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*Re-quantifying W. C. Printz's Concept
of Quantitas Intrinseca*

Abstract

Wolfgang Caspar Printz is remembered primarily for his innovative idea of internal temporal quantity. As it may be the earliest articulation of the concept of metrical accentuation, Printz's account has attracted significant scholarly attention; however, the reception of Printz's idea has been distorted by a reliance on George Houle's misinterpretation of just one of Printz's treatises, *Phrynis Mitilenaus* (1696). The present article proposes a fresh reading of *quantitas intrinseca* by drawing upon Printz's little-known but more comprehensive presentation of the idea in his *Compendium musicae* (1668). To begin, I critique the assumption that Printz's locution "internally long" is a simple synonym for "stressed" or "strong," since his choice of the "quantity" metaphor has noteworthy connotations of metrical patterning. I then turn to the presumption that Printz's notion of internal length aligns with metrical hierarchy, showing that it instead correlates with sounding rhythms, not abstract beats. Next, I assess the relationship between *quantitas intrinseca* and what he calls the *contrare* rhythmic pattern to demonstrate that his theory is more successful on its own terms than scholars have recognized. I conclude with a brief analysis suggesting that my revised reading of Printz affords more responsive ways of interpreting rhythm.

Keywords

Wolfgang Caspar Printz; Metrical Accentuation; Internal Duration; Rhythmopoeia; Phrynis Mitilenaus

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Re-quantifying W. C. Printz's Concept of *Quantitas Intrinseca*

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It is no exaggeration to say that the modern reputation of Wolfgang Caspar Printz (1641–1717) rests on one thing: his innovative concept of “internal temporal quantity” (*quantitas temporalis intrinseca*), as disseminated in his *Phrynis Mitileneus* (1696).¹ Assuming that Printz used the locution “internally long” for the same psycho-acoustic phenomenon to which we refer with the metaphors of stress, weight, or strength,² it appears that Printz developed a theory of metrical accentuation some 350 years ago.³ Indeed, except for his

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1 *Phrynis Mitileneus, oder Satyrischer Componist* (Dresden and Leipzig: Johann Christoph Mieth and Johann Christoph Zimmermann, 1696) is the expanded second edition of a text first published under the title *Phrynis, oder Satyrischer Componist* (Quedlinburg: Christian Okels, 1676–77). Printz's central treatment of *quantitas temporalis intrinseca* occurs in chapter six of *Phrynis*, and it is copied with only minor alterations in chapter six of the first book of *Phrynis Mitileneus*. When material is present in both editions, this article quotes from *Phrynis* and makes note of when the later edition varies meaningfully. In my research I have not identified any substantive differences concerning the concept of *quantitas temporalis intrinseca* between *Phrynis* and *Phrynis Mitileneus*, so the latter text provides no evidence that Printz's ideas on the subject developed in the intervening two decades. Printz's earlier *Compendium*, however, treats the subject significantly differently than *Phrynis* does, as I will demonstrate in due course.

2 The quantitative terminology of ancient classical metrics and rhythemics, with their talk of “long” and “short” syllables and notes and their lack of attention to stress, does not comport well with modern theories of meter and metrical accentuation. Nonetheless, Dahlhaus regarded it as “relatively innocuous” to use that terminology while stripping it of actual differences in quantity (as Printz's doctrine of internal quantity does), presumably because he assumed that the terms are effectively interchangeable with other metaphors (“Daß ein Musiktheoretiker die Terminologie der antiken Quantitätsmetrik benutzt, um Sachverhalte der modernen Taktrhythmik zu etikettieren, bei deren Beschreibung er andererseits unmißverständlich zu erkennen gibt, daß die Quantitäten gleichgültig sind, ist im Grunde relativ unverfänglich”); Dahlhaus, “‘Quantitas intrinseca’ und ‘Rhythmus,’” in Anders Lönn and Erik Kjellberg (ed.), *Analytica: Studies in the Description and Analysis of Music* (Stockholm: Almqvist & Wiksell, 1985), 18. And the scholarly consensus, with which I agree, is that Printz was indeed trying to call attention to the phenomenon of metrical accentuation.

3 I use “metrical accentuation” in the sense articulated by Lerdahl and Jackendoff: “Metrical accent, then, is a mental construct, inferred from but not identical to the patterns of accentuation at the musical surface” that is “applied to beats within a regular metrical hierarchy”; Fred Lerdahl and Ray Jackendoff, *A Generative Theory of Tonal Music* (Cambridge, MA: MIT Press, 1983, <https://doi.org/10.7551/mitpress/12513.001.0001>), 18. Justin London's more recent definition (“A metrical accent occurs when the metrically entrained listener projects a sense of both temporal location and relatively greater salience onto a musical event”) reframes the notion in a listener-centric way, though it still bears similarities to Lerdahl and Jackendoff's conception, as London himself acknowledges. Justin London, *Hearing in Time: Psychological Aspects of Musical Meter*, 2nd ed. (Oxford: Oxford University Press, 2012, <https://doi.org/10.1093/acprof:oso/9780199744374.001.0001>), 18–22.

antiquated terminology, much of Printz's conception of meter would seem unremarkable today. He concisely expresses the idea of recursive metrical hierarchy, stating that "every note is divided into two or three equal parts,"⁴ and in either case, the first of those equal parts is more stressed (i.e., stronger, heavier, internally longer, etc.) than the later part or parts.⁵ Printz also draws attention to the stress that falls at what we would call the metrical level of the measure or half-measure when he notes that "every semibreve or [onset of the] entire measure (*Tact*) also should be long according to the internal temporal quantity."⁶ Furthermore, he was clearly aware of the distinction between durational accent and metrical accent, as he discusses sarabande-like rhythms in which long durations fall on weak beats ("against the beat" [*wieder den Tact*], in his words).⁷ And despite his idiosyncratic terminology, Printz's experience of music very well may have resembled our own, since "the incorrect use of words does not at all impact the actual perception of musical phenomena, nor is it able to muddy it," as Carl Dahlhaus contends.⁸

The seeming familiarity—even modernity—of Printz's concept of internal temporal quantity has attracted significant scholarly attention. Quoting his definition of the concept in accounts of Baroque- and Classical-era meter would seem to be practically *de rigueur*, to judge by the writings of such experts in the field as William E. Caplin, Christopher Hasty, Justin London, and Danuta Mirka.⁹ Yet these eminent scholars' invocations of Printz's idea have perpetuated a distorted understanding of it, as they all rely on George Houle's misinterpretation of just one of Printz's treatises, *Phrynis Mitilenaüs*.

The present article proposes a fresh reading of *quantitas intrinseca* by drawing upon Printz's little-known but more comprehensive presentation of the idea in his *Compendium*

4 "[...] jedere Note entweder in zwey oder drey gleiche Theil [*recte*: Theile] getheilet werde"; Printz, *Phrynis*, VI, § 9. All translations are mine, unless otherwise noted. While Printz's claim is implicitly universalist and fails to distinguish notes from beats, its theoretical content otherwise closely resembles the following statement by Lerdahl and Jackendoff: "An important limitation on metrical grids for classical Western tonal music is that the time-spans between beats at any given level must be either two or three times longer than the time-spans between beats at the next smaller level" (Lerdahl and Jackendoff, *A Generative Theory of Tonal Music*, 20).

5 Printz, *Phrynis*, VI, §§ 10, 13. This will be discussed further.

6 "[...] eine jede Semibrevis oder gantzer Tact/ auch der innerlichen Quantität nach lang sey"; Printz, *Phrynis*, VI, § 11. Depending on the meter in question, the semibreve could be the length of the *tactus* or half its length.

7 See, for instance, Printz, *Phrynis*, VII, §§ 18–20. This is the pattern he calls the *enantius* or *contrare*; we will examine it in greater detail later.

8 "[...] der falsche Wortgebrauch die wirkliche Auffassung der musikalischen Phänomene gar nicht berührt, also auch nicht zu trüben vermag" (Dahlhaus, "'Quantitas intrinseca' und 'Rhythmus,'" 18).

9 See William E. Caplin, "Theories of Musical Rhythm in the Eighteenth and Nineteenth Centuries," in Thomas Christensen (ed.), *The Cambridge History of Western Music Theory* (Cambridge: Cambridge University Press, 2002), 662, <https://doi.org/10.1017/chol9780521623711.023>; Christopher F. Hasty, *Meter as Rhythm* (Oxford: Oxford University Press, 1997), 105; London, *Hearing in Time*, 174; Danuta Mirka, *Metric Manipulations in Haydn and Mozart* (Oxford: Oxford University Press, 2009, <https://doi.org/10.1093/acprof:oso/9780195384925.001.0001>), 43, *inter alios*, all of whom quote Houle's translation of Printz's definition. George Houle, *Meter and Music, 1600–1800* (Bloomington, IN: Indiana University Press, 1987, <https://doi.org/10.2979/meterinmusic1600-1800>), 80–81.

musicae (1668). By stripping this early-modern idea of its twentieth-century misinterpretations, I reveal that it is far more distant from current sensibilities than has hitherto been appreciated. To begin, I critique the assumption that Printz's locution "internally long" is a simple synonym for "stressed," "strong," and the like. By analyzing Printz's presentation of *quantitas intrinseca* in his *Compendium*, I demonstrate that his choice of the "quantity" metaphor draws upon a significant intellectual tradition and also reveal that it has noteworthy connotations of metrical patterning. I then examine the presumption that Printz's notion of "internal length" aligns with metrical hierarchy. In fact, his conception turns out to correlate with sounding rhythms, not abstract beats, as an attentive reading of his statements regarding rests elucidates. Next, I assess the relationship between *quantitas intrinseca* and what he calls the *contrare* or *enantius* rhythmic pattern, which figures prominently in the modern reception of Printz's concept. After I address errors in that reception, demonstrating that his theory is more successful on its own terms than scholars have recognized, I conclude with a brief analysis suggesting that my revised reading of Printz affords new, more responsive ways of listening to and interpreting rhythm.

I. THE NUMERICAL FOUNDATION OF PRINTZ'S CONCEPT

Here is Printz's definition of *quantitas intrinseca* from his *Phrynis Mitileneaus*, in George Houle's widely quoted English translation:

Further, the position in the measure has a peculiar power and virtue which cause notes equal to one another, according to the time signature, to seem longer or shorter. This should be especially noted as much because of the text as because of consonance and dissonance. The apparent different length of notes that are equal according to their time or value, is called *Quantitas Temporalis Intrinseca*, or the inner temporal quantity.¹⁰

Houle's rendering of the passage has the benefit of providing a text that modern readers can easily understand, but it distorts Printz's meaning. Specifically, in the first sentence he uses "position in the measure" as a translation of the word *Zahl* (number), and "time signature" for *Zeit* (time). By comparing this passage with Printz's formulation of the concept in his Latin-language *Compendium*,¹¹ it becomes clear that Printz uses *Zahl* simply to

10 "Ferner ist zu wissen / dass die Zahl eine sonderbare Krafft und Tugend habe / welche verursacht / dass unter etlichen / der Zeit nach / gleich-langen Noten oder Klängen / etliche länger / etliche kürzer zu seyn scheinen: Welches sonderlich wohl zu mercken / so wohl wegen des Textes / als auch wegen der Consonantien und Dissonantien. Diese unterschiedliche Länge etlicher / der Zeit oder Wahrung nach / gleichlange Noten / wird genennet Quantitas Temporalis Intrinseca, die innerliche Zeit-Länge [1676: innerliche Länge]"; Printz, *Phrynis Mitileneaus*, I.6, §§ 6–7, p. 18; trans. Houle, *Meter and Music*, 80–81. Houle translates the 1696 second edition of Printz's treatise, which is largely identical to the first edition.

11 I am grateful to Martin Kuester's dissertation for bringing this treatise to my attention. Perplexingly, Kuester mentions the *Compendium* in a footnote purportedly supporting his claim that the earliest recorded mention of *quantitas*

indicate the word's literal meaning: number. And that concept, number, proves to be crucial for Printz's understanding of rhythm.

Considering that the concepts of quantity and its two species—discrete quantity (i.e., multitude or number) and continuous quantity (i.e., magnitude)—date back to antiquity and became commonplace in the medieval period via Boethius's account of them, it may be somewhat unexpected that they still occupy a vaunted position in Printz's early-modern *Compendium*.¹² Indeed, as Harald Heckmann put it, Printz attempts “to grasp all areas of *Musica theoretica* (as he sees them) with one concept, namely, that of quantity.”¹³ For instance, the pitch distance between two successive sounds becomes “progressive quantity” and the pitch distance between simultaneous sounds “harmonic quantity,” while tempo is termed “mensural quantity.”¹⁴ In the treatise's first chapter, he justifies this approach: the object of mathematics is “quantity as such,” and since *musica theoretica* is a mathematical discipline, its object will be “quantity of a particular kind,” namely, “discrete quantity [i.e., number] considered comparatively, with which music [theory] deals; for it considers number compared with another [number], insofar as this concerns the diversities and harmonies of pitches.”¹⁵ That is, it deals with numerical ratios and proportions as they correlate with musical intervals and larger pitch-intervallic structures, respectively.

To this fairly orthodox Pythagorean presentation, Printz makes a notable addition by acknowledging that some of music's parameters are not inherently numerical, since time (“temporal quantity”) and amplitude (“sonorous quantity”) are continuous quantities, not discrete ones.¹⁶ Yet this awareness of time's continuous nature has little impact on his theorizing. Following the lead of the fourteenth-century theorist Johannes de Muris, Printz acknowledges that time is continuous, but treats it as discrete. He does so by

intrinseca is in the first (1676) edition of Printz's *Phrynis*; Martin Kuester, “Prosody, Text-Setting and Music Theory in Eighteenth-Century Germany” (Ph.D. diss., Cornell University, 2012), 69.

12 Regarding these two concepts, see Aristotle, *Categories*, chap. 6; Boethius, *De institutione arithmetica*, in Godofredus Friedlein (ed.), *Anicii Manlii Torquati Severini Boetii De institutione arithmetica libri duo, De institutione musica libri quinque* (Leipzig: Teubner, 1867), I.1. For a more exhaustive account of the antecedents of Printz's treatment of quantity, see Harald Heckmann, “Wolfgang Caspar Printz (1641–1717) und seine Rhythmuslehre” (Ph.D. diss., Albert-Ludwigs-Universität, 1952), 73–79.

13 “Dadurch [...] hat Printz die Möglichkeit, alle Bereiche der *Musica theoretica*, wie er sie sieht, mit einem Begriffe, eben dem der *quantitas*, zu fassen”; Heckmann, “Wolfgang Caspar Printz (1641–1717) und seine Rhythmuslehre,” 79.

14 Wolfgang Caspar Printz, *Compendium musicae in quo breviter...* (Guben: Christophor Grubner, 1668), IX § 2, XIV § 2, VI § 1.

15 “[...] *quantitas* ut sic [...] *quantitas discreta* comparatè considerata, de qua agit *Musica*: Considerat enim numerum comparatum cum alio, quatenus nimirum sonorum diversitates & concentus respicit”; Printz, *Compendium*, I, §§ 7, 13.

16 Printz, *Compendium*, I, §§ 15–17. As a result of this acknowledgement, Printz later revises his statement that the object of *musica theoretica* is “discrete quantity considered as compared [with itself],” clarifying that it is “a mixed mathematical discipline [i.e., comprising both discrete and continuous quantity], the proper object of which is *quantity* compared with another, insofar as this concerns song and harmony” (“Est itaque *Musica disciplina mathematica mixta*, cujus objectum adæquatum est *quantitas comparata* cum alio, quatenus nimirum cantionem & harmoniam respicit”; Printz, *Compendium*, I, § 20, emphasis added).

taking the smallest duration in a given context as the indivisible unit and treating all larger durations as integral multiples of it.¹⁷ Thus, although Printz attempts to subsume music-theoretical content under the concept of quantity (which includes both multitude/number and magnitude), in practice he relies nearly exclusively on number.

Viewed in the context of his *Compendium*, Printz's decision to call his innovative concept "internal temporal quantity" fits perfectly into his larger agenda of quantifying the concepts of music theory. In the treatise's second chapter, he introduces the concept of temporal quantity, dividing it into two categories that he calls external and internal.¹⁸ Printz first spends several chapters covering external temporal quantity; this term indicates the actual sounding durations of notes, and he largely uses these chapters to explain time signatures.¹⁹ One should note, though, that Printz understands meter, including triple meters, in the usual seventeenth-century way: through the traditional twofold division of the *tactus* (which he also calls *tempus* and *Schlag*) into a downward motion of the hand (the thesis) and then an upward motion (the arsis).

Once Printz has concluded his treatment of "external quantity," he turns to his innovative concept of *quantitas intrinseca*, which he defines in the earlier *Compendium* as

an apparent temporal quantity by which one note seems long and another short, although they are of like extrinsic quantity. It arises from a certain virtual inner power of number.²⁰

Compare this to Houle's translation of Printz's definition in the later *Phrynis Mitileneus*, which was cited above (here with emphasis added to indicate the rendering of the bracketed terms):

Further, *the position in the measure* [die Zahl] has a peculiar power and virtue which cause notes *equal to one another, according to the time signature* [der Zeit nach, gleich-langen], to seem longer or shorter.

The more complete context of external vs. internal quantity that the *Compendium* provides and Printz's invocation of the power of number (*numerus*) make it entirely clear that

17 See Johannes de Muris, *Notitia artis musicae*, in Ulrich Michels (ed.), *Johannis de Muris Notitia artis musicae et Compendium musicae practicae, Petrus de Sancto Dionysio Tractatus de musica. Corpus Scriptorum de Musica* 17 (n.p.: American Institute of Musicology, 1972), II.2.10–3.3, pp. 69–71. Treating musical durations as multiples of a smallest unit is no innovation, of course, as it dates all the way back to Aristoxenus's *Elementa rhythmica*; the conceptual advancement of de Muris was to reconcile this practice with time's continuous nature.

18 Printz, *Compendium*, II, § 2. Here, elsewhere in the *Compendium*, and extensively in *Phrynis*, Printz employs the expository system of definition and division characteristic of the Ramist pedagogical movement, concerning which see Caleb Mutch, "Studies in the History of the Cadence" (Ph.D. diss., Columbia University, 2015), 154–65.

19 In keeping with his quantifying agenda, Printz calls time signatures "proportions" (*proportiones*). For instance, he describes his "Tripla minima" meter (our 3/4) as "subsesquitercia," the Latin term for the 3:4 ratio; Printz, *Compendium*, III, § 7 and IV, § 5.

20 "Quantitas intrinseca est quantitas temporalis adparens, quâ nota alia longa videtur, brevis alia, licet sint similis quantitatatis extrinsecæ. Nascitur ex vi quâdam virtuali intrinseca numeri"; Printz, *Compendium*, VII, §§ 1–2.

it is not “the position in the measure” that has the power to make notes seem longer or shorter. Rather, it is number, *Zahl*, that wields this power. And these notes are not “equal to one another, according to the time signature,” they are notes *with the same length according to their [external] temporal quantity*. Indeed, we will see that when Printz theorizes *quantitas intrinseca*, he never discusses time signatures, and rarely does he explicitly mention any level of metrical structure at all.²¹

How might number have the power to make notes of equal length seem longer or shorter? Printz does not spell it out for us, but his choice of the word *virtual* (*virtualis*) offers two possible explanations. First, he could simply be using language imprecisely. In that case, we could read him as actually meaning to say that the *notes themselves* are “virtually” (i.e., “apparently”) long and short. Houle notes that “Heinichen used the terms *notae virtualiter longae* and *notae virtualiter breves* for ‘long and short’ when explaining the harmonic passing tone in figured bass,”²² and one might suppose that Printz is employing the term *virtualis* in a related way. In that case, “virtuality” would indicate the simultaneous possession of two apparently contradictory qualities, as when two notes with the same external quantity (sounding duration) have different internal quantities.

If we take Printz at his word, though—namely, that it is the *power of number* that is virtual—then this interpretation makes little sense. How could the power of number be exhibiting contradictory qualities? There is, however, a more plausible explanation for what “virtual” could indicate in this context. Whereas in the medieval period the term usually meant “potential,”²³ in the Renaissance it was applied in a new way to a variety of words, such as “distinction” (*distinctio*), “will” (*voluntas*), “cause” (*causa*), “contact” (*contactus*), and even “fear” (*formido*). In all these cases, the modifier *virtual* indicates that the modified noun is an ersatz stand-in for the real object of interest, in order to assist the human intellect in understanding the actual object.²⁴ For instance, Johann Geilfus’s *Physica emendata* states that contact can be either bodily or virtual, and “virtual contact only exists with a medium placed between, such as between the sun and the earth, [or] a magnet and iron.”²⁵ This is not a case of physical contact, properly speaking, but conceiving it *as though it were* helps us to understand the relationship in question. Likewise, as Juan Caramuel y

21 Printz occasionally mentions the *tactus* (*Tact*) in *Phrynis* and the *arsis* (one of its two components) in his *Compendium*, occurrences that will be discussed below.

22 Houle, *Meter in Music*, 81.

23 Albert Blaise, *Lexicon latinitatis medii aevi* (Turnhout: Brepols, 1975), s.v. *virtualis*.

24 One of Marcin Śmiglecki’s definitions of *virtual cause* (*causa virtualis*) makes explicit the pertinence of the virtual for human comprehension, stating that it is a cause “only in the intellect” (“sed solum esse causam in intellectu”); Martinus Smiglecus, *Logica* (Oxford: William Turner, 1638), XIV.7, p. 576, *recte* 556. See also Robert Pasnau, *Theories of Cognition in the Later Middle Ages* (Cambridge: Cambridge University Press, 1997), 172.

25 “*Virtualis contactus non sit absque medio interposito, ut inter solem & terram, magnetem & ferrum*”; Johann Geilfus, *Physica emendata* (n.p.: Gregorius Kerner, 1553), 71.

Lobkowitz wrote in 1654, two things are differentiated virtually (via a *distinctio virtualis*) “which are not distinguished [from each other] truly and in reality, but in the opinion and judgement (*opinione et decreto*) of experts are related as though they were distinguished in reality.”²⁶ The “virtual distinction” was mostly employed in theological discussions of the Trinity: for instance, Paul Slevogt asserted in 1666 that

although God’s “fatherness” (*paternitas*) and “son-ness” (*filiatio*) are in reality one and the same with God’s essence, yet they are also virtually distinguished from [that essence]. And in that regard, along with that real identicalness there remains equally a virtual distinction which brings it about that the same indivisible and most simple being of God is receptive of contradictory predications.²⁷

This application of virtual distinction is intended to help the human intellect understand how the three Persons of the Trinity are in a certain sense different, even though in reality God’s essence is absolutely simple and therefore without internal differentiation of any kind.

Thus, the Renaissance-era meaning of the adjective “virtual” clarifies Printz’s claim that internal quantity “arises from a certain virtual inner power of number.” By calling the power of number virtual, Printz suggests that he does not mean that it *actually* possesses contradictory qualities simultaneously. Rather, he is communicating that the precise way in which internal temporal quantity arises is unknown to him, but that explaining internal quantity *as though* it arises from the power of number offers the best account of the phenomenon that he is able to provide. That is to say, Printz is treating the power of number as a metaphor of sorts: number itself is not responsible for what we would call metrical accentuation, but when substituted for the actual cause, it provides valuable insight into a sophisticated phenomenon unexplainable using the technical terminology of the age.

II. THE IMPLICATIONS OF THE “QUANTITY” METAPHOR

After Printz invokes the virtual power of number in the *Compendium*, he sets forth the general principle that undergirds the rest of his discussion of *quantitas intrinseca*: “Those [notes and rests] which are numbered by an odd number are long, [while] those which are

²⁶ “Porro distinguuntur virtualiter, que vere & realiter non distinguuntur, at prudentum opinione & decreto ita se habent ac si realiter distinguerentur”; Juan Caramuel y Lobkowitz, *Metalogica disputationes* (Frankfurt: Johann Schönwetter, 1654), III.5.3, p. 103.

²⁷ “Licet enim paternitas & filiatio realiter idem sint cum essentiâ, ab eadem tamen virtualiter etiam distinguuntur, & ibi cum identitate reali pariter etiam stat virtualis distinctio, quæ facit, ut eadem entitas Dei indivisibilis & simplicissima contradictoriorum prædicatorum capax fit”; Paulus Slevogtius, *Disputationes academice* (Jena: Freyschmiedt, 1666), XII, p. 258.

numbered even are short.”²⁸ One should note that Printz uses the concept of *quantity* in two distinct ways here. In the first, quantity is an ordinal number that represents a note's index within a series, whereas in the second, quantity is a note's internal temporal value, which Printz usually specifies using the terms “long” and “short.” At the outset of the present article, it was posited that Printz used the locution “internally long” for the same phenomenon to which we refer with the metaphors of stress, weight, or strength. Thus, one might assume that these latter metaphors are simply synonymous with the metaphor of internal quantity. Yet the choice of the “quantity” metaphor turns out to have significant implications.

Beyond its aforementioned place in Printz's larger agenda of quantifying as much music theory as possible, Printz's use of the terminology of discrete quantity (i.e., number) emphasizes this idea's continuity with earlier music theorizing. Specifically, by attempting to regulate the flow of musical time via the power of number, Printz is picking up on a tradition stretching all the way back to John of Garland's *De mensurabili musica* in the thirteenth century. In that tradition, odd-numbered events have one set of characteristics, while even-numbered ones have another.²⁹ Printz's explanation of internal temporal quantity proceeds from precisely that principle.

Defining metrical accentuation in terms of quantity has another notable feature: the predictable alternation of odd and even ordinal numbers (and, by extension, long and short internal temporal quantities) that it suggests. In this respect, although Printz's “long internal temporal quantity” ultimately refers to the same psycho-acoustic phenomenon as do more modern metaphors of stress, weight, or strength, his conception of

28 “Itaque quæ numero impari numerantur, longæ, quæ pari breves sunt”; Printz, *Compendium*, VII, § 3. Cf. Printz, *Phrynis*, VI, § 10. Although Printz is not explicit about precisely what things are being numbered, the grammatical context indicates that the implied noun must be feminine. As a result, the only plausible antecedent is the implicit plural “notes” (*notae*) evoked in § 1: “one note seems long, and another short” (“nota alia longa videtur, brevis alia”). In keeping with its original meaning as a written sign or symbol, Printz uses this term not just for sounding notes, but also as a shorthand for notated “notes and rests” (*notae & pausa*), as chapter two of the *Compendium* makes clear.

29 John of Garland stipulates that in the first, second, and third rhythmic modes, all notes falling in odd-numbered positions should be concordant with one another, leaving implicit that even-numbered pitches may be dissonant: “Unde regula: omne, quod fit impari, debet concordari omni illi, quod fit in impari, si sit in primo vel secundo, et hoc in primo modo sive secundo vel tertio”; Johannes de Garlandia, *De mensurabili musica*, in Erich Reimer (ed.), *Johannes de Garlandia: De mensurabili musica, kritische Edition mit Kommentar und Interpretation der Notationslehre* (Wiesbaden: Steiner, 1972), vol. 1, chap. XI, p. 76; cf. the translation by Sarah Fuller in “Theoretical Foundations of Early Organum Theory,” *Acta Musicologica* 53/1 (1981), 77, <https://doi.org/10.2307/932569>. As Fuller goes on to explain, “The purpose of this precept is to coordinate recurrent rhythmic patterns with stable sound quality by locating consonance at the beginnings of rhythmic units” (ibid.). While consonance regulation is far less central to Printz's use of numbers, he likewise states that “every note that is long with respect to its internal quantity ought to be consonant, or at least be resolved to a consonance” (“Omnis nota quantitate intrinsecâ longa debet consonare, aut tamen in concordantiam resolvi”; Printz, *Compendium*, XIV, § 17). The more proximate source to Printz is likely the seventeenth-century Italian opposition between “good” and “bad” notes, concerning which see Houle, *Meter and Music*, 81–82. My thanks to David E. Cohen for bringing to my attention these possible sources of Printz's theorizing.

that phenomenon differs significantly. In the latter metaphors, a succession of “strong” then “weak” events could be followed variously by (1) a “strong” (as in a simple duple context), (2) another “weak” (as in a triple context), or even (3) a “medium” then “weak” (as in some conceptions of quadruple meter). Likewise, metaphors of stress and weight evoke no inherent expectations of patterning. By contrast, the metaphor of internal temporal quantity, as dictated by odd/even numbers, bears within itself an important implication: namely, that the phenomenon being theorized extends endlessly in a regular, inherently and completely predictable alternation between two states that differ in their essences. For odd and even are quite different in character from the dichotomies “strong/weak,” “heavy/light,” and “stressed/unstressed.” In each of the latter dichotomies, the two terms name the poles of what is implicitly understood as a qualitative continuum: things can be *more or less* strong or weak, heavy or light, stressed or unstressed. That is not true of “odd” and “even,” which denote kinds of numbers that are essentially distinct and opposed, and they are therefore mutually exclusive in a way the other dichotomies are not.³⁰ For instance, it would be meaningless to say that a given number is more or less odd or even: there are no degrees of oddness and evenness, and every number simply *is*, necessarily and without qualification, one or the other.

Printz's decision to rely on odd and even numbers to theorize internal temporal quantity has the feature of implying a continuous alternation of long and short, but this system is clearly unable to account for all of Printz's intuitions of how internal temporal quantity works in practice. Consequently, in the *Compendium*, he follows his principle concerning odd- and even-numbered notes with a series of fifteen or so modifications that constitute the vast majority of his treatment of *quantitas intrinseca* in that treatise.³¹ By proposing this combination of principle and modifications, Printz does not appear to be attempting an explanation of the essence of internal temporal quantity. Indeed, I suspect that in his groundbreaking effort to account for metrical accentuation, he was ultimately unable to formulate a satisfactory explanation of its nature. Instead, his aim seems to be more modest: the creation of a procedure that allows readers to examine any rhythm and arrive at an analysis of its internal temporal quantity that aligns with Printz's intuitions.³²

30 In her reading of thirteenth-century treatises on rhythm, Dorit Tanay argues that theorists of that era viewed the categories of “long” and “short” not as terms that lie on a continuum, but as “distinct or mutually exclusive essences or species”; Tanay, *Noting Music, Marking Culture: The Intellectual Context of Rhythmic Notation, 1250–1400* (Holzgerlingen: American Institute of Musicology & Hänssler-Verlag, 1999), 30–1. Printz, however, appears not to have shared this perspective, as I argue below.

31 Printz, *Compendium*, VII, §§ 4–13.

32 This resonates with my reading of his use of the term “virtual”: his set of principle and modifications provides useful heuristic insight into the phenomenon of internal temporal quantity, but it is not an explanation of the essence of the thing itself.

III. ACCOUNTING FOR TRIPLE METERS IN AN ODD-EVEN FRAMEWORK

Perhaps the most pressing challenge to Printz's general principle is the need to account for triple meters: how could he have thought that the alternation of odd and even numbers was satisfactory for explaining musical phenomena of that sort? Yet this objection would have seemed less of an issue in Printz's day. Because rhythm was understood in terms of the paired motions of thesis and arsis—even in triple meter contexts—applying the binary opposition of odd and even to it would be no stretch.³³ In fact, the division of a tripartite *tactus* into two unequal parts perfectly correlates internal and external temporal quantities: the thesis, which begins the *tactus*, is odd-numbered (and thus internally long) and lasts twice as long as the arsis (thus making the thesis externally long as well), whereas the even-numbered arsis is both internally and externally short.

This convenient correlation of odd and even with unequal thesis and arsis may explain how Printz came to be convinced by his claim in the *Compendium* that odd-numbered notes are long and even-numbered ones are short, but Printz never uses it as an explanatory strategy. For instance, in *Phrynis*, Printz simply retreats from the radical form of the claim, restricting the principle's validity to duple contexts. His version of the odd-even principle in *Phrynis* starts with the proviso "Should the divider of notes be the second number [...],"³⁴ a phrase that he uses to denote we call duple meter. (More precisely, his notion of the "divider of notes" includes both a metric and a rhythmic aspect: either as a given note's subdivision into two abstract beats of equal length, or as its division into two notes of unspecified length—not necessarily equal—that sum to the duration of the given note.) Shortly before the end of the chapter, he picks up the thread again, continuing: "Should the third number be the divider [i.e., in a triple-meter context], then the first is [internally] long [while] the second and the third are short."³⁵ Thus, in the version of the theory promulgated in *Phrynis*, the principle that odd-numbered notes are internally long simply does not apply in triple contexts.

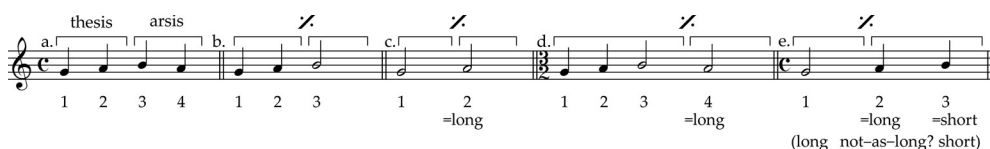
In the *Compendium*, by contrast, Printz takes a more maximalist position, proposing his general principle about odd- and even-numbered notes without restricting it to only duple contexts. Only after positing the principle does he introduce modifications to account for various situations (such as triple meter) where its results fail to align with his intuitions. Printz's explanations of these modifications, however, are far from self-evi-

33 Dahlhaus points out that even as late as 1739, Johann Mattheson still rejected a tripartite analysis of triple time in favor of a long thesis and a short arsis; Dahlhaus, "'Quantitas intrinseca' und 'Rhythmus,'" 20.

34 Printz, *Phrynis*, VI, § 10. The entirety of *Phrynis*'s version of the odd-even principle is quoted below in the section "Internal temporal quantity, measures, and metrical hierarchy."

35 "Ist die dritte Zahl Theiler/ so ist die erste lang/ die andere und dritte kurz"; Printz, *Phrynis*, VI, § 13. Note the mismatch between the *tactus*'s division into thesis and arsis vs. the long and short values of internal temporal quantity: the thesis comprises the long note and the first short one, while the arsis consists of only the final short note.

Example 1: My illustrations of Printz's general principle and first modification



dent, and he provides no musical examples or clear indications of what situations the modifications are meant to account for. It will be worth our while, then, to devote some serious attention to Printz's modifications of his general principle—and in particular, to the first six of them—thereby reconstructing their musical implications and teasing out what he leaves implicit.

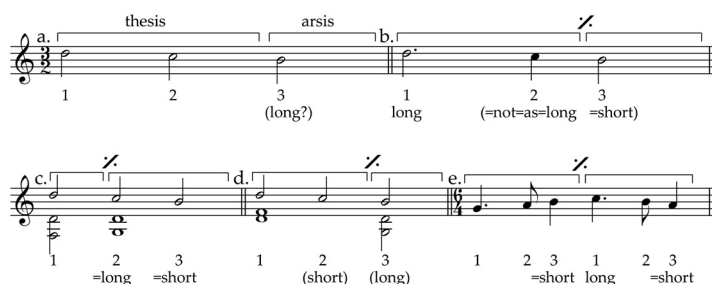
Printz's first modification immediately follows his maximalist articulation of the principle that odd-numbered notes are internally long and even-numbered ones short (as in my Examples 1a and 1b, illustrations I have created to compensate for the *Compendium's* absence of musical examples of internal temporal quantity). He continues: "But this is not the case if the first number in the arsis (*reductus*)³⁶ is even, for then, since it is odd with regard to the arsis, it is lengthened."³⁷ As is the case with many of Printz's modifications, this lays out a condition of ordinal number (often abstracted to odd vs. even) plus a particular context, and then indicates whether the result should be internally long or short. This particular modification posits that if an even-numbered note occurs at the start of the arsis (as in Examples 1c, 1d, and 1e), it is internally long; this follows, Printz explains, because it is odd-numbered *with regard to the arsis*. On its face, this results in two consecutive notes being deemed odd-numbered—a seemingly nonsensical proposition—and thus internally long. Yet Printz also occasionally speaks of internal temporal quantity as having gradations beyond simply long and short, as having *relative degrees* of length and brevity.³⁸ Extrapolating from those statements to this context, the first modification's "even note" would be internally long in its capacity as first of the arsis (and it may be followed by a relatively shorter second note within the arsis), but the preceding note would be even longer, since it is the first of both the thesis and the *tactus* as a whole (see the bottom line of Example 1e).

36 As a careful reading of the *Compendium's* fourth chapter reveals, Printz uses the term *pulsus* ("striking") for the *tactus's* thesis and *reductus* ("drawing back") for its arsis. I have not encountered this idiosyncratic usage elsewhere.

37 "Excipe tamen, si numerus primus in reductu par est: tunc enim, cum sit impar ratione reductus, producit [recte: productur]"; Printz, *Compendium*, VII, § 4.

38 Printz suggests that internal duration is relative in his second modification, which will be examined below, and later in the *Compendium* he also compares a note with the "longest internal duration" (*quantitate intrinsecā longissima*) to others that are "shorter" (*aliā breviores*); Printz, *Compendium*, XIV, § 14.

Example 2: My illustrations of Printz's second modification



Printz's second modification also suggests a gradation of relatively longer and shorter internal temporal quantities. The purpose of this modification is evidently to account for triple meter (what he calls "the division made by the number three"). This second modification, then, reads as follows: "Likewise, in the division which is made by the number three, the third [note] is either long or short (*anceps*),³⁹ due to uncertainty whether the third [note] is the first or the second of the arsis, and because the length of the first seems entirely to overwhelm the length of the third."⁴⁰ In Example 2a, the third note, B₄, is odd-numbered, so it would normally be internally long. In a triple-meter context, too, one would expect that note to align with the beginning of the arsis, since the thesis normally lasts twice as long as the arsis.⁴¹ This makes the third note "odd with regard to the arsis" (as Printz states in the first modification), thereby confirming that it should be internally long. One should note, however, that the *Compendium* implies that the third note may be internally long only when it is the third note of the *tactus* itself (i.e., constituting either the arsis or the second note of the arsis). Indeed, later in the chapter, when there is no mention of the arsis or *tactus*, Printz generalizes: "To be sure, in the division which is [made] by the third number, the first [note] is long [and] the two remaining [notes] are short."⁴²

39 This term comes from the field of classical Latin prosody. In many Latin verse forms, the final syllable of a line may be either long or short, and the word *anceps* (literally, "two-headed") refers to this twofold potential. See, for instance, Charles E. Bennett, *New Latin Grammar*, 3rd ed. (Boston: Allyn and Bacon, 1918), 245.

40 "Item in divisione, quæ fit numero ternario tertia anceps est, propter dubium an tertia sit prima an secunda reductûs, & quia longitudo primæ tertiæ longitudinem fermè obruere videtur"; Printz, *Compendium*, VII, § 4.

41 For a useful overview of early-modern attempts to reconcile the binary thesis-arsis framework with triple meters, see Roger Mathew Grant, *Beating Time & Measuring Music in the Early Modern Era* (Oxford and New York: Oxford University Press, 2014), <https://doi.org/10.1093/acprof:oso/9780199367283.001.0001>, 63, 68–90. Printz's assertion that there can be uncertainty concerning when the arsis begins seems to be quite unusual.

42 "In divisione nimirum, quæ sit numero ternario prima longa, duæ reliquæ breves sunt"; Printz, *Compendium*, VII, § 11.

Because having the third, odd-numbered note be short contradicts Printz's general principle, his second modification offers two explanations of why this can be the case. First, the musical context may suggest that the note is, in fact, the second note of the arsis, as in Example 2c, where the harmonic rhythm places far greater emphasis on the second beat than on the third.⁴³ Printz acknowledges the importance of harmonic considerations for determining internal temporal quantity,⁴⁴ and he would presumably agree that Example 2d suggests a different placement of the arsis than Example 2c. Second, Printz posits at the end of the second modification that "the length of the first [note] seems entirely to overwhelm the length of the third." This gives the impression that the last note is still technically long, but the first note is internally longer to such an extent that the third seems short in comparison. Such a phenomenon is easier to imagine in a situation like Example 2b, where the first note's external quantity is also the longest, but Printz's prose implies that it is just as true of 2a, where the note values are equal. This is a compact illustration of the sophistication of Printz's concept: internal quantity is not merely a matter of long vs. short, and a note's internal quantity is not at all determined by its sounding duration.

IV. INTERNAL TEMPORAL QUANTITY, MEASURES, AND METRICAL HIERARCHY

One significant difference between the *Compendium* and *Phrynis* lies in what Printz has to say about when to restart the numbering of notes. In the *Compendium*, he only indicates that each triple division starts with a 1 ("in the division which is by the third number, the first is long"), and he is silent about duple contexts. In *Phrynis*, by contrast, Printz addresses the issue more generally, stating that "every semibreve or entire *tactus* also should be long according to [its] internal temporal quantity, because it is numbered with an odd number, viz. 1."⁴⁵ While one could interpret this as confirming Houle's interpretation that internal temporal quantity is an index of the position within the measure⁴⁶ (if one grants

43 This unorthodox reading of a shorter thesis and longer arsis is supported by Printz's invocation of "uncertainty whether the third [note] is the first or the second of the arsis." Printz's evident belief that there can be uncertainty of that kind indicates that it must be possible for the arsis to begin at more than one time within the *tactus*.

44 For instance, Printz states that "[t]his quantity is internal, if you consider consonances and dissonances" ("Hæc est quantitas intrinseca, si ad concordantias & discordantias respicis"); Printz, *Compendium*, § 10. See also XIV, § 17 and XV, §§ 7–8, where internal quantity conversely determines the treatment of dissonances and consonances.

45 "Hierauf erhellet / daß eine jede Semibrevis oder gantzer Tact / auch der innerlichen Quantität nach lang sey / weil sie mit einer ungeraden Zahl / nemlich 1. gezehlet wird"; Printz, *Phrynis*, VI, § 11.

46 In support of this interpretation, one could also adduce one of Printz's musical examples from *Phrynis* demonstrating the proper congruence of text-setting with internal length using two statements of a melody, the second of which is offset from its proper metric position by an eighth note; Printz, *Phrynis*, VI, § 10. That wrong version concludes on the

that the measure and the *tactus* are simply synonymous⁴⁷), there are good reasons to be wary of applying this interpretation to the system Printz lays out in his *Compendium*. Indeed, even within *Phrynis* there are hints of other possibilities, as when Printz asserts that each half of the *tactus* should be long in slow 6/4 (*sesquialtera minor*) meter.⁴⁸

Furthermore, the *Compendium*'s remarkably flexible system shows no signs that Printz then viewed each *tactus* as restarting the count. In that treatise, he rarely makes explicit recourse to a pre-existing metrical structure: of its fifteen or so modifications to the general principle, only the first two refer to the arsis, and none refers to the thesis or *tactus*. Relatedly, his locution "division made by the number three" does not refer to the *tactus* or any other specific metric terminology; indeed, it is applicable at different levels of the metrical structure, not just to the division of the *tactus*. Consequently, within the principle-and-modifications system that Printz develops in his *Compendium*, it is conceptually neatest to hypothesize that notes should be numbered continuously until one of his modifications to the general principle is encountered (such as a division being made by the number three), at which point the numbering should start over at 1.

Printz's theory also contains hints that the numbering of musical events can take place on multiple metrical levels at once. We have already seen that his first modification describes a note as being simultaneously even at the level of the *tactus*'s subdivision and odd (namely, first) at the level of the arsis's subdivision. In *Phrynis*, Printz presents an even more sophisticated case. Consider my Example 2e: in 6/4 meter, each half of the *tactus* is divided "by the number three," so both the *Compendium* and *Phrynis* agree that the first note of each division is long and the remaining notes are short. In *Phrynis*, however, Printz adds a curious clarification: "Because a very slow *tactus* is used these days, each half *tactus* is usually observed [to be internally] long, especially in *sesquialtera minore*, where six quarters are sung to one *tactus*."⁴⁹ The fact that Printz added this explanation indicates that in faster tempos the start of the arsis is internally shorter than the start of the thesis, even though he just said that in triple divisions the first note is long. The only way to reconcile this is by assuming that the start of the arsis is normally considered to be not just the first (and thus internally long) at the level of the arsis's triple subdivision, but simultane-

first note after a bar line and is numbered with a "1" above the staff; yet since its purpose is to demonstrate "number being altered" ("die Zahl verändert wird") to "provoke a horrid annoyance" ("ein greulich Verdruss verursacht wird"), it seems unwise to attribute it much normativity. Heckmann, however, takes the opposite view, reading this example as proof that numbering should restart after each bar line; Heckmann, "Wolfgang Caspar Printz," 90.

47 As Roger Grant emphasizes, the Aristotelianism-informed concept of the *tactus*, with its arsis and thesis, indicated a continuous motion through space (Grant, *Beating Time*, 19–29, 52–59), a far cry from the static grid evoked by "position with the measure."

48 Printz, *Phrynis*, VI, § 15.

49 "Weil heutiges Tages ein sehr langsamer Tact gebraucht wird / wird gemeinlich auch ein jeder halber Tact lang geachtet / sonderlich in *sesquialtera minore*, da sechs Viertel auf einen Tact gesungen werden"; *ibid*.

Example 3: My illustrations of Printz's third and fourth modifications

Example 3 consists of five measures of music, labeled a through e. Measures a and b are in common time (C), while measures c, d, and e are in 3/4 time. The notation includes notes with stems and flags, and some notes are marked with a slash through them. Below the notes, numbers 1 and 2 are used to indicate the length of the notes: 1 for long and 2 for short. In measure a, the thesis is marked 1 and the arsis is marked 2=long. In measure b, the thesis is marked 1 and the arsis is marked 2=long, 3(long), 4. In measure c, the thesis is marked 1 and the arsis is marked 2=long, 3=short. In measure d, the thesis is marked 1(long), 2=long, 3 and the arsis is marked 1, 2. In measure e, the thesis is marked 1, 2=long, 3(long), 4 and the arsis is marked 5, 6.

ously the second (and thus internally short) at the level of the *tactus*'s duple subdivision. Only then does Printz's clarification about slow tempos making the start of the arsis long (namely, as internally long as the start of the thesis) make sense.

Between this capacity of internal temporal quantity to be calculated at multiple metrical levels and Printz's declaration in *Phrynis* that each *tactus* begins with 1, one might be tempted to deduce that internal temporal quantity correlates with metrical hierarchy—that is, that Printz's odd numbers ultimately refer to the given metrical hierarchy's strong beats, such that his concept of internal temporal length is effectively identical to our concept of metrical accent. Yet Printz's third and fourth modifications to his general principle, which come in quick succession, problematize this interpretation. He explains that “[3] if the first [notated thing] is silent, the second is long, and [4] if the division is made by the number three, the third is short.”⁵⁰ When one views the third modification (“if the first [notated thing] is silent, the second is long”) as a special case of the first modification (“if the first number in the arsis is even, it is long”), it seems unproblematic. As Example 3a illustrates, “if the first [comprising the thesis] is silent, the second [which is first of the arsis] is long.” Yet the third modification, far from stating that the second note must begin the arsis, makes no reference to the arsis at all; its conditions are equally well fulfilled by my Example 3b, in which the internally long second note (counting the initial rest as the first) falls on a weak beat of the metrical hierarchy. This is confirmed by Printz's fourth modification, where the first notated thing is silent, the second is long, and the third is short (Example 3c).

Printz's explanation that internally long notes can fall on what we would consider weak beats may seem obtuse, but it is actually quite defensible. Consider the brief melody shown in Example 3d: the first note is odd-numbered, and thus internally long, and the

50 “Si prima tacet, secunda est longa, & si divisio sit numero ternario, tertia brevis”; Printz, *Compendium*, VII, § 5.

second note begins the arsis, so it too is internally long.⁵¹ When the opening half note is replaced with a quarter-note rest and then a quarter note, as in Example 3e, the pattern of two consecutive internally long notes still applies.⁵² Following Printz's practice in *Phrynis* of explaining internal length by drawing upon its similarities with syllabic accentuation,⁵³ we could set a text like "Who murdered Lorca?" to Examples 3d and 3e. One can successfully perform the text while accenting the first two successive syllables ("who" and "mur-") regardless of whether "who" is set to a strong-beat half note or a weak-beat quarter.

Printz's third and fourth modifications demonstrate that there is no fixed correlation between his concept of internal temporal quantity and our notion of metrical hierarchy. How, then, are we to interpret his concept? Printz's statement that "if the first is silent, the second is long" suggests that his ideas draw on an awkward combination of what is notated and what is performed. For purposes of numbering, one counts what is notated, regardless of whether it is silent or sounding.⁵⁴ Yet the fourth modification implies that only things that are sounding may be internally long, and that a rest defers would-be internal length onto the next note. It seems, then, that Printz conceives the phenomenon of internal length as something pertaining only to sounded notes, and not to positions in a metrical grid occupied by rests. Yet when he tries to describe its operation to his readers, he struggles to theorize on the basis of sounded notes alone, and instead finds himself consistently resorting to the invocation of written notation.

V. INTERNAL TEMPORAL QUANTITY AND THE CONTRARE FOOT

Let us turn now to Printz's highly compressed sixth modification, which introduces an idea that figures prominently in the modern reception of his theory: "a greater external quantity often annuls an internal quantity that is less than the external [quantity]."⁵⁵ A greater *external* temporal quantity indicates that the note has a relatively long sounding duration, while a lesser *internal* quantity presumably means that it is an internally short

51 I have restarted the numbering in the following measure per my earlier hypothesis that numbering begins anew after each invocation of a modification to the general principle.

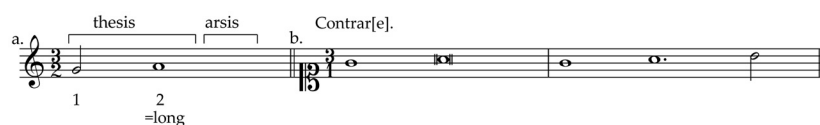
52 The numbering of Example 2e could also be reset starting at G4, per the aforementioned renumbering hypothesis, although it is not necessary in this case.

53 Using the word *Christianus* and the phrase *Fasten bringet schlechte Freude* ("fasting brings bad joy"), Printz contrasts a metrically concordant setting (where stressed/internally long syllables fall on odd-numbered notes) with a displaced, discordant one (where they fall on even-numbered ones) to demonstrate the reality of internal temporal quantity; Printz, *Phrynis*, VI, §§ 8–10.

54 As mentioned above, Printz's use of feminine adjectives means that the implied subject is "notes/notes and rests" (*notae*), not beats.

55 "Quantitas extrinseca major extinguit sæpè quantitatem intrinsecam extrinseca [*recte*: extrinsecâ] minorem"; Printz, *Compendium*, VIII, § 6.

Example 4: (a) My illustration of Printz's sixth modification; (b) Printz's examples of the *contrare* foot, from *Phrynis Mitileneus*, vol. 1 (1696), 21



value and therefore should be even-numbered. Example 4a fits this description: the second note, which is even-numbered and thus internally short (that is, it has a lesser internal quantity), has a longer external (sounding) quantity than the first note. Printz posits that in such situations the greater external quantity of the second note “annuls” its lesser internal quantity. The precise nature of the annulling is not spelled out, but it most likely indicates that the impression of a small (internal) quantity is replaced by that of a large (external) quantity. Or, to translate into modern terminology: a long note value can render a note accented (i.e., agogically/durationally) even when it is not metrically accented. This syncopated rhythmic pattern is, of course, ubiquitous in suspensions and endemic to sarabandes and the like, so it is unsurprising that Printz sought to account for it in his number-based system.

Later in the *Compendium*, Printz adds new content pertaining to this sixth modification, and it occurs in the context of his discussion of rhythmic patterning. Therein, he adapts many of the traditional quantitative foot types for musical purposes, relying primarily on notes' external temporal quantities, but occasionally making recourse to internal quantity for further clarification. (Modern scholarship tends to call this enterprise “rhythmopoeia,” but Printz terms it “musica rhythmica” in his extended treatment of the matter in *Phrynis Mitileneus*'s third book.⁵⁶) He introduces a new type of musico-rhythmic foot not found in traditional poetic theory, which he calls the *contrare* or *enantius* (“opposite”). As the name implies, the notion of contrariness is central to his conception. Example 4b (which reproduces Printz's first two examples of this foot in *Phrynis Mitileneus*) illustrates that the *contrare* is characterized by each note's internal temporal quantity being opposed or contrary to its external quantity: since the first note in each case is odd-numbered, it is internally long, but its duration (external temporal quantity) is short, whereas the converse is true of the second note. Printz's verbal explanations of the *contrare* foot in

⁵⁶ In his *Compendium* and *Phrynis*, Printz only discusses this material under the rubric of “Ways of Beginning, Continuing, and Ending” (“De Modis incipiendi, progrediendi, & finiendi”) “Von den Arten anzufangen / fortzufahren und zu endigen”; *Compendium*, XI; *Phrynis*, VII. In those treatises, he calls the *contrare* and similar phenomena a “way of continuing” (*Modus progrediendi*), not a foot; in *Phrynis Mitileneus*, he also classifies it as a “way of beginning” (*Modus incipiendi*); *Phrynis Mitileneus*, I.7, §§ 2–3. But because the other “ways of continuing” include familiar foot types such as trochaic and dactylic, I have taken the liberty of simplification by calling them all feet, rather than “ways of continuing.”

Example 5: Houle's annotated version of a musical example from Printz, *Phrynis Mitilenaëus*



his *Compendium* and *Phrynis* are somewhat abstruse,⁵⁷ but in *Phrynis Mitilenaëus* he states more clearly that this foot occurs when “the first note is long with respect to its *internal* quantity, while the other is long with respect to its *external* quantity.”⁵⁸ While the framing is somewhat different, the phenomenon being described aligns well with Printz’s sixth modification to his general principle of internal temporal quantity, where an even-numbered note’s greater external quantity is in tension with its lesser internal quantity.

Printz’s concept of the *contrare* foot has been something of a sticking point in the recent reception of his concept of *quantitas intrinseca*. George Houle, for instance, points to it as evidence of Printz’s shortcomings as a theorist. In *Phrynis Mitilenaëus*, Printz discusses a rhythmic pattern that he calls “Dichronum Dactylico-contrarium”: a two-measure unit of which the first measure is a *contrare* foot (short, long, short) and the second is a dactyl (long, short, short). Houle takes Printz’s second musical example of this pattern—namely, the start of a piece by Lully⁵⁹—and adds an analysis of its internal length above the staff (Houle uses the symbols v for short and – for long). I have transcribed the resulting illustration as Example 5.

Houle then critiques the result:

Although this is Printz’s own example, it should be noted that the v – or v – v rhythm is incorrectly realized according to his own rules of *quantitas intrinseca*. The first notes of the first, third, and fifth bars are short according to *rhythmopoeia*, but in the 3/4 measure these beats are long, according to *quantitas intrinseca*. Apparently the irrational nature of *rhythmopoeia* could not be entirely adjusted to the rationality of *quantitas intrinseca*, even by such a learned theorist.⁶⁰

57 In the *Compendium*, Printz defines it thus: “*Enantius constat vel numero pauco vel multo & quantitate numerati quantum potest, contrariâ in divisione, quæ fit numero ternario*”; XI, § 17. In *Phrynis*, he says: “*Enantius ist / wenn in jeden Tact zum wenigsten eine Note contrar ist / oder wieder den Tact gehet in denen Proportionibus so die dritte Zahl zum Theiler haben*”; VII, § 18. In neither case does Printz make it particularly clear what the nature of the contrariety is.

58 “*Die Contrare, wenn in einer Proportion unter denen Noten / so aus der division per numerum ternarium entstehen / die erste Quantitate Intrinsecâ, die andere Extrinsecâ lang*”; Printz, *Phrynis Mitilenaëus*, I.7, § 3; emphasis added.

59 Houle calls this piece a sarabande, even though Printz labels it a “Menuet” (*Phrynis Mitilenaëus*, III.17, p. 127). I have been unable to locate this precise melody in the thematic catalogue of Lully’s works; however, many melodies therein have similar rhythmic profiles; Herbert Schneider, *Chronologisch-thematisches Verzeichnis sämtlicher Werke von Jean-Baptiste Lully* (Tutzing: Hans Schneider, 1981).

60 Houle, *Meter in Music*, 70–1.

This criticism is unfounded. As we have seen, Printz's methodology for describing the workings of *quantitas intrinseca* is to begin with his general principle, that odd-numbered notes are internally long and even ones short, and then to identify modifications to that general principle in order to account for different rhythmic patterns. Since Printz's "di-chroni contrario-dactylici" label explicitly indicates that the first of every two feet is a *contrare*, then of course its initial note is "short according to *rhythmopoeia* [i.e., *quantitas extrinseca*], but [...] long, according to *quantitas intrinseca*." One might as well criticize him on the grounds that the second note in a spondee (the foot type composed of two long syllables) is long, even though his general principle dictates that it should be short, since it is even-numbered. Printz obviously knew that, and in crafting his system—specifically, his first modification—he accounted for it.

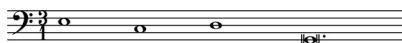
William Caplin similarly cites the *contrare/enantius* as one of the "internal contradictions within [Printz's] theory." His critique is that "the *enantius* pattern is, like the *iambus*, made up of a short followed by a long, but in this case, it is the external length, not the internal one, that defines the pattern and its boundaries with respect to the measure."⁶¹ First, Caplin's reference to defining the pattern's "boundaries with respect to the measure" is surely a result of his relying on Houle's faulty translation of Printz's definition of *quantitas intrinseca*, where Houle claims that "the position in the measure has a peculiar power." As we have seen, Printz does not define the *contrare* with respect to the measure or its boundaries: he simply describes it as occurring when the internal and external temporal quantities of a note are opposed to each other. Second, for that very reason, it is errant to describe Printz as defining the *contrare* by "the external length, not the internal one." It is precisely the interaction of these two quantities that determines the *contrare*, not the external length alone. And third, Caplin's description of this as an "internal contradiction" is no better grounded than Houle's complaint that Printz "incorrectly realizes" the *contrare* foot: the "internal contradiction" that strikes Caplin as a problem is, in fact, a feature that Printz leveraged for his theorizing of a complex musical phenomenon. More puzzling still, Caplin claims that Printz "cannot account for the very common *anapest* figure" (short-short-long).⁶² But this ignores Printz's own discussion of the anapest (see Example 6), in which he states, "In the anapestic [foot], in the last three [notes of the example, i.e., C₃, D₃, G₂] the first two are short, [and] the last is long."⁶³ In effect, Printz's second modification (the third note can be internally short in triple divisions) holds here, too, as

61 Caplin, "Theories of Musical Rhythm," 666. As Caplin explains, Printz provides examples of iambs in which both notes have the same *external* quantity, so it is the *internal* quantities of short then long that make them iambic.

62 Ibid.

63 "In der Anapæstischen seyn unter den letzten dreyen die ersten beyden kurtz / die letzte lang"; Printz, *Phrynis Mitileneus*, I, 7, § 30; *Phrynis*, VII, § 28 is identical, except for the missing musical example.

Example 6: Printz's anapest, from *Phrynis Mitilenaus*, vol. 1 (1696), 25



E3 and G2 are internally long while C3 and D3 are internally short. To account for the anapest, Printz simply selects the last three notes of the example instead of the first three.⁶⁴

The concept of the *contrare* foot also arises in Danuta Mirka's remarks on Printz, but she denies him credit for it. She begins by noting that "the distinction drawn by Printz (1696) between *quantitas intrinseca* and *quantitas extrinseca* made it possible to relate the length of a syllable in a given foot not only to a note's extrinsic value but also to its intrinsic value, determined by its position in the measure."⁶⁵ Overlooking the sophistication of Printz's theory, she claims that "This possibility was first realized by Printz himself [...] but it was only Koch who pushed it to its ultimate consequences." She goes on to list Koch's intellectual achievements, implying that they surpass those of Printz. Among these, Mirka includes the claim that "Although in some of [Koch's] examples the lengths of syllables correspond with the extrinsic values of notes as well, in others, long and short syllables are often rendered in equal rhythmical values or are even reversed with respect to these values, so that a long syllable is represented by a note shorter than the note corresponding to the short syllable."⁶⁶ This description of Koch's practice perfectly matches Printz's theorizing, too, and the similarity between her last clause and Printz's description of the *contrare* foot is striking.

One final misapprehension regarding internal temporal quantity concerns what it represents. Justin London suggests that Printz uses the concept to describe something other than metrical accentuation when he quotes Printz's definition (in Houle's translation) to support his claim that "the awareness of intentional and systematic deviations from notated durations by musicians in performance goes back quite a bit farther [than 1926]."⁶⁷ Printz, however, cannot have intended *quantitas intrinseca* to describe performed deviations from notated values, since he makes clear in his *Compendium* that *quantitas intrinseca* is only an "apparent temporal quantity" (*quantitas temporalis adparens*), where-

64 Although Printz's depiction of the anapest as starting partway through a thesis and lasting through the end of the following *tactus* (notes two through four of the example) may appear somewhat contrived, one should note that Printz is not discussing feet in general, but rather the different rhythmic "ways of ending" (*Arten zu endigen*). That is to say, he is cataloguing the different rhythmic patterns that occur in cadential bass lines; *Phrynis*, VII, §§ 25–33.

65 Mirka, *Metric Manipulations*, 94.

66 Ibid.

67 London, *Hearing in Time*, 174.

as external quantity is a note's "real length" (*vera longitudo*).⁶⁸ Printz's descriptor of the internal quantity as "apparent" certainly implies that it appears to a perceiving subject, but curiously enough, Printz never makes the perceptual implications of *quantitas intrinseca* explicit in the *Compendium* or in *Phrynis*. Rather than explaining that a note's internal temporal quantity is a property that is generated in a perceiver's consciousness, he simply attributes that property to the note itself. While a perception-based interpretation meets no resistance in Printz's text, and indeed is very plausible, it is only an extrapolation: at this stage in his intellectual development, Printz had not yet absorbed the writings of Descartes that later enabled him to recast his insights in explicitly cognitivist terms, as I demonstrate in another study.⁶⁹

CONCLUSION

The image of Printz's concept of *quantitas intrinseca* that emerges when it is no longer filtered through the misapprehensions of Houle's translation may at first appear disconcertingly alien. The easy familiarity of notes being characterized by the "time signature" and their "position in the measure"—downbeats vs. weak beats and the like—is no longer present. Instead, our attention is directed to "quantity," to the ordinal numbering of series of notes and rests, and different questions arise. Is this note an even-numbered event in the series at hand, or is it odd? How does that numbering interact with the alternation between thesis and arsis? Is this note actually internally long, or does the greater length of the previous long note overwhelm it? And so on.

Consider Example 7, an excerpt from a motet by Johann Pachelbel (1653–1706), a contemporary of Printz. The top staff presents a Houle-inspired reading, with notations of long and short syllables *à la* his analysis of the Lully sarabande/menueet reproduced above. This reading of the Pachelbel piece would describe the "Trö-" syllable in m. 5 (the example's first measure) as internally short, due to its "position in the measure" on a weak beat. As we have seen, though, Printz's third and fourth modifications state that "if the first is silent, the second is long, and if the division is made by the number three, the third is short."⁷⁰ As a result, a reading informed by Printz's *Compendium* (see the second staff of Example 7) interprets "Trö-" as long.

68 Printz, *Compendium*, VII, § 1; II, § 3. In *Phrynis*, Printz similarly speaks of number having the power to make notes "seem to be" (*zu seyn scheinen*) longer or shorter; VI, § 6.

69 Caleb Mutch, "Early Modern Music Cognition: The Case of W. C. Printz," forthcoming in *Journal of Music Theory* 69/2 (2025).

70 "Si prima tacet, secunda est long, & si divisio sit numero ternario, tertia brevis"; Printz, *Compendium*, VII, § 5.

Example 7: Two interpretations of Pachelbel, "Tröste uns Gott," P. 474, mm. 5–9

The musical score for Example 7 consists of three staves. The top staff, labeled 'Houle-ian', is in 6/8 time and shows a hemiola interpretation of the text 'Trö - ste, trö - ste uns, Gott, un - ser Hei - land.' The middle staff, labeled 'Printz-ian', is in 3/4 time and shows a more complex interpretation with various note values (long, short, shorter, shortest, long). The bottom staff shows the bass line in 3/4 time. The lyrics are 'Trö - ste, trö - ste uns, Gott, un - ser Hei - land.'

Viewing mm. 7–9 simply through a Houle-ian lens (as in the top staff of Example 7), one would likewise interpret the downbeat of each measure as internally long, and the remaining notes as short. This interpretation, though, rides roughshod over the natural accentuation of the text, as it places “-ser” of *unser* on a stronger position within the measure than “un-.” Furthermore, by means of both harmonic rhythm and text-setting Pachelbel structures these measures as a hemiola, and Printz makes clear in his *Compendium* and *Phrynis* that *quantitas intrinseca* must respond to the demands of both harmony and text.⁷¹ A standard *rhythmopoeia*-based interpretation of this passage (and Houle’s too, surely) can certainly account for the cadential hemiola: that perspective conceives it as a long-short measure (or trochaic foot) followed by a short-long one (an iambic foot or *contrare*, in Printz’s more sophisticated theory).⁷² But while reading m. 8 as a *contrare* acknowledges the complex interplay of short internal temporal quantity and long external quantity in the last note (“Hei-”), it still results in the “-land” of *Heiland* being set with a longer internal quantity than “Hei-.”

Perhaps a more successful way to reconcile the hemiola with the framework of thesis and arsis is to view mm. 7–8 as having a halved mensural quantity (*quantitatis mensuralis*)—more specifically, shifting from “tripula minima” to “tripula minor,” in Printz’s terms⁷³—such that the thesis embraces the first semibreve/three notes (“Gott, unser”) and the arsis the last minim/one note (“Hei-”). In this view, the first note (“Gott”) is internally long, and although the fourth note (“Hei-”) is even-numbered, it too may be long, since it is the first of the arsis. The “un-” syllable in m. 7 is then the second part in the tripartite division of the mm. 7–8 unit, so it should be internally short, and the following

71 Printz, *Compendium*, VII, §§ 10–11; Printz, *Phrynis*, VI, §§ 6–10.

72 See Grant, *Beating Time*, 81–90.

73 Printz, *Compendium*, IV, §§ 4–5.

“-ser” should be shorter yet, due to the demands of text setting.⁷⁴ The result of this interpretation is that the internal temporal quantities no longer conflict with the lyrics’ accentuation; indeed, it even accounts for the first syllable of “Heiland” being internally longer than each syllable of “unser,” an advantageous outcome that a “position in the measure” perspective could not produce. This brief example demonstrates how an understanding of *quantitas intrinseca* that is informed by Printz’s *Compendium* offers a markedly different listening experience, one that is not constrained by the modern hegemony of the notated measure.

Examining Printz’s concept of *quantitas intrinseca* with his *Compendium* in mind also has the happy result of revealing it to be more theoretically successful than has previously been recognized. To understand Printz’s methodology of proposing a general principle and then accounting for various rhythmic patterns via modifications is to see right through criticisms that Printz “incorrectly realized” his examples, or that his theory has “internal contradictions.” Granted, his methodology is scarcely alluring for today’s readers (historical methodologies rarely are), but it is certainly consistent on its own terms. Indeed, analysis using the combination of *quantitas intrinseca* and the traditional doctrine of poetic feet is able to account for and characterize a wide range of rhythmic patterns, as recent research has demonstrated.⁷⁵ Finally, re-evaluating Printz’s concept through the lens of his *Compendium* also sheds new light on the cognitive and perceptual implications of *quantitas intrinseca*. Those implications, however, are addressed in another article.⁷⁶

74 The note setting “-ser” can also be explained as internally shorter because at the level of the subdivided minim it is even-numbered, whereas the preceding “un-” is odd. This “multiple levels” analysis relies on the interpretation developed in the section “Internal temporal quantity, measures, and metrical hierarchy.”

75 For an example of its application to Baroque dance music, see Stephen S. Hudson, “Feeling Beats and Experiencing Motion: A Construction-Based Theory of Meter” (Ph.D. diss., Northwestern University, 2019), 128–54.

76 Mutch, “Early Modern Music Cognition: The Case of W. C. Printz.”

Abstract

Wolfgang Caspar Printz is remembered primarily for his innovative idea of internal temporal quantity. As it may be the earliest articulation of the concept of metrical accentuation, Printz's account has attracted significant scholarly attention; however, the reception of Printz's idea has been distorted by a reliance on George Houle's misinterpretation of just one of Printz's treatises, *Phrynis Mitilenaus* (1696). The present article proposes a fresh reading of *quantitas intrinseca* by drawing upon Printz's little-known but more comprehensive presentation of the idea in his *Compendium musicae* (1668). To begin, I critique the assumption that Printz's locution "internally long" is a simple synonym for "stressed" or "strong," since his choice of the "quantity" metaphor has noteworthy connotations of metrical patterning. I then turn to the presumption that Printz's notion of internal length aligns with metrical hierarchy, showing that it instead correlates with sounding rhythms, not abstract beats. Next, I assess the relationship between *quantitas intrinseca* and what he calls the *contrare* rhythmic pattern to demonstrate that his theory is more successful on its own terms than scholars have recognized. I conclude with a brief analysis suggesting that my revised reading of Printz affords more responsive ways of interpreting rhythm.

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