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Where will it END? Or, A Guide to Extended Techniques for the Violoncello

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WHERE WILL IT END?

-OR-

A guide to extended techniques for the Violoncello

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By

Dylan Messina

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Introduction

My intent in creating this project was to provide composers of today with a new resource; a technical yet pragmatic guide to writing with extended techniques on the cello. The cello has a wondrously broad spectrum of sonic possibility, yet must be approached in a different way than other string instruments, owing to its construction, playing orientation, and physical mass.

Throughout the history of the cello, many resources regarding the core technique of the cello have been published; this book makes no attempt to expand on those sources. Divers resources are also available regarding the cello's role in orchestration; these books, however, revolve mostly around the use of the instrument as part of a sonically traditional sensibility.

The techniques discussed in this book, rather, are the so-called "extended" techniques; those that are comparatively rare in music of the common practice, and usually not involved within the elemental skills of cello playing, save as fringe oddities or practice techniques. Some of these techniques came into practice early in the cello's timeline: *pizzicato, sul ponticello*, and *col legno* are nothing new, having been used as early as the mid-17th century. Others, such as the use of artificial harmonics, left-hand pizzicato and double-harmonics arrived as accoutrement to the romantic virtuosi. Many more of these techniques were introduced in the mid-20th century, when composers began to feel increasingly liberated from expectations and compositional diversity exploded; in particular, the virtuosity of cellists Mstislav Rostropovich and Siegfried Palm inspired a whole generation of composers to write for the instrument in ways never before seen. Throughout this remarkably transmuting century, the musical viability of extended techniques solidified; that they could act as gestures of expression in and of themselves, rather than be relegated to mere accessories of core technique.

The turn of the 20th century has brought us to an interesting position: with the knowledge and resources of such musical breadth available, a large catalogue of techniques explored, and new techniques burgeoning, there are grounds for an environment of unfettered creativity. A concomitant of this imaginative age is the increasing necessity of a coeval guidebook. It is with this goal in mind that I offer a new resource, in hopes that it may help the composer to achieve a deeper understanding of the cello and its applicability in contemporary idioms.

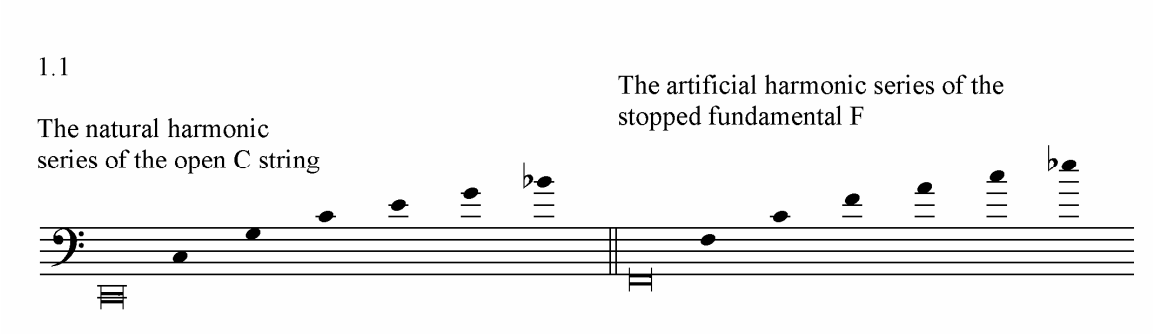
Part I. Techniques

I. Techniques with harmonics

A. "Artificial" or "false" harmonics

For the composer whose performance background is unrelated to string playing, the use of artificial harmonics may be confounding. Fortunately, though the physical background behind these harmonics is a bit complex, their application is not as difficult as it might seem.

As with natural harmonics, artificial harmonics are achieved by dividing the string at a node[1], producing an overtone of the fundamental. Artificial harmonics, however, deal not with the harmonic series of the open string's fundamental, but the series of a stopped note on the string (hence "artificial"):



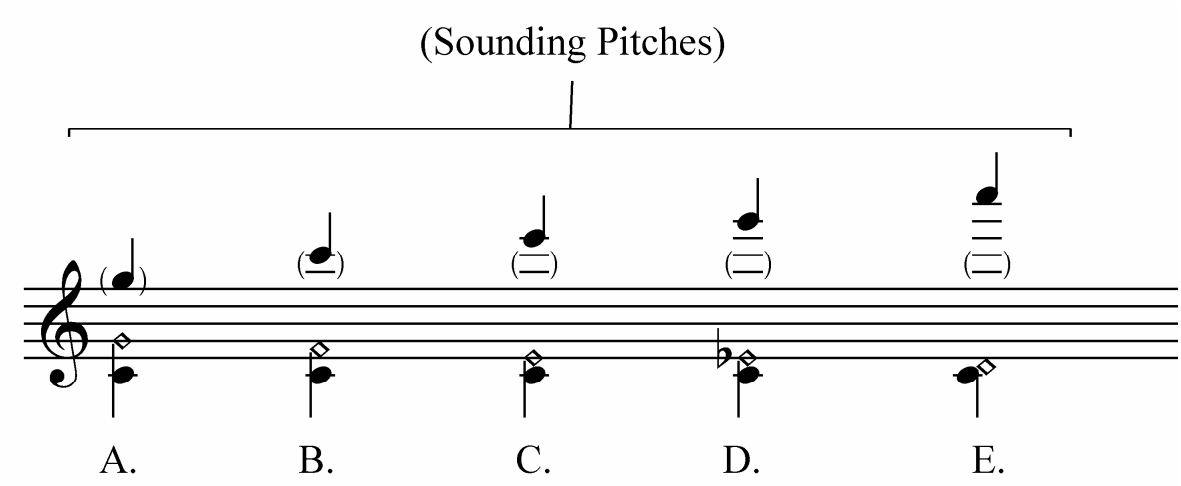
A new harmonic series is created by stopping the fundamental of the desired series with either the first finger or the thumb (depending on context and the size of the player's hand) essentially repositioning the nut, and lightly touching a certain interval above it. The pitch is related to the interval above the fundamental, as it would be in a naturally occurring series.

[1] "A point, line, or surface of a vibrating body or system that is free or relatively free from vibratory motion; a point at which a wave has an amplitude of zero". *Random House Webster's Unabridged Dictionary,* 2nd ed., s.v. "node."

Common artificial harmonic fingerings and their resulting pitches are as follows:

(ex.) Harmonic Interval Above Fundamental	**Sounding Pitch Above Fundamental**
(A). Perfect 5th	One octave + 1 5th
(B.) Perfect 4th	Two Octaves
(C.) Major 3rd	Two octaves and a Major 3rd
(D.) Minor 3rd	Two octaves + 1 5th
(E.) Major 2nd	Three Octaves

1.2

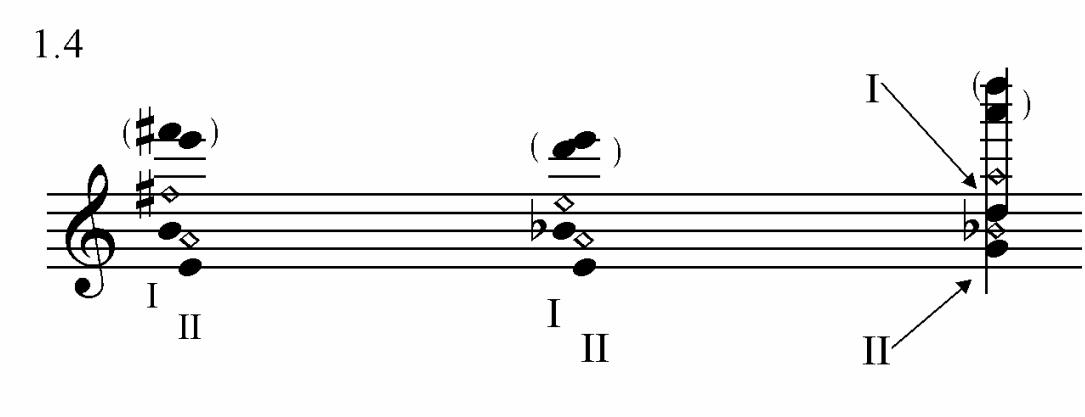


1.3

Other fingering configurations are possible, but these are the most reliable and consistent in color.

An interesting effect can be created by the simultaneous use of multiple artificial harmonics. A particularly good example of this technique can be found in the fifth movement of Bright Sheng's *Seven Tunes Heard in China* for cello solo (example 1.5). Double artificial harmonics are much more difficult to execute than single ones, and are best limited to reasonable hand positions; in the lower register, parallel fifths such as the ones in this example are effective; other configurations work better in high registers:

1.4

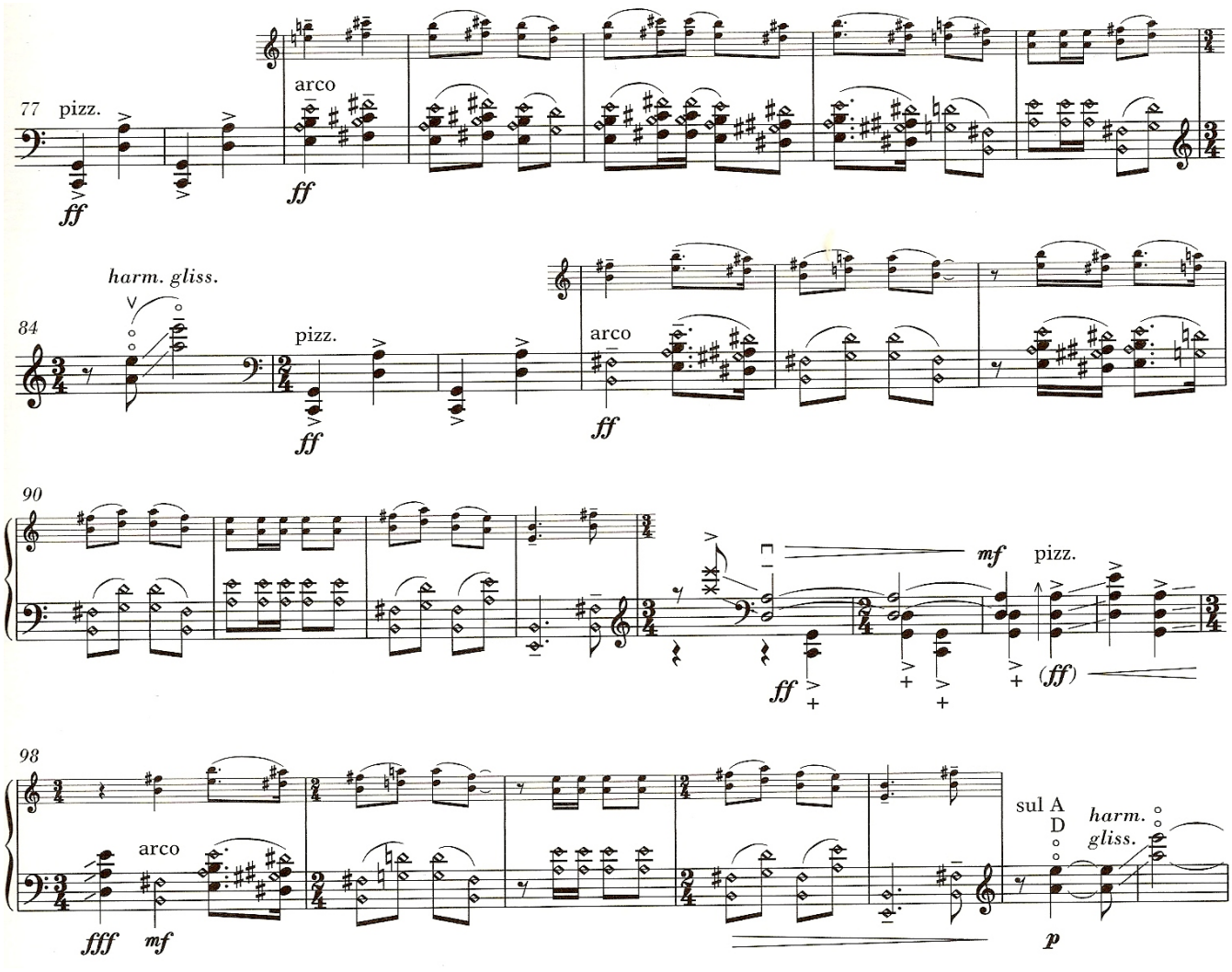


In addition, artificial harmonics can be combined with natural harmonics and non-harmonic tones within achievable hand positions.

Artificial harmonics are versatile; they are capable of any bowing articulation, as well as glissando, vibrato, crescendo, and diminuendo. In addition to their pure, focused sound, they can effectively extend the cello's upper register such that it is comparable to the violin's. A famous passage from Saint-Saëns' first cello concerto demonstrates this aptly (example 1.6).

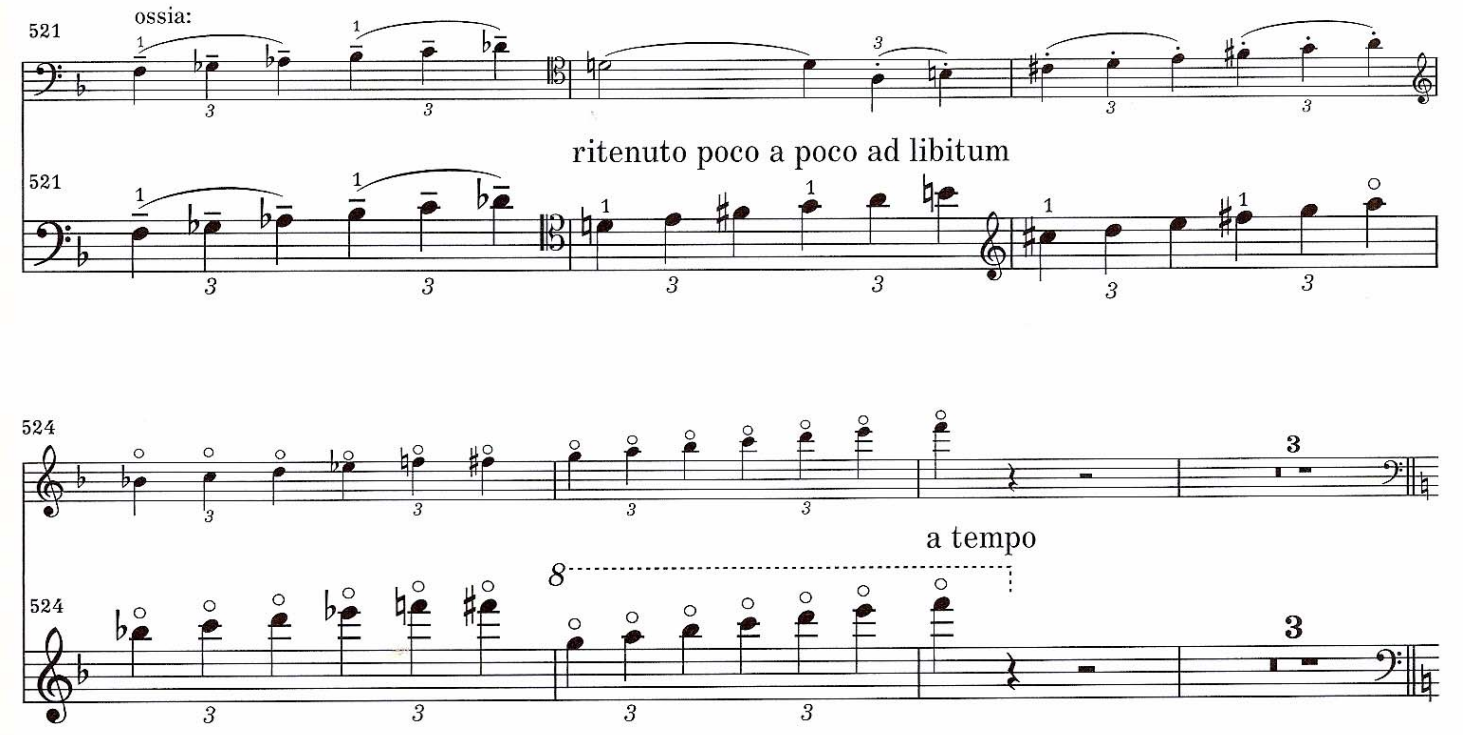
Despite their strengths, these harmonics also have limitations: they are capable of extremely soft volumes, but can rarely achieve volumes above mezzo-forte; because of their mechanical complexity, they do not lend themselves well to very agile passages; also, they somewhat more difficult to play well in tune than non-harmonic notes.

1.5



(From *Seven Tunes Heard in China* by Bright Sheng)

1.6

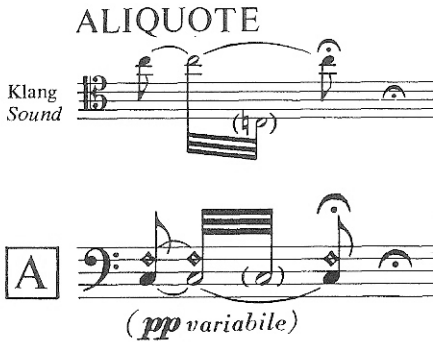


(From Cello Concerto No. 1 by Camille Saint-Saëns)

C. Harmonic trills

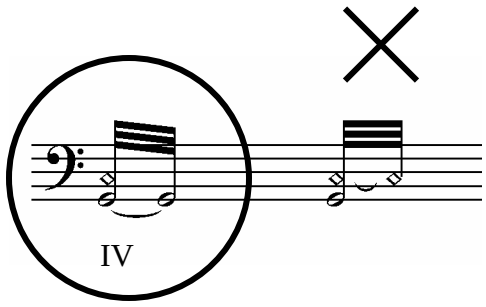
Harmonics are capable of interacting with non-harmonic tones in a number of interesting ways. One such effect is the harmonic –stopped trill, achieved by rapidly alternating a harmonic fingering and the non-harmonic stopped note in the same finger position:

1.7

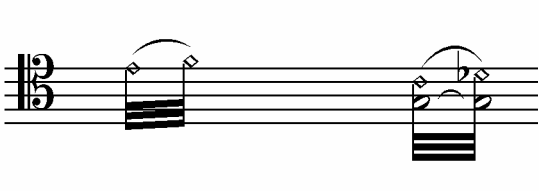


Here, the thumb or 1st finger stops a C_3, with the third or fourth finger resting lightly on the position of F, producing a C_5 harmonic. The "harmonic" finger then rapidly touches the string, in the manner of a trill, while the stopping finger remains firmly pressed against the fingerboard. This effect results in a rapid alternation between both the pitch of the harmonic and the stopped pitch, and also their respective timbres. The sound changes depending on the register in which it is performed, with the pitch alternation being more audible in higher registers, and less so in lower registers. When writing with these techniques, the trill should always be oriented such that the stopping finger remains down the whole time; writing a trill in which the stopping finger is required to leave the string will result in a clumsy execution:

1.8

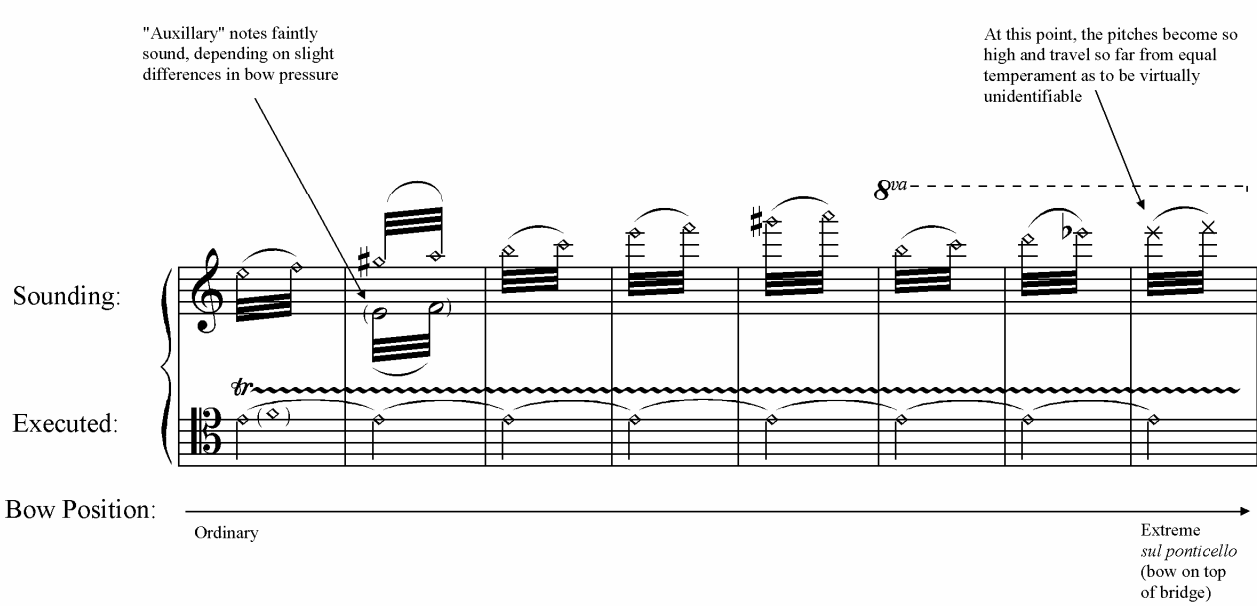


Another technique in this family is the rapid alternation of a harmonic and the harmonic one semitone higher, resembling a conventional trill:



1.9

The resulting sound can be wildly different, depending on the bow placement. S*ul tasto* will result in a sound similar to that of the harmonic-stopped trill; ordinary playing position will produce a sound close to a true semitone trill between two adjacent harmonic pitches; *sul ponticello* produces a metallic, trill-like alternation between two very high harmonics, the pitches of which depend on the bow's proximity to the bridge. Like a regular bow stroke played *sul ponticello,* different degrees of proximity to the bridge magnify different harmonics, with the highest harmonics lying closest to the bridge; the adjacent-harmonic trill:



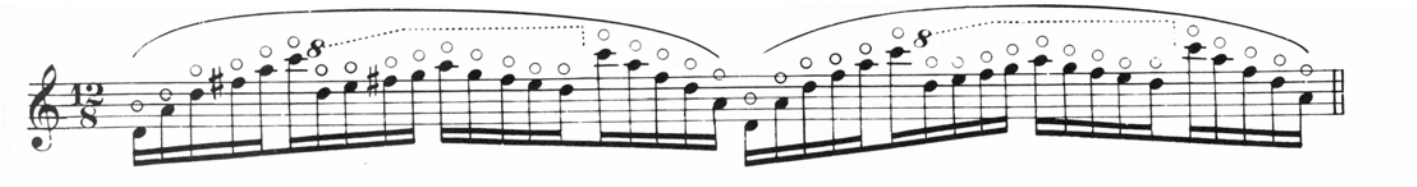
1.10

It is possible to control the bow's position in this way, and thus control the resulting pitches to a degree, but a virtuosic amount of control and agility in this

regard is not impractical. Passages utilizing specific bow contact points will be more effective is color, rather than pitch, is of primary importance.

D. Harmonics & glissandi

There are a few interesting effects that can be achieved by mixing harmonics and glissandi. One common technique, commonly referred to as the "harmonic glissando", is to execute a glissando in the conventional fashion, but with a finger set lightly on the string, as if fingering a harmonic. The result is an arpeggiation of the string's fundamental harmonic series. A number of early twentieth century composers utilized this effect, most famously Stravinsky in the beginning of *The Firebird:*

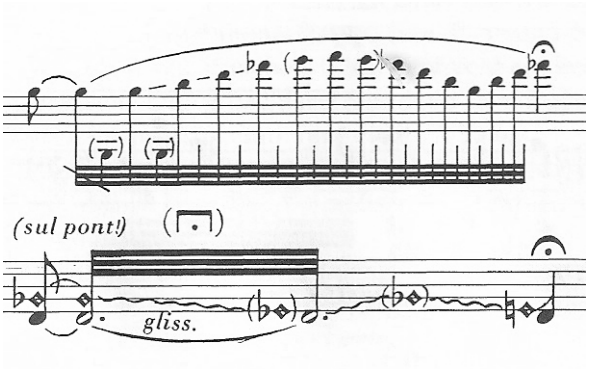


1.11

This older style of notation illustrates the resulting sound. N.B., the individual pitches in this passage are not fingered, they are the result of the glissando, which only produces pitches in the harmonic series. This style of notation has fallen out of favor, and it is now more common to notate the "harmonic glissando" as a conventional glissando, but with the "harmonic" qualification indicated above it.

Artificial harmonics can also be combined with glissandi in a number of ways. By forming and artificial harmonic position and keeping the harmonic-producing interval constant while sliding the left hand along the fingerboard, a smooth glissando analogous to the normal kind is possible, while maintaining the register and timbre of the harmonic.

Also possible is a hybrid of this technique and the glissando, found in another example from *Transpositio ad Infinitum*:



1.12

The execution of this technique is the same as the artificial harmonic, where the "fundamental" stopped pitch is held, while another finger lightly touches the string at a node; the glissando is then achieved by sliding the harmonic finger toward and away from the stopped fundamental, in the process gliding over different nodes and producing different harmonics.

Another frequently used technique is the so-called "seagull" glissando. This technique, famously used by George Crumb in *Vox Balaenae,* is executed by setting an artificial harmonic position in a high register of the fingerboard, and sliding into the lower register without altering the hand shape. This action produces a strange effect which closely resembles the cry of the seagull: the original harmonic pitch slides down a certain distance and then suddenly leaps back up to the original pitch; this process repeats until the hand can not move any further.

More on harmonics

The composer would do well to keep the aforementioned abilities and limitations in mind while writing passages using these harmonics. One precept to keep in mind when writing with these techniques is that all techniques involving harmonics are easier to produce near the bridge, especially those containing trills or tremolo. For examples on the successful implementation of artificial harmonics on the cello, the works of Takemitsu Toru and George Crumb are highly recommended. A good source for guidance and information on these matters Diran Alexanian's classic treatise Complete Cello Technique; this work contains a great amount of highly detailed information on natural and artificial harmonics. Also of particular note is R. Caroline Bosanquet's The Secret Life of Cello Strings, a handbook devoted entirely to the study of harmonics and their theoretical background.

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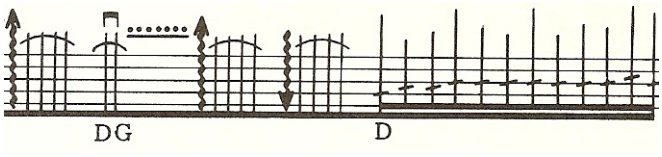
2. Extended bowing techniques

A. Ricochet

Ricochet[2], occasionally called *jeté* [3], indicates that the bow is to be propelled toward the string and allowed to rebound either once, or multiple times. This technique is highly variable, in that it can be performed in the context of dynamics from the very soft, to the moderately loud. The speed and number of resulting articulations can also be controlled, though specification in these parameters should be judicious.

B. Bowing beyond the bridge

The technique of bowing beyond the bridge, on the part of the string lying between the bridge and the tailpiece, produces a solid, tense sound that becomes shriek-like at higher dynamics. The pitch of the four strings is essentially fixed, and depends on the brand string and its material, as well as its weight and level of tension. This area is capable of any rhythmic articulation, and has a relatively wide dynamic range. For a theatric effect, one can "finger" this part of the string with the left hand, but not much pitch difference can be expected:

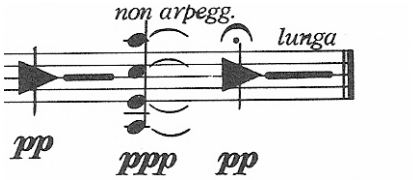


2.1

[2] Fr., "rebound". *Webster's New World French Dictionary*, s.v. *"ricochet"*.
[3] Fr., "thrown". *Ibid.,* s.v. *"jeter"*.

C. Bowing the tailpiece

As strange as it may seem, even the tailpiece (the structure at the bottom of the instrument that holds one end of the string) can be bowed. A soft, hum-like pitch will emerge if strong and steady bow pressure is applied to certain areas; like the previous technique, the pitch is contingent upon a number of physical details. Rhythmic articulation is not possible with this technique, and its dynamic range is very small; it is an effect best used for sustained passages:



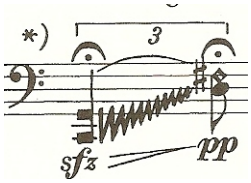
2.2

D. Two-handed bowing

Certain situations may arise (usually those involving an extreme need for bow pressure or speed) during which a two-handed grip of the bow may be advantageous; for example, when an instantaneous, aggressive attack is needed while playing the tailpiece, or constant, loud pressure is required for scratch tones (discussed later in this chapter); or when the composer desires a very loud tone across multiple strings while bowing beyond the bridge. This technique has very little codification, and its execution is less than subtle; the bow is simply held at the frog by the right hand and at the tip by the left hand. This configuration makes it impossible to stop any pitches on the fingerboard, as well as limiting the amount of rhythmic sophistication that is possible. For an extensive exploration of this technique, see Helmut Lachenmann's *Pression* for solo cello.

E. Bowing on string wrapping

Bowing directly on a string's wrapping with produce a harsh, jarring sound. Limited rhythm patterns are possible with this technique, but it is best used for slow, sustained passages, as it does not have an especially clear articulation. A visual description can be found in *Transpositio:*



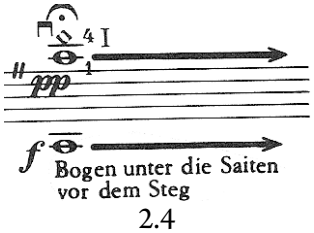
2.3

F. " Ugubu" (point-tap) effect

This rarely-used effect involves using the very point of the bow to tap a string where it crosses the bridge; this results in a bright, harmonic-rich and percussive sound. Note that this technique cannot be executed very quickly, as the bow must be dropped from a significant height to achieve the effect audibly.

G. Bowing underneath the bridge

The capabilities of bowing underneath the bridge are twofold; in addition to making a striking visual and theatrical display, this technique allows for otherwise unreachable pitch and color combinations. It is only by using this technique that playing notes simultaneously on the A and C string becomes possible:



2.4

In the execution of this technique, the bow grip is turned completely upside-down; a certain amount of time is required to make this switch efficiently. Also, the

composer can expect a decrease in the amount of control and sophistication of the bow while in this upside-down position.

Some composers, such as Vinko Globokar, György Kurtág, and Frances-Marie Uitti utilize this technique extensively in their compositions for two-bows.

H. Scratch-tone

This technique, championed by Kaija Saariaho, is realized by using heavy bow pressure near the bridge, resulting in a noisy, grinding tone that sounds simultaneously bright and dark. Also, this technique completely distorts pitch rendering it almost unidentifiable as the written pitch. Due to the amount of physical effort and control needed to achieve this effect, it is difficult to sustain for very long periods of time; it is best utilized in medium-length passages, and is more comfortable if taken under a single bow.

A common method of notating this sound is with the shape of a widening black triangle, with its thickness equal to the intended degree of distortion:

2.5

I. Two-bow technique

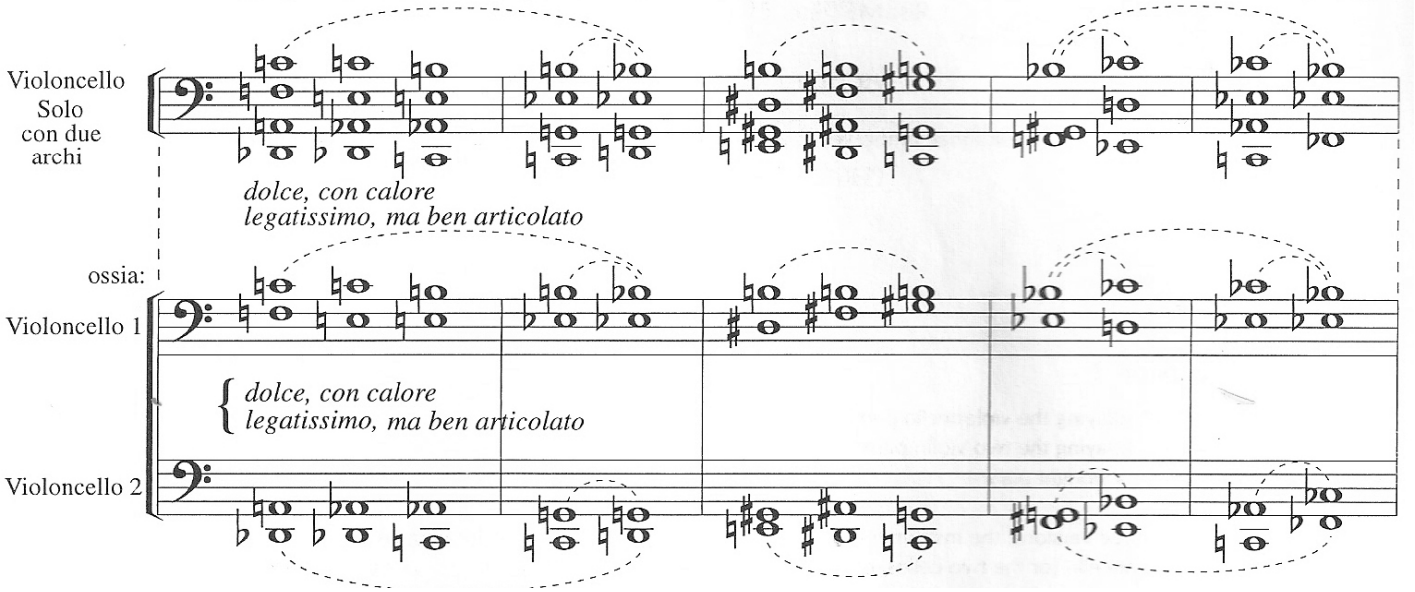
The two-bow technique is an impressive innovation by American cellist Frances-Marie Uitti, involving the simultaneous use of two bows in the right hand. This technique effectively allows the cello to become a chordal and polyphonic instrument. Different articulations are possible with each bow, and any combination of the strings can be played at any time.

This particular technique is very obscure outside of a small number of circles, and exists in the repertory of exceedingly few cellists. The composer ought to bear this in mind when composing with this technique. For more information on this topic, one should consult the essays of Frances-Marie Uitti, and examine the works commissioned for her, including the pieces of György Kurtág (ex . 2.5 Jonathan Harvey, Giacinto Scelsi, and Vinko Globokar.

LIGATURA–MESSAGE TO FRANCES-MARIE

(The answered unanswered question)

Kurtág György
Op. 31/b



3. Col legno

A. Col legno battuto

This technique, from Italian meaning "struck with wood" refers to the technique of tapping the strings with the stick of the bow rather than with the hair. The resulting sound is a thin, percussive click with only a slightly detectible pitch. This technique can articulate quick rhythmic figures with somewhat less precision than the bow-hair, but is limited to a maximum dynamic of about *forte*. *Col legno battuto* may be combined with *ricochet,* and can be executed at any place along the string's length.

B. Col legno arco (tratto)

Col legno arco, sometimes indicated as *col legno tratto,* refers to the combination of *arco* and *col legno*; i.e., the bow-stick is either rotated to such a degree that the wood touches the string at the same time as the hair, or that the wood is used exclusively rather than the hair.

This technique can produce a raspy, diffuse sound, or a pale, hollow and wooden sound, respective to the techniques mentioned above. The combination effect is more noticeable at soft dynamics and slow tempi, but can be effective in louder dynamics, and especially in crescendi.

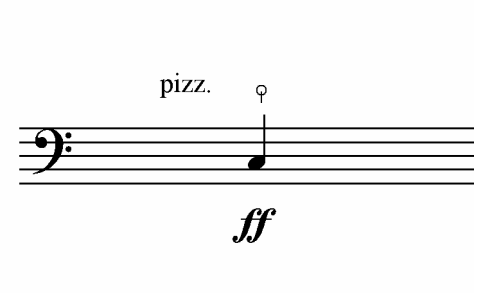
4. Pizzicato

A. "Bartok" or "Snap" pizzicato

The "Bartok" pizzicato, named after the first use of the effect in Bartok's *Divertimento for String Orchestra* (though use of the technique in Mahler's 7th Symphony predates Bartok's by 34 years), is executed by one of two means: either by plucking in the normal fashion, but with a vertically-augmented angle, or by holding the string between the thumb and first finger, pulling it straight up, and releasing it.

In both cases, the string's tension causes it to snap violently against the fingerboard upon release creating a jarring and very percussive effect. Depending upon the method of execution, the pitch may be preserved (A) or almost totally eliminated (B). This type of pizzicato can only be executed at louder dynamics, because of the string tension necessary to cause a violent rebound against the fingerboard.

The "Bartok" pizzicato is usually notated with this symbol:



4.1

B. Dead pizzicato

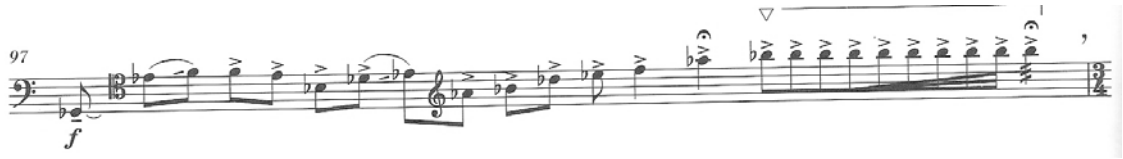
A dead pizzicato is simply a normal pizzicato where the finger of the left hand does not press the string all the way to the fingerboard. The result is an articulate sound with no resonance and no identifiable pitch, resembling a "thud"; the relative register of the pizzicato, however, is audible.

C. Thumb-stopped left-hand pizzicato

The thumb-stopped pizzicato is not so much an effect in itself, but a technique by which other effects are made possible. In this position, the thumb of the left hand stops the string while the first, second, and third fingers create the plucking motion; the thumb is meanwhile able to move, creating an eastern-sounding glissando ornament. The alignment of this position also lends itself to the rapid plucking of two or three note figures; a particularly good example of this type of integration can be found in Crumb's *Vox Balaenae.*

D. Pizzicato tremolo

Pizzicato can be rapidly articulate in the manner of a tremolo in the following ways: first, by using plectrums, such as a guitar pick or credit card, and rapidly alternating up and down strokes (as in this example from Sheng's *Seven Tunes Heard in China*)

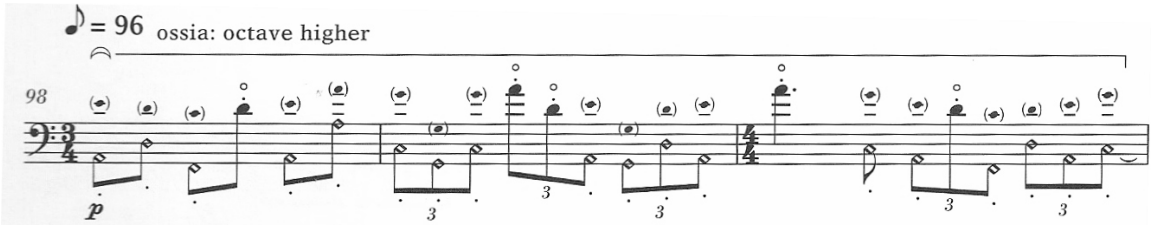


4.2

This type of tremolo is very clear, with each note repetition completely audible; the second method of pizzicato tremolo involves setting the bow down, and using the first, second, and third fingers to alternatively pluck a string. This method (used in the Crumb example) produces a dark, thrumming sound in which the articulation of each note may not be completely audible.

E. Fingernail pizzicato

Fingernail pizzicati are articulated executed by holding the back of the fingernail up to the string, and then making a flicking motion; this type of pizzicato results in a very bright, concentrated sound, somewhat similar to the Chinese *Qin*. This type of pizzicato is especially effective with harmonics, as with this example from *Seven Tunes*:



4.3

The effect of this type of pizzicato is significantly reduced if not performed near the bridge.

F. Pizzicato "quasi chitarra"

Pizzicato *quasi chitarra* or *alla chitarra* (It. *In the manner of a guitar*) refers to the method of strumming the strings with alternating up and down strokes, mimicking the playing style of a guitar. This method allows pizzicato chords to be articulated much more quickly than using only one stroke direction. Some arpeggiation must be expected when writing passages *quasi chitarra*, due to the nature of the strumming motion.

G. Pizzicato beyond the bridge

This technique is the pizzicato analogue to technique 2A, *bowing beyond the bridge.* This type of pizzicato produces a tense sound with little resonance, and sounds the same pitch as when bowed.

5. Percussion

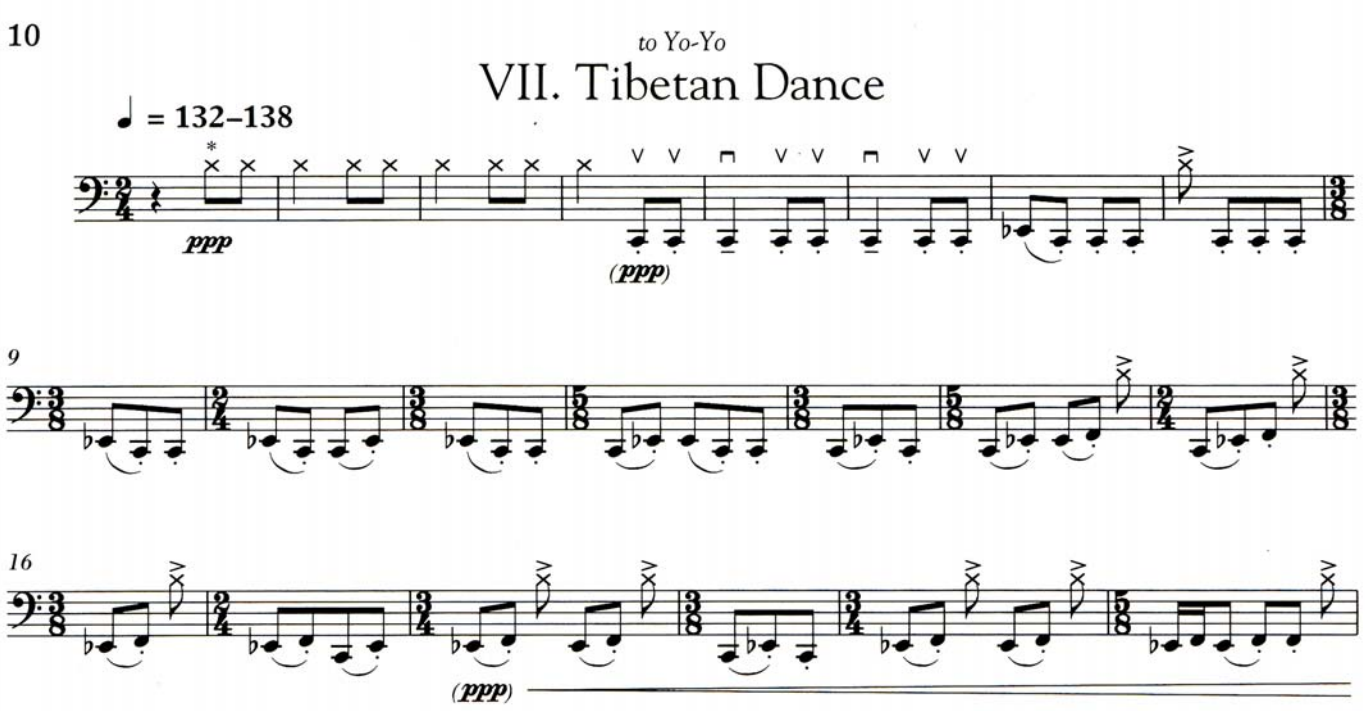
A. Left-hand only, or "Fingerschlag":

The technique (known as *Fingerschlag*[4], left-hand only, *senza arco, senza pizzicato*; involves tapping on the fingerboard directly as if it were a keyboard; this produces two pitches (footnote explaining why), as well as the sound of the string's impact on the fingerboard. The louder this technique is articulated, the more its pitch will be audible; this technique is not capable, however, of producing sounds of loud volume. Either one or two hands can be used for this technique, depending on the desired effect; using two hands, however, will necessitate placing the bow down.

B. Instrument body percussion:

The construction of the cello body makes it a prime environment for percussion effects; utilizing percussive effects (i.e. tapping, rubbing, etc.) the body in different places can produce many different pitch registers, timbres, and durations. In general, the closer a particular region is to the center of the instrument, the deeper and more resonant a sound it will produce when struck, due to the greater depth of the hollow body. The sides of the cello produce a high, articulate sound with little resonance when tapped, while the bridge produces a very dull and round attack with a small degree of string resonance. The tailpiece usually makes a dark and resonant sound, but this depends on the particular construction of the tailpiece in question. In addition, different implement of percussion, i.e. the finger, knuckle, palm, etc., can produce different sounds. Significant excursions into this sound world and its rhythmic and sonic devices include the rhythmic examples, such as last movement of *Seven Tunes, Tibetan Dance*, (example 5.1), and Luciano Berio's *Sequenza XIV*, as well as choreographic examples, such as Lachenmann's *Pression* (example 5.2).

[4] Ger., agglutinative compound from *Finger* (Finger), and *schlag* (strike, or blow): "Finger-strike", or to tap with the finger. *The Oxford-Duden German Dictionary*, 2nd ed., s.vv. "f*inger"*, and *"schlag"*.



5.1

(In this example, "x" noteheads represent tapping the body of the cello)

C. Friction rub:

The friction rub is a technique adapted from percussionists, who use it on the tambourine and occasionally on drum heads. To execute a friction rub, the player presses their fingertip against the body of the instrument and, while maintaining steady pressure, pushes it in a linear path. The instrument will amplify the finger's vibration as it travels across the body, and produce a groan-like sound, the register of which depends on the position of the finger relative to the cello's body as well as the speed of the finger's motion.

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6. Scordatura

Scordatura refers to an alteration of the cello's conventional tuning scheme (i.e. I-A, II-D, III-G, IV-C). This process allows for chords that are impossible to form with the normal tuning, as well as changing the timbre, resonance, and response of the instrument. Adjustments that would make the strings higher will result in a brighter sound, less resonances, and an instant response, while changes that would make a string lower result in a darker sound, longer resonance, and slower response.

The strings each have a particular range of safe and effective tuning possibilities. It is dangerous to request tunings which are too high, as the string may be damaged or snap; if a string is tuned too low, it will become slack and will not respond to the bow. In general, it is best not to require more than a half-step above the intended pitch of the string (e.g. the D-string tuned to E), but a whole-step is sometimes possible on heavier-gauge strings. The extent to which a string can be tuned down is much wider; it is common to tune down an entire whole step, and occasionally even up to a minor third.

For a theatrical effect, the tuning peg can be used while playing to create glissandi, and can even execute trills, as in some works of Alfred Schnittke (albeit somewhat uncoordinated trills).

It is also possible to use *Scordatura* for multiple strings simultaneously, such as in Henri Dutilleux's *Trois Strophes sur le nom Paul Sacher,* (A-D-C#-B-flat), and Crumb's *Vox Balaenae* (A-D#-G-B).

One technique that has gained popularity is the use of different strings to begin with, and then altering those pitches to get an even wider selection of pitches and colors. Notable examples include Giacinto Scelsi's *Suah* (four A strings), Jonathan Harvey's *Three Sketches* (two D strings, also requires two bows), and Richard Barrett's *Dark Ages* (two C strings).

The composer should note that, while it is common to request a change in tuning during a work, it is not feasible to request a change of stringing; if such a configuration is desired, the performer will have to use multiple instruments (such as in Luigi Nono's *Diario Polacca; Composizione no. 2*, which requires four G and four C strings.)

II. Documentation

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