A MUSICOLOGICAL INTERPRETATION OF THE AKKADIAN TERM *SIḪPU*

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This article aims to provide a musicological interpretation of the Akkadian term *siḫpu,* which makes sense to modern musicians and is compatible with the eight known cuneiform music texts.[1] While taking account of the recent publication of two fresh fragments of "Music Instruction Texts," which seem to complement *UET* 7 126, it leaves technical matters concerning the cuneiform texts to the consideration of those appropriately qualified. After considering all the cuneiform musical evidence and placing it in its social context, Michalowski has concluded:

> the "music texts" were never part of the standard school curriculum. These were not practical instructions, for which writing was superfluous, but rather theoretical exemplifications of certain limited lexicographical and mathematical knowledge associated with strings of instruments. Therefore, I suggest that the narrow scholastic tradition that is represented by these "music texts" is a marginal one that is associated primarily with mathematical and scribal practice rather than with professional music knowledge and performance, although its origins may lie in Akkadian language liturgical contexts.[2]

In a recent *JCS* paper, Jerome Colburn has challenged Kilmer's original interpretation of the music texts.[3] Colburn assumes that these texts relate to practical music only: they are to be interpreted simply as lists of names for pairs of strings. Yet from such lists musicologists have been able to produce credible reconstructions of the Mesopotamian tonal and tuning systems. I assume additionally that, as in ancient Greece, music would also have had its theoretical branch, integrated by the ancient priest-mathematicians into their religious and cosmological speculations. From ancient Greece, there is clear evidence of such integration, namely, the so-called Music of the Spheres.[4] Although analogous cuneiform evidence is still thin on the ground, we do have a few circumstantial hints. In the bilingual text of *UET* 7 126, for instance, "string-four-small" in the Sumerian column is rendered as "Ea-Creator" in the Akkadian. Livingstone gives a list of numbers associated with the Babylonian gods.[5] These include Ea (40). Interpreted as "tone-numbers," almost all of the numbers in Livingstone's list would sound pitches within the Mesopotamian tuning system. Friberg has found traces of a Babylonian origin in ancient Greek mathematics.[6] Robson reports that tables of reciprocals played a key role in the mathematics of nineteenth- and eighteenth-

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1. N3354 + N3355 + N7745 + N7679; UM 29-15-357 (+) N3020; U.7/80 (*UET* 7 74); *UET* 6/3 388; BM 65217 + BM 66616; *CBS* 10996; Nabnitu Tablet 32; *CBS* 1766. The term *siḫpu* is attested in Old Babylonian and later texts; for convenience it is referenced here without mimation.
2. P. Michalowski, "Learning Music: Schooling, Apprenticeship, and Gender in Early Mesopotamia," in *Musiker und Tradierung*, ed R. Pruzsinsky and D. Shehata, Wiener Offene Orientalistik (Vienna: LIT, 2010), 199–239.
3. J. Colburn "A New Interpretation of the Nippur Music-Instruction Fragments," *JCS* 61 (2009) 97–109.
4. L. Crickmore, "A Possible Mesopotamian Origin for Plato's World Soul," *Hermathena* 186 (2009) 5–23.
5. A. Livingstone, *Mystical and Mythological Explanatory Works of Assyrian and Babylonian Scholars* (Oxford: Clarendon, 1986), 30–33.
6. J. Friberg, *Amazing Traces of Babylonian Origin in Greek Mathematics* (Singapore: World Scientific, 2007).

century Larsa, Ur, and Nippur.[7] And musicologists have noted that these standard tables contain all the numbers needed to use as "tone-numbers" in order to quantify in ratios and reciprocal ratios of string-length the seven Mesopotamian heptachords. Music theory has always maintained its roots in both the mathematical nature of musically organized sound and in performance practice. Throughout the ages, musical scales have been recognized as theoretical abstractions from actual music. For a musicologist, it is reassuring to find that a scale such as the Akkadian heptachord *embūbu*, which is described in the music texts, is still used today by performing musicians, albeit in an equal-tempered form, as our modern Dorian mode. For a cuneiform scholar, this may suggest that any future work in interpreting the music instruction texts needs to adopt an interdisciplinary approach, involving, as required, the combined expertise of cuneiform scholars, archaeologists, musicologists, historians of mathematics, and sometimes even others.

The cuneiform tablet U.3011 from Ur, which belongs to Tablet 32 of the lexical text series *Nabnītu*, was first made known, thanks to Oliver Gurney, by Kilmer (1960 and 1965).[8] It was eventually published in a hand copy by Gurney, as No. 126 in volume 7 of *Ur Excavation Texts* (1974).[9] The Middle Babylonian piece belonging to *Nabnītu* 32 (N4782) contains the term *siḫpu.* Another category of texts, known as music instruction texts, comes from Old Babylonian Nippur. Four fragments belonging to the same text were published between 1986 and 2009 by Kilmer, Civil, Tinney, and Peterson.[10] The term *siḫpu(m)* also appears in these texts. In their articles, Kilmer's original translation of *zennum* as "tune" and *gennum* as "test" are retained, while *siḫpu* is rendered as "paired mode." The whole of tablet U.3011, together with the other sources of *Nabnītu* 32, was finally published in 1982 by Irving Finkel.[11] It can be interpreted as a list of the names and numbering of nine strings, together with seven "tunings"—each with its respective (at least implied) *siḫpu.* However, in challenging Kilmer's interpretations, Colburn has suggested that *zennum* and *gennum* may refer to as yet unidentified playing actions, probably with rhythmic significance; while *siḫpu* is to be taken as referring to a pair of adjacent strings (plus any strings an octave away), normally sounding the musical intervals of a second, which fall within the fifths and fourths of the dichords listed in *CBS* 10996.

In their 2009 paper, Kilmer and Tinney mention another earlier debate concerning the interpretation of *UET* 7 74. This text is usually considered to describe a cyclic procedure for the tuning and retuning of seven heptachords by means of sharpening or flattening one of the components of the "unclear interval" or tritone (*lā zaku*) in the previous scale.[12] In Kilmer's pioneering research the Babylonian heptachords are treated as rising scales. When Gurney initially published *UET* 7 126 in 1968, he made the same assumption.[13] But in 1990, Krispijn suggested that the signs NU.SU—a Sumerian expression previously interpreted as "no further"—was now to be read as the Akkadian *nu-su-ḫ[u-um]* meaning "to tighten" and implying (as Vitale had suggested earlier)[14] that the scales described in this text must be falling.[15] Gurney subsequently issued a revised transliteration of the text in 1994.[16] It is perhaps unfortunate that both the cuneiform and the musicological scholarly communities quickly accepted

7. E. Robson, "Words and Pictures: New Light on Plimpton 322," *America Mathematical Monthly* 109 (2003) 105–20.

8. A. D. Kilmer, "Two New Lists of Key Numbers Mathematical Operations," *OrNS* 29 (1960) 273–308 and "The Strings of Musical Instruments: Their Names, Numbers, and Significance," in *Studies in Honor of Benno Landsberger,* OIP 106 (Chicago, The Oriental Institute,1965), 261–68.

9. O. R. Gurney, *Middle Babylonian Legal Documents and Other Texts*, Ur Excavation Texts 7 (London: British Museum Publications, 1974).

10. A. D. Kilmer, and M. Civil, "Old Babylonian Musical Instructions Relating to Hymnody," *JCS* 38 (1986) 94–97; A. D. Kilmer and S. Tinney, "Old Babylonian Music Instruction Texts," *JCS* 48 (1996) 49–56; A. D. Kilmer and S. Tinney, "Correction to Kilmer/Tinney: Old Babylonian Music Instruction Texts," *JCS* 49 (1997) 118; A. D. Kilmer, and J. Peterson, "More Old Babylonian Music Instruction Fragments from Nippur," *JCS* 61 (2009) 97–109.

11. Pp. 249–54 in *The Series SIG$_7$.ALAN= Nabnītu*, ed. I. L. Finkel, with the collaboration of Miguel Civil. MSL 16 (Rome: Pontificium Institutum Biblicum, 1982).

12. L. Crickmore, "A Musical and Mathematical Context for *CBS* 1766," *Music Theory Spectrum* 30/2 (2008) 327–38, appendix.

13. O. R. Gurney, "An Old Babylonian Treatise on the Tuning of the Harp," *Iraq* 30 (1968) 229–33.

14. R. Vitale, "La musique sumero-akkadienne, gamme et notation musicale," *UF* 14 (1982) 241–65.

15. Th. J. H. Krispijn, "Beitrage zur altorienalischen Musikforschung 1," *Akkadica* 70 (1990) 70.

16. O. R. Gurney, "Babylonian Music Again," *Iraq* 56 (1994) 101–6.

"falling scales" as an unquestionable consensus view of the Babylonian tonal system, thereby committing themselves to an exclusively "either/or" rather than a possible "both/and" method of interpretation. I, however, have offered a way out of the resulting dilemma by hypothesizing that the Babylonian heptachords were modal patterns of tones and semitones (t & s) that remained the same regardless of the direction of the scale.[17] If this is correct, it follows that each modal pattern when reversed would form what could be described as an inverse mode. This article will argue that that "inverse mode" is the most likely meaning of *siḫpu*.

During the 1980s, musicologists, aware that the mediaeval church modes existed in two forms—authentic and plagal—assumed that something similar might also have been the case in ancient Mesopotamia. Consequently *siḫpu* was identified as the plagal form of the scale to which the term was attached.[18] Later, Dumbrill proposed that *siḫpu*, when added to a dichordal name (e.g., *seḫep išartim*) distinguished a particular scale from the dichord with the same name.[19] However, it is now recognized that while the mediaeval modes, like those of ancient Greece, were octave structures, comprising two disjunct tetrachords with a tone inbetween, the Mesopotamian are heptachordal and had a quite different epicentric structure, arising from a method of tuning by reciprocal fifths and fourths from a central string. Of course, in whatever way music theorists might have conceived of the Mesopotamian heptachords, practical musicians would have been likely to have considered them simply as rising or falling modal patterns, which could conveniently be played in either direction on an instrument with a gamut of a ninth. The palindromic numbering of nine strings in *UET* 7 126 supports such a view. Instruments with an odd number of strings above nine also offer players the same opportunity. From a theoretical standpoint, such a heptachord would probably be described by a modern music theorist as two conjunct tetrachords.

UET 7 74 presents a different form of tuning and retuning, which is tritonal rather than epicentric. According to this music instruction text, a player has to identify the "unclear" interval or tritone in any scale, and then sharpen or flatten one of its components in order to tune the instrument to a named heptachordal scale. The procedure, as described in the cuneiform text, works for descending scales only. It may then be that from the time of *UET* 7 74 (Old Babylonian), right through to that of classical ancient Greece, musical scales were primarily considered as falling in direction, rather than rising as is customary in the theory of scales in our own times. But returning to likely musical practice in Mesopotamia, with the introduction of tritonal tuning, the various modal patterns could no longer be played in either direction according to the end of the instrument from which the player started. The intrinsic symmetry of the original tuning system was lost. It therefore seems reasonable to suggest that in order to avoid confusion in musical terminology, the term *siḫpu* came to be used to describe the rising inverse mode that is sounded when a set of strings, tuned according to the instructions in *UET* 7 74, are played from the opposite end of the instrument.

Symmetry and Asymmetry in the Akkadian Tuning Systems

UET 7 126 lists the names and numbering of nine strings. The numbering is palindromic: 1, 2, 3, 4, <u>5</u>, 4, 3, 2, 1. Dumbrill has suggested a convincing interpretation of this numbering as a tuning procedure, in which the player uses reciprocal perfect fifths and fourths from a central string (5-1; 1-4; 5-2; 4-3; 3-3).[20] The resulting scale (G, A, B, C, D, E, F, G', A') would sound the heptachord *pītu*, "open," from either end.[21] If the series is compressed concertina-

17. L. Crickmore, "New Light on the Babylonian Tonal System," in *ICONEA 2008: Proceedings of the International Conference of Near Eastern Archaeomusicology Held at the British Museum, December 4, 5 and 6, 2008*, ed. R. J. Dumbrill and I. J. Finkel (London: ICONEA, 2010), 11–22.

18. R. Crocker, and A. D. Kilmer, "The Fragmentary Music Text from Nippur," *Iraq* 46 (1984) 83–85.

19. R. Dumbrill, *The Archaeomusicology of the Ancient Near East* (Victoria, BC: Trafford, 2005), 75.

20. R. Dumbrill, "Evidence and Inference in Texts of Theory in the Ancient Near East," in Dumbrill and Finkel, *ICONEA 2008: Proceedings of the International Conference of Near Eastern Archaeomusicology*, 105–15.

21. The description of the relative pitches by modern letter-name notation is approximate.
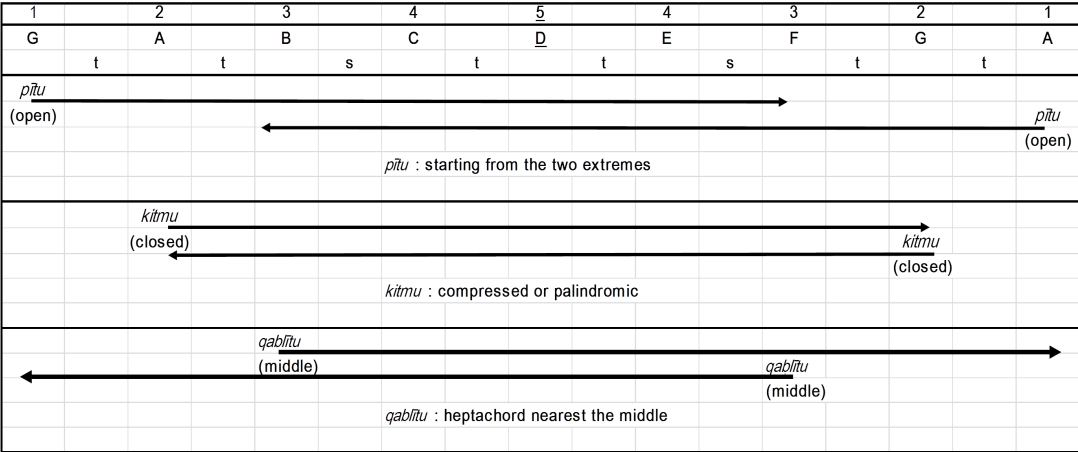
1	2	3	4	5	4	3	2	1
G	A	B	C	D	E	F	G	A
t	t	s	t	t	s	t	t	

pītu
(open)

pītu
(open)

pītu : starting from the two extremes

kitmu
(closed)

kitmu
(closed)

kitmu : compressed or palindromic

qablītu
(middle)

qablītu
(middle)

qablītu : heptachord nearest the middle

Fig. 1.

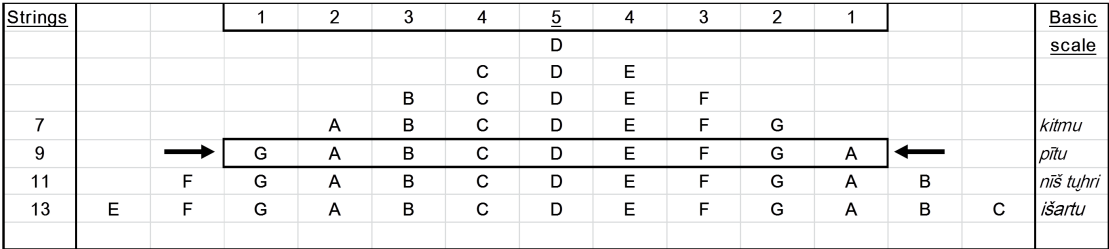| Strings			1	2	3	4	5	4	3	2	1			Basic scale
							D							
						C	D	E						
					B	C	D	E	F					
7				A	B	C	D	E	F	G				*kitmu*
9			G	A	B	C	D	E	F	G	A			*pītu*
11		F	G	A	B	C	D	E	F	G	A	B		*nīš tuḫri*
13	E	F	G	A	B	C	D	E	F	G	A	B	C	*išartu*

Fig. 2.

wise, by "covering" the first and last strings, the scale sounded would be *kitmu* (closed), the only heptachord, which is in itself palindromic.

Figure 1 shows the three heptachordal scales available to a performer using this tuning: *pītu, kitmu,* and *qablītu.* The system is intrinsically symmetrical. The modal pattern of tones and semitones (t and s) defining each heptachord remains the same regardless of the direction of the scale—rising or falling. The names of the heptachords are derived from those of pairs of strings (dichords)—the perfect fifths and fourths as listed in *CBS* 10996. Each heptachord contains a dichordal interval that is "unclear" (*lā zaku*)—modern musicians would refer to this as a "tritone." When such an "unclear" interval is "clarified"—that is, corrected to become a perfect fifth or fourth by the "tightening" (sharpening) or "loosening" (flattening) of one of its components—the dichordal name of the previously "unclear" interval becomes the name given to the newly formed heptachord. *UET* 7 74 describes such a cyclical procedure for the tuning/retuning of all seven heptachords. Figure 1 also includes some etymological speculations about the possible reasons for the choice of the heptachordal names.

 If the nine-stringed system shown in fig. 1 is extended from string 5=D in both directions until we have an eleven-stringed structure, the new tuning would sound the heptachord *nīš tuḫri.*[22] With appropriate renumbering of the strings, the tuning dichords match those specified in *CBS* 10996 (1-5; 2-6; 3-7; 4-1; 5). Interestingly, the Silver Lyre of Ur (ca. 2600 BCE), now in the British Museum, appears to have had eleven strings. The Queen's Harp, also from Ur and also in the British Museum, had thirteen strings. When the tuning system shown in fig. 1 is extended by a further two strings making a total of thirteen in all, it would permit the playing not only of each of the seven

22. S. Mirelman, and Th. J. H. Krispijn, "The Old Babylonian Tuning Text *UET* VI/3 899," *Iraq* 71 (2009), 43–52, whose authors propose *nīš tuḫri(m)* as a revised reading for the music-theoretical term *nīš* GABA.RI.

C	B	A	G	F	E	D	C	B	A	G	F	E
s	t	t	t	s	t	t	s	t	t	t	s
išartu								*išartu*
nīš tuḫri								*nīš tuḫri*
pītu								*pītu*
etc.								etc.

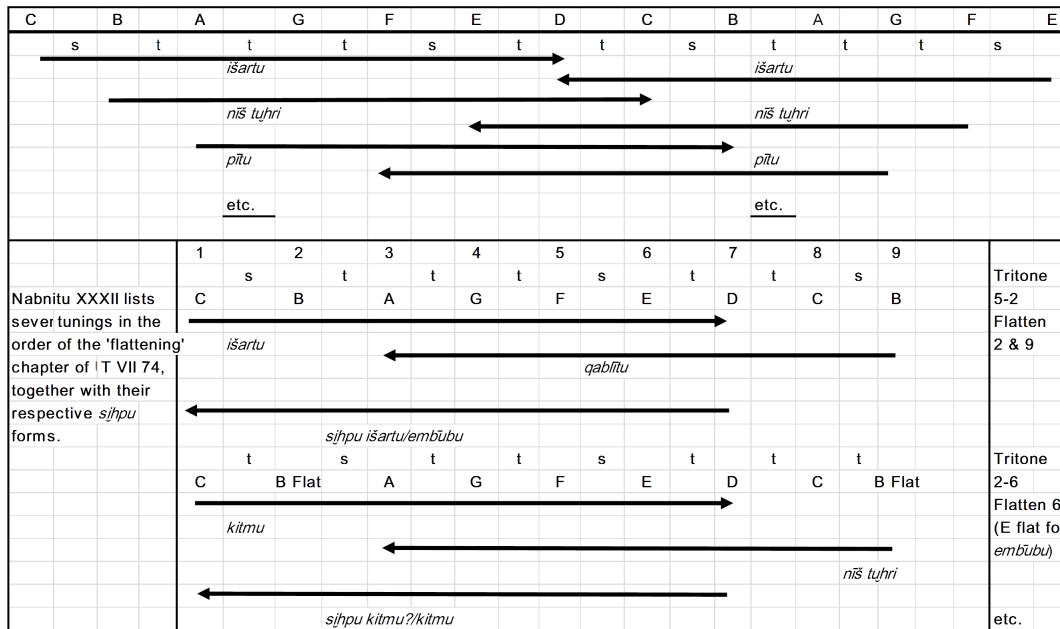|	1	2	3	4	5	6	7	8	9		Tritone 5-2
	s	t	t	t	s	t	t	s			
Nabnitu XXXII lists seven tunings in the order of the 'flattening' chapter of UT VII 74, together with their respective *siḫpu* forms.	C	B	A	G	F	E	D	C	B		Flatten 2 & 9
	išartu				*qablītu*						
	siḫpu išartu/embūbu										
	t	s	t	t	s	t	t	t			Tritone 2-6
	C	B Flat	A	G	F	E	D	C	B Flat		Flatten 6 (E flat for *embūbu*)
	kitmu								*nīš tuḫri*		
	siḫpu kitmu?/kitmu										etc.

Fig. 3.

modal heptachords, either rising or falling, but also of their respective *siḫpu* forms.[23] These extensions of the basic nine-string tuning structure are shown in fig. 2.

However, as a result of a change in tuning procedures from epicentric tuning to tuning through the correction of one of the components of the tritone (*lā zaku*), by tightening (sharpening) or loosening (flattening) one of the strings, as described in *UET* 7 74, the reciprocal symmetry between the falling and rising heptachords from the respective ends of 9, 11, and 13 stringed tunings is lost. This may have created a need for the term *siḫpu* to describe any heptachordal scale played in the opposite direction—its "inverse mode." Some examples of the loss of symmetry and the resulting *siḫpu* forms for the rising heptachords are illustrated in fig. 3. The numbering of the strings to be "tightened" or "loosened" given in the text of *UET* 7 74 applies to falling scales only, though the system can be made to work for rising scales if the alternative component of the tritonic dichords is chosen for flattening or sharpening. Consequently, the direction of the thirteen-string tuning from fig. 2 has been reversed to form a falling scale in the upper part of fig. 3.

Modulation

With the nine strings of *UET* 7 126 tuned to the heptachord *pītu* (fig. 1), *kitmu,* and *qablītu* can also be played in either direction. A couple of simple modulations can make it possible to play the remaining four heptachords (*išartu*, *embūbu*, *nīš tuḫri,* and *nīd qabli*) by "tightening," that is sharpening the F; or "loosening," that is flattening the B.

Modulation 1: sharpening the F. With the F sharpened, as described in the first chapter of *UET* 7 74, the rising heptachord *embūbu* can be played from the second string, and *išartu,* also rising, from the third. The falling hepta-

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23. L. Crickmore, "A Musical and Mathematical Context for *CBS* 1766," *Music Theory Spectrum* 30 (2008) 333, example 7. In example 8, p. 335, this is compressed into a single octave to match the seven-pointed star of *CBS* 1766.

chord *embūbu* starts from the first "behind string," and *išartu* (falling) from the second "behind string."[24] However, *nīd qabli*, can be played in its rising form only, starting from the first string; while *nīš tuḫri* in its falling form only, begins at the third "behind string."

Modulation 2: flattening the B. With the B flattened, as described in the second chapter of *UET* 7 74, the rising heptachords *embūbu* and *išartu* can be played from the first and second strings, respectively. Their corresponding falling modes start from the second and third "behind strings." However, the rising form of *nīš tuḫri* only is playable with this tuning, starting from the third string; while the falling version of the *nīd qablim* modal pattern begins at the first "behind string." Modulations 1 and 2 are displayed diagrammatically in fig. 4.

MODULATION 1 : SHARPENING										
String	1	2	3	4	**5**	4	3	2	1	**String**
Pitch	G	A	B	C	D	E	F sharp	G	A	**Pitch**
	t	t	s	t	t	t	s	t		
Scale										**Scale**
embūbu										
išartu										
										embūbu
										išartu
nīd qabli										*nīš tuḫri*
(rising only)										(falling only)

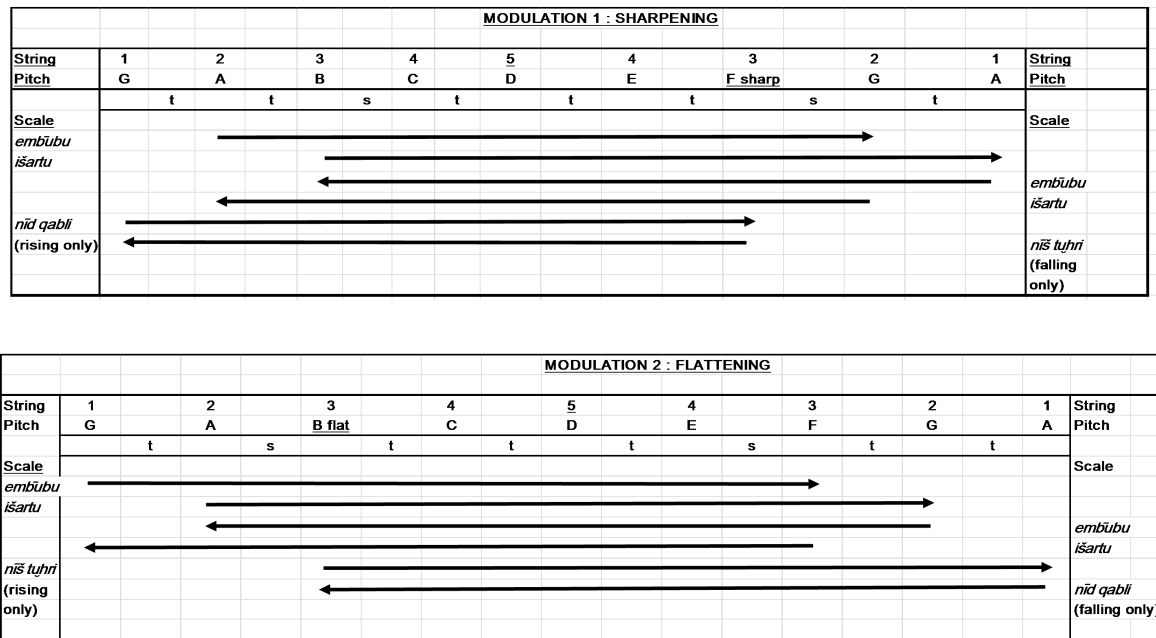| MODULATION 2 : FLATTENING										
String	1	2	3	4	**5**	4	3	2	1	**String**
Pitch	G	A	B flat	C	D	E	F	G	A	**Pitch**
	t	s	t	t	t	s	t	t		
Scale										**Scale**
embūbu										
išartu										
										embūbu
										išartu
nīš tuḫri										*nīd qabli*
(rising only)										(falling only)

Fig. 4.

It is conceivable that musicians experimenting with modulations of the kind illustrated in fig. 4 led to the evolution of the full cyclical tuning procedure described in the tuning/retuning text *UET* 7 74. Mirelman and Krispijn have shrewdly observed that it would be more accurate to describe *UET* 7 74 and its companion text *UET* VI/3 899 as "modulation" rather than "tuning/retuning" texts.[25] As can be seen from fig. 3, the procedure described in these two texts destroys the original symmetry intrinsic to the tuning implied by the palindromic numbering in *UET* 7 126. Nevertheless, *UET* 7 74 possesses its own symmetry: the first chapter, beginning from *išartu*, modulates by "tightening" until *išartu* is reached again, pitched a semitone higher than at the start. The second chapter then calls for the symmetrical reversal of the modulatory procedures in chapter one, by "loosening" strings until the tuning has returned to *išartu* at its original pitch.

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24. The strings corresponding to those numbered 4, 3, 2, 1 in the palindromic numbering of *UET* 7 126 are described as "behind strings"— presumably meaning "counted from the other end" or "from the behind of the instrument."

25. Mirelman and Krispijn, "The Old Babylonian Text *UET* VI/3 899."

siḫpu Forms

Figure 3 shows how the *siḫpu* form of an Akkadian heptachord is its inverse modal pattern.[26] This is a completely different theoretical concept from that of the ancient Greek octave species. As falling modal patterns, the ancient Greek octave species do have something in common with the heptachords of *UET* 7 74. But as rising scales, they are simply ascending ladders of the pitches sounded in the descending scale, rather than a reversal of its falling modal pattern. Figure 5 lists all seven Akkadian heptachords with their respective *siḫpu* forms, presented in the order given in *UET* 7 126 and the second ("loosening") chapter of *UET* 7 74.

HEPTACHORD	SIḪPU(M) FORM
išartum (stttst)	*embūbum* (tsttts)
kitmum (tsttst)	*kitmum* (tsttst)*
embūbum (tsttts)	*išartum* (stttst)
pītum (ttstts)	*qablītum* (sttstt)
nīd qablim (ttsttt)	*nīs tuḫrim* (tttstt)
nīs tuḫrim (tttstt)	*nīd qablim* (ttsttt)
qablītum (sttstt)	*pītum* (ttstts)

*palindromic

Fig. 5.

The Resolution of a Dilemma

The apparently contradictory nomenclature for the heptachords as transcribed by Kilmer (ascending) and Vitale (descending) can best be comprehended if one extends each of the seven-note scales to complete its octave.[27] In fig. 6 below, the patterns of the first seven tones and semitones which follow each of the heptachordal names in the first two columns—read from left to right—define the named heptachord regardless of the direction in which it is to be played. Extended to its octave by the bracketed tone or semitone, it matches the ancient Greek octave species listed in the third column—falling in the first column and rising in the second. However, reading the patterns, including the bracketed additions, from right to left, the initial seven tones and semitones in the first column define the heptachord alternatively named in the second, and *vice versa*. The scale of the Greek octave species listed in the third column now rises in the first column and falls in the second.

Vitale (falling)	Kilmer (rising)	Greek octave species
išartum stttst(t)	*nīd qablim* ttsttt(s)	Lydian
embūbum tsttts(t)	*embūbum* tsttts(t) *	Phrygian
nīd qablim ttsttt(s)	*išartum* stttst(t)	Dorian
qablītum sttstt(t)	*nīs tuḫrim* tttstt(s)	Hypolydian
kitmum tsttst(t)	*pītum* ttstts(t)	Hypophrygian
pītum ttstts(t)	*kitmum* tsttst(t)	Hypodorian
nīs tuḫrim tttstt(s)	*qablītum* sttstt(t)	Mixolydian

*palindromic

Fig. 6.

26. A. Shaffer, "A New Musical Term in Ancient Mesopotamian Music," *Iraq* 43 (1981) 79–83, suggested that *siḫpu* might refer to the inversion of the dichordal intervals listed in *CBS* 10996, a view that Colburn rejects (see footnote 3).

27. A. D. Kilmer, *RLA* 8, 463–82. The heptachords in fig. 6 are listed in the order shown on p. 475.

Although Krispijn's amendment of a line in *UET* 7 74 left Kilmer's pioneering research temporarily "on the horns of a dilemma,"[28] she continued to believe that "perhaps the answer will lie in our eventual ability to understand how 'pitch sets' could work either up or down."[29] The definition of *siḫpu* proposed in this paper goes some way towards justifying such a belief.

Conclusion

This paper has brought together evidence from a number of different disciplines, with a view to creating the most likely picture at present possible of music, both practical and theoretical, in ancient Mesopotamia. Much of that evidence inevitably remains circumstantial and subject to interpretation. Nevertheless, from a musicological standpoint it is consistent with the eight known cuneiform music texts. In the light, therefore, of this emerging picture, I offer a musicological interpretation of *UET* 7 126 and its attendant fragments that is also consistent with the evidence of CBS 10996, *UET* 7 74, and CBS 1766, and concludes that the most likely meaning in music theory of the term *siḫpu* may plausibly be taken to be "inverse mode."

I am grateful to Professors Anne Kilmer and Piotr Michalowski for advice with regard to the pertinent cuneiform texts.

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28. See note 10.
29. A. D. Kilmer, "Continuity and Change in the Ancient Mesopotamian Terminology for Music and Musical Instruments," in *Studien zur Musikarchaologie II. Orient Archaologie* 7 (Rahden/Westf: Leidorf, 2000), 113–19.