

Music in Theory and Practice: A Behavioral View[†]

by
Jay Rahn

If one regards a theory of music merely as a framework for studying music, then one might acknowledge that several such theories have already been advanced. The attempts of Guido Adler, Hugo Riemann, Frank Harrison, Claude Palisca, Mantle Hood, Alan Merriam and Charles Seeger are among the better known recent efforts to construct a unified framework for the study of music.¹ However, such attempts have resulted in views that are somewhat eclectic and disjointed: eclectic, in that there appears to be no particular unity among the various components of the individual frameworks, and disjointed, insofar as relations among the various components of the

[†] I wish to thank J. D. Keehn of the Psychology Department, Atkinson College, York University for his many detailed suggestions on the first draft of this study. Any flaws that have survived his close scrutiny are my own.

¹ Guido Adler, "Umfang, Methode und Ziel der Musikwissenschaft," *Vierteljahrschrift für Musikwissenschaft*, vol. 1, no. 1 (1885), pp. 5-20; Hugo Riemann, *Grundriss der Musikwissenschaft* (Leipzig: Verlag Quelle und Meyer, 1914); Frank Ll. Harrison, Mantle Hood and Claude V. Palisca, *Musicology* (Englewood Cliffs, N. J.: Prentice-Hall, 1963); Alan P. Merriam, *The Anthropology of Music* (Evanston: Northwestern University Press, 1964), pp. 17-35; Charles Seeger, "Toward a Unified Field Theory for Musicology," *Selected Reports*, vol. 1, no. 3 (1970), pp. 171-210. The latter lists several other efforts in the same vein.

individual frameworks are far from clear. Such endeavours also do not meet the needs that I would envision for a theory of music in that they largely ignore the connection between theory and practice. By contrast, in the present study, I advance a theoretical outlook that, I hope, is more thoroughly unified and integrated and that bears directly on the practice of music.

Behaviorism.

An important feature of the outlook which I develop here is that it adopts a stance which seems to have been, both intellectually and emotionally, quite alien to many, if not most, students of music, namely, behaviorism. By and large, the various orientations that have been favored by musical scholars of late seem to be clearly opposed to the various positions adopted by behaviorists. I am referring here to views of music that are derived, directly or indirectly, from introspectionism, phenomenology, Gestalt psychology, structuralism, and so forth.

One can search far and wide in the fields of musicology, ethnomusicology, musical semiotics, musical information theory, musical aesthetics and music theory without encountering a formulation that even dimly resembles a behavioral outlook. Indeed, apart from certain specialized topics in music psychology, music education and music therapy, behavioral approaches have been largely overlooked in serious studies of music. I feel that this neglect of behavioral

approaches can be attributed to, among other factors, the diversity that one encounters among behavioral formulations.

As G. E. Zuriff has shown in his recent comprehensive survey of behaviorism, behaviorists have not always agreed with each other.³ Whereas there are certain issues about which behaviorists are virtually unanimous, indeed adamant, there are others that are a source of division within the behaviorist camp. Accordingly, rather than providing a detailed summary of the various behaviorist positions on issues relevant to music, I attempt in what follows to show what sort of sense a behaviorist such as I might make of musical phenomena. In so doing, I give an account of music that accords with my own current position, which I would identify as behaviorist, and I try, as well, to point out certain areas where there would be major divergences among behaviorists. Moreover, instead of presenting an account of behaviorism followed by an application of the outlook to musical situations, I attempt to show behaviorism "in action" in various musical contexts from the outset of my discussion.

A Behavioral View of Various Musical Activities.

From a behavioral perspective, playing or singing a given tone is a physical act, as is putting a note onto paper, iron filings onto a

² G. E. Zuriff, *Behaviorism: A Conceptual Reconstruction* (New York: Columbia University Press, 1985).

tape, or a series of 0's and 1's onto a computer disc. Getting a student to perform, write, record or programme a tone in a given way is achieved by arranging physical aspects of the student's situation in such a manner that the task is accomplished (e.g., by means of praise, censure, explanation or demonstration). In this way, a behavioral orientation opens up the domain of musical phenomena about which one might theorize. In a behavioral theory of music, one need not feel that one is trapped inside musical tones; instead, one can deal seriously with overt acts that are involved in performing, creating and teaching music.

Other Musical Activities.

In a behavioral outlook, hearing a tone can be regarded as a physical process that begins at the point where given sound waves excite regions of the basilar membrane and provoke one's neurons to fire at certain rates and in certain patterns. Imagining a sound is considered to be a physical process akin to perceiving a sound, with the important difference that there is no sound wave that corresponds to the imagined sound in the immediate temporal and spatial vicinity of the imaginative act. Remembering a tone is viewed as being much like perceiving or imagining a tone, with the difference that the remembered sound is not perceived at the time of the remembering, but was perceived or imagined sometime in the past. Finally, one can note that "pre-composing," analyzing, and even theorizing about music might be

regarded as physical acts that involve the manipulation, and even the creation, of symbols, which may or may not correspond to tones that have been performed, composed, improvised, taught, perceived, imagined or remembered by oneself or others. In this way, then, certain private musical activities, which are often considered to be "occult" (i.e., non-physical), can be included within a behavioral account.

Private Musical Activities.

In the case of perceiving, imagining, remembering, pre-composing, analyzing or theorizing about music, a large part of one's activity is private; that is, a great amount of one's activity is not observed directly by others. However, with regard to perception, for example, certain parts of such processes (e.g., various excitations of the basilar membrane) are physical rather than occult and have been observed by others. Furthermore, there is no *prima facie* reason to believe that other components of perception or other private processes (e.g., imagining and remembering) are not physical. Nevertheless, internal, private processes are regarded in different ways by different sorts of behaviorists. This point can be illustrated by the various ways in which behaviorists of differing stripes might account for an episode where a person matches a given tone with his or her voice.

Suppose that a physical tone is produced and a person in the immediate vicinity of the physical tone produces, by singing, an echoic "response" that matches the frequency of the original tone (or

"stimulus"). In a common-sense account, one might say that the person "heard" the tone and adjusted the muscles of his or her vocal tract in order to produce the matching tone. However, a so-called "radical behaviorist" of the Watsonian variety might leave the "hearing" of the stimulus-tone out of account and regard the incident as one in which the stimulus-tone was a cause of the response-tone. Disregarding, for the time being, other causes which such a radical behaviorist might cite, one can note that an account of this sort would have the merit of being quite parsimonious and that every aspect of the account would correspond to an observable thing (or event). Both the stimulus-tone and the response-tone (and, in principle, the relevant muscular movements of the singer) would be directly observable by the investigator, whereas any private "hearing" of the tone would be left out of the account. Indeed, some radical behaviorists would deny that there was any sort of internal event that corresponded to the common-sense notion of what is entailed in "hearing a tone." However, here one should distinguish carefully between the radical behaviorism of Watson, the founder of the school, and that of Skinner, the foremost theorist of the school.

The Watsonian version of radical behaviorism, now much discredited for its denial of consciousness, has just been described, whereas Skinner's radical behaviorism, which admits consciousness (and

consequently, "hearing") is implicit in much of what follows.³ And in this regard, one should observe that whereas a follower of Skinner, like myself, would admit conscious acts, the preference would be to view them as effects rather than as causes.

A so-called "methodological behaviorist" might acknowledge that something more than the necessary adjustments of the vocal tract happened "inside" the singer between the time of the stimulus-tone and the time of the response-tone, but would disregard this "something else" because it was not observed. Some methodological behaviorists would say that the "something else" that happened was a physical process, whereas other methodological behaviorists would say that what happened was non-physical and yet other methodological behaviorists would remain non-committal on the issue of physicality. Nevertheless, all methodological behaviorists would be united in disregarding whatever might have happened between the time of the stimulus-tone and the time of the response-tone for the methodological reason that what happened was not observed. Indeed, certain methodological behaviorists would insist that what happened was in principle unobservable.

Other behaviorists would specify not only that something more than muscular movements in the vocal tract happened between the

³ See J. D. Keehn, "Consciousness and Behaviourism," *British Journal of Psychology*, vol. 55, no. 1 (1964), pp. 89-91.

appearances of the two tones, but would go so far as to assert without apology that what happened was physical, and would take pains to discern the specific physical process that was involved. Many psychologists who study the physiology of perception could be numbered among such behaviorists, though other sorts of behaviorists would denigrate their efforts as unnecessary or, in view of the extremely small amount that is known about the physiology of hearing, excessively optimistic.

Finally, another sort of behaviorist might assert that something more than adjustments of muscles in the vocal tract happened between the occurrence of the two tones, and like the methodological behaviorists, might regard the "something" that happened as either physical or non-physical. However, rather than leaving the account at the point where a methodological behaviorist would leave it, such behaviorists would go on to specify that whatever happened could be regarded as an "intervening variable," and such a behaviorist might attempt to formulate a transformation rule on the basis of which one could describe relations between the stimulus-tone and the response-tone. A large number of so-called "cognitive psychologists," who might themselves resist, and even resent, being described as behaviorists, could be included in this category.

From the preceding account, it should be clear that behaviorists of all sorts are methodologically rather fussy. Although they might diverge from one another with regard to the sorts of

interpretations they would place on specific evidence and the sorts of evidence they might consider relevant to understanding a given event, their attitudes towards evidence as such are quite uniform. The emphasis in a behavioral account is on direct evidence, that is, on things and events that are directly observed, or, in principle, observable, by the investigator. Such indirect evidence as the introspective reports that are favored by many non-behaviorists is avoided by behaviorists because of its putatively unreliable or even fictive character. If an introspective report of a putatively private process is accepted by a behaviorist, it is treated at face value, that is, as a response (e.g., a verbal response) in its own right, rather than as indirect evidence for some "deeper," "more important," or "more basic" process. And even if a behaviorist of the cognitive variety posits an intervening variable, such an entity is generally regarded as a hypothetical construct, and, beyond this hypothetical status, there is generally no particular commitment to its reality as an entity.

It should be clear that a behavioral approach might be disturbing to those who hold a certain common-sense view of music. What seems to be one of the most treasured notions in the workaday discourse of musicians, namely, the notion of the "musical ear," appears in a behavioral account to refer to a) nothing at all, b) a merely hypothetical construct, c) a process, whether physical or non-physical, that is admitted to be known in a highly incomplete manner, or d) an effect rather than a cause. In this way, the musical ear seems to

disappear if one adopts a behavioral orientation just as "earthiness" and "fieriness" disappeared in the transition from Aristotelian science to modern science. However, in the case of behaviorism, as has been the case in modern science, an apparent loss is accompanied by an explanatory gain, and this gain is explanatory in the deepest, causal sense of the word.

Causal Explanation.

If behaviorism merely represented a methodological stance towards private activity, it might be an interesting philosophical curiosity. However, from the vantage-point of the behaviorist position on certain methodological issues, several far-reaching findings have resulted. Among the most important of these is that one can effectively account for why a living being (either a human or one of the lower animals) acts in the way that it does entirely in terms of specific aspects of its inherited, genetic make-up, and more importantly for a behaviorist, in terms of the history of its activity as an individual. In particular, animate creatures tend to act in certain ways because of the immediate consequences of their having acted in those ways during the past.

In a behavioral analysis, certain activities are recognized as being inherited and other activities are acknowledged to be spontaneous. In line with the view of post-Darwinian biology, inherited activities are regarded as having consequences for the survival of the species and are

accordingly selected by the environment. In addition, many activities, both inherited and spontaneous, can be viewed as shaped or modified by the environment during a being's lifetime. Depending on the consequences of such activities, their frequency, strength and other characteristics might change.

From a behavioral point of view, if one wants to know why, for example, Debussy wrote a given piece as he did, one would inquire not only into his genetic make-up (e.g., his musical talent) but also into the consequences of his previous activities of a closely related sort (e.g., what a non-behaviorist might describe as Debussy's previous musical "experiences"). Similarly, if one would like to know why the Lapps sing *joiks* in the way that they do, one would inquire into their biological make-up, which would be expected to exhibit much the same range of variation as that which is found in other human groups, and into their individual "histories" of activity.

Problems in Applying a Behavioral Framework.

The behaviorist's insistence on the relevance of particular details of past experience to current and future activity poses a number of potential problems. *First*, since the entire history of an individual's previous activity in all its detail is regarded as being, in principle, potentially relevant to an account of that individual's later activity, it might be very difficult to explain any particular act completely because of gaps in one's knowledge of previous acts and their consequences.

The behaviorist's response to this situation is to insist on the greater importance of more proximate activity and stimulation, that is, activity and stimulation that are most similar to the activity and stimulation being considered.

Second, determining which aspects of previous acts are relevant to an account of a particular act might be extremely problematic in view of the potential relevance of all aspects of the individual's entire history of activity. For this reason, the behaviorist undertakes controlled experimentation, changing one proximate variable at a time, in order to study relations between specific causes and effects.

Third, predicting that a particular act will be the result of a complex history of activity is clearly impossible in view of the absence of complete knowledge of the causes that might determine that act. Accordingly, behaviorists frame their causal formulations in terms of probabilities, insisting that what is being caused is not, properly speaking, an individual act, but rather stability or change in the disposition to act in a certain way.

Fourth, in view of the suspect status of indirect evidence in a behaviorist outlook, it might seem that historical research, where indirect evidence looms very large, would be impossible within a behavioral framework. However, a behavioral historian need not rely on indirect evidence to any greater extent than those who hold differing views. Further, the central preoccupation of behavioral methodology need not be construed as an insistence on a restriction to what is directly

observed; instead, behavioral methodology can be understood as insisting, as in A. J. Ayer's version of logical positivism, on what is in principle observable. And in this regard, behaviorists can be considered to make far fewer assumptions than their non-behaviorist counterparts.⁴

Finally, a behavioral formulation would seem to be unable to account for large-scale social or cultural activity. However, behaviorists acknowledge that certain activities can be shared and different members of a community can be regarded, in the absence of contradictory evidence, as sharing similar histories of activity. By way of summary, then, one can note that in a behavioral account of the musical activity of Debussy or of Lapps, factors of talent and particular aspects of proximate past activity and stimulation, whether individual or shared, and whether observed or observable, would be considered to alter the probability that a given act might take place.

Advantages of a Behavioral Approach.

Beyond its methodological scrupulousness and the growing body of causal findings to which its methodological approach has given rise, there are several advantages to adopting a behavioral approach. In the first place, behaviorism yields causal accounts that demonstrably "work" when applied in the "real world." Most especially, the

⁴ A. J. Ayer, *The Central Questions of Philosophy* (Harmondsworth: Penguin, 1976), pp. 22-26.

behaviorist program has given rise directly to certain techniques of teaching and therapy that have been spectacularly successful. The relevance of these techniques to music education and music therapy is immediately obvious and their application in these fields, not surprisingly, has become commonplace. In addition, one can note that the specifically behavioral notion of "discrimination" is widely applied, whether deliberately or inadvertently, in the ordering of materials from simple to complex or from easy to difficult in the most successful curricula for performance, ear training (or dictation) and sight singing. And in this regard, one can observe that a corresponding ordering of topics from elementary to advanced has been a more or less constant feature of music theory texts since Antiquity.

Behavioral accounts of activity in general go far to show that behavioral principles operate whether one applies them deliberately or not. In other words, whether or not one is a behaviorist, one's activity can be effectively accounted for in terms of behavioral theory. Indeed, I would maintain that the most successful performers, improvisors and composers have been the best "musical engineers" in the sense that they have controlled the responses of their listeners (including themselves) to the greatest extent, whether or not any of the parties were, to use a non-behaviorist term, "aware" of the control being exerted.

Another advantage to adopting a behavioral approach is that one need not thereby deny many of the most engaging findings of other areas of inquiry. As was indicated above, behaviorism is compatible

with post-Darwinian biology, and hence, by extension, the natural sciences in general. In addition, the bulk of economics is consistent with a behavioral outlook as are large tracts of political science.⁵ In this way, the theory and practice of arts administration and the music industry need not be cut off from other musical endeavors. Moreover, some of the more promising approaches to sociology, anthropology, semiotics, linguistics and philosophy are not only compatible with a behavioral approach but also directly inspired by it.⁶ Accordingly, the ethnomusicologist, musical semiologist, and aesthete of music need not, in principle, be alienated from his or her field by virtue of adopting a behavioral approach. Additionally, in its insistence on a thoroughly probabilistic outlook, behaviorism is highly compatible with musical information theory. Nevertheless, behaviorism seems to have been remarkably unsuccessful in attracting many adherents in the fine arts and humanities, and I feel that an important factor in this regard has been the great emphasis accorded to causality in behavioral accounts.

⁵ See, for example, B. F. Skinner, *Science and Human Behavior* (New York: MacMillan, 1953).

⁶ George Caspar Homans, *Social Behavior: Its Elementary Forms*, 2nd ed. (New York: Harcourt, Brace, Jovanovich, 1974); Marvin Harris, *Cultural Materialism: The Struggle for a Science of Culture* (New York: Vintage, 1980); Charles Morris, *Foundations of the Theory of Signs* (Chicago: University of Chicago Press, 1938); B. F. Skinner, *Verbal Behavior* (Englewood Cliffs, N.J.: Prentice-Hall, 1957); Willard Van Orman Quine, *Word and Object* (Cambridge, Mass: M.I.T. Press, 1960).

Causal and Descriptive Accounts.

Perhaps because of their striking success in framing causal accounts for a wide range of activity, behaviorists seem to have denigrated the central role that is played by description in any serious empirical inquiry. For example, the writings of B. F. Skinner, one of the foremost behavioral theoreticians, contain many derogatory references to description (or "topography") as opposed to causal explanation.⁷ However, I would submit that a clear preference for a causal theory over a descriptive theory is somewhat difficult to maintain, for both sorts of theory are properly to be evaluated in terms of their consistency and parsimony, the clarity (e.g., operationality) of their terms, their verifiability and falsifiability, their scope, and so forth. Indeed, it is not entirely clear that any distinction whatever need be made between causal and descriptive theories if one has already distinguished between relatively good and bad theories.

If one strips away the often embarrassing determinisms (e.g., "the chord of Nature") from many music theories, one finds that one is frequently left with highly effective frameworks for describing pieces. Indeed, I feel that much of what passes as music theory can be regarded most charitably and fruitfully as a valuable framework for the description of relations among tones in individual works.

⁷ B. F. Skinner, *About Behaviorism* (New York: Vintage, 1974), pp. 29, 71-75.

In the case of music, and in the case of much of the subject matter of the fine arts and humanities, one is confronted with enormous problems of description by virtue of the high degree of idiosyncrasy and complexity in the entities with which one is dealing. Those aspects of a late Beethoven quartet that serve to distinguish it as a particular work seem much more difficult to describe than the relevant aspects of an experimental set-up in a study of operant conditioning. And indeed, arriving at a convincing interpretation of an individual work or group of works can represent an outstanding achievement apart from any relevance that the description might have for a causal account of the activity that surrounds it.

I do not mean to deny that causality might enter into even the most hermetic analysis of a work of art. Rather, I would insist that the sorts of causal connections which might be invoked or implicit in such an account could be quite low in level or even trivial (e.g., on the order of noting that a given pair of tones produces a given interval as opposed to asserting that the two tones in question were caused by a certain independent variable or were the proximate cause of a dependent variable more surprising than their highly predictable acoustical effect). In addition, if one wishes to connect one's description of a piece with a causal account that is more than trivial, one's description might have to be extremely detailed, for otherwise a Beethoven quartet might be treated erroneously as the equivalent of a far different work. In this regard, it seems to me that one of the primary functions of music theory is

descriptive in this sense, for in order to determine why Beethoven might have written a piece in a certain way or why listeners to the work might have responded to it in a certain way or why it might be advantageous for a composer to take the work as a point of departure for a new composition, one must first determine just what is involved in the work. And a consideration of this point leads to a hypothesis that I feel is both truly musical and truly behavioral.

A Musico-Behavioral Hypothesis.

Central to a behavioral formulation is the notion that the consequences of past activities can increase or decrease the probability of such activities recurring in much the same form in the future. In behavioral terms, a consequence that increases the probability of an activity is a "reinforcer." Certain reinforcers (e.g., nourishment) are tied to the survival of the species and can be regarded, accordingly, as inherited. Others (e.g., currency in a monetary economy) are acquired during one's lifetime, often in connection with inherited reinforcers. It is fairly clear that certain consequences extrinsic to musical activity (e.g., food and money) substantially reinforce (or in non-behaviorist terms, "motivate") musical activity. However, I do not know of any detailed formulation according to which consequences that are intrinsic to musical activity have been advanced as reinforcers of musical activity.

It seems plausible that the sheer exercise of fine motor activity might reinforce the activities that precede it. Indeed, such an hypothesis is consistent with the observation that performers and composers often have acquired habitual activities that seem to serve as a preparation to playing, singing and setting notes onto paper. It would also seem that the very fact that sounds are immediately produced as a consequence of fine motor activity (as in the case of most performance) serves as a reinforcer of that activity--witness the effect of the reverse, situation where, for example, a piano key does not produce a sound when depressed, and, as predicted by behavioral theory, frustration and anger result. In addition, playing the correct notes would seem to be highly reinforcing, as in the case where one's seeing of notes in a score corresponds with both one's touch on an instrument and one's hearing of the resulting tones (or even with one's imagining of such tones as in the case where pianists practice on a silent keyboard). However, I do not feel that such intrinsic reinforcers can fully account for humanity's seemingly universal and frequent pursuit of musical activity, especially in the instance of sheer hearing. Accordingly, I would include among the most important reinforcers of musical activity (including the maintenance of auditory attention) properties of the sounds themselves.

Whereas one might cite as reinforcing aspects of musical sounds certain putative "emotions," "associations," "images" and so forth that music has been considered to arouse, it is difficult, if not in principle impossible, to study such things, nor is it entirely clear that

they are universal features of music. However, sheer structure would appear to be an invariant property of musical sounds, and, indeed, of things in general. No matter how modest a thing might be, it has structure, that is certain amounts and kinds of complexity. A thing's complexity might vary in amount and kind, but it is necessarily present in the thing. Whether a particular structure is reinforcing might be a matter of inheritance or lived "experience." However, even if it is a matter of inheritance its manifestation might be shaped by experience. Surely, one might be hungry without having an appetite for reptile meat--not right now, thank you very much. And in the same way, one might "crave" musical structure but not hunger after a particular kind or amount of complexity. Moreover, just as one might be satiated by food, and hence seek out a moderate amount of nourishment on a given occasion or cease eating when one is full, so too might one tend to seek out certain amounts of musical complexity at any given time or stop listening altogether. Indeed, studies of musical style would suggest that the kinds and amounts of complexity that have reinforced people have tended to be normative in a given situation, and that these amounts and kinds of complexity have varied greatly and coherently from situation to situation. Further, it would seem that, in behaviorist fashion, one must look to the environments in which music has been produced, which include the sounds that have been "in the air" at any given time, in order to determine the factors that have given rise to particular amounts and kinds of musical complexity on any given occasion. And

according to the present formulation, such a determination would be of central importance not only to the scholar but also to the practitioner of music insofar as, for example, composers and performers can be considered to shape musical structure and the responses of their listeners.

Conclusion.

By way of conclusion, one can note that the austere and exacting methodological outlook of behaviorism yields a view of the world that is highly rich and variegated.⁸ Such an outlook discourages one from positing, *a priori*, potentially stultifying dualisms, e.g., between humanity and the rest of Nature. If one adopts a behavioral framework, one can travel rather freely among the major current disciplines of scholarship. If one introduces sounds and structure into a behavioral formulation, one can undertake the traditional enterprises of musical scholarship within a behavioral context. And if one does so, one might begin to entertain the prospect of a theory of music that not only accounts for, but predicts and controls musical practice.

⁸ See, for example, Gilbert Ryle, *On Thinking* (Oxford: Basil Blackwell, 1979), and B. F. Skinner, *Notebooks* (Englewood Cliffs, N.J.: Prentice-Hall, 1980).