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A Few Words on Music Theory, Analysis and about Yours Truly

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Source: *Intégral*, Vol. 14/15 (2000/2001), pp. 38-48

Published by: [Intégral](#)

Stable URL: <http://www.jstor.org/stable/40214076>

Accessed: 25/04/2011 10:32

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no longer teach.\* The course was at the doctoral level, offered not only for theory graduate students, but also for performers, composers, musicologists, and students in other music disciplines. The text represents some of my thoughts on the then-present state of music theory to which I add qualifying and supplemental comments in footnotes. Some of these will seem to digress a bit. This is because the original text has limitations of time, place, and content and I want to cover some other, tangentially-related issues in my views on music theory. Since things (and ideas about them) change quickly, this commentary will probably become obsolete in a few years. It's better therefore to think of it as a snapshot in 2001.



### **A Few Words on Music Theory, Analysis and about Yours Truly<sup>1</sup>**

By way of an introduction to this course, I have written up a few of my ideas on subjects pertaining to the study of atonal music, to make my orientation clear and to avoid confusion.<sup>2</sup>

If I have to produce a definition of music theory,<sup>3</sup> for me it is the study of music<sup>4</sup> structure.<sup>5</sup> Music theory is distinct from

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\* Until the autumn of 1999, I held a joint appointment in the composition and theory departments of the Eastman School of Music. After that I joined the composition department full time.

<sup>1</sup> This is the title of the original text. It is reproduced exactly (but without the footnote numbers) as it appeared to the students in the course. The reader may wish to read the text first without referring to the commentary.

<sup>2</sup> The purpose of the text was not to suppress discussion or "lay down the law," but to avoid having to address questions in class based on misconceptions and assumptions about my views. I had subsequently found that students ascribed to me musical views and opinions based on their own biases and misunderstandings about music theory and non-tonal, twentieth-century music. This took time away from the presentation of the course's material and often affected the tone and content of the students' presentations and papers. I therefore felt the need to write this text, to which I often referred jocularly as a "disclaimer."

<sup>3</sup> Perhaps a definition is impossible since music theory today seems to cover so many different concerns. But fuzzifying my definition is not very helpful, for it only results in a hierarchy of activities from center to periphery.

musicology,<sup>6</sup> which more generally treats the role and context of (usually) art music in Western culture. Nevertheless, it has been the usual occupation of music theorists to produce accounts of pieces of music called analyses.<sup>7</sup> Although music theory, taken as the study of structure (including its human perception), could be considered a kind of science,<sup>8, 9</sup> analysis<sup>10</sup> is clearly a form of criticism<sup>11</sup> (in the

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<sup>4</sup> Up until recently, “music” meant “Western concert art music,” even though there was some work on music structure in other (non-Western) cultures by ethnomusicologists.

<sup>5</sup> By music structure I mean not only “the notes” and their relations, but the relation of the notes (or, more generally, reified sound terms) to their various sonic, conceptual, personal, social, and cultural contexts—that is, applied semiotics. In addition, recent music theory has put more emphasis on musical transformations versus musical entities. Nevertheless, the relationship between entities and transformations remains the site for most music theoretic research.

<sup>6</sup> Guido Adler (1885) coined the term ‘musicology’ to denote all study of music. However this term has come to stand for the domain of the Western music historian and critic.

<sup>7</sup> David Lewin was one of the first theorists to clearly distinguish theory from analysis. See Lewin 1969.

<sup>8</sup> But what kind of science? Certainly a “systematized knowledge...to determine the nature or principle of what is being studied”, to quote Webster partially. But the ellipsis contains the words “derived from observation, study, and experimentation,” and some music theory is speculative and purely rational.

<sup>9</sup> Most of the discussion of music theory as a science uses hard sciences such as physics as the model. Recent work in music cognition and perception is changing this orientation. Yet, other sciences such as biology (which emphasizes classification and emergent phenomena rather than reduction) offers new directions for theorists wanting to ground music structure in some sort of realist ontology. See Sterelny & Griffiths 1999.

<sup>10</sup> And analysis is of works of art while theory need not have an aesthetic dimension.

<sup>11</sup> Or I could say music appreciation, even though this term was once used to stand for a form of musical populism, now usually termed “outreach.” In any case, I mean the criticism that is distinct from the journalism of “music critics,” although there are some music critics who do criticism as I mean it.

sense of literary criticism<sup>12</sup>) so that it is firmly grounded in the humanities.<sup>13, 14</sup>

The motivations for doing analysis are various. People differ<sup>15</sup> with respect to their perceptions and appreciation of music<sup>16</sup> and at various levels of musical maturity, and they often want to talk about these responses with others. For me, inasmuch as musical experience is intersubjective,<sup>17</sup> the goal of analysis is to provide accounts of our musical experience<sup>18</sup> of compositions. My motive is

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<sup>12</sup> Thus, music theory/analysis could be said to straddle C. P. Snow's two cultures. See Snow 1969.

<sup>13</sup> Of course, the fact/value distinction cannot be mapped one-to-one to the dualism of science/humanities. See Putnam 1988.

<sup>14</sup> Thus analysis cannot avoid questions of value—except by *fiat*, no matter how data-driven or “neutral” it purports to be. It should be remembered that while the recognition of musical value is embedded in culture, it can directly apply to the structure of music (sound and relations). For instance, when composers talk of a “good” piece, they are often referring to the way the musical materials are organized and deployed as distinct from the “meaning” or “use” of the piece by the audience. They understand all too well that what they call a “bad” piece can nevertheless satisfy the cultural and social needs of the audience.

<sup>15</sup> These differences are both of kind and degree. For instance, the person with absolute pitch hears music in a very different way from a person with relative pitch.

<sup>16</sup> And musics from different places and times demand different kinds of skills and habits from the musician and listener.

<sup>17</sup> Intersubjective can be taken in Karl Popper's sense of a community that offers criticism of and improvements to potentially falsifiable hypotheses. I use intersubjective also to mean that it is possible to communicate one's subjective sensibilities to others in a productive and meaningful way. See Popper 1959.

<sup>18</sup> There has been some recent interest among music scholars to study and describe the nature of music experience. See, for example, Robinson 1997. Music theory methodology can play an important role in this research provided that one believes that it is possible and worthwhile not only to quantify musical qualities, but also to retranslate the quantified representations of music back into musical quality. The use of musical notation in at least Western art music is based on this faith. (Certainly there will always be counter-intuitive artifacts and irrelevant side effects produced by the translation of *quale* to fact and back, and theory has a role in identifying these pseudo-entities and relations.) However, the use of notation (that is, transcription) and other forms of music representation in music that is not usually notated may be completely misleading and inappropriate as help in studying the experience of that music.

to share my musical experiences with others,<sup>19</sup> not to separate people into insiders and outsiders.<sup>20</sup>

Music theory provides analysis with precise musical tools.<sup>21</sup> A piece of music is therefore something we not only compose, play and listen to (in social and cultural settings) but also something we contemplate in (musical) memory. [In fact, there is as much narrative interest in the way we get to know a piece as in the experience of the piece in real time.]<sup>22</sup> Therefore I am not usually interested in considering a piece of music to be a Platonic<sup>23</sup> object imperfectly described<sup>24</sup> by its notation in a score. I'm much more interested in all the ways we can hear a piece, in the sense of hearing<sup>25</sup> X as Y in the context of Z.<sup>26</sup> As a result, in my mind there

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<sup>19</sup> I should have also said I encourage others to share their musical experiences with me.

<sup>20</sup> However, when knowledge differentials are used to code class and social hierarchies, it is almost impossible to share anything without intimidating others or creating a clique.

<sup>21</sup> These tools not only help us describe and model music structure, but allow us to think about it—hence the “therefore” in the next sentence. Each tool functions as a filter or hermeneutic, changing our “perception” of the music we study. Thus practicing music theory enriches our appreciation of music; it can undo the reification of musical experience as a result of habit—what Alfred North Whitehead called “inert knowledge.” See Whitehead 1929.

<sup>22</sup> In the text, the passages within square brackets might have been written in footnotes, but I felt they should be in the text, but set off in some way and not by ordinary parentheses.

<sup>23</sup> It may be easier to think of a piece of music, or music itself, as an ideal to be manifested in performance—especially in the Western intellectual tradition that accepts the dualism of appearance and reality, or phenomena and noumena.

<sup>24</sup> Or alternatively, one can consider the “music” to be perfectly (adequately) described by (stated in) the score, which leads to Nelson Goodman’s criterion of compliance for determining the identity of a musical composition. See Goodman 1976.

<sup>25</sup> “Hearing” also includes imagining hearings, how it is possible to hear, why we can or cannot hear music in a given context or occasion, and so on.

<sup>26</sup> For instance, consider the note sequence <E4 G4>. This might be described as an ascending minor third, the third and fifth of an arpeggiation of C major chord, a move “up three semitones,” a step in the C pentatonic scale, two notes related by inversion around F#/F♯ (or C#/B♯), a member of the interval-class 3, the limits of a *gamaka* (sliding ornament) that expresses the *svara ga* (the third degree, F4) of the

is no single definitive<sup>27</sup> or correct<sup>28</sup> analysis of a piece. We read analysis not<sup>29</sup> to confirm our own ideas and experiences but to find out what someone else has to say about a piece or repertoire. This is not say that analysis is radically relative, that anything goes. We judge<sup>30</sup> the quality of analysis in the same way we respond to music itself. Insight, creativity, elegance, perspective, technical finesse, intelligibility, interest, and suitability are some of the traits of good analysis.

Music theory is not mathematics. Some might regard some formal musical theories as forms of applied mathematics, but for me this is largely pretentious, as the math so applied, even if quite abstract, is usually not very sophisticated,<sup>31</sup> certainly not on the cutting edge of mathematical research.<sup>32</sup> Furthermore, the notation and concepts in most musical theories differ from their

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raga *Bhairavi*, etc. Each of these descriptions presumes a different musical context, musical system, model, or even language, none of which is translatable into another description on the list. And yet more than one of these descriptions may be operative simultaneously in a particular analysis that identifies <E4 G4>. And even "<E4, G4>" is a relative term, dependent on contexts as simple as the instrument on which the "notes" are played or the tuning system employed.

<sup>27</sup> Nevertheless, theorists often vie as to the "best" analysis of a piece, for within a particular discourse—such as Schenkerian analysis—usually only one analysis is fully authentic. This is because the context Z (the theory) fixes the relationship of hearing X as invariably Y, to within specified transformations. To be fair, when Schenkerian analysis is used in the larger context of musical criticism, its role can be multivalent and less than definitive.

<sup>28</sup> "Correct" or "cogent" might neutralize the globalizing connotations of "definitive," but it need not open the door to multiple interpretations. In fact, context W may be designed to prevent ambiguity or variance by the careful use of conditionals.

<sup>29</sup> I should have written "not only."

<sup>30</sup> "Judge" is too limiting; we also sense, apprehend, intuit, discover, evaluate, and so forth.

<sup>31</sup> Some exceptions include digital sound processing, musical cybernetics (musical grammars and artificial composition), and advanced scale theory. A few articles, however, are mathematically challenging. For example, see Vuza 1992-1993.

<sup>32</sup> Over the last 20 years there has been a marked increase in the quality of the mathematical reasoning used in music theory due to the fine work of John Clough and Jack Douthett (1991), David Lewin (1987), and others.

counterpoints<sup>33</sup> in mathematics *per se* in both notation and generality. [For instance, calling atonal music theory “set theory” is to trivialize both atonal theory (which has much more to it than only considering simple relations among sets of tones) and mathematical set theory, which deals with relations among infinite sets among many other things.]

The question of mathematics in theory is better regarded as a question about formalism in music theory. A formal theory, when carried out correctly, is one that guarantees consistency and precision;<sup>34</sup> it provides clear definitions and dependable modes of inference and relation. One is free to use a formal theory for any purpose whatsoever. Therefore, formal theories should *not* be associated with the terms “formalism”<sup>35</sup> or “positivism”<sup>36</sup> which have (wrongly) come to connote an aesthetic or philosophical position that represses social or cultural criteria in music study.<sup>37</sup> It

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<sup>33</sup> [*Sic*].

<sup>34</sup> But the price is immediacy and rhetorical power, not to mention comprehensibility when the formalism becomes complex and very detailed.

<sup>35</sup> Formalism in mathematics is one alternative to Platonism, which posits the existence and discovery of mathematical objects. The formalist considers only the rules for writing and manipulating certain marks on paper (or computer screens) called mathematics that may or may not have anything to do with anything else. Similarly, if there is anything like formalism in music discourse, it would include the study of musical notation without concern for the sound or the experience of music the notations might code or enable. Some analysis might seem to be formal in this sense, but it is rather that the analysts takes it for granted that the score adequately portrays the music’s experience and sound providing one knows how to read a score—that is, hear the music “in one’s head.” So analyzing a score is not just studying the structure of marks on a page.

<sup>36</sup> Positivism does not refer solely to logical positivism, namely, the attempt to represent the world without recourse to metaphysical argument by the criterion of verifiability; which, unfortunately, is a metaphysical supposition. (This should be distinguished from the term logical atomism in the early twentieth-century, which attempted to construct experience from sense data and logic alone, a project still pursued in a more sophisticated form by some music theorists.) But “positivism” goes back even further to the work of Auguste Comte (1830), the founder of sociology, who defined positivism as way of formulating the “laws” of humanity from observation.

<sup>37</sup> Perhaps these erroneous connotations come from the supposition that formal theories are chiefly employed to represent musical “languages,” as if this would

is also important to regard a formal theory as mutable and fluid; if a theory of this (or any other) type does not capture a particular musical sense or perception, it is appropriate to either change or abandon it. [It should be noted that—and for technical reasons alone<sup>38</sup>—a non-trivial and complete formal theory of anything is an ideal rather than a reality; those theories deemed formal are simply more formal than others, but hardly ever completely formal.]

About the field of atonal<sup>39</sup> music theory. This is the study of music (structure) without pitch centers.<sup>40</sup> This does not mean that the music we study is not hierarchic<sup>41</sup> or “tonal”<sup>42</sup> in many senses. Indeed, the field shares concepts with tonal theory: structural levels from Schenkerian theory; symmetry from Riemannian theory; and

shed light on what music is actually is, beyond its mere appearance. Richard Rorty has argued that the use of the philosophy of language to represent reality has not yielded much fruit, and we need to see language as only a part of reality; we need to “change the conversation” to a pragmatic mode of inquiry.

<sup>38</sup> Russell (1919) showed that the unbridled notion of “set” can lead to self-contradiction. In 1931, Gödel showed that a mathematical system equal to or greater than the complexity of ordinary arithmetic written in a language *L* will either include statements that cannot be proved true or false, or only guarantee consistency within a subset of what can be written in *L*. We can know which statements of *L* are undecidable only by the use of a metalanguage *L'*, but *L'* has the same problem as *L*, and so on for *L''*, *L'''*, etc. See Nagel & Newman 1958.

<sup>39</sup> It's curious that the term ‘atonal’ has not had a stable or precise denotation since its introduction about 85 years ago, partly because it has been applied to valorize or condemn a number of different but overlapping musical repertoires or “styles.” Some scholars and musicians have used ‘post-tonal’ to avoid the absurd literal meaning of atonal as “without tone” and other negative connotations. But post-tonal music wrongly implies that there is a special music “after” tonal music, and resonates poorly with what might seem a namesake: ‘post-modernism.’

<sup>40</sup> Or, as some might have it, the study of music as if it had no pitch centers.

<sup>41</sup> Some theorists have assumed that hierarchical structure is a *sine qua non* for efficient internalization of music; it is important, but “association” plays just as important a role in music cognition.

<sup>42</sup> While atonal music may not have pitch or pitch-class centers, it will often involve hierarchic structure; higher structural levels will be built out of smaller ones. A typical atonal composition will often be constructed from a small group of related pc segments, such as rows, or a handful of pcsets or set-classes. Tonal music may have little hierarchic development, as in much of African and Asian music, or loose syntax as in Western music before *circa* 1550.



coordination of vertical and horizontal pitch class structures from counterpoint. Note well that twelve-tone theory is a subset of atonal music theory, despite their segregation in some scholarly quarters.

Finally about yours truly.<sup>43</sup> My<sup>44</sup> work and expertise in atonal music theory is but one facet of my musical life. I am a composer,<sup>45</sup> but I do not invariably write atonal or twelve-tone music. [I have a joint appointment in the Theory and Composition departments at Eastman.]<sup>46</sup> I am as interested<sup>47</sup> in the music of Cage, Steve Reich, Copland, Rachmaninoff, Ornette Coleman and many others as in the music of Milton Babbitt or Elliott Carter.<sup>48</sup> [It's all wonderful music!] Other musical passions are in Western common practice art

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<sup>43</sup> I felt it was necessary for the students to identify me in a larger musical context than only as a proponent of atonal music, to help them see me and this music as not only "other."

<sup>44</sup> My identifying myself in the text was deliberate. Much music theory, and especially analysis is written from an impersonal point of view, as if the analysis were a matter of fact rather than interpretation, and the writer had more than mere "warranted authority." Yet much of analysis is based on the desire to share one's intimacy with a work with another person. While the nature of the analysis may be formal, the method of presentation can be quite informal. It's interesting to attend advanced classes in math and science, where the professors are anything but detached and stuffy authorities. But there's another side to this question. The beautiful music we study may be best discussed in texts that are beautifully written, that stimulate appreciation in their elegance and literary excellence. Such writing may or not have an intimate dimension.

<sup>45</sup> I did not begin serious study of music theory until the early 1970s at Yale. And most of my early work was on compositional theory, to solve technical problems in my own music.

<sup>46</sup> Not since 1999.

<sup>47</sup> Of course, the spectrum of my musical tastes is irrelevant to the study or teaching of particular aspects of theory or analysis. I mentioned it only because I wanted the students to know I was not some sort of serial zealot.

<sup>48</sup> However, we might find after some effort that some of the music by the composers on this list is not equally susceptible to present forms and practices of music theory. We have to accept that some music we like is not illuminated by musical analysis without positing inherent limitations within the music or indicting music theory as a whole.

music<sup>49</sup> and earlier [especially late 15th century Renaissance] as well as jazz and non-Western music, particularly in Indian music.<sup>50</sup> As implied above, I don't regard theory or analysis as a way of determining (a hierarchy of) musical value.<sup>51</sup>

—Robert Morris, January 5, 1998.

### Afterword

One issue didn't come up in my commentary: What about the future of music theory? Despite its origins in classical Greece and

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<sup>49</sup> Western "classical music" is my "native" musical language. Many of my younger colleagues, even those teaching and studying music in "conservatories," have come to music theory with a much more eclectic musical background, with competence in listening and performing pop, rock, and jazz. Since I was raised in a period before the presence of a mass media and when classical music was being popularized in at least the larger cities of the United States, it was possible to remain relatively unaffected by anything but classical music. Only in my 30s did I get at all interested in popular music, and mainly because of its musical structures, as distinct from its cultural meanings and social functions.

<sup>50</sup> I'm presently writing a book on South Indian music using (mainly recently introduced) tools and concepts from Western music theory. So I'm happy to see many other theorists looking at the role of music structure in other repertoires outside of Western concert music. But one must be very careful to make sure such study is not just a way of finding some new music on which to ply our well-used techniques, and perhaps to universalize certain claims we have about music structure and its cognition. Studying the music of another culture is a tricky business much discussed among ethnomusicologists, and one has to perform reality checks frequently. My study of Indian music structure and practice is made feasible because what we would call "theoretic knowledge" is known and practiced not only by scholar-musicians, but also by any competent Indian musician. In addition, there is a history of scholarship that poses questions about structure that Western techniques can address. Indeed, Indian scholars have demonstrated interest in using Western approaches to their music, and there is a growing literature on Indian music written by Westerners that is taken seriously in India. In addition, I've been listening and studying Indian music since I was 16 years old, although my professional contributions date back only to 1989.

<sup>51</sup> Asserting and arguing for musical value is one of the uses of criticism. Theory and analysis can escape this by being clear about the contexts in which they are practiced, which may result in the deconstruction of the project of value ascription itself.

the series of writings we call music theory from then until the twentieth-century, *modern* music theory is a young field drawing on other modern and postmodern scientific and academic disciplines. It is obviously still experiencing growing pains as questions about its identity and scope proliferate. However, a few major problems have arisen in the last thirty years, some of which I've alluded to in the commentary: 1) What is the relation of music structure to musical experience? 2) Are there universals in music structure and its cognition? 3) How does (or should) the discussion of the structure of music impinge on the interpretation of music, its criticism, performance, or journalism, for instance? 4) Is there a general theory of musical analysis? 5) What of the pedagogy of twentieth-century music—including musical skills such as ear training, dictation, keyboard and sight-singing? These problems and others should not be forgotten or ignored as the field broadens and diversifies.

Robert Morris

#### References

- Adler, Guido. 1885. "Umfang, Methode und Ziel der Musikwissenschaft." *Vierteljahrsschrift für Musikwissenschaft* 1: 5-20.
- Clough, John, and Jack Douthett. 1991. "Maximally Even Scales." *Journal of Music Theory* 35/1 & 2: 93-173.
- Comte, Auguste. 1888. *Introduction to Positive Philosophy*. Indianapolis: Hackett. Originally published as *Cours de philosophie*, Paris: Bachelier, 1830.
- Goodman, Nelson. 1976. *Languages of Art*. Indianapolis: Hackett.
- Lewin, David. 1969. "Behind the Beyond: A Response to Edward T. Cone." *Perspectives of New Music* 7/2: 59-69.
- Lewin, David. 1987. *Generalized Musical Intervals and Transformations*. New Haven and London: Yale University Press.
- Nagel, Ernest, and James R. Newman. 1958. *Gödel's Proof*. New York: New York University Press.
- Popper, Karl. 1959. *The Logic of Scientific Discovery*. New York: Harper and Row. Originally published as *Logik der Forschung*, Vienna: Springer, 1935.
- Putnam, Hilary. 1988. *The Many Faces of Realism (The Paul Carus Lectures, Washington, 1985)*. La Salle, IL: Open Court.
- Robinson, Jennifer. 1997. *Music and Meaning*. Ithaca, NY: Cornell University Press.
- Rorty, Richard. 1981. *Philosophy and the Mirror of Nature*. Princeton: Princeton University Press.

- Russell, Bertrand. 1919. *Introduction to Mathematical Philosophy*. London: G. Allen & Unwin, Ltd.
- Snow, C. P. 1964. *The Two Cultures: and a Second Look*. Cambridge: Cambridge University Press.
- Sterelny, Kim, and P. E. Griffiths. 1999. *Sex and Death: An Introduction to Philosophy of Biology*. Chicago: University of Chicago Press.
- Vuza, Dan Tudor. 1991-93. "Supplementary Sets and Regular Complementary Canons." *Perspectives of New Music* 29/2: 22-49; 30/1: 184-207; 30/2: 102-125; 31/1: 270-305.
- Whitehead, Alfred North. 1929. *The Aims of Education*. New York: Macmillan Company.



## The "Sweet Spot": What Composing Has Taught Me about Teaching Theory\*

I entered the field of music theory through what used to be one of the main entrances, but has become increasingly a side, if not back, door. My training was as a composer, and most of my work outside of teaching, especially in the past few years, has been writing, rather than writing about, music. I mention this because I realize that my work as a theorist has been somewhat skewed: I have concentrated on two complementary (and some may say self-serving) interests, the study of music whose techniques and ideas I want to try out in my own; and the advocacy of, if not my music, then at least my kind of music. (I hasten to add that I have learned from and have advocated for a far broader range of musical styles and languages than I have the skill, interest, or courage to write in myself. Nevertheless, I confess that my tastes and enthusiasms have always informed what I've taught and been taught by.) Thus, in participating in *Intégral's* millennial celebration, while I don't feel positioned to comment on directions new or old in the field of music theory, I would like to share some of the insights I have

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\* I am grateful to Gregory Marion and Benjamin Broening for their comments on earlier drafts of this paper.