Appendix A

Appendix: analysis of works

A.1 TPC and network analysis of Saariaho's *NoaNoa*

A.1.1 *NoaNoa* bars 1–21 TPC analysis and pass 1 network

$$\mathrm{TPC}(1) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\mathrm{IC4})\big) \\ \mathrm{FREEZE}\,\Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(1) \end{bmatrix}. \tag{A.1}$$

$$\mathrm{TPC}(2) = \begin{bmatrix} \beta\big(\mathrm{flute}(\mathrm{IC4})\big) \\ \mathrm{FREEZE}\,\Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \end{bmatrix}. \tag{A.2}$$

$$\mathrm{TPC}(3) = \begin{bmatrix} \beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss})\big)\Big) \\ \mathrm{FREEZE}\,\Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(2) \end{bmatrix}. \tag{A.3}$$

$$\mathrm{TPC}(4) = \begin{bmatrix} \beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss})\big)\Big) \\ \mathrm{FREEZE}\,\Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \end{bmatrix}. \tag{A.4}$$

$$\mathrm{TPC}(5) = \begin{bmatrix} \beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss})\big)\Big) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \leftarrow \mathrm{trigger}(3) \end{bmatrix}. \tag{A.5}$$

$$\mathrm{TPC}(6-8) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC5}(\mathrm{trills}), \mathrm{IC0}(\mathrm{trills})\big)\Big) \\ \mathrm{DRY}\ \Big(\mathrm{flute}(\mathrm{harmonics})\Big) \end{bmatrix}. \tag{A.6}$$

$$\mathrm{TPC}(9-11) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\text{several ICs}(\mathrm{filled} + \mathrm{trills})\big)\Big) \\ \mathrm{DRY}\ \Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.7}$$

$$\mathrm{TPC}(12) = \begin{bmatrix} \beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss}, \text{high register})\big)\Big) \\ \mathrm{FREEZE}\ \Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(4) \end{bmatrix}. \tag{A.8}$$

$$\mathrm{TPC}(13-16) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\text{several ICs}(\mathrm{filled} + \mathrm{trills})\big)\Big) \\ \mathrm{DRY}\ \Big(\mathrm{flute}\Big) \leftarrow \mathrm{trigger}(5) \end{bmatrix}. \tag{A.9}$$

$$\mathrm{TPC}(17-19, 1) = \begin{bmatrix} \alpha\Big(\beta\big(\mathrm{flute}(\mathrm{IC1})\big)\mathrm{inversion}\Big) \\ \mathrm{DRY}\ \Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.10}$$

$$\mathrm{TPC}(19, 2-20) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC4}(\mathrm{filled} + \mathrm{trills})\big)\Big) \\ \mathrm{DRY}\ \Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.11}$$

$$\mathrm{TPC}(21) = \begin{bmatrix} \alpha\big(\beta(\mathrm{flute})\mathrm{inversion}\big) \\ \mathrm{DRY}\ \Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.12}$$

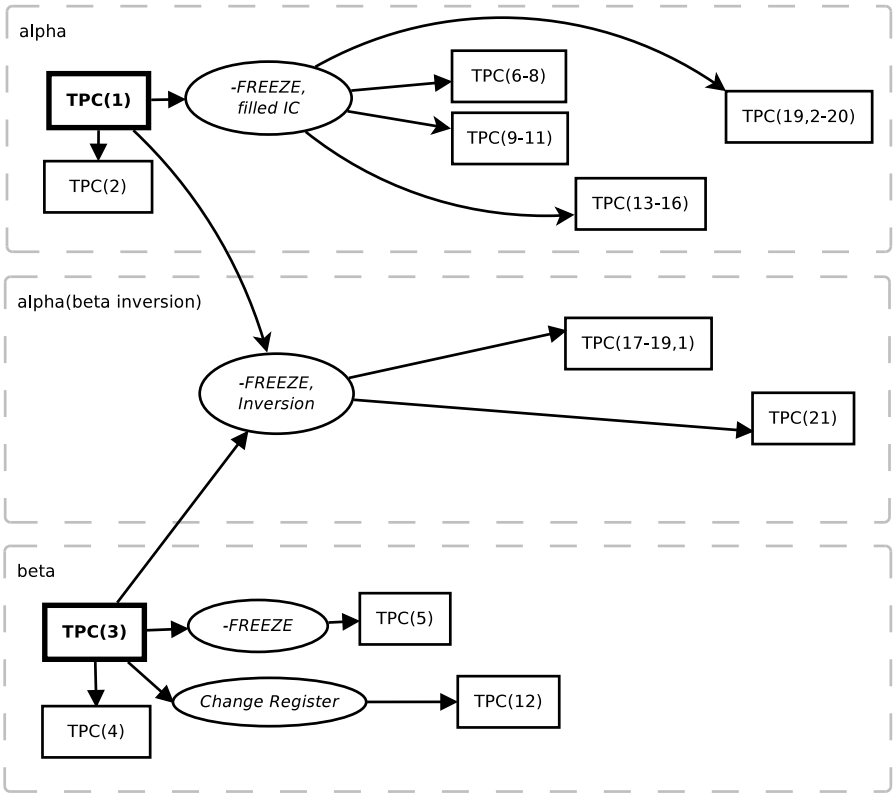


Figure A.1: Transformation network pass 1 from *NoaNoa* (bars 1–21).

A.1.2 *NoaNoa* bars 22–47 TPC analysis and pass 2 network

$$\mathrm{TPC}(22-28) = \left[\begin{array}{l} \gamma\big(\mathrm{flute}(\mathrm{drone}), \mathrm{voice}(\mathrm{words})\big) \\ \mathrm{WhisperSUSTAINED} \left(\begin{array}{r} (\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{ANALYSIS}(\mathrm{amplitude}) \\ \mathrm{inverse} \downarrow \\ (\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{REVERB}(\mathrm{duration}) \end{array}\right) \\ \uparrow \\ \mathrm{trigger}(6) \end{array}\right]. \tag{A.13}$$

$$\mathrm{TPC}(29) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC5}(\mathrm{filled})\big)\Big) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \leftarrow \mathrm{trigger}(7) \end{bmatrix}. \tag{A.14}$$

$$\mathrm{TPC}(30) = \begin{bmatrix} \beta\Big(\mathrm{flute}\big(\mathrm{IC2}(\mathrm{gliss}, \mathrm{flutter\ tongue})\big)\Big) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.15}$$

$$\mathrm{TPC}(31-32) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC3}(\mathrm{filled}), \mathrm{IC6}\big)\Big) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.16}$$

$$\mathrm{TPC}(33) = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\mathit{125C})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED}(\mathrm{flute})\Big) \leftarrow \mathrm{trigger}(8) \end{bmatrix}. \tag{A.17}$$

$$\mathrm{TPC}(34) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC3}(\mathrm{filled})\big)\Big) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.18}$$

$$\mathrm{TPC}(35,1) = \begin{bmatrix} \gamma\big(\mathrm{flute}(\mathrm{drone}), \mathrm{voice}(\mathrm{words})\big) \\ \mathrm{WhisperSUSTAINED}\left(\begin{array}{r} (\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{ANALYSIS}(\mathrm{amplitude}) \\ \mathrm{inverse}\downarrow \\ (\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{REVERB}(\mathrm{duration}) \end{array}\right) \\ \uparrow \\ \mathrm{trigger}(9) \end{bmatrix}. \tag{A.19}$$

$$\mathrm{TPC}(35,2) = \begin{bmatrix} \beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED}(\mathrm{noise})\Big) \leftarrow \mathrm{trigger}(10) \end{bmatrix}. \tag{A.20}$$

$$\mathrm{TPC}(36,1) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\mathrm{IC4})\big) \\ \mathrm{FREEZE}\,\Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(11) \end{bmatrix}. \tag{A.21}$$

$$\mathrm{TPC}(36,2) = \begin{bmatrix} \beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss})\big)\Big) \\ \mathrm{FREEZE}\,\Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \end{bmatrix}. \tag{A.22}$$

$$\mathrm{TPC}(37)^{1} = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{125C})\big)\Big) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED}(\mathrm{flute})\Big) \leftarrow \mathrm{trigger}(12) \end{bmatrix}. \tag{A.23}$$

$$\mathrm{TPC}(38) = \begin{bmatrix} \alpha\big(\beta(\mathrm{flute})\mathrm{inversion}\big) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.24}$$

$$\mathrm{TPC}(39,1) = \begin{bmatrix} \beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss})\big)\Big) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.25}$$

$$\mathrm{TPC}(39,2-40) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{fill},\mathrm{microtone\ trill})\big)\Big) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.26}$$

$$\mathrm{TPC}(41-42) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC4}, \beta\big(\mathrm{IC1}(\mathrm{gliss})\big), \mathrm{IC4}(\mathrm{trill})\big)\Big) \\ \mathrm{FREEZE}\,\Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(13) \end{bmatrix}. \tag{A.27}$$

$$\mathrm{TPC}(43-44) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{several\ ICs}(\mathrm{fill})\big)\Big) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \leftarrow \mathrm{trigger}(14) \end{bmatrix}. \tag{A.28}$$

[1] In the score, there is an indication of 'rev.' at bar 37, but on the recording, there does not seem to be a sustaining reverb effect on neither the flute nor the sample playback, only a sustain continuing the sound from bar 36. [Saariaho, 1997]

$$\mathrm{TPC}(45,1) = \begin{bmatrix} \alpha\big(\beta(\text{flute})\text{inversion}\big) \\ \text{DRY}\,\Big(\text{flute}\Big) \end{bmatrix}. \tag{A.29}$$

$$\mathrm{TPC}(45,2) = \begin{bmatrix} \beta(\text{flute}, \text{PlaySAMPLE}) \\ \text{DRY}(\text{flute}) \\ \text{PlaySAMPLE}\,\Big(\text{PreRECORDED}(\text{sampled flute})\Big) \\ \uparrow \\ \text{trigger}(15) \end{bmatrix}. \tag{A.30}$$

$$\mathrm{TPC}(46-47)^2 = \begin{bmatrix} \beta\Big(\text{flute}\big(\text{IC1}(\text{gliss})\big)\Big) \\ \text{DRY}(\text{flute}) \\ \text{PlaySAMPLE}\left(\begin{array}{r} \text{PreRECORDED}(\text{voice})\text{modulated} \\ \uparrow \\ \text{flute} \rightarrow \text{ANALYSIS} \end{array}\right) \\ \uparrow \\ \text{trigger}(16) \end{bmatrix}. \tag{A.31}$$

[2]The score indicates a 'pre-recorded voice modulated by flute' [Saariaho, 1992] where the modulation may refer to convolution as described in the 1993 ICMC proceedings. [Chabot et al., 1993, 211–212] In bar 48 a female voice is heard, probably the flautist Camilla Hoitenga, and in bar 49 a male voice is heard, presumably the 'pre-recorded voice' in a more recognisable playback. [Saariaho, 1997]

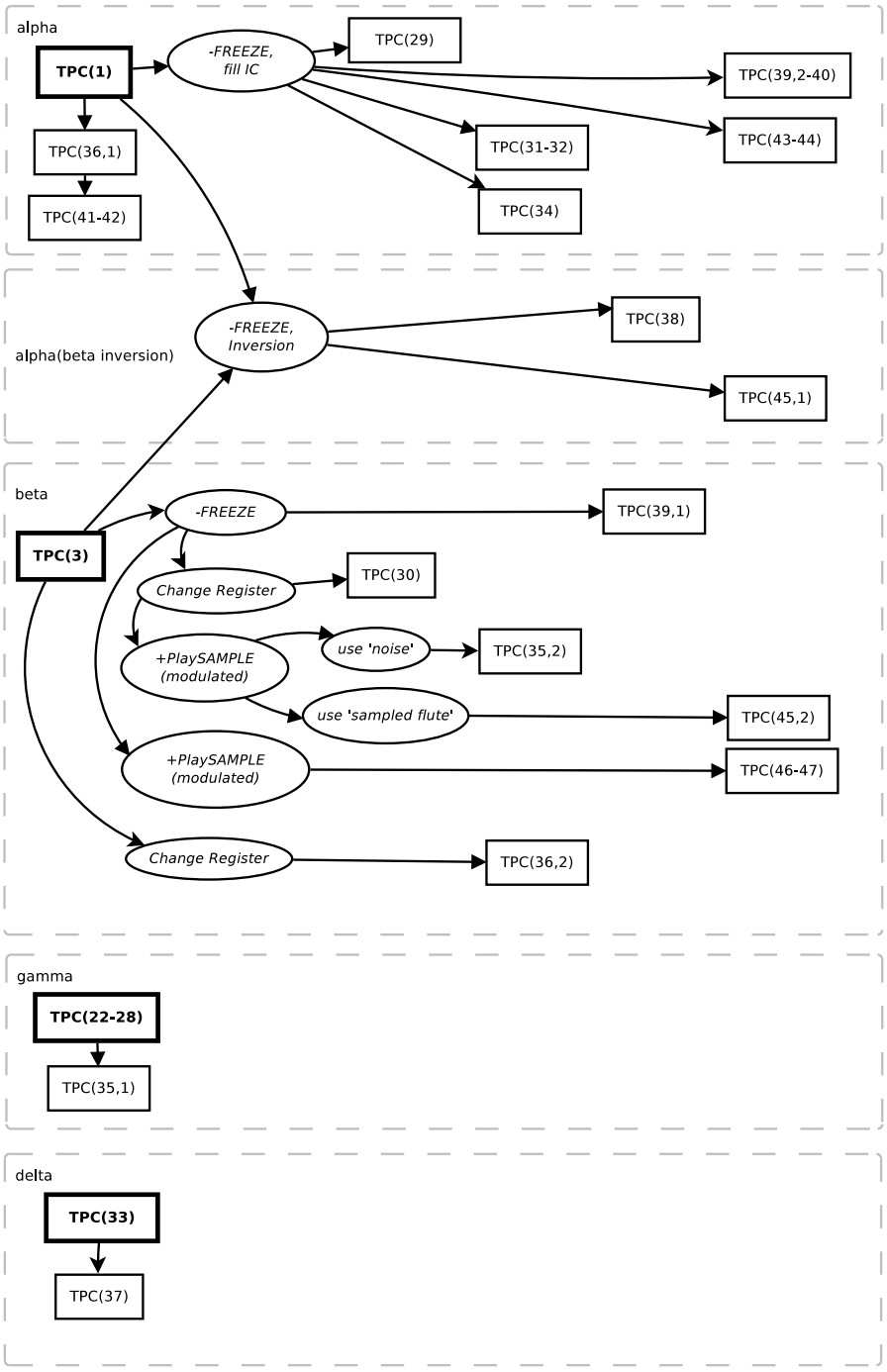


Figure A.2: Transformation network pass 2 from *NoaNoa* (bars 22–47).

A.1.3 *NoaNoa* bars 48–93 TPC analysis and pass 3 network

$$\mathrm{TPC}(48-53) = \left[\begin{array}{l} \gamma\big(\mathrm{flute(drone)}, \mathrm{voice(words)}, \mathrm{PlaySAMPLE(words)}\big) \\ \mathrm{PlaySAMPLE}\left(\begin{array}{r}\mathrm{PreRECORDED(voice)modulated}\\ \uparrow \\ \mathrm{flute} \rightarrow \mathrm{ANALYSIS}\end{array}\right) \\ \mathrm{WhisperSUSTAINED}\left(\begin{array}{r}(\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{ANALYSIS(amplitude)}\\ \mathrm{inverse}\downarrow \\ (\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{REVERB(duration)}\end{array}\right) \\ \uparrow \\ \mathrm{trigger}(17) \end{array}\right]. \tag{A.32}$$

$$\mathrm{TPC}(54)^{3} = \left[\begin{array}{l} \alpha\Big(\mathrm{flute}\big(\mathrm{IC4}, \mathrm{IC5(trill}, \mathrm{gliss)}\big)\Big) \\ \mathrm{PlaySAMPLE}\left(\begin{array}{r}\mathrm{PreRECORDED(voice)modulated}\\ \uparrow \\ \mathrm{flute} \rightarrow \mathrm{ANALYSIS}\end{array}\right) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \leftarrow \mathrm{trigger}(18) \end{array}\right]. \tag{A.33}$$

[3] In bar 54 the PlaySAMPLE(PreRECORDED(voice)modulated) continues from the previous bars, and arguably there is a reference to β in the glissandi. One might suggest an $\alpha-\beta-\gamma$ mixture. However, I denote this bar with an α motif, as this seems to be the predominant idea from the experiential perspective; in other words, the α motif predominates the aural image when listening to the recording. [Saariaho, 1997]

$$\mathrm{TPC}(55)^{4} = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{125C})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{voice})\Big) \leftarrow \mathrm{trigger}(19) \end{bmatrix}. \tag{A.34}$$

$$\mathrm{TPC}(56) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC3}(\mathrm{scale\ fill})\big)\Big) \\ \mathrm{DRY}\Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.35}$$

$$\mathrm{TPC}(57-59) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\mathrm{harmonics}, \mathrm{trills})\big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{flute\ trills})\Big) \leftarrow \mathrm{trigger}(20) \end{bmatrix}. \tag{A.36}$$

$$\mathrm{TPC}(60) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\mathrm{IC5}, \mathrm{IC6}, \mathrm{IC3\ with\ scalar\ fills})\big) \\ \mathrm{DRY}\Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.37}$$

$$\mathrm{TPC}(61) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\mathrm{IC4}), \mathrm{voice}(\mathrm{gliss})\big) \\ \mathrm{FREEZE}\Big((\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(21) \end{bmatrix}. \tag{A.38}$$

$$\mathrm{TPC}(62) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\mathrm{IC1}), \mathrm{voice}(\mathrm{gliss})\big) \\ \mathrm{FREEZE}\Big((\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(22) \end{bmatrix}. \tag{A.39}$$

$$\mathrm{TPC}(63) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\mathrm{IC6}), \mathrm{voice}(\mathrm{gliss})\big) \\ \mathrm{FREEZE}\Big((\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(23) \end{bmatrix}. \tag{A.40}$$

[4] In bar 55 it seems likely that the trigger(19) is a signal to stop the PlaySAMPLE.

$$\mathrm{TPC}(64) = \begin{bmatrix} \alpha\big(\beta(\mathrm{flute})\mathrm{inversion}\big) \\ \mathrm{DRY}\Big(\mathrm{flute}\Big) \leftarrow \mathrm{trigger}(24) \end{bmatrix}. \tag{A.41}$$

$$\mathrm{TPC}(65,1) = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{127A})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \end{bmatrix}. \tag{A.42}$$

$$\mathrm{TPC}(65,2) = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{127A})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{sampled\ flute})\Big) \leftarrow \mathrm{trigger}(25) \end{bmatrix}. \tag{A.43}$$

$$\mathrm{TPC}(66) = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{126B})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{sampled\ flute})\Big) \leftarrow \mathrm{trigger}(26) \end{bmatrix}. \tag{A.44}$$

$$\mathrm{TPC}(67,1) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\mathrm{IC3}, \mathrm{fill})\big) \\ \mathrm{DRY}\Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.45}$$

$$\mathrm{TPC}(67,2) = \begin{bmatrix} \beta\Big(\mathrm{flute}\big(\mathrm{IC2}(\mathrm{gliss})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{sampled\ flute})\Big) \leftarrow \mathrm{trigger}(27) \end{bmatrix}. \tag{A.46}$$

$$\mathrm{TPC}(68) = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{126B})\big), \mathrm{voice}(\mathrm{words})\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{sampled\ flute})\Big) \end{bmatrix}. \tag{A.47}$$

$$\mathrm{TPC}(69-70) = \begin{bmatrix} \alpha\big(\beta(\text{flute})\text{inversion}\big) \\ \text{DRY}\,\Big(\text{flute}\Big) \end{bmatrix}. \tag{A.48}$$

$$\mathrm{TPC}(71) = \begin{bmatrix} \gamma\big(\text{flute(drone)}, \text{voice(words)}\big) \\ \text{WhisperSUSTAINED}\left(\begin{array}{r} (\text{flute}, \text{voice}) \rightarrow \text{ANALYSIS(amplitude)} \\ \text{inverse} \downarrow \\ (\text{flute}, \text{voice}) \rightarrow \text{REVERB(duration)} \end{array}\right) \\ \uparrow \\ \text{trigger(28)} \end{bmatrix}. \tag{A.49}$$

$$\mathrm{TPC}(72,1) = \begin{bmatrix} \alpha\big(\beta(\text{flute})\text{inversion}\big) \\ \text{WhisperSUSTAINED}\left(\begin{array}{r} (\text{flute}, \text{voice}) \rightarrow \text{ANALYSIS(amplitude)} \\ \text{inverse} \downarrow \\ (\text{flute}, \text{voice}) \rightarrow \text{REVERB(duration)} \end{array}\right) \end{bmatrix}. \tag{A.50}$$

$$\mathrm{TPC}(72,2-73) = \begin{bmatrix} \gamma\big(\text{flute(drone)}, \text{voice(words)}\big) \\ \text{WhisperSUSTAINED}\left(\begin{array}{r} (\text{flute}, \text{voice}) \rightarrow \text{ANALYSIS(amplitude)} \\ \text{inverse} \downarrow \\ (\text{flute}, \text{voice}) \rightarrow \text{REVERB(duration)} \end{array}\right) \end{bmatrix}. \tag{A.51}$$

$$\mathrm{TPC}(74-75)=\begin{bmatrix}\gamma\big(\mathrm{flute}\big(\mathrm{IC5}(\mathrm{trill})\big),\mathrm{voice}(\mathrm{words})\big)\\ \mathrm{WhisperSUSTAINED}\begin{pmatrix}(\mathrm{flute},\mathrm{voice})\rightarrow\mathrm{ANALYSIS}(\mathrm{amplitude})\\ \mathrm{inverse}\downarrow\\ (\mathrm{flute},\mathrm{voice})\rightarrow\mathrm{REVERB}(\mathrm{duration})\end{pmatrix}\\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{flute\ noises})\Big)\leftarrow\mathrm{trigger}(29)\end{bmatrix}. \tag{A.52}$$

$$\mathrm{TPC}(76)=\begin{bmatrix}\beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss},\mathrm{flutter})\big)\Big)\\ \mathrm{WhisperSUSTAINED}\begin{pmatrix}(\mathrm{flute},\mathrm{voice})\rightarrow\mathrm{ANALYSIS}(\mathrm{amplitude})\\ \mathrm{inverse}\downarrow\\ (\mathrm{flute},\mathrm{voice})\rightarrow\mathrm{REVERB}(\mathrm{duration})\end{pmatrix}\\ \uparrow\\ \mathrm{trigger}(30,\mathrm{stop\ rev.})\\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{flute\ noises})\Big)\end{bmatrix}. \tag{A.53}$$

$$\mathrm{TPC}(77)=\begin{bmatrix}\beta\Big(\big(\mathrm{flute}(\mathrm{IC1}(\mathrm{gliss})\big),\mathrm{voice}(\mathrm{drone})\Big)\\ \mathrm{DRY}\Big(\mathrm{flute},\mathrm{voice}\Big)\\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{flute\ noises})\Big)\end{bmatrix}. \tag{A.54}$$

$$\mathrm{TPC}(78-83)=\begin{bmatrix}\alpha\big(\mathrm{flute}(\mathrm{several\ ICs},\mathrm{fills},\mathrm{trills})\big)\\ \mathrm{DRY}\Big(\mathrm{flute}\Big)\end{bmatrix}. \tag{A.55}$$

$$\mathrm{TPC}(84,1)=\begin{bmatrix}\beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss},\mathrm{high\ register})\big)\Big)\\ \mathrm{DRY}\Big(\mathrm{flute}\Big)\end{bmatrix}. \tag{A.56}$$

$$\mathrm{TPC}(84,2)=\begin{bmatrix}\gamma(\mathrm{flute},\mathrm{voice})\\ \mathrm{DRY}\Big(\mathrm{flute},\mathrm{voice}\Big)\end{bmatrix}. \tag{A.57}$$

$$\mathrm{TPC}(85-87) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\mathrm{IC5}, \mathrm{IC6\ scalar\ fills})\big) \\ \mathrm{DRY}\ \Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.58}$$

$$\mathrm{TPC}(88-93) = \begin{bmatrix} \beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss}, \mathrm{high\ register}, \mathrm{flutter})\big)\Big) \\ \mathrm{FREEZE}(\mathrm{flute}) \leftarrow \mathrm{triggers}(31-36) \\ \mathrm{PlaySAMPLE} \begin{pmatrix} \mathrm{PreRECORDED(voice)modulated} \\ \uparrow \\ \mathrm{flute} \rightarrow \mathrm{ANALYSIS} \end{pmatrix} \end{bmatrix}. \tag{A.59}$$

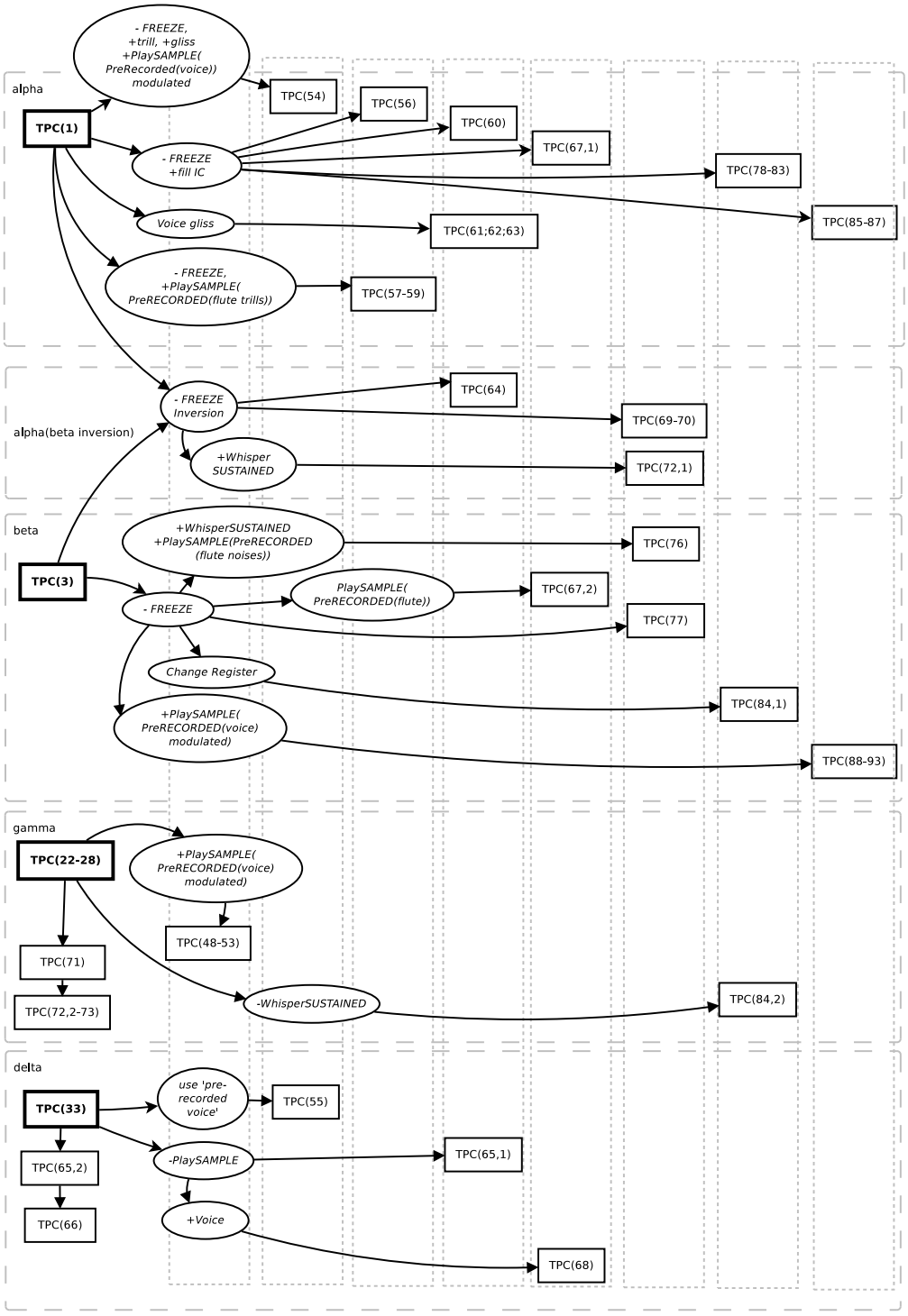


Figure A.3: Transformation network pass 3 from *NoaNoa* (bars 48–93). In this diagram I have added eight vertical boxes with dotted edges, to organise the TPC in sequence, top-to-bottom and left-to-right.

A.1.4 *NoaNoa* bars 94–109 TPC analysis and pass 4 network

$$\mathrm{TPC}(94,1) = \begin{bmatrix} \alpha\big(\mathrm{flute(IC2)}\big) \\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big) \end{bmatrix}. \tag{A.60}$$

$$\mathrm{TPC}(94,2) = \begin{bmatrix} \gamma\big(\mathrm{flute(breath)}, \mathrm{voice(word)}\big) \\ \mathrm{DRY(flute)} \\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED(sampled\ flute)}\Big) \leftarrow \mathrm{trigger}(37) \end{bmatrix}. \tag{A.61}$$

$$\mathrm{TPC}(94,3) = \begin{bmatrix} \alpha\big(\mathrm{flute(IC4)}\big) \\ \mathrm{DRY(flute)} \\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED(sampled\ flute)}\Big) \end{bmatrix}. \tag{A.62}$$

$$\mathrm{TPC}(95,1) = \begin{bmatrix} \gamma\big(\mathrm{flute(breath)}, \mathrm{voice(word)}\big) \\ \mathrm{DRY(flute, voice)} \\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED(sampled\ flute)}\Big) \leftarrow \mathrm{trigger}(38) \end{bmatrix}. \tag{A.63}$$

$$\mathrm{TPC}(95,2) = \begin{bmatrix} \beta\big(\mathrm{flute(IC1)}\big) \\ \mathrm{DRY(flute)} \\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED(sampled\ flute)}\Big) \end{bmatrix}. \tag{A.64}$$

$$\mathrm{TPC}(95,3-96)^{5} = \begin{bmatrix} \gamma\big(\mathrm{flute(breath)}, \mathrm{voice(word)}\big) \\ \mathrm{DRY(flute, voice)} \\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED(sampled\ flute)}\Big) \end{bmatrix}. \tag{A.65}$$

[5] In bars 95–96 the IC1 in the flute might justify a $\alpha\big(\beta(\mathrm{flute})\mathrm{inversion}\big)$ description such as in

$$\mathrm{TPC}(97,1) = \begin{bmatrix} \alpha\big(\beta(\text{flute})\text{inversion}\big) \\ \text{DRY}\,\Big(\text{flute}\Big) \end{bmatrix}. \tag{A.66}$$

$$\mathrm{TPC}(97,2-99) = \begin{bmatrix} \gamma\big(\text{flute(breath)}, \text{voice(word)}\big) \\ \text{DRY(flute, voice)} \end{bmatrix}. \tag{A.67}$$

$$\mathrm{TPC}(100,1) = \begin{bmatrix} \alpha\big(\text{flute(IC6)}\big) \\ \text{DRY}\,\Big(\text{flute}\Big) \end{bmatrix}. \tag{A.68}$$

$$\mathrm{TPC}(100,2) = \begin{bmatrix} \gamma(\text{flute, voice}) \\ \text{DRY(flute, voice)} \\ \text{PlaySAMPLE}\,\Big(\text{PreRECORDED(sampled flute)}\Big) \leftarrow \text{trigger(39)} \end{bmatrix}. \tag{A.69}$$

$$\mathrm{TPC}(100,3) = \begin{bmatrix} \alpha\big(\beta(\text{flute})\text{inversion}\big) \\ \text{DRY}\,\Big(\text{flute}\Big) \\ \text{PlaySAMPLE}\,\Big(\text{PreRECORDED(sampled flute)}\Big) \end{bmatrix}. \tag{A.70}$$

$$\mathrm{TPC}(101,1) = \begin{bmatrix} \alpha(\text{flute}) \\ \text{DRY(flute)} \\ \text{PlaySAMPLE}\,\Big(\text{PreRECORDED(sampled flute)}\Big) \leftarrow \text{trigger(40)} \end{bmatrix}. \tag{A.71}$$

$$\mathrm{TPC}(101,2) = \begin{bmatrix} \gamma\big(\text{flute(breath)} + \text{voice}\big) \\ \text{DRY(flute, voice)} \\ \text{PlaySAMPLE}\,\Big(\text{PreRECORDED(sampled flute)}\Big) \end{bmatrix}. \tag{A.72}$$

TPC(97,1). However, in this segmentation I am giving priority to the γ motif, as I am not attempting to thoroughly disentangle Saariaho's pitch set development.

$$\mathrm{TPC}(102-103,1)=\begin{bmatrix}\alpha\big(\mathrm{flute}(\text{several ICs},\mathrm{fills})\big)\\ \mathrm{DRY}\,\Big(\mathrm{flute}\Big)\end{bmatrix}. \tag{A.73}$$

$$\mathrm{TPC}(103,2)=\begin{bmatrix}\gamma\big(\mathrm{flute}(\mathrm{breath}),\mathrm{voice}\big)\\ \mathrm{DRY}(\mathrm{flute},\mathrm{voice})\\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED}(\text{sampled flute})\Big)\leftarrow\mathrm{trigger}(41)\end{bmatrix}. \tag{A.74}$$

$$\mathrm{TPC}(103,3-104,1)=\begin{bmatrix}\alpha\big(\mathrm{flute}(\text{several ICs})\big)\\ \mathrm{DRY}(\mathrm{flute})\\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED}(\text{sampled flute})\Big)\end{bmatrix}. \tag{A.75}$$

$$\mathrm{TPC}(104,2)=\begin{bmatrix}\gamma\big(\mathrm{flute}(\mathrm{breath}),\mathrm{voice}\big)\\ \mathrm{DRY}(\mathrm{flute},\mathrm{voice})\end{bmatrix}. \tag{A.76}$$

$$\mathrm{TPC}(104,3-105,1)=\begin{bmatrix}\alpha\big(\mathrm{flute}(\text{several ICs},\mathrm{fills})\big)\\ \mathrm{DRY}(\mathrm{flute})\end{bmatrix}. \tag{A.77}$$

$$\mathrm{TPC}(105,2)=\begin{bmatrix}\gamma\big(\mathrm{flute}(\mathrm{breath}),\mathrm{voice}\big)\\ \mathrm{DRY}(\mathrm{flute},\mathrm{voice})\\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED}(\text{sampled flute})\Big)\leftarrow\mathrm{trigger}(42)\end{bmatrix}. \tag{A.78}$$

$$\mathrm{TPC}(105,3-106,1)=\begin{bmatrix}\alpha\Big(\big(\beta(\mathrm{flute})\mathrm{inversion}\big),\mathrm{voice}\Big)\\ \mathrm{DRY}(\mathrm{flute},\mathrm{voice})\\ \mathrm{PlaySAMPLE}\,\Big(\mathrm{PreRECORDED}(\text{sampled flute})\Big)\end{bmatrix}. \tag{A.79}$$

$$\mathrm{TPC}(106,2) = \begin{bmatrix} \gamma\big(\mathrm{flute}(\mathrm{breath}), \mathrm{voice}\big) \\ \mathrm{DRY}(\mathrm{flute}, \mathrm{voice}) \end{bmatrix}. \tag{A.80}$$

$$\mathrm{TPC}(106,3-107) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\text{several ICs}, \mathrm{fills})\big) \\ \mathrm{DRY}(\mathrm{flute}) \end{bmatrix}. \tag{A.81}$$

$$\mathrm{TPC}(108,1) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\text{IC3},\ \mathrm{fills}(\beta)\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \end{bmatrix}. \tag{A.82}$$

$$\mathrm{TPC}(108,2) = \begin{bmatrix} \gamma\big(\mathrm{flute}(\mathrm{breath}), \mathrm{voice}(\textit{l'arbre})\big) \\ \mathrm{DRY}(\mathrm{flute}, \mathrm{voice}) \end{bmatrix}. \tag{A.83}$$

$$\mathrm{TPC}(108,3) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\text{IC1},\ \mathrm{fills}(\beta)\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \end{bmatrix}. \tag{A.84}$$

$$\mathrm{TPC}(109) = \begin{bmatrix} \gamma\big(\mathrm{flute}(\mathrm{breath}) + \mathrm{voice}(\textit{sentait})\big) \\ \mathrm{DRY}(\mathrm{flute}, \mathrm{voice}) \end{bmatrix}. \tag{A.85}$$

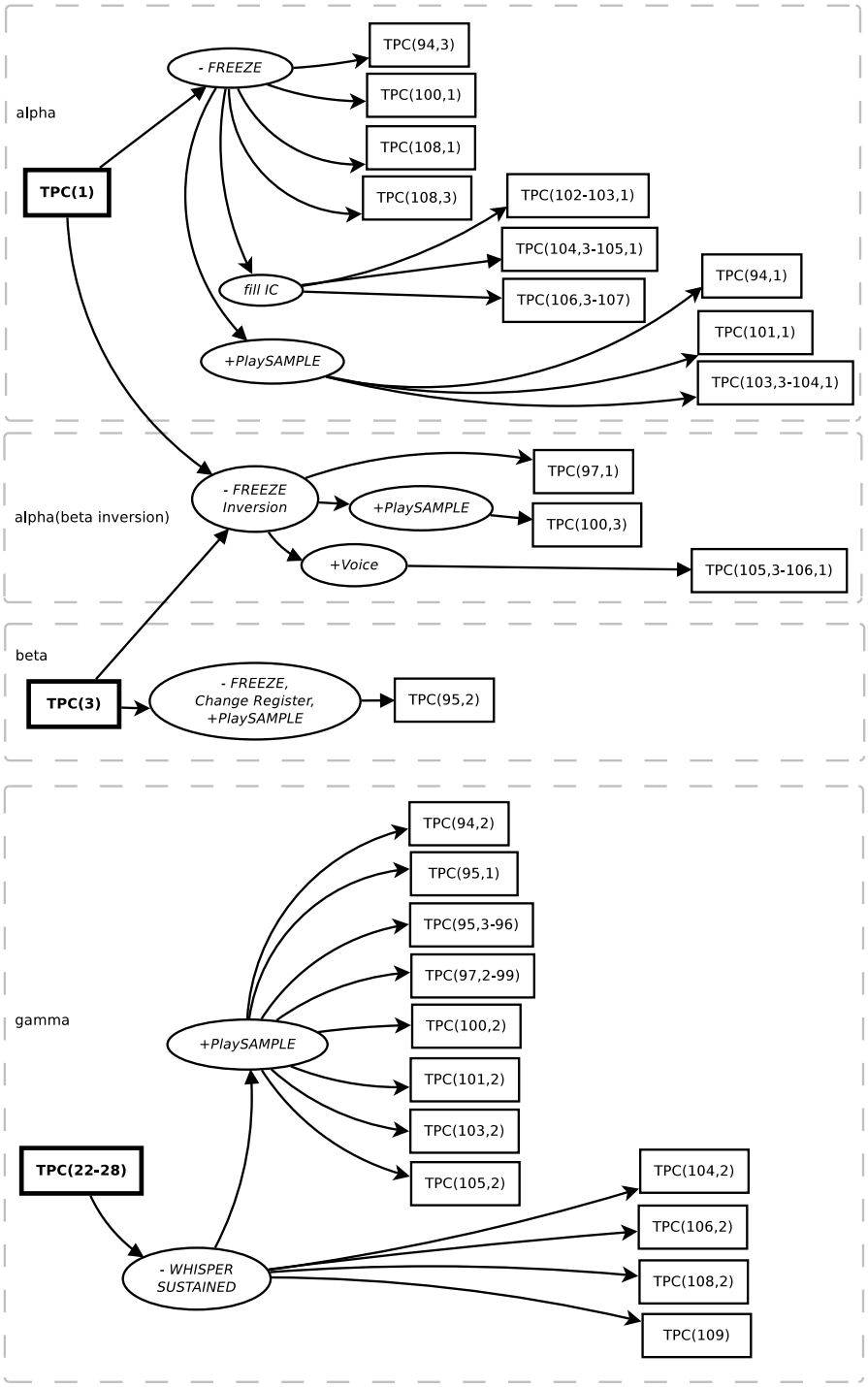


Figure A.4: Transformation network pass 4 from *NoaNoa* (bars 94–109).

A.1.5 *NoaNoa* bars 110–175 TPC analysis and pass 5 network

$$\mathrm{TPC}(110) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\mathrm{IC5}, \mathrm{fill}, \mathrm{trill})\big) \\ \mathrm{FREEZE}\Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(43) \end{bmatrix}. \tag{A.86}$$

$$\mathrm{TPC}(111) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC4}, \beta\big(\mathrm{IC1}(\mathrm{gliss})\big)\big)\Big) \\ \mathrm{FREEZE}\Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(44) \end{bmatrix}. \tag{A.87}$$

$$\mathrm{TPC}(112) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC5}, \beta\big(\mathrm{IC1}(\mathrm{gliss})\big)\big)\Big) \\ \mathrm{FREEZE}\Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(45) \end{bmatrix}. \tag{A.88}$$

$$\mathrm{TPC}(113) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC6}, \beta\big(\mathrm{IC1}(\mathrm{gliss})\big)\big)\Big) \\ \mathrm{FREEZE}\Big(\mathrm{flute} \rightarrow \mathrm{REVERB}(\textit{infinite})\Big) \leftarrow \mathrm{trigger}(46) \end{bmatrix}. \tag{A.89}$$

$$\mathrm{TPC}(114-116) = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{125C})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \leftarrow \mathrm{trigger}(47) \\ \mathrm{PlaySAMPLE}\begin{pmatrix} \mathrm{PreRECORDED}(\mathrm{voice})\mathrm{modulated} \\ \uparrow \\ \mathrm{flute} \rightarrow \mathrm{ANALYSIS} \end{pmatrix} \leftarrow \mathrm{trigger}(47) \end{bmatrix}. \tag{A.90}$$

$$\mathrm{TPC}(117-118) = \begin{bmatrix} \gamma\big(\mathrm{flute}(\mathrm{drone}), \mathrm{voice}(\mathrm{words})\big) \\ \mathrm{DRY}(\mathrm{flute}, \mathrm{voice}) \\ \mathrm{PlaySAMPLE}\begin{pmatrix} \mathrm{PreRECORDED}(\mathrm{voice})\mathrm{modulated} \\ \uparrow \\ \mathrm{flute} \rightarrow \mathrm{ANALYSIS} \end{pmatrix} \end{bmatrix}. \tag{A.91}$$

$$\mathrm{TPC}(119-123)=\begin{bmatrix}\delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\mathcal{77}G-A)\big)\Big)\\ \mathrm{DRY}(\mathrm{flute})\\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{filtered\ sounds})\Big)\leftarrow\mathrm{trigger}(48)\end{bmatrix}. \tag{A.92}$$

$$\mathrm{TPC}(124)=\begin{bmatrix}\beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss})\big)\Big)\\ \mathrm{DRY}(\mathrm{flute})\\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{filtered\ sounds})\Big)\end{bmatrix}. \tag{A.93}$$

$$\mathrm{TPC}(125-126)^{6}=\begin{bmatrix}\gamma\big(\mathrm{flute}(\mathrm{drone}),\mathrm{voice}(\mathrm{words})\big)\\ \mathrm{WhisperSUSTAINED}\begin{pmatrix}(\mathrm{flute},\mathrm{voice})\rightarrow\mathrm{ANALYSIS}(\mathrm{amplitude})\\ \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\mathrm{inverse}\downarrow\\ (\mathrm{flute},\mathrm{voice})\rightarrow\mathrm{REVERB}(\mathrm{duration})\end{pmatrix}\\ \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\uparrow\\ \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\mathrm{trigger}(49)\\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{filtered\ sounds})\Big)\end{bmatrix}. \tag{A.94}$$

$$\mathrm{TPC}(127)=\begin{bmatrix}\beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss},\mathrm{flutter})\big)\Big)\\ \mathrm{WhisperSUSTAINED}\begin{pmatrix}(\mathrm{flute},\mathrm{voice})\rightarrow\mathrm{ANALYSIS}(\mathrm{amplitude})\\ \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\mathrm{inverse}\downarrow\\ (\mathrm{flute},\mathrm{voice})\rightarrow\mathrm{REVERB}(\mathrm{duration})\end{pmatrix}\\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{filtered\ sounds})\Big)\end{bmatrix}. \tag{A.95}$$

[6]The score specifies at cue 48 (in bar 119) that there will be 'pre-recorded, filtered sounds to bar 124'. [Saariaho, 1992] But on the recording [Saariaho, 1997] it sounds like the pre-recorded part continues into bars 125–127.

$$\mathrm{TPC}(128-130) = \begin{bmatrix} \gamma\Big(\beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss}, \mathrm{flutter})\big)\Big) + \mathrm{voice}(\textit{fleur})\Big) \\ \mathrm{WhisperSUSTAINED} \begin{pmatrix} (\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{ANALYSIS}(\mathrm{amplitude}) \\ \mathrm{inverse} \downarrow \\ (\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{REVERB}(\mathrm{duration}) \end{pmatrix} \\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{filters})\Big) \leftarrow \mathrm{triggers}(50, 51, 52) \end{bmatrix}. \tag{A.96}$$

$$\mathrm{TPC}(131) = \begin{bmatrix} \gamma\Big(\beta\Big(\mathrm{flute}\big(\mathrm{IC1}(\mathrm{gliss}, \mathrm{flutter}, \mathrm{trill})\big)\Big) + \mathrm{voice}(\textit{fan\acute{e}e})\Big) \\ \mathrm{WhisperSUSTAINED} \begin{pmatrix} (\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{ANALYSIS}(\mathrm{amplitude}) \\ \mathrm{inverse} \downarrow \\ (\mathrm{flute}, \mathrm{voice}) \rightarrow \mathrm{REVERB}(\mathrm{duration}) \end{pmatrix} \\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{filters})\Big) \end{bmatrix}. \tag{A.97}$$

$$\mathrm{TPC}(132) = \begin{bmatrix} \alpha\big(\mathrm{flute}(\mathrm{IC1}, \mathrm{IC2})\big) \\ \mathrm{DRY}\Big(\mathrm{flute}\Big) \leftarrow \mathrm{trigger}(53) \\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{filters})\Big) \end{bmatrix}. \tag{A.98}$$

$$\mathrm{TPC}(133) = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{127A})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{filters})\Big) \end{bmatrix}. \tag{A.99}$$

$$\mathrm{TPC}(134) = \begin{bmatrix} \mathrm{DRY}(\mathrm{flute}(\mathrm{pause})) \\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\mathrm{filters})\Big)\ \mathrm{fadeOut} \end{bmatrix}. \tag{A.100}$$

$$\mathrm{TPC}(135) = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{126B})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}(\mathrm{filters})\right) \leftarrow \mathrm{trigger}(54) \end{bmatrix}. \tag{A.101}$$

$$\mathrm{TPC}(136) = \begin{bmatrix} \alpha\big(\beta(\mathrm{flute})\mathrm{inversion}, \beta\ \mathrm{fill}\big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}(\mathrm{filters})\right) \end{bmatrix}. \tag{A.102}$$

$$\mathrm{TPC}(137) = \begin{bmatrix} \alpha\Big(\mathrm{flute}\big(\mathrm{IC3}(\mathrm{filled})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}(\mathrm{filters})\right) \end{bmatrix}. \tag{A.103}$$

$$\mathrm{TPC}(138-141) = \begin{bmatrix} \beta\big(\mathrm{flute}(\mathrm{IC1})\big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}(\mathrm{filters})\right) \end{bmatrix}. \tag{A.104}$$

$$\mathrm{TPC}(142) = \begin{bmatrix} \gamma\big(\mathrm{flute}(\mathrm{drone}), \mathrm{voice}(\mathrm{consonants})\big) \\ \mathrm{DRY}\left(\mathrm{flute}, \mathrm{voice}\right) \end{bmatrix}. \tag{A.105}$$

$$\mathrm{TPC}(143-146) = \begin{bmatrix} \gamma\Big(\alpha\Big(\mathrm{flute}\big((\mathrm{IC1}, \mathrm{IC2}, \mathrm{IC4})(\mathrm{filled})\big)\Big), \mathrm{voice}(\mathrm{syllables\ on\ downbeats})\Big) \\ \mathrm{DRY}(\mathrm{flute}, \mathrm{voice}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}(\mathrm{filters})\right) \end{bmatrix}. \tag{A.106}$$

$$\mathrm{TPC}(147) = \begin{bmatrix} \gamma\Big(\beta\big(\mathrm{flute}(\mathrm{IC1})\big), \mathrm{voice}(\mathrm{consonants})\Big) \\ \mathrm{DRY}(\mathrm{flute}, \mathrm{voice}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}(\mathrm{filters})\right) \mathrm{fadeOut} \end{bmatrix}. \tag{A.107}$$

$$\mathrm{TPC}(148-150,1)=\begin{bmatrix}\gamma\begin{pmatrix}\alpha\Big(\mathrm{flute}\big(\mathrm{ICs(filled)}\big)\Big)\\ \beta\Big(\mathrm{flute}\big(\mathrm{IC1(high\ register)}\big)\Big)\\ \mathrm{voice(syllables\ on\ downbeats)}\end{pmatrix}\\ \mathrm{DRY(flute,voice)}\\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED(filters)}\Big)\leftarrow\mathrm{triggers}(56,57)\end{bmatrix}. \tag{A.108}$$

$$\mathrm{TPC}(150,2-154,1)=\begin{bmatrix}\gamma\Big(\alpha\Big(\mathrm{flute(ICs(filled)}\Big),\mathrm{voice(syllables\ on\ downbeats)}\Big)\\ \mathrm{DRY(flute,voice)}\\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED(filters)}\Big)\leftarrow\mathrm{triggers}(58,59)\end{bmatrix}. \tag{A.109}$$

$$\mathrm{TPC}(154,2-155)=\begin{bmatrix}\gamma\Big(\alpha\Big(\mathrm{flute}\big(\mathrm{ICs(filled)}\big)\Big),\mathrm{voice(syllables\ and\ consonants)}\Big)\\ \mathrm{DRY(flute,voice)}\end{bmatrix}. \tag{A.110}$$

$$\mathrm{TPC}(156-158)=\begin{bmatrix}\delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{125C})\big)\Big)\\ \mathrm{DRY(flute)}\\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}\big(\mathrm{filters(voice)}\big)\Big)\leftarrow\mathrm{trigger}(60)\end{bmatrix}. \tag{A.111}$$

$$\mathrm{TPC}(159)=\begin{bmatrix}\mathrm{DRY}\big(\mathrm{flute(pause)}\big)\\ \mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}\big(\mathrm{filters(voice)}\big)\Big)\ \mathrm{fadeOut}\end{bmatrix}. \tag{A.112}$$

$$\text{TPC}(160-162) = \begin{bmatrix} \gamma\Big(\alpha\Big(\text{flute}\big(\text{ICs}(\text{filled})\big)\Big), \text{voice}(\text{syllables and consonants})\Big) \\ \text{DRY}(\text{flute}, \text{voice}) \end{bmatrix}. \tag{A.113}$$

$$\text{TPC}(163-165) = \begin{bmatrix} \delta\Big(\text{flute}\big(\text{multiphonic}(\textit{125C})\big)\Big) \\ \text{DRY}(\text{flute}) \\ \text{PlaySAMPLE}\left(\text{PreRECORDED}\left(\begin{matrix}\text{filtered and processed} \\ \text{flute sounds}\end{matrix}\right)\right) \\ \uparrow \\ \text{trigger}(61) \end{bmatrix}. \tag{A.114}$$

$$\text{TPC}(166) = \begin{bmatrix} \text{flute}(\text{pause}) \\ \text{PlaySAMPLE}\left(\text{PreRECORDED}\left(\begin{matrix}\text{filtered and processed} \\ \text{flute sounds}\end{matrix}\right)\right) \text{fadeOut} \end{bmatrix}. \tag{A.115}$$

$$\text{TPC}(167) = \begin{bmatrix} \gamma\Big(\alpha\Big(\text{flute}\big(\text{ICs}(\text{filled})\big)\Big), \text{voice}(\text{syllables and consonants})\Big) \\ \text{DRY}(\text{flute}, \text{voice}) \end{bmatrix}. \tag{A.116}$$

$$\text{TPC}(168) = \Big[\text{DRY}\big(\text{flute}(\text{pause})\big)\Big]. \tag{A.117}$$

$$\mathrm{TPC}(169,1) = \left[\begin{array}{l} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{126B})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}\left(\begin{array}{l}\text{filtered and processed}\\ \text{flute sounds}\end{array}\right)\right) \\ \uparrow \\ \mathrm{trigger}(62) \end{array}\right]. \tag{A.118}$$

$$\mathrm{TPC}(169,2) = \left[\begin{array}{l} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{126B})\big), \mathrm{voice}(\textit{la fleur})\Big) \\ \mathrm{DRY}(\mathrm{flute}, \mathrm{voice}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}\left(\begin{array}{l}\text{filtered and processed}\\ \text{flute sounds}\end{array}\right)\right) \end{array}\right]. \tag{A.119}$$

$$\mathrm{TPC}(170) = \Big[\mathrm{flute}(\mathrm{pause})\Big]. \tag{A.120}$$

$$\mathrm{TPC}(171) = \left[\begin{array}{l} \gamma\big(\mathrm{flute}(\text{breath drone}), \mathrm{voice}(\text{consonants})\big) \\ \mathrm{DRY}(\mathrm{flute}, \mathrm{voice}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}\left(\begin{array}{l}\text{filtered and processed}\\ \text{flute sounds}\end{array}\right)\right) \\ \uparrow \\ \mathrm{trigger}(63) \end{array}\right]. \tag{A.121}$$

$$\mathrm{TPC}(172,1) = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{126B})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}\begin{pmatrix}\text{filtered and processed}\\ \text{flute sounds}\end{pmatrix}\right) \end{bmatrix}. \tag{A.122}$$

$$\mathrm{TPC}(172,2) = \begin{bmatrix} \gamma\Big(\delta\big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{126B})\big)\big), \mathrm{voice}(\textit{la fleur})\Big) \\ \mathrm{DRY}(\mathrm{flute},\mathrm{voice}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}\begin{pmatrix}\text{filtered and processed}\\ \text{flute sounds}\end{pmatrix}\right) \end{bmatrix}. \tag{A.123}$$

$$\mathrm{TPC}(173-175) = \begin{bmatrix} \delta\Big(\mathrm{flute}\big(\mathrm{multiphonic}(\textit{126B})\big)\Big) \\ \mathrm{DRY}(\mathrm{flute},\mathrm{voice}) \\ \mathrm{PlaySAMPLE}\left(\mathrm{PreRECORDED}\begin{pmatrix}\text{filtered and}\\ \text{processed}\\ \text{flute sounds}\end{pmatrix}\right)\mathrm{fadeOut} \end{bmatrix}. \tag{A.124}$$

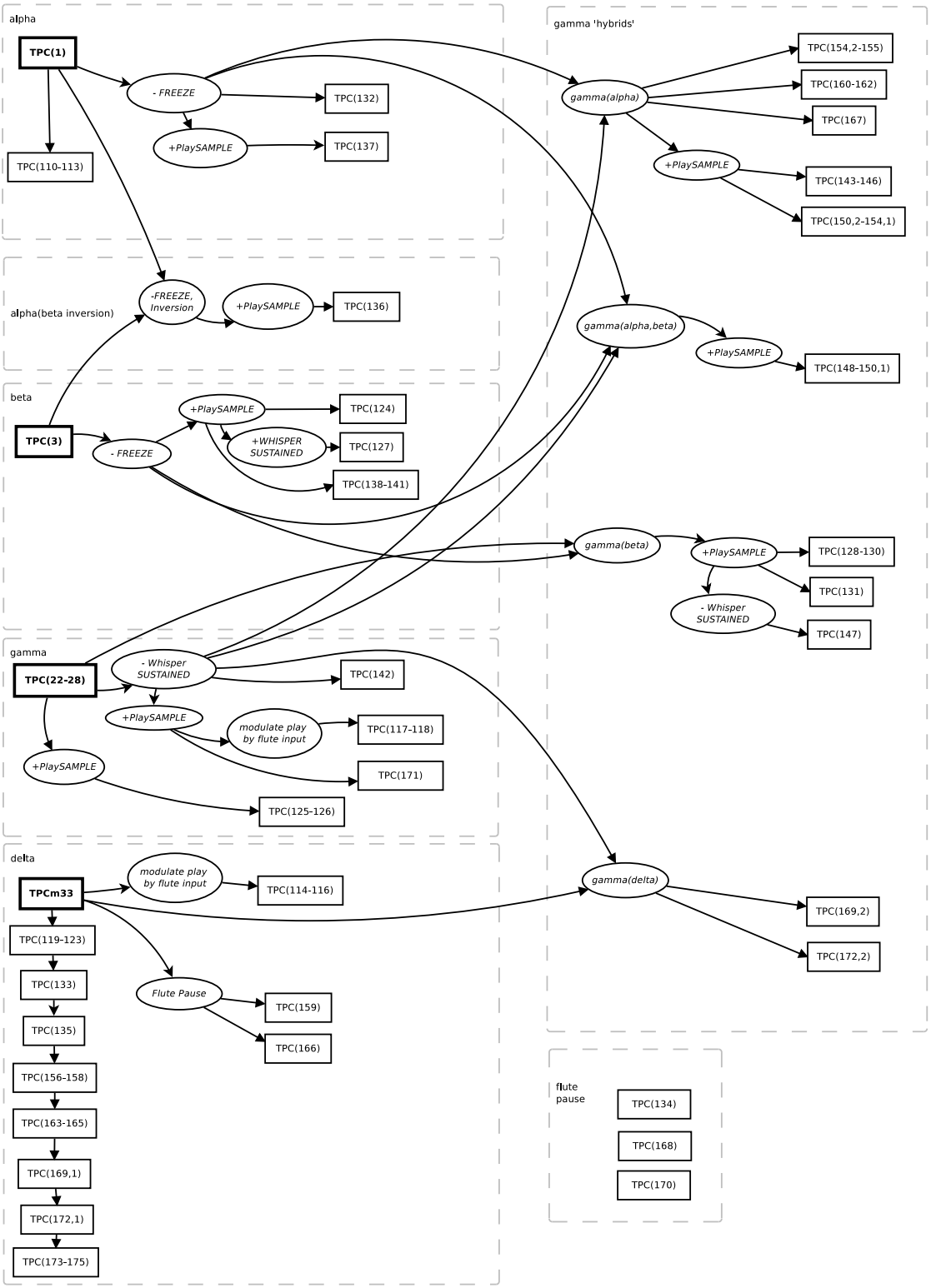


Figure A.5: Transformation network pass 5 from *NoaNoa* (bars 110–175).

A.2 Analysis of Berio's *Altra voce* (bars 1–23)

A.2.1 Analysis of *Altra voce* pitch-class sets

See section 4.2 for discussion of the analysis.[7]

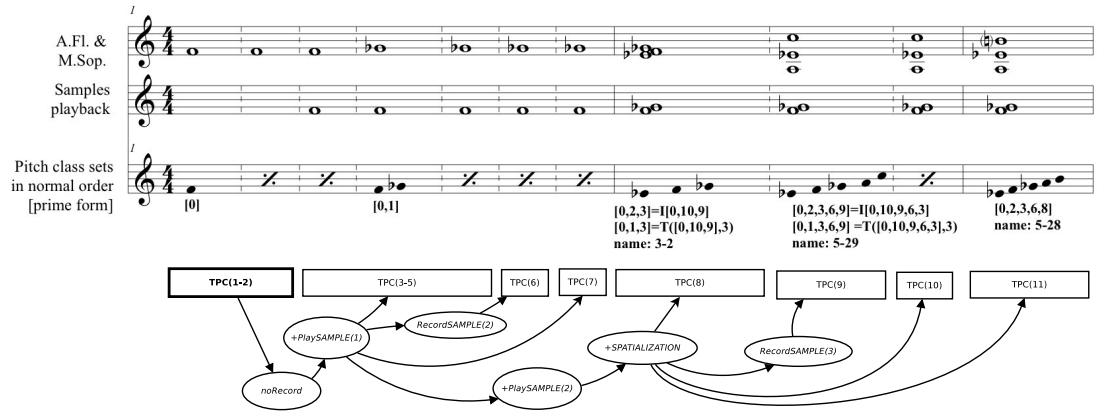


Figure A.6: Analytic reduction to pc sets of bars 1–11 from *Altra voce*, aligned with the pass 1 TPC segmentation and transformation paths.

[7]Pitch-class set names are Forte's 'Prime Forms'. [Forte, 1973, 179–181] In the TPC analysis of bars 1–19 in section A.2.2 the pc sets are preceded by 'PCset'.

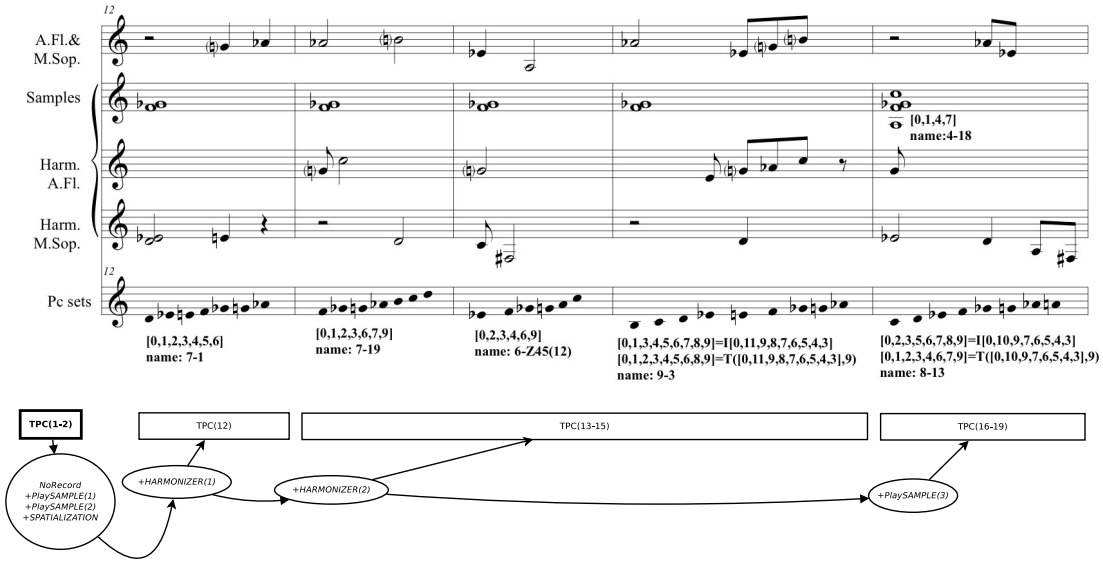


Figure A.7: Analytic reduction to pc sets of bars 12–16 from *Altra voce*, aligned with the pass 1 TPC segmentation and transformation paths.

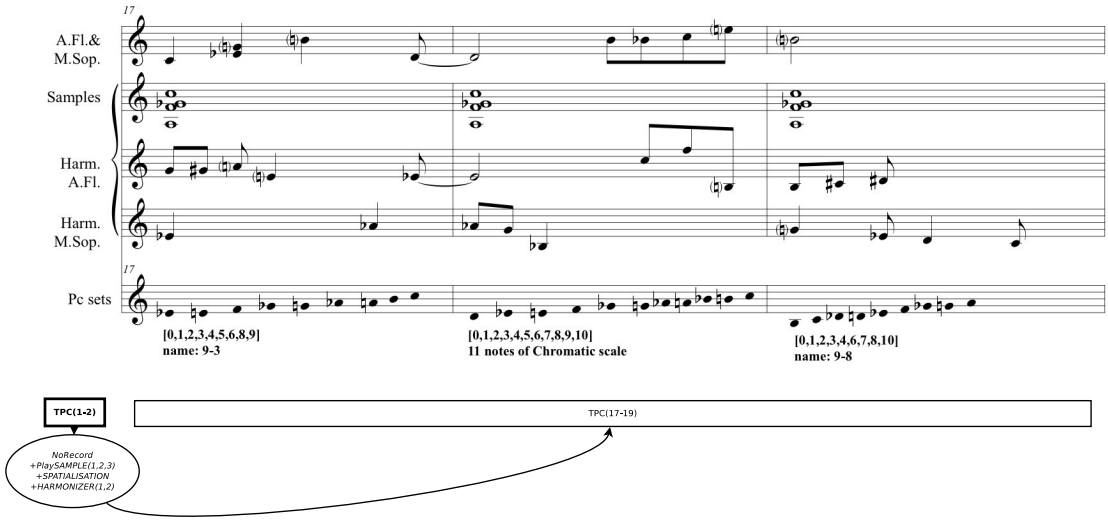


Figure A.8: Analytic reduction to pc sets of bars 17–19 from *Altra voce*, aligned with the pass 1 TPC segmentation and transformation paths.

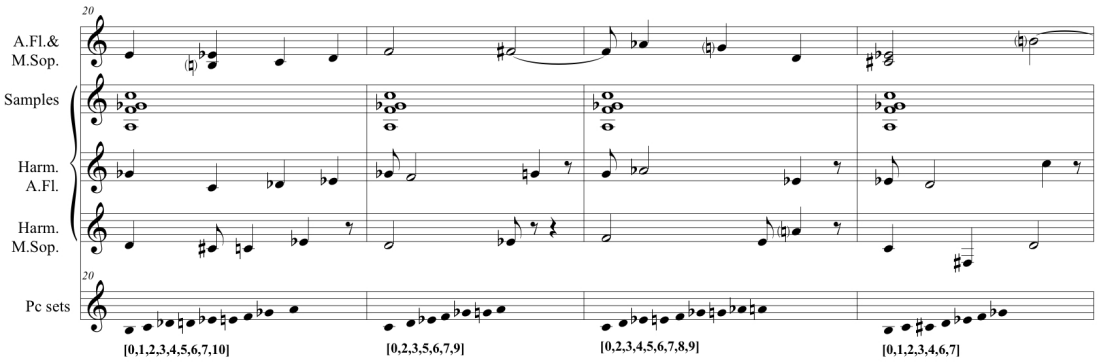


Figure A.9: Analytic reduction to pc sets of bars 20–23 from *Altra voce*.

A.2.2 TPC analysis of bars 1–19 of *Altra voce*

$$\mathrm{TPC}(1) = \begin{bmatrix} \alpha(\text{a.fl.} \Rightarrow \mathrm{PCset}[0]) \\ \mathrm{DRY}(\text{a.fl.}) \end{bmatrix}. \tag{A.125}$$

$$\mathrm{TPC}(2) = \begin{bmatrix} \alpha\big((\text{a.fl.}, \text{mez.sop}) \Rightarrow \mathrm{PCset}[0]\big) \\ \mathrm{DRY}(\text{a.fl.}, \text{mez.sop.}) \rightarrow \mathrm{RecordSAMPLE}(1) \end{bmatrix}. \tag{A.126}$$

$$\mathrm{TPC}(3) = \begin{bmatrix} \alpha\Big(\big(\text{a.fl.}, \text{mez.sop}, \mathrm{PlaySAMPLE}(1)\big) \Rightarrow \mathrm{PCset}[0]\Big) \\ \mathrm{DRY}(\text{a.fl.}, \text{mez.sop.}) \\ \mathrm{PlaySAMPLE}(1)\mathrm{loop} \leftarrow \mathrm{trigger}(\mathrm{Cue1}) \end{bmatrix}. \tag{A.127}$$

$$\mathrm{TPC}(4-5) = \begin{bmatrix} \alpha\Big(\big(\text{a.fl.}, \text{mez.sop}, \mathrm{PlaySAMPLE}(1)\big) \Rightarrow \mathrm{PCset}[0,1]\Big) \\ \mathrm{DRY}(\text{a.fl.}, \text{mez.sop.}) \\ \mathrm{PlaySAMPLE}(1)\mathrm{loop} \end{bmatrix}. \tag{A.128}$$

$$\mathrm{TPC}(6) = \begin{bmatrix} \alpha\Big(\big(\text{a.fl.}, \text{mez.sop}, \mathrm{PlaySAMPLE}(1)\big) \Rightarrow \mathrm{PCset}[0,1]\Big) \\ \mathrm{DRY}(\text{a.fl.}, \text{mez.sop.}) \rightarrow \mathrm{RecordSAMPLE}(2) \\ \mathrm{PlaySAMPLE}(1)\mathrm{loop} \end{bmatrix}. \tag{A.129}$$

$$\mathrm{TPC}(7) = \begin{bmatrix} \alpha\Big(\big(\text{a.fl.}, \text{mez.sop}, \text{PlaySAMPLE}(1)\big) \Rightarrow \text{PCset}[0,1]\Big) \\ \text{DRY}(\text{a.fl.}, \text{mez.sop.}) \\ \text{PlaySAMPLE}(1)\text{loop} \end{bmatrix}. \tag{A.130}$$

$$\mathrm{TPC}(8) = \begin{bmatrix} \alpha\Big(\big(\text{a.fl.}, \text{mez.sop}, \text{PlaySAMPLE}(1,2)\big) \Rightarrow \text{PCset}[0,1,3]\Big) \\ \text{DRY}(\text{a.fl.}, \text{mez.sop.}) \\ \left.\begin{matrix} \text{PlaySAMPLE}(1)\text{loop} \\ \begin{pmatrix} \text{PlaySAMPLE}(2)\text{loop} \\ \text{trigger(Cue2)} \uparrow \end{pmatrix} \end{matrix}\right\} \rightarrow \begin{pmatrix} \text{SPATIALIZE(L, R)loop} \\ \uparrow \\ \text{trigger(Cue2)} \end{pmatrix} \end{bmatrix}. \tag{A.131}$$

$$\mathrm{TPC}(9) = \begin{bmatrix} \alpha \begin{pmatrix} \big(\text{a.fl.}, \text{mez.sop}, \text{PlaySAMPLE}(1,2)\big) \\ \Downarrow \\ \text{PCset}[0,1,3,6,9] \end{pmatrix} \\ \text{DRY}(\text{a.fl.}, \text{mez.sop.}) \rightarrow \text{RecordSAMPLE}(3) \\ \text{PlaySAMPLE}(1,2)\text{loop} \rightarrow \text{SPATIALIZE(L, R)loop} \end{bmatrix}. \tag{A.132}$$

$$\mathrm{TPC}(10) = \begin{bmatrix} \alpha\Big(\big(\text{a.fl.}, \text{mez.sop}, \text{PlaySAMPLE}(1,2)\big) \Rightarrow \text{PCset}[0,1,3,6,9]\Big) \\ \text{DRY}(\text{a.fl.}, \text{mez.sop.}) \\ \text{PlaySAMPLE}(1,2)\text{loop} \rightarrow \text{SPATIALIZE(L, R)loop} \end{bmatrix}. \tag{A.133}$$

$$\mathrm{TPC}(11) = \begin{bmatrix} \alpha\Big(\big(\text{a.fl.}, \text{mez.sop}, \text{PlaySAMPLE}(1,2)\big) \Rightarrow \text{PCset}[0,2,3,6,8]\Big) \\ \text{DRY}(\text{a.fl.}, \text{mez.sop.}) \\ \text{PlaySAMPLE}(1,2)\text{loop} \rightarrow \text{SPATIALIZE(L, R)loop} \end{bmatrix}. \tag{A.134}$$

$$\mathrm{TPC}(12) = \left[\begin{array}{l} \alpha\left(\begin{pmatrix}\text{a.fl., mez.sop}\\ \text{PlaySAMPLE}(1,2)\\ \text{HARMONIZER(mez.sop.)}\end{pmatrix} \Rightarrow \text{PCset}[0,1,2,3,4,5,6]\right) \\ \text{DRY(a.fl., mez.sop.)} \\ \left.\begin{array}{l}\text{PlaySAMPLE}(1,2)\text{loop} \\ \begin{pmatrix}\text{HARMONIZER}\big(\text{mez.sop.}, (-300,0)\text{cents}\big)\text{loop}\\ \uparrow \\ \text{trigger(Cue3)}\end{pmatrix}\end{array}\right\} \rightarrow \begin{pmatrix}\text{SPATIALIZE(L, R)loop}\\ \uparrow \\ \text{trigger(Cue3)}\end{pmatrix} \end{array}\right]. \tag{A.135}$$

$$\mathrm{TPC}(13) = \left[\begin{array}{l} \alpha\left(\begin{pmatrix}\text{a.fl., mez.sop}\\ \text{PlaySAMPLE}(1,2)\\ \text{HARMONIZER(mez.sop., a.fl.)}\end{pmatrix} \Rightarrow \text{PCset}[0,1,2,3,6,7,9]\right) \\ \text{DRY(a.fl., mez.sop.)} \\ \left.\begin{array}{l}\text{PlaySAMPLE}(1,2)\text{loop} \\ \text{HARMONIZER}\big(\text{mez.sop.}, (-300,0)\text{cents}\big)\text{loop} \\ \begin{pmatrix}\text{HARMONIZER}\big(\text{a.fl.}, (100,0)\text{cents}\big)\text{loop}\\ \uparrow \\ \text{trigger(Cue4)}\end{pmatrix}\end{array}\right\} \rightarrow \begin{pmatrix}\text{SPATIALIZE(L, R)loop}\\ \uparrow \\ \text{trigger(Cue4)}\end{pmatrix} \end{array}\right]. \tag{A.136}$$

$$\mathrm{TPC}(14) = \left[\begin{array}{l} \alpha\left(\left(\begin{array}{l}\text{a.fl.}, \text{mez.sop}\\ \text{PlaySAMPLE}(1,2)\\ \text{HARMONIZER}(\text{mez.sop.}, \text{a.fl.})\end{array}\right) \Rightarrow \text{PCset}[0,2,3,4,6,9]\right) \\ \text{DRY}(\text{a.fl.}, \text{mez.sop.}) \\ \left.\begin{array}{l}\text{PlaySAMPLE}(1,2)\text{loop}\\ \text{HARMONIZER}\big(\text{mez.sop.}, (-300,0)\text{cents}\big)\text{loop}\\ \text{HARMONIZER}\big(\text{a.fl.}, (100,0)\text{cents}\big)\text{loop}\end{array}\right\} \rightarrow \text{SPATIALIZE}(\text{L},\text{R})\text{loop} \end{array}\right]. \tag{A.137}$$

$$\mathrm{TPC}(15) = \left[\begin{array}{l} \alpha\left(\left(\begin{array}{l}\text{a.fl.}, \text{mez.sop}\\ \text{PlaySAMPLE}(1,2)\\ \text{HARMONIZER}(\text{mez.sop.}, \text{a.fl.})\end{array}\right) \Rightarrow \text{PCset}[0,1,2,3,4,5,6,8,9]\right) \\ \text{DRY}(\text{a.fl.}, \text{mez.sop.}) \\ \left.\begin{array}{l}\text{PlaySAMPLE}(1,2)\text{loop}\\ \text{HARMONIZER}\big(\text{mez.sop.}, (-300,0)\text{cents}\big)\text{loop}\\ \text{HARMONIZER}\big(\text{a.fl.}, (100,0)\text{cents}\big)\text{loop}\end{array}\right\} \rightarrow \text{SPATIALIZE}(\text{L},\text{R})\text{loop} \end{array}\right]. \tag{A.138}$$

$$\text{TPC}(16) = \left[\begin{array}{l} \alpha\left(\begin{pmatrix}\text{a.fl., mez.sop}\\ \text{PlaySAMPLE}(1,2)\\ \text{HARMONIZER}(\text{mez.sop., a.fl.})\end{pmatrix} \Rightarrow \text{PCset}[0,1,2,3,4,6,7,9]\right) \\ \left.\begin{array}{l}\text{DRY}(\text{a.fl., mez.sop.})\\ \text{PlaySAMPLE}(1,2)\text{loop}\\ \text{HARMONIZER}\big(\text{mez.sop.}, (-300,0)\text{cents}\big)\text{loop}\\ \text{HARMONIZER}\big(\text{a.fl.}, (100,0)\text{cents}\big)\text{loop}\\ \begin{pmatrix}\text{PlaySAMPLE(3)loop}\\ \uparrow \\ \text{trigger(Cue5)}\end{pmatrix}\end{array}\right\} \rightarrow \begin{pmatrix}\text{SPATIALIZE(L, R)loop}\\ \uparrow \\ \text{trigger(Cue5)}\end{pmatrix} \end{array}\right]. \tag{A.139}$$

$$\text{TPC}(17) = \left[\begin{array}{l} \alpha\left(\begin{pmatrix}\text{a.fl., mez.sop}\\ \text{PlaySAMPLE}(1,2,3)\\ \text{HARMONIZER}(\text{mez.sop., a.fl.})\end{pmatrix} \Rightarrow \text{PCset}[0,1,2,3,4,5,6,8,9]\right) \\ \left.\begin{array}{l}\text{DRY}(\text{a.fl., mez.sop.})\\ \text{PlaySAMPLE}(1,2,3)\text{loop}\\ \text{HARMONIZER}\big(\text{mez.sop.}, (-300,0)\text{cents}\big)\text{loop}\\ \text{HARMONIZER}\big(\text{a.fl.}, (100,0)\text{cents}\big)\text{loop}\end{array}\right\} \rightarrow \text{SPATIALIZE(L, R)loop} \end{array}\right]. \tag{A.140}$$

$$\mathrm{TPC}(18-19)=\left[\begin{array}{l}\alpha\left(\begin{pmatrix}\text{a.fl.},\text{mez.sop}\\ \text{PlaySAMPLE}(1,2,3)\\ \text{HARMONIZER}(\text{mez.sop.},\text{a.fl.})\end{pmatrix}\right)\\ \qquad\qquad\Downarrow\\ \left(\begin{array}{l}\text{PCset}[0,1,2,3,4,5,6,7,8,9,10,11]\\ \text{DRY}(\text{a.fl.},\text{mez.sop.})\\ \text{DRY}(\text{PlaySAMPLE}(1,2,3)\text{loop})\\ \text{HARMONIZER}\begin{pmatrix}\text{mez.sop.}\\ (-300,0)\text{cents}\end{pmatrix}\text{loop}\\ \text{HARMONIZER}\big(\text{a.fl.},(100,0)\text{cents}\big)\text{loop}\end{array}\right)\rightarrow\text{SPATIALIZE}(\text{L},\text{R})\text{loop}\end{array}\right].\tag{A.141}$$

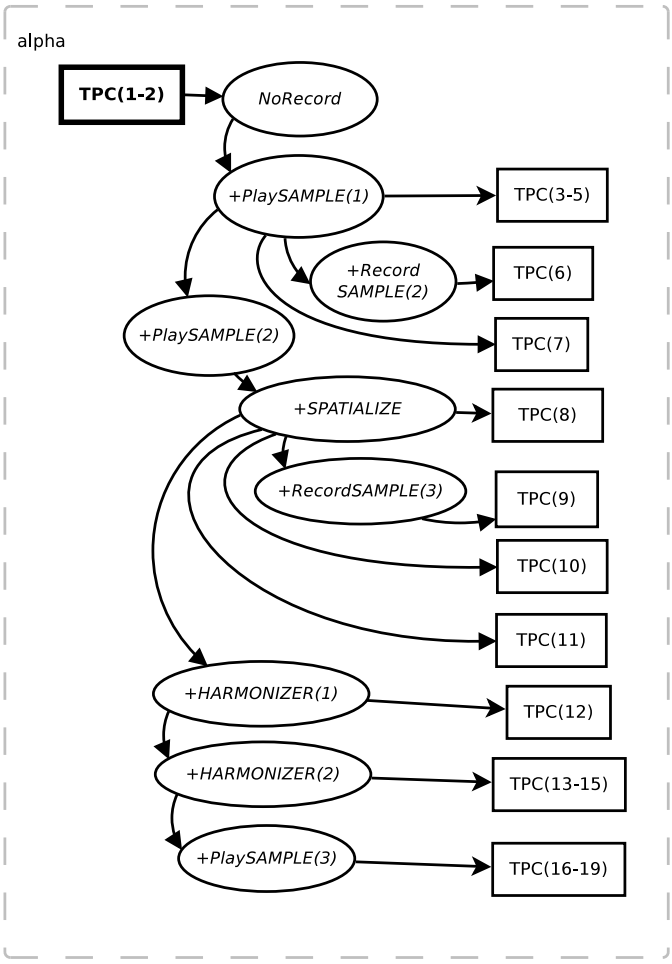


Figure A.10: Transformation network pass 1 (bars 1–19) from *Altra voce*.

A.3 Analysis of Harvey's *Ricercare una melodia*

$$\mathrm{TPC}(1) = \begin{bmatrix} \alpha\big(\text{trumpet(interval motif)}\big) \\ \text{trumpet} \rightarrow \Big(\text{RecordSAMPLE(TapeDelay)loop}\Big) \end{bmatrix}. \tag{A.142}$$

$$\mathrm{TPC}(2)^{8} = \begin{bmatrix} \alpha\Big(\big(\text{trumpet}, \text{tape}(1)\big) \Rightarrow \text{(interval motif)}\Big) \\ \left.\begin{matrix} \text{trumpet} \\ \text{PlaySAMPLE}\big(\text{TapeDelay}(1)\big)\text{loop} \end{matrix}\right\} \rightarrow \begin{pmatrix} \text{RecordSAMPLE} \\ \text{(TapeDelay)loop} \end{pmatrix} \end{bmatrix}. \tag{A.143}$$

$$\mathrm{TPC}(3) = \begin{bmatrix} \alpha\Big(\big(\text{trumpet}, \text{tape}(1,2)\big) \Rightarrow \text{(interval motif)}\Big) \\ \left.\begin{matrix} \text{trumpet} \\ \text{PlaySAMPLE}\big(\text{TapeDelay}(1,2)\big)\text{loop} \end{matrix}\right\} \rightarrow \begin{pmatrix} \text{RecordSAMPLE} \\ \text{(TapeDelay)loop} \end{pmatrix} \end{bmatrix}. \tag{A.144}$$

$$\mathrm{TPC}(4) = \begin{bmatrix} \alpha\Big(\big(\text{trumpet}, \text{tape}(1,2,3)\big) \Rightarrow \text{(interval motif)}\Big) \\ \left.\begin{matrix} \text{trumpet} \\ \text{PlaySAMPLE}\big(\text{TapeDelay}(1,2,3)\big)\text{loop} \end{matrix}\right\} \rightarrow \begin{pmatrix} \text{RecordSAMPLE} \\ \text{(TapeDelay)loop} \end{pmatrix} \end{bmatrix}. \tag{A.145}$$

$$\mathrm{TPC}(5-25) = \begin{bmatrix} \alpha\Big(\big(\text{trumpet}, \text{tape}(1,2,3,4)\big) \Rightarrow \text{(interval motif)}\Big) \\ \left.\begin{matrix} \text{trumpet} \\ \text{PlaySAMPLE}\big(\text{TapeDelay}(1,2,3,4)\big)\text{loop} \end{matrix}\right\} \rightarrow \begin{pmatrix} \text{RecordSAMPLE} \\ \text{(TapeDelay)loop} \end{pmatrix} \end{bmatrix}. \tag{A.146}$$

[8] When the tape system is started all four channels would be playing back, but I am presuming there is nothing on the tape to begin with and therefore indicate the build-up of the delay canon with TapeDelay(1), TapeDelay(1,2) and so on. From TPC(55) and after I omit these channel labels in the TapeDelay, and use *FADE* indications instead.

$$\mathrm{TPC}(26-28) = \begin{bmatrix} \alpha\Big(\big(\mathrm{tape}(1,2,3,4)\big) \Rightarrow (\text{interval motif})\Big) \\ \mathrm{PlaySAMPLE}\big(\mathrm{TapeDelay}(1,2,3,4)\big)\mathrm{loop} \rightarrow \begin{pmatrix} \mathrm{RecordSAMPLE} \\ (\mathrm{TapeDelay})\mathrm{loop} \end{pmatrix} \end{bmatrix}. \tag{A.147}$$

$$\mathrm{TPC}(29-33) = \begin{bmatrix} \beta \begin{pmatrix} \mathrm{trumpet(scalar)} \\ \mathrm{tape}(1,2,3,4) \end{pmatrix} \\ \left.\begin{matrix} \mathrm{trumpet} \\ \mathrm{PlaySAMPLE}\big(\mathrm{TapeDelay}(1,2,3,4)\big)\mathrm{loop} \end{matrix}\right\} \rightarrow \begin{pmatrix} \mathrm{RecordSAMPLE} \\ (\mathrm{TapeDelay})\mathrm{loop} \end{pmatrix} \end{bmatrix}. \tag{A.148}$$

$$\mathrm{TPC}(34-37) = \begin{bmatrix} \beta \begin{pmatrix} \mathrm{trumpet(scalar)} \\ \mathrm{tape}(1,2,3,4) \end{pmatrix} \\ \left.\begin{matrix} \mathrm{trumpet} \\ \begin{pmatrix} \mathrm{PlaySAMPLE}\big(\mathrm{TapeDelay}(1,2,3,4)\big)\mathrm{loop} \\ \mathit{FADER\ PLAY} \end{pmatrix} \end{matrix}\right\} \rightarrow \begin{pmatrix} \mathrm{RecordSAMPLE} \\ (\mathrm{TapeDelay})\mathrm{loop} \end{pmatrix} \end{bmatrix}. \tag{A.149}$$

$$\mathrm{TPC}(38-46) = \begin{bmatrix} \beta \begin{pmatrix} \mathrm{trumpet(scalar)} \\ \mathrm{tape}(1,2,3,4) \end{pmatrix} \\ \left.\begin{matrix} \mathrm{trumpet} \\ \begin{pmatrix} \mathrm{PlaySAMPLE}\big(\mathrm{TapeDelay}(1,2,3,4)\big)\mathrm{loop} \\ \mathit{FADER\ PLAY} \end{pmatrix} \end{matrix}\right\} \rightarrow \begin{pmatrix} \mathrm{RecordSAMPLE} \\ (\mathrm{TapeDelay})\mathrm{loop} \end{pmatrix} \end{bmatrix}. \tag{A.150}$$

$$\mathrm{TPC}(47,1) = \left[\begin{array}{l} \beta\begin{pmatrix}\mathrm{trumpet(scalar)}\\ \mathrm{tape}(1,2,3,4)\end{pmatrix} \\ \left.\begin{array}{l}\mathrm{trumpet}\\ \begin{pmatrix}\mathrm{PlaySAMPLE(TapeDelay)loop}\\ \textit{FADE OUT}\end{pmatrix}\end{array}\right\} \rightarrow \begin{pmatrix}\mathrm{RecordSAMPLE}\\ \mathrm{(TapeDelay)loop}\end{pmatrix} \end{array}\right]. \tag{A.151}$$

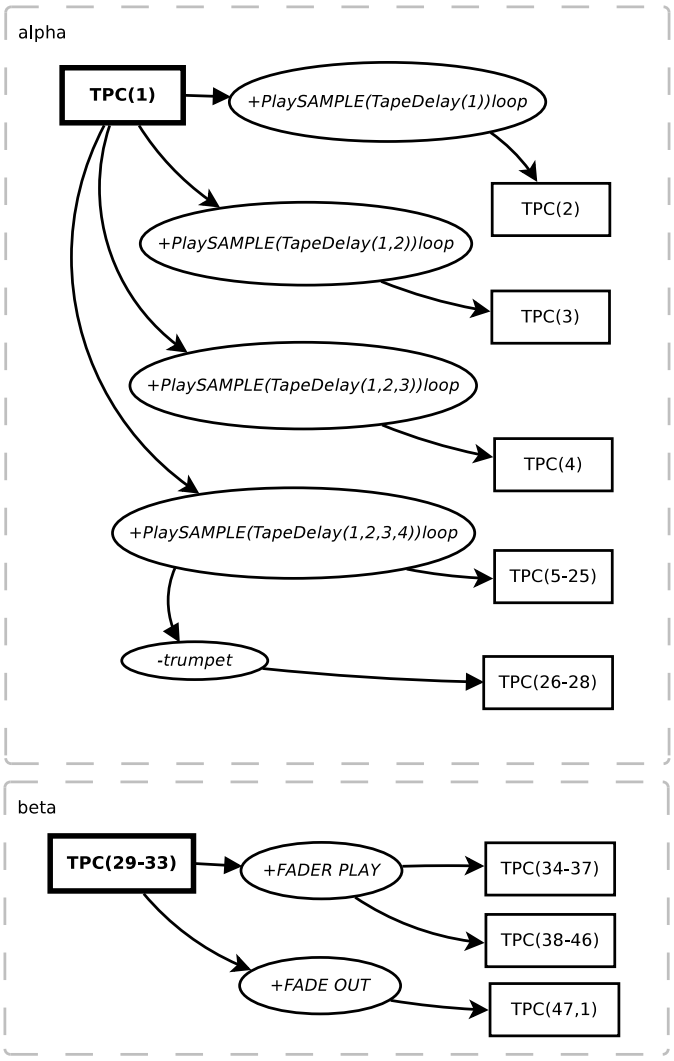


Figure A.11: Transformation network pass 1 (bars 1– 47) from *Ricercare una melodia.*

$$\mathrm{TPC}(47,2) = \begin{bmatrix} \beta\left(\mathrm{trumpet(scalar)}\right) \\ \mathrm{trumpet} \\ \begin{pmatrix} \mathrm{Stop(TapeDelay)loop} \\ \textit{change to half - speed} \end{pmatrix} \end{bmatrix}. \tag{A.152}$$

$$\mathrm{TPC}(48-52) = \begin{bmatrix} \beta\left(\mathrm{trumpet(scalar)}\right) \\ \mathrm{trumpet} \end{bmatrix}. \tag{A.153}$$

$$\mathrm{TPC}(53-54) = \begin{bmatrix} \beta\left(\mathrm{trumpet(scalar)}\right) \\ \mathrm{trumpet} \rightarrow \begin{pmatrix} \mathrm{RecordSAMPLE} \\ \mathrm{(TapeDelay, 0.5speed)loop} \end{pmatrix} \end{bmatrix}. \tag{A.154}$$

$$\mathrm{TPC}(55) = \begin{bmatrix} \alpha\big(\mathrm{trumpet(interval\ motif), tape(1)}\big) \\ \mathrm{trumpet} \\ \left.\begin{pmatrix} \mathrm{PlaySAMPLE(TapeDelay, 0.5speed)loop} \\ \textit{FADE UP(1)} \end{pmatrix}\right\} \rightarrow \begin{pmatrix} \mathrm{RecordSAMPLE} \\ \mathrm{(TapeDelay, 0.5speed)loop} \end{pmatrix} \end{bmatrix}. \tag{A.155}$$

$$\mathrm{TPC}(56-57) = \begin{bmatrix} \alpha\big(\mathrm{trumpet(interval\ motif), tape(1)}\big) \\ \left.\begin{matrix} \mathrm{trumpet} \\ \left(\mathrm{PlaySAMPLE(TapeDelay, 0.5speed)loop}\right) \end{matrix}\right\} \rightarrow \begin{pmatrix} \mathrm{RecordSAMPLE} \\ \mathrm{(TapeDelay, 0.5speed)loop} \end{pmatrix} \end{bmatrix}. \tag{A.156}$$

$$\mathrm{TPC}(58-59) = \begin{bmatrix} \alpha\big(\mathrm{trumpet(interval\ motif), tape(1,2)}\big) \\ \mathrm{trumpet} \\ \left.\begin{pmatrix} \mathrm{PlaySAMPLE(TapeDelay, 0.5speed)loop} \\ \textit{FADE UP(2)} \end{pmatrix}\right\} \rightarrow \begin{pmatrix} \mathrm{RecordSAMPLE} \\ \mathrm{(TapeDelay, 0.5speed)loop} \end{pmatrix} \end{bmatrix}. \tag{A.157}$$

$$\mathrm{TPC}(60-63,1)=\left[\begin{array}{l}\left.\begin{array}{l}\alpha\big(\text{trumpet(interval motif)},\text{tape}(1,2)\big)\\ \text{trumpet}\\ \Big(\text{PlaySAMPLE(TapeDelay}, 0.5\text{speed)loop}\Big)\end{array}\right\}\rightarrow\begin{pmatrix}\text{RecordSAMPLE}\\ \text{(TapeDelay}, 0.5\text{speed)loop}\end{pmatrix}\end{array}\right]. \tag{A.158}$$

$$\mathrm{TPC}(63,2)=\left[\begin{array}{l}\alpha\big(\text{trumpet(interval motif)},\text{tape}(1,2,3)\big)\\ \text{trumpet}\\ \begin{pmatrix}\text{PlaySAMPLE(TapeDelay}, 0.5\text{speed)loop}\\ \textit{FADE UP}(3)\end{pmatrix}\rightarrow\begin{pmatrix}\text{RecordSAMPLE}\\ \text{(TapeDelay}, 0.5\text{speed)loop}\end{pmatrix}\end{array}\right]. \tag{A.159}$$

$$\mathrm{TPC}(64-66,1)=\left[\begin{array}{l}\alpha\big(\text{trumpet(interval motif)},\text{tape}(1,2,3)\big)\\ \text{trumpet}\\ \text{PlaySAMPLE(TapeDelay}, 0.5\text{speed)loop}\rightarrow\begin{pmatrix}\text{RecordSAMPLE}\\ \text{(TapeDelay}, 0.5\text{speed)loop}\end{pmatrix}\end{array}\right]. \tag{A.160}$$

$$\mathrm{TPC}(66,2)=\left[\begin{array}{l}\alpha\big(\text{trumpet(interval motif)},\text{tape}(2,3,4)\big)\\ \text{trumpet}\\ \begin{pmatrix}\text{PlaySAMPLE(TapeDelay}, 0.5\text{speed)loop}\\ \textit{FADE OUT}(1)\\ \textit{FADE UP}(4)\end{pmatrix}\rightarrow\begin{pmatrix}\text{RecordSAMPLE}\\ \text{(TapeDelay}, 0.5\text{speed)loop}\end{pmatrix}\end{array}\right]. \tag{A.161}$$

$$\mathrm{TPC}(67-73)=\begin{bmatrix}(\alpha,\beta)\Big(\big(\mathrm{trumpet}(\text{interval motif},\mathrm{scalar}),\mathrm{tape}(2,3,4)\big)\Big)\\ \mathrm{trumpet}\\ \begin{pmatrix}\mathrm{PlaySAMPLE}(\mathrm{TapeDelay},0.5\mathrm{speed})\mathrm{loop}\\ \mathit{FADE\ OUT}(\mathit{1})\\ \mathit{FADE\ UP}(\mathit{4})\end{pmatrix}\end{bmatrix}. \tag{A.162}$$

$$\mathrm{TPC}(74)=\begin{bmatrix}(\alpha,\beta)\Big(\big(\mathrm{trumpet}(\text{interval motif},\mathrm{scalar}),\mathrm{tape}(3,4)\big)\Big)\\ \mathrm{trumpet}\\ \begin{pmatrix}\mathrm{PlaySAMPLE}(\mathrm{TapeDelay},0.5\mathrm{speed})\mathrm{loop}\\ \mathit{FADE\ OUT}(\mathit{2})\end{pmatrix}\end{bmatrix}. \tag{A.163}$$

$$\mathrm{TPC}(75,1)=\begin{bmatrix}\beta\big(\mathrm{trumpet}(\mathrm{IC}),\mathrm{tape}(3,4)\big)\\ \mathrm{trumpet}\\ \Big(\mathrm{PlaySAMPLE}(\mathrm{TapeDelay},0.5\mathrm{speed})\mathrm{loop}\Big)\end{bmatrix}. \tag{A.164}$$

$$\mathrm{TPC}(75,2)=\begin{bmatrix}\beta\big(\mathrm{trumpet}(\mathrm{IC}),\mathrm{tape}(3,4)\big)\\ \mathrm{trumpet}\\ \begin{pmatrix}\mathrm{PlaySAMPLE}(\mathrm{TapeDelay},0.5\mathrm{speed})\mathrm{loop}\\ \mathit{FADE\ OUT}(\mathit{3},\mathit{4})\end{pmatrix}\end{bmatrix}. \tag{A.165}$$

A.4 Analysis of portfolio work *The Ghost of Judith*

$$\mathrm{TPC(A)} = \begin{bmatrix} \alpha(\mathrm{sop.}) \\ \mathrm{DRY(soprano)} \rightarrow \mathrm{RecordSAMPLE(A)} \end{bmatrix}. \tag{A.166}$$

$$\mathrm{TPC(B)} = \begin{bmatrix} \alpha\Big(\mathrm{soprano}, \mathrm{SYNTH}\big(\mathrm{granular(A)}\big)\Big) \\ \mathrm{DRY(soprano)} \\ \mathrm{SYNTH}\big(\mathrm{granular(A, parameters)}\big) \leftarrow \mathrm{ANALYSIS(soprano, attack)} \end{bmatrix}. \tag{A.167}$$

$$\mathrm{TPC(C,1)} = \begin{bmatrix} \beta(\mathrm{soprano}) \\ \mathrm{soprano} \rightarrow \mathrm{RecordSAMPLE(C)} \\ \mathrm{FREEZE}\big(\mathrm{soprano} \rightarrow \mathrm{REVERB}(\textit{infinite})\big) \\ \mathrm{DELAY(soprano, panning)} \end{bmatrix}. \tag{A.168}$$

$$\mathrm{TPC(C,2)} = \begin{bmatrix} \beta\big(\mathrm{soprano}, \mathrm{PlaySAMPLE(C)}\big) \\ \mathrm{FREEZE}\big(\mathrm{soprano} \rightarrow \mathrm{REVERB}(\textit{infinite})\big) \\ \mathrm{DELAY(soprano, panning)} \\ \mathrm{SYNTH}\big(\mathrm{granular(C)}\big) \end{bmatrix}. \tag{A.169}$$

$$\mathrm{TPC(D)} = \begin{bmatrix} \beta(\mathrm{soprano}) \\ \mathrm{DELAY(soprano, panning)} \\ \mathrm{FLANGER(soprano)} \end{bmatrix}. \tag{A.170}$$

$$\mathrm{TPC(E,1)} = \begin{bmatrix} \beta\Big(\mathrm{soprano}, \mathrm{SYNTH}\big(\mathrm{granular(C)}\big)\Big) \\ \mathrm{FREEZE}\big(\mathrm{soprano} \rightarrow \mathrm{REVERB}(\textit{infinite})\big) \\ \mathrm{SYNTH}\big(\mathrm{granular(C)}\big) \end{bmatrix}. \tag{A.171}$$

$$\mathrm{TPC(E,2)} = \begin{bmatrix} \beta\Big(\mathrm{soprano}, \mathrm{SYNTH}\big(\mathrm{granular(C)}\big)\Big) \\ \mathrm{DRY(soprano)} \\ \mathrm{SYNTH}\big(\mathrm{granular(C)}\big) \end{bmatrix}. \tag{A.172}$$

$$\mathrm{TPC(F,1)} = \begin{bmatrix} \beta(\mathrm{soprano}) \\ \mathrm{soprano} \rightarrow \mathrm{RecordSAMPLE(F)} \\ \mathrm{DRY(soprano)} \end{bmatrix}. \tag{A.173}$$

$$\mathrm{TPC(F,2)} = \begin{bmatrix} \gamma(\mathrm{soprano}) \\ \mathrm{DRY(soprano)} \\ \mathrm{PinkNOISE} \begin{pmatrix} \mathrm{soprano} \rightarrow \mathrm{ANALYSIS(amplitude)} \\ \mathrm{inverse} \downarrow \\ \mathrm{BandpassFilter(envelope)} \end{pmatrix} \end{bmatrix}. \tag{A.174}$$

$$\mathrm{TPC(G)} = \begin{bmatrix} \beta(\mathrm{soprano}) \\ \mathrm{DRY(soprano)} \\ \mathrm{SYNTH}\big(\mathrm{granular(C)}\big) \end{bmatrix}. \tag{A.175}$$

$$\mathrm{TPC(H,1)} = \begin{bmatrix} \alpha(\mathrm{soprano}) \\ \mathrm{DRY(soprano)} \rightarrow \mathrm{RecordSAMPLE(H)} \\ \mathrm{SYNTH}\big(\mathrm{granular(C)}\big) \end{bmatrix}. \tag{A.176}$$

$$\mathrm{TPC(H,2)} = \begin{bmatrix} \alpha(\mathrm{soprano}) \\ \mathrm{DRY(soprano)} \\ \mathrm{SYNTH}\big(\mathrm{granular(C)}\big) \end{bmatrix}. \tag{A.177}$$

$$\mathrm{TPC(I)}^{9} = \begin{bmatrix} \beta\big(\mathrm{soprano}, \mathrm{SYNTH(additive)}\big) \\ \mathrm{DRY(soprano)} \\ \mathrm{SYNTH(additive)} \end{bmatrix}. \tag{A.178}$$

$$\mathrm{TPC(J)} = \begin{bmatrix} \beta(\mathrm{soprano}) \\ \mathrm{DRY(soprano)} \end{bmatrix}. \tag{A.179}$$

$$\mathrm{TPC(K)} = \begin{bmatrix} \alpha\big(\mathrm{soprano}, \mathrm{SYNTH(granular)}\big) \\ \mathrm{DRY(soprano)} \\ \mathrm{SYNTH}\big(\mathrm{granular(C)}\big) \end{bmatrix}. \tag{A.180}$$

$$\mathrm{TPC(L,1)} = \begin{bmatrix} \beta(\mathrm{soprano}) \\ \mathrm{DRY(soprano)} \rightarrow \mathrm{RecordSAMPLE(L)} \\ \mathrm{SYNTH}\big(\mathrm{granular(C)}, \mathrm{move\ register}\big) \end{bmatrix}. \tag{A.181}$$

$$\mathrm{TPC(L,2)} = \begin{bmatrix} \gamma\Big(\mathrm{soprano}, \mathrm{SYNTH}\big(\mathrm{granular(C,F,H)}\big)\Big) \\ \mathrm{DRY(soprano)} \\ \mathrm{SYNTH}\big(\mathrm{granular(C)}\big) \\ \mathrm{SYNTH}\big(\mathrm{granular(F)}\big) \\ \mathrm{SYNTH}\big(\mathrm{granular(H)}\big) \end{bmatrix}. \tag{A.182}$$

[9] The SYNTH(additive) is varied by stochastic low frequency modulations in pitch and amplitude. This technique also appears in other portfolio works such as *Trio in 3 times 3 rooms*, see the description in section 3.3.

$$\mathrm{TPC(M)} = \begin{bmatrix} \beta(\mathrm{soprano}, \mathrm{SYNTH(additive)}) \\ \mathrm{DRY(soprano)} \\ \mathrm{SYNTH}\left(\mathrm{additive} \left(\begin{matrix} \mathrm{spatialisation} \\ \mathrm{envelope} \\ \mathrm{frequency\ modulation} \end{matrix} \right) \leftarrow \mathrm{DOPPLER} \right) \end{bmatrix}. \tag{A.183}$$

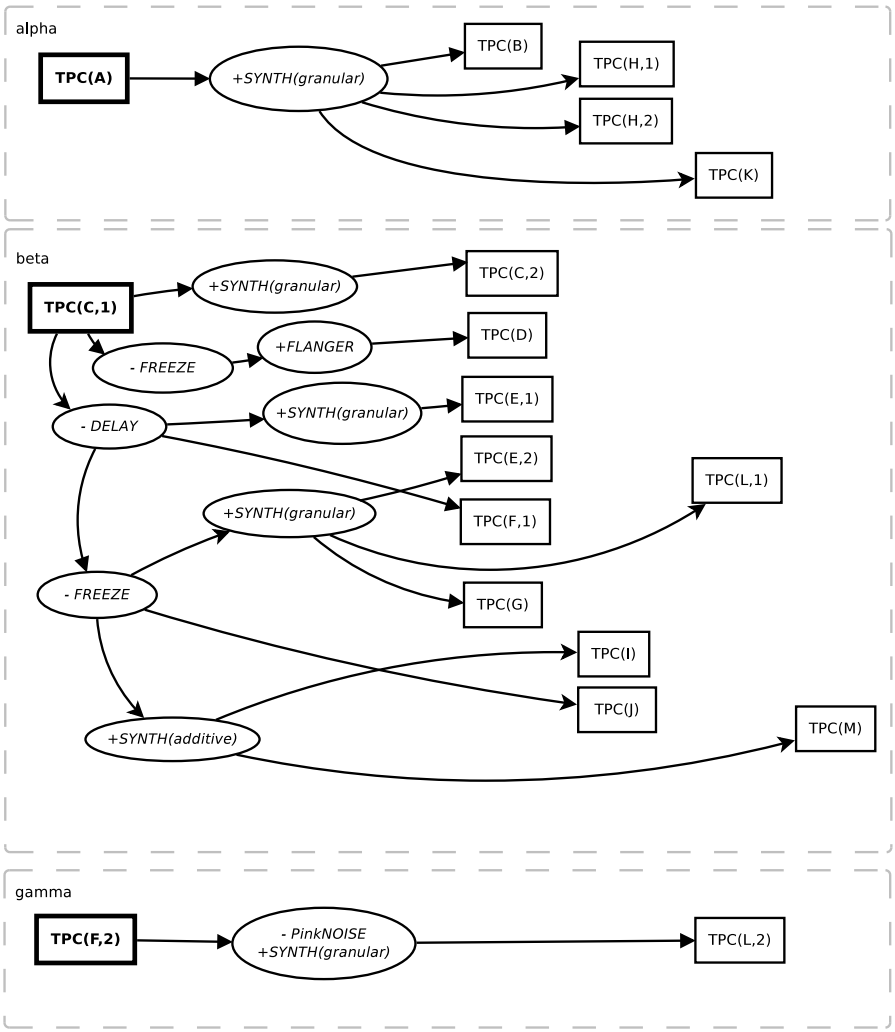


Figure A.12: Transformation network from *The Ghost of Judith*.

A.5 Analysis of portfolio work *Trio in 3 times 3 rooms*

See section 3.4 for discussion on the TPC analysis of *Trio in 3 times 3 rooms*. From TPC(34) and onwards, where no SPATIALIZE components or Room parameters are indicated, the spatialisation of the TPC components are assumed to be in RoomA.

A.5.1 Part A1

$$\text{TPC}(1) = \begin{bmatrix} \alpha\Big(\big(\text{cl}, \text{pno}, \text{cb}, \text{SYNTH}(\text{additive})\big) \Rightarrow \textit{Chord}\Big) \\ \text{FREEZE} \begin{pmatrix} (\text{cl}, \text{pno}, \text{cb}) \\ \downarrow \text{crossfade} \downarrow \\ \text{SYNTH} \begin{pmatrix} \text{additive} \\ (\text{pitch}, \text{gain}) \leftarrow \text{LFO}(\text{stochastic}) \\ \text{SPATIALIZE}(\text{RoomA}, \textit{boids}) \end{pmatrix} \end{pmatrix} \end{bmatrix}. \quad \text{(A.184)}$$

$$\text{TPC}(2) = \begin{bmatrix} \alpha\Big(\big(\text{SYNTH}(\text{additive})\big) \Rightarrow \textit{Chord}\Big) \\ \text{FREEZE} \begin{pmatrix} \text{SYNTH} \begin{pmatrix} \text{additive} \\ (\text{pitch}, \text{gain}) \leftarrow \text{LFO}(\text{stochastic}) \\ \text{SPATIALIZE}(\text{RoomA}, \textit{boids}) \end{pmatrix} \end{pmatrix} \end{bmatrix}. \quad \text{(A.185)}$$

$$\text{TPC}(3-6) = \begin{bmatrix} \beta(\text{cl}), \alpha\big(\text{SYNTH}(\text{additive})\big) \\ \text{clarinet} \rightarrow \big(\text{RecordSAMPLE}(\text{A1}), \text{RecordANALYSIS}(\text{A1})\big) \\ \text{SYNTH} \begin{pmatrix} \text{additive} \\ (\text{pitch}, \text{gain}) \leftarrow \text{LFO}(\text{stochastic}) \\ \text{SPATIALIZE}(\text{RoomA}, \textit{boids}) \end{pmatrix} \end{bmatrix}. \quad \text{(A.186)}$$

TPC(7–10) = TPC(3–6).

TPC(11–14) = TPC(3–6).

$\mathrm{TPC}(15\text{–}18) = \mathrm{TPC}(3\text{–}6).$

$\mathrm{TPC}(19\text{–}22) = \mathrm{TPC}(3\text{–}6).$[10]

$$\mathrm{TPC}(23-24) = \begin{bmatrix} \beta(\mathrm{cl}, \mathrm{DELAY}), \alpha\big(\mathrm{SYNTH}(\mathrm{additive})\big) \\ \mathrm{clarinet} \\ \mathrm{DELAY}\begin{pmatrix} \mathrm{cl} \rightarrow (\textit{ping} - \textit{pong}) \\ \mathrm{SPATIALIZE}(\mathrm{RoomA}, \mathrm{preset\ 4speaker}) \end{pmatrix} \\ \mathrm{SYNTH}\begin{pmatrix} \mathrm{additive} \\ (\mathrm{pitch}, \mathrm{gain}) \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{SPATIALIZE}(\mathrm{RoomA}, \textit{boids}) \end{pmatrix} \end{bmatrix}. \tag{A.187}$$

$\mathrm{TPC}(25\text{–}26) = \mathrm{TPC}(23\text{–}24).$

$\mathrm{TPC}(27\text{–}29) = \mathrm{TPC}(23\text{–}24).$

$\mathrm{TPC}(30\text{–}32) = \mathrm{TPC}(23\text{–}24).$

$$\mathrm{TPC}(33, 1) = \begin{bmatrix} \alpha\big(\mathrm{SYNTH}(\mathrm{additive})\big) \\ \mathrm{SYNTH}\big(\mathrm{granular}(\mathrm{A1})\big) \\ \mathrm{SYNTH}\begin{pmatrix} \mathrm{additive} \\ \big(\mathrm{pitch}(\mathrm{glissandi}), \mathrm{gain}\big) \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{SPATIALIZE}(\mathrm{RoomA} \rightarrow (\mathrm{RoomB}, \mathrm{RoomC}), \textit{boids}) \end{pmatrix} \end{bmatrix}. \tag{A.188}$$

[10] In bars 3–22 there is a progression of parameter changes to the stochastic modulation of the SYNTH, but for this TPC analysis such parameter changes will be considered immaterial, and the TPC segmentation according to phrasing in the clarinet part TPC(3–22) are considered equal in the transformation network (shown under the 'beta+alpha' TPC-category in Figure A.13).

$$\mathrm{TPC}(33,2) = \begin{bmatrix} \alpha\big(\mathrm{SYNTH}(\mathrm{additive})\big), \beta\big(\mathrm{PlaySAMPLE}(\textit{soprano sax})\big) \\ \mathrm{SYNTH}\big(\mathrm{granular}(\mathrm{A1})\big) \\ \mathrm{PlaySAMPLE}\big(\mathrm{PreRECORDED}(\textit{soprano sax})\mathrm{RoomC}\big) \\ \mathrm{SYNTH}\begin{pmatrix} \mathrm{additive} \\ \big(\mathrm{pitch}(\mathrm{glissandi}), \mathrm{gain}\big) \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{SPATIALIZE}\big((\mathrm{RoomB}, \mathrm{RoomC}), \textit{boids}\big) \end{pmatrix} \end{bmatrix}. \tag{A.189}$$

$$\mathrm{TPC}(33,3) = \begin{bmatrix} \mathrm{PlaySAMPLE}\begin{pmatrix} \mathrm{PreRECORDED} \\ (\textit{small clapping}, \textit{waves noise}) \\ \mathrm{RoomA} \end{pmatrix} \end{bmatrix}. \tag{A.190}$$

$$\mathrm{TPC}(33,4) = \begin{bmatrix} \mathrm{PlaySAMPLE}\begin{pmatrix} \mathrm{PreRECORDED} \\ (\textit{DoorClose1}) \\ \mathrm{RoomA} \end{pmatrix} \end{bmatrix}. \tag{A.191}$$

A.5.2 Part B1

$$\mathrm{TPC}(34) = \begin{bmatrix} \mathrm{PlaySAMPLE}\big(\mathrm{PreRECORDED}(\textit{Cyprus beach walk})\big) \\ \mathrm{PinkNOISE}\begin{pmatrix} \mathrm{BandPassFilter}(\textit{boids}) \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \end{bmatrix}. \tag{A.192}$$

$$\mathrm{TPC}(35-54) = \begin{bmatrix} \beta(\mathrm{cl}), \gamma(\mathrm{pno}, \mathrm{cb}) \\ \mathrm{cl}, \mathrm{pno}, \mathrm{cb} \\ \mathrm{PlaySAMPLE}\big(\mathrm{PreRECORDED}(\textit{Cyprus beach walk})\big) \\ \mathrm{PinkNOISE}\begin{pmatrix} \mathrm{BandPassFilter}(\textit{boids}) \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \end{bmatrix}. \tag{A.193}$$

$$\mathrm{TPC}(55-56) = \begin{bmatrix} \mathrm{PlaySAMPLE}\begin{pmatrix} \mathrm{PreRECORDED}(\mathit{Machine}) \\ \mathrm{SPATIALIZE}(\text{preset 4speaker trajectories}) \end{pmatrix} \\ \mathrm{PlaySAMPLE}(\mathrm{A1})\text{modulated} \leftarrow \mathrm{ANALYSIS}(\mathrm{A1}) \end{bmatrix}. \tag{A.194}$$

A.5.3 Pass 1 network (parts A1 and B1)

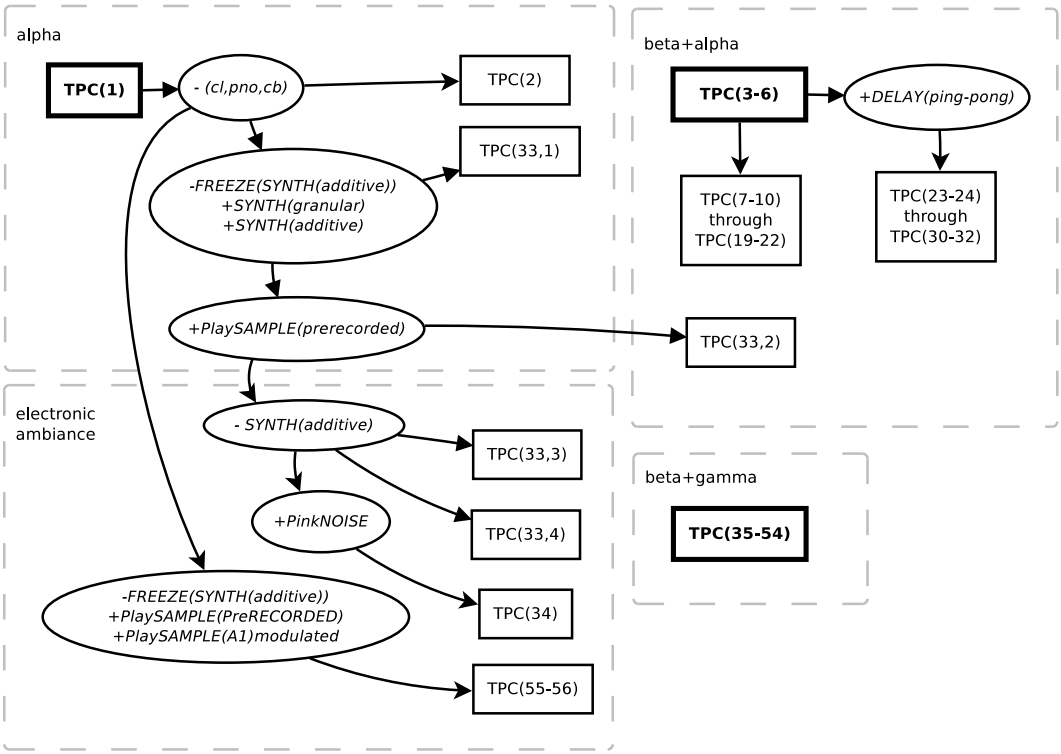


Figure A.13: Transformation network pass 1 from *Trio in 3 times 3 rooms.*

A.5.4 Part A2

$$\mathrm{TPC}(57) = \begin{bmatrix} \alpha\Big(\big(\mathrm{cl}, \mathrm{pno}, \mathrm{cb}, \mathrm{SYNTH}(\mathrm{additive})\big) \Rightarrow \textit{Chord}\Big) \\ \mathrm{FREEZE} \begin{pmatrix} (\mathrm{cl}, \mathrm{pno}, \mathrm{cb}) \\ \downarrow \mathrm{crossfade} \downarrow \\ \mathrm{SYNTH} \begin{pmatrix} \mathrm{additive} \\ (\mathrm{pitch}, \mathrm{gain}) \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \end{pmatrix} \end{bmatrix}. \quad \text{(A.195)}$$

$$\mathrm{TPC}(58) = \begin{bmatrix} \alpha\big(\mathrm{SYNTH}(\mathrm{additive}) \Rightarrow \textit{Chord}\big) \\ \mathrm{FREEZE} \begin{pmatrix} \mathrm{SYNTH} \begin{pmatrix} \mathrm{additive} \\ (\mathrm{pitch}, \mathrm{gain}) \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \end{pmatrix} \end{bmatrix}. \quad \text{(A.196)}$$

$$\mathrm{TPC}(59-70) = \begin{bmatrix} \beta(\mathrm{cl}, \mathrm{pno}), \alpha\big(\mathrm{SYNTH}(\mathrm{additive})\big) \\ (\mathrm{clarinet}, \mathrm{piano}) \rightarrow \big(\mathrm{RecordSAMPLE(A2)}, \mathrm{RecordANALYSIS(A2)}\big) \\ \mathrm{SYNTH} \begin{pmatrix} \mathrm{additive} \\ (\mathrm{pitch}, \mathrm{gain}) \leftarrow (\mathrm{LFO}(\mathrm{stochastic})) \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \end{bmatrix}. \quad \text{(A.197)}$$

TPC(71–73) = TPC(59–70).

TPC(74–76) = TPC(59–70).

TPC(77–79) = TPC(59–70).

TPC(80–82,1) = TPC(59–70).

$$\mathrm{TPC}(82, 2-83) = \begin{bmatrix} \alpha\big(\mathrm{SYNTH}(\mathrm{additive})\big) \\ \mathrm{SYNTH}\begin{pmatrix} \mathrm{additive} \\ \mathrm{pitch}(\mathrm{glissandi\ downwards}) \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{gain}(\mathrm{decrescendo}) \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \end{bmatrix}. \tag{A.198}$$

A.5.5 Part B2

$$\mathrm{TPC}(84-89) = \begin{bmatrix} \gamma(\mathrm{cb}) \\ \mathrm{cb} \\ \mathrm{PlaySAMPLE}\big(\mathrm{PreRECORDED}(\textit{Birmingham mall ambience})\big) \end{bmatrix}. \tag{A.199}$$

$$\mathrm{TPC}(90-108) = \begin{bmatrix} \beta(\mathrm{cl}), \gamma(\mathrm{pno}, \mathrm{cb}) \\ \mathrm{cl}, \mathrm{pno}, \mathrm{cb} \\ \mathrm{PlaySAMPLE}\big(\mathrm{PreRECORDED}(\textit{Birmingham mall ambience})\big) \end{bmatrix}. \tag{A.200}$$

$$\mathrm{TPC}(109, 1) = \Big[\mathrm{PlaySAMPLE}\big(\mathrm{PreRECORDED}(\textit{crowd expression}, \textit{laughter})\big)\Big]. \tag{A.201}$$

$$\mathrm{TPC}(109, 2) = \Big[\mathrm{PlaySAMPLE}\big(\mathrm{PreRECORDED}(\textit{waves}, \textit{noise})\big)\Big]. \tag{A.202}$$

$$\mathrm{TPC}(109, 3) = \begin{bmatrix} \mathrm{PlaySAMPLE}\begin{pmatrix} \mathrm{PreRECORDED} \\ (\textit{Damascus street ambience}) \\ \mathrm{RoomC} \end{pmatrix} \end{bmatrix}. \tag{A.203}$$

$$\mathrm{TPC}(110-131)=\begin{bmatrix}\beta(\mathrm{pno})\\ \mathrm{pno}\\ \mathrm{PlaySAMPLE}\begin{pmatrix}\mathrm{PreRECORDED}\\ (\textit{Damascus street ambience})\\ \mathrm{RoomC}\end{pmatrix}\\ \mathrm{PinkNOISE}\begin{pmatrix}\mathrm{BandPassFilter}(\textit{boids})\\ \mathrm{SPATIALIZE}(\textit{boids})\end{pmatrix}\end{bmatrix}. \tag{A.204}$$

$$\mathrm{TPC}(132-148)=\begin{bmatrix}\beta(\mathrm{pno})\\ \mathrm{pno}\\ \mathrm{PlaySAMPLE}\begin{pmatrix}\mathrm{PreRECORDED}\\ (\textit{Child cry})\mathrm{RoomC}\\ (\textit{water running})\mathrm{RoomA}\end{pmatrix}\\ \mathrm{PinkNOISE}\begin{pmatrix}\mathrm{BandPassFilter}(\textit{boids})\\ \mathrm{SPATIALIZE}(\textit{boids})\end{pmatrix}\end{bmatrix}. \tag{A.205}$$

$$\mathrm{TPC}(149-150)=\begin{bmatrix}\mathrm{PlaySAMPLE}\begin{pmatrix}\mathrm{PreRECORDED}(\textit{Machine})\\ \mathrm{SPATIALIZE}(\text{preset 4speaker trajectories})\end{pmatrix}\\ \mathrm{PlaySAMPLE}(\mathrm{A1})\text{modulated} \leftarrow \mathrm{ANALYSIS}(\mathrm{A1})\end{bmatrix}. \tag{A.206}$$

A.5.6 Pass 2 network (parts A2 and B2)

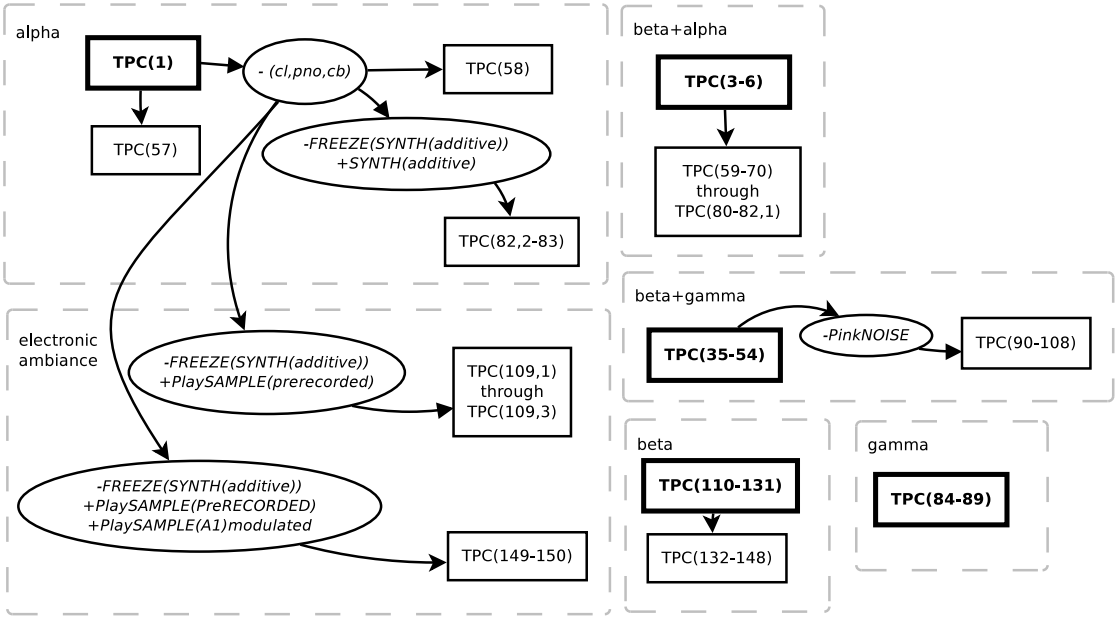


Figure A.14: Transformation network pass 2 from *Trio in 3 times 3 rooms*.

A.5.7 Part A3

$$\mathrm{TPC}(151) = \left[\begin{array}{l} \alpha\Big(\big(\mathrm{cl}, \mathrm{pno}, \mathrm{cb}, \mathrm{SYNTH}(\mathrm{additive})\big) \Rightarrow \mathit{Chord}\Big) \\ \mathrm{FREEZE}\left(\begin{array}{l} (\mathrm{cl}, \mathrm{pno}, \mathrm{cb}) \\ \downarrow \text{ crossfade } \downarrow \\ \mathrm{SYNTH}\left(\begin{array}{l} \text{additive} \\ (\text{pitch}, \text{gain}) \leftarrow \mathrm{LFO}(\text{stochastic}) \\ \mathrm{SPATIALIZE}(\mathit{boids}) \end{array}\right) \leftarrow \mathrm{DOPPLER} \end{array}\right) \end{array}\right]. \tag{A.207}$$

$$\mathrm{TPC}(152) = \begin{bmatrix} \alpha\big(\mathrm{SYNTH}(\mathrm{additive})\big) \\ \mathrm{SYNTH}\begin{pmatrix} \mathrm{additive} \\ (\mathrm{pitch}, \mathrm{gain}) \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \leftarrow \mathrm{DOPPLER} \end{bmatrix}. \quad \text{(A.208)}$$

$$\mathrm{TPC}(153-171) = \begin{bmatrix} \beta(\mathrm{cb}), \alpha\big(\mathrm{SYNTH}(\mathrm{additive})\big) \\ \mathrm{cb} \\ \mathrm{SYNTH}\begin{pmatrix} \mathrm{additive} \\ (\mathrm{pitch}, \mathrm{gain}) \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \leftarrow \mathrm{DOPPLER} \end{bmatrix}. \quad \text{(A.209)}$$

$$\mathrm{TPC}(172-190) = \begin{bmatrix} \beta(\mathrm{cb}), \alpha\big(\mathrm{SYNTH}(\mathrm{additive})\big) \\ \mathrm{cb} \\ \mathrm{SYNTH}\begin{pmatrix} \mathrm{additive} \\ \mathrm{pitch(glissandi)} \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{gain} \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \leftarrow \mathrm{DOPPLER} \end{bmatrix}. \quad \text{(A.210)}$$

$$\mathrm{TPC}(191) = \begin{bmatrix} \alpha\big(\mathrm{SYNTH}(\mathrm{additive})\big) \\ \mathrm{PlaySAMPLE}\big(\mathrm{PreRECORDED}(\textit{crowd clapping}, \textit{waves})\big) \\ \mathrm{PinkNOISE}\begin{pmatrix} \mathrm{BandPassFilter}(\textit{boids}) \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \\ \mathrm{SYNTH}\begin{pmatrix} \mathrm{additive} \\ \mathrm{pitch(glissandi)} \leftarrow \mathrm{LFO(stochastic)} \\ \mathrm{gain} \leftarrow \mathrm{LFO(stochastic)} \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \leftarrow \mathrm{DOPPLER} \end{bmatrix}. \tag{A.211}$$

$$\mathrm{TPC}(192,1) = \Big[\mathrm{PlaySAMPLE}\big(\mathrm{PreRECORDED}(\textit{DoorClose2})\mathrm{RoomC}\big)\Big]. \tag{A.212}$$

$$\mathrm{TPC}(192,2) = \begin{bmatrix} \alpha\big(\mathrm{SYNTH}(\mathrm{additive})\big) \\ \mathrm{PlaySAMPLE}\begin{pmatrix} \mathrm{PreRECORDED} \\ (\textit{Cyprus beach walk 2}) \\ \mathrm{RoomC} \end{pmatrix} \\ \mathrm{PinkNOISE}\begin{pmatrix} \mathrm{BandPassFilter}(\textit{boids}) \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \\ \mathrm{SYNTH}\begin{pmatrix} \mathrm{additive} \\ \mathrm{pitch(glissandi)} \leftarrow \mathrm{LFO(stochastic)} \\ \mathrm{gain} \leftarrow \mathrm{LFO(stochastic)} \\ \mathrm{SPATIALIZE}(\textit{boids}) \end{pmatrix} \leftarrow \mathrm{DOPPLER} \end{bmatrix}. \tag{A.213}$$

A.5.8 Part B3

$$\mathrm{TPC}(193-213)=\begin{bmatrix}\beta(\mathrm{cl}),\gamma(\mathrm{pno},\mathrm{cb})\\ \mathrm{cl},\mathrm{pno},\mathrm{cb}\\ \mathrm{PlaySAMPLE}\begin{pmatrix}\mathrm{PreRECORDED}\\ (\textit{Cyprus beach walk 2})\\ \mathrm{RoomC}\end{pmatrix}\\ \mathrm{PinkNOISE}\begin{pmatrix}\mathrm{BandPassFilter}(\textit{boids})\\ \mathrm{SPATIALIZE}(\textit{boids})\end{pmatrix}\end{bmatrix}. \tag{A.214}$$

$$\mathrm{TPC}(214)=\begin{bmatrix}\mathrm{PlaySAMPLE}\begin{pmatrix}\mathrm{PreRECORDED}(\textit{Italian ocean surf})\\ \mathrm{SPATIALIZE}(\mathrm{preset\ 4speaker})\end{pmatrix}\\ \mathrm{PlaySAMPLE(A1)modulated}\leftarrow\mathrm{ANALYSIS(A1)}\\ \mathrm{PlaySAMPLE(A2)modulated}\leftarrow\mathrm{ANALYSIS(A2)}\end{bmatrix}. \tag{A.215}$$

$$\mathrm{TPC}(215)=\begin{bmatrix}\mathrm{PlaySAMPLE}\begin{pmatrix}\mathrm{PreRECORDED}(\textit{Machine},\textit{waves})\\ \mathrm{SPATIALIZE}(\mathrm{preset\ 4speaker\ trajectories})\end{pmatrix}\\ \mathrm{PlaySAMPLE(A1)modulated}\leftarrow\mathrm{ANALYSIS(A1)}\\ \mathrm{PlaySAMPLE(A2)modulated}\leftarrow\mathrm{ANALYSIS(A2)}\\ \mathrm{SYNTH}\big(\mathrm{granular(A1)}\big)\end{bmatrix}. \tag{A.216}$$

A.5.9 Part C1

$$\mathrm{TPC}(216-231)=\begin{bmatrix}\beta(\mathrm{cl})\\ \mathrm{cl}\end{bmatrix}. \tag{A.217}$$

$$\mathrm{TPC}(232)=\Big[(\mathrm{cl},\mathrm{pno},\mathrm{cb})\mathrm{pause}\Big]. \tag{A.218}$$

$$\mathrm{TPC}(233) = \begin{bmatrix} \alpha\big((\mathrm{cl}, \mathrm{pno}, \mathrm{cb}) \Rightarrow \mathit{Chord}\big) \\ \mathrm{cl}, \mathrm{pno}, \mathrm{cb} \end{bmatrix}. \tag{A.219}$$

$$\mathrm{TPC}(234) = \Big[\mathrm{PlaySAMPLE}\big(\mathrm{PreRECORDED}(\mathit{DoorClose3})\big)\Big]. \tag{A.220}$$

A.5.10 Pass 3 network (parts A3 and B3)

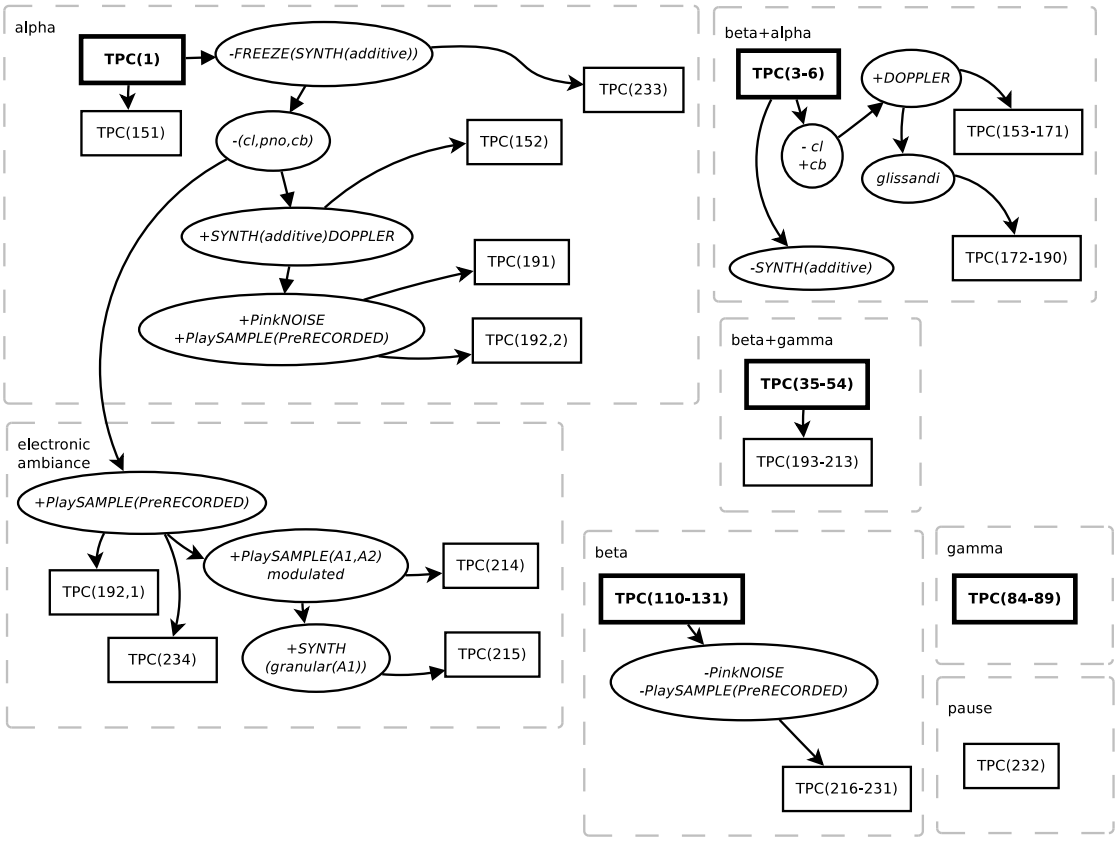


Figure A.15: Transformation network pass 3 from *Trio in 3 times 3 rooms*.

A.6 Analysis of portfolio work *Blandango Willow*

A.6.1 TPC analysis of *Blandango Willow*

'Introduction'

$$\mathrm{TPC(A)} = \Big[\mathrm{PlaySAMPLE}\Big(\mathrm{PreRECORDED}(\textit{introduction})\Big)\Big]. \quad \text{(A.221)}$$

'Theme'

$$\mathrm{TPC(B)} = \begin{bmatrix} \alpha(\mathrm{ts}, \mathrm{trp}, \mathrm{tbn}) \rightarrow \mathrm{RecordSAMPLE(B)} \\ \mathrm{FREEZE}(\mathrm{ts}, \mathrm{trp}, \mathrm{tbn}) \end{bmatrix}. \quad \text{(A.222)}$$

$$\mathrm{TPC(C)} = \begin{bmatrix} \beta(\mathrm{pno}, \mathrm{vc}, \mathrm{cb}, \mathrm{ds}) \\ \mathrm{DRY}(\mathrm{pno}, \mathrm{vc}, \mathrm{cb}, \mathrm{ds}) \end{bmatrix}. \quad \text{(A.223)}$$

$$\mathrm{TPC(D)} = \begin{bmatrix} \gamma\big(\mathrm{pno}, \mathrm{vc}, \mathrm{cb}, \mathrm{PlayMIDI(9)}\big)\mathrm{improv} \\ \mathrm{DRY}(\mathrm{pno}, \mathrm{vc}, \mathrm{cb}) \\ \mathrm{PlayMIDI}\begin{pmatrix} \text{instrument 9} \\ \text{pitch} \leftarrow \mathrm{ANALYSIS} \leftarrow \mathrm{PlaySAMPLE(B)internal} \end{pmatrix} \end{bmatrix}. \quad \text{(A.224)}$$

$$\mathrm{TPC(E)} = \begin{bmatrix} \gamma\big(\mathrm{pno}, \mathrm{vc}, \mathrm{cb}, \mathrm{PlayMIDI(9)}\big)\mathrm{improv} \\ \mathrm{DRY}(\mathrm{pno}, \mathrm{vc}, \mathrm{cb}) \\ \mathrm{DELAY}\big(\mathrm{vc} \rightarrow (\mathrm{ping} - \mathrm{pong})\big) \\ \mathrm{PlayMIDI}\begin{pmatrix} \text{instrument 9} \\ \text{pitch} \leftarrow \mathrm{ANALYSIS} \leftarrow \mathrm{PlaySAMPLE(B)internal} \end{pmatrix} \end{bmatrix}. \quad \text{(A.225)}$$

'Variation 1'

$$\mathrm{TPC(F)} = \begin{bmatrix} \alpha(\mathrm{tutti}) \rightarrow \mathrm{RecordSAMPLE(F)} \\ \mathrm{FREEZE(tutti)} \end{bmatrix}. \tag{A.226}$$

$$\mathrm{TPC(G)} = \begin{bmatrix} \beta(\mathrm{ts, tbn, pno, cb, ds}) \\ \mathrm{DRY(ts, tbn, pno, cb, ds)} \end{bmatrix}. \tag{A.227}$$

$$\mathrm{TPC(H)} = \begin{bmatrix} \gamma\big(\mathrm{ts, trp, tbn, pno, cb, ds, PlayMIDI(11)}\big)\mathrm{improv} \\ \mathrm{DRY(ts, trp, tbn, pno, cb, ds)} \\ \mathrm{PlayMIDI}\begin{pmatrix} \text{instrument 11} \\ \text{pitch} \leftarrow \mathrm{ANALYSIS} \leftarrow \mathrm{PlaySAMPLE(F)internal} \end{pmatrix} \end{bmatrix}. \tag{A.228}$$

$$\mathrm{TPC(I)} = \begin{bmatrix} \gamma\big(\mathrm{ts, trp, tbn, pno, cb, ds, PlayMIDI(11)}\big)\mathrm{improv} \\ \mathrm{DRY(ts, trp, tbn, pno, cb, ds)} \\ \mathrm{DELAY}\big(\mathrm{trp} \rightarrow (\mathrm{ping} - \mathrm{pong})\big) \\ \mathrm{PlayMIDI}\begin{pmatrix} \text{instrument 11} \\ \text{pitch} \leftarrow \mathrm{ANALYSIS} \leftarrow \mathrm{PlaySAMPLE(F)internal} \end{pmatrix} \end{bmatrix}. \tag{A.229}$$

'Variation 2'

$$\mathrm{TPC(J)} = \begin{bmatrix} \alpha(\mathrm{ts, trp, tbn, pno}) \\ \mathrm{FREEZE(ts, trp, tbn, pno)} \end{bmatrix}. \tag{A.230}$$

$$\mathrm{TPC(K)} = \begin{bmatrix} \beta(\mathrm{tbn, pno, vc, cb, ds}) \\ \mathrm{DRY(tbn, pno, vc, cb, ds)} \rightarrow \mathrm{RecordSAMPLE(K)} \end{bmatrix}. \tag{A.231}$$

$$\mathrm{TPC(L)} = \begin{bmatrix} \gamma\big(\mathrm{tbn, pno, vc, cb, ds, PlayMIDI(13)}\big)\mathrm{improv} \\ \mathrm{DRY(tbn, pno, vc, cb, ds)} \\ \mathrm{PlayMIDI}\begin{pmatrix} \text{instrument 13} \\ \text{pitch} \leftarrow \mathrm{ANALYSIS} \leftarrow \mathrm{PlaySAMPLE(C)internal} \end{pmatrix} \end{bmatrix}. \tag{A.232}$$

'Variation 3'

$$\mathrm{TPC(M)} = \begin{bmatrix} \alpha(\mathrm{ts, pno, vc, cb, ds}) \\ \mathrm{DRY(ts, pno, vc, cb, ds)} \end{bmatrix}. \tag{A.233}$$

$$\mathrm{TPC(N)} = \begin{bmatrix} \alpha(\mathrm{tutti}) \rightarrow \mathrm{RecordSAMPLE(N)} \\ \mathrm{DRY(tutti)} \end{bmatrix}. \tag{A.234}$$

$$\mathrm{TPC(O)} = \begin{bmatrix} \alpha(\mathrm{ts, trp, tbn, pno, cb, ds}) \\ \mathrm{DRY(ts, trp, tbn, pno, cb, ds)} \end{bmatrix}. \tag{A.235}$$

$$\mathrm{TPC(P)} = \begin{bmatrix} \gamma\big(\mathrm{ts, pno, cb, ds, PlayMIDI(12)}\big)\mathrm{improv} \\ \mathrm{DRY(ts, pno, cb, ds)} \\ \mathrm{PlayMIDI}\begin{pmatrix} \text{instrument 12} \\ \text{pitch} \leftarrow \mathrm{ANALYSIS} \leftarrow \mathrm{PlaySAMPLE(N)internal} \end{pmatrix} \\ \mathrm{PlaySYNTH}\big(\mathrm{granular, sample(K)}\big) \end{bmatrix}. \tag{A.236}$$

$$\mathrm{TPC(Q)} = \begin{bmatrix} \gamma\big(\mathrm{ts, pno, cb, ds, PlayMIDI(12)}\big)\mathrm{improv} \\ \mathrm{DRY(ts, pno, cb, ds)} \\ \mathrm{DELAY}\big(\mathrm{ts, vc} \rightarrow (\mathrm{ping} - \mathrm{pong})\big) \\ \mathrm{PlayMIDI}\begin{pmatrix} \text{instrument 12} \\ \text{pitch} \leftarrow \mathrm{ANALYSIS} \leftarrow \mathrm{PlaySAMPLE(N)internal} \end{pmatrix} \\ \mathrm{PlaySYNTH}\big(\mathrm{granular, sample(K)}\big) \end{bmatrix}. \tag{A.237}$$

'Variation 4'

$$\mathrm{TPC(R-U)} = \begin{bmatrix} \alpha(\mathrm{tutti}) \\ \mathrm{DRY(tutti)} \end{bmatrix}. \tag{A.238}$$

$$\mathrm{TPC(V)} = \begin{bmatrix} \gamma(\mathrm{tutti})\mathrm{improv} \\ \mathrm{DRY(tutti)} \end{bmatrix}. \tag{A.239}$$

$$\mathrm{TPC(W)} = \begin{bmatrix} \gamma(\mathrm{tutti})\mathrm{improv} \\ \mathrm{DRY(tutti)} \\ \mathrm{DELAY}\big(\mathrm{ts, trp, tbn, vc} \rightarrow (\mathrm{ping-pong})\big) \end{bmatrix}. \tag{A.240}$$

'Variation 5'

$$\mathrm{TPC(X)} = \begin{bmatrix} \alpha(\mathrm{tutti}) \\ \mathrm{DRY(tutti)} \end{bmatrix}. \tag{A.241}$$

$$\mathrm{TPC(Y)} = \begin{bmatrix} \alpha(\mathrm{ts, trp, pno, cb}) \\ \mathrm{FREEZE(ts, trp, pno, cb)} \end{bmatrix}. \tag{A.242}$$

$$\mathrm{TPC(Z)} = \Big[\mathrm{FREEZE} \rightarrow \mathrm{Fade\ Out}\Big]. \tag{A.243}$$

A.7 Analysis of portfolio work *Chasing the voices of windmills*

Much of *Chasing the voices of windmills* is built around a drone (pitch A) and so pitch-class sets are notated with a fixed pitch class 0 = A; rather than indicating Forte's basic forms [Forte, 1973] such as was used in the analysis of Berio's *Altra voce* in section 4.1 and Appendix A.2. Number lists in [ ] brackets indicate the (fixed A=0) pc sets in the TPC segmentation of *Chasing the voices of windmills*. Pitch motif variations are notated as components such as for example trombone1$\big([0]\ldots[0 \quad \text{gliss}\rightarrow 7]\big)$ in TPC(1) which indicates that trombone 1 plays a motif beginning on A (pitch class 0) and repeats while varying glissandi as far away in pitch space as E (pitch class 7). A component such as for example trombone1$[2 \quad \text{gliss}\rightarrow (4,6,8)]$ in TPC(102–108) indicates variations in glissandi from B (pitch class 2) to three other pitch classes (4,6 and 8). With a component such as SYNTH$\Big(\text{additive}, \big([0,2,8,10]\text{gliss}\rightarrow [0,2,4]\big)\Big)$ in TPC(128–130) the SYNTH plays the pc set [0,2,8,10] and these glissandi to the pc set [0,2,4] through a concerted motion.

A.7.1 Part 1

$$\text{TPC}(1-11) = \left[\begin{array}{l} \alpha\left(\begin{array}{l}\text{trombone1}\big([0]\ldots[0\ \text{gliss}\rightarrow 7]\big)\\ \text{trombone2}\big([0]\ldots[0\ \text{gliss}\rightarrow 5]\big)\end{array}\right) \\ \text{DRY}(\text{trombone1},\text{trombone2}) \rightarrow \left\{\begin{array}{l}\text{RecordANALYSIS(a)}\\ \text{RecordSAMPLE(A)}\end{array}\right. \end{array}\right]. \tag{A.244}$$

$$\mathrm{TPC}(12-20) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}\big([0\ \mathrm{gliss} \to 2] \ldots [0\ \mathrm{gliss} \to 3]\big) \\ \mathrm{trombone2}\big([11\ \mathrm{gliss} \to 5] \ldots [11\ \mathrm{gliss} \to 3]\big) \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{SYNTH}(\mathrm{additive}) \end{bmatrix}. \tag{A.245}$$

$$\mathrm{TPC}(21-28) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}\big([0\ \mathrm{gliss} \to 1] \ldots [0\ \mathrm{gliss} \to 3]\big) \\ \mathrm{trombone2}[11\ \mathrm{gliss} \to 2] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0, 11]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \to \mathrm{RecordSAMPLE(C)} \\ \mathrm{SYNTH}(\mathrm{additive}) \end{bmatrix}. \tag{A.246}$$

$$\mathrm{TPC}(29-33) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[2, 3, 4, 6] \\ \mathrm{trombone2}[0, 2, 11] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0, 11]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \to \mathrm{RecordSAMPLE(D)} \\ \mathrm{SYNTH}(\mathrm{additive}) \end{bmatrix}. \tag{A.247}$$

$$\mathrm{TPC}(34-36) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[2, 3, 4, 6, 9] \\ \mathrm{trombone2}[0, 2, 11] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0, 11]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{SYNTH}(\mathrm{additive}) \end{bmatrix}. \tag{A.248}$$

$$\mathrm{TPC}(37-41) = \begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}[6,9] \\ \text{trombone2}[0,2,3,6] \\ \text{SYNTH}\big(\text{additive}, [0,3,6,11]\big) \end{pmatrix} \\ \text{DRY}(\text{trombone1}, \text{trombone2}) \\ \text{SYNTH}(\text{additive}) \end{bmatrix}. \tag{A.249}$$

$$\mathrm{TPC}(42-47) = \begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}[6,9] \\ \text{trombone2}[2,3,6] \\ \text{SYNTH}\big(\text{additive}, [0,3,6,11]\big) \end{pmatrix} \\ \text{DRY}(\text{trombone1}, \text{trombone2}) \\ \text{SYNTH}(\text{additive}) \\ \text{PlaySAMPLE(D)loop} \\ \text{PlaySAMPLE} \begin{pmatrix} \text{A}, \begin{pmatrix} \text{transpositions} \\ \uparrow \\ \text{ANALYSIS(a)loop} \end{pmatrix} \end{pmatrix} \text{loop} \end{bmatrix}. \tag{A.250}$$

$$\mathrm{TPC}(48-57) = \begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}[4,6,9,10] \\ \text{trombone2}\big([5,7,8]\textit{hyperactive slide}\big) \\ \text{SYNTH}\big(\text{additive}, [0,3,6,11]\big) \end{pmatrix} \\ \text{FREEZE}(\text{trombone1}, \text{trombone2}) \\ \text{DELAY}(\text{trombone1}, \text{trombone2}) \\ \text{SYNTH}(\text{additive}) \\ \text{PlaySAMPLE(D)loop} \\ \text{PlaySAMPLE} \begin{pmatrix} \text{A}, \begin{pmatrix} \text{transpositions} \\ \uparrow \\ \text{ANALYSIS(a)loop} \end{pmatrix} \end{pmatrix} \text{loop} \end{bmatrix}. \tag{A.251}$$

A.7.2 Part 2

$$\mathrm{TPC}(58) = \Big[\mathrm{FadeOut}(\mathrm{PlaySAMPLE(D,A)loop}, \mathrm{FREEZE}, \mathrm{DELAY})\Big]. \tag{A.252}$$

$$\mathrm{TPC}(59-60) = \begin{bmatrix} \beta \begin{pmatrix} \mathrm{trombone1}\big([11,2]\textit{hyperactive slide}\big) \\ \mathrm{trombone2}\big([0,11]\textit{hyperactive slide}\big) \end{pmatrix} \\ \big(\mathrm{FREEZE} \rightarrow \mathrm{DRY}\big)(\mathrm{trombone1}, \mathrm{trombone2}) \\ (\mathrm{trombone1}, \mathrm{trombone2}) \rightarrow \mathrm{RecordSAMPLE(I)} \end{bmatrix}. \tag{A.253}$$

$$\mathrm{TPC}(61)^{11} = \begin{bmatrix} \beta \begin{pmatrix} \mathrm{trombone1}\big([4]\textit{hyperactive slide}\big) \\ \mathrm{trombone2}\big([3,6]\textit{hyperactive slide}\big) \end{pmatrix} \\ \big(\mathrm{FREEZE} \rightarrow \mathrm{DRY}\big)(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{PlaySAMPLE}\big(\mathrm{(A)transposed\ -8tv, backwards}\big)\mathrm{loop} \end{bmatrix}. \tag{A.254}$$

$$\mathrm{TPC}(62) = \begin{bmatrix} \beta \begin{pmatrix} \mathrm{trombone1}\big([0,6]\textit{hyperactive slide}\big) \\ \mathrm{trombone2}\big([3,8]\textit{hyperactive slide}\big) \end{pmatrix} \\ \big(\mathrm{FREEZE} \rightarrow \mathrm{DRY}\big)(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{PlaySAMPLE}\big(\mathrm{(A)transposed\ -8tv, backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big(\mathrm{(I)transposed\ -8tv, backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big(\mathrm{(A)transposed\ -15tv, backwards}\big)\mathrm{loop} \end{bmatrix}. \tag{A.255}$$

[11] I am using –8tv to indicate transpositions one octave lower, –15tv to indicate transpositions two octaves lower and –31tv to indicate transpositions four octaves lower. The 'backwards' indication means that the SAMPLE is played backwards.

$$\mathrm{TPC}(63) = \begin{bmatrix} \beta\begin{pmatrix}\mathrm{trombone1}\big([9]\textit{hyperactive}\ \mathrm{slide}\big)\\ \mathrm{trombone2}\big([10]\textit{hyperactive}\ \mathrm{slide}\big)\end{pmatrix} \\ \big(\mathrm{FREEZE} \to \mathrm{DRY}\big)(\mathrm{trombone1}, \mathrm{trombone2}) \\ (\mathrm{trombone1}, \mathrm{trombone2}) \to \mathrm{RecordSAMPLE(L)} \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -8\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{I})\mathrm{transposed}\ -8\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{I})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \end{bmatrix}. \tag{A.256}$$

$$\mathrm{TPC}(64) = \begin{bmatrix} \beta\begin{pmatrix}\mathrm{trombone1}\big([10]\textit{hyperactive}\ \mathrm{slide}\big)\\ \mathrm{trombone2}\big([5]\textit{hyperactive}\ \mathrm{slide}\big)\end{pmatrix} \\ \mathrm{FREEZE}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -8\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{I})\mathrm{transposed}\ -8\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{I})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \end{bmatrix}. \tag{A.257}$$

$$\mathrm{TPC}(65-66) = \begin{bmatrix} \beta\begin{pmatrix}\mathrm{trombone1}\big([1]\textit{hyperactive}\ \mathrm{slide}\big)\\ \mathrm{trombone2}\big([1]\textit{hyperactive}\ \mathrm{slide}\big)\end{pmatrix} \\ \big(\mathrm{FREEZE} \to \mathrm{DRY}\big)(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}\big((\mathrm{trombone1}, \mathrm{trombone2}) \to \textit{ping} - \textit{pong}\big) \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -8\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{I})\mathrm{transposed}\ -8\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{I})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{L})\mathrm{transposed}\ -15\mathrm{tv}\big) \end{bmatrix}. \tag{A.258}$$

A.7.3 Part 3

$$\mathrm{TPC}(67-71) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[0] \\ \mathrm{trombone2}[0] \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -8\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{I})\mathrm{transposed}\ -8\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{I})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \end{bmatrix}. \quad \text{(A.259)}$$

$$\mathrm{TPC}(72-80) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}\big([0]\ldots[0\ \mathrm{gliss} \rightarrow 5]\big) \\ \mathrm{trombone2}\big([0]\ldots[0\ \mathrm{gliss} \rightarrow 8]\big) \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}\big((\mathrm{trombone1}, \mathrm{trombone2}) \rightarrow \mathit{ping} - \mathit{pong}\big) \\ \mathrm{SYNTH}(\mathrm{additive}) \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -8\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{I})\mathrm{transposed}\ -8\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \end{bmatrix}. \quad \text{(A.260)}$$

$$\mathrm{TPC}(81-86) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[0] \\ \mathrm{trombone2}[10] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0,10]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{SYNTH}(\mathrm{additive}) \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{I})\mathrm{transposed}\ -31\mathrm{tv}, \mathrm{backwards}\big) \\ \mathrm{PlaySAMPLE}(\mathrm{C}) \end{bmatrix}. \quad \text{(A.261)}$$

$$\mathrm{TPC}(87-93) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}\big([0] \ldots [0\ \mathrm{gliss} \rightarrow 4]\big) \\ \mathrm{trombone2}\big([10] \ldots [10\ \mathrm{gliss} \rightarrow (0,8)]\big) \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0,2,10]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}\big((\mathrm{trombone1}, \mathrm{trombone2}) \rightarrow \mathit{ping} - \mathit{pong}\big) \\ \mathrm{SYNTH}(\mathrm{additive}) \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \end{bmatrix}. \quad \text{(A.262)}$$

$$\mathrm{TPC}(94-96) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[0\ \mathrm{gliss} \rightarrow 4] \\ \mathrm{trombone2}[10\ \mathrm{gliss} \rightarrow 0] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0,2,8,10]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{SYNTH}(\mathrm{additive}) \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}(\mathrm{C}) \end{bmatrix}. \quad \text{(A.263)}$$

$$\mathrm{TPC}(97-101) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[2] \\ \mathrm{trombone2}[8] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0,2,8,10]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{SYNTH}(\mathrm{additive}) \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \end{bmatrix}. \quad \text{(A.264)}$$

$$\mathrm{TPC}(102-108) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[2\ \mathrm{gliss} \rightarrow (4,6,8)] \\ \mathrm{trombone2}[8\ \mathrm{gliss} \rightarrow (0,2,10)] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0,2,10]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}\big((\mathrm{trombone1}, \mathrm{trombone2}) \rightarrow \mathit{ping}-\mathit{pong}\big) \\ \mathrm{SYNTH}(\mathrm{additive}) \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \end{bmatrix}. \quad \text{(A.265)}$$

$$\mathrm{TPC}(109-115) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[8] \\ \mathrm{trombone2}[8] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0,2,4,6,8,10]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{SYNTH}(\mathrm{additive}) \\ \mathrm{PlaySAMPLE}\big((\mathrm{A})\mathrm{transposed}\ -15\mathrm{tv}, \mathrm{backwards}\big)\mathrm{loop} \\ \mathrm{PlaySAMPLE}\big((\mathrm{I})\mathrm{transposed}\ -31\mathrm{tv}, \mathrm{backwards}\big) \\ \mathrm{PlaySAMPLE}(\mathrm{C}) \end{bmatrix}. \quad \text{(A.266)}$$

$$\mathrm{TPC}(116-119)=\begin{bmatrix}\alpha\begin{pmatrix}\text{trombone1}[8\text{ gliss}\to(4,6)]\\ \text{trombone2}[8\text{ gliss}\to(10,0)]\\ \text{SYNTH}\big(\text{additive},[0,2,4,6,8,10]\big)\end{pmatrix}\\ \text{DRY}(\text{trombone1},\text{trombone2})\\ \text{DELAY}(\text{trombone1},\text{trombone2})\\ \text{SYNTH}(\text{additive})\\ \text{PlaySAMPLE}\big((\text{A})\text{transposed }-15\text{tv},\text{backwards}\big)\text{loop}\end{bmatrix}. \quad \text{(A.267)}$$

$$\mathrm{TPC}(120-121)=\begin{bmatrix}\alpha\begin{pmatrix}\text{trombone1}[8\text{ gliss}\to 2]\\ \text{trombone2}[8\text{ gliss}\to(10,0)]\\ \text{SYNTH}\Big(\text{additive},\big([0,2,4,6,8,10]\text{gliss}\to[0,2,8,10]\big)\Big)\end{pmatrix}\\ \text{DRY}(\text{trombone1},\text{trombone2})\\ \text{DELAY}\big((\text{trombone1},\text{trombone2})\to \textit{ping}-\textit{pong}\big)\\ \text{SYNTH}(\text{additive})\end{bmatrix}. \quad \text{(A.268)}$$

$$\mathrm{TPC}(122-127)=\begin{bmatrix}\alpha\begin{pmatrix}\text{trombone1}[6,2]\\ \text{trombone2}[10,0]\\ \text{SYNTH}\big(\text{additive},[0,2,8,10]\big)\end{pmatrix}\\ \text{DRY}(\text{trombone1},\text{trombone2})\\ \text{DELAY}\big((\text{trombone1},\text{trombone2})\to \textit{ping}-\textit{pong}\big)\\ \text{SYNTH}(\text{additive})\end{bmatrix}. \quad \text{(A.269)}$$

$$\mathrm{TPC}(128-130) = \begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}[8\ \text{gliss} \to (4,2,0)] \\ \text{trombone2}[10\ \text{gliss} \to (0,2)] \\ \text{SYNTH}\Big(\text{additive}, \big([0,2,8,10]\text{gliss} \to [0,2,4]\big)\Big) \end{pmatrix} \\ \text{DRY}(\text{trombone1}, \text{trombone2}) \\ \text{DELAY}\big((\text{trombone1}, \text{trombone2}) \to \textit{ping} - \textit{pong}\big) \\ \text{SYNTH}(\text{additive}) \end{bmatrix}. \quad \text{(A.270)}$$

$$\mathrm{TPC}(131-136) = \begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}[4,0] \\ \text{trombone2}[0,2] \\ \text{SYNTH}\big(\text{additive}, [0,2,4]\big) \end{pmatrix} \\ \text{DRY}(\text{trombone1}, \text{trombone2}) \\ \text{DELAY}\big((\text{trombone1}, \text{trombone2}) \to \textit{ping} - \textit{pong}\big) \\ \text{SYNTH}(\text{additive}) \end{bmatrix}. \quad \text{(A.271)}$$

$$\mathrm{TPC}(137-138) = \begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}[4\ \text{gliss} \to (2,0)] \\ \text{trombone2}[0\ \text{gliss} \to (2,4)] \\ \text{SYNTH}\big(\text{additive}, [0,2,4]\big) \end{pmatrix} \\ \text{DRY}(\text{trombone1}, \text{trombone2}) \\ \text{DELAY}\big((\text{trombone1}, \text{trombone2}) \to \textit{ping} - \textit{pong}\big) \\ \text{SYNTH}(\text{additive}) \end{bmatrix}. \quad \text{(A.272)}$$

$$\mathrm{TPC}(139-140) = \begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}[4\ \text{gliss} \to (2,0)] \\ \text{trombone2}[0\ \text{gliss} \to (2,4)] \\ \text{SYNTH}\Big(\text{additive}, \big([0,2,4]\text{gliss} \to [0,2]\big)\Big) \end{pmatrix} \\ \text{DRY}(\text{trombone1}, \text{trombone2}) \\ \text{DELAY}\big((\text{trombone1}, \text{trombone2}) \to \textit{ping} - \textit{pong}\big) \\ \text{SYNTH}(\text{additive}) \end{bmatrix}. \quad \text{(A.273)}$$

$$\mathrm{TPC}(141-146) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[2,0,4] \\ \mathrm{trombone2}[0,2,4] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0,2]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}\big((\mathrm{trombone1}, \mathrm{trombone2}) \rightarrow \mathit{ping}-\mathit{pong}\big) \\ \mathrm{SYNTH}(\mathrm{additive}) \end{bmatrix}. \tag{A.274}$$

$$\mathrm{TPC}(147-148) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[2\ \mathrm{gliss} \rightarrow 0] \\ \mathrm{trombone2}[0\ \mathrm{gliss} \rightarrow 2] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0,2]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}\big((\mathrm{trombone1}, \mathrm{trombone2}) \rightarrow \mathit{ping}-\mathit{pong}\big) \\ \mathrm{SYNTH}(\mathrm{additive}) \end{bmatrix}. \tag{A.275}$$

$$\mathrm{TPC}(149-153) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[0] \\ \mathrm{trombone2}[2] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0,2]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{DELAY}\big((\mathrm{trombone1}, \mathrm{trombone2}) \rightarrow \mathit{ping}-\mathit{pong}\big) \\ \mathrm{SYNTH}(\mathrm{additive}) \end{bmatrix}. \tag{A.276}$$

$$\mathrm{TPC}(154-155) = \begin{bmatrix} \alpha \Big(\mathrm{SYNTH}\Big(\mathrm{additive}, \big([0,2]\mathrm{gliss} \rightarrow [0]\big)\Big)\Big) \\ \mathrm{SYNTH}(\mathrm{additive}) \end{bmatrix}. \tag{A.277}$$

$$\mathrm{TPC}(156-166) = \begin{bmatrix} \alpha \begin{pmatrix} \mathrm{trombone1}[0] \\ \mathrm{trombone2}[0] \\ \mathrm{SYNTH}\big(\mathrm{additive}, [0]\big) \end{pmatrix} \\ \mathrm{DRY}(\mathrm{trombone1}, \mathrm{trombone2}) \\ \mathrm{SYNTH}(\mathrm{additive}) \end{bmatrix}. \tag{A.278}$$

$$\mathrm{TPC}(167) = \begin{bmatrix} \alpha \Big(\mathrm{SYNTH}[0]\Big) \\ \mathrm{SYNTH}(\mathrm{additive})\mathrm{FadeOut} \end{bmatrix}. \tag{A.279}$$

A.7.4 *Chasing the voices of windmills* transformation network diagram

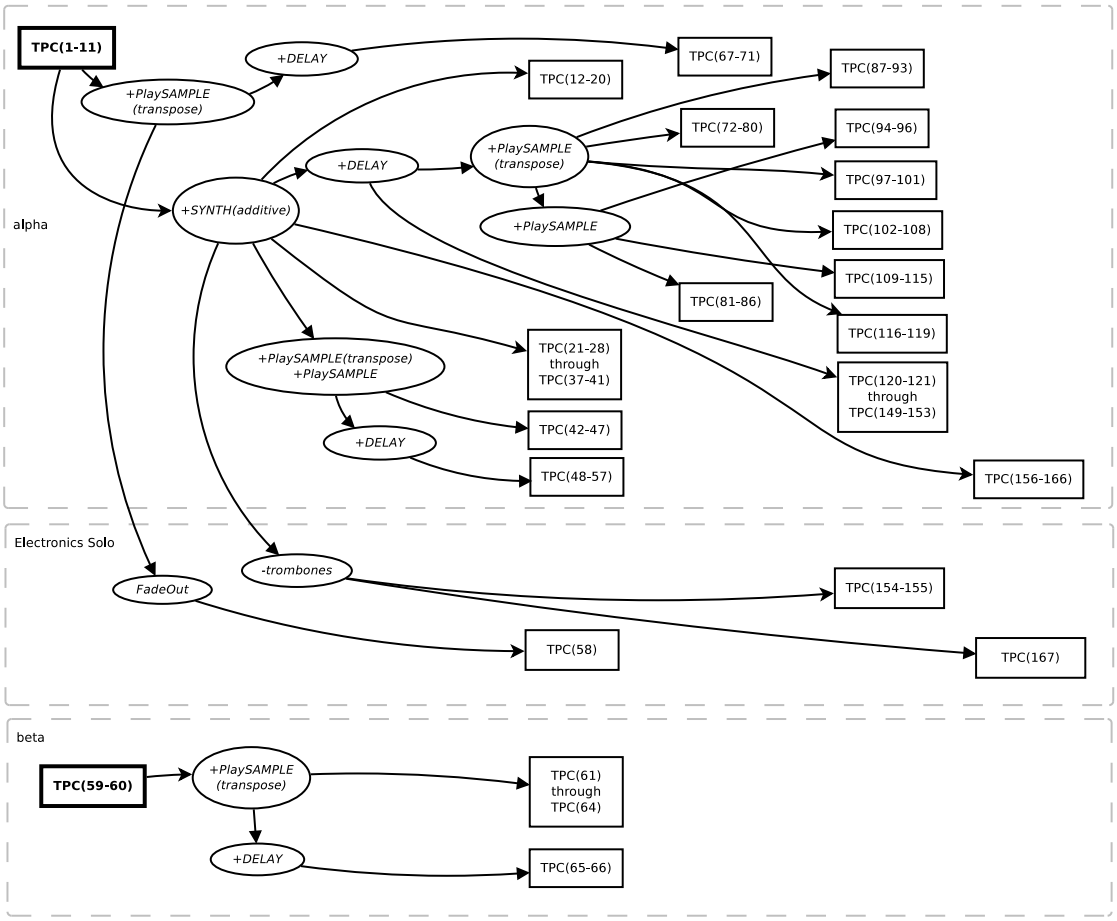


Figure A.16: Transformation network diagram of *Chasing the voices of windmills*.

A.7.5 Screen shots from *Chasing the voices of windmills* MaxMSP patch

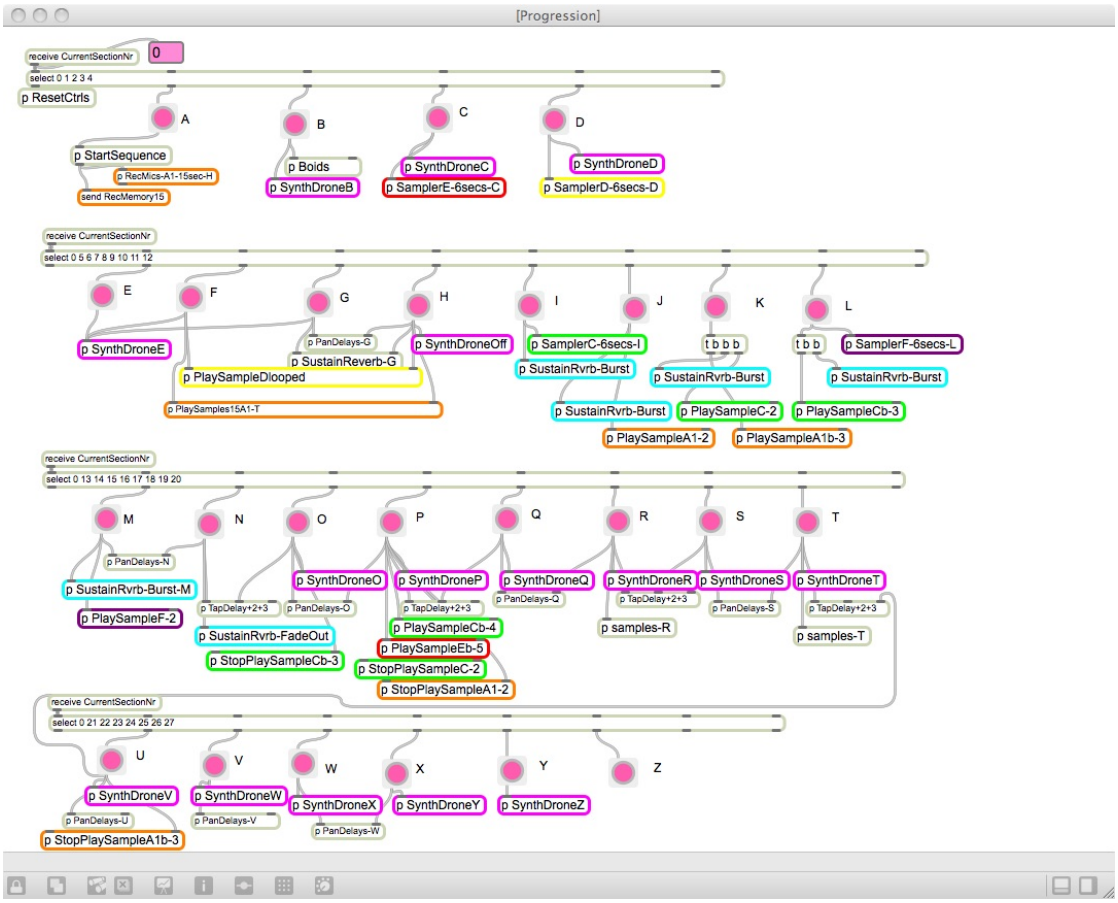


Figure A.17: Screen shot of progression control subpatch in *Max 6* from *Chasing the voices of windmills*.

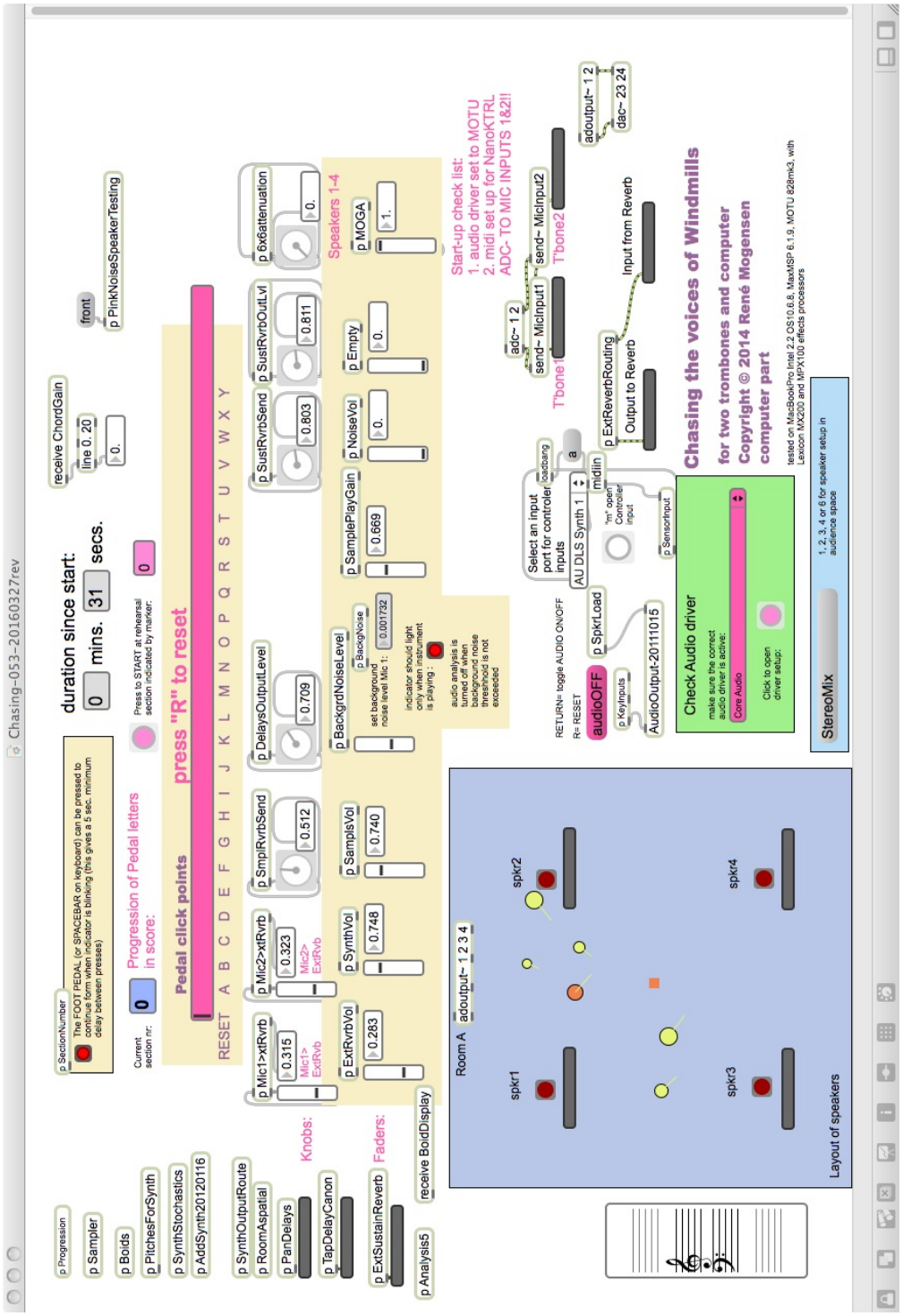


Figure A.18: Screen shot of front end in *Max 6* from *Chasing the voices of windmills*.

A.8 Analysis of portfolio work *Paese favola*

$$\mathrm{TPC(A,1)} = \begin{bmatrix} \alpha(\text{saxophone}) \\ \text{FREEZE}\Big(\text{saxophone} \rightarrow \text{REVERB}(\textit{infinite})\Big) \end{bmatrix}. \tag{A.280}$$

$$\mathrm{TPC(A,2)} = \begin{bmatrix} \beta(\text{saxophone}) \\ \text{FREEZE}\Big(\text{saxophone} \rightarrow \text{REVERB}(\textit{infinite})\Big) \end{bmatrix}. \tag{A.281}$$

$$\mathrm{TPC(B)} = \begin{bmatrix} (\alpha,\beta)(\text{saxophone}), \delta(\text{SYNTH}) \\ \text{FREEZE}\Big(\text{saxophone} \rightarrow \text{REVERB}(\textit{infinite})\Big) \\ \text{SYNTH}\Big(\text{additive}, \big(\text{chords(boids)} \leftarrow \text{ANALYSIS(saxophone, pitch)}\big)\Big) \end{bmatrix}. \tag{A.282}$$

$$\mathrm{TPC(C)} = \begin{bmatrix} (\alpha,\beta)(\text{saxophone}), \delta(\text{SYNTH}) \\ \text{FREEZE}\Big(\text{saxophone} \rightarrow \text{REVERB}(\textit{infinite})\Big) \\ \text{SYNTH}\Big(\text{additive}, \big(\text{chords(boids)} \leftarrow \text{ANALYSIS(saxophone, pitch)}\big)\Big) \\ \text{DELAY(saxophone} \rightarrow \text{TapDelay)} \end{bmatrix}. \tag{A.283}$$

$$\mathrm{TPC(D)} = \begin{bmatrix} \beta(\text{saxophone}) \\ \text{DRY(saxophone)} \end{bmatrix}. \tag{A.284}$$

$$\mathrm{TPC(E)} = \begin{bmatrix} \gamma(\text{voice}) \\ \text{voice} \rightarrow \text{RecordSAMPLE(E)} \end{bmatrix}. \tag{A.285}$$

$$\mathrm{TPC(F)} = \begin{bmatrix} (\alpha,\beta)(\text{saxophone}) \\ \text{DELAY(saxophone} \rightarrow \text{TapDelay)} \\ \text{SYNTH}\big(\text{granular}, \text{SAMPLE(E)}\big) \leftarrow \text{ANALYSIS(saxophone, pitch)} \end{bmatrix}. \tag{A.286}$$

$$\mathrm{TPC(G)} = \begin{bmatrix} (\alpha, \beta)(\text{saxophone}) \\ \mathrm{DRY}(\text{saxophone}) \\ \mathrm{SYNTH}\Big(\text{additive}, \big(\text{chords}(\text{boids}) \leftarrow \mathrm{ANALYSIS}(\text{saxophone}, \text{pitch})\big)\Big) \\ \mathrm{SYNTH}\big(\text{granular}, \mathrm{SAMPLE(E)}\big) \leftarrow \mathrm{ANALYSIS}(\text{saxophone}, \text{pitch}) \end{bmatrix}. \tag{A.287}$$

$$\mathrm{TPC(H)} = \begin{bmatrix} \beta(\text{saxophone}) \\ \mathrm{DRY}(\text{saxophone}) \end{bmatrix}. \tag{A.288}$$

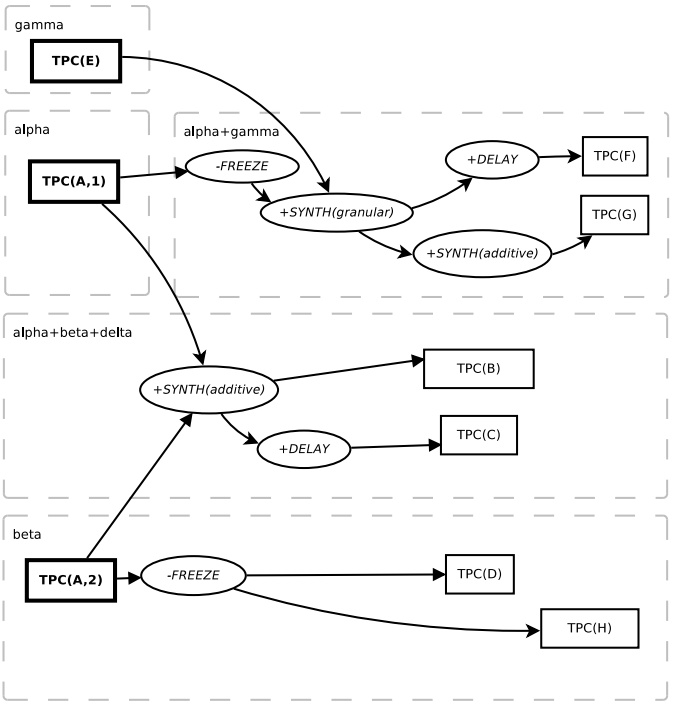


Figure A.19: Transformation network pass from *Paese favola*.

Appendix B

Appendix: Catalogue of Transformation Path Types

The hierarchy map in Figure B.1 is organised with the most general super-types at the top, and below these are path types with inheritance from the super-types. The types are grouped in dotted-line boxes so that path types in each box can have inheritance from the boxes above it, for example: 'Types (level 2)' can inherit from 'Types (level 1)' and 'Super-types', but not from 'Types (level 3)' or 'Types (level 4)'. The arrows indicate inheritance directions between super-types and path types. Path types are shown in rounded boxes. The numbers in the lower right hand of the boxes, such as B.2.1 in $-FREEZE$, indicate the subsection in the catalogue where the path type and its instances are detailed.

B.1 Typology Hierarchy Map

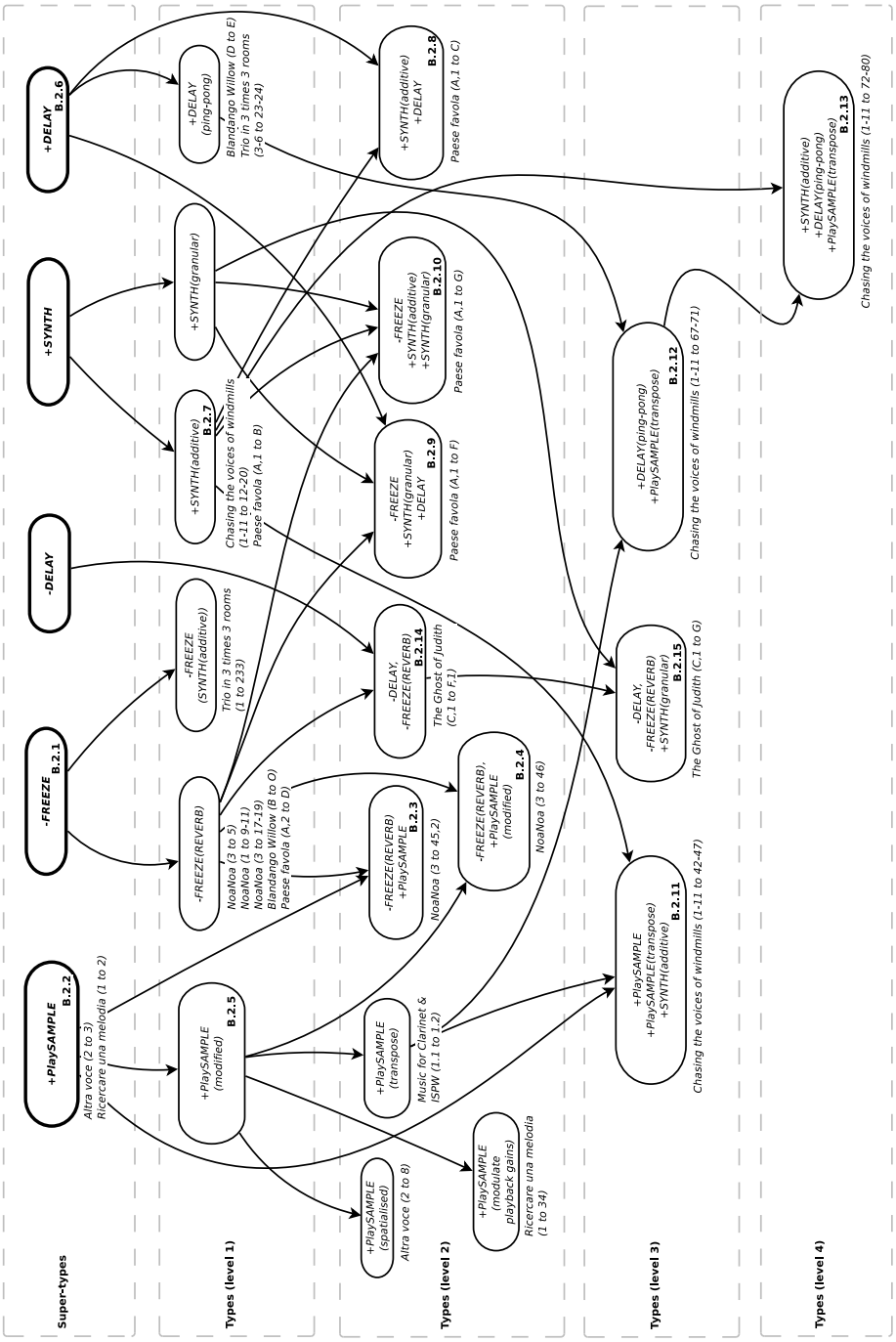


Figure B.1: Typology hierarchy map

B.2 Transformation Path Type Catalogue

In the catalogue, below each of the general TPC and path type representations are listed one or more instances of the path types. For each instance in the catalogue, score excerpts are shown, followed by the corresponding TPC and transformation path representations. In the catalogue, the TPC and path representations generally ignore transformations involving pitch organisation, and instead focus on the relations between acoustic instruments and electronics. I am also omitting 'trigger' indications that are included in the TPC analyses in Appendix A.

B.2.1 Path type $-FREEZE$

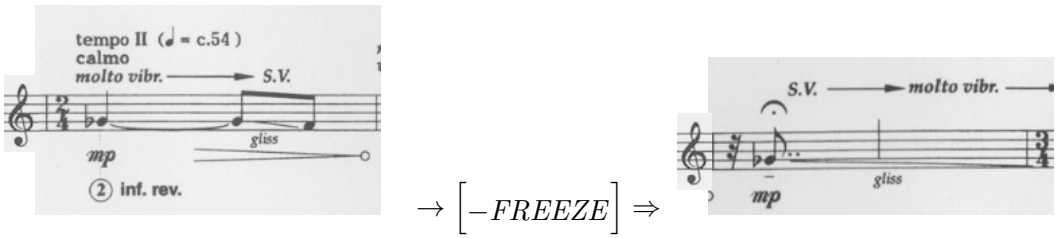
General TPC and path description (where ϵ is a pitch structure):

$$\begin{bmatrix} \epsilon(\text{instrument}) \\ \text{FREEZE(instrument)} \end{bmatrix} \rightarrow \Big[-FREEZE\Big] \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}) \\ \text{DRY(instrument)} \end{bmatrix}. \tag{B.1}$$

$-FREEZE$ path type instance in Saariaho's *NoaNoa*:

TPC(3)→[$-FREEZE$]⇒TPC(5)

Score excerpts and transformation path:



TPC representations and transformation path:

$$\begin{bmatrix} \beta\Big(\text{flute}\big(\text{IC1}(\text{gliss})\big)\Big) \\ \text{FREEZE}\,\Big(\text{flute} \rightarrow \text{REVERB}(\textit{infinite})\Big) \end{bmatrix} \rightarrow \Big[-\textit{FREEZE}\Big] \Rightarrow \begin{bmatrix} \beta\Big(\text{flute}\big(\text{IC1}(\text{gliss})\big)\Big) \\ \text{DRY}\,\Big(\text{flute}\Big) \end{bmatrix}. \quad \text{(B.2)}$$

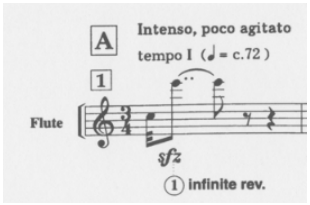
Soft system analysis vertical array representation:

$$\begin{pmatrix} m1 \rightarrow fp \rightarrow c(sftw) \\ m1(fl) \rightarrow mic \rightarrow c(sftw) \\ m1(fl) \rightarrow snd \\ c(sftw \rightarrow spkr) \rightarrow snd \\ snd \rightarrow m1(ear) \end{pmatrix} + \begin{pmatrix} -\big(m1 \rightarrow fp \rightarrow c(sftw)\big) \\ -(\rightarrow c(sftw)) \\ 0 \\ 0 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ m1(fl) \rightarrow mic \\ m1(fl) \rightarrow snd \\ c(sftw \rightarrow spkr) \rightarrow snd \\ snd \rightarrow m1(ear) \end{pmatrix}. \quad \text{(B.3)}$$

$-$*FREEZE* path type instance in Saariaho's *NoaNoa*:

TPC(1)→ [$-$*FREEZE*]⇒TPC(9–11)

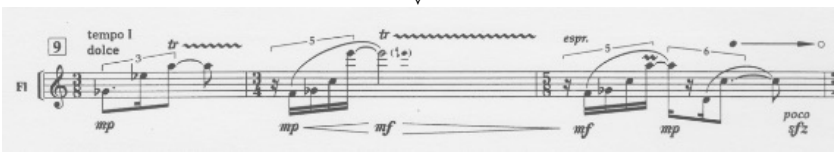
Score excerpts and transformation path:



$$\downarrow$$

$$\begin{bmatrix} +fill(IC) \\ -FREEZE \end{bmatrix}$$

$$\Downarrow$$



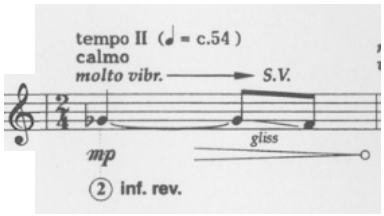
TPC representations and transformation path:

$$\begin{bmatrix} \alpha\big(\text{flute(IC4)}\big) \\ \text{FREEZE}\left(\begin{matrix}\text{flute}\downarrow \\ \text{REVERB}(\textit{infinite})\end{matrix}\right) \end{bmatrix} \rightarrow \begin{bmatrix} +fill(IC) \\ -FREEZE \end{bmatrix} \Rightarrow \begin{bmatrix} \alpha\Big(\text{flute}\big(\text{several ICs(filled + trills)}\big)\Big) \\ \text{DRY}\,\Big(\text{flute}\Big) \end{bmatrix}. \tag{B.4}$$

$-$*FREEZE* path type instance in Saariaho's *NoaNoa*:

TPC(3)→[$-$*FREEZE*]⇒TPC(17–19)

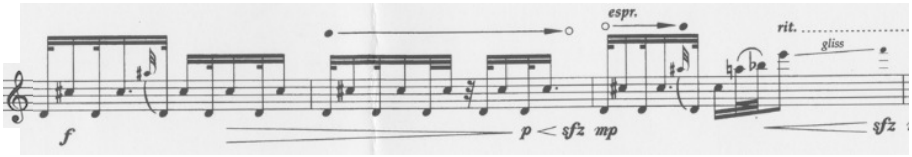
Score excerpts and transformation path:



$$\downarrow$$

$$\begin{bmatrix} +inversion \\ -FREEZE \end{bmatrix}$$

$$\Downarrow$$



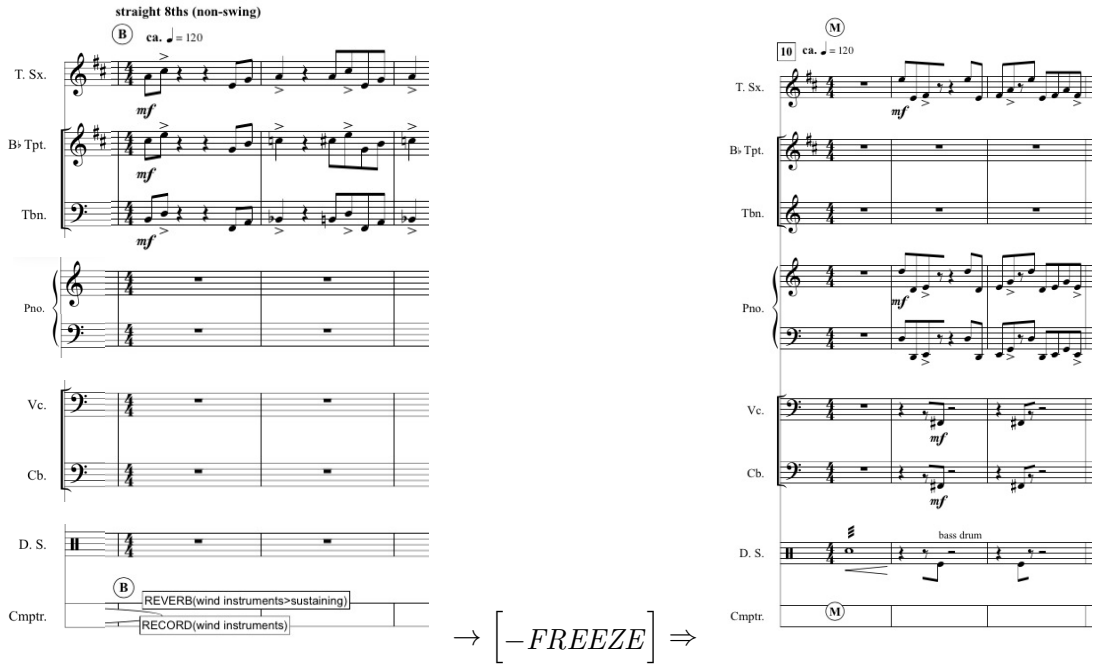
TPC representations and transformation path:

$$\begin{bmatrix} \beta\Big(\text{flute}\big(\text{IC1}(\text{gliss})\big)\Big) \\ \text{FREEZE}\,\Big(\text{flute} \rightarrow \text{REVERB}(\textit{infinite})\Big) \end{bmatrix} \rightarrow \begin{bmatrix} +inversion \\ -FREEZE \end{bmatrix} \Rightarrow \begin{bmatrix} \alpha\Big(\beta\big(\text{flute}(\text{IC1})\big)\text{inversion}\Big) \\ \text{DRY}\,\Big(\text{flute}\Big) \end{bmatrix}. \tag{B.5}$$

$-$*FREEZE* path type instance in portfolio work *Blandango Willow*:

TPC(B)→[$-$*FREEZE*]⇒TPC(M)

Score excerpts and transformation path:



$$\rightarrow \left[-FREEZE\right] \Rightarrow$$

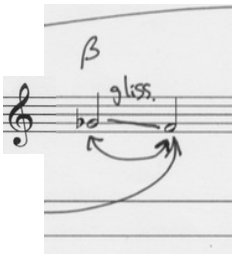
TPC representations and transformation path:

$$\begin{bmatrix} \alpha(\text{ts}, \text{trp}, \text{tbn}) \rightarrow \text{RecordSAMPLE(B)} \\ \text{FREEZE}(\text{ts}, \text{trp}, \text{tbn}) \end{bmatrix} \rightarrow \left[-FREEZE\right] \Rightarrow \begin{bmatrix} \alpha(\text{ts}, \text{pno}, \text{vc}, \text{cb}, \text{ds}) \\ \text{DRY}(\text{ts}, \text{pno}, \text{vc}, \text{cb}, \text{ds}) \end{bmatrix}. \tag{B.6}$$

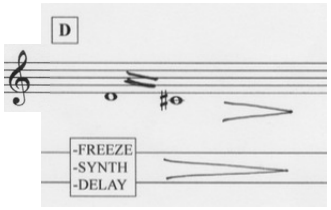
$-$*FREEZE* path type instance in portfolio work *Paese favola*:

TPC(A,2)→[$-$*FREEZE*]⇒TPC(D)

Score excerpts and transformation path:



$\rightarrow \left[-FREEZE\right] \Rightarrow$



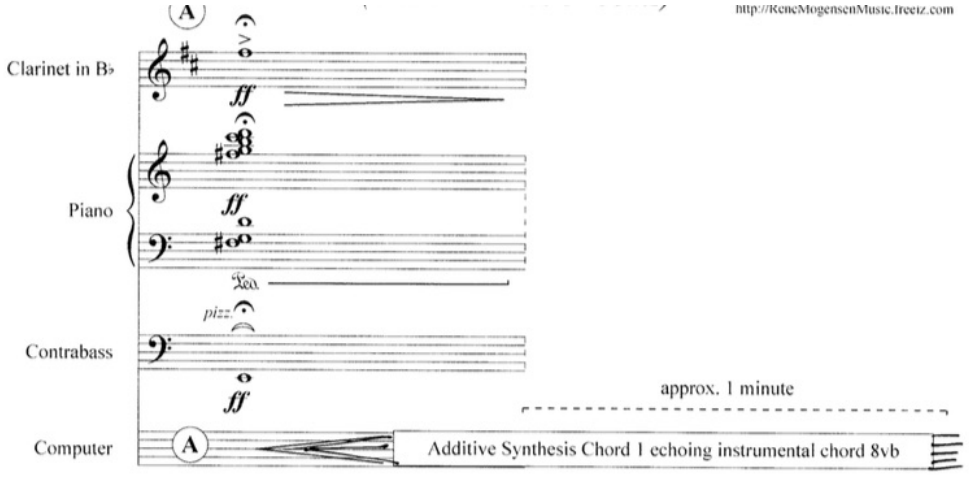
TPC representations and transformation path:

$$\begin{bmatrix} \beta(\text{saxophone}) \\ \text{FREEZE} \begin{pmatrix} \text{saxophone} \downarrow \\ \text{REVERB}(\textit{infinite}) \end{pmatrix} \end{bmatrix} \rightarrow \left[-FREEZE\right] \Rightarrow \begin{bmatrix} \beta(\text{saxophone}) \\ \text{DRY}(\text{saxophone}) \end{bmatrix}. \tag{B.7}$$

−*FREEZE* path type instance in portfolio work *Trio in 3 times 3 rooms*:

TPC(1)→[−*FREEZE*]⇒TPC(233)

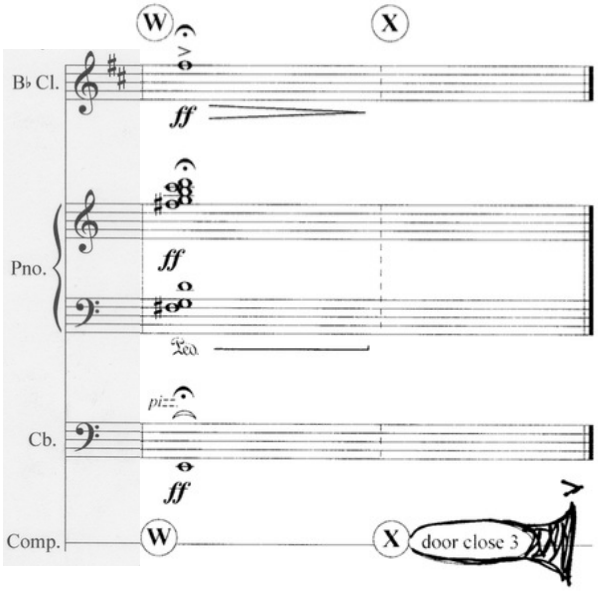
Score excerpts and transformation path:



↓

$\left[-FREEZE\right]$

⇓



TPC representations and transformation path:

$$\left[\begin{array}{l} \alpha\Big(\big(\mathrm{cl}, \mathrm{pno}, \mathrm{cb}, \mathrm{SYNTH}(\mathrm{additive})\big) \Rightarrow \mathit{Chord}\Big) \\ \mathrm{FREEZE}\left(\begin{array}{l} (\mathrm{cl}, \mathrm{pno}, \mathrm{cb}) \\ \downarrow \mathrm{crossfade} \downarrow \\ \mathrm{SYNTH}\left(\begin{array}{l} \mathrm{additive} \\ (\mathrm{pitch}, \mathrm{gain}) \leftarrow \mathrm{LFO}(\mathrm{stochastic}) \\ \mathrm{SPATIALIZE}(\mathrm{RoomA}, \mathit{boids}) \end{array}\right) \end{array}\right) \end{array}\right]$$

$$\downarrow$$

$$\Big[-\mathit{FREEZE}\Big]$$

$$\Downarrow$$

$$\left[\begin{array}{l} \alpha\big((\mathrm{cl}, \mathrm{pno}, \mathrm{cb}) \Rightarrow \mathit{Chord}\big) \\ \mathrm{cl}, \mathrm{pno}, \mathrm{cb} \end{array}\right]. \tag{B.8}$$

B.2.2 Path Type +*PlaySAMPLE*

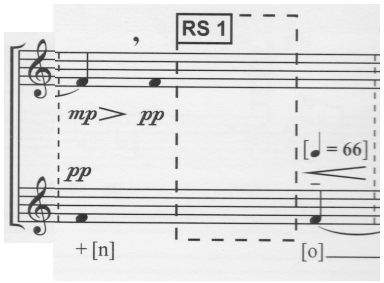
General TPC and path description: Where ϵ is a pitch structure and γ is one or more audio samples.

$$\begin{bmatrix} \epsilon(\text{instrument}) \\ \text{instrument} \end{bmatrix} \rightarrow \Big[+PlaySAMPLE \Big] \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}, \text{PlaySAMPLE}(\gamma)) \\ \text{instrument} \\ \text{PlaySAMPLE}(\gamma) \end{bmatrix}. \tag{B.9}$$

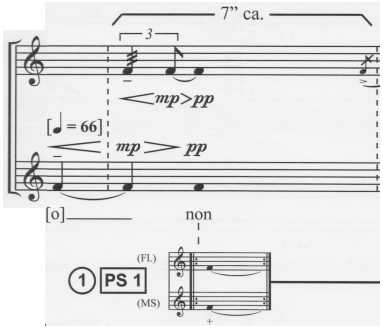
Instance of Path Type +*PlaySAMPLE* in Berio's *Altra voce*:

TPC(2)→[+*PlaySAMPLE*] ⇒ TPC(3)

Score excerpts and transformation path:



→ [+*PlaySAMPLE*] ⇒



TPC representations and transformation path:

$$\begin{bmatrix} \alpha\big((\text{a.fl.}, \text{mez.sop}) \Rightarrow \text{PCset}[0]\big) \\ \text{DRY}(\text{a.fl.}, \text{mez.sop.}) \rightarrow \text{RecordSAMPLE}(1) \end{bmatrix} \\ \downarrow \\ \Big[+\mathit{PlaySAMPLE}\Big] \\ \Downarrow \\ \begin{bmatrix} \alpha\Big(\big(\text{a.fl.}, \text{mez.sop}, \text{PlaySAMPLE}(1)\big) \Rightarrow \text{PCset}[0]\Big) \\ \text{DRY}(\text{a.fl.}, \text{mez.sop.}) \\ \text{PlaySAMPLE}(1)\text{loop} \end{bmatrix}. \tag{B.10}$$

Instance of Path Type *+PlaySAMPLE* in Harvey's *Ricercare una melodia* TPC(1)→[+*PlaySAMPLE*]⇒TPC(2):

Score excerpts and transformation path:

→ [+*PlaySAMPLE*] ⇒

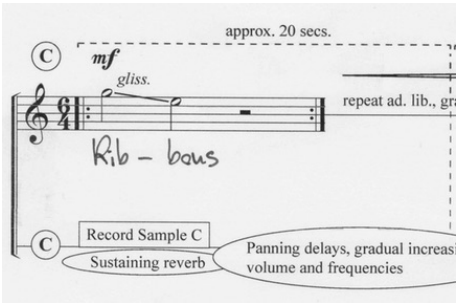
TPC representations and transformation path:

$$\begin{bmatrix} \alpha\big(\text{trumpet(interval motif)}\big) \\ \text{trumpet} \rightarrow \Big(\text{RecordSAMPLE(TapeDelay)loop}\Big) \end{bmatrix} \\ \downarrow \\ \Big[+\mathit{PlaySAMPLE}\Big] \\ \Downarrow \\ \begin{bmatrix} \alpha\Big(\big(\text{trumpet}, \text{tape}(1)\big) \Rightarrow \text{(interval motif)}\Big) \\ \left.\begin{matrix} \text{trumpet} \\ \text{PlaySAMPLE}\big(\text{TapeDelay}(1)\big)\text{loop} \end{matrix}\right\} \rightarrow \begin{pmatrix} \text{RecordSAMPLE} \\ \text{(TapeDelay)loop} \end{pmatrix} \end{bmatrix}. \tag{B.11}$$

Instance of Path Type *+PlaySAMPLE* in portfolio work *The Ghost of Judith*

TPC(C,1)→[+*PlaySAMPLE*]⇒TPC(C,2):

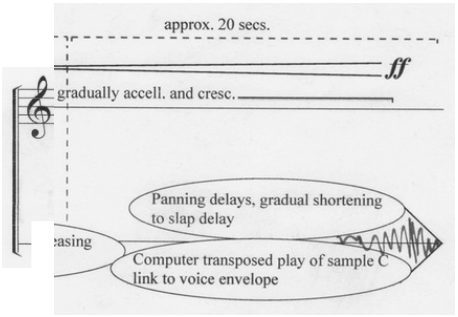
Score excerpts and transformation path:



$$\downarrow$$

$$\Big[+PlaySAMPLE\Big]$$

$$\Downarrow$$



TPC representations and transformation path:

$$\begin{bmatrix} \beta(\text{soprano}) \\ \text{soprano} \rightarrow \text{RecordSAMPLE(C)} \\ \text{FREEZE(soprano)} \\ \text{DELAY(soprano, panning)} \end{bmatrix} \rightarrow \Big[+PlaySAMPLE\Big] \Rightarrow \begin{bmatrix} \beta\big(\text{soprano, PlaySAMPLE(C)}\big) \\ \text{FREEZE(soprano)} \\ \text{DELAY(soprano, panning)} \\ \text{PlaySAMPLE(C)} \end{bmatrix}. \tag{B.12}$$

B.2.3 Path Type $-$*FREEZE*, $+$*PlaySAMPLE*

General TPC and path description:

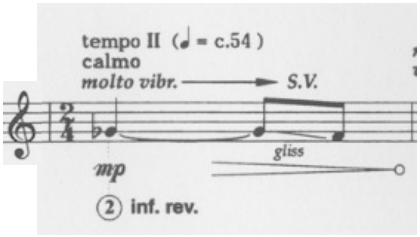
Where ϵ is a pitch structure and γ is one or more audio samples.

$$\begin{bmatrix} \epsilon(\text{instrument}) \\ \text{FREEZE}(\text{instrument}) \end{bmatrix} \rightarrow \begin{bmatrix} -FREEZE \\ +PlaySAMPLE \end{bmatrix} \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}) \\ \text{DRY}(\text{instrument}) \\ \text{PlaySAMPLE}(\gamma) \end{bmatrix}. \tag{B.13}$$

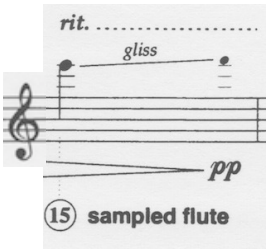
$-$*FREEZE*, $+$*PlaySAMPLE* path type instance in Saariaho's *NoaNoa*:

TPC(3)→[$-$*FREEZE*, $+$*PlaySAMPLE*]⇒TPC(45,2)

Score excerpts and transformation path:



$$\rightarrow \begin{bmatrix} -FREEZE \\ +PlaySAMPLE \end{bmatrix} \Rightarrow$$



TPC representations and transformation path:

$$\begin{bmatrix} \beta\Big(\text{flute}\big(\text{IC1}(\text{gliss})\big)\Big) \\ \text{FREEZE}\,\Big(\text{flute} \rightarrow \text{REVERB}(\textit{infinite})\Big) \end{bmatrix} \\ \downarrow \\ \begin{bmatrix} -\textit{FREEZE} \\ +\textit{PlaySAMPLE} \end{bmatrix} \\ \Downarrow \\ \begin{bmatrix} \beta(\text{flute}, \text{PlaySAMPLE}) \\ \text{DRY}(\text{flute}) \\ \text{PlaySAMPLE}\,\Big(\text{PreRECORDED}(\text{sampled flute})\Big) \end{bmatrix}. \tag{B.14}$$

B.2.4 Path Type $-$*FREEZE, +PlaySAMPLE(modified)*

General TPC and path description:

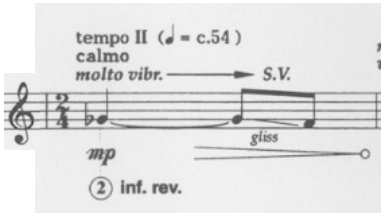
Where ϵ is a pitch structure and γ is one or more audio samples.

$$\begin{bmatrix} \epsilon(\text{instrument}) \\ \text{FREEZE(instrument)} \end{bmatrix} \rightarrow \begin{bmatrix} -FREEZE \\ +PlaySAMPLE(modified) \end{bmatrix} \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}) \\ \text{DRY(instrument)} \\ \text{PlaySAMPLE}(\gamma, \text{modified}) \end{bmatrix}. \tag{B.15}$$

$-$*FREEZE, +PlaySAMPLE(modified)* path type instance in Saariaho's *NoaNoa*:

TPC(3)→[$-$*FREEZE, +PlaySAMPLE(modulated)*]⇒TPC(46–47)

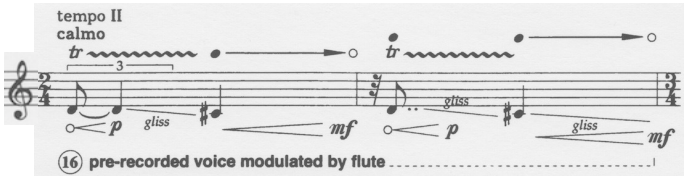
Score excerpts and transformation path:



$$\downarrow$$

$$\begin{bmatrix} -FREEZE \\ +PlaySAMPLE(modulated) \end{bmatrix}$$

$$\Downarrow$$



TPC representations and transformation path:

$$\begin{bmatrix} \beta\Big(\text{flute}\big(\text{IC1(gliss)}\big)\Big) \\ \text{FREEZE}\,\Big(\text{flute} \rightarrow \text{REVERB}(\textit{infinite})\Big) \end{bmatrix}$$

$$\downarrow$$

$$\begin{bmatrix} -\textit{FREEZE} \\ +\textit{PlaySAMPLE}(\textit{modulated}) \end{bmatrix}$$

$$\Downarrow$$

$$\begin{bmatrix} \beta\Big(\text{flute}\big(\text{IC1(gliss)}\big)\Big) \\ \text{DRY(flute)} \\ \text{PlaySAMPLE}\begin{pmatrix} \text{PreRECORDED(voice)modulated} \\ \uparrow \\ \text{flute} \rightarrow \text{ANALYSIS} \end{pmatrix} \end{bmatrix}. \tag{B.16}$$

B.2.5 Path Type +*PlaySAMPLE(modified)*

General TPC and path description:

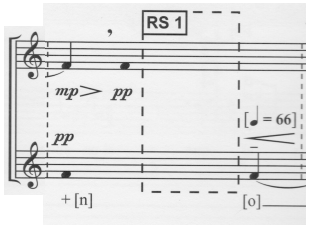
Where ϵ is a pitch structure and γ is one or more audio samples.

$$\begin{bmatrix} \epsilon(\text{instrument}) \\ \text{instrument} \end{bmatrix} \rightarrow \Big[+PlaySAMPLE(modified) \Big] \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}) \\ \text{instrument} \\ \text{PlaySAMPLE}(\gamma, \text{modified}) \end{bmatrix}. \quad \text{(B.17)}$$

+*PlaySAMPLE(modified)* path type instance in Berio's *Altra voce*:

TPC(2)→[+*PlaySAMPLE(spatialised)*]⇒TPC(8)

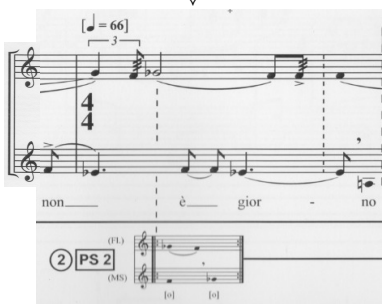
Score excerpts and transformation path:



↓

$$\Big[+PlaySAMPLE(spatialised) \Big]$$

⇓



TPC representations and transformation path:

$$\begin{bmatrix} \alpha\big((\text{a.fl.}, \text{mez.sop}) \Rightarrow \text{PCset}[0]\big) \\ \text{DRY}(\text{a.fl.}, \text{mez.sop.}) \rightarrow \text{RecordSAMPLE}(1) \end{bmatrix}$$

$$\downarrow$$

$$\Big[+\mathit{PlaySAMPLE}(\mathit{spatialised})\Big]$$

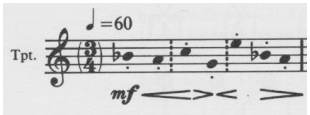
$$\Downarrow$$

$$\begin{bmatrix} \alpha\Big(\big(\text{a.fl.}, \text{mez.sop}, \text{PlaySAMPLE}(1,2)\big) \Rightarrow \text{PCset}[0,1,3]\Big) \\ \text{DRY}(\text{a.fl.}, \text{mez.sop.}) \\ \left.\begin{matrix} \text{PlaySAMPLE}(1)\text{loop} \\ \text{PlaySAMPLE}(2)\text{loop} \end{matrix}\right\} \rightarrow \text{SPATIALIZE}(\text{L}, \text{R})\text{loop} \end{bmatrix}. \tag{B.18}$$

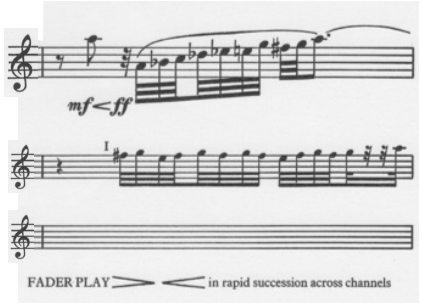
***+PlaySAMPLE(modified)* path type instance in Harvey's *Ricercare una melodia*:**

TPC(1)→[+*PlaySAMPLE(change gains)*]⇒TPC(34–37)

Score excerpts and transformation path:



$$\rightarrow \begin{bmatrix} +\mathit{PlaySAMPLE} \\ (\mathit{change\ gains}) \end{bmatrix} \Rightarrow$$



...

TPC representations and transformation path:

$$\begin{bmatrix} \alpha\big(\text{trumpet(interval motif)}\big) \\ \text{trumpet} \rightarrow \Big(\text{RecordSAMPLE(TapeDelay)loop}\Big) \end{bmatrix}$$

$$\downarrow$$

$$\Big[+\mathit{PlaySAMPLE(change\ gains)}\Big]$$

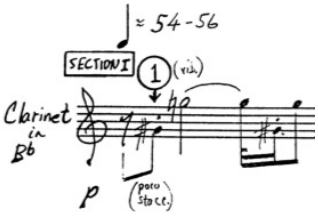
$$\Downarrow$$

$$\begin{bmatrix} \beta \begin{pmatrix} \text{trumpet(scalar)} \\ \text{tape}(1,2,3,4) \end{pmatrix} \\ \left.\begin{matrix} \text{trumpet} \\ \begin{pmatrix} \text{PlaySAMPLE}\big(\text{TapeDelay}(1,2,3,4)\big)\text{loop} \\ \mathit{FADER\ PLAY} \end{pmatrix} \end{matrix}\right\} \rightarrow \begin{pmatrix} \text{RecordSAMPLE} \\ \text{(TapeDelay)loop} \end{pmatrix} \end{bmatrix}. \tag{B.19}$$

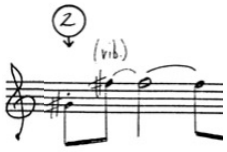
+*PlaySAMPLE(modified)* path type instance in Lippe's *Music for clarinet & ISPW*:

TPC(cue1)→[+*PlaySAMPLE(transpose)*]⇒TPC(cue2)

Score excerpts and transformation path:



$$\rightarrow \begin{bmatrix} +\mathit{PlaySAMPLE} \\ (\mathit{transpose}) \end{bmatrix} \Rightarrow$$



TPC representations and transformation path:

$$\begin{bmatrix} \alpha\big(\text{clarinet(IC1)}\big) \\ \text{clarinet} \rightarrow \text{RecordSAMPLE(1)} \end{bmatrix} \rightarrow \begin{bmatrix} +\mathit{PlaySAMPLE} \\ (\mathit{transpose}) \end{bmatrix} \Rightarrow \begin{bmatrix} \alpha\big(\text{clarinet(IC2)}\big) \\ \text{clarinet} \\ \text{PlaySAMPLE}(1, \text{transpose}) \end{bmatrix}. \tag{B.20}$$

B.2.6 Path Type $+DELAY$

General TPC and path description:

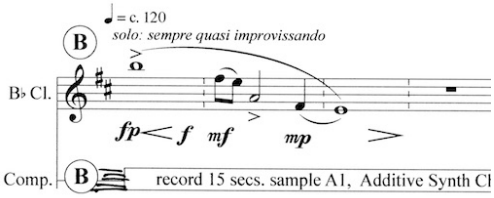
Where ϵ is a pitch structure.

$$\Big[\epsilon(\text{instrument})\Big] \rightarrow \Big[+DELAY\Big] \Rightarrow \begin{bmatrix}\epsilon(\text{instrument}) \\ \text{DELAY(instrument)}\end{bmatrix}. \tag{B.21}$$

$+DELAY$ path type instance in portfolio work *Trio in 3 times 3 rooms*:

TPC(3–6)→[$+DELAY$*(ping-pong)*]⇒TPC(23–24)

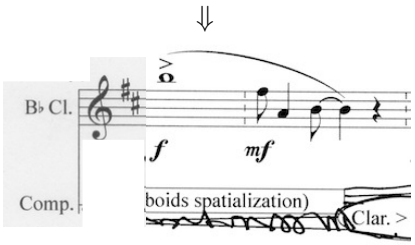
Score excerpts and transformation path:



$$\downarrow$$

$$\Big[+DELAY(ping-pong)\Big]$$

$$\Downarrow$$



TPC representations and transformation path:

$$\begin{bmatrix} \beta(\text{cl}), \alpha\big(\text{SYNTH}(\text{additive})\big) \\ \text{clarinet} \rightarrow \big(\text{RecordSAMPLE}(\text{A1}), \text{RecordANALYSIS}(\text{A1})\big) \\ \text{SYNTH} \begin{pmatrix} \text{additive} \\ (\text{pitch}, \text{gain}) \leftarrow \text{LFO}(\text{stochastic}) \\ \text{SPATIALIZE}(\text{RoomA}, \textit{boids}) \end{pmatrix} \end{bmatrix}$$

$$\downarrow$$

$$\Big[+DELAY\,(ping - pong)\Big]$$

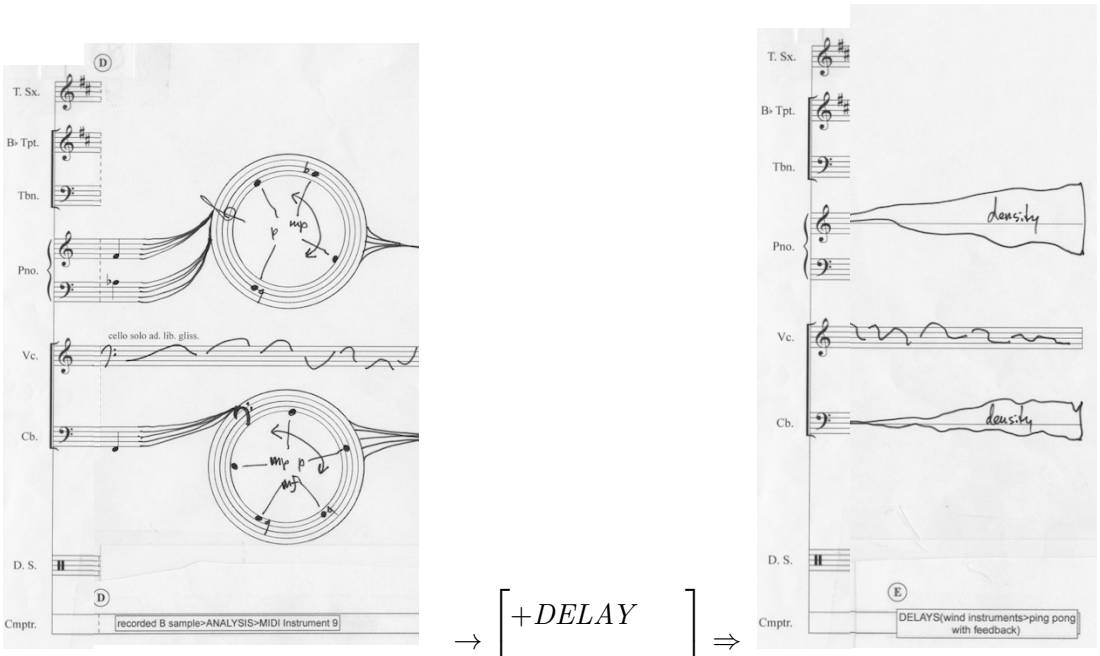
$$\Downarrow$$

$$\begin{bmatrix} \beta(\text{cl}, \text{DELAY}), \alpha\big(\text{SYNTH}(\text{additive})\big) \\ \text{clarinet} \\ \text{DELAY} \begin{pmatrix} \text{cl} \rightarrow (ping - pong) \\ \text{SPATIALIZE}(\text{RoomA}, \text{4 speaker fixed}) \end{pmatrix} \\ \text{SYNTH} \begin{pmatrix} \text{additive} \\ (\text{pitch}, \text{gain}) \leftarrow \text{LFO}(\text{stochastic}) \\ \text{SPATIALIZE}(\text{RoomA}, \textit{boids}) \end{pmatrix} \end{bmatrix}. \tag{B.22}$$

$+DELAY$ path type instance in portfolio work *Blandango Willow*:

TPC(D)→[$+DELAY$*(ping-pong)*]⇒TPC(E)

Score excerpts and transformation path:



$$\rightarrow \begin{bmatrix} +DELAY \\ (ping-pong) \end{bmatrix} \Rightarrow$$

TPC representations and transformation path:

$$\begin{bmatrix} \gamma(\text{pno, vc, cb, PlayMIDI(9)})\text{improv} \\ \text{DRY(pno, vc, cb)} \\ \text{PlayMIDI} \begin{pmatrix} \text{instrument 9} \\ \text{pitch} \leftarrow \text{ANALYSIS} \leftarrow \text{PlaySAMPLE(B)internal} \end{pmatrix} \end{bmatrix}$$

$$\downarrow$$

$$\Big[+DELAY\,(ping-pong)\Big]$$

$$\Downarrow$$

$$\begin{bmatrix} \gamma\big(\text{pno}, \text{vc}, \text{cb}, \text{PlayMIDI}(9)\big)\text{improv} \\ \text{DRY}(\text{pno}, \text{vc}, \text{cb}) \\ \text{DELAY}\big(\text{vc} \rightarrow (\text{ping} - \text{pong})\big) \\ \text{PlayMIDI}\begin{pmatrix}\text{instrument } 9 \\ \text{pitch} \leftarrow \text{ANALYSIS} \leftarrow \text{PlaySAMPLE(B)internal}\end{pmatrix} \end{bmatrix}. \tag{B.23}$$

B.2.7 Path Type *+SYNTH(additive)*

General TPC and path description:

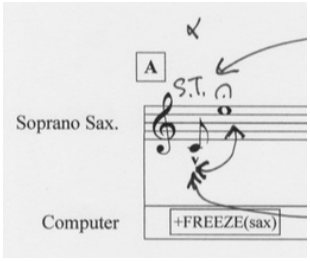
Where ϵ and γ are pitch structures.

$$\Big[\epsilon(\text{instrument})\Big] \rightarrow \Big[+SYNTH\,(additive)\Big] \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}), \gamma(\text{SYNTH}) \\ \text{SYNTH(additive)} \end{bmatrix}. \tag{B.24}$$

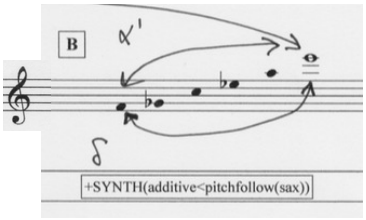
***+SYNTH(additive)* path type instance in portfolio work *Paese favola*:**

TPC(A,1)→[*+SYNTH(additive)*]⇒TPC(B)

Score excerpts and transformation path:



$$\rightarrow \begin{bmatrix} +\beta(sax) \\ +SYNTH\,(additive) \end{bmatrix} \Rightarrow$$



TPC representations and transformation path:

$$\begin{bmatrix} \alpha(\text{saxophone}) \\ \text{FREEZE} \begin{pmatrix} \text{saxophone} \downarrow \\ \text{REVERB}(infinite) \end{pmatrix} \end{bmatrix}$$

$$\downarrow$$

$$\begin{bmatrix} +\beta(sax) \\ +SYNTH(additive) \end{bmatrix}$$

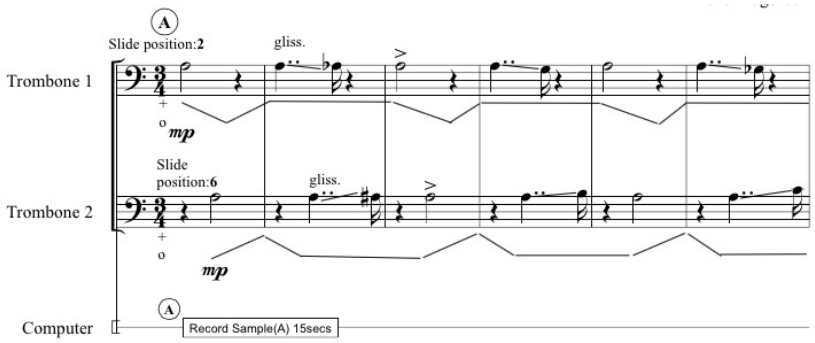
$$\Downarrow$$

$$\begin{bmatrix} (\alpha,\beta)(\text{saxophone}), \delta(\text{SYNTH}) \\ \text{FREEZE}\begin{pmatrix} \text{saxophone}\downarrow \\ \text{REVERB}(\textit{infinite}) \end{pmatrix} \\ \text{SYNTH}\Big(\text{additive}, \big(\text{chords(boids)} \leftarrow \text{ANALYSIS(saxophone, pitch)}\big)\Big) \end{bmatrix}. \tag{B.25}$$

+*SYNTH(additive)* path type instance in portfolio work *Chasing the voices of windmills*:

TPC(1–11)→[+*SYNTH(additive)*]⇒TPC(12–20)

Score excerpts and transformation path:

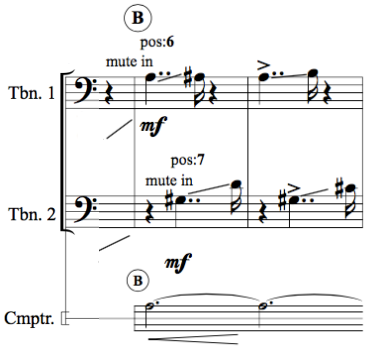


…

$$\downarrow$$

$$\left[+SYNTH(additive)\right]$$

$$\Downarrow$$



…

TPC representations and transformation path:

$$\left[\begin{array}{l} \alpha\left(\begin{array}{l}\text{trombone1}\big([0]\ldots[0\ \text{gliss}\rightarrow 7]\big)\\ \text{trombone2}\big([0]\ldots[0\ \text{gliss}\rightarrow 5]\big)\end{array}\right) \\ \text{DRY}(\text{trombone1},\text{trombone2})\rightarrow\left\{\begin{array}{l}\text{RecordANALYSIS(a)}\\ \text{RecordSAMPLE(A)}\end{array}\right. \end{array}\right]$$

$$\downarrow$$

$$\Big[+SYNTH(additive)\Big]$$

$$\Downarrow$$

$$\left[\begin{array}{l} \alpha\left(\begin{array}{l}\text{trombone1}\big([0\ \text{gliss}\rightarrow 2]\ldots[0\ \text{gliss}\rightarrow 3]\big)\\ \text{trombone2}\big([11\ \text{gliss}\rightarrow 5]\ldots[11\ \text{gliss}\rightarrow 3]\big)\\ \text{SYNTH}\big(\text{additive},[0]\big)\end{array}\right) \\ \text{DRY}(\text{trombone1},\text{trombone2}) \\ \text{SYNTH(additive)} \end{array}\right]. \tag{B.26}$$

B.2.8 Path Type *+SYNTH(additive), +DELAY*

General TPC and path description:

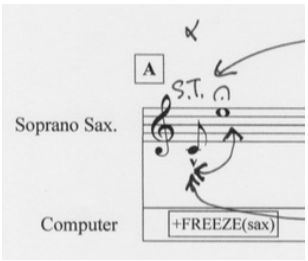
Where ϵ and γ are pitch structures.

$$\Big[\epsilon(\text{instrument})\Big] \rightarrow \begin{bmatrix} +SYNTH(additive) \\ +DELAY(instrument) \end{bmatrix} \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}, \text{DELAY}), \gamma(\text{SYNTH}) \\ \text{SYNTH(additive)} \\ \text{DELAY(instrument)} \end{bmatrix}. \tag{B.27}$$

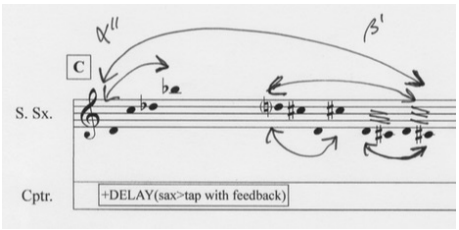
***+SYNTH(additive), +DELAY* path type instance in portfolio work *Paese favola*:**

TPC(A,1)→[*+SYNTH(additive),+DELAY(TapDelay)*]⇒TPC(C)

Score excerpts and transformation path:



$$\rightarrow \begin{bmatrix} +\beta(sax) \\ +SYNTH(additive) \\ +DELAY(TapDelay) \end{bmatrix} \Rightarrow$$



TPC representations and transformation path:

$$\begin{bmatrix} \alpha(\text{saxophone}) \\ \text{FREEZE}\Big(\text{saxophone} \rightarrow \text{REVERB}(infinite)\Big) \end{bmatrix}$$

$$\downarrow$$

$$\begin{bmatrix} +\beta(sax) \\ +SYNTH(additive) \\ +DELAY(TapDelay) \end{bmatrix}$$

$$\Downarrow$$

$$\begin{bmatrix} (\alpha,\beta)(\text{saxophone}), \delta(\text{SYNTH}) \\ \text{FREEZE}\Big(\text{saxophone} \rightarrow \text{REVERB}(\textit{infinite})\Big) \\ \text{SYNTH}\Big(\text{additive}, \big(\text{chords(boids)} \leftarrow \text{ANALYSIS(saxophone, pitch)}\big)\Big) \\ \text{DELAY(saxophone} \rightarrow \text{TapDelay)} \end{bmatrix}. \tag{B.28}$$

B.2.9 Path Type $-$*FREEZE*, $+$*SYNTH(granular)*, $+$*DELAY*

General TPC and path description:

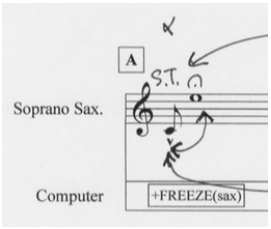
Where ϵ and γ are pitch structures.

$$\begin{bmatrix} \epsilon(\text{instrument}) \\ \text{FREEZE(instr.)} \end{bmatrix} \rightarrow \begin{bmatrix} -FREEZE \\ +SYNTH(granular) \\ +DELAY(instrument) \end{bmatrix} \Rightarrow \begin{bmatrix} \epsilon(\text{instrument} + \text{DELAY}) + \gamma(\text{SYNTH}) \\ \text{DRY(instrument)} \\ \text{SYNTH(granular)} \\ \text{DELAY(instrument)} \end{bmatrix}. \tag{B.29}$$

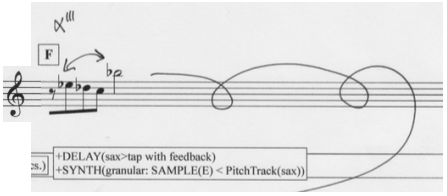
$+$*SYNTH(additive)* path type instance in portfolio work *Paese favola*:

TPC(A,1)$\rightarrow$[$-$*FREEZE*, $+$*SYNTH(granular)*, $+$*DELAY*]$\Rightarrow$TPC(F)

Score excerpts and transformation path:



$$\rightarrow \begin{bmatrix} +\beta(saxophone) \\ -FREEZE \\ +SYNTH(granular) \\ +DELAY(TapDelay, sax) \end{bmatrix} \Rightarrow$$



TPC representations and transformation path:

$$\begin{bmatrix} \alpha(\text{saxophone}) \\ \text{FREEZE}\Big(\text{saxophone} \rightarrow \text{REVERB}(infinite)\Big) \end{bmatrix}$$

$$\downarrow$$

$$\begin{bmatrix} +\beta(saxophone) \\ -FREEZE \\ +SYNTH(granular) \\ +DELAY(TapDelay, sax) \end{bmatrix}$$

$$\Downarrow$$

$$\begin{bmatrix} (\alpha, \beta)(\text{saxophone}) \\ \text{DELAY}(\text{saxophone} \rightarrow \text{TapDelay}) \\ \text{SYNTH}\big(\text{granular}, \text{SAMPLE(E)}\big) \leftarrow \text{ANALYSIS}(\text{saxophone}, \text{pitch}) \end{bmatrix}. \tag{B.30}$$

B.2.10 Path Type −*FREEZE*, +*SYNTH(granular)*, +*SYNTH(additive)*

General TPC and path description:

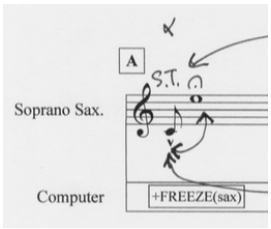
Where ϵ, δ and γ are pitch structures.

$$\begin{bmatrix} \epsilon(\text{instrument}) \\ \text{FREEZE(instr.)} \end{bmatrix} \rightarrow \begin{bmatrix} -FREEZE \\ +SYNTH(granular) \\ +SYNTH(additive) \end{bmatrix} \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}) \\ \gamma(\text{SYNTH}) + \delta(\text{SYNTH}) \\ \text{DRY(instrument)} \\ \text{SYNTH(granular)} \\ \text{SYNTH(additive)} \end{bmatrix}. \tag{B.31}$$

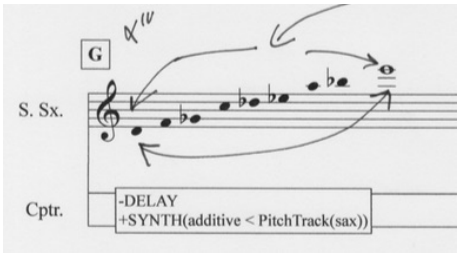
+*SYNTH(additive)* path type instance in portfolio work *Paese favola*:

TPC(A,1)→[−*FREEZE*, +*SYNTH(granular)*, +*SYNTH(additive)*]⇒TPC(G)

Score excerpts and transformation path:



$$\rightarrow \begin{bmatrix} +\beta(sax) \\ -FREEZE \\ +SYNTH(granular) \\ +SYNTH(additive) \end{bmatrix} \Rightarrow$$



TPC representations and transformation path:

$$\begin{bmatrix} \alpha(\text{saxophone}) \\ \text{FREEZE}\left(\text{saxophone} \rightarrow \text{REVERB}(infinite)\right) \end{bmatrix}$$

$$\downarrow$$

$$\begin{bmatrix} +\beta(sax) \\ -FREEZE \\ +SYNTH(granular) \\ +SYNTH(additive) \end{bmatrix}$$

$$\Downarrow$$

$$\begin{bmatrix} (\alpha,\beta)(\text{saxophone}) \\ \text{DRY}(\text{saxophone}) \\ \text{SYNTH}\Big(\text{additive}, \big(\text{chords}(\text{boids}) \leftarrow \text{ANALYSIS}(\text{saxophone}, \text{pitch})\big)\Big) \\ \text{SYNTH}\big(\text{granular}, \text{SAMPLE(E)}\big) \leftarrow \text{ANALYSIS}(\text{saxophone}, \text{pitch}) \end{bmatrix}. \tag{B.32}$$

B.2.11 Path Type *+PlaySAMPLE, +PlaySAMPLE(modified), +SYNTH(additive)*

General TPC and path description:

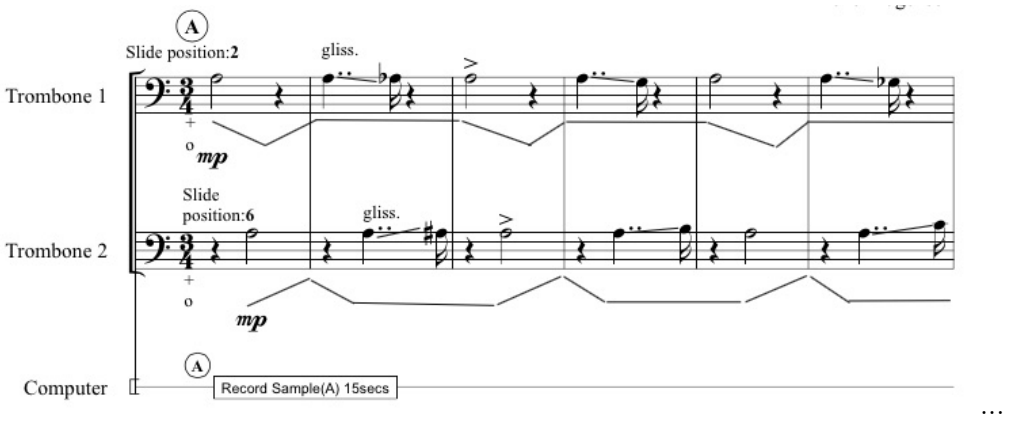
Where ϵ and γ are pitch structures; δ and ϕ are samples.

$$\Big[\epsilon(\text{instrument})\Big] \rightarrow \begin{bmatrix} +PlaySAMPLE \\ +PlaySAMPLE(modified) \\ +SYNTH(additive) \end{bmatrix} \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}), \gamma\big(\text{SYNTH(additive)}\big) \\ \text{PlaySAMPLE}(\phi) \\ \text{PlaySAMPLE}(\delta, \text{modified}) \\ \text{SYNTH(additive)} \end{bmatrix}. \tag{B.33}$$

***+PlaySAMPLE, +PlaySAMPLE(modified), +SYNTH(additive)* path type instance in portfolio work *Chasing the voices of windmills*:**

TPC(1–11)→[*+PlaySAMPLE, +PlaySAMPLE(transpose), +SYNTH(additive)*] ⇒ TPC(42–47)

Score excerpts and transformation path:

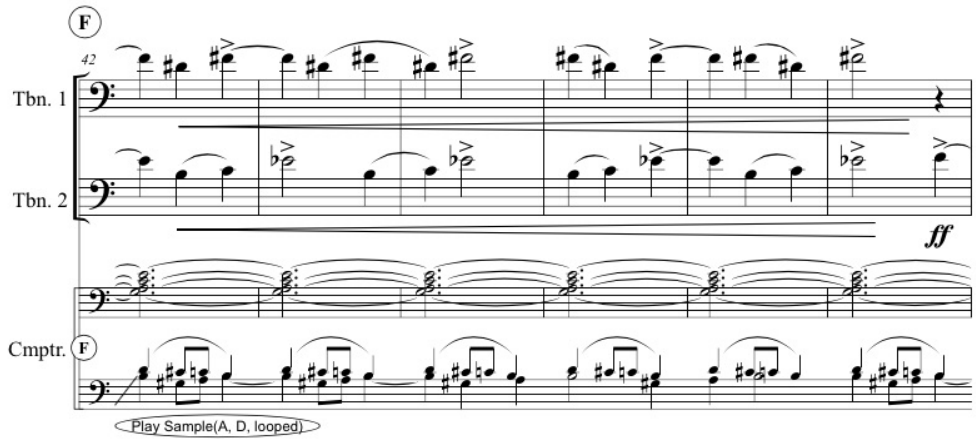


...

$$\downarrow$$

$$\begin{bmatrix} +PlaySAMPLE \\ +PlaySAMPLE(transpose) \\ +SYNTH(additive) \end{bmatrix}$$

$$\Downarrow$$



TPC representations and transformation path:

$$\begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}\big([0]\ldots[0\ \text{gliss} \rightarrow 7]\big) \\ \text{trombone2}\big([0]\ldots[0\ \text{gliss} \rightarrow 5]\big) \end{pmatrix} \\ \text{DRY}(\text{trombone1}, \text{trombone2}) \rightarrow \begin{cases} \text{RecordANALYSIS(a)} \\ \text{RecordSAMPLE(A)} \end{cases} \end{bmatrix}$$

$$\downarrow$$

$$\begin{bmatrix} +PlaySAMPLE \\ +PlaySAMPLE(transpose) \\ +SYNTH(additive) \end{bmatrix}$$

$$\Downarrow$$

$$\left[\begin{array}{l} \alpha\left(\begin{array}{l}\text{trombone1}[6,9]\\ \text{trombone2}[2,3,6]\\ \text{SYNTH}\big(\text{additive},[0,3,6,11]\big)\end{array}\right) \\ \text{DRY}(\text{trombone1},\text{trombone2}) \\ \text{SYNTH}(\text{additive}) \\ \text{PlaySAMPLE(D)loop} \\ \text{PlaySAMPLE}\left(\text{A},\left(\begin{array}{l}\text{transpositions}\\ \uparrow\\ \text{ANALYSIS(a)loop}\end{array}\right)\right)\text{loop}\end{array}\right]. \tag{B.34}$$

B.2.12 Path Type *+DELAY(ping-pong), +PlaySAMPLE(modified)*

General TPC and path description:

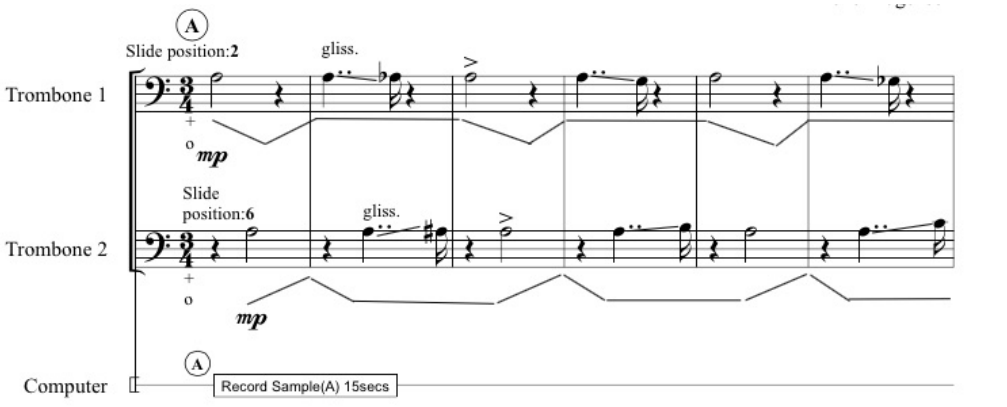
Where ϵ is a pitch structures; δ is one or more samples.

$$\Big[\epsilon(\text{instrument})\Big] \rightarrow \begin{bmatrix} +DELAY(ping-pong) \\ +PlaySAMPLE(modified) \end{bmatrix} \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}) \\ \text{DELAY}(\text{instrument} \rightarrow \text{ping} - \text{pong}) \\ \text{PlaySAMPLE}(\delta, \text{modified}) \end{bmatrix}. \tag{B.35}$$

***+DELAY(ping-pong), +PlaySAMPLE(modified)* path type instance in portfolio work *Chasing the voices of windmills*:**

TPC(1–11)→[*+DELAY(ping-pong), +PlaySAMPLE(transpose)*] ⇒ TPC(67–71)

Score excerpts and transformation path:

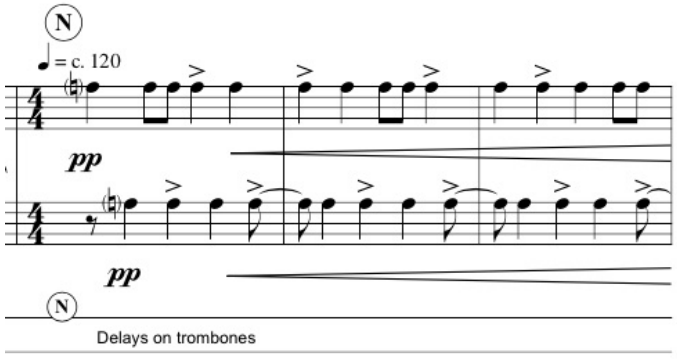


...

↓

$$\begin{bmatrix} +DELAY(ping-pong) \\ +PlaySAMPLE(transpose) \end{bmatrix}$$

$$\Downarrow$$



...

TPC representations and transformation path:

$$\begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}\big([0]\ldots[0\ \text{gliss} \rightarrow 7]\big) \\ \text{trombone2}\big([0]\ldots[0\ \text{gliss} \rightarrow 5]\big) \end{pmatrix} \\ \text{DRY}(\text{trombone1}, \text{trombone2}) \rightarrow \begin{cases} \text{RecordANALYSIS(a)} \\ \text{RecordSAMPLE(A)} \end{cases} \end{bmatrix}$$

$$\downarrow$$

$$\begin{bmatrix} +PlaySAMPLE \\ +PlaySAMPLE(transpose) \\ +SYNTH(additive) \end{bmatrix}$$

$$\Downarrow$$

$$\begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}[0] \\ \text{trombone2}[0] \end{pmatrix} \\ \text{DRY}(\text{trombone1}, \text{trombone2}) \\ \text{DELAY}(\text{trombone1}, \text{trombone2}) \\ \text{PlaySAMPLE}\big((\text{A})\text{transposed } -8\text{tv}, \text{backwards}\big)\text{loop} \\ \text{PlaySAMPLE}\big((\text{I})\text{transposed } -8\text{tv}, \text{backwards}\big)\text{loop} \\ \text{PlaySAMPLE}\big((\text{A})\text{transposed } -15\text{tv}, \text{backwards}\big)\text{loop} \\ \text{PlaySAMPLE}\big((\text{I})\text{transposed } -15\text{tv}, \text{backwards}\big)\text{loop} \end{bmatrix}. \tag{B.36}$$

B.2.13 Path Type *+SYNTH(additive), +DELAY, +PlaySAMPLE*

General TPC and path description:

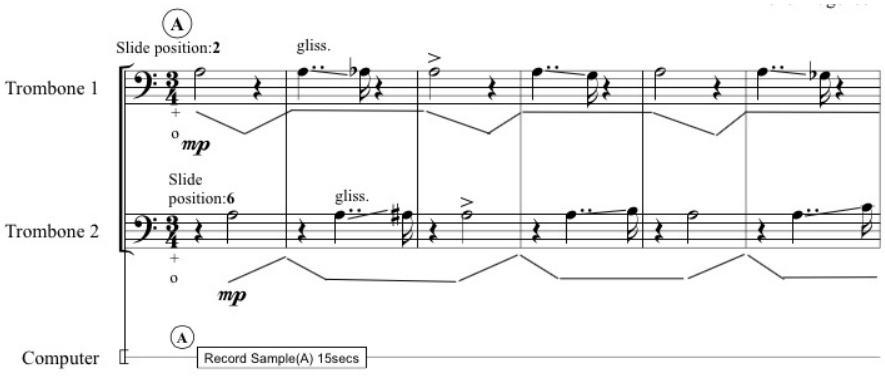
Where ϵ and γ are pitch structures and δ is one or more samples.

$$\Big[\epsilon(\text{instrument})\Big] \rightarrow \begin{bmatrix} +SYNTH(additive) \\ +DELAY(instrument) \\ +PlaySAMPLE \end{bmatrix} \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}), \gamma(\text{SYNTH}) \\ \text{SYNTH(additive)} \\ \text{DELAY(instrument)} \\ \text{PlaySAMPLE}(\delta) \end{bmatrix}. \tag{B.37}$$

***+SYNTH(additive), +DELAY, +PlaySAMPLE* path type instance in portfolio work *Chasing the voices of windmills*:**

TPC(1–11)→[*+SYNTH, +DELAY, +PlaySAMPLE*]⇒TPC(72–80)

Score excerpts and transformation path:

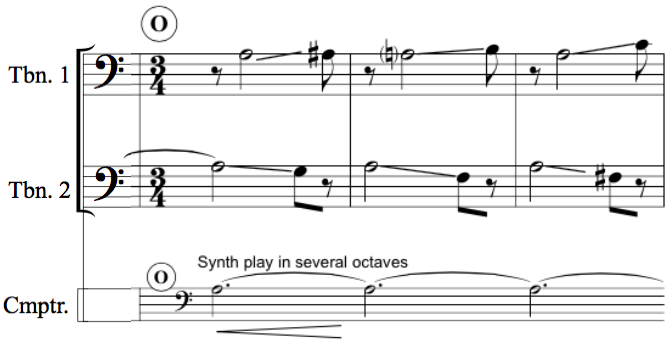


...

↓

$$\begin{bmatrix} +SYNTH(additive) \\ +DELAY \\ +PlaySAMPLE \end{bmatrix}$$

$$\Downarrow$$



...

TPC representations and transformation path:

$$\begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}\big([0]\ldots[0\ \text{gliss} \rightarrow 7]\big) \\ \text{trombone2}\big([0]\ldots[0\ \text{gliss} \rightarrow 5]\big) \end{pmatrix} \\ \text{DRY}(\text{trombone1}, \text{trombone2}) \rightarrow \begin{cases} \text{RecordANALYSIS(a)} \\ \text{RecordSAMPLE(A)} \end{cases} \end{bmatrix}$$

$$\downarrow$$

$$\begin{bmatrix} +SYNTH(additive) \\ +DELAY \\ +PlaySAMPLE \end{bmatrix}$$

$$\Downarrow$$

$$\begin{bmatrix} \alpha \begin{pmatrix} \text{trombone1}\big([0]\ldots[0\ \text{gliss} \to 5]\big) \\ \text{trombone2}\big([0]\ldots[0\ \text{gliss} \to 8]\big) \\ \text{SYNTH}\big(\text{additive}, [0]\big) \end{pmatrix} \\ \text{DRY}(\text{trombone1}, \text{trombone2}) \\ \text{DELAY}\big((\text{trombone1}, \text{trombone2}) \to \mathit{ping} - \mathit{pong}\big) \\ \text{SYNTH}(\text{additive}) \\ \text{PlaySAMPLE}\big((\text{A})\text{transposed } -8\text{tv}, \text{backwards}\big)\text{loop} \\ \text{PlaySAMPLE}\big((\text{I})\text{transposed } -8\text{tv}, \text{backwards}\big)\text{loop} \\ \text{PlaySAMPLE}\big((\text{A})\text{transposed } -15\text{tv}, \text{backwards}\big)\text{loop} \end{bmatrix}. \tag{B.38}$$

B.2.14 Path Type $-DELAY,\ -FREEZE$

General TPC and path description:

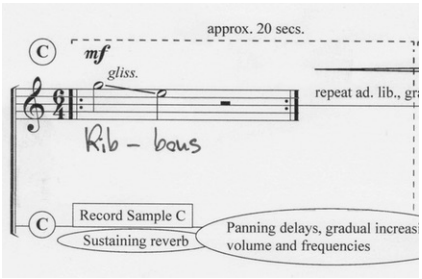
Where ϵ is a pitch structure.

$$\begin{bmatrix} \epsilon(\text{instrument}) \\ \text{DELAY(instrument)} \\ \text{FREEZE(instrument)} \end{bmatrix} \rightarrow \begin{bmatrix} -DELAY \\ -FREEZE \end{bmatrix} \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}) \\ \text{DRY(instrument)} \end{bmatrix}. \tag{B.39}$$

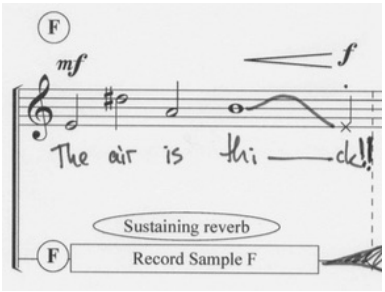
$-DELAY,\ -FREEZE$ path type instance in portfolio work *The Ghost of Judith*:

TPC(C,1)→[$-DELAY,\ -FREEZE$]⇒TPC(F,1)

Score excerpts and transformation path:



$$\rightarrow \begin{bmatrix} -DELAY \\ -FREEZE \end{bmatrix} \Rightarrow$$



TPC representations and transformation path:

$$\begin{bmatrix} \beta(\text{soprano}) \\ \text{soprano} \rightarrow \text{RecordSAMPLE(C)} \\ \text{FREEZE}\big(\text{soprano} \rightarrow \text{REVERB}(\textit{infinite})\big) \\ \text{DELAY}(\text{soprano}, \text{panning}) \end{bmatrix}$$

$$\downarrow$$

$$\begin{bmatrix} -\textit{DELAY} \\ -\textit{FREEZE} \end{bmatrix}$$

$$\Downarrow$$

$$\begin{bmatrix} \beta(\text{soprano}) \\ \text{soprano} \rightarrow \text{RecordSAMPLE(F)} \\ \text{DRY}(\text{soprano}) \end{bmatrix}. \tag{B.40}$$

B.2.15 Path Type *−DELAY, −FREEZE, +SYNTH(granular)*

General TPC and path description:

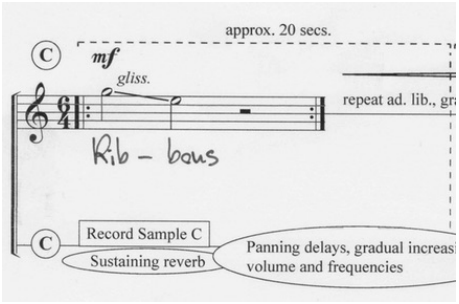
Where ϵ is a pitch structure.

$$\begin{bmatrix} \epsilon(\text{instrument}) \\ \text{DELAY(instrument)} \\ \text{FREEZE(instrument)} \end{bmatrix} \rightarrow \begin{bmatrix} -DELAY \\ -FREEZE(REVERB) \\ +SYNTH(granular) \end{bmatrix} \Rightarrow \begin{bmatrix} \epsilon(\text{instrument}) \\ \text{DRY(instrument)} \\ \text{SYNTH(granular)} \end{bmatrix}. \quad \text{(B.41)}$$

***−DELAY, −FREEZE, +SYNTH(granular)* path type instance in portfolio work *The Ghost of Judith*:**

TPC(C,1)→[*−DELAY, −FREEZE, +SYNTH(granular)*]⇒TPC(G)

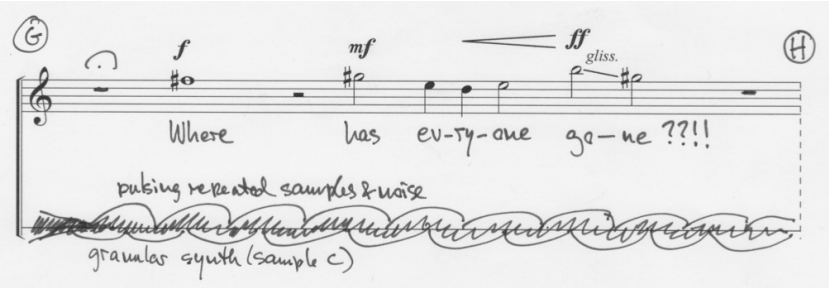
Score excerpts and transformation path:



$$\downarrow$$

$$\begin{bmatrix} -DELAY \\ -FREEZE \\ +SYNTH(granular) \end{bmatrix}$$

$\Downarrow$



TPC representations and transformation path:

$$\begin{bmatrix} \beta(\text{soprano}) \\ \text{soprano} \rightarrow \text{RecordSAMPLE(C)} \\ \text{FREEZE}\big(\text{soprano} \rightarrow \text{REVERB}(\textit{infinite})\big) \\ \text{DELAY}(\text{soprano}, \text{panning}) \end{bmatrix}$$

$$\downarrow$$

$$\begin{bmatrix} -\textit{DELAY} \\ -\textit{FREEZE} \\ +\textit{SYNTH}(\textit{granular}) \end{bmatrix}$$

$$\Downarrow$$

$$\begin{bmatrix} \beta(\text{soprano}) \\ \text{DRY(soprano)} \\ \text{SYNTH}\big(\text{granular(C)}\big) \end{bmatrix}. \tag{B.42}$$

Appendix C

Appendix: audio CD programme and documentation

Portfolio audio cd tracks:

1. *The Ghost of Judith* performed by Olivia Hinman, with assistance from René Mogensen, in Birmingham Conservatoire Recital Hall, January 16, 2012

2. *Trio in 3 times 3 rooms* premiere performance by Sesam Trio, with assistance from René Mogensen, in Aalborg Kloster, Aalborg Denmark, December 6, 2011.

3. *Blandango Willow* premiere performance by the ToneArt Ensemble, with assistance from René Mogensen, in Kulturhuset Islands Brygge, Copenhagen Denmark, September 13, 2013.

4. *Chasing the voices of windmills* performed by Niels-Ole Bo Johansen and Chris Houlding, with assistance from René Mogensen, in Birmingham Conservatoire ABH Concert Hall, October 28, 2014.

5. *Paese favola* performed by René Mogensen, in private studio, October 2015