Breeches Mary |
| Denis Delaney | Going to Donnybrook | Blue Bonnet's Jig |
| Doherty's Fancy | Handy With the Stick | Come Now or Stay |
| Dunmanway Lasses | Hinchey's Delight | Crabs in the Skillet |
| Dick Sullivan's Favorite | I Do Not Incline | Castletown Conners |
| Fiddler's Heaven | Jackson's Morning Brush | Finerty's Frolic |
| Galway Tom | Jack of All Trades | Green Sleeves |
| Hartigan's Fancy | Katie's Fancy | I'll Neither Spin nor Weave |
| Humors of Glendart | Kitty Come Over | Julia McMahon |
| Jackson's Frieze Coat | My Darling Asleep | Lannigan's Ball |
| Jackson's Cravat | Nell Flaherty's Drake | Move Up to Me |
| Jackson's Rolling Jig | Out With the Boys | Merry Mary |
| My Brother Tom | Out on the Ocean | O'Mahony's Frolics |
| Miss Walsh's Fancy | Our Own Little Isle | O'Gallagher's Frolics |
| The Widow Brady | Paddy's Resource | Paddy in London |
| The Best in the Bag | Paddy's Whiskers | Snug in the Blanket |
| The Sod of Turf | Sweet Biddy Daly | The Girls of Banbridge |
| The Humors ofTrim | The Walls of Liscarroll | The Flaxdresser |
| The Short Grass | The Humors of Bantry | The Sporting Bachelor |
| The Spotted Cow | The Book of Rights | The Cat in the Corner |
| Tim Hogan's Jig | The Joy of My Life | The House in the Glen |
| The Fardown Farmer | The Races at Carrick | The Runaway Bride |
| The Old Horned Sheep | The First Night in America | The Boys From Ballinafad |
| The Banks of Lough Gowna | The Market Town | The Rambler from Clare |
| The Green Meadow | The Humors of Castle Lyons | The New Married Couple |
| The Merry Maiden | The Mountaineer's March | The Absent-Minded Man |
| The Gudgeon of Maurice's Car | The Top of Cork Road | The Frieze Breeches |
| The Foot of the Mountain | The Angry Peeler | The Humors of Castlecomer |
| Willy Walsh's Jig | The Humors of Cavan | The Woeful Widow |
| Wasn't She Fond of Me? | The Blarney Pilgrim | The Piper's Welcome |
| Wallop the Spot | The Ranting Rake | The Humors of Clare |
| | The Bridal Jig | The Chorus Jig |
| | The Frost is All Over | The Stolen Purse |
| | The Red Rose | Young Francis Mooney |
| | The Lads of Dunse | |

# Click a tune title for score and playback

These are from *The Session,* a crowd-sourced repository with many variants, so not fully reliable

**click**

Co-authors: Seán for contacting us and providing data; Kieran for design and implementation

Funders: Polifonia project funded by EU Horizon 2020

Collaborators: all in Polifonia, especially Danny Diamond

Workshop organiser: David Meredith