

Crossbow

Robin Hayward

a constructed improvisation for solo violin

Tuning of strings

The four strings are tuned according to the first four prime numbers of an undertone row hanging from E6:

String	Prime	Tuning
E5	2	E5
A4	3	A4
D4	5	C4 raised by a Ptolemaic comma (string tuned 10:9 down from D4)
G3	7	F#3 raised by a septimal comma (tuned 28:27 down from G3)

Colour markers on the bow and fingerboard

The prime numbers are assigned four colours:

2 [4]*	-	blue
3 [6]*	-	green
5	-	orange
7	-	yellow

* The numbers 4 and 6 also correspond to the colours blue and green respectively.

The bow length is equally divided into 4, 5, 6 and 7 parts using thin strips of paper of the corresponding colour.

The fingerboard is divided into 2 halves. The lower half (towards the bridge) is then divided with the coloured paper strips into 2, 3, 5, and 7 parts, and the upper half (towards the pegbox) into 4, 5, 6 and 7 parts.

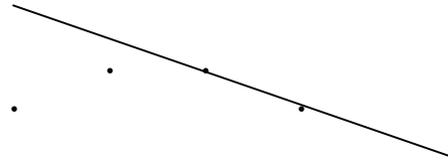
Playing position

The violin is positioned on the knees, with the pegbox facing towards the audience, at 180 degrees from the player. The left hand is used to operate the lower half of the fingerboard; the four fingers are placed on the four strings leaving the thumb free to move beneath them, where it can pluck the strings. The strings covering the upper half of the fingerboard are bowed.

Movements of the bow

The bow is moved both left / right (up- and down-bow) and away / towards the player (toward the pegbox and towards the bridge). Three possible angles of the bow in relation to the strings are permitted:

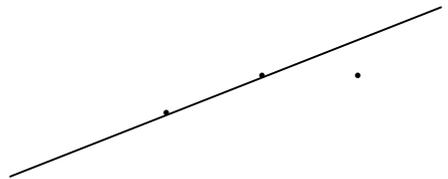
Angle a: resting on the A and E strings:



Angle b: resting on the C and A strings:



Angle c: resting on the F# and C strings:



Which of these angles is used at any moment depends on the left / right starting position of the bow.

starting position (colour of strip on bow)	angle
blue	a
green	a or b*
orange	b or c*
yellow	c

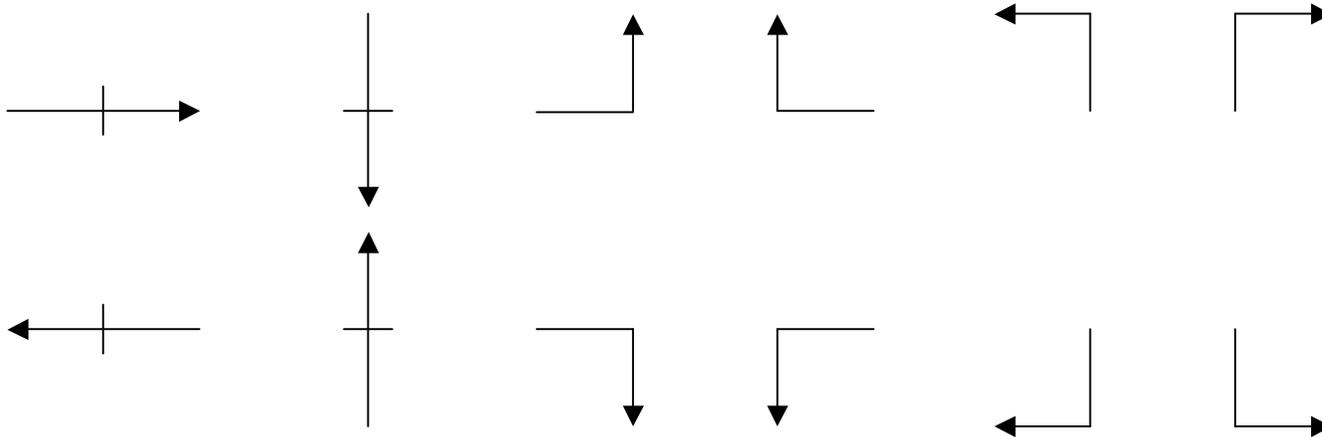
* The choice between the two possible angles is left to the player in the moment of the performance.

Length of bowings

Bow movements are measured in units, one unit being the distance between two coloured strips. How far the bow moves also depends on the left / right starting position of the bow.

starting position	distance in units
blue	2
green	3
orange	5
yellow	7

For a two unit movement there are 12 possible routes:



Which of these routes is chosen is left up to the player in the moment of performance, within the restrictions imposed by the overall plan (form) of the piece (see below).

Bow pressure and speed

There are three possible bow pressures: very high (pressing the string against the fingerboard), high (the string catches during an up or down bow, but remains free from the fingerboard), and low (just high enough to produce a pitch during an up or down bow).

Bow speed is a function of bow pressure:

bow pressure	speed
very high	very slow – the bow carries the string with it until it is suddenly released
high	slow – the string stutters due to the friction of the bow
low	just fast enough to produce a pitch

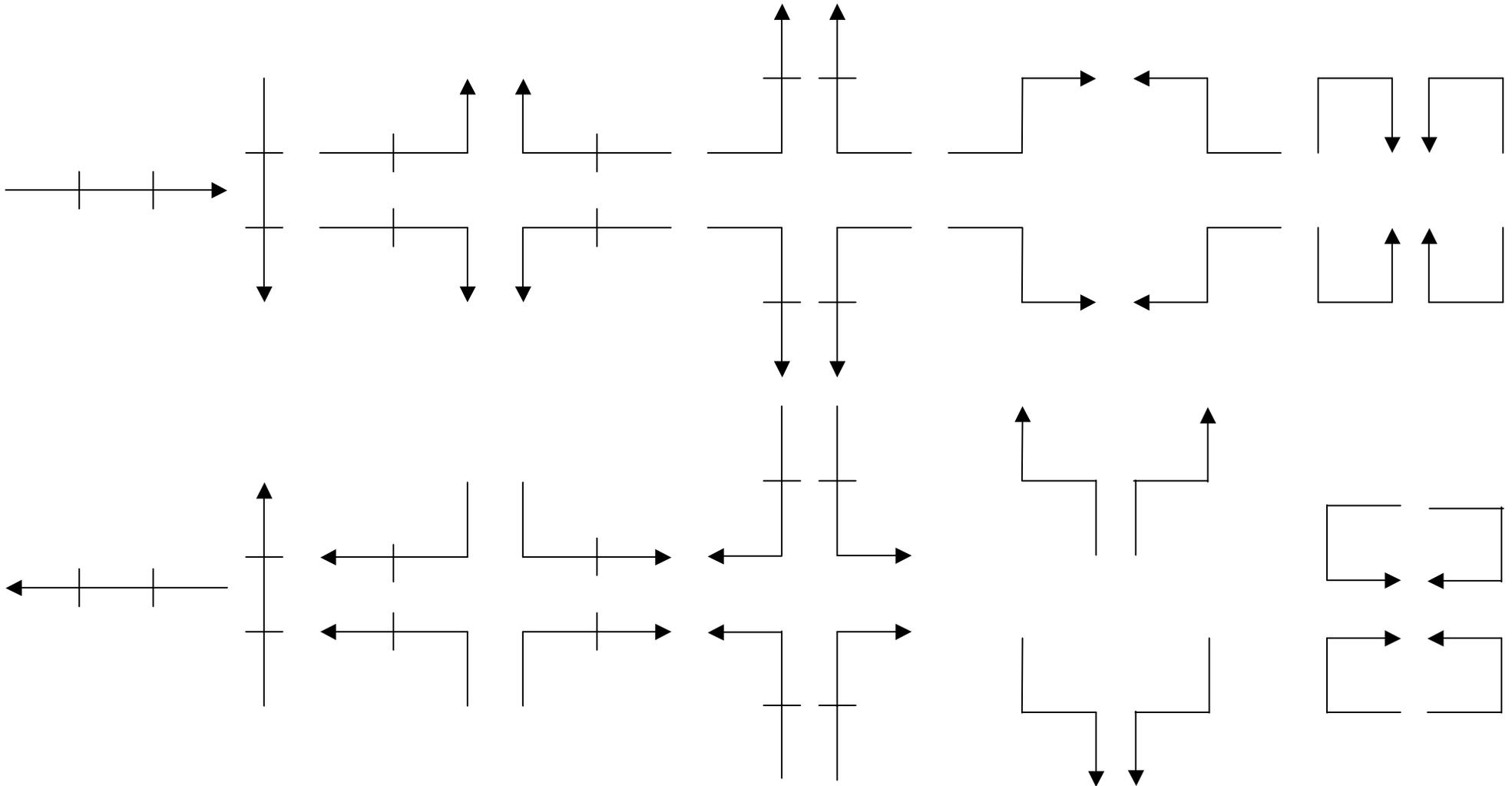
During bowings of two or three units the bow pressure remains constant. The transition between the individual units is marked by one or more of the following options:

- change of direction by 90 degrees, as indicated in the possible routes
- touching the string with a finger of the left hand (or in the case that the finger is already in contact with the string, removing the finger from the string)
- touching the left hand thumb against the string (or in the case the thumb is already in contact with the string, removing it from the string).
- pressing the string against the fingerboard with a finger of the left hand (or in case the string is already depressed, releasing the string from the fingerboard).

Which ones of these options is used is left to the performer in the moment of performance. At least one must be used in order to make the individual units audible.

When the same colour occurs on both the bow and the fingerboard, the string that at that moment is in contact with the bow is plucked with the thumb of the left hand.

For a three unit movement there are 36 possible routes:



The same rules apply to three-unit as apply to two-unit movements: the bow pressure stays constant throughout the whole movement, and the individual units are marked by a combination of the four different options.

Pauses between movements

A movement is followed by a pause, in which the player prepares him or herself for the next movement. The bow pressure between two consequent movements must always be different.

Five- and seven-unit movements

The routes of five- and seven-unit movements are derived from the two- and three-unit movements. Though the bow pressure stays constant within the two- and three-unit movements, it has to change between them. The bow pressure thus marks the derivation of the five- and seven-unit movements from the two- and three-unit movements. The individual units within the five- and seven-unit sections are marked using the same method as in the two- and three-unit sections.

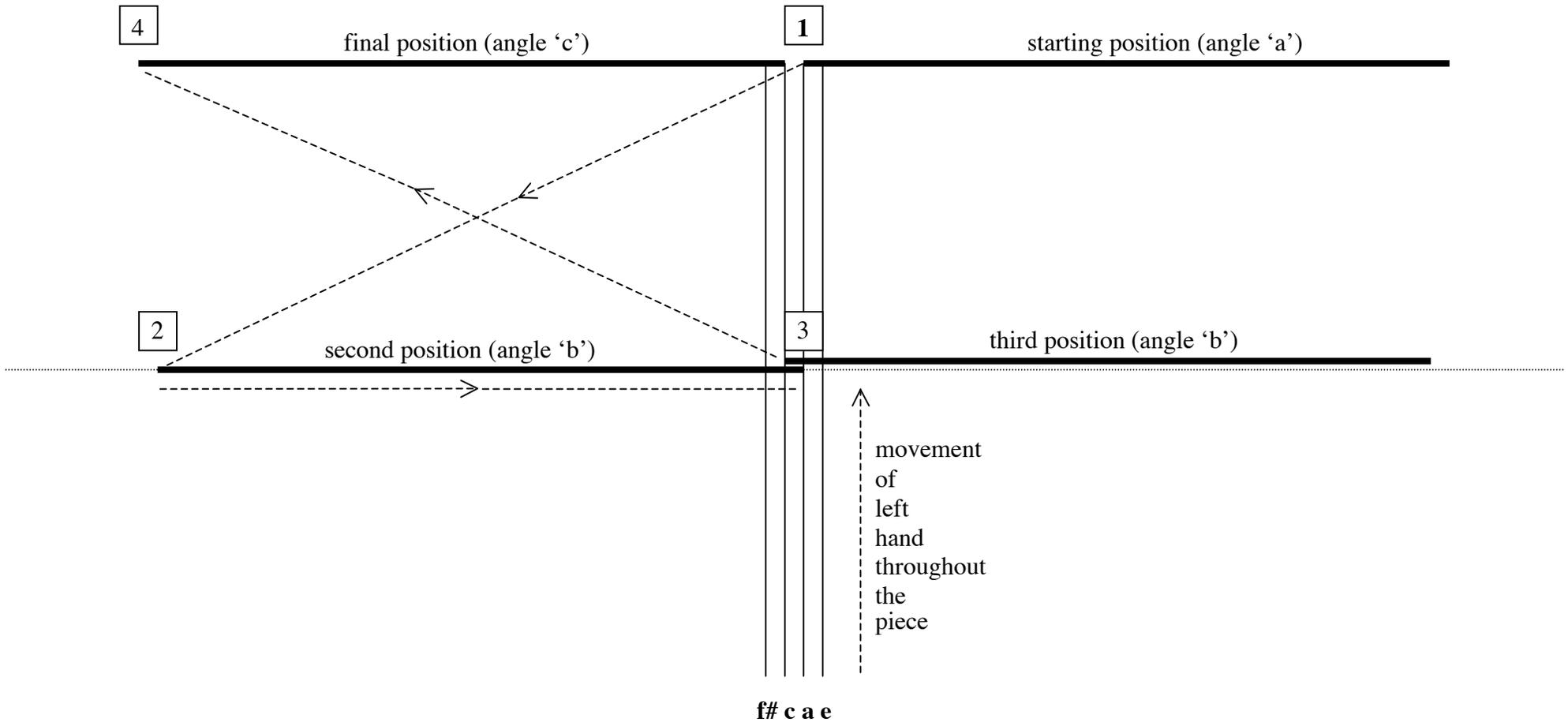
Correction of bow position

It will frequently occur that the angle of the bow to the strings between consecutive movements will be different. When this occurs, the angle of the bow is first corrected to the new angle, and then the bow is moved to the correct position using light bow pressure. The next movement follows after a preparation pause.

The movements of the bow should always be as straight as possible, without *accelerando* or *rallentando*.

Form

Though the details of each movement are negotiated by the player in the moment of performance, these follow an overall route which is preplanned. The piece starts with the tip of the bow at the pegbox of the violin (position 'a').



Using the four different modes of movement (2, 3, 5 and 7), the bow traces an overall movement from position 1 to position 2, and from position 3 to position 4. Between position 2 and 3 the same four modes are used, with the difference that the transition between units within modules may be marked by changes of direction of 180, rather than 90 degrees. The bow therefore remains positioned half way between the peg box and bridge for the entire second section of the piece.

Left hand

The fingers of the left hand are always positioned above different coloured strips, and the thumb also always plucks directly above a coloured strip. At the beginning of the piece the left hand is placed near the bridge. Between each movement module one of the four fingers moves up one colour away from the bridge towards the pegbox, until by the end of the piece the hand lies near the middle of the fingerboard.

Pauses between the three sections

When the bow has reached position 2 and position 3 there is a pause of 15 – 20 seconds, significantly longer than the pauses necessary for preparation and movement of the left-hand fingers between the movement modules.

Approaching positions at the ends of sections

Towards the ends of sections the player will have to judge the landing of the bow at the correct position within the rules imposed by the four modes of movement.

Note to the performer

For the piece to work effectively it is necessary to have internalized the various rules in order to be able to play freely within them. Once tried out in practice, the rules are much simpler and easier to memorize than they may appear to be when reading through these instructions. The three different bow pressures / speeds must be clearly differentiated in order to allow the underlying structure to be articulated.

Crossbow was composed April – May 2007, and revised October 2007. First performed by Benjamin Bindewald, Berlin, June 2007.