Children at a funeral

for prepared piano

James Wood

Children at a Funeral was written for Andrew Ball as a result of a Holst Foundation Award 1995

Notes on the preparation

The following materials are required:	
Screws (galvanised - hardened twin-thread)	no. 10 x 45mm (1¾")
	no. 12 x 50mm (2")

110. 10 X 45Hilli (174))
no. 12 x 50mm (2")	2
no. 12 x 62mm (2½")	6
no. 12 x 80mm (3¼")	1

Bolts	$M4 \times 30$	25
	$M5 \times 40$	3
	$M5 \times 50$	16
	$M5 \times 70$	5
	$M6 \times 75$	18
	$M6 \times 40$	3

Note: These tables correspond with preparations made on a Steinway B piano. The first performance, however, was given on a Boston G193 (roughly equivalent in size to a Steinway A). Although smaller (requiring some of the dimensions given here to be slightly reduced), this piano proved to be very well suited to the preparations. Note that, on the Boston, the strings from F1 to B1 inclusive are only double strung (whereas on the Steinway B they are triple) - in this case only one of the two rubber wedges are needed. It will also be found that the position of the rubber wedge for Bb1 is limited by the piano frame - in this case the wedge should be positioned close to the piano frame. I am grateful to Colin Turner and the technicians at Steinway & Sons for their help and advice during the preparations at the Steinway Studios for the first performance - this was given by Andrew Ball at the Wigmore Hall on 17 February 1997.

Rubber wedges (see following tables for sizes)

The rubber wedges can be cut from long rubber strips (or the strips), normally available from a good rubber-merchant - the rubber should be rather hard (for example, not unlike that used on the soles of shoes), and can be cut quite easily with a Stanley knife. Two thicknesses are used: 5.5mm (for most of the wedges) and 15mm for the 'fat wedges'.

When cutting the wedges it is highly recommended to cut a little notch (or groove) either side and a few MM from the point of the wedge so that it can be 'clicked' into place when wedged between the strings. This stops the wedge from jumping out when the string in struck. This is particularly important on the lower strings, and when the wedges are placed in the middle of the strings. Obviously the size of the notch depends on the thickness of the string that is to fit in it, and the exact position of the notches should be such that the width between them matches (or is very slightly greater than) the distance between the adjacent strings of the course in question.

When cutting the 'single-string' wedges (very lowest register), a deep slot should be cut from the tip of the wedge upwards about 15 mm so that the wedge can fit around the string like a clamp. If this slot also is cut rather wedge-shaped (wider at the top than the bottom), this will again help to hold the wedge in place when the string is played.

Positioning and Tuning

The following tables show the optimum positions for the screws, bolts and wedges for each course of strings in order to achieve the given tunings of the most prominent 'sub-harmonics' and harmonics. In the case of the strings with 'sub-harmonics' - the sub-harmonic pitch given is the lowest audible one (in most cases a complex spectrum of other harmonics will result, but it is the lowest one that should be tuned). These sub-harmonics are produced when screws or bolts are placed at or near the middle of the string - the tuning is influenced both by the weight (i.e. length) of the screw or bolt, and by its precise position. The longer (heavier) the bolt, the deeper the sub-harmonic. For fine tuning, moving the bolt towards the tail of the piano sharpens the sub-harmonic pitch, moving it towards the keyboard end flattens it. The same is true of the very long rubber wedges (eg for C2, B1 and Bb1) which produce a deep, resonant (rather 'funky') thud.

When fine tuning the position of the screws and bolts, the most important aspect is the (microtonal) relationships (sometimes very small intervals) between the sub-harmonic pitches, rather than their precise actual frequencies. Furthermore it will noted that the pitches of the sub-harmonics, when played in a chromatic scale, do not form a straight line (i.e. when a downward chromatic scale is played, some sub-harmonic pitches will be heard to go up and some to go down) - these relationships are very important to observe.

Bowing cords

Very long (c. 6 metres, tripled) pieces of nylon cord are used (c. 2 mm thick), and threaded between the strings as shown on the tables. The cord should be rosined with cello rosin, with more rosin in the middle of the cord than at the ends (this is the best way to achieve the *crescendi* and *diminuendi*).

With the piano lid removed, two 'side panels' should be clamped to the piano frame (either side of the music desk). Three pulleys are then fixed to each side panel, at a position determined by the 'cord route' for each cluster. The cords then pass from the strings (across the piano), up through the pulleys on either side of the mast, and then back towards (and on either side of) the player. In this way the player can bow the piano from his normal seated position, and therefore bow and play the keyboard simultaneously. The instruction 'right-side cords' means that the player should pull the cords for that cluster from the right-side pulleys, and the instruction 'left-side cords' means he should pull from the left-side pulleys. Obviously, for any given cluster/ set of cords, these instructions ('right-side cords', 'left-side cords' will always alternate). Care should be taken, however, to prevent the three sets of cords getting entangled with each other!

Scraping the bolts (bar 94 to the end)

The three bolts to be scraped are as follows -

- Bb5 (around the middle of the string sounding Ab4 9cents)
- 2) G5 (around the middle of the string sounding Bb4 + 34 cents, i.e. higher than 1)
- 3) F#3 (around the middle of the string sounding c. B3)

It is recommended to saw off the top of these bolts in order to avoid hitting the bolt-head with the rapid upward stroke.

Dynamics

Note that, because of the fact that different types of preparation can result in drastically different dynamic levels, all the dynamic markings indicate the dynamic that is to be *played*, and to necessarily the dynamic that will be *heard*. For example the extreme upper register (C#6 to C7) sounds very quiet, and so in general is marked to be played rather strongly).

Preparation Tables

General note - in the Preparation Tables which follow, the horizontal lines represent the strings themselves, so the preparation data (in the spaces between the lines) applies precisely to the corresponding gaps between the strings. Notice that in the upper register (Db6 to C7), sometimes rubber wedges are placed between string 3 of one course and string 1 of the next course (eg. between C7 and B6).

The instruction 'kbd end' means at the extreme end of the string at the keyboard end, the instruction 'off tail end' means about 10mm from the bridge at the tail end, 'extr tail end' means at the extreme tail end of the string (or as near the tail end bridge as possible), and 'exact mid' means the exact mid-point of the string (1st harmonic above fundamental). 'mid' means approximately in the middle, the exact position to be found by experiment, and with reference to the pitch chart.

Measurements - all measurements are in mm

Position - figures represent the distance between the mute and the tail end of the string; that is to say the point where the longer of the pair of strings crosses the 'bridge' at the tail end of the sound-board (not to the fixing peg).

Fr/sub-h - Frequency of the lowest audible sub-harmonic - this is expressed as an equal-tempered note on the keyboard, plus or minus *x* cents. (100 cents = 1 semitone)

Fr/h - Frequency of the highest audible harmonic - the position can be found easily by finding the corresponding harmonic by sliding a finger up the string whilst playing the string repeatedly.

Preparation Tables

			Mute	Guage	Lenath	Width at top	Thickness	Position	Fr/sub-h	Fr/h	Cord route
	_	$\overline{}$	Screw	No 10	45	rridui at top	FINCKIOSS	mid	G4 + 22	1-7/11	Corditodie
	C 7	\vdash		110							
		_	R-wedge		28	12	5.5	kbd end			
	В 6										
	D 0	L	Screw	No 10	45			mid	F#4 + 19	 -	<u> </u>
į		г	Screw	No 10	45	<u> </u>	-	mid	F#4 - 34		
	Bb 6	\vdash	Suew	110 10				mig	T#4 - 34		
		<u>_</u>	R-wedge	 	28	12	5.5	kbd end		<u> </u>	
ļ					_						
	A 6		Screw	No 12	50			mid	D4	-	
		<u></u>		N- 40			-	-	04 50		
ļ	АЬ 6	\vdash	Screw	No 12	62			mid	C4 + 30		
		_	R-wedge	-	28	12	5.5	kbd end	·· ···		
		\Box						1.44 01.4		· ···· · · ·	
do.	G 6	\vdash	Screw	No 12	62			mid	B3 + 44		
Ę.		\equiv									
D - register ghostly shadow	Gb 6		Screw	No 12	62			mid	B3 + 6.		
Steri		\Box	R-wedge		28	12	5.5	kbd end			
169			11-vicage	-	20	12	3.3	NOG CITA			
	F6	\vdash	Screw	No 12	62		<u></u>	mid	B3		
		_)				
	E6		Screw	No 12	62	(2)		mid	A#3 + 50		
	_	L_	Ö wadaa		20	10		145-4			
		_	R-wedge		28	12	5.5	kbd end			<u> </u>
	ЕЬ 6		Screw	No 12	50	4		mid	C4 + 27		
ļ		<u> </u>			0						
	D 6		Screw	No 12	62			mid	B3 - 23		
		<u></u>			<u>Q</u>			· · · · · · · · · · · · · · · · · · ·			
		_	R-wedge		28	12	5.5	kbd end			
Į	_Db 6		Screw	No 12	80?				Ab3 - 62		
		_			-						
f	_ C 6		Bolt	M4	30			mid	Db5 - 11		
				ļ							<u> </u>
		_	Bott	M4	30			mid	Bb4 + 39		
	B 5	\vdash	DUIL	1014	30			11110	BU4 + 39	· · · · ·	
		_		 							
	Bb 5		Boft	M4	30			mid	Ab4 - 9		
	003	L							<u> </u>		
		_	0-4	144	20			:	Db4 14		
	A 5	\vdash	Bolt	M4	30			mid	Bb4 - 11		
		<u> </u>	_	!	_					<u> </u>	<u> </u>
	42.5		Bolt	M4	30			mid	F#4 - 6		
	Ab 5										
		_	D-II	1 1 1 1	00			- min	Dh.4	ļ	
	G 5	\vdash	Bolt	M4	30			mid	Bb4 + 34		
Nest			<u> </u>				<u> </u>			 	1
brig	C+ "		Bolt	M4	30			mid	A4 + 20	 	
ister	Gb 5										
A - register: brightest		_	<u> </u>								
<	F5	\vdash	Bolt	M4	30			mid	Eb4 + 9		
			L	L	<u> </u>	<u> </u>	<u> </u>	L.—.	<u> </u>	L	<u> </u>

		ĺ	Mute	Guage	Length	Width at top	Thickness	Position	Fr/sub-h	Fr/h	Cord route
Τ		Γ	Bolt	M4	30	,		mid	Db4 + 20		
1	E 5	H									
		_								-	
		-	Bolt	M4	30			mid	C4	i	
	Eb 5										
		ᆫ									
		¦	Bolt	M4	30	-		mid	C4 + 50		
ŀ	D 5	 	2011	.,,,	00						
Ì		L									
		<u>, </u>	Bolt	M4	30			mid	C4 - 34	·-	
	Db 5		BOR	171-7	00			1,110	0 0		
		L.									
		_	Bolt	M5	50			mid	F3 + 6		
Γ	C 5	<u> </u>	Bolt	M4	30			extr tail end	13+0		——
-		<u> </u>	BUIL	1414				extr rail end			
		_	Bolt	M5	50			mid	F3 - 39		
	B 4	<u> -</u>	Bolt	M4	30			extr tail end	F3 - 39		
		_	DOM	1914	30			exii iaii eno		ļ	
-		_	Bolt	M5	50		,	mid	E3 - 23	 	
	Bb 4	\vdash	Bolt	M4	30			extr tail end	E3 - 23		<u>.</u>
1		\Box	Boir	IVI4	30			exti (ati eliq		-	<u> </u>
		_	Dall	M5	50			mid	Eb3 + 20		
	A 4	-	Bolt						ED3 + 20		
		\sqsubseteq	Bolt	M4	30			ext tail end			<u> </u>
		_	Delt	145	70		71	anid.	02 11		
	Ab 4	\vdash	Bolt	M5	70			mid	C3 - 11		
		L_ :	Bolt	M4	30	. 4		extr tail end			
		$\overline{}$	Dati	115	50			maried.	0#0 . 4.4	,	
<u> </u>	G 4	\vdash	Bolt	M5	50	7		mid	C#3 + 14		
ig		\Box	Bolt	M4	30			extr tail end			
B - register, less bright		ــــم	D-19	145	50	4			0#0 . 0	-	
<u> </u>	Gb 4	\vdash	Bolt	M5	50 30	<u> </u>		mid	C#3 + 8		
		\Box	Bolt	M4	30			extr tail end			
<u>.</u>		_	D-11	145	70			:.1	00 0		
- [F 4	\vdash	Bolt	M5	70			mid	C3 + 6		
- [$ldsymbol{\square}$	Bolt	M4	30			extr tail end			
		$\overline{}$	Doll	A4C	50				Bb2 - 22		
	E 4	\vdash	Bolt Bolt	M5 M4	50 30			mid extr tail end		<u> </u>	<u> </u>
		ᆫ	BOIL	IV 4	30	ļ	<u></u>	extrainend			
-		$\overline{}$	D-14	140					O'-0 00	<u> </u>	
	Eb 4	-	Bolt	M6	75	<u> </u>		mid	Gb2 - 20	<u> </u>	
		L	Bolt	M4	30		·	extr tail end		-	
		$\overline{}$	D-14	140	75			and of	Ch0 C0		
	D 4	\vdash	Bolt	M6	75	ļ. - .		mid	Gb2 - 62	-	 _
		$ldsymbol{\sqsubseteq}$	Bolt	M4	30			extr tail end	·	ļ	
		$\overline{}$	D-15	140	75				050 50		
	Db 4	\vdash	Bolt	M6	75			mid	Gb2 - 58		,
-	_	┖	Bolt	M4/M5	30/50	ļ <u>.</u>		extr tail end	··· - ··		
		$\overline{}$	Dall	140	175		·		F0 15		
Γ	 C 4	\vdash	Bolt	M6	75	<u> </u>		mid	E2 + 45		<u></u>
		\sqsubseteq	Bolt	M4/M5	30/50			off tail end			<u> </u>
- [$\overline{}$	0.00	1.40	75				ELC ::	ļ	
-	В 3	\vdash	Bolt	M6	75			mid	Eb2 + 11	<u> </u>	
		\sqsubseteq	Bolt	M5	40	ļ		off tail end			
-		$\overline{}$		110	1 25			ļ <u>.</u>	5.0	ļ	<u> </u>
- 1	Bb 3	\vdash	Bolt	M6	75			mid	Eb2 - 11	ļ	<u> </u>
	Bb 3	,	Bolt	M5	40			off tail end	<u> </u>	ļ	
		_	1	í	1	1	1				
		_	Dolt	146	75	<u> </u>			50.00		
	A 3		Bolt Bolt	M6 M5	75 40			mid of tail end	D2 - 23		

			Mute	Guage	Length	Width at top	Thickness	Position	Fr/sub-h	Fr/h	Cord route
- 1		$\overline{}$	Bolt	M6	75	1110111 01 100	11110141033	mid	Db2 + 16	1 1741	Corditodie
	Ab3	\vdash	Bolt	M5	40/50/70	 		off tail end	002 + 10		
C-register: less bright still, becoming darker and richer		Щ	BUIL	1415	40/50//0	<u> </u>		on tall end		 -	
pue		$\overline{}$	Bolt	M6	75	 	<u> </u>	mid	Db2		
ray.	G 3	\vdash	Bolt	M5	40/50/70	 	<u> </u>	off tail end		 	
E G		L.,	5011	10.5	40/30/70			OII TAIL BIRG	<u> </u>		
tine		$\overline{}$	Bolt	M6	75		-	mid	Db2 - 58		
pec	Gb 3	\vdash	Bolt	M5	40/50/70	<u>-</u>		off tail end			
¥		<u> </u>	-	 	1 40/00/10	 		017 1011 0110			
£.		$\overline{}$	Bolt	M6	75	<u> </u>	 	mid	C2 +9	<u>-</u>	
اقيا	F3	\vdash	Bolt	M5	40/50/70	 		off tail end	02.10		· · · · - · · · · · · · · · · · · · ·
les		_		1	10/00//0	 		un tan ono			
ister		$\overline{}$	Bolt	M6	75			mid	B1 + 17		
83.	E 3	\vdash	Bolt	M5	40/50/70	 		off tail end			
~		_	-	+						 	
		Г	Bolt	Мб	75			mid	B1 · 9		
	Eb 3	\vdash	Bolt	M6	40	 		off tail end		 	
ļ	ı	_				 -	·				·
- }		Г	Bolt	M6	75		- "-	mid	B1 - 36	†	<u> </u>
	D 3	\vdash	Bolt	M6	40		_	off tail end			
		_		1			4	<u> </u>			
ĺ		Γ	Bolt	M6	75			mid	Въ1 - 23		
Į	Db 3	\vdash	Bolt	M6	40			off tail end	-		
		_									
í		Г	R-wedge		25	7.0	5.5	exact mid		C4	
	C3	_	R-wedge		25	7	5.5	exact mid		C4	
310		_			_ ^						
1st harmonic	В 4	Γ	R-wedge		25	7	5.5	exact mid		B3	
Ē	B 2		R-wedge		25	7	5.5	exact mid		ВЭ	
		_									
	DL 1		R-wedge	<u></u>	25	7	5.5	exact mid		Bb3	
Į	Bb 2		R-wedge		25	7	5.5	exact mid		Bb3	
ত্র		_		Q		<u></u>			L		UNDER
ع ق	A 2	L	Bolt	M6	75	BOWED		mid			UNDER
<u></u>	Α.	L	Bolt	M5	70	CLUSTER 1		mid			UNDER
cluster 1 (sul tasio)		_				(bowed AND					OVER
	Ab 2		Bolt	M6	75	Thread doub	le cords	mid	<u> </u>		OVER
<u> </u>	NO Z		Bolt	M5	70	tail side		miď	·		OVER
e big						of dampers					UNDER
9	G 2		Bolt	M6	75			mid			UNDER
bowed (prepared)	_02	L	Bolt	M5	70	(quasi sul tas	sto)	mid			UNDER
_		_	<u> </u>	1	<u> </u>				<u> </u>	 	
[Gb 2		R-wedge	ļ	25	7	5.5	exact mid		Gb3	
1	_	L	R-wedge	-	25	7	5.5	exact mid		Gb3	
빝		_	D	-	05	_		A			<u> </u>
151 harmonic	F 2	\vdash	R-wedge	 	25	7	5.5	exact mid		F3	
골		L	R-wedge	 	25	7	5.5	exact mid		F3	
-]		_	D.wodoo	-	25	7	5.5	exact mid		E3	
	E 2	\vdash	R-wedge R-wedge		25	7	5.5	exact mid		E3	<u> </u>
•	-	L	n-wedge		25	'	5.5	exactinio			UNDER
	_	<u></u>	-	+	 	BOWED		 			UNDER
<u>۽</u> (ЕЪ 2	\vdash	-	+	 · 	CLUSTER 2				 	UNDER
		<u></u>		-	 	(no preparati	on)	 	 		OVER
2 (su		_		+	 - -	Thread doub					OVER
ster	D 2	-	<u> </u>	-		extreme keyi		<u> </u>		· · ·	OVER
큠		L_		+		end of strings			 -	 	UNDER
howed cluster 2 (sul pont)		$\overline{}$		-		5110 51 51111g	-		 	 	UNER
Ĕ	Db 2	\vdash		 		(quasi sul po	nt \	<u> </u>		 	UNDER
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		ı	Mute	Guage	Length		Thickness	Position	Fr/sub-h	Fr/h	Cord route
		r	R-wedge	Guage	75	24	5.5	mid	F#1 + 30		Cold lodia
ſ	C 2	<u> </u>									
ا ج:			R-wedge		75	24	5.5	mid	F#1 + 30		
percussive, funky		_									
ş	B 1	_	R-wedge		75	24	5.5	mid	F#1 - 6	ļ <u></u> .	<u>-</u>
1881	-	L	R-wedge		75	24	5.5	mid	F#1 - 6		
2									j		
-	DL 1		R-wedge		105	24	5.5	mid	Eb1 - 25		
Ļ	_Bb 1		R-wedge	_	105	24	5.5	mid	Eb1 - 25		
										,	UNDER
. ſ					BOWE)					UNDER
bowed cluster 3 (sul lasto)	A 1	_			CLUST	ER 3					UNDER
=		_		Ī	(no prej	oaration)					OVER
e 6		Г				triple cords					OVER
ister	Ab 1	H			tail side					 	OVER
를		<u> </u>			of damp				 	 	UNDER
ž		_		-		····					UNDER
٤Į	G 1	\vdash			/nuasi s	sul tasto)		<u> </u>	<u>. </u>		UNDER
		_			(quusi s			-		-	
		_	R-wedge		30	10	5.5	170	 	Gb5	
<u> </u>	Gb 1	<u> </u>	R-wedge	-	30	10	5.5	170	 -	Gb5	
量		ٺ	n-weage		30		J.3	170		GIO	
rich, gong-like		_	Durades		<u> </u>	10	 _	175		FC	
[원]	F 1	┡	R-wedge		35	12	13	175	<u> </u>	F5	
,	_		R-wedge		30	10	<u>.C.</u>	175		F5 .	
÷ (Eb 1										
<u>.</u>		L	Fat R-wedge		70	25	15.0	610		G#3	
5th harm. (pure)									ļ		
<u> </u>			Fat R-wedge		25	18	15.0	625		G3	
	_	_							<u></u> .		
필	Dı	니	R-wedge		45	17	5.5	765		C4 - 4	
Ę		_			•	V					
7th harm. (rich)	_Db 1	L	R-wedge i		45	17	5.5	800		B3 - 4	:
	_	_			.0						
ive, funky	C1	L	R-wedge		75	24 or more	5.5	mid	F0 ca.		
نڌ											
. <u>Ş</u> .	ВО	Г	R-wedge		75	24 or more	5.5	mid	E0 ca.		
perc	L	_									
- 1	Въ 0	Γ	R-wedge		52	15	5.5	920	complex a	round A1	
	A 0	Г	R-wedge		52	15	5.5	930	complex a	round Ab1	
		_					·			T	
	Ab 0	Г	R-wedge		50	15	5.5	723	harmonics	up to Gb3	
		_								Τ'	
9	C0	Г	R-wedge		50	15	5.5	730	harmonics	up to F3	
g-lii		_		i						1	
no5	Gb 0	\Box	Gb0 not used						 	·	
nics,	GDU	_	450 1101 4550	<u> </u>		! 		 -		 	
IO.	EA		F0 not used						+		
- Fa	F0	L		From E	bû cawa	rds preparatio	n detaile an	nhuta tha li	ina (atrina) h	olow thom	
mise, harmonies, gong-like	E O	—	E0 not used Single string R		30	25	5.5	397			
-	ЕЬ 0	_						1		up to Db3	
	DO	_	Single string R		30	25	5.5	400	harmonics	 _	 -
	Db 0	_	Single string R	-weage	30	25	5.5	405	harmonics	s up to B2	
	CO	_	C0 not used	<u></u>	-		-			-	
	B -1	_	B-1 not used							1	
	Bb-1	_	Bb-1 not used		20			200	1	l	
	A -1	_	Single string R	-wedge	60	25	5.5	288	complex		

Note - references to specific harmonics assume that the '1st harmonic' sounds one octave above the fundamental, the '4th harmonic' sounds two octaves and a major third above the fundamental, and so on.

Children at a funeral

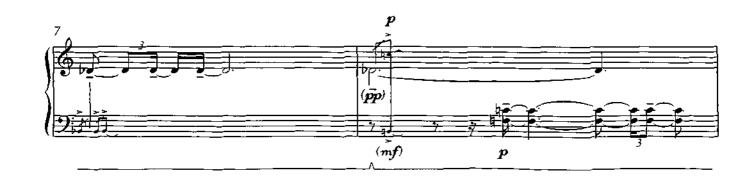
for prepared piano

James Wood



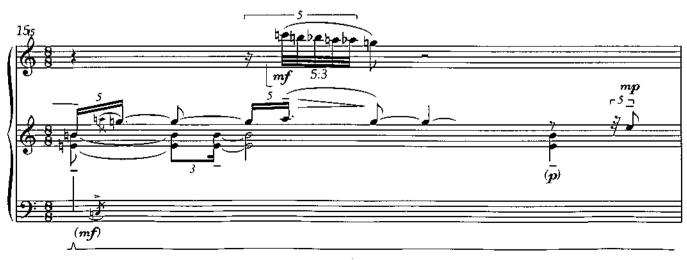


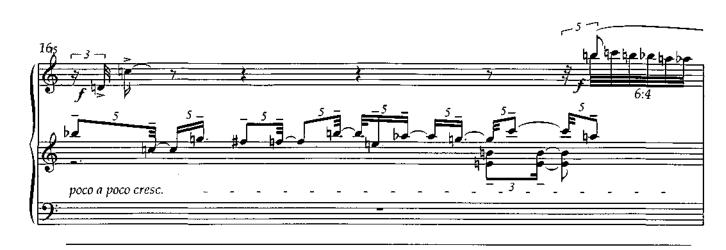


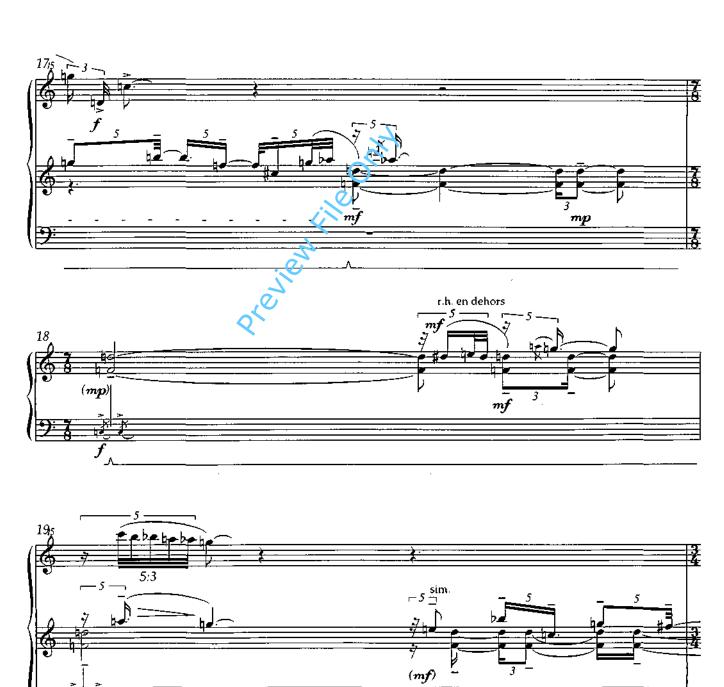


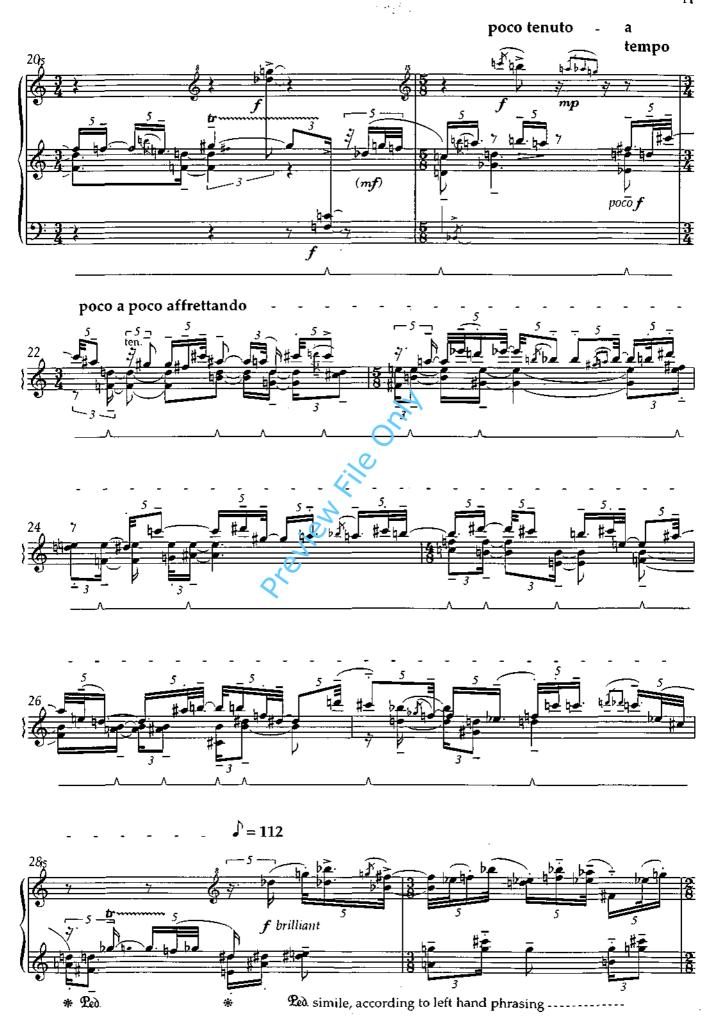




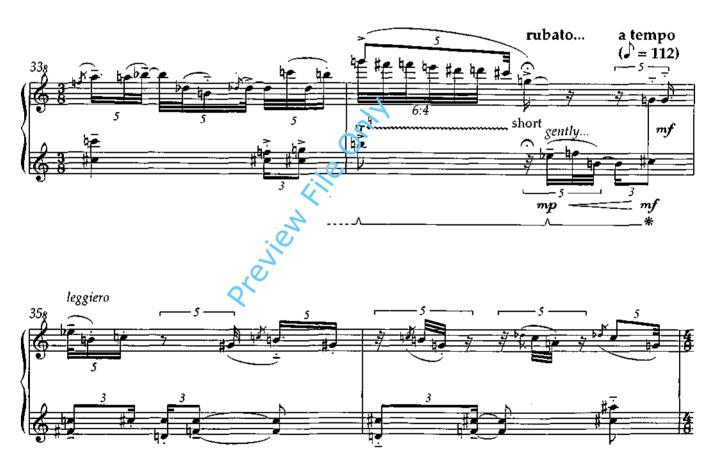


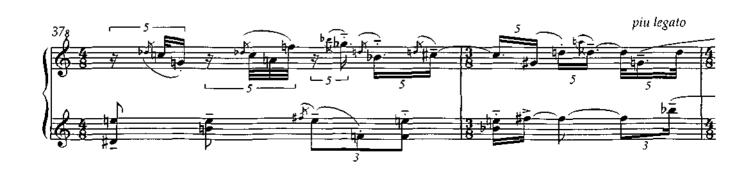


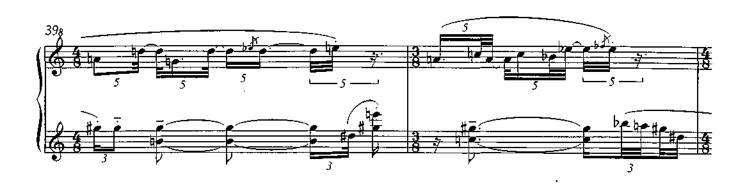


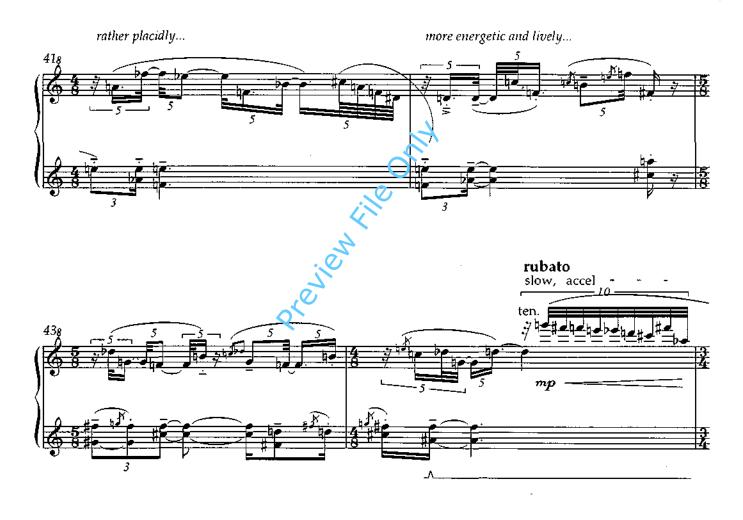


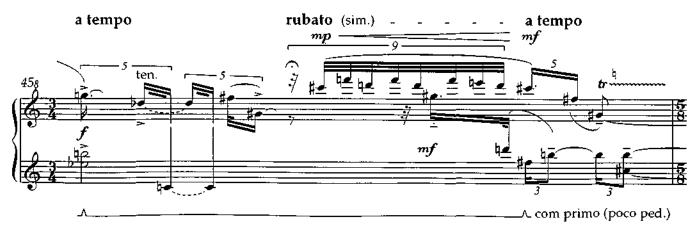




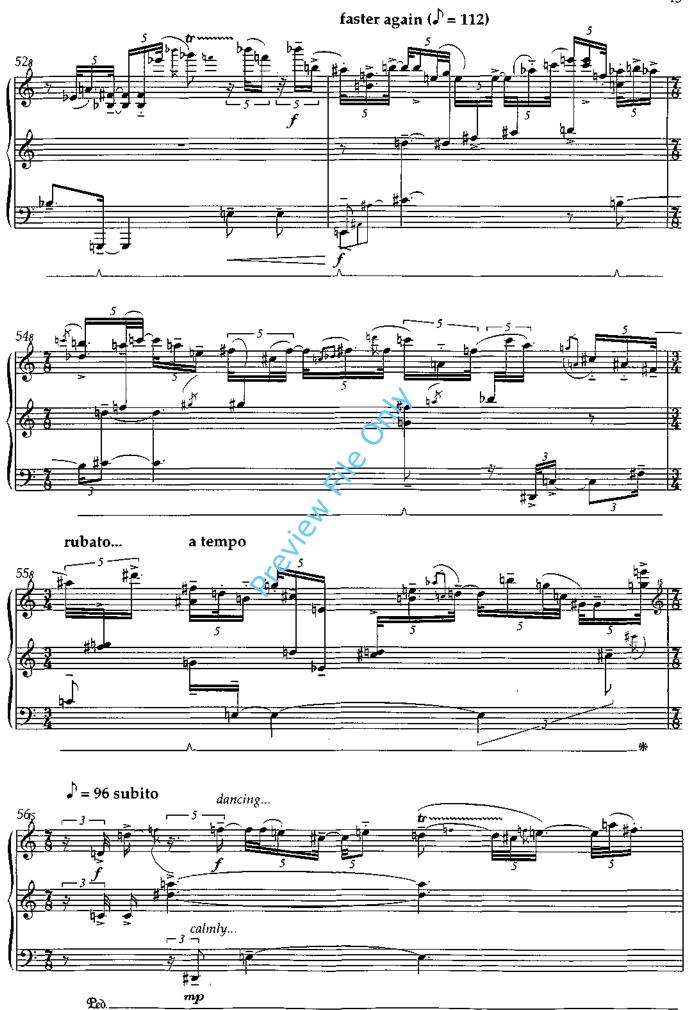




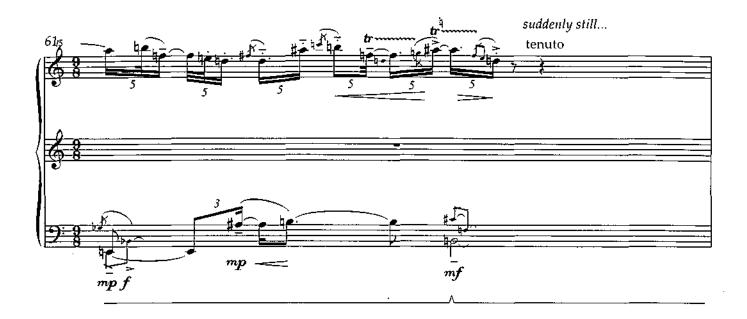


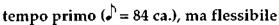














* tails up = pull with right hand; tails down = pull with left hand

Note starting positions for bowing cords: clusters 1 and 2 start from the right-side; cluster 3 starts from the left side

