

Some Recorded Thoughts on Recorded Objects

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As early as 1807 a certain Thomas Young described his "sound recorder": a sharp metal stylus attached to a wax-coated, revolving cylinder. A vibrating object held against the stylus would cause it to trace a representation of the waveform onto the wax coating of the cylinder. By 1856 Leon Scott de Martinville had improved this device. His "phonoautograph" picked up acoustical vibrations directly from the air via a horn attached to a diaphragm. But like Young's, the grooves cut into the lampblack cylinder couldn't be made deep or rigid enough to be useful for playback, though he, like others, understood the idea that such grooves could, in principle, be used to "play back" the original sound. Indeed, shortly before Edison announced his phonograph in 1877, Frenchman Charles Cros had developed a method for photoengraving the original grooves onto a metallic cylinder hard enough to direct a playback needle. The recorded object was born.

But despite earlier, successful attempts to package pieces of music -- music boxes, musical clocks, and player pianos -- the new recording devices were initially thought to have their greatest use (and market) in business and science. Though the occasional musical performance exists (there's a famous recording of Brahms playing his Hungarian Dance #1, for example), it wasn't until 1906 that the Victor Company announced its "Victrola" and its famous "Red Seal" label, the first full-blown attempt to market musical performances as recorded objects.

Our ability to affix sounds into physical form and then to reproduce them quickly and easily, has changed the way we listen to and hear those sounds, and the way composers invent and arrange them. Music recordings, then, like music notation, provide more than a way to preserve and recreate performance; they also reflect the way we think about music. Music scores are studied in great detail but recorded objects, unfortunately, are still treated somewhat as curiosities, things for the collector or hobbyist. Little distinction is made, for example, between recorded objects which serve to document live musical performances and those which do not document but which are performances in and of themselves, as is the case with much electronic, computer, and popular music. Such categories can be provocative, since they

are based solely on how we are meant to hear (and mentally process) the recorded object, and whether we are able (or not) to map what we hear on some past event.

Recordings As Documents

To talk about a recording as a document is to make at least one assumption: that the recording is a reasonable audio representation of a sequence of events that took place in real-time. Like a motion picture camera, the recording device captures -- and preserves -- these events for some future (re)viewing. Like a photograph, the sound image is a test of reality, proof that some event did, in fact, occur; a document, of the past and for the ages.¹

It is strange to think of a sequence of sounds as hard, physical evidence. There are, as we know, many ways in which a sequence of sounds can find its way onto a piece of tape and so the recorded object on which those sounds reside must be heard with the same suspicion accorded all evidence. We question the object's authenticity; the line between documentation and illusion, between capturing the raw data of reality and manufacturing them, is a very fine one indeed.

Because the line is so fine, it can be crossed very easily. I once heard of a person who had trouble listening to a 1943 recording of Beethoven's 7th

performed by the Berlin Philharmonic with Furtwängler conducting. Right at the very beginning of the piece one hears a very loud cough, presumably by a member of the audience. It wasn't the cough per se that bothered this person, but the associations it imposed: the concert hall, the stage, the audience, the entire historic moment. Knowing it was Furtwängler, the Berlin Philharmonic, and 1943, the performance mattered less to him at that moment than its time and place, namely the Third Reich; it followed, for him, that the cougher must have been a highly regarded Nazi sympathizer; who else would have had a seat so close to the orchestra his cough was picked up by the microphone?

The point isn't whether the cougher was really a Nazi, but the inherent fascination of the document, the extent to which what we call "authenticity" intrudes into all recordings, whether live or not, even when there is nothing as egregious as a fascist cough. We always know, on some level, that we are hearing into a past. One is able to locate (and associate) a particular recording with the approximate year when it was made -- not just by surface or structural features of the music, or the style of playing, but by the sheer sound of the record, which has changed in direct relation to developments in recording technology.²

The late pianist Glenn Gould wrote eloquently about what these technological developments would mean for the concert performer and was especially critical of those (performers and public alike) who resist comprehending the value of those changes. He bemoaned the fact that "live" performance is still regarded as something sacred and that the value of a recording is thought to be in its ability to document such performances as faithfully as possible. In such cases verisimilitude is measured by the extent to which the recording apparatus can remain neutral and non-intrusive. Record production crews, "determined to provide for the listener the evocation of a concert experience", make sure that "their microphones will in no way amplify, dissect, or intrude upon the occasion being preserved"³; the results are recordings with "distant brass", "all but inaudible timpani" and pianissimo chords "suppressed by an outbreak of bronchitis from the floor".⁴ The recorded document "spurns that elusive time-transcending objective which is always within the realization of recorded music."⁵

We can, however, think of recordings as being more than just sound documents of past events; because a recording sounds in the present tense, we also think of it as representing the here and now. We know that recording and event are different and yet, because the event can only happen once but the recording can be

played back again and again, the recording seems invested with some kind of authority, something we can go back to, to consult, verify, or analyze.

Pseudo-Documents

Perfect Performances

To the ear unfamiliar with the recording process and the many ways in which recorded objects can be made, a recording of an event is, by definition, a document of that event -- a performance -- which occurred at a specific time and place. Let's say that somewhere, at this very moment, a performance of the first eight measures of Schoenberg's Third String Quartet is just beginning. Anyone familiar with the piece will know what these measures are going to sound like; to be sure, one has certain, rather precise expectations about what sorts of things will happen and when-- even though no one knows what this performance of the quartet will sound like. At the crudest level, one will expect to hear two violins, a viola and cello, no more, less, or different. Further, one will expect these instruments to play specified pitches in a certain order, no more, less, or different. In fact, one could, theoretically, be a hundred miles away and, with score in hand, begin an imaginary performance in one's head which runs concurrently, and perfectly in synch, with the live performance.

Now let's say the violist played a D natural instead of a D# in measure 4, the first violinist's entrance in m. 5 was a little too aggressive, more mezzoforte than piano and the cellist, who otherwise entered with a beautiful tone in m. 8, should have played the E# - F# legato to m. 9 on one bow. But say the second violinist played those same measures the best we have ever heard.

A recording of the performance will serve up those same measures exactly as rendered, time and time again. And that is precisely what makes subsequent playings of this recording different from subsequent performances. It's important to realize that the small blemishes easily overlooked (if noticed at all) during an otherwise perfectly acceptable (even knockout) performance in real-time can, during recording-time, appear deafeningly loud.⁶ It also shows that as composers, instrumentalists, and listeners (but especially as composers), we make some cognitive difference between what we hear "as Now advances"⁷ (and so never heard again) and what we commit to tape; it's as if we wished the tape could be eloquent ("definitive") enough to speak for all and any possible future performances -- as if, in fact, it made them unnecessary.

The fact that a tape can be rewound and played again means, of course, that it can also be rewound and recorded again. Measure Z can be recorded on Monday,

measure Y on Tuesday, measure X on Wednesday, and all three spliced together on Thursday. To do so, however, is to breach 'document mode', to fabricate a reality/chronology that didn't exist. The recording process imposes its own time on the recorded object, one having very little to do with the external, real-time of performance, or the internal musical-time of the composition.

Take the same four instrumentalists, playing the same eight measures, but now, instead of restricted to a single, "all or nothing" concert performance (and recorded document thereof) imagine them having an unlimited amount of time, and takes, from which to construct, from any number of performances (and partial performances), a single "best performance" which would have been unlikely, maybe impossible, in any single real-time performance. The violist can record m. 4 again -- or as many times as necessary -- on a separate piece of tape, which can be spliced in at the proper place later. Or, because she is the only one playing in m. 4, she can record over the bad passage -- again as many times as needed -- until she gets it right. What's important to notice is that she can do this at any time, independent of the other three players. But it's a different story at m.5, where the microphone is picking up the work of both violinists and can not distinguish between them. The

first violin's entrance was awkward, to be sure, but the second violinist played his part perfectly. There is no way we can give the first violin another chance without forcing the second violin to take one also. And what if, on this next take, the first violin corrects her entrance but the second violin's performance is inferior to his last? More than likely, another take will be called for, and maybe another after that, until either both have given their "best" performance, or a compromise is reached. And at m. 9 it becomes more complicated still; with three parts involved the chances for perfection decrease, as, of course, the necessity for compromise increases.⁸

Virtually every recording which is not a bona fide document of some live performance is tampered with in some way or another. ("It's cooked" was an expression used by my college piano teacher, sans Levi-Strauss.) Glenn Gould tells about his recording of the A minor fugue from The Well Tempered Clavier: one take, of a "solemn, rather pompous" character, was deemed suitable for the opening exposition and concluding statement, while another, of a more "effervescent" nature, was used for the episodic variations of the middle.⁹ Harder to imagine, perhaps, is the recording of "House of Blue Lights" by the rock group "Commander Cody and the Lost

Planet Airmen". The group's producer, finding none of keyboardist George Frayne's twelve takes to be satisfactory, and not confident that a thirteenth would be any better, hired studio pianist Roger Kellaway to "dub over" Frayne's part. Kellaway himself had some difficulty in "copying" Frayne's part, so much so that he recorded the left and right hand parts on two separate tracks. Frayne, first miffed at having been replaced and now feeling vindicated, overdubbed his right hand part over Kellaway's. The result is a recording in which the piano part features the left hand of one man and the right hand of another.¹⁰

The recording studio is a place for fixing sound onto a medium that can be held in one's hands, to be cut, copied, pasted, manipulated, saved like a precious manuscript or discarded like scrap paper. To the composer a piano or a string quartet are, on one level, what the bows, strings, and keys are to the instrumentalists on another -- the means by which sound is made. This adds an additional step to the process of bringing music from paper to sound, from mind to ear (to mind). In the past -- that is, when the score was the closest one could get to a perfect embodiment of the music -- the instrumentalist was the final arbiter, the official voice of the absent composer. No matter how closely composer and instrumentalist had collaborated, no

matter how generous the accolades with which a composer endorsed his or her favorite player(s) (or how bitter the denunciations), the music issued forth onto the "soundscroll"¹¹ for that fleeting moment only by dint of someone's fingers stopping strings, covering holes, pressing keys, pushing valves, or delicately balancing wood. But once in the studio, the violin, flute, bassoon, trumpet, or timpani cease to be the voices which speak to us directly. They become conduits, an intermediate stage in a larger (and longer) process; all will wind up (of those that wind up at all) in the loudspeaker.

When we think of a performing ensemble we think of n number of individuals in n number of locations. And having some degree of musical sophistication, we are aware of the complicated process by which those instruments must be patiently coaxed and gently coerced into an ensemble. There is, then, a history to any one performance which is a function of the unique histories of each of its members. What happens, then, to these separate histories, these identities, when, on a recording, via a loudspeaker, those people and their instruments are, in fact, at the same place at the same time? There are no faces behind the loudspeaker, no unique points of view. The recording masks these

histories -- these personal identities -- with the single, neutral presence of the loudspeaker.

Impossible Performances

A number of years ago, there was a television special honoring Stevie Wonder. I recall in particular one sketch involving an "interview" with Beethoven, played by Peter Ustinov dressed in frock coat and top hat. "Ah, Mr. Beethoven," the interviewer asked, "you write out all the parts yourself now, don't you?" "Jawohl", answered Ustinov/Beethoven, "all uff zem." "But you don't play them all yourself, do you?" "Nein, nein." "Well that's too bad," the interviewer said, and went on about how unless Beethoven had played all the parts himself he wasn't really in the same league as Stevie Wonder. What I found striking was not the meaningless comparison of Stevie Wonder and Beethoven, but the almost total ingenuousness with which record-making could be compared to score-making.

Stevie Wonder, to take this one example, had recorded some music where he plays all the instruments himself; that's no small accomplishment, especially since he plays them well. But notice that our "interviewer" is more impressed by that fact than he is by another more incomprehensible one: when listening to Stevie Wonder

playing all those instruments at once on that record, he is listening to the impossible. And in doing so, he has removed himself from any domain where he can imagine a live performance taking place.

This is a different kind of impossibility than hearing a recording of a performance of Beethoven's Seventh in one's living room. The literal or suggested presence of a score, both in the recording studio and in the living room, constantly raises questions of interpretation and compromise. Because the issue of authenticity is always on the surface we are always allowed to imagine a real-time performance. We know that in making a recording of Beethoven's Seventh passages will be recorded and rerecorded, in no particular order; more precisely, in an order dependent more on the exigencies of the recording process than on the internal musical logic of the composition.¹² The final result will be an assemblage of those passages, pieced together in the order Beethoven wrote them. When we play the recording, we should never know it is not a document of a real-time orchestral performance; after all, that's the way the piece was meant to be heard. The recording does not, in other words, violate Beethoven's score. Our experience of listening to the recording includes our being able to imagine being present at its performance -- even though no such performance existed.

In Stevie Wonder's case, like that of all music which is not score-dependent, the record is the only evidence of the music's existence, its final (and only) authority. To the extent that the recording is a superior means of preservation than notation, it makes the score obsolete; to the extent that the recording is its own generator of future performances, it makes the score irrelevant, and after the fact.¹³

We may not be able to imagine Stevie Wonder playing four instruments at the same time, but we can imagine him playing each instrument separately (we can imagine the record being made). In that sense his recording, like the Beethoven recording, imitates document mode. We've heard Wonder's ensemble of instruments before (bass, drums, keyboard, guitar, brass) and have little difficulty imagining them now. His recording, then, is a pseudo-document, a notch more abstract than the Beethoven recording. We are still able to suspend disbelief and find a context for his performance -- that is, we can pretend it happened in the only way music ever could happen before the advent of recording machines -- in real time and in person.

Suffice it to say that the distinctions upon which such pseudo-documents are based often overlap; some "perfect" performances are also "impossible" (the right hand of one man playing, the left hand of another), while

others are not (Gould's A-minor Invention). Each, however, can be imagined in a performance. Regardless of the degree of "perfection" or "impossibility" there still exists some tether with the world of the concert hall.

Take the following description of Stokowski recording Khatchaturian's 2nd Symphony:

"(He) sat down at the board with all of those knobs and dials, and started doing the most incredible things in terms of balances. He was practically recomposing Khatchaturian's piece. Mind you, the orchestra had played it as written with all the correct dynamics ... But when we got into the mixing studio -- My Lord -- flutes became twice as loud as brass sections; he was bringing out the viola's inner parts over the melody in the violins and other strange distortions. And yet in that piece, looking at it charitably, he gave the final product a kind of raw, animalistic excitement. He made the music bigger than life."¹⁴

Or, similarly, Prokofiev's own description of his recording for Eisenstein's Alexander Nevsky:

"Since the sound of Teutonic trumpets and horns was no doubt unpleasant to the Russian ear, in order not to miss the dramatic effect, I have insisted that these fanfares be played directly into the microphone. Also, in our orchestras we have very powerful instruments, such as a trombone, and in comparison the more feeble sound of a bassoon. If we place the bassoon right near the microphone and the trombone some twenty meters from it, then we will have a powerful bassoon and in the background a barely audible trombone. This practice can offer a completely 'upside down' means of orchestration, which would have been impossible in compositions for symphonic orchestra."¹⁵

Both Schuller's and Prokofiev's descriptions suggest something which we have only hinted at until now: the recording studio is itself an instrument, one step further removed from the original sound sources yet requiring no less technique and sensitivity in bringing those sounds to life. If, as Jacques Barzun has said, "the moment man ceased to make music with his voice alone the art became machine-ridden," and all instruments are involved in the making of some illusion, then we can see the recording studio as a logical continuation -- an instrument of instruments -- able to fashion constructs otherwise impossible. For the recording studio is "played" too, though not on stage and in real time. But it is played for an audience, an audience who, in the very act of bringing the concert hall to its living room, gladly embraces the illogical and willingly submits to illusion. The illusion might be the perfect performance -- of an ensemble so finely wrought, so keenly balanced, that all minds had to be thinking as one (Beethoven and Schoenberg examples). Or, as in the case with Stevie Wonder, it might be the converse -- the illusion of an ensemble where only one man exists. Stokowski and Prokofiev, on the other hand, combine elements of both -- not just the illusion of a perfect performance by an imaginable ensemble, but the illusion of that ensemble doing the unimagineable.

By and large then, it would appear that recordings which are not themselves documents of real-time events try to sound as if they were. We are allowed -- and encouraged -- to associate the sounds coming out of the loudspeaker with the actual objects and people from which they originated, even if in doing so we mentally (re)construct a performance that never existed. We skip a step, the recording process itself, which for most listeners is, after all, just a mysterious activity occurring at some point between performance and playback.

Abstractions

In the preceding discussion we have been concerned with music we can imagine seeing in concert. We now turn our attention to music synthesized electronically, for which there is no analog in real-time, no performance to speak of, real or imaginary.¹⁶ Boulez's claim that electronic music deprives the audience "of the possibility of associating a sound with a gesture" is, no doubt, founded on that music's removal (and independence) from the concert hall.¹⁷ His is another way of saying that electronic music is incapable of being a document or pseudo-document. It's instructive to ask, then, to what extent document mode is imitable by electronic means and the extent to which any music affords that same

possibility of associating sound with gesture (and how, or if, electronic music is different in that regard).

Musique concrète, for example, succeeded (or failed) not because everyday sounds were documented, but precisely because those sounds were yanked from their original contexts and transformed into musical constructs. The tape recorder thus made "the whole world into a synthesizer."¹⁸ Even in those cases where we can identify a component sound -- a nightingale, breaking glass, or churchbell -- the question is whether, in the context of a musical composition, it makes any sense to do so.

Synthesizers, which are based on analog oscillators, are, in effect, "pitch machines", and give the composer a certain control over the production of individual pitch events. With Milton Babbitt's "Composition for Synthesizer," for example, the pitch events are articulated across a small number of distinct timbral groups and are heard as separate, discrete lines; in no way is it difficult for us to hear the piece as comprised of separate "instruments," and even for us to imagine a person behind each one. Creating the illusion of these instruments also creates a paradox: these instruments can be heard, but not seen or touched. If they can't be seen or touched, then they can't be played. And if they can't be played, then how can they be heard?

The mechanics of getting these sounds onto tape (the gesture) can only be guessed by the listener, even to one well-versed in how electronic music is made. It's too hard for the listener to know, much less imagine, just what the composer did exactly; the whole process of getting music from brain to ear back to brain again is invisible to the listener, mediated by machinery and gadgetry. On the other hand, (and as a part response to Boulez's objection) how much "gesture" could be associated with Monteverdi's tremoli and pizzicati; wasn't part of the delight of hearing these novel musical devices in not knowing how they were made? And what gesture can we associate with, say, Strauss' "flatterzunge" or, more recently, Cage's prepared piano?

"The moment man ceased to make music with his voice alone the art became machine ridden. Orpheus' lyre was a machine, a symphony orchestra is a regular factory for making artificial sounds, and a piano is the most appalling contrivance of levers and wires this side of the steam engine."¹⁹

It's this electronic machinery and gadgetry that frightens many people off, inspiring predictions of music's dehumanization and ultimate demise.²⁰ Yet machinery and gadgetry -- technology, if you will -- has in a very significant sense been intimately bound up with the course of western music, at least since the day when

instruments ceased being mere shadows of vocal lines.²¹ How the invention of valves, slides, keys and pads, pedals, plectra and hammers have affected the music composers have written suggests a chicken or egg situation; did "progress" in theoretical matters, the development of the harmonic language, for example, influence the way our instrumental families developed, or did the instrument maker, part craftsman, part musician, part engineer, determine the ways in which composers would think about, and hence write, their music?²² Even the failures, the "abandoned wrecks along the way" reveal persistent attempts to "use current technology in realizing musical ideas and instincts."²³ One thing is certain: the driving force behind each and every technological advancement was to make a wider range of sound available -- more pitches, greater dynamics, richer timbres -- with easier effort. And that meant greater range could be explored and exploited by instrumentalist and composer alike in the creation of more intense illusions. Technology thus collaborated with the composer in defining the virtuoso as the one who could bring off these illusions. In a sense, then, the history of music technology parallels the history of virtuosity.

The following passage about J.S. Bach by a contemporary, provides both the sense of what human

mastery over such gadgetry can do for the musician (for music), and the excitement it can generate in the listener.

" ... if ... you could see Bach ... either playing our clavier, which is many citharas in one, with all the fingers of both hands, or running over the keys of the instrument of instruments, whose innumerable pipes are brought to life by bellows, with both hands and, at utmost speed, with his feet, producing by himself the most various and at the same time mutually agreeable combinations of sounds in orderly procession. If you could see him, I say, doing what many of your citharoedists and six hundred of your tibia players could not do ... Favorer as I am of antiquity, the accomplishments of our Bach, and of any others that there may be like him, appear to me to effect what not many Orpheuses, nor twenty Arions, could achieve."²⁴

Herr Johann Gesner, Bach's enthusiastic listener, is duly impressed by this other, more famous Johann. Much as our TV host was overwhelmed by Stevie Wonder, Gesner can not quite reconcile what he sees (or imagines) with what he hears. He hears more sound than he can associate with one man; Bach sounds super-human, becomes bigger-than-life, a magician of sorts.

Of course Johann Gesner was one of the lucky ones -- privy, it seems, to a close-up look at the old master at the keyboard. Most of those who heard Bach (or any other organist, for that matter) heard him in a church, where one's attention had, perforce, to be directed elsewhere -- straight ahead, to the altar, or pulpit, where the real action was supposed to be taking place. (The altar was

not a stage -- at least not for musicians.) Bach, and his instrument, were kept out of sight, so the average music-lover/parishioner had no idea how those sounds were made, (which, of course, only enhanced the magic) much as in the Babbitt example above.

A little over a hundred years later Berlioz was to write (in a letter to Liszt):

" You, my dear Liszt, know nothing of such perplexities... You can confidently say, adapting Louis XIV:

'I am the orchestra! I am the chorus and the conductor as well. My piano sings, broods, flashes, thunders. It rivals the keenest bows in swiftness; it has its own brazen harmonies and can conjure on the evening air its veiled enchantment of insubstantial chords and fairy melodies, just as the orchestra can and without all that paraphernalia... I don't require a hundred musicians or even twenty - I don't require any at all. I don't even require any music. A large room with a grand piano in it, and I have a great audience at my command' ... What a dream! A golden dream such as one dreams when one's name is Liszt or Paganini."²⁵

Liszt or Paganini. Even for Berlioz, these names seemed "bigger than life"; these were wizards of their instrument, able to make wood, steel, or gut come to life, and make gadgetry submit to human will.

¹ It's tempting to compare tape recordings to photographs and film; all can be physical manifestations of past events. Film and tape seem particularly analogous --especially when combined into the single piece of celluloid of a motion picture -- replaying in real time, at so many inches per second, visual and sonic events already past. Twenty five years ago acoustic engineers were called before the Warren Commission to analyze a recording inadvertently made during the assassination of President Kennedy. They were asked to verify that certain sounds were gunshots, and if so, what could be determined about their distance and direction from the tape recorder, the assumption being that a recording could be analyzed as data, put under a microscope as it were, and tell us something about the physical world external to itself. Similarly, ten years later, during the Watergate hearings, it came to light that Nixon had taped his conversations in the Oval Office; while many people were outraged, they were also determined to hear each and every reel. When an "eighteen-minute gap" was discovered in one of the more crucial tapes, experts were again called in to determine if the president's secretary could have accidentally erased part of the tape in the way she claimed-- and even if the erased portion could somehow be "restored."

² That one can conclude a record is "old" by hearing the scratchy and slightly tinny surface of a recording raises interesting issues about the way we hear not just the piece and a particular performance of it, but about the way we can literally hear the state of recording technology at the time the recording was made. In other words, one can conceivably date a particular recording by the sound of its surface. Similarly, a disk can often be identified by the sound of its "wear", i.e., the temporal position of pops and scratches. Thus can I identify my recording of Schumann's Symphony #1 played by the Vienna Philharmonic conducted by Leonard Bernstein by the sound of a small scratch which I know precedes measure 50 of the first movement.

³ Tim Page, ed., The Glenn Gould Reader, p. 334. (Reprint of "The Prospects of Recording", High Fidelity, April 1966.)

⁴ Ibid., p. 340.

⁵ Page, op.cit., p. 340.

⁶ Pianist Claudio Arrau has purportedly refused to authorize any recordings of his live performances, having realized that simply the way he plays for a public in a concert hall is antipathetic to the hearing of the same piece, via a loudspeaker, in one's living room.

Similarly, the opera singer in Beineix's film Diva absolutely refuses to be recorded on aesthetic grounds. She brings to mind Walter Benjamin's argument that the mechanical work of art destroys the "aura" of the original. See Walter Benjamin, "The Work of Art in an Age of Mechanical Reproduction," Illuminations, pp. 217-252.

⁷ J.K. Randall, "a Soundscroll.", Perspectives of New Music, Spring-Summer 1975.

⁸ For simplicity, this example presumes a single-track tape recorder. A multi-track recorder would allow each of the four instrumentalists to record their part independently.

⁹ Page, op.cit., p. 340. Later on he fantasizes splicing the development section from the first movement of Beethoven's Fifth, conducted by Klemperer, into a recording of the same piece conducted by Bruno Walter.

¹⁰ Geoffrey Stokes, Starmaking Machinery. Gould alludes to something similar in the aforementioned essay in describing a recording of Tristan where Elisabeth Schwarzkopf appends a missing high C to a passage otherwise featuring Kirsten Flagstad.

¹¹ J.K. Randall, op.cit.

¹² The following paragraph from classical record producer Suvi Raj Grubb's book of memoirs, Music Makers

On Record, (p. 25) is an example of how the recording schedule is driven more by the mundane than the musical:

"Legge had for some time left the setting up and the mechanics of our recordings to me and I was the only person who knew the details of this one -- which singers would be available on which days; who should not be asked to sing anything demanding on such and such a day having sung a strenuous role the previous night several hundred miles away; who liked to arrive at least an hour before a session began to give herself time to warm up; and who would work himself into a frenzy if he arrived more than two minutes before; I even knew on what days it would be that time of the month for a certain singer who would not then like to be asked to sing anything above top C. I had drawn up the recording schedule and plotted the 'stereo production', which had now become an essential element." (recording *Die Zauberflöte*)

¹³ What this means is that future performances (and recordings) by other musicians will be generated by this recording; other interpretations of the same material, no matter how different and appealing, still reference the recording -- that is, an ideal performance -- rather than a score, which is an imagined performance.

¹⁴ Gunther Schuller recalling Stokowski's recording of Khatchaturian's 2nd Symphony (1959). Eisenberg, Evan. The Recording Angel: Explorations in Phonography. p.153.

¹⁵ Prokofiev describing his recording of A. Nevsky. Eisenberg, op. cit., p. 115.

¹⁶ "Electronic music" takes many shapes and sizes. Common to them all, however, is the fact that a loudspeaker of some sort is necessary to bring it into being. In that sense, Stevie Wonder's record is "electronic" (as might a studio recording of Beethoven's Seventh). Throughout this paper the term is meant in its narrower sense: music produced for tape either by "classic" electronic studio methods, or computer generated.

¹⁷ Pierre Boulez, "At The Ends Of Fruitful Lands ..", Die Reihe, v. 1

¹⁸ Paul Lansky, "The Sound of Software-Computer Made Music", *Perspectives in Computing*, v.5 No.3&4

¹⁹ Jacques Barzun, quoted in Herbert Russcol, "Music Since Hiroshima: The Electronic Age Begins," The American Scholar. Volume 39, no. 2 (Autumn 1970) p. 289.

²⁰ In an article about Kasparov's defeat of the most advanced chess computer to date ("Deep Thought," The New York Times Magazine, January 14, 1990), the observation was made that it is not only inevitable that a computer will one day soon defeat the world's best human chess player but that from that day onward machines will always and forever defeat humans. For those who see the computer as an adversary, future musical prospects would probably appear quite dim.

²¹ Those who cite Giovanni Gabrieli as being among the first to write instrumental parts independent and irrespective of vocal lines are in safe company.

²² From a different angle, it's interesting to ask to what extent musical ideas spring from other ideas in the arts. For example, the introduction of explicit dynamic markings in scores (again, Gabrieli's *Pian'e Forte*) can be seen as an attempt to create the illusion of relative distance from the listener. This is directly analagous to the development of perspective and foreshortening in Renaissance drawing.

²³ Paul Lansky, *op.cit.*

²⁴ Johann Matthias Gesner (1738), quoted in The Bach Reader, p. 231,

²⁵ Berlioz, Memoirs, p. 283.