

**Charlie Sdraulig**

**arc**

*for cello and electronics*

**2022-23**

To David Moran,  
with sincere thanks for all of his creativity and expertise during the development of this piece.

*Slip-stick—an absent bow covered by curved finger proxies: staggering, tender digits.*

## Setup and electronics

*arc* may be presented as either a **concert piece diffused over speakers** or as a **performance-installation diffused over headphones**. For the latter option, organise multiple 20-minute performance sessions (over a day or several days) for up to eight audience members at a time, who should all sit as close as possible to the player. A blacked out, quiet space is required.

Equipment:

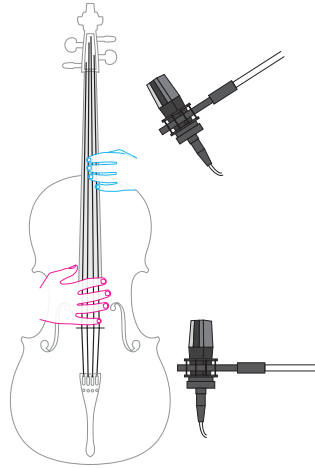
- **Two close cardioid condenser microphones** (see the diagram on the following page) going into the house mixer or directly into the laptop's interface:
  - one large diaphragm condenser directed at the f-hole (e.g., AKG C414 or similar in cardioid pattern—this is the primary microphone)
  - one small or large diaphragm condenser pointing at the fingerboard (e.g., KM184 or AKG C414 or similar in cardioid pattern pointing at the 3<sup>rd</sup>/4<sup>th</sup> harmonic to pick up left hand finger rubbing/scraping)
- Laptop with interface and midi controller (e.g., nanoKONTROL or similar) running a Max patch (contact me at the email address below for the latest version)—the electronics mostly consist of subtle fades and sample playback, see the [purple](#) instructions in the score for details
  - aim for a highly amplified intimate/ASMR-like sound unless otherwise instructed in the score
- Stage OR in-ear **monitoring** for the cellist (mono mixdown of both microphones and the electronics)
- **Stereo mix** to the house or to the audience's headphones as applicable—panning  $\approx$  separate the two microphones slightly (e.g., f-hole LDC just off centre, ca.10-20% to the left, fingerboard microphone 25-40% to the right, but adjust according to the space/diffusion available)
  - for **headphone diffusion** in a **performance-installation** presentation, the following additional equipment is required (maximum numbers are given—accommodating fewer audience members per session is also an option):
    - 8-channel headphone amplifier
    - 8 3.5mm male to female extension cables for the audience headphones  $\geq 5$  m
    - 9 pairs of open back headphones (e.g. Koss KSC75 headphones are recommended as a high quality, cheap option)—the extra pair is for the sound engineer
- Interconnect cables and adapters for the above as needed

Some light compression and notch filtering may be necessary to mitigate feedback in concert. This can be achieved via the Max patch or mixer.

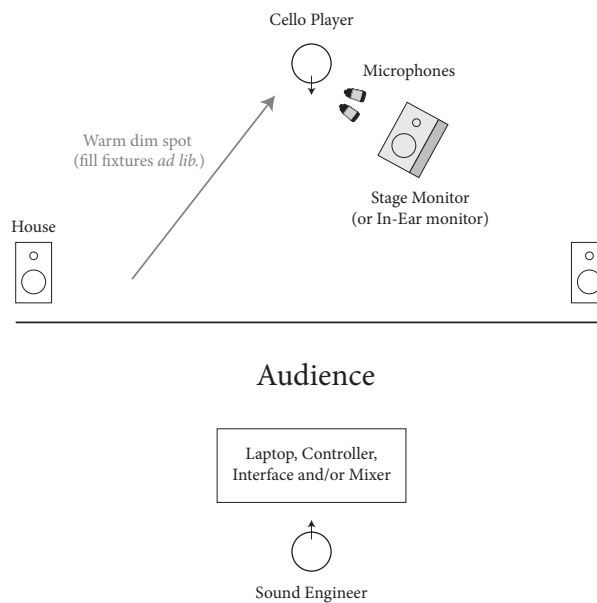
Dim spot lighting directed at the cellist's hands, originating from stage right. Place both microphones stage left—ensure they catch as little light as possible (i.e., try to 'hide' the microphones) and do not obstruct audience members' view of the cellist's hands.

Please contact me for further information, if you have any questions about these or any other aspects of the piece (email: [cbsdraulig@gmail.com](mailto:cbsdraulig@gmail.com)).

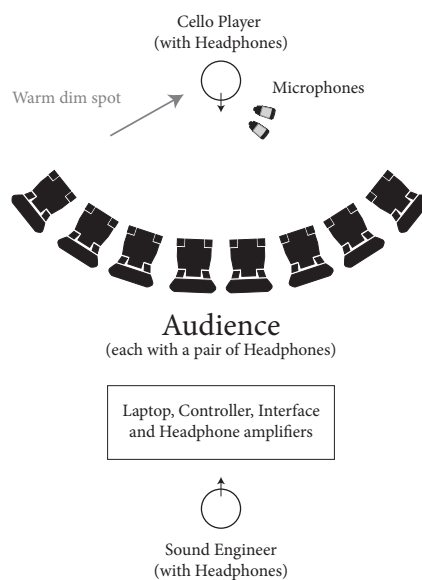
## Microphone placements



## Concert stage plot (not to scale)



## Performance-installation stage plot (not to scale)



# General performance directions

**This piece should be performed from memory.** The score is formatted for display on  $\geq 11$ " tablets.

All of the sounds in this piece will be produced with your fingers—**no bow is required.**

For all techniques, no matter which parts of your finger(s) or thumb(s) are involved, **minimise the surface area of your contact with the instrument.** Perhaps counter-intuitively, you will find it easier to produce most sounds with minimal pressure and contact at a very slow speed—this approach avoids prematurely dampening/choking the sounds.

Nevertheless, many sounds will remain at the threshold of audibility, so practice with amplification is essential. A USB microphone is a relatively cost-effective and convenient solution, if no other options are available. Contact me for recommendations, if required.

**Deliberate, calm movements and choreography throughout.** Smooth transitions between techniques, unless otherwise indicated. Note the placement of hands relative to the bridge, etc., in the diagrams on the score—respecting these positions will clarify the piece's medium- and long-term physical trajectories for audience members. I recommend practicing in front of a mirror to develop this discipline.

A successful performance will largely depend upon how effectively micro-variations within sounds/gestures are explored and contrasted with one another. How many fine-grained distinctions can you communicate?

**Opportunistically interact with ambient sounds and audience behaviours** by synchronizing the onsets and offsets of phrases, notes, techniques, etc., with them and/or by subtly altering the character of your playing in response to the live situation. For example, you might wait for an audience member to shuffle in their seat before you begin section 2; you could align your brushing in section 10 with a repeating bird call, an audience member's breathing, or a heater's periodic crackling; you could steadily play softer or reduce the density of a given texture to attune to a sense of concentrated hush in the room, etc. Do not try to manufacture these moments; rather, attend to the events around you as you play and respond if the opportunity arises. The time-space notation is purposefully open allow you this flexibility, just ensure the proportional relationships between phrases are broadly maintained.

To assist with memorisation, mnemonic titles for each section are available upon request.

## Noteheads

- ◆ harmonic pressure
- ◆ half pressure
- fully stopped (norm.)

Bend the string horizontally in the direction of the arrow:

- ◁ without pressing the string toward the fingerboard (do not touch the fingerboard)
- ◁ while pressing the string toward the fingerboard (do not touch the fingerboard)
- ◀ while minimally touching the fingerboard

As above, but without (or only minimally) bending the string:

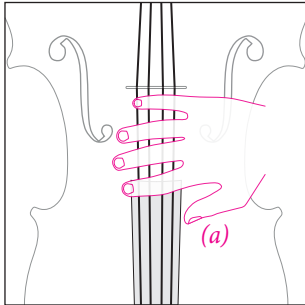
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Finger positions and choreographies are clarified with diagrams and instructions in the score.

# arc

for cello and electronics

Charlie Sdraulig (2022-23)



**1**

ca. 2-4" (i)

(\*)

(\*\*)

III

2

hold

hold

hold

hold

(i) this time-space notation is purposefully open to allow you to alter and attune your playing in response to the live situation

(\*) l.h. 2: silently depress and release III, without fully stopping it

(a) r.h.: relaxed, dampening the strings; do not allow any clearly identifiable pitches to speak

(\*\*) l.h. 2: predominantly diagonal movement, wrapping around the side of III; still silent

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(\*\*\*)

bend

hold

release

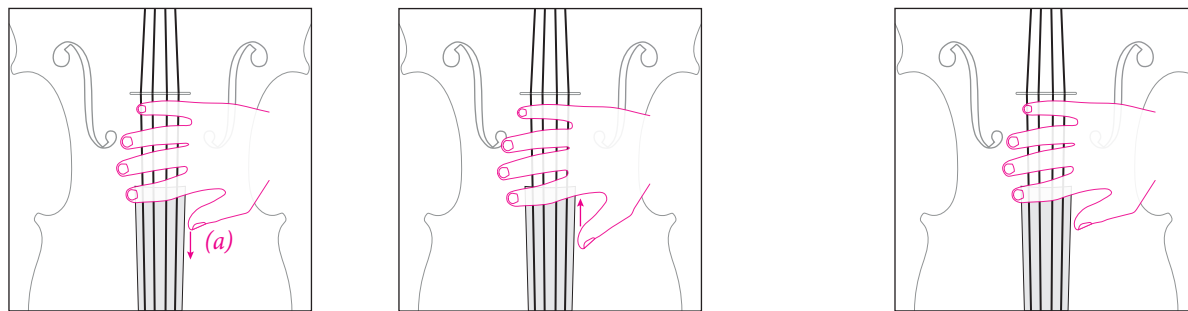
hold

× ad lib. (ii)

(\*\*\*) l.h. 2: bend III horizontally, without touching the fingerboard; still silent

(ii) move to section 2 opportunistically in response to audience behaviours or ambient sounds

*Electronics:* over the course of this section, gradually fade up from a moderate to a high level of amplification



**2**

(i) ca. 6-9"

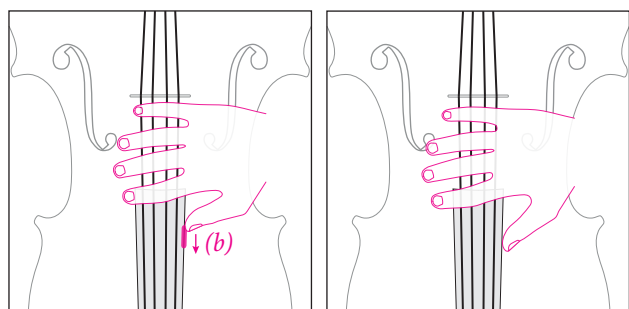
(\*)

(2)

bend hold release (attacca) (ii)

- (i) the aforementioned flexibility still applies, but please ensure the proportional relationships between sections are broadly maintained
- (\*) l.h. 2: gradually lower finger and slip-stick rub on the fingerboard while touching III; these are the first intentional sounds you perform
- (a) r.h. thumb: silently move without touching the fingerboard, anticipating the slip-stick rub in section 3
- (ii) always move smoothly to the next section without a pause

≡



**3**

(a) (\*)

(b) (\*\*)

(c) (\*\*\*)

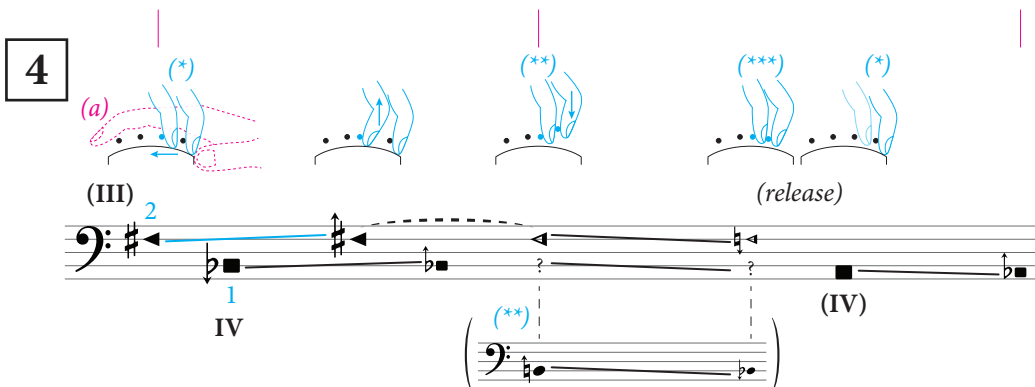
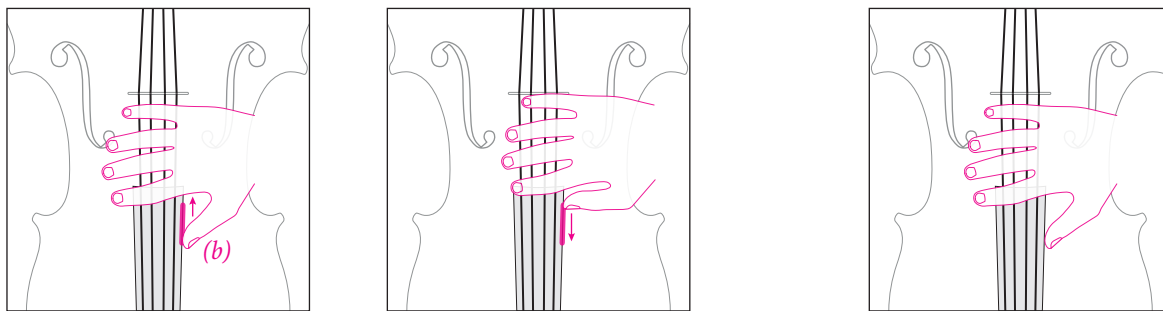
(d)

(bend) (release)

(c)

+ IV

- (a) r.h.: arch slightly and allow pitches to intermittently speak for the first time
- (\*) l.h. 2: slip-stick rub on the fingerboard while touching III
- (b) r.h. thumb: slip-stick rub on the side of the fingerboard
- (\*\*) l.h. 2: silently, slightly raise your finger off the fingerboard, while touching III
- (c) r.h. thumb: push IV on top of l.h. 2 fingernail and then gradually slide IV down, slip-stick, sounding pitches on the small stave
- (\*\*\*) l.h. 1: pull and slide IV in support of r.h. thumb in (c)
- (d) rh. thumb: let IV fall off the end of l.h. 2 fingernail, making a dampened quasi-pizz. sound



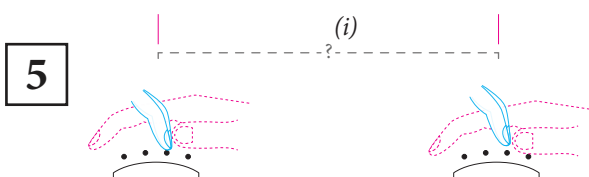
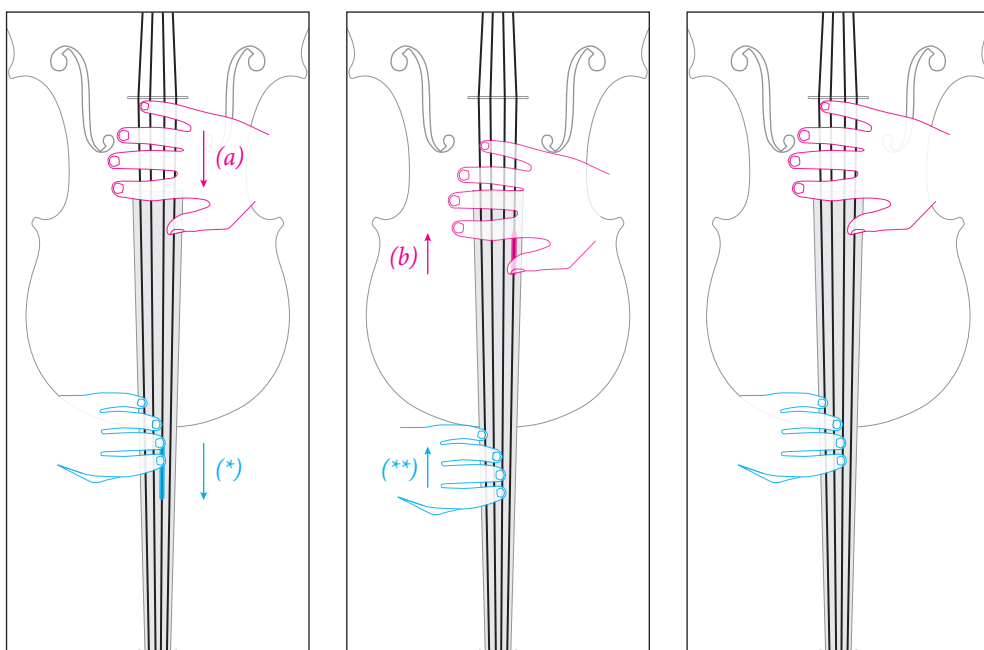
(a) r.h.: arch further, dampen less and allow pitches to speak more often

(\*) l.h. 1: slip-stick rub on the fingerboard while touching IV, glissando vertically without (or only minimally) bending the string

(b) r.h. thumb: slip-stick rub on the side of the fingerboard

(\*\*) l.h. 1: suddenly pull IV on top of l.h. 2 fingernail and then gradually slide IV down, sounding pitches on the small stave  
(note that l.h. 2 is still keeping III taut)

(\*\*\*) l.h. 1 & 2: quickly and silently release both strings



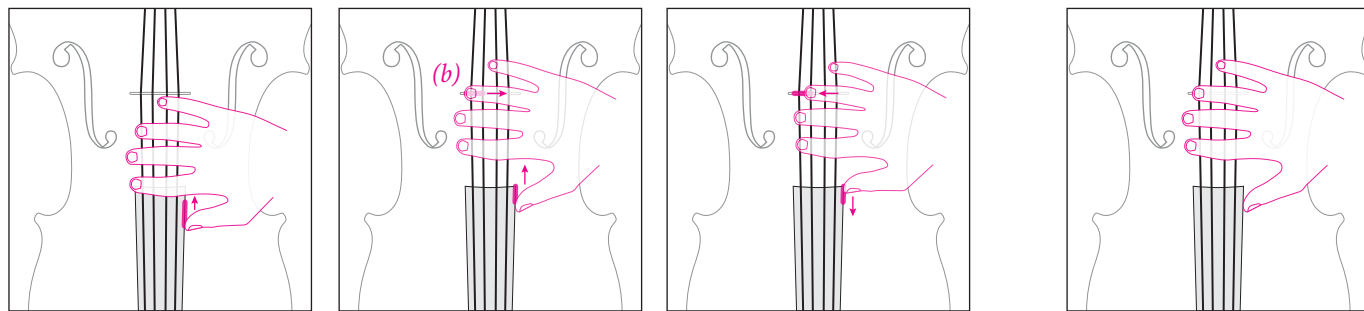
(i) move slowly at first so your brushing seamlessly emerges out of the previous section; barely audible, timing ad lib.

(\*) l.h. 1 & 2: brush your fingertips on top of III; harmonic pressure ◊ (toneless, no slip-stick)

(a) r.h.: hover above the strings and silently move in sync with l.h.

(\*\*) l.h.: hover above the strings and silently move in sync with r.h.

(b) r.h. thumb: brush the side of your thumb on top of IV; harmonic pressure ◊ (toneless, no slip-stick)

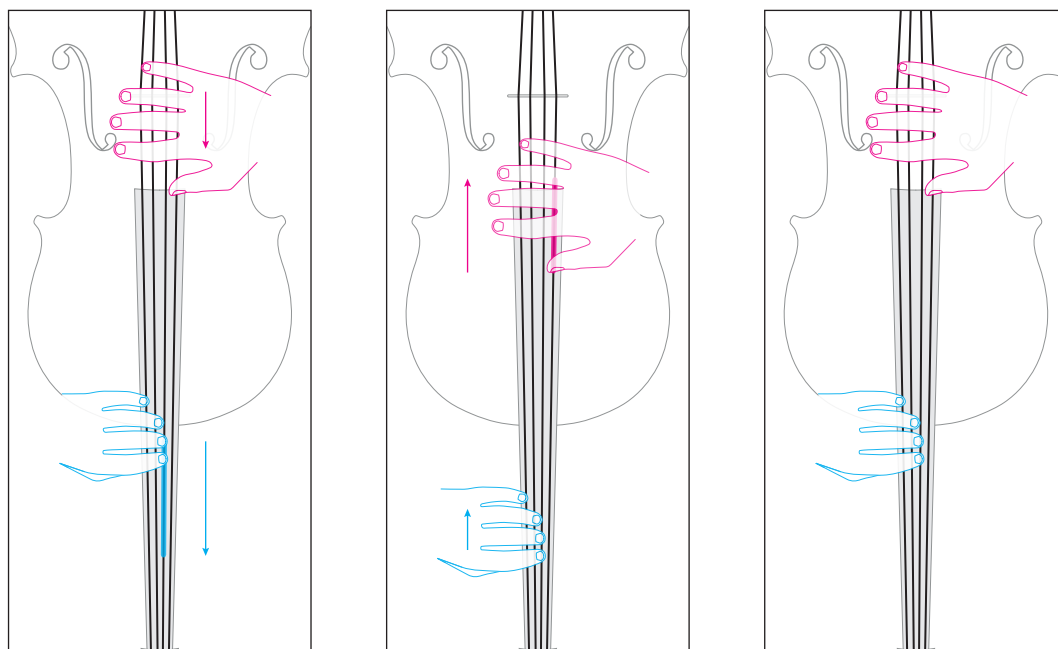


**6**

(a) r.h. 1, 2, 3 & 4: hover above the strings; no dampening hereafter  
 (\*) l.h.: slip-stick rubs, etc., as before  
 (b) r.h. 3: slip-stick rub along the top of the bridge  
 (\*\*) l.h. 3: suddenly pull II on top of l.h. 4 fingernail and then gradually slide II down, sounding pitches on the small stave

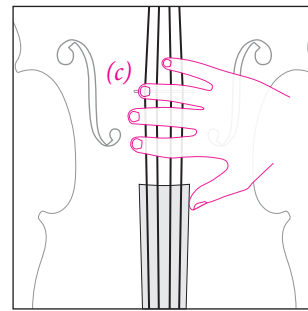
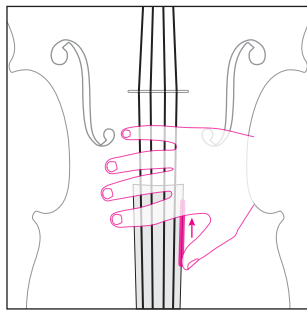
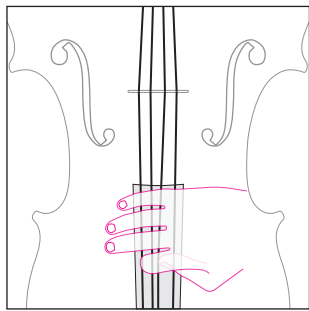
*Electronics: fade in sample 1 when IV enters; keep well below the amplified cello level; fade out at the end of this section*

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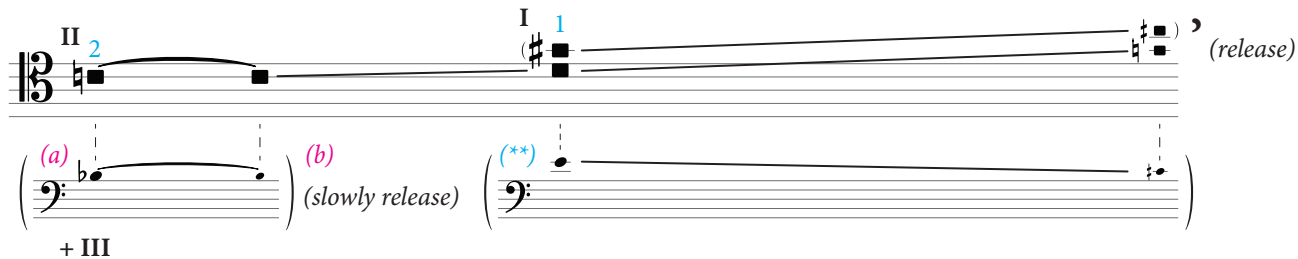
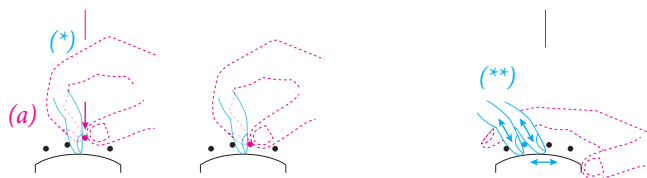


**7** (i)

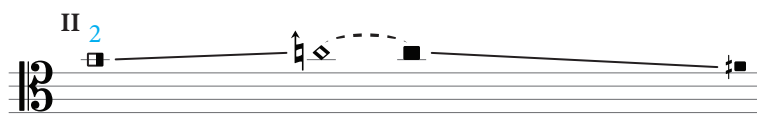
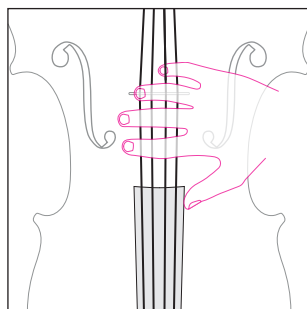
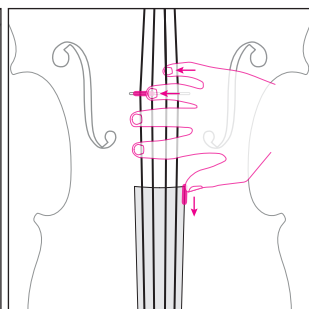
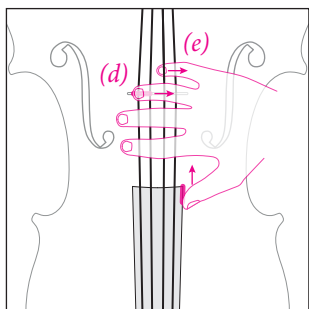
(i) instructions as in section 5, but move a little faster



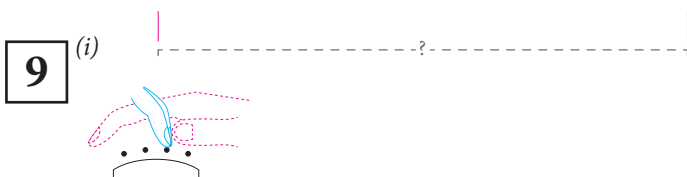
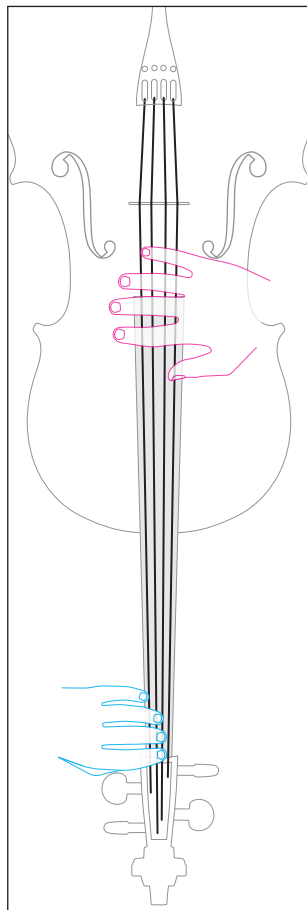
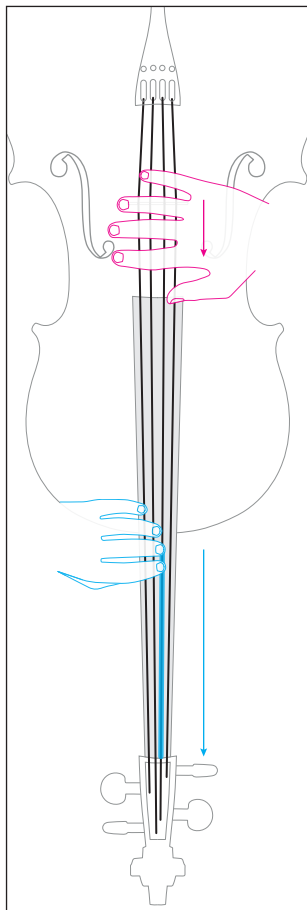
8



- (a) r.h. thumb & 1: suddenly push **III** on top of l.h. 2 fingernail and then gradually slide **III** down, sounding pitches on the small stave  
 (\*) l.h. 2: hold position while touching **II** and the fingerboard  
 (b) r.h. thumb & 1: slowly and silently release **III**; relax r.h. and smoothly transition to its next position  
 (\*\*) l.h. 2: gently press **II** on top of l.h. 1 fingernail and then slide **II** diagonally a little ad lib., sounding pitches on the small stave; slight side to side slip-stick rubs on the fingerboard to sound **II** pitches on the large stave (l.h. 1 may also move diagonally to assist the sound production of pitches on the small stave only)  
 (c) r.h. 3: silently rest your fingertip on the top of the bridge

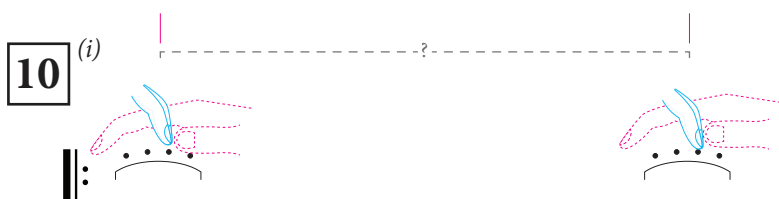
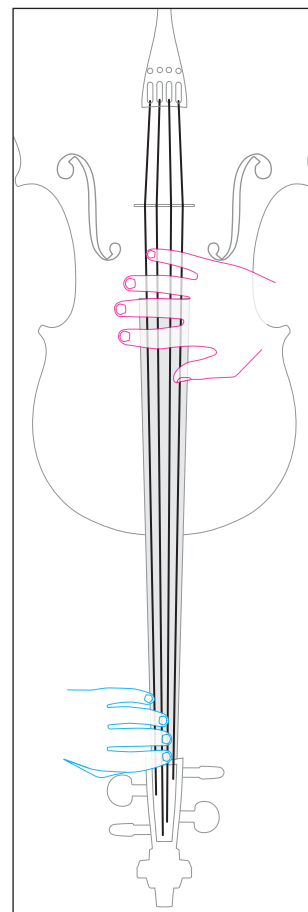
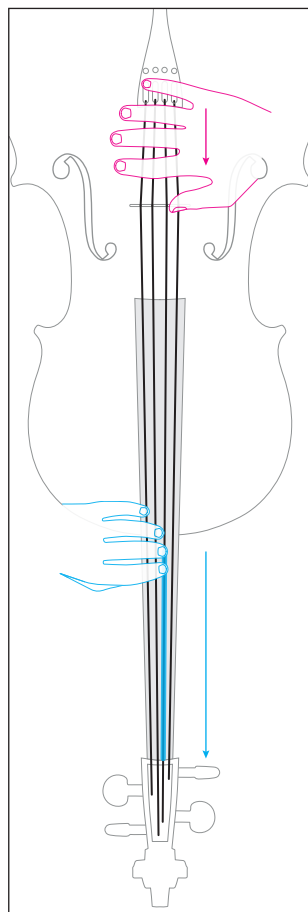
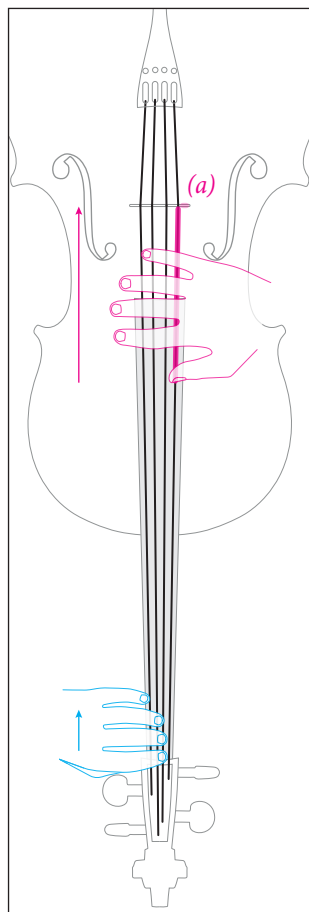


- (d) r.h. 3: slip-stick rub along the top of the bridge, as before  
 (e) r.h. 4: behind the bridge, slide your fingernail underneath and against **III**, back and forth ad lib., slip-stick  
 (\*\*\*) l.h. 2: slide your fingernail on **II**, back and forth ad lib., slip-stick  
 (\*\*\*\*) l.h. 2: carefully release **II**, straighten your finger and smoothly transition to a slip-stick rub on the fingerboard



(i) instructions as in section 5, but move fast enough to produce a fairly consistent, audible sound

*Electronics: start a gradual, slow fade up*

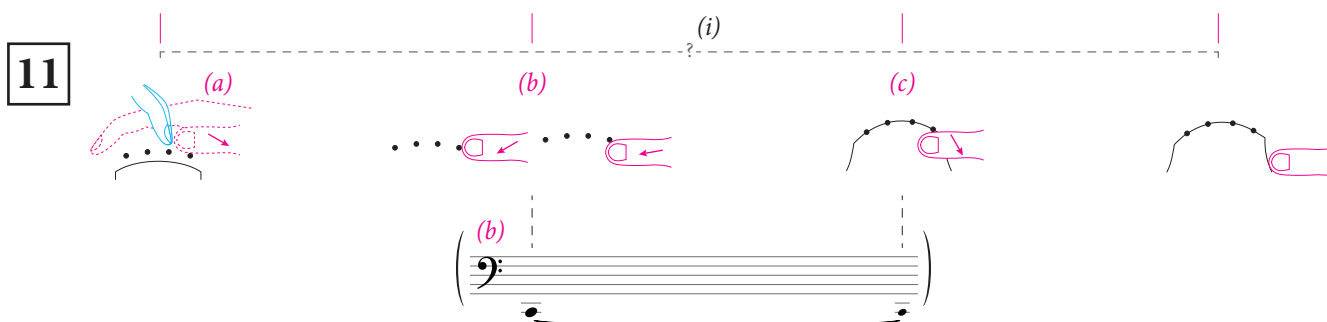
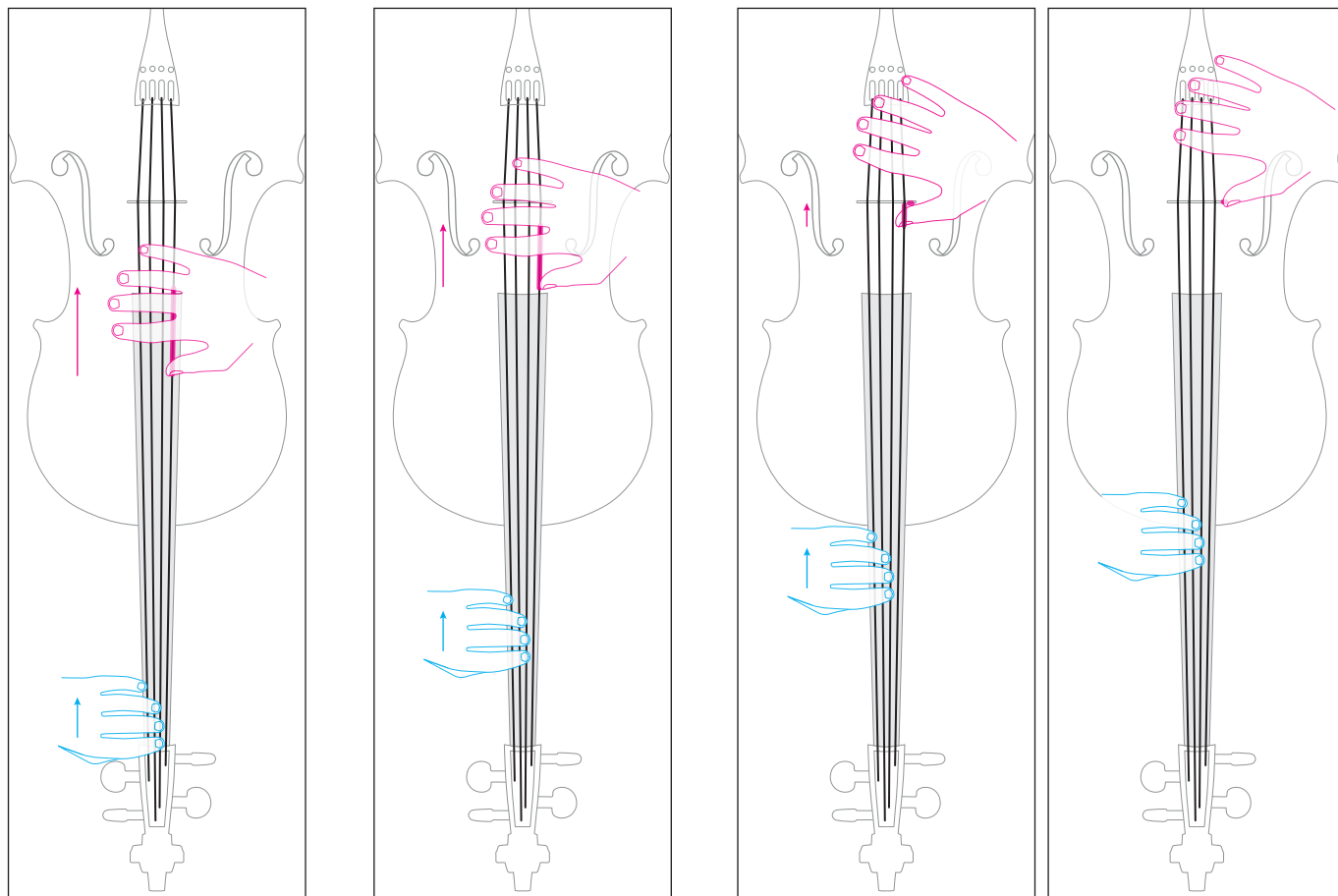


× *ad lib.* (ii)  
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- (i) instructions as in section 5, but move fast enough to produce a fairly consistent, audible sound at first  
 (ii) loop for a while (over a minute) and get steadily slower and softer, as if emulating slow, calm breathing;  
 move to section 11 opportunistically in response to audience behaviours or ambient sounds

(a) *r.h. thumb*: only once when you are highly amplified, after many loops, and in response to audience behaviours or ambient sounds, brush the top edge of the bridge when your thumb is near it

*Electronics*: over the next ca. 15", continue to gradually fade up (avoid feedback); then, over ca. 60", gradually fade down from a high to a low level of amplification (i.e., subtle, but still perceptible reinforcement); finally, suddenly fade back up to a high level



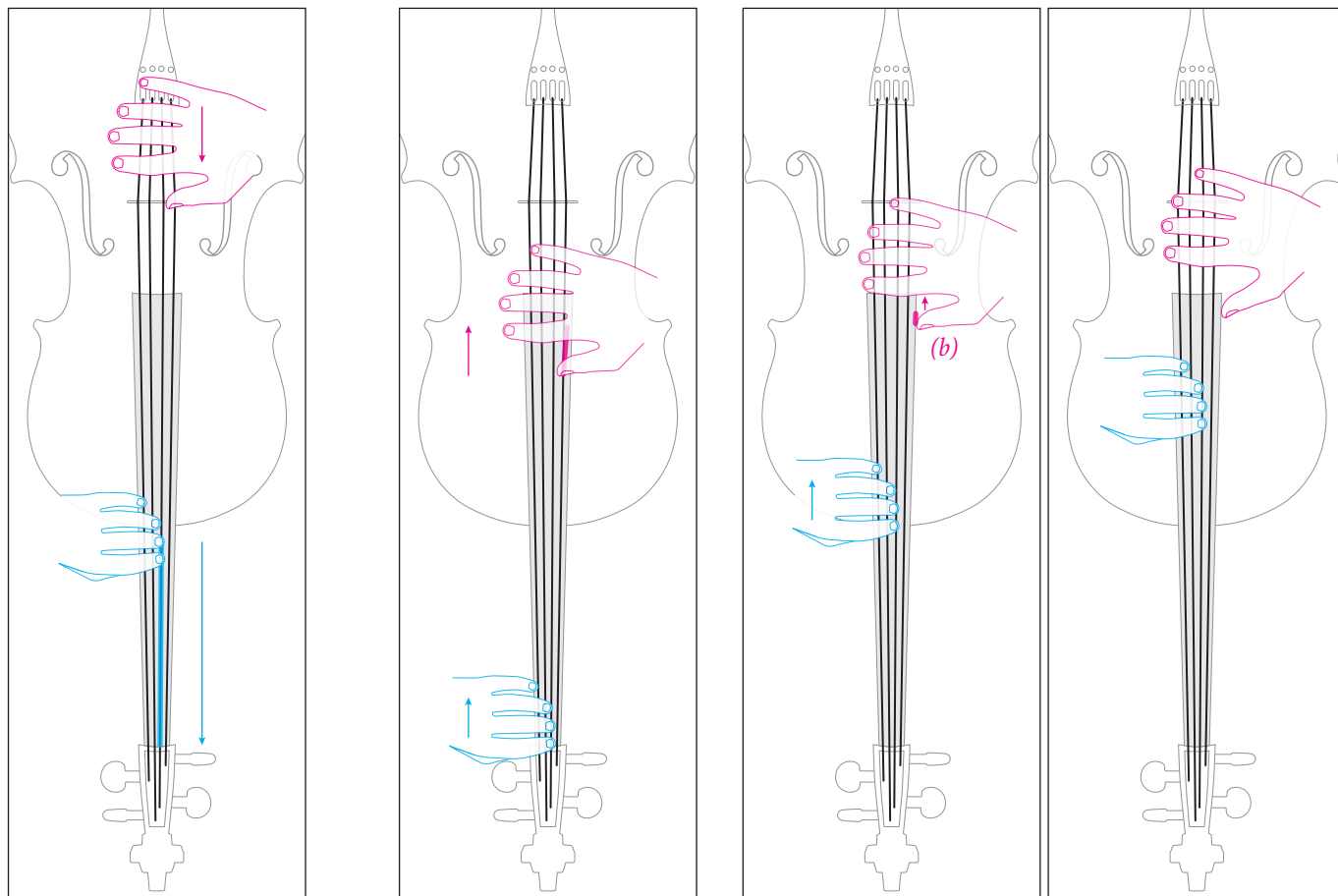
(i) integrate all of the actions below into one seamless, continuous gesture;

this whole section should take roughly the same amount of time as a corresponding gesture near the end of section 10

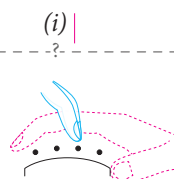
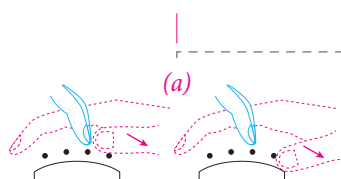
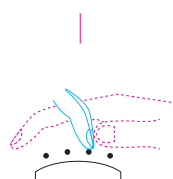
(a) *r.h. thumb*: gradually transition to brushing **IV** with the tip of your thumb; harmonic pressure  $\diamond$  (toneless, etc.)

(b) *r.h. thumb*: gradually slide your thumb underneath **IV**; harmonic pressure  $\diamond$ , but allow the open string pitch to sound

(c) *r.h. thumb*: angle your thumb so it also brushes the side of the bridge and then follow the bridge's contour down a few centimetres



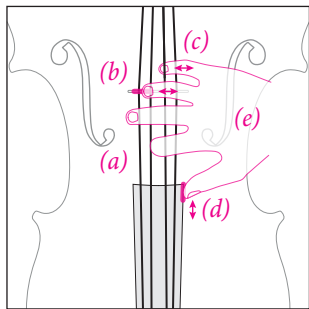
12



(a) *r.h. thumb*: gradually transition to brushing IV and the top of the fingerboard with the tip of your thumb; harmonic pressure ♦

(b) *r.h. thumb*: slip-stick rub on the side of the fingerboard

(i) integrate these actions into one seamless, continuous gesture



13

(i)

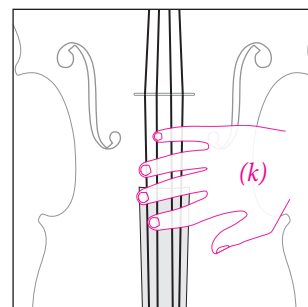
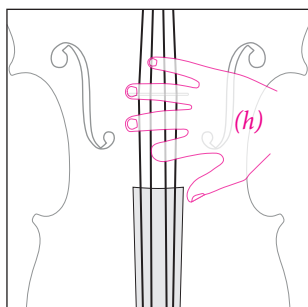
(a)

(\*) 1&2

(\*\*)

- (\*) l.h. 1&2: bend III by pushing it towards IV; gradually lower your fingers and slip-stick rub on the fingerboard while touching III
- (\*\*) l.h. 1&2: silently hold until section 14, making space for the actions of r.h. 1
- (a) r.h. 1: slide your fingernail against II, up and down ad lib. (quasi-bowing), slip-stick; high horizontal pressure into II
- (b) r.h. 3: slip-stick rub along the top of the bridge, back and forth ad lib.
- (c) r.h. 4: behind the bridge, infrequently slide your fingernail underneath and against III, back and forth ad lib., slip-stick
- (d) r.h. thumb: slip-stick rub on the side of the fingerboard, back and forth ad lib.
- (e) r.h.: perform all r.h. actions simultaneously, but slowly, to produce a creaky, extremely sparse and irregular texture; however, one by one, gradually slow each r.h. action to a standstill, except for r.h. 1
- (i) move to the next system opportunistically in response to audience behaviours or ambient sounds

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(ii)

(f)

(g)

(i)

(f)

(j)

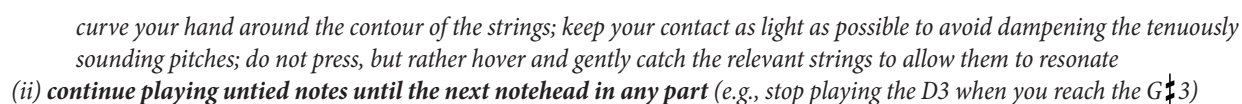
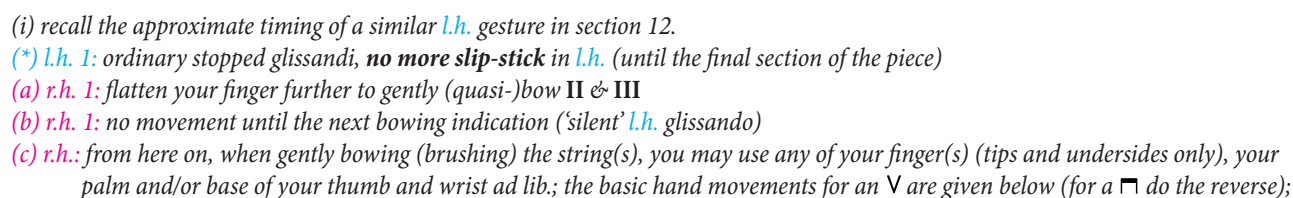
(k)

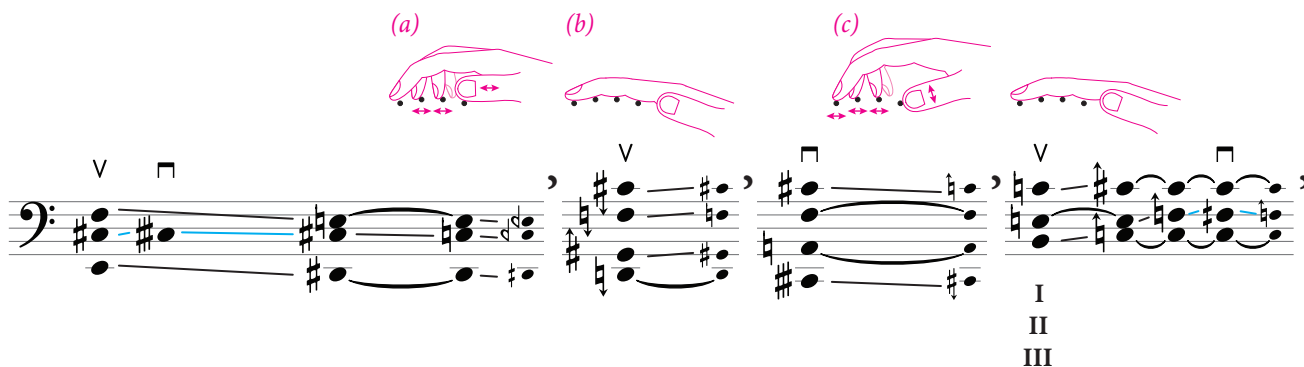
(g)

2

- (ii) transition between these actions opportunistically in response to audience behaviours or ambient sounds
- (f) r.h. 1: gradually reduce your horizontal pressure into II and transition to more consistent, very slow fingernail sliding back and forth
- (g) r.h. 1: harmonic pressure  $\diamond$  into II; aim to produce a fairly continuous, vanishingly soft open string pitch (i.e., no more slip-stick)
- (h) r.h.: raise and relax the rest of your hand so that your thumb and other fingers no longer touch the instrument
- (i) r.h. 1: gradually bend your finger to gently slide from your fingernail tip to your top knuckle on II
- (j) r.h. 1: gradually raise your finger to gently slide your fingertip (no nail) on II
- (k) r.h. 1: gradually angle and flatten your finger to gently (quasi-)bow II while moving your hand away from the bridge (i.e., sul tasto)

Electronics: fade in sample 2 during (i) to reach an almost imperceptibly soft level; fade out before the return of (f)

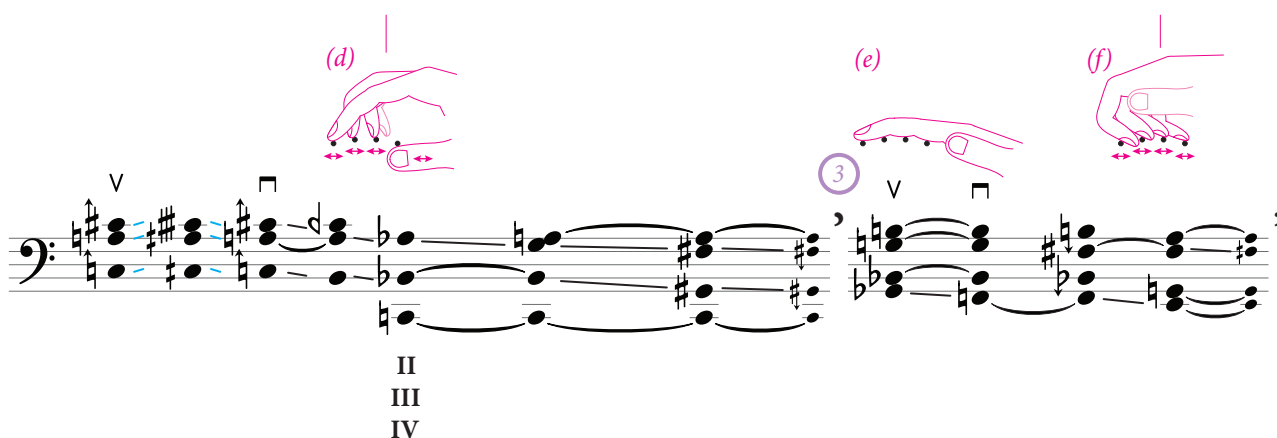
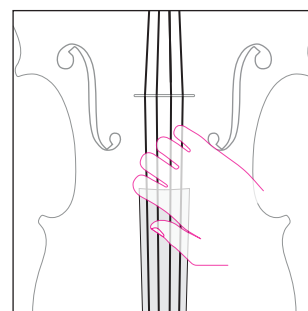
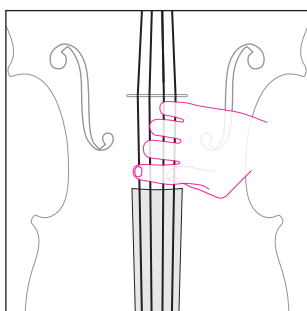




(a) *r.h.*: near the end of the □, arch your hand a little; gently slide your fingertips and the side of your thumb on the strings back and forth at slightly different speeds ad lib.; akin to a glacially slow, irregular quasi-tremolo; continue keeping your contact as light as possible

(b) *r.h.*: bowing (brushing) the strings, as at the beginning of this section

(c) *rh*: near the end of the □, arch your hand further; gently slide your fingertips and the end of your thumb on the strings, etc.

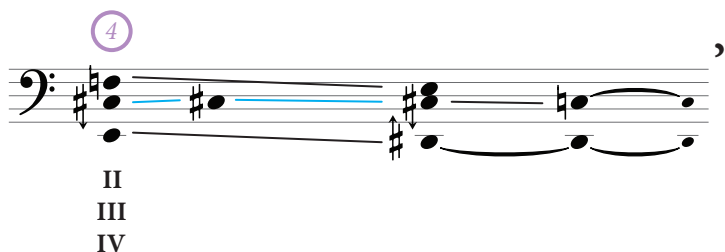


(d) *r.h.*: soon after you start the □, move your hand closer to the bridge and arch it even further than before; gently tuck your thumb under IV; slide your fingertips and the side of your thumb on the strings, etc.

(e) *r.h.*: bowing (brushing) the strings, as at the beginning of this section (thumb above the strings, a sul tasto 'bow' position, etc.)

(f) *rh*: soon after you start the □, lift and arch your hand still further than before; gently slide from your fingernail tips to your top knuckles, back and forth on the strings at slightly different speeds ad lib., etc.; keep your contact as light as possible

*Electronics*: fade in sample 3 to reach an almost imperceptibly soft level; fade out at the end of this system



*Electronics*: fade in sample 4; keep well below the amplified cello level; fade out at the end of this section

# 16<sup>(i)</sup>

(a)

(\*)

5

IV + III      III + II      + I      I  
III  
IV

(\*) *l.h.*: barely touch the indicated node(s) (hover, without applying pressure and minimise the surface area in contact with the string; the harmonics likely will not sound, if you apply a standard *l.h.* harmonic pressure); the sounding pitches of the harmonics are given on the small staff above

(a) *r.h.*: throughout this section, continue to slide from your fingernail tips to your top knuckles, back and forth on the indicated strings at slightly different speeds *ad lib.* (explore contrasts and vary within the range of slow to nearly frozen in place); akin to a glacially slow, irregular quasi-tremolo; you must keep your contact as light as possible, otherwise the harmonics will not sound; again, do not press, but rather hover and gently catch the relevant strings to allow them to resonate; double and triple harmonics do not always need to sound simultaneously

(i) take extra time *ad lib.* to ensure each harmonic sounds, or to luxuriate, if a given harmonic sounds particularly well, but please broadly maintain the proportional relationships between phrases

*Electronics*: fade in sample 5 to reach an almost imperceptibly soft level; fade out shortly before you fade in the next sample

6

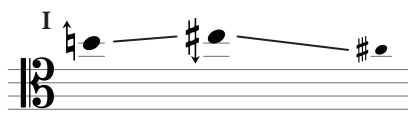
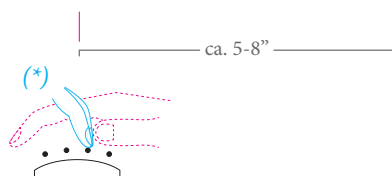
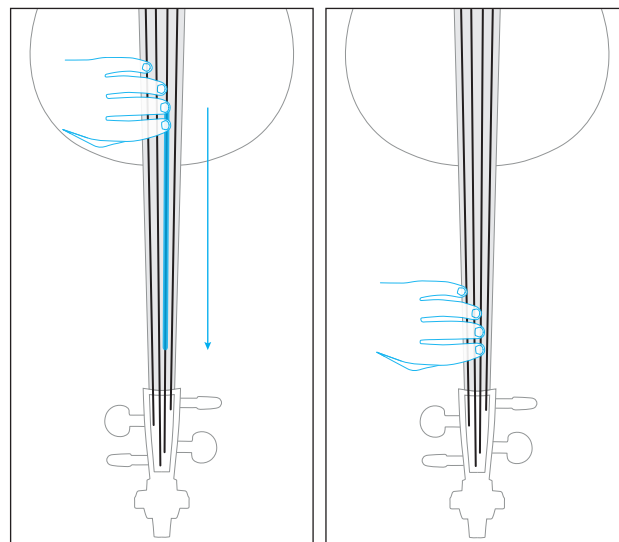
I      III + II      III

*Electronics*: fade in sample 6 to reach an almost imperceptibly soft level; fade out at the end of this system

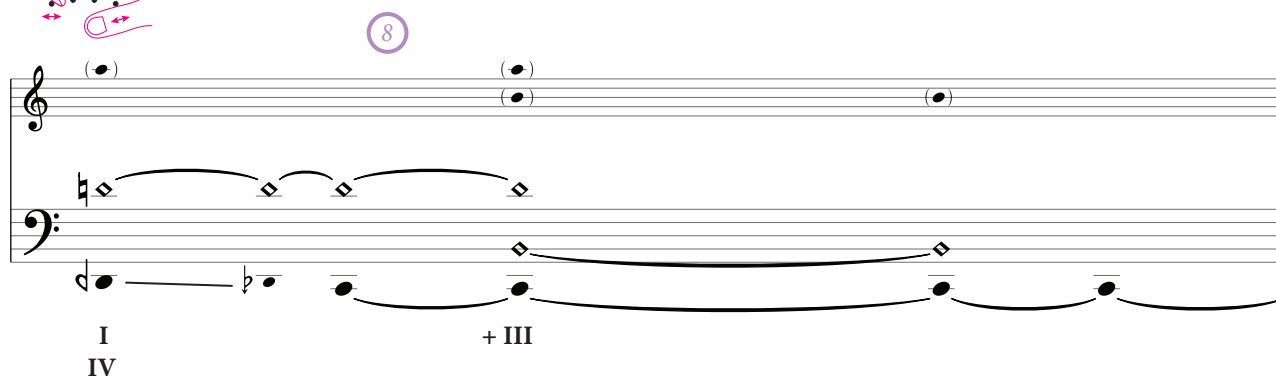
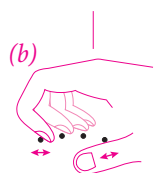
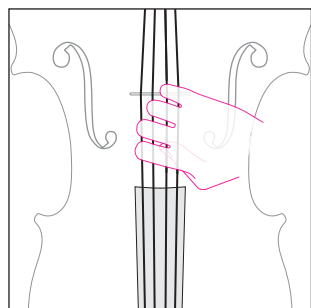
7

I  
II  
III      I  
III

*Electronics*: fade in sample 7 to reach an almost imperceptibly soft level; fade out at the end of this system

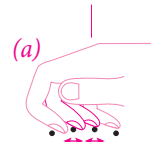
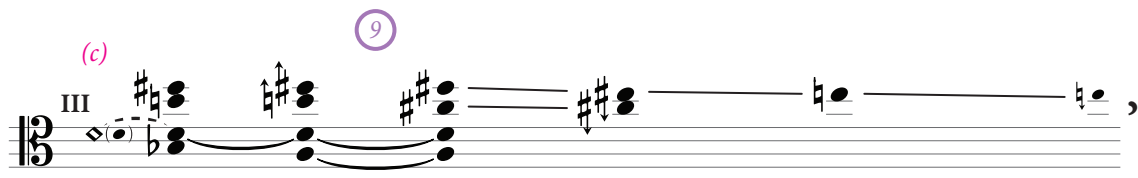


(\*) l.h. 1 & 2: brushing, etc. as in section 5, but r.h. remains still; all transitions between techniques should be as seamless as possible

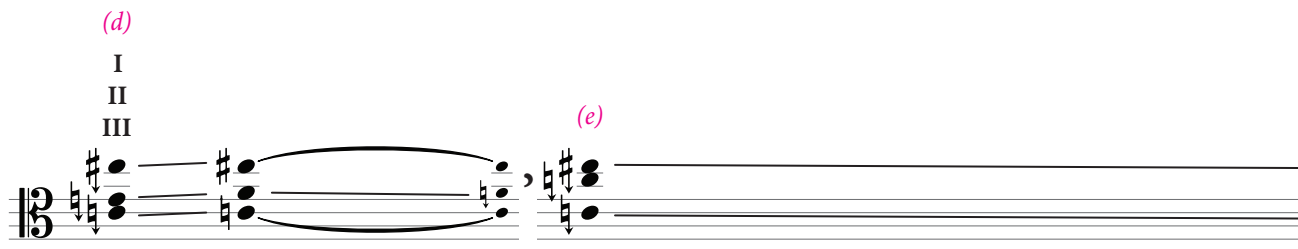


(b) r.h.: gently tuck your thumb under IV and slide the side of your thumb against the string; for I & III, slide from your fingernail tips to your top knuckles, back and forth at slightly different speeds ad lib., etc., as before

Electronics: fade in sample 8 to reach an almost imperceptibly soft level; fade out at the end of this system

 $\parallel$  $\parallel$ 

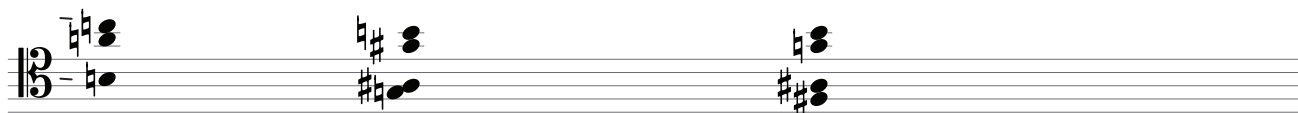
*Electronics:* fade in sample 9; keep well below the amplified cello level at first



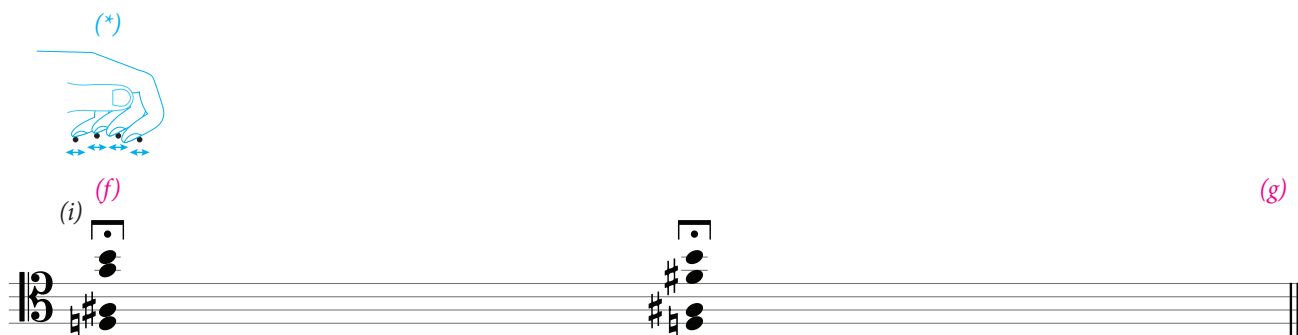
(d) *r.h.*: gradually reduce fingernail ('bow') pressure

(e) *r.h.*: suddenly play with an extremely high fingernail ('bow') pressure and extremely slow ('bow') speed; aim to emulate dampened, slip-stick-like sounds; the result should be creaky, tense, and muscular, with irregular quasi-pizz. sounds > when you allow your fingernails to occasionally fall off the strings ad lib.

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(i) timing ad lib.; modify your playing and align events opportunistically in response to audience behaviours or ambient sounds

(\*) *l.h.*: adopt the same techniques as the *r.h.*, but also bend the strings and slip-stick rub around the indicated pitches ad lib.

(f) *r.h.*: as before, but sometimes suddenly return to an as light as possible fingernail ('bow') pressure (i.e., introduce sudden, brief tender moments) before gradually transitioning back to a very high pressure, etc.

(g) *r.h.*: end with tenderness

*Electronics*: on this page, faders ad lib., repeating the following gesture: gradually fade up a little, before slowly fading down and then suddenly resetting back to the original level; operate between a moderate to a high level of amplification throughout; undercut/compensate for the high pressure cello techniques; independently vary the ascending and descending ramp durations of the amplified cello and sample playback faders; the sample playback level should rarely, if ever, exceed the amplified cello signal; fade out sample playback before the cellist finishes playing.