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Experiments with Melody and Meter, or The Effects of Music: The Edison- Bingham Music Research

Eleanor Selfridge-Field

Among his 1,093 patented inventions, Thomas Alva Edison (1847–1931) took the greatest personal pride, in his later years, in the phonograph. Between the invention of the tin-foil model in 1877 and the advent of the Diamond Disk in 1912, recording technology on both sides of the Atlantic had stumbled through a series of transitions. The Edison Phonograph Company, launched in 1888, had many progeny. Among the series of companies later formed under the same aegis, only the National Phonograph Company, started in 1892, endured until Edison's last years.¹

Competition for sales, chiefly from the Victor and Gramophone companies, increased in the first decade of the twentieth century as attention became focused on the cultivation of a home market (earlier demonstrations of the phonograph had usually been given for public assemblies). In the interest of seeing his company prevail, Edison became increasingly involved (some would say obsessively so) in deciding what should be recorded. In 1912, he took complete charge of all recording auditions and decisions. Management of recording operations must have consumed most of his waking hours over the next decade of his life, since he auditioned approximately 120,000 test recordings. By the time the National Phonograph Company closed its doors on 2 November 1929 (two days before the crash of the New York stock market), the Edison recording enterprise had pressed, under its various labels, more than 30,000 titles.²

In the early years of phonography there was no "natural" market for the product. At first, the phonograph was considered to be a medium for the dissemination of speech.³ Hypothetically, it could deliver public messages, take dictation, play recorded books for the blind, and serve as a vehicle for advertising.⁴ Edison foresaw in the phonograph a potential instrument of educational reform: listeners could hear the words of great thinkers and writers. Through the *Edison Phonograph Monthly*, published from 1903 to 1922,⁵ many additional uses were suggested through user testimonials. Among these were the teaching of languages by "correspondence," giving speeches in absentia, assuaging loneliness on oceanic voyages and Arctic

expeditions, and luring rabbits into the sights of hunters by playing the recorded sounds of their prey—ferrets. (The mechanical models then in manufacture made their use in remote places practical; later electrical models curtailed the travels of the phonograph.)

Through what might be called the construction of the musical purposes of phonography, the company's influence on perceptions of musical experience and on American musical aesthetics was profound. Competing record companies also bore much influence here; their contributions must await later discussion. In the case of the National Phonograph Company, Edison's confidence in his own abilities to judge music was extreme, especially considering the fact that he had suffered from a serious hearing impairment since the age of twelve.

In 1920 the National Phonograph Company contracted with a young psychologist, Walter Van Dyke Bingham (1880–1952), to fund a series of experiments. The history of this collaboration is documented in the archive of the Edison National Historic Site.⁶ It was within the context of the company's unending search for what today might be called “greater market penetration” that this sponsorship of music research occurred.

Predictably, the arrangement foundered on quarrels over purpose. Bingham's early intellectual inclination toward cognitive questions and Edison's practical interest in behavioral ones never entirely converged. Common ground was ostensibly found in a series of studies of “the effects of music.” The main areas explored, during two years of experimentation, were three topics described as song-selection research, mood-change research, and the influences of music on muscular activity. The first also engendered a fourth: dance-selection research.

Bingham's Early Studies

As an undergraduate at the University of Chicago from 1905 to 1907 and a graduate student of psychology at Harvard University in 1907–8, Bingham had been involved in experiments related to theories of melody. His collected *Studies in Melody* appeared as a monograph supplement to the *Psychological Review* in 1910.⁷ At the time of this publication, Bingham was an instructor in educational psychology at Teachers College, Columbia University. His studies are grouped into four parts but essentially concern two topics: what Bingham calls “the melody problem” and the effects of melodic “stimuli” on motor movement. Ultimately he was concerned with a theoretical question: why do certain sequences of tones seem to cohere to achieve a sense of “melodic unity” while others do not?

The melody problem was partly philosophical and partly psychological: Bingham wished to determine "how a series of discrete tonal stimuli generate the experience of melodic unity." He explored pitch relationships and inflections of various kinds and introduced the concept of "melodic trend," in which certain sequences of tones end more satisfactorily ("better") on the upper tone and others "better" on the lower tone.⁸ He eventually brought his inquiry into the context of tonality, which he considered to be an "attitude" that is "probably motor at basis."⁹

His experimentation on melodic stimuli involved finger tapping on a special piece of apparatus (Fig. 1). He ascertained that the height, form, and amplitude of finger tapping "in a vertical direction" varied with the size and direction of melodic intervals. In a series of experiments he used progressively longer sequences of pitches. Auditory experiments involving the relationship of single tones to chords, foreshadowing the work of Carl Seashore (1866–1949) and others, were also run.¹⁰ In conclusion, Bingham compared motor phenomena of "melody" (by which he meant pitch sequences) and rhythm.¹¹ In this endeavor he mainly sought to find common ground between the two.

These excerpts give the flavor of his conclusions:

[A] motor theory of melody makes possible an unambiguous statement of the nature of melodic "relationship." Two or more tones are felt to be "related" when there is [a] community of organized response. . . .

The origin of . . . feelings of "relationship" [may be attributed to] two main forces. . . . The first of these, the phenomenon of consonance, is native. . . . But although the basis for consonance inheres in the inborn structure of the nervous system and the acoustical properties of vibrating bodies, nevertheless it is a commonplace of musical history and observation that these same native tendencies are subject to tremendous modification in the course of experience. . . .

[T]he associative factor . . . is directly efficient in determining what tones shall be felt as "related," quite apart from any effects which it has upon judgments of consonance. Mere custom, mere habituation . . . results in a facility of recognition and response which is capable of generating these feelings of "relationship." . . . The "relationship" is . . . traceable to the motor phase of the process. . . .

The unity, then, which marks the differences between a mere succession of discrete tonal stimuli and a melody, arises not from the tones themselves: it is contributed by the act of the listener. . . . when, finally, the series of tones comes to such a close that what has been a continuous act of response is also brought to definite completion, the balanced muscular "resolution": [this] gives rise to the feeling of finality, and the series is recognized as a unity, a whole, a melody.¹²

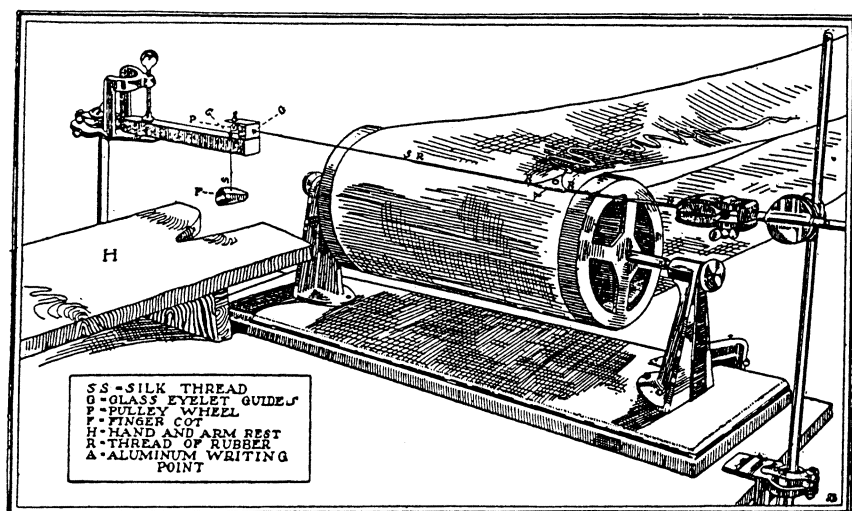


Figure 1. Bingham's apparatus for finger-tapping experiments. The right hand rested on the glove-shaped platform H. The index finger was placed in the "cot" F, which was connected by a silk thread to an aluminum writing point. A seismograph-like recording of activity was produced on the paper continuously fed by the roller. Reproduced from *Studies in Melody* [1910], 44.

Bingham's conception of "unity . . . contributed by the act of the listener" is prescient in its anticipation of structuralism and theories of musical cognition. Indeed, we might fruitfully contemplate how much of the preoccupation with form in twentieth-century discussions of the arts has been prompted by the access to experiences of wholeness provided by phonographs, cameras, and other devices that facilitate repeated exposures to the same work, through which such abstract notions can be grasped. At the same time, Bingham's notion of "muscular" participation in the conception of tonal closure must be regarded as a metaphor of that time that can only be considered inappropriately disjunct in this. Such observations might have better suited an era in which most musical experiences were engendered by live performance.

In later years Bingham was to wield considerable force as an industrial psychologist; his many later achievements suggest that he was a most persuasive figure. His aptitude tests were influential in determining the career choices of millions of Americans schooled in the 1930s, 1940s, and 1950s, when the societies that he founded and the publications he edited flourished.¹³ His aptitude test for music directed those with the highest

scores to become conductors; those with the lowest were to become lawyers!

Bingham's Song-Selection Research

At some time during the second decade of the century Bingham moved to the Carnegie Institute of Technology¹⁴ in Pittsburgh as an assistant professor of applied psychology. In 1920 a plan to use phonographs to broadcast messages about exhibits in the nearby Carnegie Museum was proposed to the Edison company by the assistant director of the Department of Fine Arts, Robert Harshe. The museum's "educational plan" was envisioned as a model that could be widely copied, so, inevitably, the Edison company was interested.

It is not clear from surviving correspondence that the museum plan was ever carried out, but Bingham apparently heard of it and devised a differently motivated proposal for the use of Edison equipment.¹⁵ Rarely do we reflect on the extent to which the availability of recorded music may have influenced the kinds of questions that researchers could pursue. It is doubtful, however, that Bingham would have used recorded music in his previous research.

The common ground that Bingham believed to exist between his research interests and the interests of the National Phonograph Company consisted of a need to study "the effects of music." Bingham's original goal was to find criteria for identifying systematically those recorded musical works that best served a variety of beneficial purposes. From the point of view of the National Phonograph Company, this was market research that could be translated into a list of items in the Edison catalog that would have wide public appeal. Company officials believed that once such a list was compiled, it would be a simple matter to identify and record more items with the same musical characteristics.

The first result of this collaboration was an announcement, made by Bingham on 13 October 1920, of the establishment of the Thomas A. Edison Prize for the "most meritorious research on THE EFFECTS OF MUSIC [to be] submitted to the American Psychological Association before June 1, 1921." The amount of the award was to be \$500. The working vocabulary of psychological research around 1920 is very much in evidence in the list of "appropriate subjects" for submission, which included the following items:

1. Classification of musical selections according to their psychological effects.
2. Individual differences in musical sensitivity.

3. Types of listeners.
4. Validity of introspection in studying affective responses to music.
5. Modification of moods by music.
6. Effects of familiarity and repetition: emotional durability of various types of selections.
7. Effects of contrasting types of music on muscular activity.
8. An experimental study of music as an aid in synchronizing routine factory operations.

When these goals were reviewed by the recording company, however, the projected results seemed too little directed toward practical development to suit Edison. William Maxwell, a company vice president who seems to have been far more enthusiastic than his employer, wrote on behalf of the firm to Bingham on 29 October 1920 that

We should be very much disappointed if the research work, on which you have been engaged and which we hope it may seem advisable to continue throughout next year, should yield, as its principal result, nothing of greater importance than a classification of our Re-Creations,¹⁶ differing so little from the classifications already in use by the talking machine manufacturers, that the average person would not appreciate the difference. . . .

We hope, as a result of your work, to get ahold of some big thought, predicated on the realism of the New Edison, which can be developed along large lines in our advertising and sales promotion work and which, after being thus presented to the public, can be incorporated in our Re-Creation catalogue as the dominating thought.¹⁷

A handwritten note of the following day to Edison says, "Dr. Bingham is becoming too commonplace and I am trying to get him up in the clouds again."¹⁸ Edison's response, appended to his copy of the letter, indicates how little confidence he had in the arrangement: he returned the note with the comment, "Maxwell=You will end in throwing all these things in the wastebasket after infinite trouble and irritation."

Matters became more complicated with the involvement of the Federal Advertising Agency of New York. On 30 October, Bingham's commitment was assigned a new meaning in a letter from this agency.¹⁹

"What Mr. Maxwell would like to get from you . . . is a classification of present Edison Re-Creations on the basis of the moods which they produce." Although the author concluded that Bingham's work claimed "the intense interest of all of us," Edison wrote on the file copy forwarded by Maxwell that he "doubt[ed] the real ability of professors to do anything of use in this line."

Bingham forthwith produced a report²⁰ of progress on what he now termed the “Edison-Carnegie Music Research” project. In it, Bingham said that the purposes of the project were to

1. “add to the present very limited store of exact, scientific knowledge regarding the effects of different kinds of music [and]
2. help in the wider dissemination throughout America of these musical emotional values, by making available . . . such results . . . as may be useful . . . in bringing the public to . . . want these emotional effects of music which Mr. Edison has made accessible to them.”²¹

Bingham was confident that “the different aims of our research” (i.e., Bingham’s research and Edison’s commerce) would “interlock.” He proposed that the 700 Re-Creations then available be divided into three categories: those with a “marked . . . effect of some sort, as quieting, or stimulating, &c.”; those whose effects were doubtful or variable; and those with no effect at all on feelings and emotions.²² As for his own research, Bingham listed as works in progress:

1. A study of the measurement of individual differences and group differences of affective reaction to Re-Creations of music, in which uniformity of response would be judged.
2. A study of the effects of repetition on emotional effects of Re-Creations, in which the intention was to determine how long it took subjects to grow weary, or at least to fail to respond emotionally to a given piece.
3. The development of a new method of teaching musical appreciation in “universities, conservatories, high schools and music clubs, by getting the learners to make systematic comparisons of selections with attention directed toward the nature of their appeal . . . instead of studying musical form and [the] history of music.”
4. A thoughtful article by Mr. Follett²³ on the general subject of musical effect, for publication in *The Atlantic*.
5. A list of suggested selections to be recorded on account of the superior strength of their appeal.²⁴

Bingham referred to the expiration of “our work with you” by 1 February (1921) and expressed the hope that his research would produce “new information about the power of music over men’s minds and moods.”²⁵ In accompanying material, Bingham asserted that “the best sellers are the selections that exert the strongest effects on the emotions, mood and actions of the listener.”²⁶ He discussed music that was quiet, music that was stimulating, and “heart” (i.e., sentimental) songs. Then he revealed that “To continue the original investigation of the effects of music and to

round it out with those essential supplementary researches on prediction of sales, I should like to have available for the year beginning February 1, 1921, an appropriation of \$15,000.”²⁷

Bingham traveled to Orange, New Jersey, to defend his plan. He met with his critics on 9 November 1920. The following day Maxwell wrote an optimistic report to Edison. He believed that Bingham’s position paper, entitled “What Music Will Do for You,”²⁸ could be developed “into a very big selling point.”

Maxwell’s Mood-Change Chart

Because of Bingham’s tardiness in pinning down details that could be related to specific recordings, Maxwell took it into his own hands to develop a “Mood Change Chart” that could be used to document auto-assessments of response to designated works in the Edison catalog. This chart was to appear in the January–February 1921 issue of the *Edison Magazine*.²⁹ Maxwell passed on to Edison a copy of the Thomas A. Edison Prize announcement, which, he had learned, was attracting “a great deal of interest.” He further reported, on the basis of Bingham’s claims, that there were prospects for the research collaboration of Columbia, Dartmouth, and Johns Hopkins universities. The point Maxwell most wanted to communicate was that “if we can thoroughly sell the idea that the big thing about music is how it makes you feel, I think that we shall have done a good deal to counteract the influence of artist exploitation.”³⁰

Having gained Bingham’s approval for the Mood Change Chart, Maxwell then appears to have consulted Edison on appropriate subjects for public experiments. Edison made the general observation that “the most sophisticated man in New York” would be “an ideal subject . . . because he [would] be the least susceptible to emotion.” Edison selected the famous detective William J. Burns to be the first subject, and on 15 November Burns duly became Subject no. 1. The chart he completed has been preserved (Fig. 2). As reported here, Schumann’s “*Träumerei*” caused Burns’s mood to change from “serious” to “care free,” while “*Alice Blue Gown*” further elevated his mood from “care free” to “gay.”

The company used this chart in a New Edison promotion that invited the general public to record their own mood changes using, if necessary, equipment in their dealers’ shops. In provisional copy produced by the Federal Advertising Agency,³¹ it was stated that “Mr. Edison needs thousands of these charts because his research work must be conducted on the law of averages.”

In academic realms, the challenge was taken up at Yale University during the following spring. In fact, tests were administered to twenty-six

MOOD CHANGE CHART

An Analysis of Your Mental Reactions to Music, as RE-CREATED by the
New Edison, "the Phonograph with a Soul."

Date of Test Nov 15th 20

1. Place Edison Shop
(Home or Where)

2. Time (Mark X in square)
Morning ☐ Afternoon ☒
Evening ☐

3. Weather (Mark X in square)
Dull ☐ Cold ☒
Bright ☐ Warm ☐

4. What kind of music did you
feel like hearing? (Mark all words
which describe such music with X in square).

Tender ☐ Vivacious ☐ Joyous ☐
Solemn ☐ Majestic ☐ Weird ☐
Soothing ☒
Martial ☐ Exciting ☐ Gay ☐
Simple ☐ Dreamy ☐ Sad ☐

5. What was your mood im-
mediately preceding test?
(Mark X in square)

Serious or ☒ Worried or ☐
Gay ☐ Carefree ☐

Depressed or ☐ Nervous or ☐
Exhilarated ☐ Composed ☐

Fatigued or ☐ Sad or ☐
Unfatigued ☐ Joyful ☐

Discouraged ☐
or Optimistic ☐

6. As a result of the test, what were your most noticeable mood
changes?
(Serious to gay, gay to serious, worried to carefree, nervous to composed, etc.)

MOOD CHANGE	RE-CREATION CAUSING SUCH CHANGE
<u>Serious</u> to <u>Carefree</u>	<u>Träumerei</u>
<u>Carefree</u> to <u>Gay</u>	<u>Alice Blue Gown</u>
_____ to _____	_____

7. Please comment on manner in which mood changes occurred:

Leaves from a very serious conference
and noted the fact that listening to
the music produced on The Edison new

Please fill in, sign and hand to
Edison dealer.

MUSIC RESEARCH DEPARTMENT
EDISON LABORATORIES
ORANGE, N. J.

Signed Wm. J. Burns
Address _____

(SEE INSTRUCTIONS ON REVERSE SIDE)

Figure 2. The Mood Change Chart completed by the detective William J. Burns after listening to Edison recordings of "Träumerei" and "Alice Blue Gown." Reproduced from copy in the archive of the Edison National Historic Site and used by permission.

students of the psychology department in a musical program presented on the afternoon of 19 May 1921. The selections offered and the performing groups represented were:

- | | |
|--------------------------------------|-------------------------|
| 1. Triumphal March (<i>Aida</i>) | Sodero's Band |
| 2. Cavatina [by Raff] | Albert Spalding, violin |
| 3. Sally [by Kern] | Raderman's Orchestra |
| 4. Perfect Day [by Bond] | Anna Case, soprano |
| 5. Medley of American Patriotic Airs | New York Military Band |

Reports appeared in the *New Haven Journal Courier* and the *New York Sun* the following day.³² A subhead in the *Journal Courier* read, "Patriotic and Merry Tunes . . . Plainly Affect Feelings."

Matters took a new direction in the account that appeared in the *Sun*. This article reported that "music may become useful in treating human maladies." It continued: "The day may come, it is predicted at Yale, when pneumonia will be treated not only with open windows and malted milk but by a few disks of dreamy waltz music. If a man breaks his arm and is restless, a battle march or possibly a line of comic opera may be fed out to him after each meal." A further piece on the Yale experiment, which appear in the *Journal Courier* on the 22nd, elaborated on this idea by stating that "the principal effort of the tests was to determine what kinds of music may be applied in treating neurotic patients."

Back at the Edison Company, there was concern that "the men who participated in the [Yale] experiment are so much above average in intelligence, that the results will not be typical."³³ Here, in fact, a populist definition of artistic success is offered. Maxwell writes, "I have become pretty well convinced that nothing is a masterpiece in music, literature, or art, unless it is capable of appealing to all types of people. If a thing requires education, before it can be appreciated, I doubt if it is a masterpiece." Maxwell wrote on the same day to Bingham³⁴ asking him whether it would be feasible for him to "make a special analysis" of the charts from Yale.

Although it would appear from the large number of mood-change charts that were printed that other experiments of this kind were run, no evidence of their widespread distribution or completion has been found.

The Influences of Music on Muscular Activity

Bingham's early interest in the influence of music on muscular activity seems not to have been pursued directly, but the Yale mood-change work

did lead to speculation on the question. An internal company report of 1920 makes it clear how the two interests were seen to have become intertwined in the reports of the Yale experiment. An Edison agent named De Forest wished to convey the news that “a Mr. Betzler, one of the physical directors³⁵ at the Y.M.C.A. College at Springfield, Massachusetts, had achieved signal success in relieving and curing cases of infantile paralysis [polio] with a treatment he had originated which included music [played] through an Edison Phonograph.”³⁶

According to Betzler’s account, he had been involved in the treatment of paralysis for some sixteen years and for the past four had been using recorded music therapeutically. He selected the Edison phonograph over other models for its tone quality and its easy operability. He complained that hearing scratches had a negative effect on patients. Betzler provided several case histories to document his success. In particular, he mentioned his successful work with “a noted Harvard athlete,” Horace Quimby, who had been in treatment for four months to reverse the effects of polio.

De Forest tried with little success to learn which Edison recordings were used in Betzler’s treatments. The nearest to hand was something called “Crescendo,” played by the Hungarian Orchestra (one of the numerous pickup groups convened in the Edison recording studios). Betzler was evasive about specific titles, thus denying the company the possibility of promoting them as curative.

In treatment requiring muscular stimulation, Betzler said, “we use soft easy music to begin with and change the music to more stimulating effects as the case progresses. . . . I am convinced that music plays a tremendous part in the treatment I give.” Betzler was, however, a man of great modesty and refused to let verbal accounts of his work be used in advertising copy, much to the company’s further dismay.

Gatewood’s Dance Research

In his initial contacts with the company, Bingham had forwarded “a study of dance music” that was made with the help of members of two professional societies, the National Association of Dancing Masters and the International Association of Dancing Masters. It was pointed out that

[t]hese people may be counted on to help push the sale of records. . . . They want dance records that excel both as dances and as music, and in certain re-creations we have found a happy combination of these two elements. A prepared list of these selections, which are superior to dance to and also superior to listen to, should be accessible to the retail sales-people. . . . If we will curtail the widespread use of poorer dance music

through emphasis on the production and sale of the *best* dance records, rapid advances can be made toward establishing a finer type of dancing than now prevails.³⁷

The “Studies of Dance Music” to which Bingham refers was that of Esther L. Gatewood, at Teachers’ College, Columbia University. In his letter Bingham recommends that “such an analysis as that described in this paper” be used to determine which selections would meet the dual criteria of listening and dancing value.

Gatewood’s research was in fact much more specific than Bingham’s. According to her report,³⁸ several dancing masters “of repute” verified that “the use of the phonograph is quite as satisfactory for dancing . . . as music played by the instruments directly” and opposed the view that “the volume is not adequate [nor] the rhythm . . . as marked.” Dancing masters were in “favor of the study and proper classification of dancing records,” she maintained. Gatewood conducted an experiment in which lists of fourteen waltzes, twenty-two one-steps, and twenty-six fox-trots were circulated to a group of dancing masters throughout the United States. From twenty-five responses, she was able to identify from the Edison catalog the five “best” waltzes, one-steps, and fox-trots.

Best waltzes:³⁹

Record	Title	Words and Music	Date of publication
50511	“Beautiful Ohio”	Ballard Macdonald and Mary Earl	1917, 1918
50397	“Mighty Lak’ a Rose”	Frank L. Stanton and Ethelbert Nevin	1901
50291	“Perfect Day”	Carrie Jacobs Bond	1910
50544	“Djer-Kiss Waltz” ⁴⁰	Matthew Woodward; Sam and Lee Schubert	1911?
50397	“Waters of Venice”	Neville Fleeson and Albert von Tilzer	1918

Best one-steps:

Record	Title	Words and Music	Date of publication
50535	“Me-ow”	Harry D. Kerr and Mel Kaufman	1919
50527	“Arabian Nights”	M. David and William Hewitt	1918
50521	“Sand Dunes”	Byron Gay	1919
50458	“Rambler Rose”	Harry B. Smith and Victor Jacobi	1917
50567	“Razzle-Dazzle”	“Thompson”	1888

Best fox-trots:

Record	Title	Words and Music	Date of publication
50496	"Smiles"	J. Will Callahan and Lee S. Roberts	1917
50479	"Indianola"	S. R. Henry and D. Onivas	1917
50544	"Egypt Land"	Costello and Casey	1919
50567	"In My Daddy's Arms"	[no print identified]	?
50511	"City of Dreams"	[no print identified]	?

Excerpts from the no. 1 waltz, "Beautiful Ohio," and the no. 1 fox-trot, "Smiles," are shown in Examples 1 and 2.

Gatewood repeated the survey with twelve graduate students, "all of whom were fond of dancing." The original results were confirmed with only minor exceptions. Among these, "Waters of Venice" was not judged to be "good music," although it was good to dance to. "Rambler Rose" was not judged good to dance to. In both cases opinions differed more widely for fox-trots and one-steps than for waltzes. Gatewood attributed this principally to the more secure place of the waltz in the dance repertory and the corollary familiarity of the dance form.

Gatewood also attempted to adduce from a detailed study of these works which musical attributes most contributed to their success. She prefaced her concluding observations with these thoughts: "It seems evident that music which is good for dancing must have certain good musical attributes as well. This does not mean that compared with all the music produced, it is among the best to which to listen, any more than it means that good music to which to listen is also good for dancing. It means however, that the best music for dancing does have certain good musical characteristics."⁴¹ Among her specific desiderata (here taken from her summary) were these:

1. a rhythm which is not exaggerated and which becomes an intrinsic part of the melody;
2. regular accent which depends not upon the mechanical beat of the drums, but upon the rise and fall of the melody pattern;
3. a rather simple idyllic melody, one which is easily caught by the listener, so that it soon has a familiar but not a boring sound;
4. decided harmony, usually of the alto voice, woven in with the melody and not supplied by the accompaniment;
5. dance figure that follows a more or less well defined pattern, readily followed by the dancer, but still interesting enough to lend itself to variety in the dance figures used;

Chorus
p a tempo

Drift - ing with the cur - rent down a moon - lit stream While a - bove the

p a tempo

mf

Heav - ens in their glo - ry gleam And the stars on high

dim. *p*

Twin - kle in the sky Seem - ing in a Par - a - dise of

dim. *p*

love di - vine Dream - ing of a pair of eyes that looked in mine Beau - ti - ful O -

hi - o, in dreams a - gain I see Vi - sions of what used to be.

Example 1. Excerpt from "Beautiful Ohio" (words by Ballard Macdonald, music by Mary Earl). New York: Shapiro, Bernstein, and Co., 1918. The company also advertised arrangements for "full orchestra, military band, song, song orchestration, and male quartet."

Refrain

There are smiles _____ that make us hap - py, _____ There are smiles _____

_____ that make us blue, _____ There are smiles _____ that steal a - way the

tear - drops. _____ As the sun - beams steal a-way the dew, _____ There are

smiles _____ that have a ten-der mean - ing _____ That the eyes _____ of love a-lone may

Example 2. Excerpt from "Smiles" (words by J. Will Callahan, music by Lee S. Roberts). Detroit: Jerome H. Remick, 1918.

see, _____ and the smiles _____ that fill my life with sun - shine _____

_____ Are the smiles that you give to me _____ me _____

Example 2. Continued

6. movement as a part of the music itself, stimulating not too marked a rise and fall in the strain-relaxation feeling of the dancer; and
7. musical quality, whether it be considered as the proper blending of these qualities or the presence of the other unanalyzed factors which lend something of interest and beauty.⁴²

Perception of the first three qualities is largely subjective; the fifth and sixth require kinesthetic validation; the seventh is summary. The fourth is disputable: the concept of “alto voice” as a component of “decided harmony” might refer, in “Beautiful Ohio,” for example, to the predominating use of parallel thirds in the right hand of the piano accompaniment, but in the parallel octaves in the accompaniment of “Smiles” there is no obvious “alto voice.” Thus Gatewood’s results do not readily confirm her theories.

Since she does not give a corresponding list of the original pool of recordings used, there is no way to judge the relative accuracy of her observations with respect to highly ranked works as distinct from the remaining works in the pool. Her efforts to pin down specific features that contribute to the attractiveness of music do nonetheless merit interest because, apart from the voluminous promotional copy of record catalogs, few people before her attempted to create such profiles on the basis of recorded sound.

Conclusion

On 2 February 1922, Maxwell wrote to Charles Edison, one of the inventor's five sons,⁴³ suggesting that for the funding cycle beginning 1 March, \$5,000 be appropriated for the Carnegie Research and \$10,000 be channeled via Bingham to "school research."⁴⁴ It appears that Charles Edison consented to this arrangement but his father did not.⁴⁵ Maxwell wrote to Bingham on the 27th, "I am very sorry to say that Mr. Edison has determined to discontinue the research work and the school research work. I had hoped for a different decision."⁴⁶

Anticipating this result, Maxwell had recently reminded Bingham, consolingly, that he stood to earn royalties from his books, and as for the company, "the psychological effects of music represent a field in which we are the leaders."⁴⁷ This supposed leadership was ephemeral, however. The *Edison Phonograph Monthly*, the company's chief vehicle for the education of its sales agents, was terminated more or less concurrently with the February 1922 issue. While the company continued to improve its recording techniques throughout the 1920s, its efforts to promote recorded music on the basis of its beneficial effects ceased.

Notes

Portions of this paper have been presented in talks given before the industrial affiliates of Stanford University (May 1994), at the annual meeting of the Society for Music Perception and Cognition (University of California at Berkeley, June 1995), and at Harvard University (April 1996). Responses from and informal discussions with Lola Cuddy, Carol Krumhansl, and Leonard Meyer have been especially helpful.

1. A number of very fine studies on the development of the technology are available, among them, Walter L. Welch and Leah Brodbeck Stenzel Burt, *From Tin Foil to Stereo: The Acoustic Years of the Recordings Industry (1877–1929)* (Gainesville: University Press of Florida, 1994; this work succeeds Oliver Read and Walter L. Welch, *From Tin Foil to Stereo: Evolution of the Phonograph* [Indianapolis: H. W. Sams, 1959]), which gives a concentrated view of the period examined here. Roland Gelatt's classic retrospective of the industry during its first century, *The Fabulous Phonograph, 1877–1977*, 2d ed. (New York: Macmillan, 1977), is highly recommended.

2. The definitive title list is that of Raymond R. Wile, comp., *Edison Disc Artists and Records, 1910–1929*, ed. Ronald Dethlefsen (Brooklyn: APM Press, 1985). The 30,000 published items represented an acceptance rate of approximately 50 per cent. Each submission consisted of two parts: a recording of the actual "selection" and a recording of the performer(s)' scales. The latter was used to evaluate acoustical problems related to timbre and technique.

3. In fact, it was Edison's earlier invention of the microphone that made production of Alexander Graham Bell's telephone, originally conceived as a hearing aid for the latter's deaf sister, practical.

4. John and Susan Edwards Havrith, *Edison, Musicians, and the Phonograph: A Century in Retrospect* (New York: Greenwood, 1987), 1. In later years, Edison envisioned the phonograph as an audition tool for concert organizers, who would be able to choose the singers and the repertory that seemed best suited to their needs.
5. Initiated as the *Edison Amberola Monthly* in March 1903, this publication appeared under various names, chiefly as the *Edison Phonograph Monthly*. The first fourteen volumes (through Jan. 1917) were reissued between 1976 and 1989 by Pennant Lithograph (Louisville, Ky.). Copies of the remaining volumes (through Feb. 1922) are currently scarce.
6. Many thanks are due to Douglas Tarr of the archive of the Edison National Historic Site for his diligent assistance in locating and providing access to the documents cited here. The archive is located at the site of the old Phonograph Works in what was then Orange, New Jersey (now West Orange). Edison's home, Glenmont, is nearby. Some of the documents cited were uncataloged at the start of this study and others were in course of being recataloged during my most recent visit, but the organization is systematic and materials seem to be easily retrievable even after slight alterations to the numbering.
7. *Psychological Review* 12, no. 3 (Jan. 1910): 1–88.
8. These questions are laid out in the first study. In the second, experimental results are presented and discussed.
9. On this basis, he then reformulates the original problem (41).
10. Although Seashore was older than Bingham, his studies on the psychology of music postdated those of the younger man. Prior to the *Psychology of Music* (New York: McGraw-Hill, 1938; reprint, New York: Dover, 1967), Seashore's main writings in this field were *The Psychology of Musical Talent* (Boston: Silver, Burdett and Co., 1919) and his *Manual of Instructions and Interpretations for Measures of Musical Talent*, produced for a National Phonograph Company rival, the Columbia Graphophone Company, also in 1919. In 1910, however, Seashore was the chair of the committee of the American Psychological Association that produced a report on "the standardizing of procedure in experimental tests." Like Bingham's *Studies in Melody*, this report was published in 1910 by the Review Publishing Company in Lancaster, Pennsylvania. This suggests that Seashore was acquainted with Bingham's early work and approved of Bingham's experimental methods.
11. Bingham, 81.
12. Bingham, 81–88. Bingham's work refers to earlier writings of Theodor Lipps, "Zur Theorie der Melodie," *Zeitschrift für Psychologie* 27 (1902): 237ff.; Lipps, *Grundlegung der Aesthetik* (1903); Max Meyer, "Elements of a Psychological Theory of Melody," *Psychological Review* 7 (1900): 241–73; Meyer, "Experimental Studies in the Psychology of Music," *American Journal of Psychology* 14 (1903): 456ff.; Meyer, "Unscientific Methods in Musical Esthetics," *Journal of Philosophy, Psychology, and Scientific Methods* 1 (1904): 711ff.; R. H. Stetson, "Rhythm and Rhyme," *Psychological Review Monograph Supplement* 4 (1902): 413ff.; Stetson, "A Motor Theory of Rhythm and Discrete Succession," *Psychological Review* 12 (1905): 250ff.; and F. Weinmann, "Zur Structur der Melodie," *Zeitschrift für Psychologie* 35 (1904): 340–79. It also makes reference to the Ellis translations (1895) of Helmholtz's *Sensations of Tone*. Meyer and Stetson both appear to have been associated with Harvard University at the time these studies were conducted.
13. Bingham was the author of numerous books that enjoyed many editions. Among them were *Procedures in Employment Psychology* (Chicago: A. W. Shaw, 1926), *Psychology*

Today (Chicago: University of Chicago Press, 1932), and *Aptitudes and Aptitude Testing* (New York: Harper and Bros., 1937).

14. The forerunner of Carnegie-Mellon University.
15. Bingham's first approach to the company was in a letter of 5 May 1920 addressed to Mr. [William] Maxwell, a company vice president.
16. "Re-Creations" were recordings.
17. Edison Archive, Phonograph Division, Box 71, letter of 29 Oct. 1920 from "WM" to M. V. Bingham. The New Edison was a phonograph model.
18. Box 71, note of 30 Oct. from Maxwell to Edison.
19. The author, "HE," relates that he had a "pretty hot half-hour" defending Bingham's work, in the absence of a written report, to Maxwell, Mahin, and Nixon of the Edison Company. He wrote, "I was unable to tell him anything about the progress you had made in this direction."
20. Box 71, report of 1 Nov. 1920 (hereafter cited as Progress Report).
21. Progress Report, 1.
22. Progress Report, 3–4.
23. It has not been possible to determine Follett's identity.
24. Progress Report, 4–6.
25. Progress Report, 7.
26. Progress Report, 11.
27. Progress Report, 12.
28. No copy of this paper has been located.
29. This was a bimonthly publication that served primarily as a catalog of new releases and presented photographs of new available models of equipment.
30. Box 71, letter of 10 Nov. 1920 from W. Maxwell to Edison. The phrase "artist exploitation" referred to the Edison Company's preference for perpetually fresh talent, in contrast to the practice of the Victor Company to put performers, especially opera singers, on long-term contracts. Edison regarded performers as incidental to musical performance and contracts as an unnecessary nuisance. The true performer was, in his mind, the "reproduction equipment." Only from 1915 did performers' names appear on National Phonograph record labels. In the 1920s the Victor Company was dominating sales, despite the greater expense of these contracts and the sometimes less sophisticated nature of its equipment. In addition, the advent of radio broadcasting was cutting into the record sales of both companies, for it enabled mass listening, and this required only a single recording owned by a broadcast studio.
31. Box 71, draft of 17 Nov. 1920.
32. These were duly sent on to the company by phonograph dealers, particularly the Pardee-Ellenberger Company in New Haven, who had made arrangements in March to make equipment available for the study (Edison Archive, Box 71, letter of 28 Feb. 1920 from W. O. Pardee to Wm. Maxwell; letter of 2 Mar. 1920 from "WM" to W. O. Pardee). This dealership was one that had figured prominently in promotional affairs dating back at least to 1903.

33. Box 71, letter of 26 May 1921 from "WM" [William Maxwell] to H. W. Rogers.
34. Box 71, letter of 26 May 1921 from "WM" to W. V. Bingham.
35. That is, a physical therapist.
36. Written by C. H. De Forest to W. O. Pardee of the New Haven franchise, Box 71, letter of 27 Feb. 1920.
37. Edison Archive, Box 71, letter of 5 May 1920 from W. V. Bingham to W. H. Maxwell.
38. [Esther L. Gatewood], "An Analytic Study of Dance Music," typescript in the Edison Archive, Box 71, [1922].
39. The lists are given in "An Analytical Study," 2–3. The ciphers "50" are omitted for items after the first in each list. I have provided the names of lyricists and composers as well as the dates of publication. "I'm Forever Blowing Bubbles" narrowly missed the short list of waltzes.
40. Possibly "Kiss Waltz," from a Viennese operetta of 1911.
41. "An Analytical Study," 6. Each attribute is considered in greater detail in preceding commentary.
42. "An Analytical Study," 6f.
43. Charles Edison was later the governor of the state of New Jersey.
44. This latter reference was to the dance research of Drs. Farnsworth and Gatewood at Columbia. Maxwell had written to Esther L. Gatewood the previous day requesting a meeting on the 15th.
45. Box 71, letter of 11 Feb. 1922 from "WM" to W. V. Bingham. Maxwell wrote to Gatewood on the 11th requesting a report in lieu of the previously arranged meeting. She responded on the 13th (Box 71, letter of Esther L. Gatewood to Mr. William Maxwell) with a list of concerns, including the observation that "handling the work through Pittsburgh has proved quite a handicap."
46. Box 71, letter of 27 Feb. 1922 from "WM" to W. V. Bingham.
47. Box 71, letter of 2 Feb. 1922 from W. Maxwell to Chas. Edison.