

Self-redundancy in Music

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Talk plan

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- Treating them like grammars for generative purposes
- Producing musical reflexes and hyper-reflexes

Information decay ('uncertainization')

Null uncertainization

Content $3 \times 7 = 21$ bits

$$\text{MSI} = (21-0)/7 = \boxed{3.0}$$

a b c d b c a

(A)

$$\text{MSI} = (21-1)/7 = \boxed{2.9}$$

a b c ⁻¹ b c a



a b c d b c a

(B)

$$\text{MSI} = (21-2)/7 = \boxed{2.7}$$

a b c ⁻¹ b ⁻¹ a



a b c d b c a

(C)

$$\text{MSI} = (21-0)/7 = \boxed{3.0}$$

a ⁻⁰ d ⁻⁰ a

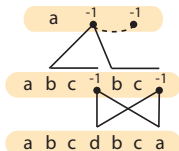


a b c d b c a

(D)

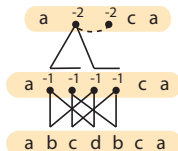
More decay examples

$$\text{MSI} = (21-2)/6 = 3.2$$



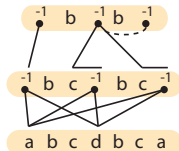
(E)

$$\text{MSI} = (21-4)/7 = 2.4$$



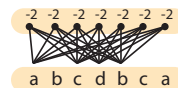
(F)

$$\text{MSI} = (21-3)/7 = 2.6$$



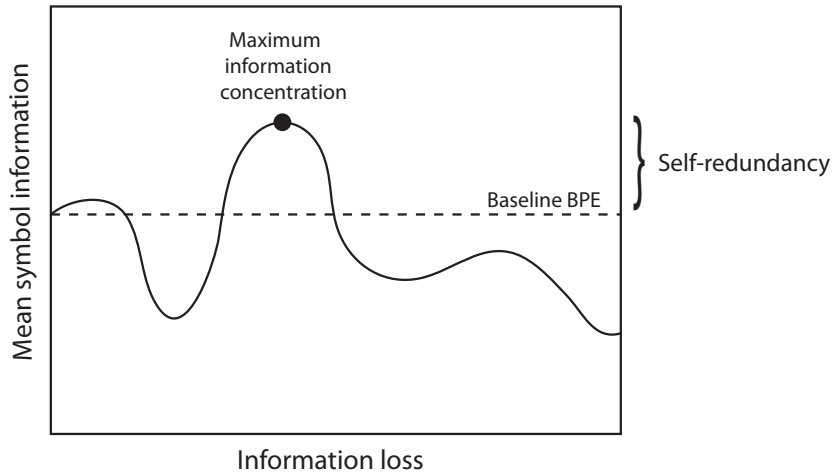
(G)

$$\text{MSI} = (21-14)/7 = 1.0$$

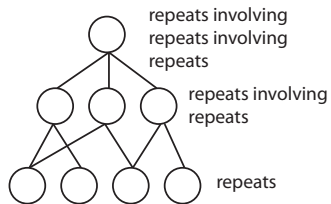
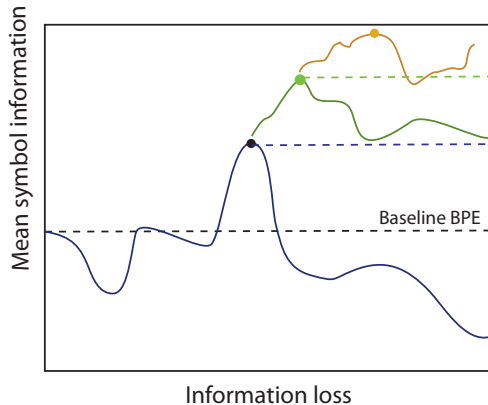


(H)

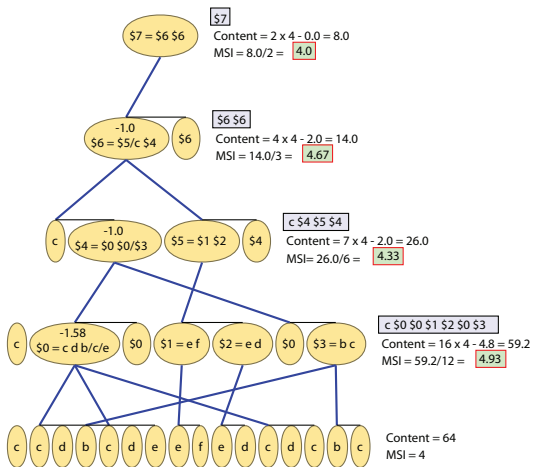
Conservative uncertainization



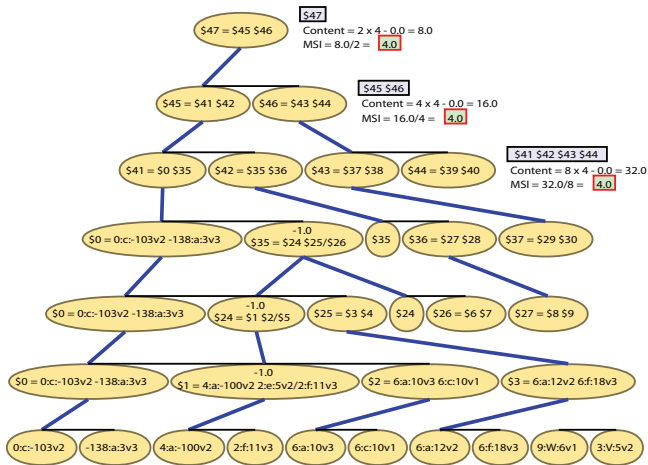
Conservative recursive uncertainization (CRU)



Self-redundancy structures in musical sequences



La Marseillaise



Generating musical reflexes

Generating musical replexes

- Self-redundancy structures are hierarchical symbol structures, just like phrase-structure grammars.

Generating musical replexes

- Self-redundancy structures are hierarchical symbol structures, just like phrase-structure grammars.
- Recursive symbol expansion can be used to generate novel sequences ('replexes') with the same SR structure.

Four replexes of GSTQ melody

```
c c d b c d e e f e d c d e c d e  
e f e d c d e c d e e f e d c d c b c  
e f e d c d e c d c e f e d c d e c d e  
c c d b b c e f e d c d c c d c
```

Many more can be produced using the Replexer applet.

Extract from replex of Mozart's Sonata in C minor

The image displays a musical score for an extract from a replex of Mozart's Sonata in C minor. The score is written on two staves, both using a treble clef and a common time signature (C). The music is characterized by a complex, chromatic melodic line in the upper voice and a more rhythmic, accompanimental line in the lower voice. The upper staff begins with a series of eighth and sixteenth notes, followed by a more active melodic passage. The lower staff features a steady eighth-note accompaniment with occasional rests and dynamic markings. The score concludes with a double bar line.

Hyper-replexes

- Use tree-unification to amalgamate self-redundancy structures.

Hyper-replexes

- Use tree-unification to amalgamate self-redundancy structures.
- Replex then 'crosses' informational properties of more than one source.

Extract from a replex crossing Glass's Koyaanisqatsi suite with Bach's Prelude No 13 (wtc1)



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- Use of SR structures to generate reflexes

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- Self-redundancy
- Conservative recursive uncertainization
- Self-redundancy structures
- Use of SR structures to generate reflexes
- and hyper-reflexes

Shannon, C. and Weaver, W. (1949). THE MATHEMATICAL THEORY OF COMMUNICATION. Urbana, Illinois: University of Illinois Press.

Software at <http://www.chrisThornton.eu/replex-music.html>