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Shrieks, Flutters, and Vocal Curtains: Electronic Sound/Electronic Music in Hitchcock's *The Birds*

James Wierzbicki



Figure 1. Alfred Hitchcock in a publicity photo for *The Birds* (1963).

The avian sounds that fill Alfred Hitchcock's 1963 *The Birds* (Figure 1) were hardly ignored by the film's first reviewers. In the *New York Times*, Bosley Crowther warned that *The Birds* "is whirring and screeching with deafening uproar" at local theaters.¹ A critic for *Time* magazine called attention to the "shrieking din" of the title sequence and remarked that later "the sound track ... reaches a deafening crescendo of screeching, whistling, chattering, flapping cacophony."² Noting the affective contrast between speech and noise, the reviewer for the *Christian Science Monitor* opined metaphorically that the "interplay of brittle humans and predatory birds is developed as a kind of miasmatic anti-music, aimed at eye and ear."³ The film critic for the *Los Angeles Times* wrote that the bird noise "scratches you like a fingernail across glass."⁴ Perhaps most tellingly, Richard Coe in the *Washington Post* observed that "the story is mercifully without any background music whatever, except for weird electrical sounds by Remi Gassmann and Oskar Sala" (Figure 2).⁵



Figure 2. Composer Oskar Sala in his Berlin studio (ca. 1980).

Coe's remark stands apart from the others, not just because it suggests that audiences of the early 1960s might consider a narrative film without conventional underscore to be something of a relief but also because it recognizes that there might indeed be a kind of "background music" in this particular film's "weird electrical sounds."⁶

The fact that these sounds were specially commissioned was publicized several months before the film opened, and doubtless this contributed to the agenda that Hitchcock had been furthering since the release of his 1960 *Psycho*.⁷ Along with achieving yet another box-office success, with *The Birds* it seems that Hitchcock finally established his reputation as a maker of "artistic" films. But most of the "serious" critics who helped grant Hitchcock this sought-after status focused their attention on the plot of *The Birds*; occasionally they made comparisons with the same-titled play by Aristophanes, but most often they celebrated the film's ominous lack of resolution before embarking on Freud-inspired explorations of bird symbolism and the complex relationships among the female characters. Not until 1978, when Elisabeth Weis published an article titled "The Sound of One Wing Flapping,"⁸ was there a serious study of the film's sonic elements. But even Weis's commentary, like a more recent and equally probing analysis by Australian writer Philip Brophy,⁹ deals with the bird sounds primarily as they relate to the narrative. In the critical literature associated with *The Birds*, the electronically generated sounds have indeed been noticed and remarked upon, but almost always they have been "heard" not as specially constructed sonic objects but simply as replications of various noises that actual birds might make. In the process, they have been "interpreted" only as more or less realistic sound effects.

This idea is supported by a comment from Bernard Herrmann, the composer who was famously associated with Hitchcock from 1955 until 1966 and who in the title credits for *The Birds* is prominently listed as "sound consultant."¹⁰ During a 1971 interview with the journal *Sight and Sound*, Herrmann was asked a direct question: "Wasn't your work on *The Birds* a musical innovation?" To which Herrmann replied,

It wasn't music at all. Remi Gassmann ... devised a form of sound effects. I just worked with him simply on matching it with Hitchcock, but there was no attempt to create a score by electronic means. We developed the noise of birds electronically because it wasn't possible to get a thousand birds to make that sound. I guess you could if you went to Africa and waited for the proper day.¹¹

Vis-à-vis Herrmann's involvement in *The Birds*, Hitchcock--in the interviews that led to François Truffaut's well-known book on the director--states only that he "asked Bernard Herrmann to supervise the whole sound track."¹² The remark is vague, and it gets no clarification in "Mr. Hitchcock's Notes: Background Sounds for *The Birds*," a thick file dated 23 October 1962¹³ that is now included among the Hitchcock Papers at the Margaret Herrick Library in Beverly Hills, California. The file is rich in detail regarding not only the types of electronically generated bird sound that Hitchcock wanted at particular moments in the film but also the emotional/psychological messages he wanted these sounds to convey, but it makes no mention of Herrmann. Likewise rich in detail, albeit of a more technical nature, is the file related to *The Birds* in the Remi Gassmann Papers that since 1982 have been housed at the University of California, Irvine (UC-Irvine).¹⁴ The Gassmann Papers and scattered comments by Gassmann's collaborator Oskar Sala do reveal that Herrmann requested, as the audio mix was nearing completion, that Gassmann and Sala provide Hitchcock's postproduction studio with three extra sounds in particular sonic ranges, on the chance that these might be necessary to augment certain of the film's more dramatic sequences. Beyond that, there is nothing--not in the Bernard Herrmann Archive at the University of California, Santa Barbara, or anyplace else--that explains how Herrmann contributed, as "sound consultant" or otherwise, to *The Birds*.

There is, as noted, Herrmann's ostensibly dismissive statement from 1971 to the effect that the electronic sounds featured in *The Birds* amounted to something that "wasn't music at all." On the other hand, though, there is also, thanks to the legwork that Steven C. Smith did for his biography of Herrmann, a statement from 1984--nine years after Herrmann's death--that suggests that Herrmann genuinely took pride in whatever it was that he did for *The Birds*. Smith quotes Alastair Reid, a director with whom Herrmann worked briefly in the early 1970s.¹⁵ *The Birds* "was the one Hitchcock film [Herrmann] talked about a lot," Reid told Smith. "He regarded himself as one of its prime movers, almost a co-director because of his role in creating the soundtrack."¹⁶

The purpose of this article is not to wonder about the "role in creating the soundtrack" for *The Birds* that may have been taken by the canonically "great" film composer Bernard Herrmann. Rather, the goal here is simply to offer information on the soundtrack's actual creators and the instrument with which they worked, to explain how the electronically generated soundtrack came to be, and to examine in some detail the content and structure of one of the soundtrack's longer segments. The analysis of the sounds that accompany the extended scene near the end of the film, during which birds for the second time attack the protagonists' house, is intended to be only descriptive. Whether this or any other portion of the soundtrack truly constitutes electronic "music"--as opposed to "a form of sound effects"--is something that readers can decide for themselves.

Oskar Sala, Remi Gassmann, and the Trautonium

Perusing the vast amount of writing that has been devoted to *The Birds*, one frequently comes across statements to the effect that the soundtrack involved electronic manipulations of prerecorded natural bird sounds, that Remi Gassmann (whose last name is sometimes misspelled) was a German composer, and that Gassmann was a coinventor (with Oskar Sala) of the instrument on which the film's electronic sounds were produced.

In fact, the film's only natural bird sounds are those heard in the opening scene, when the two main characters engage in dialogue amidst noise in a pet shop; without exception, all of the other bird sounds spring in their entirety from a device called the Trautonium (Figure 3), first exhibited in 1930 and named after its inventor, the German physicist-acoustician Friedrich Trautwein.¹⁷ In fact, Gassmann was an American, born in 1908 in St. Mary's, Kansas, and educated at St. Mary's College, Kansas, and the Eastman School of Music, Rochester, New York, before embarking on a brief period of study, with composition teacher Paul Hindemith, at the Berlin Hochschule für Musik in the early 1930s.¹⁸ And, in fact, Gassmann knew next to nothing about how the Trautonium actually worked. The German-born Sala¹⁹ had been closely involved with Trautwein since the instrument's inception and then, after Trautwein's death in 1956, contributed to the instrument's technical evolution, most significantly in the pioneering of the Mixtur-Trautonium (Figure 4), so called because it could mix more or less standard tones with their subharmonics. In marked contrast, Gassmann's relationship with the Trautonium--at least before the late 1950s--was limited to memories of witnessing prototype demonstrations ca. 1931–32.

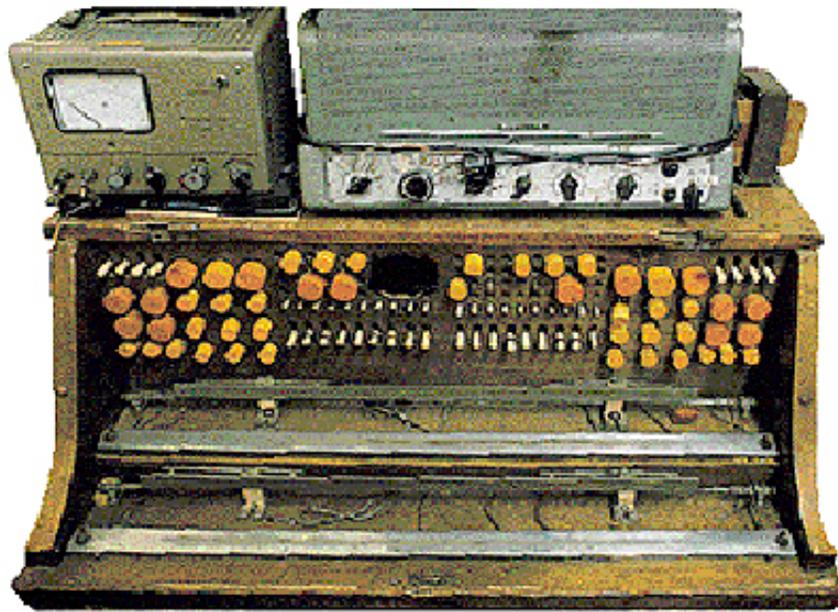


Figure 3. An early version of the Trautonium (ca. 1935).



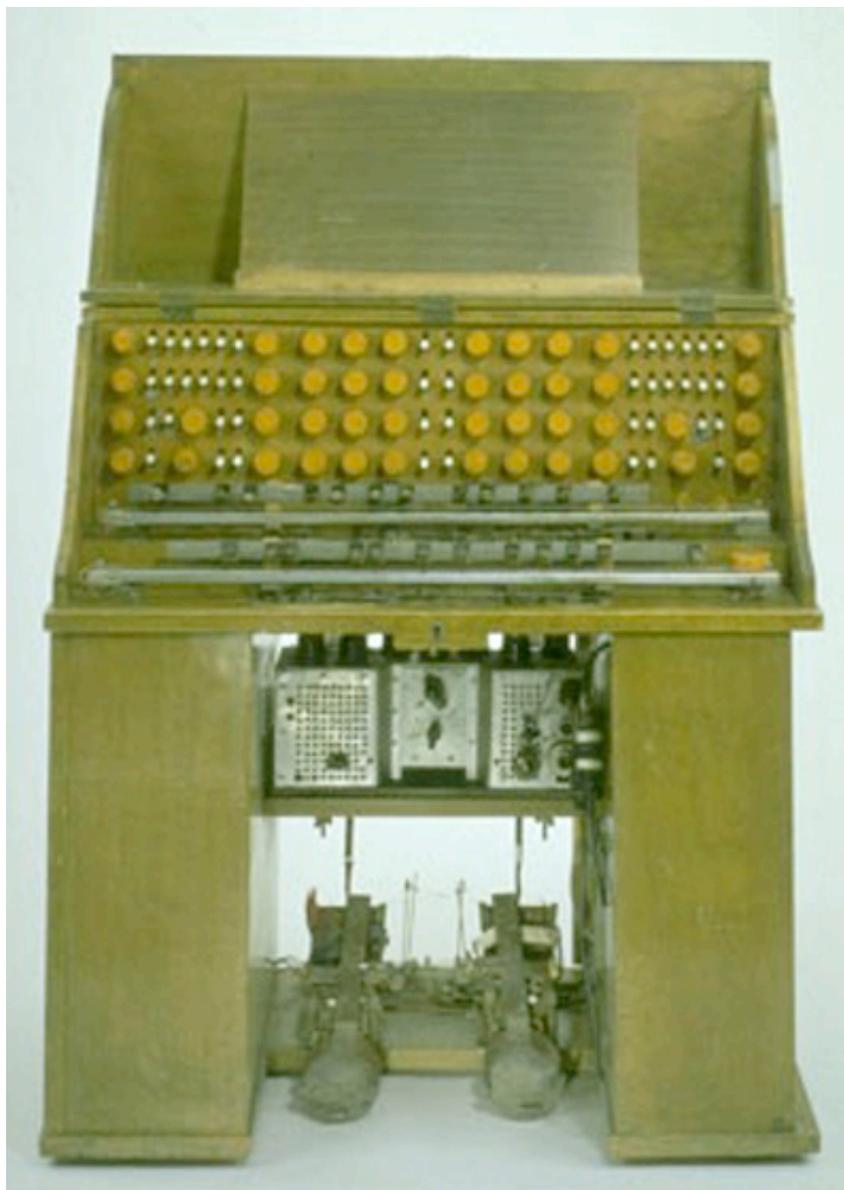


Figure 4. The Mixtur-Trautonium (ca. 1965).

The American-born Gassmann may have been only marginally familiar with the technical aspects of the Trautonium, but by 1959 he was well aware of the instrument's potential both as a vehicle for concert music²⁰ and as a generator of sounds for use in film soundtracks.²¹ In that year he visited Sala at his Berlin studio. An account from Sala has it that during the visit Gassmann hit spontaneously upon the idea for a ballet accompanied by electronic music,²² but the fact that the ballet was premiered in Berlin in May of the next year suggests that right from the start Gassmann had collaboration in mind.

Presented as part of the 1960 Berlin Festival, the ballet (titled *Paeon*, with choreography by Tatjana Gsovsky) was only a modest success, and the reviews suggested that the music, despite the obvious fact that it was created entirely by electronic means, was in both form and content "much more conventional than that of the Cologne studio" operated by Karlheinz Stockhausen.²³ In terms of the immediate future of Gassmann and the Trautonium, however, doubtless far more influential than comments by dance critics was a feature article by an unnamed Associated Press writer that ran--accompanied by a two-column photograph of Sala, Gassmann, and the instrument--in September 1960 in the *Christian Science Monitor* and probably many other American newspapers. The article begins, "Ever heard a flute playing bass notes or a bull fiddle twittering like a canary? You'll hear those and a lot of other sounds if a new instrument called the mixtur-trautonium catches on." A few paragraphs later, it says,

All the sounds are produced electronically. Gassmann has used no regular instruments for his ballet. Nor has he recorded natural sounds and speeded them up or slowed them down, like the composers of what is called "concrete music."

He doesn't need such things.

"Why," he says, "with this instrument you can have whole glissandi of chordal kettledrums."

A kettledrum produces only one note at a time. It has to be retuned before you can get a second note. To play a chord glissando--20 or 30 notes in quick succession--you would need a whole stage full of kettledrums. You would also have to be about 20 feet tall and adept at roller skating.

But, Gassmann asks, why bother? With the mixtur-trautonium the composer not only makes up his own tunes and harmonies, he can invent timbres and resonances never produced by mere wood or metal. He need no longer be a slave to violins and trombones, let alone kettledrums.

The possibilities--enough to drive any composer wild, Gassmann says--are multiplied by the use of the tape recorder. A tape with music on it can be overlaid with more music, as many as 10 or 11 times. The only limits are the tape and the human ear.²⁴

Perhaps bolstered by this publicity, Gassmann managed to have his score accepted in its entirety by the New York City Ballet for a new work titled *Electronics* (choreographed by George Balanchine, and featuring in its cast such NYCB stars as Diana Adams, Violette Verdy, Jacques d'Amboise, and Edward Villella) that premiered in New York on 22 March 1961 and ran through 9 April. At least one reviewer remarked, disparagingly, that Gassmann's effort "does not sound so very different from all the other electronic tapes which modern dancers have been using ever since musique concrete came into vogue."²⁵ But others commented favorably on the "intensity of nerve wracking sound" and declared that not only was this "the most ambitious and merciless electronic 'score' to date" but also that with *Electronics* "the first major space-age ballet arrived."²⁶ The *New York Times*'s John Martin, then probably the most influential dance critic in the United States, observed in his overnight review that Gassmann's score, in contrast to many other electronic scores, "is actually music."²⁷

Doubtless much more significant, two weeks later Martin revisited *Electronics* primarily, it seems, for the purpose of commenting on the score and its implications. After commending Gassmann for creating genuinely expressive electronic music that to his ears sounded no more "mechanical" than music produced by violins or pianos, Martin wrote,

The advantage of the electronic medium lies ... in its limitless range and variety of sounds, volumes, intensities, speeds, harmonics, manipulations of new areas. We would do well to open our minds to its possibilities, for here it is and we are in for it. There is no use trying to laugh it aside. The new chemistry that has come forth with materials created not by the shearing and spinning, the digging and delving, of "nature," but by processes of synthesizing; the new mathematics, nuclear fission, interplanetary exploration, extra-universal concepts, are facts. They have nudged us little by little and unawares into a set of new spatial-temporal dimensions, a set of new universal substantives.

It is, as it were, the eighth day of Creation, and it cannot be ignored out of existence, by the artist any more than by the scientist. The artist must inevitably learn how to be used to forces thus opened up to him; how to be inspired, perhaps even frightened, by them. It is a question of man adjusting to a new environment in the interest of survival, and also of increase, which are the two basic animal drives. To the artist, whose field lies in the intangible perceptions of reality that we call esthetics, belongs as always the vision of reconciliation.²⁸

Letters, Contracts, and Deadlines

As Sala told the story, it was during performances of *Electronics* in New York City in March--April 1961 that Gassmann learned of the difficulties Hitchcock was having in finding a "sonic solution" for his next film.²⁹ But Sala had the chronology wrong: that Hitchcock's next film would be an adaptation of Daphne du Maurier's short story "The Birds"³⁰ was not announced until October,³¹ and the first draft of the screenplay was not finished until a month later.³² Still, Martin's essay--boldly declaring that technological innovation cannot simply "be ignored out of existence"--must have caught the attention of artistic persons who, in the early 1960s, aspired as Hitchcock did to cutting-edge status.³³ And, surely, forward-thinking West Coast artists would have been aware that Gassmann was to appear at UCLA for a lecture-demonstration on his music for *Electronics*, which was slated for three performances at Los Angeles's Greek Theater in the second week of August 1961.³⁴

There is no evidence to suggest that Hitchcock or anyone in his circle attended Gassmann's lecture-demonstration or the Los Angeles performances during which Gassmann's Trautonium-generated ballet score was played. What is known for sure is that Gassmann, somehow having gotten word that the director was seeking unusual sonorities for his in-progress film, early in 1962 wrote to Hitchcock and made a bold pitch. Mailed from 470 Panorama Drive, Laguna Beach, California (apparently a Hyatt hotel), Gassmann's letter, dated 18 April 1962, informs the director that "familiar sounds--from common noises to music to esoteric effects--as well as an almost limitless supply of completely unfamiliar sounds, can now be produced, controlled, and utilized for film purposes. The result is much like a new dimension in film productions."³⁵ Significantly, Gassmann's letter makes clear that the "almost limitless supply of completely unfamiliar sounds" is no mere fantasy. Such sounds in fact *are* being produced, Gassmann writes, on an instrument located in Berlin.

This letter, and whatever undocumented telephone or face-to-face campaigning Gassmann might have done, must have impressed Hitchcock, for three weeks later (9 May 1962) the Hitchcock office sent a contract to Gassmann's attention not in California but at the Oskar Sala Sound Studios, Leistikowstrasse 5, Berlin, Charlottenburg, Germany. The contract begins,

The undersigned is producing a theatrical motion picture now entitled "THE BIRDS," using the Studio facilities of REVUE STUDIOS, at Universal City, California. You have advised us that you own a certain electronic sound machine, which machine is located in West Berlin, Germany, and which machine is capable of producing sound effects of a type and kind which would be suitable for the incorporation into the sound track of said motion picture.³⁶

Along with an indication that Gassmann and Sala were to be paid \$3,000 if they "promptly and satisfactorily complete all [their] obligations," the most salient of the contract's eleven points are the first three:

1. You hereby acknowledge that we have handed you a script for said motion picture and 750 feet of 35mm action track film, which is a sequence or sequences from said motion picture.
2. You hereby agree to create a separate sound track made up of sound effects and various sounds synchronized with the action of said 750 feet of film. Said sound track shall be composed of the type of sound and sound effects which your representative has previously discussed with Mr. Alfred Hitchcock.
3. You hereby agree to return and deliver to us, at Universal City, California, said 750 feet of action track and deliver to us the sound track you are to produce hereunder, not later than June 15, 1962...³⁷

The 750-foot reel that was sent to Gassmann and Sala came from the end of the film and contained the scene in which birds mount their second attack on the Brenner house (at four minutes and thirty-two seconds, the longest of the film's seven bird attacks) and, albeit in visually incomplete form, the scene in which birds almost kill the main female character (Melanie Daniels, played by Tippi Hedren) in the house's attic.³⁸ Although the contract specified that the entire script was to be delivered to the Berlin studio, Sala recalled that Gassmann presented him only with the 750-foot reel and no points of reference as to what took place before or after the depicted scene.³⁹ Thus, Sala wrote, he had no choice but to "play directly" to the shocking, yet arguably realistic, filmic images.⁴⁰

Apparently the sounds that Sala and Gassmann concocted for the attack on the house and the attack on Melanie pleased Hitchcock, for on 26 October 1962 the Hitchcock office sent another contract to Berlin. This one referred to the sounds fitted to the 750-foot reel as "the sample"; it stated that a copy of the *entire* film would forthwith be sent to Berlin,⁴¹ and it specified that the "new sound track" needed to be delivered between 3 and 8 December.⁴²

Gassmann, at least, anticipated that there would be trouble in meeting this deadline, and he worried that his and Sala's work would not be finished in time for an anticipated visit to Berlin by Hitchcock.

On 14 November 1962 Gassmann, writing on stationery from the Berlin Hilton, informed Hitchcock that he and Sala had still not received the reels containing "the big scenes for electronic sound treatment: the title, the children's party, the attack of the swifts, the crow sequence at school; the attack on Melanie in the attack; the final sequence."⁴³ Gassmann indicated that he and Sala did have reels 10 and 13, which contained the attack on the town and the attic attack, but he claimed that these "are still too indefinite for exact synchronization."⁴⁴ In any case, he wrote, "since we have not yet received the important, and time-consuming, sequences mentioned above--which certainly represent the main electronic work still to be done--it would appear inadvisable for us to suggest being fully prepared for your arrival in Berlin during the first week of December."⁴⁵

On a more positive note, Gassmann informed Hitchcock that "the general attack of the birds on the cottage, which

was prepared last summer (Reel 12), has now been completely re-worked, and I hope you will find its effectiveness improved. The faults of mixing, indicated in your notes on sound, have of course been corrected."⁴⁶ He added that "at present [he is] working on the scene of Melanie's death."⁴⁷

Realizing his mistake, the next day Gassmann sent another letter in which he stated that, of course, he meant "the scene of Annie's death."⁴⁸ Annie Hayworth (played by Suzanne Pleshette) is the town's schoolteacher and evidently a former love of the film's main male character, Mitch Brenner (played by Robert Taylor). The final version of the film has no scene that features Annie's death; rather, it contains a scene in which Annie's already dead body, outside her house, following the attack of the crows on the schoolchildren, is discovered by Melanie and Mitch. Yet Gassmann's letter suggests that he was, indeed, scoring a death scene. After apologizing for his "typing error," he writes,

In any case, the scene in question has gained, I believe, by a very economical use of crow mutterings before and after the actual death scene, which remains silent, except for a murderous crow cry from the roof to justify Mitch's wanting to throw a stone. It will be very easy to take out anything you may find inappropriate, or to put in anything that may be missing.⁴⁹

Responding immediately to the letter in which Gassmann pleaded that he had still not received crucial film reels, Hitchcock's personal assistant Peggy Robertson on 16 November 1962 wrote to Gassmann to assure him that reels 4, 8, and 14, along with a reel containing the title sequence, would be shipped within the next week or so. But most of her letter rings with a tone that seems alternately dismissive and harsh:

Regarding Reel 10--the attack on the Tides Restaurant (which includes the Telephone Booth) and Reel 13--the attack on Melanie in the Attic--you now have all the material which will be available to you and, therefore, I suggest that you proceed with these reels with the utmost dispatch. In the Tides sequence the air is full of birds attacking (they also attack the telephone booth) and in the attic scene in Reel 13 the room is full of birds attacking Melanie.

We were rather disappointed in your letter concerning the delay in your work, as we had hoped it was progressing in accordance with the last two conversations you had with Mr. Hitchcock and Mr. Tomasini, when you understood that all the special effects could not be made available to you, and that you would go ahead with the material that is being sent to and would be ready for Mr. Hitchcock's arrival in December. As you know, the action is mainly that of attacking birds. In addition, Mr. Tomasini is furnishing you with a detailed description of the final shot in the picture. Therefore, please do not look for any further special effects shots, but use your imagination in the sequence of the attacking birds as you discussed with Mr. Hitchcock.⁵⁰

Gassmann, perhaps fearing that his stock with Hitchcock was in danger of losing value, answered with a letter dated 19 November 1962:

There is perhaps some misunderstanding:

Please be so kind and inform Mr. Hitchcock that there has been no delay whatsoever at this end. All reels sent to Berlin have already been prepared for him.

My letter of November 14 referred to the fact that reels 1, 4, 6, 8, and 14 have not been received; that they represent more than half of the electronic sound track to be executed; and that in view of these circumstances, it would only be fair to Mr. Hitchcock to anticipate a delay.

Regardless of deadlines proposed earlier, we cannot execute material we do not have. We shall of course continue to work with the greatest dispatch; but certainly a reasonable time must be considered for the proper execution of more than half of the total material.⁵¹

Whatever misunderstanding existed must have been cleared up quickly, for in another letter dated the same day Gassmann, referring to a cable communication, politely thanks Robertson for her authorization "to proceed with the transfers as directed by Mr. Tomasini."⁵² Most of this second letter from 19 November deals with such technical and legal matters as the format of the soundtrack tapes, their mode of delivery, and the provenance of the master tapes. In light of the anticipated early-December Hitchcock visit that Gassmann had referred to just five days earlier, however, the letter's penultimate paragraph is puzzling. It states, "According to my present information, Mr. Hitchcock is leaving for Berlin *this afternoon* and Mr. Tomasini, *tomorrow morning*."⁵³

In this case, too, misunderstandings seem to have been cleared up soon enough by cablegrams. The next letter

in the archive at UC-Irvine is dated 28 November 1962, and in it Robertson informs Gassmann quite specifically of her colleagues' travel plans. Tomasini, she tells Gassmann, will arrive in Berlin the morning of 4 December: "We have already arranged for a car to meet him at Tempelhoff Airport and take him to the Berlin Hilton Hotel, where we have made reservations for him. He will then come out to your studio."⁵⁴ Hitchcock, Robertson tells Gassmann, will arrive in Berlin eleven days later. Significantly--because no mention of it had been made in any earlier correspondence--Robertson informs Gassmann that Hitchcock's traveling companion will be Bernard Herrmann.

Precisely when Hitchcock decided to bring Herrmann into the process is unclear; while throughout his November 1962 correspondence Gassmann alludes to impending visits to Berlin by Hitchcock and Tomasini, he never mentions a visit by Herrmann. In any case, although Herrmann's involvement in the project was perhaps something of a surprise to Gassmann, once a decision had been made it was hardly kept secret. On 14 December 1962 the *Los Angeles Times* reported,

Alfred Hitchcock will be making "The Birds," already offbeat enough, still more so. It will have no music "as such" but instead, electronic sound. This will be supplied by Remi Gassman [*sic*] and Oskar Sala in Berlin, to which city Hitchcock will fly today. He will be accompanied by Bernard Herrmann, who has scored a number of his films, in the capacity of "sound consultant."⁵⁵

In Berlin for eleven days before the arrival of Hitchcock and Herrmann, Tomasini went over all of the four-channel tapes that Gassmann and Sala had prepared, listened to the tapes as played in synchronization with the relevant film footage, and supervised the final audio mix. Sala recalled that Tomasini was extremely pleased with the production work and had only one small request, "that I remove the gentle chirping I had placed softly under the big ascent of the crows at the schoolhouse, so that the effect would be as though the birds were knowingly making a stealthy approach."⁵⁶ Sala recalled, too, that Herrmann was likewise pleased, and that shortly after the Berlin visit he asked only that Sala create three extra sounds--in the sparrow, gull, and crow ranges--in case the "massing scene" (that is, the final scene) later needed to be strengthened.⁵⁷ Most important, Hitchcock was pleased. Regarding Hitchcock's activity in Berlin, Sala wrote only that the director wanted to pose for photographs with the Trautonium (Figure 5), and that he was glad that, instead of the anticipated "period of fine-tuning," he (and presumably Herrmann, as well) could have a Christmas holiday in St. Moritz.⁵⁸



Figure 5. Hitchcock trying out the Mixtur-Trautonium as Sala looks on (1962).

That Tomasini's and Hitchcock's business in Berlin was concluded before Christmas is confirmed by a letter to the Hitchcock office from the managers of Mars-Film, the Berlin postproduction facility at which the synchronized audiovisual material was examined. Written in German and dated 2 February 1963, the letter in effect is an invoice, requesting a fee of \$3,022.83 for services rendered between 12 and 21 December 1962.⁵⁹

On the same day, the managers of Mars-Film wrote a follow-up letter to Gassmann, addressed to him at 215 East Seventy-ninth Street, New York.⁶⁰ What Gassmann was doing in New York City in early February is unclear, for it seems that three weeks earlier he had again taken up residence in Southern California. At least, a letter dated 16 January 1963 was sent to Gassmann at Apartment 512, 8440 Sunset Boulevard, Hollywood.

This letter to Gassmann from Paul Donnelly, production manager of Revue Studios,⁶¹ is puzzling because whatever request prompted it remains a mystery. Rather bluntly, the letter says,

In regards to your request to change the Oskar Sala–Remi Gassmann credit on "THE BIRDS," I must advise you that this cannot be done. The credit, as it now reads, was approved by Mr. Hitchcock, and although we would like to accommodate you, the titles as you know have been completed for weeks and it would be impossible at this late date.⁶²

In the final version of *The Birds*, the pertinent credit slide (Figure 6) lists Gassmann's name above Sala's. Is this wording, and placement of names, something about which Gassmann might have had reason to complain? Or is it the result of Donnelly's giving in to some request by Gassmann even after the "official" deadline for changes had passed?



Figure 6. Credit slide from *The Birds* (1963).

Every shred of actual evidence relating to the soundtrack of Hitchcock's film suggests that the "electronic sound production and composition" were *entirely* the work of Oskar Sala, and that Gassmann's role--granted, not an unimportant one--was limited to coming up with the idea for a Trautonium-generated soundtrack, successfully pitching the idea to Hitchcock, and then managing both the negotiations and the studio procedure. Whereas Sala by 1962 had had hands-on experience with more than a hundred film productions and would continue working with film for almost another forty years,⁶³ Gassmann's sole involvement with film centered on *The Birds*; although Gassmann by 1962 indeed had musical compositions to his credit, only his recent ballet score (alternately titled *Paeon* and *Electronics*) involved electronic sounds, and those sounds were obviously produced not by Gassmann but by Sala. It seems not entirely logical, then, that in the credits for *The Birds* Gassmann's name is listed above Sala's.

The billing in the title sequence of *The Birds* likely owes to campaigning on the part of Gassmann. To be sure, as two more documents in the UC-Irvine Archive demonstrate, there should be no underestimating Gassmann's entrepreneurial ambitions. One of these documents is a letter dated 14 March 1963, about two weeks before *The Birds* went into general release, in which Gassmann informs Sala that he recently "held two very important demonstrations for the heads of two of the major Hollywood Studios--MGM and Warner Brothers [*sic*]."⁶⁴ The other is an advertisement that appeared in a Hollywood trade paper on 9 April 1963, at around the time when *The Birds* was reaping its first reviews; the advertisement announces a studio called Audiographic Arts, Inc., located at 11350 Ventura Boulevard in Studio City, California, and run by Remi Gassmann and Oskar Sala.⁶⁵ Nothing resulted from either the "demonstrations" that Gassmann supposedly gave for representatives of MGM and Warner Bros. or from the short-lived Audiographic Arts studio with which Sala seemed to be involved in name only. Subsequent to *The Birds*, the Trautonium indeed enjoyed a long career in film music, but this happened in Germany, not Hollywood, and came exclusively at the hands of Sala.

Dramatic Considerations, Mix Plan, and Cue Sheets

The Gassmann Archive at UC-Irvine includes a short article by Gassmann titled "Plastic Sound and Frozen Symbol," published in 1968 in the Toronto-based pamphlet/journal *Explorations* but first submitted two years earlier to the *Review of the Independent Electronic Music Center, Inc.*⁶⁶ The archive includes, too, the rough notes for what apparently is a never-finished essay (possibly a book) tentatively titled "Orpheus and Electronics," "Electronic Orpheus," "An Ordeal for Orpheus," "Electronic Ordeal for Orpheus," or "New Ordeals for Orpheus." Both the published article and the incomplete notes deal with the ideological/aesthetic possibilities of electronic music, in effect attempting (albeit without much success) to expand on matters articulated quite clearly by dance critic John Martin in his April 1961 reconsideration of Gassmann's score for the ballet *Electronics*. Surprisingly, considering the critical and commercial success that by the mid 1960s had been awarded *The Birds*, nowhere in these writings does Gassmann allude, even tangentially, to his involvement with the Hitchcock film.

Perhaps because it was legally necessary for his dealings with Hitchcock, but more likely because it lent efficiency to the production process, Gassmann kept careful notes in which he listed all of *The Birds'* electronic sounds and indicated their precise locations on various reels of four-channel recording tape. But it seems that Gassmann left no document pertinent to the actual making of those sounds, or to the dramaturgical considerations that informed, or limited, their creation. For this, one must turn to Sala.

On at least two occasions Sala waxed expansively on his work for *The Birds*. One of these occurred in 1991, when he presented an autobiographical address at the KlangArt-Kongreß at the University of Osnabrück; the talk was at least in part designed as a promotion for a forthcoming recording aimed at the international market, and thus--even though it was written and delivered in German--in its 1993 published form it bears the English title "My Fascinating Instrument."⁶⁷ Sala's other disquisition on *The Birds* occurred at around the same time; it took the form of an interview conducted largely by Peter Frieß that was published, in 1995, in a book on the role that technology played in German music after World War II.⁶⁸

In neither of these accounts does Sala offer details as to how he might have adjusted the Trautonium's harmonic and subharmonic filters, or manipulated the attack-sustain-delay-release parameters of particular tones, to create electronic sounds that to the film's audience likely would be associated with crows or seagulls. In both accounts, however, he articulates the intriguing challenge presented by the Hitchcock assignment.

Bill Krohn, in his book on Hitchcock's working methods, points out that the director began his 1962 interviews with Truffaut by fairly boasting of the decidedly experimental electronic soundtrack that was to be used in the forthcoming *The Birds*. What Hitchcock does not tell Truffaut, Krohn writes, is that until the arrival of the intriguing letter from Gassmann (in April 1962) "the picture was always meant to have a normal soundtrack with natural bird sounds."⁶⁹ Krohn offers no documentary evidence, but his claim makes sense; at this relatively early stage in the filmmaking process, probably it was indeed assumed that Hitchcock associate Bernard Herrmann would eventually be asked to compose a more or less "normal" score for *The Birds*, and that the dramatically important naturalistic bird-related sound effects would be supplied, without much difficulty, by audio librarians.

Perhaps inspired by the letter from Gassmann, Hitchcock decided in the spring of 1962--when location shooting for *The Birds* was still in progress--that for this film naturalistic bird sounds would not suffice. Precisely how the message was communicated to Sala remains a mystery, but the message from Hitchcock that Sala felt he received in effect said, "Every day I can hear the cries of gulls and crows. For this film I want something different, something unusual, something that will actually frighten people."⁷⁰

After Gassmann presented him with the film reel whose electronic accompaniment was to serve as his "audition" for Hitchcock,⁷¹ Sala embarked on a period of intense research that pushed him, in the first place, to determine how he might replicate the acoustic properties of natural bird sounds. But, after experimentation, Sala says, he discovered that certain completely artificial sounds--including one he described as a "super shriek"--seemed to suit the film's dramatic needs much better than did anything based on actual bird sound.⁷² Therefore, in collaboration with Gassmann, Sala settled on a general method by which he would indeed imitate "normal" bird cries but in a way that right from the start would convey to listeners a sense of the film's decidedly "abnormal" plot.⁷³

Along with the bird cries, sound effects that Sala fitted to the audition reel also included those of shattering window glass, the birds' pecking at the door, furniture being slid across the floor to form a barricade, and boards being nailed to cover various of the house's openings.⁷⁴ For Sala, by this time well practiced in fitting sound to picture, the audition reel posed a challenge that to a large extent was pleasurable.⁷⁵ Still, the exercise amounted to what Sala called a "journeyman's exam in sound synchronization technique."⁷⁶ Sala was doubtless aware that the percussive noises in the audition scene could easily have been dubbed in by sound technicians in Hollywood. Apparently it was Sala's decision to create by electronic means not just the requested bird noises but *all* of the scene's noises, and to do it with such virtuosity that Hitchcock would have no choice but to award him with a contract to "score" the entire film.⁷⁷

As mentioned previously, Hitchcock did ask Sala--and Gassmann, working as his collaborator and agent--to provide all of the film's bird sounds except for those featured in the film's opening pet-shop scene. That Hitchcock was impressed with Sala's synchronization technique and the psychological potency of his bird sounds goes without saying. Much more significant, according to Sala, was the fact that Hitchcock seemed to be aware not only that these electronic bird sounds were completely unprecedented but also that they could not be produced anywhere but at Sala's unusually equipped facility.⁷⁸ That Hitchcock for the sake of *The Birds* was willing to deal with someone located as far away as Berlin is a point worth noting. The very first instance of a major Hollywood studio looking beyond its immediate environs for sound effects seems to have occurred in 1956, when MGM commissioned "electronic tonalities" from Louis and Bebe Barron for its science-fiction film *Forbidden Planet*;⁷⁹ probably the second instance of such long-distance outsourcing is the one under discussion here.

Considering the uniqueness of the bird sounds that Sala included in the audition tape, it is not surprising that Hitchcock accepted them. At least somewhat surprising is that Hitchcock (apparently in consultation with Tomasini and, perhaps, Herrmann) also accepted the audition tape's nonavian sounds.

An undated two-page typewritten document in the Gassmann Archive appears to be a catalog of sounds that Sala used, or at one point intended to use, for the audition reel. Except for the film's title and the words "They're going"--the scene's sole text, spoken by Mitch near the end of the attack--it is entirely in German. Labeled "Mix Plan," it is divided into four sections whose headings ("large bird scene," "out of doors," "bird voices," "enacted scenes"⁸⁰) suggest an attempt to sort the sounds according to acoustic type and/or dramatic function, but the sounds listed under the headings are not entirely consistent with such a categorization. The fourth heading ("enacted scenes") lists two "fights with gulls," the "dragging of furniture in front of the door," and the speaking of the words "They're going."⁸¹ Under the second heading ("out of doors"), however, one finds not only such clearly outdoor sounds described as "Flutter, three times," "first shriek (child)," "second shriek (child)," "swarm," "shriek (mother and child)," "bird approach from below," "second bird approach," "scraping/scratching," "two shrieks," and "scene-departure" but also an obviously indoor sound described as "hammer and nails."⁸² Along with sounds attributed to the "domestic birds" (presumably, the pair of caged lovebirds), the only purely avian sounds listed under the third heading ("bird voices") are not voiced but, rather, fluttering noises heard before and after the spoken text,⁸³ all the other sounds listed under this heading (several instances of window glass shattering, fireplace wood dropped on the floor, Mitch's attempt to tie a shutter with a lamp's electrical cord, the closing of a window, the gulls' relentless pecking at the door) result from either humans or birds interacting with objects around them.⁸⁴ And under the Mix Plan's first heading ("large bird scene") there is nothing but a squiggly pencil-drawn line that extends to the bottom of the page.

That Sala was asked to adjust both the content and the mix of these sounds is evident from Gassmann's letter to Hitchcock of 14 November 1962. That in their essence most of these original sounds--including those not directly related to birds--were retained for the film is evidenced by one of the documents labeled "cue sheet" that Gassmann sketched in

longhand and then neatly typed up in advance of Tomasini's visit to Berlin.⁸⁵ The introductory note at the top of the cue sheet for the film's reel 12 (containing the second attack on the house) informs Tomasini that the relevant reel of four-channel audio tape includes "components of the recent 'winter' version, plus Berlin dub of the same," and it reminds Tomasini that "single channels and Berlin dub of the 'summer' version alone were sent to REVUE last summer and are not included in the present shipment."⁸⁶ Referring to one of the three extra sounds that Herrmann requested after hearing the final Berlin mix, Gassmann's note also includes the suggestion that "for a final re-dubbing at REVUE" the Hollywood engineers should "use 'summer' dub, plus the four channels of the 'winter' version, plus extra gull loop."⁸⁷

The cue sheet for reel 12 is the only one of the thirteen cue sheets that contains such an introductory note, and this suggests that for Gassmann the task of managing sounds that had been created both for the audition tape and for the "final" version was more than a little complicated. Perfectly clear, however, are the descriptive labels that Gassmann attached to the various sounds. The labels, entirely in English, are arrayed in columns that represent the four channels of a particular reel of audiotape. In each column the labels are typed one after the other and separated only by a single line of empty space; there is no suggestion (on this cue sheet or any other) that sounds whose labels align horizontally were intended for simultaneous realization. As described by Gassmann, these are the sounds designed for the film's reel 12:

Channel 1: vocal curtain (No. 1); single vocals (door closing); vocal curtain (No. 2); single vocal (cry in the dark); vocal curtain (No. 3); flutters (departure of birds).

Channel 2: single flutters (three times); single vocals; swarm effect; single vocals; 1st effect (window); wood pecks; flutters; 2nd effect (window); scratching; vocal curtain No. 1; scratching; vocal curtain No. 2; single vocal; vocal curtain No. 3 (departure of birds).

Channel 3: 1st glass break; wood throw; glass sound; window closes; lamp throw; 2nd glass break; window closes; wood pecks; door pecks.

Channel 4: vocals (first gull fight); vocals (second gull fight); flutters; effect (furniture move); hammering (the door); flutter curtains.⁸⁸

Along with the cue sheet specific to reel 12, the Gassmann Archive contains a dozen similarly labeled documents. The only one not linked completely with a specific reel of film lists the three sounds requested by Herrmann for the final scene ("two low tones," "one very high effect," "one shrill motif") and three other sounds ("wild flutters," "gull curtain [distant]," "gull curtain [nearer]").⁸⁹ The only cue sheet that itemizes sounds for an "alternate version" is the one related to the film's reel 1 title sequence. Its upper portion lists these sounds:

Channel 1: flutter curtain (synchron)

Channel 2: vocal curtain (gulls, from the first frame to the overlap into San Francisco sequence--up to entrance into pet shop)

Channel 3: vocal curtain (crows)

Channel 4: effects curtain (lovebirds, swallows, etc.)⁹⁰

Below this, however, is an indication for "Reel 1 alternate," which specifies (only for channel 1) "vocals and flutters (at beginning "Universal" title)," "vocals and flutters (not in the Berlin dub)," and "vocal curtain (more gull sounds in overlap to S.F. sequence)."⁹¹ This cue sheet is of interest because it suggests that it was at first planned that Sala would provide sounds not just for the title sequence but for all of the ensuing scene in the pet shop, and that at some later point it was decided that the electronically generated sounds would end with the gull cries that form the "sound bridge" between the title sequence and the opening scene.⁹²

"Sonic Objects," Transcription, and Analysis

The second attack on the house, of course, contains many moments in which several sounds, in monaural mix, are heard at the same time. But the attack scene also contains a fairly large number of moments in which different sounds are heard, or at least introduced, in discrete succession. Someone who only *listens* to the scene, for example, might describe its first fifty-five seconds--beginning with the initial, barely perceptible bird noise and then moving in steady crescendo toward the first smash of window glass--as a series of clearly distinguishable sonic events, each of which has a measurable duration (Figure 7).

Chirping sound	0:00 – 0:03	Steady noise	0:21 – 0:32
Flutter of wings	0:03 – 0:05	Distant 'bark'	0:32 – 0:33
'Distant chorus'	0:08 – 0:12	Wooden knocks	0:38 – 0:39
Flutter surge	00:12 – 0:13	Loud 'yelps'	0:39 – 0:40
Soft 'barks'	0:15 – 0:16	'Strangle' sound	0:41 – 0:43
Flutter surge	0:16 – 0:17	'Strangle' sound	0:45 – 0:46
Flutter surge	0:17 – 0:19	'Chorus' swoop	0:50 – 0:53
'Yelps'	0:19 – 0:20	Breaking glass	0:54 – 0:55

Figure 7. Sonic events in *The Birds*, second attack on the house, 0:00–0:55.

These descriptive labels are entirely my own, but it does not require much imagination to match them--more or less--with the English-language terms offered by Gassmann in his cue sheet for reel 12 or with the German terms offered by Sala in his memoir. My distinguishing here between "barks" and "yelps" and "strangle" sounds implies no ornithological expertise; these particular labels are used only to indicate that what I call a "bark" is a sonic object noticeably different (in terms of attack and timbre) from one that I call a "yelp," and that a "loud yelp" or a "distant bark" is a variant of a similarly named sonic object encountered earlier.⁹³

That these sonic objects differ from one another is not simply a matter of aural perception; the differences are plainly visible when the sonic objects are reified as waveforms. For example, in the sequence-opening "chirping sound" (probably what Gassmann in the cue sheet identified as "vocal curtain (No. 1)" and possibly what in the Mix Plan was identified as "Vogelanflug von unten"), one can see the regularity of the sine waves (Figure 8).

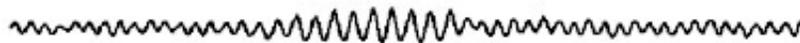


Figure 8. Waveform of "chirping sound" in *The Birds*, second attack on the house.

In contrast, in the "flutter of wings" (probably the first of the cue sheet's "single flutters" and the first of the Mix Plan's "Flattern 3 mal") one can see the waveform's ragged irregularity (Figure 9).

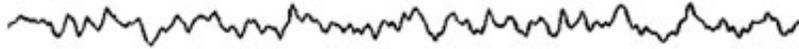


Figure 9. Waveform of "flutter of wings" in *The Birds*, second attack on the house.

And in the "flutter surge" one can see not just the irregularity but also the marked increase in amplitude (Figure 10).



Figure 10. Waveform of "flutter surge" in *The Birds*, second attack on the house.

The Mix Plan refers to various "Schrei" ("shriek") sounds, and the cue sheet refers to various "single vocal" effects. These are general labels, but surely included under their rubrics is the sharply articulated ear-grating sonic object I identify as a "yelp" (Figure 11).

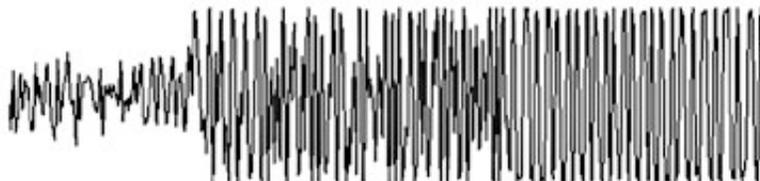


Figure 11. Waveform of "yelp" in *The Birds*, second attack on the house.

What I call "wooden knocks" are likely sounds that the Mix Plan calls "Kaminholz" ("fireplace wood") and that the cue sheet calls the results of "wood throw." In any case, the markedly percussive sonic object is distinguished by its square-wave formation (Figure 12).

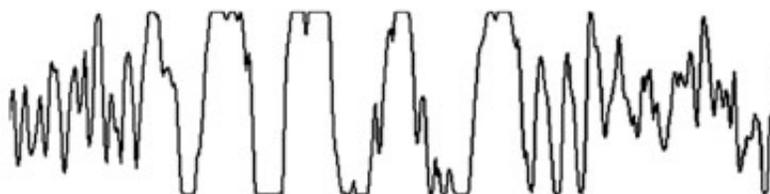


Figure 12. Waveform of "wooden knocks" in *The Birds*, second attack on the house.

Finally, the sonic object that represents the obvious climax of the film sequence's first fifty-five seconds (what I call "breaking glass," what the Mix Plan calls "1.Fensterglas splitter," and what the cue sheet calls "1st glass break") can be seen to be a combination of square waves and jagged sawtooth waves that is both loud and strident (Figure 13).

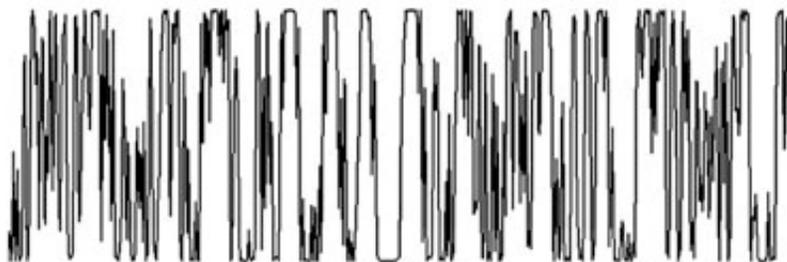


Figure 13. Waveform of "breaking glass" in *The Birds*, second attack on the house.

Waveform analysis shows, literally, that in the context of *The Birds* a "yelp" is different from a "bark" or a "chorus" or a "flutter," but anyone equipped with a good set of ears would have known that just by listening. The various sonic objects being different from one another in ways that are not just physically but aurally obvious, a system of notation can be devised in which the sonic objects are indicated by unique symbols whose temporal elements are indicated by their horizontal positions along a time line, whose approximate pitch is indicated by their vertical positions relative to a baseline, and whose volume levels are indicated either by conventional musical markings or by the symbols' sizes. According to such an invented notation system (in which chirping sounds are indicated by dashed horizontal blocks, flutter sounds by tremolo marks, chorus sounds by vertical blocks, barks by standard quarter notes, yelps by accent-headed notes, wooden knocks by note heads without stems, strangle sounds by X-headed notes, and the sound of breaking glass by a jagged-edged oval), a "transcription" of the attack sequence's first fifty-five seconds might look like Figure 14.

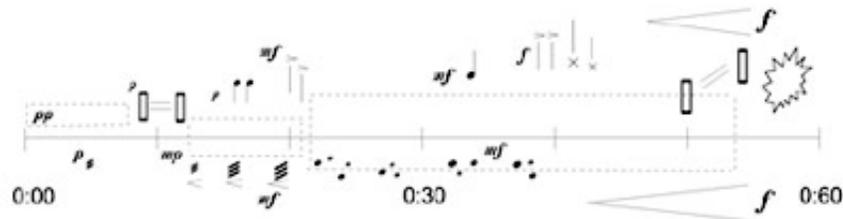


Figure 14. Detailed transcription of *The Birds*, second attack on house, 0:00–0:55.

The second attack on the house lasts not just fifty-five seconds but four minutes and thirty-two seconds. Using a notation system of the sort just described, it would be easily possible to concoct a detailed transcription of the entire sequence. More useful for the purposes of an analysis of the entire sequence, however, would be a reduction whose notation indicates only the most obviously ear-catching moments and the dynamic paths that lead to or away from those moments.

In the reduced transcription (Figure 15), the jagged-edged oval in the first line represents the "breaking glass" sound described earlier. In the second line of the reduced transcription, the jagged circle represents a sudden loud and intense bird noise--likely the noise Sala described as a "super shriek" ("Superschreie")--that continues for about thirty seconds, until Mitch manages to close the window shutter. Upon the shutter's closing, the volume level suddenly drops (indicated by the *subito mf*) but then rises quickly toward another window smash--as loud as the first--combined with a surge of the shrieking sound. After Mitch manages to close the second set of shutters, the volume level again suddenly drops.

The third line of the reduced transcription includes only the indication for a *mf* volume level; the sixty seconds represented on the time line are not without dramatically interesting sonic events, but these events (most notably, bursts of percussive sound as the birds start to peck through the door, and Mitch, in response, nails boards over the door) are set over a backdrop of general bird noise that occasionally changes in pitch but hardly at all in terms of volume level. In the reduced transcription's fourth line, the *subito mp* marks the moment at which Mitch manages to barricade the door by blocking it with a large piece of furniture; the wooden pecking noises continue, but they are much quieter than before.

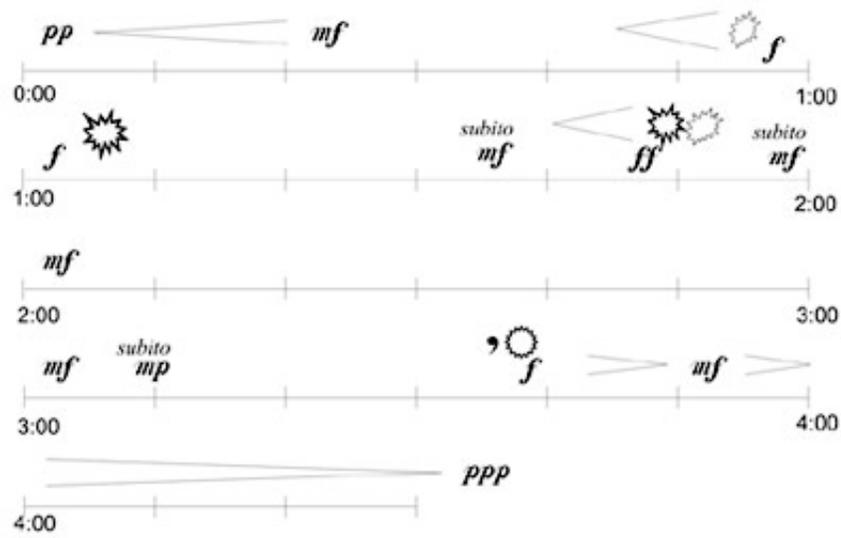


Figure 15. Reduced transcription of *The Birds*, second attack on house, 0:00–4:32.

What happens next is perhaps the sequence's most sonically dramatic gesture. After about a half-minute of reduced bird noise there comes a sharp gull cry that sounds unnervingly like a human scream. Almost as though this "scream" were some sort of signal, all the bird noise abruptly stops (indicated by the comma in the transcription's fourth line). Following the pause comes an outburst (indicated by the jagged-edged circle) of audibly discrete sonic objects. Heard in quick succession, these objects--a loud bark, a surge of flutter, a softer bark, a combination of flutter and chorus noise, a sharp yelp, and a chorus swoop--are reminiscent in both their essence and their clarity of the sounds that made up the sequence's opening half-minute; in contrast to their earlier manner of presentation, however, here their volume levels gradually decrease. The start of the decrescendo mark in the transcription's fifth line indicates the moment at which the sequence's only words ("They're going") are spoken, and after this the bird sounds--as one might expect--fade away.

The five-line reduced transcription of the attack sequence can be further reduced to just a single line, and for the sake of clarifying the sequence's overall dynamic shape the single-line transcription can be positioned over a scale of volume levels. In such an illustration (Figure 16), it can easily be seen that the crescendo at the beginning of the sequence is approximately the same length as the decrescendo at the sequence's end. More significant, such an illustration shows that the onsets of the sequence's three loudest volume levels coincide with what are arguably the sequence's most important sonic gestures: the first window smash (*f*), the second window smash combined with the surge of the "super shriek" (*ff*), and the outburst of discrete bird noises (*f*) that follows the moment of silence.

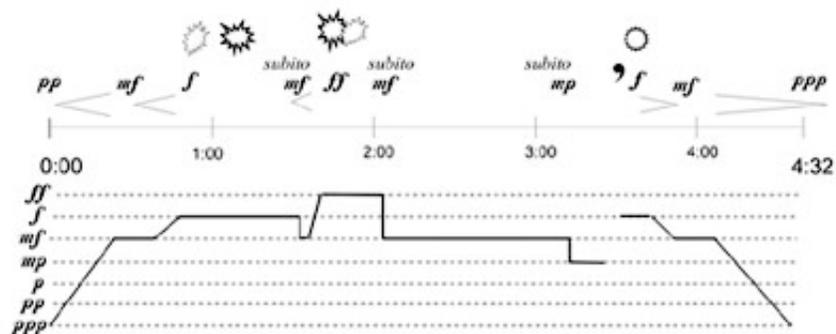


Figure 16. Reduced transcription of *The Birds*, second attack

As for the structural properties of the electronic sounds that accompany the attack sequence, an analysis might be approached by many avenues. For example, one could regard the sequence through the filter of the traditional sonata form. In such a view (Figure 17), one might see the initial presentation of discrete sonic objects as an introduction, the first window smash and the ensuing noise as an A theme, the sustained super shriek as a B theme, the combination of super shriek and the second window smash as the start of a development section, the discrete sounds that follow the moment of silence as a recapitulation (albeit not of the two themes but of the introductory material), and the diminuendo after the spoken words as a coda.

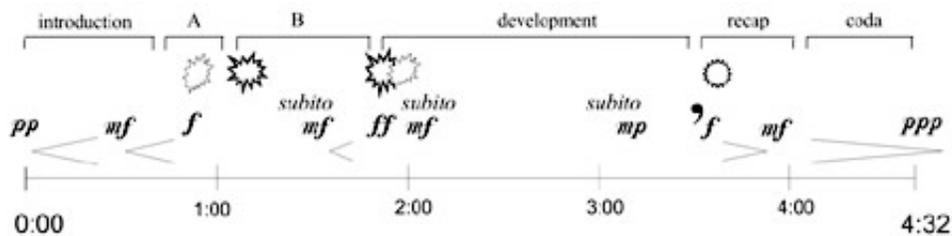


Figure 17. Reduced transcription of *The Birds*, second attack on house; sonata-form analysis.

Another, and likely more sensible, approach to a structural analysis of the attack sequence could involve proportions. Although Sala was indeed a German composer who took his early training with the neoclassicist Hindemith, it should be kept in mind that he created his electronic sounds for *The Birds* at a time when the archly Germanic sonata form was regarded as old-fashioned and when forward-looking composers were expressing keen interest in mathematically informed ideas about musical design.⁹⁴

In any case, subjecting the attack sequence to examination based on the most familiar of the so-called Fibonacci series⁹⁵ reveals at least two interesting facts (Figure 18). If the sequence's entire duration is divided into Fibonacci sections, with the smaller section preceding the larger section, it can be seen that the division occurs *precisely* at the moment at which the super shriek is combined with the loud noise of smashing glass; if the larger section is similarly divided, but this time with the larger subsection coming first, the division can be seen to occur *precisely* at the sequence's singular instant of silence.

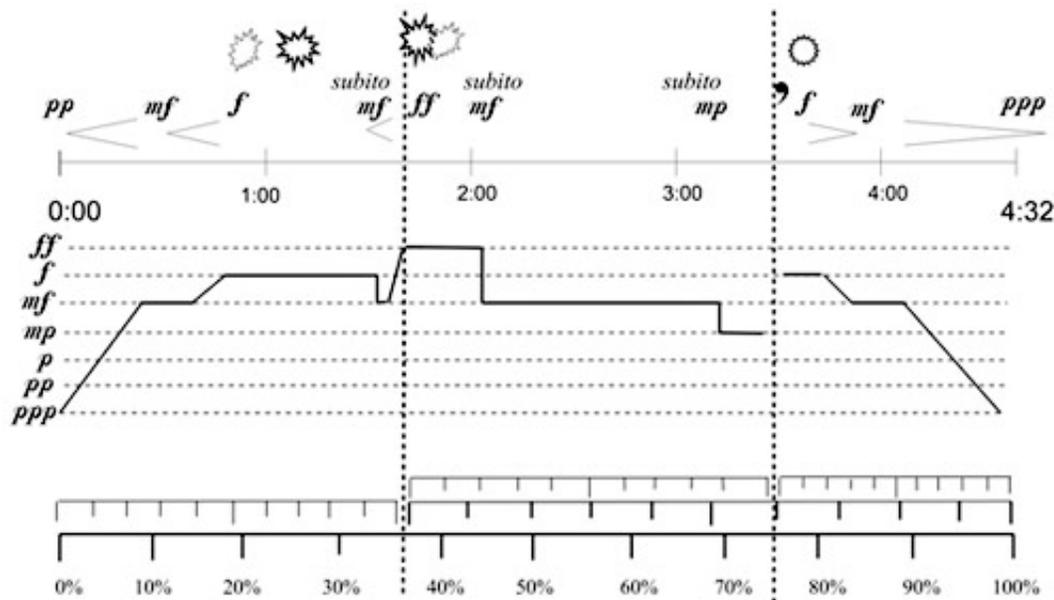


Figure 18. Reduced transcription of *The Birds*, second attack on house, showing divisions according to Fibonacci proportions.

Conclusion

Perhaps this is mere coincidence. Perhaps it was only by accident that Oskar Sala, commissioned to create quasi-realistic electronic sounds for a film scene in which birds attack a house for more than four and a half minutes, placed the scene's two most sonically "momentous" moments--one of them representing maximum sound, the other representing minimum sound--at points mathematically related to the scene's entire duration.

On the other hand, perhaps some "intelligent design" governed Sala's sounds for this longest of the film's seven attack sequences (and also for the title sequence, which, with a compact duration of one minute and forty-five seconds, lends itself equally well to transcription and form analysis).

It may be that Bernard Herrmann believed that the electronic sounds in *The Birds* amounted to just "a form of sound effects," something that "wasn't music at all." Remi Gassmann, whose involvement with the soundtrack for *The Birds* was largely entrepreneurial and managerial, might have agreed with that. It seems likely, however, that Oskar Sala was of a different opinion. After all, throughout his long career Sala identified himself not as a noisemaker but as a composer.

Acknowledgments

For assistance in making available some of the materials that made the researching of this essay possible, the author expresses heartfelt thanks to Jackie Dooley, archivist in the Department of Special Collections of the library at the University of California, Irvine. Thanks are also extended to UC-Irvine professor of music Margaret Murata and professor emeritus Colin Slim (for information on how the Remi Gassmann Papers came to reside at UC-Irvine) and to University of Michigan professor of musicology Steven Whiting (for help with the translations from German).

Endnotes

¹ Bosley Crowther, "Screen: Hitchcock's Fine Feathered Fiends: Director's *The Birds* Add Horror to Innocence: Shocks and Thrills in a Bizarre Tale," *New York Times*, 29 March 1963, 5. The review was reprinted, under the headline "Screen: 'The Birds': Hitchcock's Feathered Fiends Are Chilling," on 1 April 1963.

² "They Is Here," *Time*, 5 April 1963.

³ Louis Chapin, "Hitchcock's 'The Birds,'" *Christian Science Monitor*, 4 April 1963, 16.

⁴ Philip K. Scheuer, "'Birds' Pecks Away at Human Beings," *Los Angeles Times*, 29 March 1963, D13.

⁵ Richard L. Coe, "Hitch Is Still Quite the Bird," *Washington Post*, 12 April 1963, B11.

⁶ Although *The Birds* has no conventional underscore, it does feature two bits of diegetic music. Visiting the Brenner house, the character of Melanie sits at the piano and plays a portion of the first of Debussy's 1891 *Deux arabesques*; later, when Melanie goes to the schoolhouse, the children are singing a folksong called "Risseldy, Rosseldy." For information on how the obscure "Risseldy, Rosseldy" found its way into the screenplay, see Jack Sullivan, *Hitchcock's Music* (New Haven: Yale University Press, 2006), 270–71.

⁷ For a detailed account of Hitchcock's admitted plan, see Robert E. Kapsis, "Hollywood Filmmaking and Reputation Building: Hitchcock's *The Birds*," *Journal of Popular Film and Television* 15, no. 1 (Spring 1987): 5–15.

⁸ Weis, Elisabeth. "The Sound of One Wing Flapping." *Film Comment* 14, no. 5 (September–October 1978): 42–48. Weis's article formed the basis of chapter 8 (pp. 136–46) of her *The Silent Scream: Alfred Hitchcock's Sound Track* (London: Associated University Presses, 1982).

⁹ Philip Brophy, "The Birds: The Triumph of Noise over Music," *Essays in Sound*, no. 4 (Sydney, 1999), available online at <http://www.philipbrophy.com/projects/sncnm/Birds.html>.

¹⁰ The Hitchcock films for which Herrmann provided scores are *The Trouble with Harry* (1955), *The Man Who Knew Too Much* (1956), *The Wrong Man* (1957), *Vertigo* (1958), *North by Northwest* (1959), *Psycho* (1960), and *Marnie* (1964). Herrmann was slated to score Hitchcock's *Torn Curtain* (1966) but was dismissed and replaced by John Addison. For details on the breakup of the Hitchcock-Herrmann relationship, see Sullivan, *Hitchcock's Music*, 276–87, and Steven C. Smith, *A Heart at Fire's Center: The Life and Music of Bernard Herrmann* (Berkeley: University of California Press, 1991), 267–74.

¹¹ Bernard Herrmann, in Ted Gilling, "The Colour of Music: An Interview with Bernard Herrmann," *Sight and Sound* 41, no. 1 (Winter 1971–72), 37.

¹² François Truffaut, *Hitchcock*, rev. ed. (New York: Simon and Schuster, 1985), 295. Truffaut's book was originally published, in French, as *Hitchcock/Truffaut* (Paris: Éditions Ramsay, 1967), but the interviews were conducted for the most part in 1962–63, while *The Birds* was in postproduction.

¹³ Evan Hunter completed the first draft of his screenplay for *The Birds* in November 1961; filming took place for the most part in March and April 1962. For details on the production and postproduction chronology, see Kapsis, "Hollywood Filmmaking"; Kyle B. Counts, "The Making of Alfred Hitchcock's *The Birds*: The Complete Story behind the Precursor of Modern Horror Films," *Cinefantastique* 12, no. 2 (Fall 1980): 15–35; and Bill Krohn, *Hitchcock at Work* (London: Phaidon, 2000), 238–63.

¹⁴ After his work on *The Birds*, Gassmann resided primarily in Laguna Beach, California. In the mid-1960s he made the acquaintance of Clayton Garrison, founding chancellor of the University of California, Irvine, and Gassmann arranged that upon his death his estate would go to this brand new university. Upon Gassmann's death in 1982, then, UC-Irvine acquired not just documents relating to *The Birds* but also scores both published and in manuscript, disk and tape recordings, books and scrapbooks, photographs, letters, and numerous other materials. Significantly, the Gassmann bequest included a monetary gift of approximately \$250,000, the interest proceeds of which have since 1996 been used to support both a student-oriented electronic music studio and a concert series devoted to works that somehow involve electronic music.

¹⁵ Herrmann provided the score for Reid's *The Night Digger* (1971), a British film released in the United States as *The Road Builder*.

¹⁶ Smith, *Heart at Fire's Center*, 254. Smith's interview with Reid dates from 6 June 1984.

¹⁷ The Trautonium uses neon-filled tubes as its tone generators. The gas-discharge tone generators emits sawtooth waves extremely rich in upper harmonics, which are then filtered--along the lines of naturally occurring acoustic formants, and presaging the concept of subtractive synthesis--by means of tunable electrical circuits. On the earliest models, both pitch and volume level were controlled by a pressure-sensitive fingerboard. The so-called Volkstrautionium, manufactured

by Telefunken beginning in 1932, featured a standard keyboard and, for volume control, a foot pedal. For more on the technical aspects of the early Trautonium, see Ted Darter, *The Art of Electronic Music: The Instruments, Designers, and Musicians behind the Artistic and Popular Explosion of Electronic Music* (New York: Quill, 1984), 39–41; and Oskar Sala, "My Fascinating Instrument," in *Neue Musiktechnologie*, ed. Bernd Enders (Mainz: B. Schott's Söhne, 1993): 75–93.

¹⁸ After his studies with Hindemith, Gassmann served as instructor of music theory and composition at the Chicago Symphony Orchestra's preparatory school (1940–46), worked as a music critic for the *Chicago Times* (1941–47), directed a concert series at the University of Chicago (1942–45), and headed the music department at Elmhurst College, Elmhurst, Illinois (1943–45). In 1946 he was commissioned to compose the score for a ballet titled *Billy Sunday*, choreographed by Ruth Page for the Ballet Russe de Monte Carlo and premiered, with considerable success, in New York in 1948. Through most of the 1950s Gassmann, not much active as a composer, resided in Strasbourg, France. From the late 1950s until his death in 1982, he lived in the Southern California cities of Costa Mesa and Laguna Beach.

¹⁹ Oskar Sala was born in 1910 in Griez, Thuringia, and died in 2002 in Berlin. Like Gassmann, he was a composition student of Hindemith at the Berlin Hochschule für Musik, and it was largely Hindemith's interest in the Trautonium that brought Sala into contact with both the instrument and its inventor. For details on Sala's career, see the unsigned obituary in *Musical Times* 143, no. 1878 (Spring 2002): 4–6; Peter Frieß, with Gert Krumbacher and Kerstin Sydel, "Oskar Sala im Gespräch," in *Deutsches Museum Bonn: Forschung und Technik in Deutschland nach 1945* (Munich: Peter Frieß and Peter M. Steiner, Deutscher Kunstverlag, 1995): 215–36; and Sala, "My Fascinating Instrument."

²⁰ Hindemith composed *Siebens Triostücke für drei Trautonien* (1930) a *Konzertstück für Trautonium und Streicher* (1931), and *Langsames Stück und Rondo* for Trautonium and orchestra (1935). References to the Trautonium often note that the instrument also attracted the attention of Richard Strauss and Werner Egk, but Strauss used it only to emulate the sound of a gong in his 1940 *Japanese Festival Music (Festmusik zur Feier 2600jährigen Bestehens des Kaiserreichs Japan)*, and Egk apparently used it only for special effects in scores for radio plays and in operas that he conducted, after 1937, at the Berlin Staatsoper. (Under various conductors, during the 1950s and 1960s the Trautonium regularly produced the dramatic bell sounds in productions of Wagner's *Parsifal* in Berlin, Bayreuth, Munich, and Naples. See Sala, "My Fascinating Instrument," 79.)

While Hindemith, Strauss, and Egk are the three German composers whose names are typically--almost in cliché fashion--associated with the Trautonium, the list of composers who took the instrument seriously is actually quite long. Along with Sala, it includes Paul Höffer (*Kleine Kammermusik*, 1932), Harald Genzmer (two concertos, 1937 and 1952, and *Musik für Trautonium und großes Blasorchester*, 1942), Herrmann Ambrosius (*Rhapsodie*, 1941), Julius Weismann (*Variationen und Fuge mit Orchester*, 1941), Klaus Jungk (*Musik für Trautonium und Streichquartett*, 1951), Paul Dessau (the opera *Die Verurteilung des Lukullus*, 1949), Carl Orff (*Entrata*, 1954), and Jürg Baur (*Konzert für Mixturtrautonium und Streichquartett*, 1955–56).

²¹ Although the Trautonium was designed as a musical instrument, not a noisemaker, it was certainly capable of producing interesting noises. Indeed, in 1930--the year of its public debut--it was used to emulate the sound of an airplane propeller for a German sound film titled *Stürme über dem Montblanc* (directed by Arnold Franck, the film was released in the United States in 1932 as *Avalanche*; along with diegetic fragments of compositions by Bach and Beethoven, the film features an original score by Paul Dessau). It was used again in 1934 to produce what Sala termed the "Zaubermelodien" (Sala, "My Fascinating Instrument," 85) composed by Georg Häntzschel for Thea von Harbou's production of *Hanneles Himmelfahrt*.

According to the entry on Sala in the online Internet Movie Data Base--<http://www.imdb.com/name/nm0757387/#composer> (accessed 5 July 2007)--Sala's credits as film composer consist only of *Armer Hansi (Poor Hansi)*, 1943), *Schneeweisschen und Rosenrot (Snow White and Rose Red)*, 1955), *Schöpfung ohne Ende* (Creation without End, 1957), *In wechselndem Gefälle* (Sounding the Surface, 1962), *Der Würger von Schloß Blackmoor (The Strangler of Blackmoor Castle)*, 1963), *Die Todesstrahlen des Dr. Mabuse (The Thousand Eyes of Dr. Mabuse)*, 1964), *Petrol-Carburant-Kraftstoff* (1965), *Herrliche Zeiten im Spessart (Glorious Times in the Spessart)*, 1967), *Make Love, Not War: Die Liebesgeschichte unserer Zeit* (1968), *Unterwegs nach Kathmandu (On the Road to Katmandu)*, 1971, television), *Gestern was heute noch Morgen* (1992, television), *Kiss My Blood* (1998), *Kingdom of Poet O* (2000), *Tatort: Tödliches Verlangen* (2000, television), and *Fenster mit Aussicht (Window with a View)*, 2001). According to Sala's autobiographical account ("My Fascinating Instrument," 85), however, between 1945 and 1958 he also contributed sounds to more than two hundred feature-length films and television spots. Many of these contributions--all of which predate Sala's work on Hitchcock's *The Birds*--are listed in Hugh Davies, comp., *International Electronic Music Catalogue: Répertoire International des Musiques Electroacoustiques* (Cambridge, MA, and London: MIT Press, 1968); and Daniela Schmidt, "Filmmusik von Oskar Sala: Katalogisierung und Analyse exemplarischer Beispiele" (master's thesis, Berlin Hochschule der Künste, n.d.).

²² "1959 kam er nach Berlin zurück, besuchte mich im Studio, sah und hörte, was sich da inzwischen seit 1930

getan hatte... Er schlug spontan eine gemeinschaftliche Produktion vor, ein elektronisches Ballett" (Sala, "My Fascinating Instrument," 87).

²³ Everett Helm, "Berlin Festival Rich in Events," *New York Times*, 9 October 1960, X11. See also R.H., "Electronic Music: Notes and News," *Musical Times* 101, no. 1407 (May 1960), 304.

²⁴ "Mixtur-Trautonium Makes Its Debut: All of the Sounds Are Produced Electronically," *Christian Science Monitor*, 1 September 1960, 17.

²⁵ P. W. Manchester, "Uneasy 'Electronics' Première," *Christian Science Monitor*, 1 April 1961, 10.

²⁶ Miles Kastendieck, *New York Journal-American*, 23 March 1961; Louis Biancolli, *New York World-Telegram*, 23 March 1961; and Walter Terry, *New York Herald Tribune*, 23 March 1961. All were quoted in a display advertisement placed by the New York City Ballet in the *New York Times*, 27 March 1961, 27.

²⁷ John Martin, "Ballet: Season's Novelty--'Electronics,' Dance to a Taped Score by Gassmann, Is Dramatically Logical," *New York Times*, 23 March 1961, 30.

²⁸ John Martin, "The Dance: Synthetics--Balanchine Utilizes Electronic Score," *New York Times*, 9 April 1961, X11.

²⁹ "Da war Gassmann schon wieder in New York, wo das Werk mit neuer Choreographie von George Balanchine im Radio City-Center herauskam. Dabei erfuhr er von den Schwierigkeiten des Hitchcock-Clans, eine Lösung der Akustik für diesen Film zu finden" (Sala, "My Fascinating Instrument," 88). This and other translations, as well as paraphrases, of passages from Sala's article are mine.

³⁰ Daphne du Maurier's "The Birds" was first published in 1952 in a British anthology titled *The Apple Tree* (London: Victor Gollanz) and an American anthology titled *Kiss Me Again, Stranger* (New York: Doubleday). Although du Maurier's 1952 story is the film's only credited source, recent Hitchcock scholarship suggests that another source might be Frank Baker's 1936 novel *The Birds* (London: Peter Davies). Both du Maurier's story and Baker's novel are set in Cornwall; whereas du Maurier's story focuses on a single family, however, Baker's novel--like Hitchcock's film--concerns not just attacks by birds but also a complex relationship involving a man, a woman with whom he is newly in love, and the man's frail and possibly very jealous mother. See Ken Mogg, "Two Discoveries," *Maguffin*, 9 December 2005, available online at http://www.labyrinth.net.au/%7Emuffin/wanted_for_murder_c.html (accessed 19 January 2007).

³¹ Philip K. Scheuer, "Next Hitchcock Will Hit at Complacency," *Los Angeles Times*, 3 October 1961, A11.

³² See note 13.

³³ The article that announced Hitchcock's intention to adapt du Maurier's "The Birds" noted that the director was still undecided as to whether the film would be shot in color or black and white, but it stated unequivocally that the "photography will be a combination of live and animation" and the film's purpose would be "to stir people out of their complacency." The article makes no reference, however, to plans for an innovative soundtrack (Scheuer, "Next Hitchcock").

³⁴ "Electronics and Music," *Los Angeles Times*, 30 July 1961, O18.

³⁵ Letter from Gassmann to Hitchcock, 18 April 1962. Copies of the letter are preserved in the Remi Gassmann Archive, Department of Special Collections, UC-Irvine Libraries, UC-Irvine; and in the Hitchcock Archive, Margaret Herrick Library, in Beverly Hills, California. The letter is quoted in Sullivan, *Hitchcock's Music*, 284, and in Smith, *Heart at Fire's Center*, 254.

³⁶ Letter from Hitchcock to Gassmann, 9 May 1962, Gassmann Archive.

³⁷ Ibid.

³⁸ Sala wrote, "Nach längerem Hin und Her, der Zeitdruck wuchs, kam schließlich Gassmann mit einem Akt zur probweisen Vertonung zurück. Es war der große Hausüberfall und Tippi Hedrens Beinahe-Untergang durch die Vögel auf dem Oberboden" ("My Fascinating Instrument," 88).

³⁹ "Anhaltspunkte, was denn vor- und nachher passierte, brachte Gassmann nicht mit" (ibid.).

⁴⁰ "Direckt zum Bild zu spielen, sich als unangenehm, erschreckend, ja widerlich, aber dennoch von den Tieren stammend, anboten" (ibid.).

⁴¹ Sala wrote, "*Now please make all of it*, was the instruction to Gassmann" ("*Aber bitte alles machen*, so der Auftrag an Gassmann") (ibid.).

⁴² Letter from Hitchcock to Gassmann, 26 October 1962, Gassmann Archive.

⁴³ Letter from Gassmann to Hitchcock, 14 November 1962, Gassmann Archive. On the same day, Gassmann wrote a similar letter to Paul Donnelly, the production manager at Revue Studios, which shared both address and stationery with Alfred J. Hitchcock Productions, Inc., in Universal City, California. In the early 1960s, Revue Studios was in effect the technical department of Alfred J. Hitchcock Productions, Inc.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ Ibid. The reference is to the 23 October 1962 document titled "Mr. Hitchcock's Notes: Background Sounds for *The Birds*," in which Hitchcock refers to the previously submitted sounds, as in the 26 October contract, as "the sample."

⁴⁷ Ibid.

⁴⁸ Letter from Gassmann to Hitchcock, 15 November 1962, Gassmann Archive.

⁴⁹ Ibid.

⁵⁰ Letter from Peggy Robertson to Gassmann, 16 November 1972, Gassmann Archive. The Tides Restaurant to which Robertson refers is the location from which Melanie and others witness the start of the attack on the town; in the film, the restaurant itself is never attacked. George Tomasini served as editor of *The Birds*.

⁵¹ Letter (1) from Gassmann to Robertson, 19 November 1962, Gassmann Archive.

⁵² Letter (2) from Gassmann to Robertson, 19 November 1962, Gassmann Archive.

⁵³ Ibid. Emphases mine.

⁵⁴ Letter from Robertson to Gassmann, 28 November 1962, Gassmann Archive.

⁵⁵ Philip K. Scheuer, "Costume Designers Get Sidewalk Brush" (subheadline, "Hitchcock's Birds Electronic"), *Los Angeles Times*, 14 December 1962, D17.

⁵⁶ " ... einige Tage vor der Endmischung, Hitschs Chefcutter mit mir nochmals alles durchging, hat er sein Erstaunen über diese Anlage sehr deutlich ausgedrückt. Er hatte nur noch einen kleinen Wunsch, das wusch-wusch, das ich leise dem Großaufflug der Raben bei der Schule unterlegt hatte, ganz wegzunehmen, damit sozusagen der Effekt entsteht, daß sich die Vögel ganz bewußt anschleichen" (Sala, "My Fascinating Instrument," 88).

⁵⁷ "Bernard Herrmann bat mich noch um drei Klänge in der Spatzen-, Möwen- und Rabenlage, zur eventuellen Verstärkung bei den Massenszenen, wenn da noch so allerlei an Geräuschen hinzukommt" (ibid.).

⁵⁸ "Nachdem er sich alles angehört hatte, kam er in mein Studio, zum Fototermin, und wollte unbedingt einen Ton auf dem Instrument herausbringen, was die Fotografen natürlich freute. Er war offensichtlich zufrieden und freute sich, daß er statt der vorgeplanten 'Verbesserungstage' gleich in sein Weihnachts-Ferientempel St. Moritz reisen konnte" (ibid.).

The photo shoot to which Sala refers resulted in at least three photographs that in January 1963 were widely distributed with publicity materials for *The Birds*. One of these shows Hitchcock seated at the Trautonium's keyboard, studiously pressing a key as Sala looks on. Another, designed for comic effect (reproduced in Krohn, *Hitchcock at Work*,

262), shows Hitchcock pressing a key with his left hand while grimacing in feigned pain and covering an ear with his right hand. Still another (reproduced in Counts, "Making of Alfred Hitchcock's *The Birds*," 30) shows Sala at the keyboard with both Gassmann and Hitchcock looking on.

⁵⁹ Letter from P. Machineck and I. V. Gregor, Mars-Film, to Alfred J. Hitchcock Productions, Inc., 2 February 1963, Gassmann Archive.

⁶⁰ Letter from P. Machineck and I. V. Gregor, Mars-Film, to Gassmann, 2 February 1963, Gassmann Archive.

⁶¹ For the relationship between Revue Studios and Alfred J. Hitchcock Productions, Inc., see note 43.

⁶² Letter from Paul Donnelly to Gassmann, 16 January 1963, Gassmann Archive.

⁶³ See note 21.

⁶⁴ Letter from Gassmann to Sala, 14 March 1963, Gassmann Archive.

⁶⁵ Advertisement, *Hollywood Reporter*, 9 April 1963, 13, Gassmann Archive.

⁶⁶ The *Review of the Independent Electronic Music Center, Inc.* was based in Trumansburg, New York, the town where Robert Moog in 1965 began commercial manufacture of his eponymous Moog Synthesizer. Gassmann's article appears in *Explorations* 22 (June 1968): 93–96.

⁶⁷ Sala, "My Fascinating Instrument," 75–93. The same-titled recording (Erdenklang 90340) was released in May 1995; it is devoted exclusively to Sala's own compositions (*Fantasie-Suite en drei Sätzen, Largo, Fanfare, Impression Electronique, Elektronische Tanzsuite, and Rede des toten Christus vom Welgebaude herab, daß kein Gott sei*). Sala made two previous recordings for the same label: "Subharmonische Mixturen" (Erdenklang 70962) includes Hindemith's *Langsames Stück für Orchester und Rondo für Trautonium*, Sala's score for the film *Der Würger von Schloss Dartmore*, and several other Sala compositions; along with pieces by Sala, "Elektronische Impressionen" (Erdenklang 81032) features Hindemith's *Siebens Triostücke für drei Trautonien* and the *Konzertstück für Trautonium und Streicher*.

⁶⁸ Frieß, "Oskar Sala im Gespräch," 215–36.

⁶⁹ Krohn, *Hitchcock at Work*, 262.

⁷⁰ "Sein Einwand: 'Ach, das höre ich doch jeden Tag von den Möven und Krähen. Ich brauche etwas Ungewöhnliches, was die Leute erschreckt'" ("Oskar Sala im Gespräch," 232). "Naturlaute die man jeden Tag hören kann, paßten ihm nicht. Gewiß, es sollen Vögel sein, die da flattern und schreien, aber es muß trotzdem anormal sein, es muß die Leute erschrecken" (Sala, "My Fascinating Instrument," 88).

⁷¹ In "Oskar Sala im Gespräch" (232), Sala refers to the reel containing the scene of the second attack on the house as a "Probeakt" for which he proceeded to make "ein bißchen Knochenarbeit." In "My Fascinating Instrument" (88), he describes the reel as "einem Akt zur probweisen Vertonung."

⁷² "Im Mischatelier breitete sich zwar nicht Entsetzen aus--Tonmeister sind vieles gewohnt--wohl aber Erstaunen, daß diese Superschreie tatsächlich ohne jeden realen Hintergrund elektronisch gelingen und eindeutig den Vögeln zugeordnet werden" (Sala, "My Fascinating Instrument," 88).

⁷³ "Wir einigten uns auf die Formulierung, daß umgekehrt der Versuch, mit elektronischen Mitteln normalschreiende Vögel zu imitieren, wohl nicht gelungen wäre, so daß also schon im Ansatz, es nicht-real zu versuchen, ein Lösungseffekt liege" (ibid.).

⁷⁴ "Da war ja nicht nur mit Möven, sondern auch mit Fenstern, Türen, Schränken, Nageln und Hämmern allerhand los" (Sala, "Oskar Sala im Gespräch," 233).

⁷⁵ "Das Anlegen der Effekte an so außergewöhnliche Bildvorgänge war für einen inzwischen Cut-Geübten ein Sondervergnügen" (Sala, "My Fascinating Instrument," 88).

⁷⁶ " ... eine Art Gesellenprüfung für Sychrontechnik" (Sala, "Oskar Sala im Gespräch," 233).

⁷⁷ "Immerhin ging es uns ja darum, daß dem Probeakt der ganze Film folgen werde, was unsere Tontechnik als so gut wie sicher annahm" (Sala, "My Fascinating Instrument," 88).

⁷⁸ Sala suggests that Hitchcock must have asked himself: "Wie sollen die uns das nachmachen? Diese Elektronik haben sie doch noch gar nicht. Und was den Doppel-Sechsteller-Schneidetisch anbelangt?" (ibid.).

⁷⁹ For details, see James Wierzbicki, *Louis and Bebe Barron's "Forbidden Planet": A Film Score Guide* (Lanham, MD: Scarecrow, 2005), 1–62.

⁸⁰ "Grosse Vogelkulisse," "Aussetür zu," "Vogelstimmen," "Realscene" and "Mischplan" for *The Birds*, n.d., Gassmann Archive.

⁸¹ "1.Mövenkampf," "2.Mövenkampf," "Möbelrücken vor die Tür," and "Text: They're going" (ibid.).

⁸² "Flattern 3 mal," "1.Schrei (Kind)," "2.Schrei (Kind)," "Schwarm," "Schrei (Mutter u. Kind)," "1.Vogelanflug von unten," "2.Vogelanflug," "Scharren," "2 Schreie," "Kulisse Abflug," and "Hämmern (Nageln)" (ibid.).

⁸³ "Heimvögel," "Geräuschflattern (vor Text)," and "Geräuschflattern (nach Text)" (ibid.).

⁸⁴ "1.Fensterglas splitter," "Kaminholz," "Fenster zu lampe," "2.Glas splitter," "Fenster schliessen," "Tür hacken," "2 mal Tür hacken," and "Türhacker" (ibid.).

⁸⁵ The term *cue sheet* usually refers to a document, prepared in large part for legal reasons, in which is listed precise timings for every single bit of music--whether originally composed or borrowed/licensed from preexisting repertoire--that is used in a film. In the case of Gassmann's cue sheets for *The Birds*, the documents are simply lists of sonic effects that are used, not necessarily in chronological order, in various of the film's scenes.

⁸⁶ Cue sheet for *The Birds*, reel 12, n.d., Gassmann Archive.

⁸⁷ Ibid.

⁸⁸ Ibid.

⁸⁹ Cue sheet for *The Birds*, n.d., Gassmann Archive.

⁹⁰ Cue sheet for *The Birds*, reel 1, n.d., Gassmann Archive.

⁹¹ Ibid.

⁹² There is no cue sheet for the film's reel 2. The cue sheet for reel 3, which includes the attack on Melanie by a single gull, calls for "single vocals (gulls, at the dock)," "1st vocal curtain (gulls, for monitor selection)," "2nd vocal curtain (gulls, for monitor selection)," and "single vocal, plus effect (gull attack of Melanie in the boat)." Reels 4 and 5 do not feature bird attacks, and their listings of electronic sounds are appropriately brief: "vocal curtain (migrating birds)," "single vocals (night, arrival at the farm)," "vocal curtain (blackbirds, continued in Reel 5)," "vocal curtain (blackbirds, as Mitch looks up)," and "curtain, single vocals (blackbirds)."

The film's reel 6 contains both the attack on the children's birthday party and the first attack on the Brenner house. Its items are "single vocals (children's party)," "vocals (lovebirds)," "vocal curtain (swallows)," "single flutters (children's party)," "single vocal (fireplace sparrow)," "flutter curtain (swallows)," "effect (swoop of birds down fireplace)," "effect (second entrance of birds)," "effect (third entrance of birds)," and "effect curtain (wizz and thumps of swallows in the room)." There is no cue sheet for reel 7. The cue sheets for reels 8 and 9 both contain sounds related to the attack of the birds on the children at school: "flutter curtain (crows rise)," "flutter curtain continues to end of sequence," "soft flutters (before crow rise)," "single vocals (attacks)," "single vocals, NEW (attack on car and departure of birds, for dubbing selection)," "1st effect curtain (crows rise)," "2nd effect curtain," "single vocals (boy at tree)," "3rd effect curtain," "vocal curtain (to the end of the sequence)," and "short vocal curtain (continuation of Reel 8 departure of birds from car)."

Sounds listed for reel 10, which features the birds' attack on the town, are "gas," "single vocal (big bird)," "single vocals," "vocal curtain," "single flutters," "single vocals," "single flutters," "glass bumps," "glass break," "single flutters,"

"vocals (Melanie notices attack begins, etc.)," "single vocal (distant)," "single vocal," "single vocals (high shot)," "1st vocal curtain (long shot, telephone booth)," "glass bumps," "2nd vocal curtain (long shots, telephone booth)," and "vocal curtain (beginning at the high shot and continuing)." Reel 11 contains the scene in which Mitch and Melanie discover the dead body of Annie. Along with a few items labeled "extras" ("wild flutter loop" and "Former (alternate) version of this sequence; also one channel"), its sounds are identified as "vocal curtain (overhang from Reel 10)" and "single vocals and flutters (Annie's death sequence)."

For reel 13, featuring the attack on Melanie in the attic, the sounds are "five different flutters (before attic attack)," "flutter curtain (to end of reel)," "single flutters and effects," "vocal curtain (to end of reel)," and "rhythmic flutters (added after the Berlin dub)." Along with the three sounds requested by Herrmann (listed on the unnumbered cue sheet but specified as being for reel 14), the sounds for the film's final reel are "vocal curtain (stairs)," "single flutters," "single vocal (hand peck)," "single flutters," "single vocal (leg peck)," "single flutters," "short vocal curtain (but not to end of reel)," "flutter curtain (stairs)," "vocal curtain (after Mitch opens door to yard)," and "vocals (selected for fade-out at the end of the film)."

⁹³ *Sonic object* here refers a discrete sonic phenomenon whose identity is definable in terms of timbre, gesture, etc. The term, used in this sense, originated with *musique concrète* composer Pierre Schaeffer in the 1950s. For more on the term's origins, and its implications, see Pierre Schaeffer, *Que Sais-je? La Musique Concrète* (Paris: Presses Universitaires de France, 1973); Michel Chion, *Guide des objets sonoris--Pierre Schaeffer et la recherche musicale* (Paris: Buchet-Casterl, 1983); and Carlos Palombini, "Pierre Schaeffer: From Research into Noises to Experimental Music," *Computer Music Journal* 17, no. 3 (Autumn 1993): 14–19. In the 1970s the French film theorist Christian Metz introduced the term "aural object," but for the most part this term has been used to refer not to sonic phenomena per se but to sounds that are associated with entities within a filmic narrative. See Christian Metz, "Le perçu et le nommé," in *Pour une esthétique sans entrave--Mélanges Mikel Dufrenne* (Paris: <CAE>ditions 10/18, 1975), 153–61; in a translation by Georgia Gurrieri, the essay appeared as "Aural Objects," *Yale French Studies*, no. 60, Cinema/Sound (1980): 24–32.

⁹⁴ Among the postwar modernists concerned in one way or another with mathematics were John Cage, Pierre Boulez, György Ligeti, Krzysztof Penderecki, Karlheinz Stockhausen, and Iannis Xenakis. For contemporaneous accounts, see Everett Helm, "Notes from Abroad: Darmstadt International Summer School of Music," *Musical Times* 97, no. 1363 (September 1956): 490–91; Aurelio de la Vega, "The Training of a Composer Today," *Music Educators Journal* 49, no. 2 (November 1962): 45–48; and Elliott Carter, "Letter from Europe," *Perspectives of New Music* 1, no. 2 (Spring 1963): 195–205. For historical accounts, see Michel Oren, "Anti-Art as the End of Cultural History," *Performing Arts Journal* 15, no. 2 (May 1993): 1–30; and Amy Beal, "Negotiating Cultural Allies: American Music in Darmstadt, 1946–1956," *Journal of the American Musicological Society* 53, no. 1 (Spring 2000): 105–39.

⁹⁵ The thirteenth-century Italian mathematician Leonard Pisano (commonly known as Fibonacci) devised many numerical series that he found of interest. The series best known today is an additive series (1, 1, 2, 3, 5, 8, 13, 21, ...) in which the final number is always the sum of the two preceding numbers. Once extended beyond its first few entries, the series yields a more or less constant proportion--sometimes called the golden mean, the golden section, or the golden ratio--between the ultimate and penultimate numbers. If the whole (represented by the ultimate number) is divided at the point represented by the penultimate number, the proportional relationship between the large section and the whole will be the same as the proportional relationship between the small section and the large section. The so-called Fibonacci series was consciously applied to music by such twentieth-century modernists as Béla Bartók, John Cage, Karlheinz Stockhausen, Edgard Varèse, and Anton Webern, and music theorists have long argued that the series figured, albeit unconsciously, in the music of Classical era composers. For more on the Fibonacci series and its relationship to music, see J. H. Douglas Webster, "Golden-Mean Form in Music," *Music & Letters* 31, no. 3 (July 1950): 238–48; Jonathan Kramer, "The Fibonacci Series in Twentieth-Century Music," *Journal of Music Theory* 17, no. 1 (Spring 1973): 110–48; Jeffrey B. Havill, "The Multi-Media Performance '987' Based on the Golden Ratio," *Leonardo* 9, no. 2 (Spring 1976): 130–32; Tibor Bachman and Peter J. Bachman, "An Analysis of Béla Bartók's Music through Fibonacci Numbers and the Golden Mean," *Musical Quarterly* 65, no. 1 (January 1979): 72–82; and Edward Rothstein, *Emblems of Mind: The Inner Life of Music and Mathematics* (New York: Avon, 1995), 135–89.