PNW

A musical composition for Narrator, Tenor Saxophone, and Live Computer Electronics

Douglas M. Niemela

A dissertation
submitted in partial fulfillment of the
requirements for the degree of

Doctor of Musical Arts

University of Washington
2015

Reading Committee:
Richard S. Karpen, Chair
Joel-Francois Durand
Juan C. Pampin

Program Authorized to Offer Degree:
School of Music
Abstract

PNW

A musical composition for Narrator, Tenor Saxophone, and Live Computer Electronics

Douglas M. Niemela

Chair of the Supervisory Committee:
Director Richard S. Karpen
School of Music

Concatenative Sound Synthesis (CSS) has undergone software tool development for composition in non-realtime use in the MATLAB (Sturm, 2006) and Max/MSP (Schwarz, 2003) programming environments. Live Concatenative Sound Synthesis remains rare as of 2015 and has one initial tool within Max/MSP (Schwarz, 2006). This dissertation is centered around the original creation of an extensive Live CSS plug-in for the SuperCollider audio environment, its exploration and use in a significant musical composition. “PNW”, contained herein, is this work, a composition of live poetry reading, tenor saxophone accompaniment, and use of “Concatenate”, a new Live CSS plug-in for the SuperCollider environment.
ACKNOWLEDGEMENTS

For his continued patience and words of wisdom, I would like to thank my advisor, Dr. Richard S. Karpen. I was permitted room to develop an idea from concept, to software tools, to resultant work. I would also like to thank both Dr. Juan Pampin, who guided my initial experiments in manipulating sound with computers, and Dr. Joel-Francois Durand for his encouragement and connection to the tradition of composition. As time moves on, and we are gone, this was an especially intense and dynamic period in the growth of the music and digital arts departments at the University of Washington.

Thank you to Raymond Carver for producing poetry like no other, and to Tess Gallagher for viewing my test video and warmly approving of this use.

I would also like to thank my father, (Professor) Roy W. Niemela, for his academic guidance through my undergraduate years, and my mother, Corinne S. Niemela, for her unquestioning support.
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Date:       June 22, 2015  
To:         Doug Niemela  
Email:      dougn@uw.edu  
From:       Lauren Rogoff  
Re:         Performance of 11 poems for PhD Thesis Presentation  
On behalf of:   Tess Gallagher  

Dear Doug Niemela,

This letter grants one-time, non-exclusive, English-language musical performance rights to perform a live reading accompanied by music (the “Production”) of 11 poems: The Old Days, My Boat, Powder Monkey, The Phone Booth, Where the Groceries Went, The Cobweb, The Car, The Jungle, It's Course, Possible, and Eagles (collectively, the "Work") by Raymond Carver (the “Author”) on the terms indicated below only:

- Performers: Doug Niemela, reader TBD, musical interludes by a member of Bill Frisell band
- Territory: Washington, US
- Admission price: free
- Performance date/duration: Oct 22, 2015
- Performance location: "The Chapel Performance Space", Good Shepard Center, 4649 Sunnyside Ave N. Seattle, WA.
- Audience size: 100

This letter further grants one-time, non-exclusive rights to record the Production for non-commercial, archival purposes only. Any further use or distribution of the Work will be subject to Tess Gallagher’s prior written approval, and a further agreement to be negotiated.

The Author shall receive credit of authorship of the Work in the customary manner during any performances, and the following acknowledgements should appear on all printed material for the Production:
The Old Days, My Boat from Where Water Comes Together with Other Water by Raymond Carver, copyright © 1985 by Raymond Carver, 1996 by Tess Gallagher, used by her permission.

No further use of this material in extended distribution, other media, or future editions shall be made without the express written consent of The Wylie Agency. All rights not expressly granted herein are hereby reserved and retained by Tess Gallagher.

Yours sincerely,

Lauren Rogoff
lrogoff@wylieagency.com
The following is the archival record for the “Production” of the “Performance of 11 poems for PhD thesis Presentation” of Raymond Carver.

See bibliography for credits per Wylie Agency.

Thanks to all, especially Tess Gallagher.
Douglas M Niemela

PNW

For Narrator, Tenor Saxophone, and Live Computer Electronics

(2015)
SCORE NOTES
Performing Time: Approx. 18'

“PNW” is centered around a live reading of 8 poems of Raymond Carver (Carver, 1985, 1986). Told as personal stories of Pacific Northwest life, raw audio material for the accompanying computer concatenation corpus was collected from Washington's Puget Sound region, home for Raymond Carver in later life. Score was created for surround sound live reproduction. The narrator, tenor saxophonist, and live mix engineer actively perform together throughout the 10 movements. The concatenation software serves to create an interactive environment for all performers.

SET UP

Concatenative sound synthesis components have been developed for 4 channels of surround sound reproduction. Performers should be situated inside this quadraphonic field so as to hear and react to the entirety of the sound experienced by the audience. It is suggested the
performers be aligned facing the audience, from the front inside portion of the quadraphonic image. This includes the mix engineer position. Plain sound reinforcement for both sax and voice can be restricted to speakers on either side of this position, so as to give directionality to these sources. Slight reverb can be used to augment these sources if desired.

NARRATOR

Narration should be read as a “first person” telling of life experiences. Narration should be performed into a suitable voice microphone with wind filter, providing input to both computer processes, and hall sound reinforcement.

Score order designates movements 1 and 4 as solo tenor saxophone (prelude and interlude). The narrator should wait for sounds to dissipate before entering after these. Likewise, between movements, the narrator should wait for sounds to dissipate and the mix engineer to progress the concatenation program to the next synthesis construct.

TENOR SAXOPHONE

Tenor Saxophone performs as both solo prelude and interlude, as well as accompaniment to live voice narration on 3 poems. The tenor saxophone part should take caution as to not overwhelm the voice narration when acting as accompanist. A clip-on type microphone is used on the sax bell, providing input to computer processes and hall sound reinforcement.
Score for tenor saxophone provides suggested “key phrases” for improvised elaboration. These phrases are coordinated with relatively predictable reaction from the concatenation software. Provided the performer is keenly aware of the nature of the narration at any moment, the performer may deviate from the suggested key phrase if another idea is in mind. This should always provide smooth and supportive counterpoint to the narration.

Key phrases are, at times, provided in coordination with word reference points to the poetic narration. These serve as timing coordination points between narrator and tenor saxophone.

**MIX ENGINEER**

During performance of any movement, the mix engineer should actively balance the sound hall volume of source acoustics, and resultant concatenative sound environment. The environment should not overpower the presence of source acoustics.
At times within the score, a parameter change (See Appendix A for codes) is specified. This should be transmitted to the running concatenation synth without stoppage.

ELECTRONICS

Concatenation processes involve the use of 13 audio files and associated “Conanalysis” metadata files to be loaded as the concatenation corpus. These may be obtained from the composer's world wide web audio repository. During progression among movements of the piece, select corpora will be combined and supplied to the designated synthesis construct for that movement. See the Concatenation help pages for details (Appendix A). Output will be 2 to 4 channels, depending on the movement. An appropriate GUI interface should be constructed to provide switching among these synthesis constructs. Within each movement, there are smaller parameter shifts indicated. These should be controllable from the same GUI performance interface.

The following are audio corpora, associated concatenation analysis files, and synthesis constructs for the SuperCollider audio environment (McCartney, 2002) required for each movement:
I. Prelude (tenor saxophone solo)

seaSyn101c.aif  seaSyn101c.aif.analysis
delMarExt2B.aif  delMarExt2B.aif.analysis

\[
\text{SynthDef}(\text{concatenator1}, \{ \text{arg corpusBuf}, \text{liveinput}=0, \text{lowThresh}, \text{audFileCnt}, \text{pitchwt}, \text{crossFade}, \text{parameterVal}, \text{hold}, \text{gate}, \text{audioin}=1, \text{anaArray};
\text{var env, sig8, sig1, sig2, sig3, sig4, sig5, sig6, sig7, livesig, livesig2, anaArray2, mainsig, cssig, freq, hasFreq, livsig;}
\text{var t, inp1, livesig3};
\text{env=EnvGen.ar(Env.asr(0.1,0.2), gate: gate, doneAction:2);}
\text{livesig = AudioIn.ar(1);}
\text{livesig2 = AudioIn.ar(1);}
\text{livesig3 = AudioIn.ar(1);}
\text{cssig = 0.43;}
\text{livsig = 0.0;}
\text{# freq, hasFreq = Pitch.kr(livesig2, ampThreshold: 0.002, median: 1, peakThreshold: 0.4);}
\text{hasFreq = hasFreq * 0.0027;}
\text{t = Trig1.kr(Amplitude.kr(livesig3, add: -0.17), 2.5);}
\text{inp1 = livesig3 * t;}
\text{sig3 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, 0.28, 1, parameterVal, 0, anaArray, freq, hasFreq);}
\text{sig4 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, 1.275, 1, parameterVal, 0, anaArray, freq,}
\text{sig5 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, 1.00, 1, parameterVal, 0, anaArray, freq, hasFreq);}
\text{sig6 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.88, 1, parameterVal, 0, anaArray, freq, hasFreq);}
\text{sig7 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 1.1, 1, parameterVal, 0, anaArray, freq, hasFreq);}
\text{sig1 = DelayC.ar(sig3, 0.3, LFNoise1.kr(0.1, 0.1, 0.11));}
\text{sig2 = DelayC.ar(sig5, 0.3, LFNoise1.kr(0.1, 0.1, 0.11));}
\text{Out.ar(0, [sig4 + sig6 + sig3, sig5 + sig1 + sig7] * cssig);}
\}\).send(s);
\]

II. The Possible

seaSyn101c.aif  seaSyn101c.aif.analysis
crossCC.aif  crossCC.aif.analysis
julieVoice.aif  julieVoice.aif.analysis

\[
\text{SynthDef}(\text{concatenator2}, \{ \text{arg corpusBuf}, \text{liveinput}=0, \text{lowThresh}, \text{audFileCnt}, \text{pitchwt}, \text{crossFade}, \text{parameterVal}, \text{hold}, \text{gate}, \text{audioin}=1, \text{anaArray};
\text{var env, sig, sig1, sig2, sig3, sig4, sig5, sig6, sig7, sig8, sig9, sig10, livesig, livesig2, anaArray2,}
\text{mainsig, csvol, freq, hasFreq, livvol, tempo;}
\text{env=EnvGen.ar(Env.asr(0.1,0.2), gate: gate, doneAction:2);}
\text{livesig = AudioIn.ar(1) * audioin;}
\text{livesig2 = AudioIn.ar(1) * audioin;}
\text{csvol = 0.24;}
\text{livvol = 0.0;}
\text{tempo= 1.45;}
\text{# freq, hasFreq = Pitch.kr(livesig2, ampThreshold: 0.002, median: 1, peakThreshold: 0.4);}
\text{hasFreq = hasFreq * 0.002;}
\text{sig = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (tempo * 0.20), 1, parameterVal, 1,}
\text{\text{\ldots}}
\]
\]

viii
anaArray, freq, hasFreq);

    sig1 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (tempo * 0.37), 1, parameterVal, 0,
    anaArray, freq, hasFreq);
    sig2 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (tempo * 0.35), 1, parameterVal, 1,
    anaArray, freq, hasFreq);
    sig3 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (tempo * 0.22), 1, parameterVal, 0,
    anaArray, freq, hasFreq);
    sig4 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (tempo * 0.30), 1, parameterVal, 1,
    anaArray, freq, hasFreq);
    sig5 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (tempo * 0.91), 1, parameterVal, 0,
    anaArray, freq, hasFreq);
    sig6 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (tempo * 0.41), 1, parameterVal, 1,
    anaArray, freq, hasFreq);
    sig7 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (tempo * 0.36), 1, parameterVal, 0,
    anaArray, freq, hasFreq);
    sig8 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (tempo * 0.38), 1, parameterVal, 1,
    anaArray, freq, hasFreq);
    sig9 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (tempo * 0.26), 1, parameterVal, 0,
    anaArray, freq, hasFreq);
    sig10 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (tempo * 0.48), 1, parameterVal, 1,
    anaArray, freq, hasFreq);

    Out.ar(0, [(sig + sig3 + sig4, sig5 + sig7 + sig9, ((sig1 + sig2 + sig4) * 0.45), ((sig6 + sig8 + sig10) *
    0.45)] * csvol);
    ).send(s);
}

III. The Old Days

bikingSea.aif   bikingSea.aif.analysis
delMarExt2B.aif  delMarExt2.aif.analysis
party.aif       party.aif.analysis
wesSyn102b.aif  wesSyn102b.aif.analysis

{ SynthDef(concatenator3, {arg corpusBuf, liveinput=0, lowThresh, audFileCnt, pitchwt, crossFade, parameterVal,
hold, gate, audioIn=1, anaArray;
    var env, sig, sig1, sig2, sig3, sig4, sig5, sig6, sig7, livesig, livesig2, anaArray2, mainsig, cssig, freq,
hasFreq, livsig;
    var t, inp1, livesig3, sig8, sig9, sig10, sig11;
    env=EnvGen.ar(Env.asr(0,1,0.2), gate: gate, doneAction:2);
    livesig = AudioIn.ar(1);
    livesig2 = AudioIn.ar(1);
    livesig3 = AudioIn.ar(1);
    cssig = 0.6;
    livsig = 0.0;

    # freq, hasFreq = Pitch.kr(livesig2, ampThreshold: 0.002, median: 1, peakThreshold: 0.4);
    hasFreq = hasFreq * 0.0027;
    t = Trig1.kr(Amplitude.kr(livesig3, add: -0.18), 2.5);
    inp1 = livesig * t;
    sig1 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.255, 1, parameterVal, 0, anaArray,
freq, hasFreq);
    sig2 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (0.17 * 2), 1, parameterVal, 0,
anaArray, freq, hasFreq);  

}
sig3 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, (0.17 * 2), 1, parameterVal, 0, anaArray, freq, hasFreq);
sig4 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.8975, 1, parameterVal, 0, anaArray, freq, hasFreq);

sig9 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.17, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig10 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.9975, 1, parameterVal, 0, anaArray, freq, hasFreq);

sig5 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.255, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig8 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.2975, 1, parameterVal, 0, anaArray, freq, hasFreq);

sig6 = DelayC.ar(sig1, 0.3, LFNoise1.kr(0.1, 0.03, 0.07));
sig7 = DelayC.ar(sig4, 0.3, LFNoise1.kr(0.1, 0.03, 0.07));
sig11 = DelayC.ar(sig10, 0.3, LFNoise1.kr(0.1, 0.1, 0.11));
Out.ar(0, [sig2 + sig1 + sig10, sig3 + sig4 + sig9, sig5 + sig6 + sig11, sig7 + sig8] * cssig);

).send(s);

IV. Interlude (solo tenor saxophone)

hoSyn102bb.aif    hoSyn102bb.aif.analysis
seattle441.aif    seattle.aif.analysis

(  SynthDef\{concatenator4, {arg corpusBuf, liveinput=0, lowThresh, audFileCnt, pitchwt, crossFade, parameterVal, hold, gate, audioin=1, anaArray;  var env, sig, sig1, sig2, sig3, sig4, sig5, sig6, sig7, livesig, livesig2, anaArray2, mainsig, cssig, freq, hasFreq, livsig;  var t, inp1, livesig3, sig8, sig9, sig10, sig11;  env=EnvGen.ar(Env.asr(0,1,0.2), gate: gate, doneAction:2);  livesig = AudioIn.ar(1);  livesig2 = AudioIn.ar(1);  livesig3 = AudioIn.ar(1);  cssig = 0.4;  livsig = 0.0;

    # freq, hasFreq = Pitch.kr(livesig2, ampThreshold: 0.002, median: 1, peakThreshold: 0.4);
    hasFreq = hasFreq * 0.0025;
    t = Trig1.kr(Amplitude.kr(livesig3, add: -0.14), 2.5);
    inp1 = livesig * t;
    sig1 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.255, 1, parameterVal, 0, anaArray, freq, hasFreq);
    sig2 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (0.17 * 2), 1, parameterVal, 0, anaArray, freq, hasFreq);
    sig3 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, (0.17 * 2), 1, parameterVal, 0, anaArray, freq, hasFreq);
    sig4 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.8975, 1, parameterVal, 0, anaArray, freq, hasFreq);
    sig9 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.17, 1, parameterVal, 0, anaArray, freq, hasFreq);
    sig10 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.9975, 1, parameterVal, 0, anaArray, freq, hasFreq);

})

\x5c
V. Where the Groceries Went

seattle441.aif  seattle441.aif.analysis
ropesL.aif  ropesL.aif.analysis
knotsL441.aif  knotsL441.aif.analysis
ho441.aif  ho441.aif.analysis

SynthDef(concatenator5, {arg corpusBuf, liveinput=0, lowThresh, audFileCnt, pitchwt, crossFade, parameterVal, hold, gate, audioin=1, anaArray;
var env, sig8, sig1, sig2, sig3, sig4, sig5, sig6, sig7, livesig, livesig2, anaArray2, mainsig, cssig, freq, hasFreq, livsig;
var t, inp1, livesig3;
env=EnvGen.ar(Env.asr(0,1,0.2), gate: gate, doneAction:2);
livesig = AudioIn.ar(1);
livesig2 = AudioIn.ar(1);
livesig3 = AudioIn.ar(1);
cssig = 0.5;
livsig = 0.0;
# freq, hasFreq = Pitch.kr(livesig2, ampThreshold: 0.002, median: 1, peakThreshold: 0.4);
hasFreq = hasFreq * 0.002;
t = Trig1.kr(Amplitude.kr(livesig3, add: -0.22), 2.5);
inp1 = livesig * t;

freq, hasFreq;
sig1 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.3967, 1, parameterVal, 0, anaArray,
freq, hasFreq);
sig2 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.2550, 1, parameterVal, 0, anaArray,
freq, hasFreq);
sig3 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, 0.22, 1, parameterVal, 0, anaArray,
freq, hasFreq);
sig4 = Concatenate.ar(corpusBuf, sig3, lowThresh, audFileCnt, 0.22, 1, parameterVal, 0, anaArray,
freq, hasFreq);
sig5 = Concatenate.ar(corpusBuf, sig4, lowThresh, audFileCnt, 0.22, 1, parameterVal, 0, anaArray,
freq, hasFreq);
sig6 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.4533, 1, parameterVal, 0, anaArray,
freq, hasFreq);
Out.ar(0, [sig5 + sig4, sig5 + sig3, sig1 + sig2, sig6 + sig2] * cssig);
});send(s);
)
VI. The Phone Booth

seaSyn101c.aif seaSyn101c.aif.analysis
delMarExt2B.aif delMarExt2.aif.analysis

```plaintext
(SynthDef\concatenator6, {arg corpusBuf, liveinput=0, lowThresh, audFileCnt, pitchwt, crossFade, parameterVal, hold, gate, audioin=1, anaArray;
    var env, sig8, sig1, sig2, sig3, sig4, sig5, sig6, sig7, livesig, livesig2, anaArray2, mainsig, cssig, freq, hasFreq, livsig;
    var t, inp1, livesig3;
    env = EnvGen.ar(Env.asr(0,1,0.2), gate: gate, doneAction:2);
    livesig = AudioIn.ar(1);
    livesig2 = AudioIn.ar(1);
    livesig3 = AudioIn.ar(1);
    cssig = 0.3;
    livsig = 0.0;
    # freq, hasFreq = Pitch.kr(livesig2, ampThreshold: 0.002, median: 1, peakThreshold: 0.4);
    hasFreq = hasFreq * 0.002;

    sig2 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, 0.55, 1, parameterVal, 0, anaArray, freq, hasFreq);
    sig3 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, 0.95, 1, parameterVal, 0, anaArray, freq, hasFreq);
    sig4 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, 0.75, 1, parameterVal, 0, anaArray, freq, hasFreq);
    sig5 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, 0.88, 1, parameterVal, 0, anaArray, freq, hasFreq);

    sig1 = DelayC.ar(sig4, 0.3, LFNoise1.kr(0.1, 0.1, 0.11));
    sig8 = DelayC.ar(sig5, 0.3, LFNoise1.kr(0.1, 0.1, 0.11));
    sig6 = DelayC.ar(sig3, 0.3, LFNoise1.kr(0.1, 0.1, 0.11));
    sig7 = DelayC.ar(sig2, 0.3, LFNoise1.kr(0.1, 0.1, 0.11));

    Out.ar(0, [sig4+sig8, sig5+sig6, sig3+sig7, sig2+sig1] * cssig);
}).send(s);
```

VII. My Boat

party.aif party.aif.analysis
hoSyn102bb.aif hoSyn102bb.aif.analysis
bikingSea.aif bikingSea.aif.analysis

```plaintext
(SynthDef\concatenator7, {arg corpusBuf, liveinput=0, lowThresh, audFileCnt, pitchwt, crossFade, parameterVal, hold, gate, audioin=1, anaArray;
    var env, sig, sig1, sig2, sig3, sig4, sig5, sig6, sig7, livesig, livesig2, anaArray2, mainsig, cssig, freq, hasFreq, livsig;
    var t, inp1, livesig3, sig8;
    env = EnvGen.ar(Env.asr(0,1,0.2), gate: gate, doneAction:2);
    livesig = AudioIn.ar(1);
    livesig2 = AudioIn.ar(1);
    livesig3 = AudioIn.ar(1);
```
cssig = 0.6;
livsig = 0.0;

# freq, hasFreq = Pitch.kr(livesig2, ampThreshold: 0.002, median: 1, peakThreshold: 0.4);
hasFreq = hasFreq * 0.002;
t = Trig1.kr(Amplitude.kr(livesig3, add: -0.18), 2.5);
inp1 = livesig * t;
sig1 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.255, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig2 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, (0.17 * 2), 1, parameterVal, 0, anaArray, freq, hasFreq);
sig3 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, 0.17, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig4 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.2975, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig5 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.255, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig6 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, 0.2833, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig7 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, 0.2975, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig8 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, 0.31167, 1, parameterVal, 0, anaArray, freq, hasFreq);

VIII. The Car

bikingSea.aif      bikingSea.aif.analysis
seaSyn101c.aif    seaSyn101c.aif.analysis
seattle441.aif    seattle441.aif.analysis

( SynthDef('concatenator8, {arg corpusBuf, liveinput=0, lowThresh, audFileCnt, pitchwt, crossFade, parameterVal, hold, gate, audioin=1, anaArray;
  var env, sig8, sig1, sig2, sig3, sig4, sig5, sig6, sig7, livesig, livesig2, anaArray2, mainsig, cssig, freq, hasFreq, livsig;
  var t, inp1, livesig3;
  env=EnvGen.ar(Env.asr(0,1,0.2), gate: gate, doneAction:2);
  livesig = AudioIn.ar(1);
livesig2 = AudioIn.ar(1);
livesig3 = AudioIn.ar(1);
cssig = 0.5;
livsig = 0.0;

  # freq, hasFreq = Pitch.kr(livesig2, ampThreshold: 0.002, median: 1, peakThreshold: 0.4);
  hasFreq = hasFreq * 0.002;
t = Trig1.kr(Amplitude.kr(livesig3, add: -0.18), 2.5);
  inp1 = livesig * t;

  sig1 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.31167, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig2 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.2833, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig3 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, 0.2975, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig4 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, 0.31167, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig5 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, 0.2833, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig6 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, 0.2975, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig7 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, 0.5, 1, parameterVal, 0, anaArray, freq, hasFreq);
sig8 = Concatenate.ar(corpusBuf, sig2, lowThresh, audFileCnt, 0.5, 1, parameterVal, 0, anaArray, freq, hasFreq);

  Out.ar(0, [sig2 + sig1, sig3 + sig4, sig5 + sig6, sig7 + sig8] * cssig);
})}.send(s); )
IX. The Cobweb

ho441.aif    ho441.aif.analysis
hoRocks.aif   hoRocks.aif.analysis
seattle441.aif seattle441.aif.analysis

(  
  SynthDef\(\text{\textbackslash{}concatenator9}, \{\text{arg corpusBuf, liveinput=0, lowThresh, audFileCnt, pitchwt, crossFade, parameterVal, hold, gate, audioIn}=1, \text{anaArray};  
  \text{var env, sig8, sig1, sig2, sig3, sig4, sig5, sig6, sig7, livesig, livesig2, anaArray2, mainsig, cssig, freq, hasFreq, livsig;  
  \text{var t, inp1, livesig3, time;  
  env=Env\text{Gen}.ar(Env\text{asr}(0, \text{.1, .2}), \text{gate: gate, doneAction=2});  
  \text{livesig} = \text{AudioIn}.ar(1);  
  \text{livesig2} = \text{AudioIn}.ar(1);  
  \text{livesig3} = \text{AudioIn}.ar(1);  
  \text{cssig} = .43;  
  \text{livsig} = .0;  
  \text{time} = 1.5;  
  \# freq, hasFreq = Pitch.kr(livesig2, \text{ampThreshold: .002, median: 1, peakThreshold: .4});  
  \text{hasFreq} = \text{hasFreq} * .002;  
  \text{t} = \text{Trig1}.kr(\text{Amplitude}.kr(livesig3, \text{add: -.20}), 2.5);  
  \text{inp1} = \text{livesig} * \text{t};  
  \text{sig3} = \text{Concatenate}.ar(\text{corpusBuf, livesig, lowThresh, audFileCnt}, (\text{time} * .28), 0, \text{anaArray, freq, hasFreq});  
  \text{sig4} = \text{Concatenate}.ar(\text{corpusBuf, livesig, lowThresh, audFileCnt}, (\text{time} * 1.275), 0, \text{anaArray, freq, hasFreq});  
  \text{sig5} = \text{Concatenate}.ar(\text{corpusBuf, livesig, lowThresh, audFileCnt}, (\text{time} * 1.00), 0, \text{anaArray, freq, hasFreq});  
  \text{sig6} = \text{Concatenate}.ar(\text{corpusBuf, inp1, lowThresh, audFileCnt}, (\text{time} * 0.88), 0, \text{anaArray, freq, hasFreq});  
  \text{sig7} = \text{Concatenate}.ar(\text{corpusBuf, inp1, lowThresh, audFileCnt}, (\text{time} * 1.1), 0, \text{anaArray, freq, hasFreq});  
  \text{sig1} = \text{DelayC}.ar(\text{sig3, 0.3, LFNoise1}.kr(0.1, 0.1, 0.11));  
  \text{sig2} = \text{DelayC}.ar(\text{sig5, 0.3, LFNoise1}.kr(0.1, 0.1, 0.11));
Out.ar(0, [sig4 + sig6 + sig3, sig5 + sig1 + sig7] * cssig);
}
).send(s);
)

X. Its Course

hoSyn102bb.aif       hoSyn102bb.aif.analysis
crossC.aif           crossC.aif.analysis
bikingSea.aif        bikingSea.aif.analysis

(  
  SynthDef('concatenator10, (arg corpusBuf, liveinput=0, lowThresh, audFileCnt, pitchwt, crossFade, parameterVal, hold, gate, audioin=1, anaArray;  
    var env, sig8, sig1, sig2, sig3, sig4, sig5, sig6, sig7, livesig, livesig2, anaArray2, mainsig, cssig, freq,  
    hasFreq, livsig;  
    var t, inp1, livesig3, sig9, sig10, sig11, sig12;  
    env=EnvGen.ar(Env.asr(0,1,0.2), gate: gate, doneAction:2);  
    livesig = AudioIn.ar(1);  
    livesig2 = AudioIn.ar(1);  
    livesig3 = AudioIn.ar(1);  
    cssig = 0.45;  
    livsig = 0.0;  
    # freq, hasFreq = Pitch.kr(livesig2, ampThreshold: 0.002, median: 1, peakThreshold: 0.4);  
    hasFreq = hasFreq * 0.002;  
    t = Trig1.kr(Amplitude.kr(livesig3, add: -0.18), 2.5);  
    inp1 = livesig * t;  

    sig1 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.8525, 1, parameterVal, 0, anaArray,  
           freq, hasFreq);  
    sig2 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.55, 1, parameterVal, 0, anaArray,  
           freq, hasFreq);  
    sig3 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, 0.3875, 1, parameterVal, 0, anaArray,  
           freq, hasFreq);  
    sig4 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, 0.17, 1, parameterVal, 0, anaArray,  
           freq, hasFreq);  
    sig5 = Concatenate.ar(corpusBuf, sig4, lowThresh, audFileCnt, 0.53407, 1, parameterVal, 0, anaArray,  
           freq, hasFreq);  
    sig6 = Concatenate.ar(corpusBuf, livesig, lowThresh, audFileCnt, 0.465, 1, parameterVal, 0, anaArray,  
           freq, hasFreq);  
    sig7 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.5425, 1, parameterVal, 0, anaArray,  
           freq, hasFreq);  
    sig8 = Concatenate.ar(corpusBuf, inp1, lowThresh, audFileCnt, 0.775, 1, parameterVal, 0, anaArray,  
           freq, hasFreq);  
    sig9 = DelayC.ar(sig2, 0.3, LFNoise1.kr(0.1, 0.1, 0.11));  
    sig10 = DelayC.ar(sig1, 0.3, LFNoise1.kr(0.1, 0.1, 0.11));  
    sig11 = DelayC.ar(sig5, 0.3, LFNoise1.kr(0.1, 0.1, 0.11));  
    sig12 = DelayC.ar(sig7, 0.3, LFNoise1.kr(0.1, 0.1, 0.11));  
  Out.ar(0, [sig1 + sig3 + sig9, sig2 + sig4 + sig12, sig5 + sig6 + sig10, sig7 + sig8 + sig11] * cssig);  
  )}.send(s);
Prelude

(I)

Tenor Sax.

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II. The Possible

I spent years, on and off, in academe.
Taught at places I couldn't get near
as a student. But never wrote a line
about that time. Never. Nothing stayed
with me in those days. I was a stranger,
and an imposter, even to myself. Except
at that one school. That distinguished
institution in the midwest. Where
my only friend, and my colleague,
the Chaucerian, was arrested for beating his wife.
And threatening her life over the phone,
a misdemeanor. He wanted to put her eyes out.
Set her on fire for cheating.
The guy she was seeing, he was going to hammer him
into the ground like a fence post.

He lost his mind for a time, while she moved away
to a new life. Thereafter, he taught
his classes weeping drunk. More than once
wore his lunch on his shirt front.
I was no help. I was fading fast myself.
But seeing the way he was living, so to speak,
I understood I hadn't strayed so far from home
after all. My scholar-friend. My old pal.
At long last I'm out of all that.
And you, I pray your hands are steady,
and that you're happy tonight. I hope some woman
has just put her hand under your clean collar
a minute ago, and told you she loves you.
Believe her, if you can, for it's possible she means it.
Is someone who will be true, and kind to you.
All your remaining days.
The Old Days
(III)

Solo Opening

\textit{tranquillo}

Voice Start

"Phone Ring"

"someone pulled a knife"

fade out

"But you talked him down"

"Anyway your in Pittsburg and...

Voice CS Feed OFF

"It was then I remembered"

"Rang"

"I love you Bro"

"Hung up"
III. The Old Days

[tenor saxophone starts - wait for cue from tenor sax performer]
You'd dozed in front of the TV minutes in front of the TV
but you hadn't been to bed yet because it was screaming at you
when you called. I was asleep, to get it a drink when you woke up.
or nearly, when the phone rang. Anyway, you're in Pittsburgh,
You wanted to tell me you'd thrown and I'm in here in this
a party. And I was missed. little town on the other side
It was like the old days, you of the country. Most everyone
said, and laughed. has cleared out of our lives now.
Dinner was a disaster. You wanted to call me up and say hello.
Everybody dead drunk by the time To say you were thinking
food hit the table. People about me, and of the old days.
were having a good time, a great To say you were missing me.
time, a hell of a time, until It was then I remembered
somebody took somebody back to those days and how
else's fiancee upstairs. Then telephones used to jump when they rang.
somebody pulled a knife. And the people who would come
But you got in front of the guy in those early-morning hours
time as he was going upstairs to pound on the door in alarm.
and talked him down. Never mind the alarm felt inside.
Disaster narrowly averted, I remember that, and gravy dinners.
you said, and laughed again. Knives lying around, waiting
You didn't remember much else for trouble. Going to bed
of what happened after that. and hoping I wouldn't wake up.
People got into their coats I love you, Bro, you said.
and began to leave. You And then a sob passed
must have dropped off for a few between us. I took hold
of the receiver as if
it were my buddy's arm.
And I wished for us both
I could put my arms
around you, old friend.
I love you too, Bro.
I said that, and then we both hung up.
Interlude

(IV)

A  energetico

B

10

14

repeat A once

18

parameter Change - 7

21

24

wander - G whole tone

various approaches  slow, wander

slow, wander

niente
When his mother called for the second time that day, she said:
“I don't have any strength left. I want to lay down all the time.”

“Did you take your iron?” he wanted to know. He sincerely wanted to know. Praying daily, hopelessly, that iron might make a difference. “Yes, but it just makes me hungry. And I don't have anything to eat.”

He pointed out to her they'd shopped for hours that morning. Brought home eighty dollars' worth of food to stack in her cupboards and the fridge. “There's nothing to eat in this goddamn house but baloney and cheese,“ she said. Her voice shook with anger. “Nothing!” “And how's your cat? How's Kitty doing?” His own voice shook. He needed to get off this subject of food; it never brought them anything but grief.

“Kitty, “ his mother said. “Here, Kitty. Kitty, Kitty. She won't answer me, honey. I don't know this for sure, but I think she jumped into the washing machine when I was about to do a load. And before I forget, that machine's making a banging noise. I think there's something
the matter with it. Kitty! She won't answer me. Honey, I'm afraid. I'm afraid of everything. Help me, please. Then you can go back to whatever it was you were doing. Whatever it was that was so important I had to take the trouble to bring you into this world.”
She slumps in the booth, weeping into the phone. Asking a question or two, and weeping some more. Her companion, an old fellow in jeans and denim shirt, stands waiting his turn to talk, and weep. She hands him the phone. For a minute they are together in the tiny booth, his tears dropping alongside hers. Then she goes to lean against the fender of their sedan. And listens to him talk about arrangements.

I watch all this from my car. I don't have a phone at home, either. I sit behind the wheel, smoking, waiting to make my own arrangements. Pretty soon he hangs up. Comes out and wipes his face. They get in the car and sit with the windows rolled up. The glass grows steamy as she leans into him, as he puts his arm around her shoulders. The workings of comfort in that cramped, public place.

I take my small change over to the booth, and step inside. But leaving the door open, it's
so close in there. The phone still warm to the touch.
I hate to use a phone
that's just brought news of death.
But I have to, it being the only phone
for miles, and one that might
listen without taking sides.

I put in the coins and wait.
Those people in the car wait too.
He starts the engine then kills it.
Where to? None of us able
to figure it. Not knowing
where the next blow might fall,
or why. The ringing at the other end
stops when she picks it up.
Before I can say two words, the phone
begins to shout, “I told you it's over!
Finished! You can go
to hell as far as I'm concerned!”

I drop the phone and pass my hand
across my face. I close and open the door.
The couple in the sedan roll
their windows down and
watch, their tears stilled
for a moment in the face of this distraction.
Then they roll their windows up
and sit behind the glass. We
don't go anywhere for a while.
And then we go.
My Boat
(VII)

Tenor Sax.

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VII. My Boat

[tenor saxophone starts - wait for cue from tenor sax performer]

My boat is being made to order. Right now it's about to leave
the hands of its builders. I've reserved a special place
for it down at the marina. It's going to have plenty of room
on it for all my friends: Richard, Bill, Chuck, Toby, Jim, Hayden,
Gary, George, Harold, Don, Dick, Scott, Geoffrey, Jack,
Paul, Jay, Morris, and Alfredo. All my friends! They know who
they are.

Tess, of course. I wouldn't go anywhere without her.
And Kristina, Merry, Catherine, Diane, Sally, Annick, Pat,
Judith, Susie, Lynne, Cindy, Jean, Mona.

Doug and Amy! They're family, but they're also my friends,
and they like a good time. There's room on my boat
for just about everyone. I'm serious about this!
There'll be a place on board for everyone's stories.
My own, but also the ones belonging to my friends.
Short stories, and the ones that go on and on. The true
and the made-up. The ones already finished, and the ones still
being written.

Poems, too! Lyric poems, and the longer, darker narratives.
For my painter friends, paints and canvases will be on board
my boat.

We'll have fried chicken, lunch meats, cheeses, rolls,
French bread. Every good thing that my friends and I like.
And a big basket of fruit, in case anyone wants fruit.

In case anyone wants to say he or she ate an apple,
or some grapes, on my boat. Whatever my friends want,
name it, and it'll be there. Soda pop of all kinds.

Beer and wine, sure. No one will be denied anything, on
my boat.
We'll go out into the sunny harbor and have fun, that's the idea.
Just have a good time all around. Not thinking
about this or that or getting ahead or falling behind.

Fishing poles if anyone wants to fish. The fish are out there!
We may even go a little way down the coast, on my boat.
But nothing dangerous, nothing too serious.
The idea is simply to enjoy ourselves and not get scared.
We'll eat and drink and laugh a lot, on my boat.
I've always wanted to take at least one trip like this,
with my friends, on my boat. If we want to
we'll listen to Schumann on the CBC.
But if that doesn't work out, okay,
we'll switch to KRAB, The Who, and the Rolling Stones.
Whatever makes my friends happy! Maybe everyone
will have their own radio, on my boat. In any case,
we're going to have a big time. People are going to have fun,
and do what they want to do, on my boat.
VIII. The Car

The car with the cracked windshield.
The car that threw a rod.
The car without brakes.
The car with a faulty U-joint.
The car with a hole in its radiator.
The car I picked peaches for.
The car with no reverse gear.
The car I traded for a bicycle.
The car with steering problems.
The car with generator trouble.
The car with no back seat.
The car with the torn front seat.
The car that burned oil.
The car with rotten hoses.
The car that left the restaurant without paying.
The car with bald tires.
The car with no heater or defroster.
The car with its front end out of alignment.
The car the child threw up in.
The car I threw up in.
The car with a blown head-gasket.
The car I left on the side of the road.
The car that leaked carbon monoxide.
The car with a sticky carburetor.
The car that hit the dog and kept on going.
The car with a hole in its muffler.
The car with no muffler.
The car my daughter wrecked.
The car with the twice-rebuilt engine.
The car with corroded battery cables.
The car bought with a bad check.
Car of my sleepless nights.
The car with a stuck thermostat.
The car whose engine caught fire.
The car with no headlights.
The car with a broken fan belt.
The car with wipers that wouldn't work.
The car I gave away.
The car with transmission trouble.
The car I washed my hands of.
The car I struck with a hammer.
The car with payments that couldn't be met.
The reposessed car.
The car whose clutch-pin broke.
The car waiting on the back lot.
Car of my dreams.
My car.
IX. The Cobweb

A few minutes ago, I stepped onto the deck of the house. From there I could see and hear the water, and everything that's happened to me all these years. It was hot and still. The tide was out.

No birds sang. As I leaned against the railing a cobweb touched my forehead. It caught in my hair. No one can blame me that I turned and went inside. There was no wind. The sea was dead calm. I hung the cobweb from the lampshade. Where I watched it shudder now and then when my breath touches it. A fine thread. Intricate.

Before long, before anyone realizes, I'll be gone from here.
Its Course

(X)

niemela

Tenor Sax.

Solo Intro

Slow, meandering

Start Voice

"noise like water..." ADD

lively, energetic

"Right where you’re living"

Parameter Change - 4

Voice CS Feed OFF

"and for a moment I imagine"

lively, energetic

"after in this life"

Voice CS Feed ON

Voice CS Feed OFF

"disappear in a..."

Slow, meandering

End Voice

Solo Exit

work down to

niente
X. Its Course

[tenor saxophone starts – wait for cue from tenor sax performer]

The man who took 38 steelhead out of this little river last winter (his name is Bill Zitter, "last name in the directory") told me the river's changed its course dramatically, he would even say radically, since he first moved here, he and his wife. It used to flow "yonder, where those houses are." When salmon crossed that shoal at night, they made a noise like water boiling in a cauldron, a noise like you were scrubbing something on a washboard. "It could wake you up from a deep sleep." Now, there's no more salmon run. And he won't fish for steelhead this winter, because Mrs. Zitter's eaten up with cancer. He's needed at home. The doctors expect she'll pass away before the New Year.

"Right where you're living," he goes on, "that used to be a motorcycle run. They'd come from all over the country to race their bikes. They'd tear up that hill and then go down the other side. But they were just having fun. Young guys. Not like those gangs today, those bad apples." I wished him luck. Shook his hand. And went home to my house, the place they used to race motorcycles.

Later, at the table in my room, looking out over the water, I give some thought to just what it is I'm doing here. What it is I'm after in this life. It doesn't seem like much, in the end. I remembered what he'd said about the young men and their motorcycles. Those young men who must be old men now. Zitter's age, or else my age. Old enough, in either case. And for a moment I imagine the roar of the engines as they surge up this hill, the laughter and shouting as they spill, swear, get up, shake themselves off, and walk their bikes to the top. Where they slap each other on the back and reach in the burlap bag for a beer. Now and then one of them gunning it for all it's worth, forcing his way to the top, and then going lickety-split down the other side! Disappearing in a roar, in a cloud of dust.
Right outside my window is where
all this happened. We vanish soon enough.
Soon enough, eaten up.
BIBLIOGRAPHY

The Old Days, My Boat from *Where Water Comes Together with Other Water* by Raymond Carver, copyright © 1985 by Raymond Carver, 1996 by Tess Gallagher, used by her permission.


APPENDIX A

CONCATENATE

SUPERCOLLIDER CONCATENATIVE SYNTHESIZER PLUG-IN

Concatenate.ar(corpusbufnum, live input, threshold, unit length, crossfade, matching, continuous, analysisbufnum)

Live input concatenative synthesizer. Searches analysis buffer and concatenates units from associated corpus buffer by similar/opposite audio characteristics to live input. Operates continuously or in bursts with input. Prior library analysis of each source file by Conanalyse is required (recommended Conanalyser GUI).

Can be used in simultaneous instances (with different concatenation parameters) from same/different corpus and associated analysis files for layering/chaining/multichannel effects. Ugen is mono.

**corpusbufnum** - audio buffer number of source corpus file. Up to 48 source files (with analysis files) can be used with Concatenator GUI.

**live input** - audio input at 44100 for concatenation control.

**cut-off** - noise floor/low volume limiting in live input (0-1). Default is 0.0005

**unit length** - 0 is random unit lengths from 0.1 to 0.4 secs. A float value >= 0.1 determines fixed unit lengths up to 1.0". Lower limit is 0.1 second.

**crossfade** - click control (1), or not (0) between units.

**matching** - code for matrix of similar/opposite matching of pitch, amplitude, spectral centroid,
spectral tilt (see below) to live input.

**continuous** - continuous concatenation after sensing input (1), or burst mode with input (0).

**analysisbufnum** - buffer number of analysis data. Must be generated by Conanalysis.

matching matrix: (Use Numerical code)

0  Oppose amp, Match freq, Match spectral center, Match spectral tilt
1  Match amp, Oppose freq, Match spectral center, Match spectral tilt
2  Match amp, Match freq, Oppose spectral center, Match spectral tilt
3  Match amp, Match freq, Match spectral center, Oppose spectral tilt
4  Oppose amp, Oppose freq, Match spectral center, Match spectral tilt
5  Oppose amp, Match freq, Oppose spectral center, Match spectral tilt
6  Oppose amp, Match freq, Match spectral center, Oppose spectral tilt
7  Match amp, Oppose freq, Oppose spectral center, Match spectral tilt
8  Match amp, Oppose freq, Match spectral center, Oppose spectral tilt
9  Match amp, Match freq, Oppose spectral center, Oppose spectral tilt
10 Oppose amp, Oppose Freq, Oppose spectral center, Match spectral tilt
11 Oppose amp, Oppose freq, Match spectral center, Oppose spectral tilt
12 Oppose amp, Match freq, Oppose spectral center, Oppose spectral tilt
13 Match amp, Oppose freq, Oppose spectral center, Oppose spectral tilt
14 Oppose amp, Oppose freq, Oppose spectral center, Oppose spectral tilt
15 Match amp, Match freq, Match spectral center, Match spectral tilt
Code Examples:

```lisp
(s.sendMsg('allocRead, 0, "@Volumes/HD/Users/user/Folder/AudioFile.aif", 0, 0);
(s.sendMsg('allocRead, 1, "@Volumes/HD/Users/user/Folder/AudioFile.aif.analysis", 0, 0);

SynthDef('concatenator, {arg corpusbuf, liveinput=0, lowThresh, unitLength, crossFade, parameterVal, contcon, gate, anaArray;
  var env, sig1, sig2, livesig, anaArray2;
  env=EnvGen.ar(Env.asr(0,1,0.2), gate: gate, doneAction:2);
  livesig = SoundIn.ar(liveinput);
  anaArray);
  sig1 = Concatenate.ar(corpusBuf, livesig, lowThresh, unitLength, crossFade, parameterVal, contcon, anaArray);
  sig2 = Concatenate.ar(corpusBuf, sig1, lowThresh, unitLength, crossFade, parameterVal, contcon, anaArray);
  Out.ar(0, [sig1, sig2]) * env;
}).send(s);

(s.sendMsg('new, 'concatenator, x=s.nextNodeID, 1, 'corpusbuf, 0, 'liveinput, 0, 'lowThresh, 0.008, 'unitLength, 0, 'crossFade, 0, 'parameterVal, 15, 'contcon, 0, 'gate, 0, 'anaArray, 1);
```
APPENDIX B
BLOCK DIAGRAM OF CONCATENATE PLUG-IN
(grey areas are a single module - stackable)

Audio Input

Input Threshold

Amplitude detection
Zero Crossings
FFT Analysis:
Spectral Tilt
Spectral Centroid

Pitch Detection

Corpus Metadata

Audio Corpus

Search Algorithm:
Switchable matching
Criteria

Concatenation Process:
Unit Sizing
Cross fading
Continuous output / Burst

Mono audio output stream
Douglas M. Niemela was born in Gainesville, Florida on December 30, 1963. He received a B.A. in Interdisciplinary Humanities at the University of Maryland in 1988, with concentrations in art history, world literature, and international law. Concurrent studies were conducted at Berklee College of Music in bass studies and jazz arranging.

From 1995 to 2001, Douglas M. Niemela was a computer graphics troubleshooter for Microsoft Corporation in Redmond, Washington, specializing in PostScript programming for product print and packaging graphics. He entered the University of Washington and received an M.M. in composition in 2006. At the University of Washington, he has taught classes in desktop music technology, assembled sound reinforcement systems for the School of Music, and assisted in concert production.

Douglas M. Niemela has composed for theater, dance, live and computer music performances while at the University of Washington. He has performed and taught on electric bass in Washington, DC, San Francisco, Boston, and Seattle.