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Tuning Procedures in Ancient Iraq (AAWM 2012)

The discovery of a small corpus of about twenty texts concerning strings, tuning and performance from ancient Iraq (loosely equivalent to “Mesopotamia”) and Syria has transformed our view of the earliest stages of music history. Not only is this corpus by far the earliest recorded expression of what might be called “music theory”. These texts also belong to a highly sophisticated musical culture which was forgotten for approximately two millennia, before the decipherment of cuneiform writing in the nineteenth century. This corpus represents a truly forgotten, first chapter of music history, with no predecessors and no obvious successors (despite the fact that a connection with ancient Greek music theory has been argued, the connections are in my opinion indirect—this is not to say that there is no connection between Mesopotamia and Greece, but that the similarities were probably general characteristics of Mediterranean music cultures in Antiquity, the only major evidence of which have survived from Mesopotamia and Greece).

The Mesopotamian texts concerning the technicalities of music are written in the Akkadian language, on clay tablets. They were excavated from sites in modern Iraq (the north was known as Assyria and the south Babylonia), as well as Syria. None of these texts are precisely dated; however, they can be very approximately dated by period, from the analysis of script, language and orthography. The earliest of these texts, the tuning texts, date to the Old Babylonian period, which is conventionally ca. 2000-1500 BCE. (Thus, the earliest of our texts (namely the tuning text, of which I will expand on later) precede anything comparable from the other ancient civilisations of which music theory and notation texts have survived from the pre-Christian era, such as Greece and China, by approximately one millennium). Other relevant texts date to the Middle Assyrian (1500-1000 BCE), Neo-Assyrian (1000-600 BCE) and Neo-Babylonian (1000-600 BCE) periods. The texts are united by the use of a terminology for music which, according to the approximate dating of the texts, was in use for over 1000 years at least. In some ways, looking at these fragments can be compared to looking at western musical culture from 1000 AD to 2000 AD, where only twenty scraps of notation and theory have survived. The nature of our sources for ancient Mesopotamia allow us only isolated glimpses into what is a vast first chapter of music history. Nevertheless, this fact that the set of musical terms remained consistent over such a period of time confirms our view of a highly conservative musical culture, a view which is not inconsistent with our knowledge of the conservative nature of Mesopotamian culture in general.

Due to limitations of time, I have decided to focus here on one particular text, which is undoubtedly the most important—the tuning text. It must be borne in mind that our interpretation of this text is dependent on other texts which date from a much later period. Most importantly, the enumeration of string dichords together with string numbers is known from a text dating as much as a thousand years later. This is an unavoidable problem in Mesopotamian studies in general. We have to work with our available evidence, much of which is separated by hundreds of years. Whilst this is not ideal, we are aided by the conservatism of Mesopotamian scribal traditions. In many facets of Mesopotamian culture, elements of 2nd millennium culture were continued and renewed in the 1st millennium BCE.

The tuning text is known from two manuscripts, both of which have only been recently identified. Taken together, a large part of the tuning text is extant, although some of it has had to be reconstructed, based on logical deduction, and our knowledge of the other theory texts. One manuscript was published in 1968 by Oliver Gurney, and the other by myself and Theo Krispijn in 2009. Both manuscripts date to the Old Babylonian period, and both were excavated from the city of Ur in southern Babylonia. We don't have any more information concerning the precise location of the excavation—for example, we do not know if the texts belonged to a music teacher, or whether they were housed in the scribal school. From internal evidence, I have attempted to show that due to differences in language, style and handwriting, the two manuscripts were written by different scribes. This is significant because it shows us that the tuning text was not the isolated invention of a single scribe, but that it was a text which must have been known in the city of Ur during the Old Babylonian period, at least among a certain group of specialists.

The tuning text is a set of instructions for tuning a stringed instrument known as a *sammû*. The identification of this instrument is uncertain. I translate the term as a lyre, but all we know for sure is that it was a 9-stringed musical instrument. The tuning text seems, at first sight, not to be a manual for fine tuning of the *sammû*. Instead, it is (at least on the surface) a manual for changing the tuning of the instrument from one mode to another, through a cycle of modes. However, it may well have also been a means of fine tuning, as a byproduct of going through the modal cycle—the process of going through each mode, and successively testing and correcting each dichord (pair of open strings) can also be a method of tuning the instrument.

What may be called modulation¹ from one mode to another is achieved either by successive loosening or successive tightening of dichords. The principle of the dichord is central to Mesopotamian music theory. A dichord is a pair of open strings, defined by number, and given a name, e.g. *išartum* (which means literally “straight, correct, normal”) is the dichord between strings 2 and 6; *qablītum* (which means literally “middle”) is the dichord between strings 5 and 2. By extension, the dichord is also the name of an instrument's tuning or “mode”. A key feature of a certain mode is the “clear” nature of its named dichord, e.g. being in the *išartum* mode is partially defined by determining that the *išartum* dichord between strings 2 and 6 is “clear”. The identification of a certain mode is also dependent on another interval being “unclear”, as we shall see below. We have no information outside of the tuning text itself which explains what exactly is meant by “clear” and “unclear” in a musical context. The Akkadian adjective *zakû*, used in the tuning text to describe dichords, has the meaning of “clear, clean, pure”. Conversely, *la zakû* is used to mean “unclear, unclean, impure”.² The Akkadian adjective is normally used to describe things such as liquids, metals, the sky, or people (freedom from a claim, or guilt). I will return to the question of precisely what is meant by this term below.

The tuning text follows an “if X then Y” format, which is known in various other contexts of Mesopotamian text, such as law codes and omens. In laws it highlights a particular offence, followed by the punishment, e.g. “if a man commits a robbery and is caught, that man will be killed” (Hammurabi's Laws, no. 22). In omens, the identification of a physical feature of the world (such as the liver) had a precise consequence, e.g. “if the left lobe (of the liver) is covered by a membrane and it is abnormal, the king will die from illness” (Ulla Koch-

¹ My use of the word “modulation” simply means conversion of the instrument's open string arrangement; it does not imply movement through modes during performance.

² For the rest of this article, I will not use quotation marks for *clear* and *unclear*, although they are implied.

Westenholz, *Babylonian Liver Omens*, Copenhagen, 2000, p. 102, no. 328). Similarly, the tuning text follows the format of identifying a feature, followed by an action, which is then followed by a result, e.g.:

If the lyre is *išartum* and you play an <unclear>³ *qablītum*, you loosen the second string and the back string (for me) and the lyre is *kitmum* (lines 13-16)

This clause (the structure of which is replicated throughout the tuning text) can be subdivided into diagnosis, action and result.

The diagnosis is: “If the lyre is *išartum* and you play an <unclear> *qablītum*”. This means that if the instrument is tuned according to the *išartum* mode, you can confirm this proposed diagnosis by playing *qablītum* (strings 5-2), and hearing that this interval is unclear. If the *qablītum* interval is unclear you can be sure that the instrument is indeed tuned to the mode of *išartum*. A further element in the initial diagnosis, which is not specifically stated but implied, is to play the *išartum* dichord. As has already been stated, dichord names refer to specific dichords as well as modes; being in a mode is partially defined by the fact that the mode-name’s dichord is clear. Thus, an unstated although probable first step in the initial diagnosis is to play the *išartum* dichord between strings 2 and 6, and to check that it is indeed clear. Therefore, we can propose that there are 2 steps involved in the diagnosis—checking one interval is clear, and that the other is unclear.

The diagnosis is followed by treatment: “you loosen the second string and the back string (for me)⁴ and the lyre is *kitmum*”. The treatment is concerned with the interval *qablītum*, which has just been diagnosed as unclear. The issue at hand now is to make this unclear interval clear. Thus, loosening the second string and the back string will make the unclear interval of *qablītum* clear. The “back string” is the Mesopotamian term for the 9th string, which is logical—remember there are nine strings in total. The *qablītum* dichord consists of strings 5 and 2—loosening string 2—together with string 9 (we may assume that string 9 was tuned in parallel octaves with string 2) will alter the *qablītum* dichord and make it clear.

The treatment is followed by result: “and the lyre is *kitmum*”. This is the end result of a process of diagnosis and treatment, which also prepares the way for the next step in the tuning cycle:

If the lyre is *kitmum* and you play an unclear *išartum*, you loosen the fourth string from behind (for me) and [the lyre is *embūbum*.] (lines 17-20)

Thus, the following clause begins with a proposed diagnosis of *kitmum*, the mode which the instrument should already be tuned to, at this point in the modulation cycle. The format of what follows is already familiar from the previous clause. The proposed diagnosis is followed by a test—if you play the *išartum* dichord and it is unclear, the instrument is indeed tuned to *kitmum*. The action is to loosen the “4th string from behind”, which is string 6, thus the *išartum* dichord (strings 2 and 6) now becomes clear, and the instrument is now tuned to the mode of *embūbum*.

³ < > signs indicate a part of the text which, from the context, we can deduce was omitted by the scribe. [] indicate parts of the text which are broken, and therefore reconstructed.

⁴ “for me” is in brackets to indicate the existence of a particle in the Akkadian language which may indicate a directive action towards the speaker. This may indicate the pedagogic function of the tuning text.

Here are the first three clauses of the loosening section, below which is a table. From this table we can see the clear and unclear nature of particular dichords, the combination of which define a particular mode. Thus, the mode of *išartum* is defined by strings 2-6 being clear and strings 5-2 unclear. Loosening string 2 (together with string 9, which is in an octave relationship with string 2) will make the 5-2 dichord clear, but it will also make the 2-6 dichord unclear. The instrument will now be in the *kitmum* mode. Now you loosen string 6. This will make the 2-6 dichord clear, but it will also make the 6-3 dichord unclear. The instrument is now in the *embūbum* mode.

If the lyre is *išartum* (strings 2-6) and you play an <unclear> *qablītum* (strings 5-2), you loosen the second string and the back string (for me) and the lyre is *kitmum*.

If the lyre is *kitmum* (strings 6-3) and you play an unclear *išartum* (strings 2-6), you loosen the fourth string from behind (for me) and [the lyre is *embūbum* (strings 3-7).]

[If the lyre is *embūbum* (strings 3-7) (and/,) you play an unclear *kitmum* (strings 6-3), you loosen the third string (for me) and the lyre is] *pītum* (strings 7-4).

mode	clear	unclear
<i>išartum</i>	2-6	5-2
<i>kitmum</i>	6-3	2-6
<i>embūbum</i>	3-7	6-3

Here is the procedure for all seven modes of the loosening section:

mode	clear	unclear
<i>išartum</i>	2-6	5-2
<i>kitmum</i>	6-3	2-6
<i>embūbum</i>	3-7	6-3
<i>pītum</i>	7-4	3-7
<i>nīd(i) qablim</i>	4-1	7-4
<i>nīš tu□rim</i>	1-5	4-1
<i>qablītum</i>	5-2	1-5

The system is an elegant and practical means of tuning. Notice that the steps in testing clear and unclear intervals follows a sequence where there is always a string in common with the preceding dichord, or the string is directly above or below a string in the previous dichord. Thus, the physical action of testing dichords involves plucking open strings with one finger/hand, in the sequence: 2-2-3-2-3-3-4-3-4-4-5-4-5-5, and with the other finger/hand, the sequence is: 6-5-6-6-7-6-7-7-1⁵-7-1-1-2-1. The limited and minor hand movements involved in the playing and testing of dichords during modulation and/or tuning must have made the process easy to remember, and relatively quick to accomplish.⁶

⁵ 1 follows 7 in the heptatonic system

⁶ Whether or not the process of modulation would be quick and efficient enough to be accomplished during performance, or in a break between sections of a performance, is difficult to determine. If this was common practice it would allow us to speculate on the role of modulation in the Hurrian Hymns, -examples of notation from mid 2nd millenium BCE found at Ugarit (Syria), which use Mesopotamian dichord names combined with numbers.

The tightening section (partially reconstructed, as I have already mentioned) follows the same sequence from *išartum* to *išartum*, but in the opposite direction, so *qablītum*, *nīš tu□rim* etc. Each mode is defined by the same criteria as the loosening section—the same dichords are clear and unclear. The difference is that the first string (as represented in the table above) in the unclear dichord is tightened, instead of the second string loosened. So, in the mode of *išartum*, the *qablītum* dichord (strings 5-2) is unclear. In the loosening section, string 2 (and string 9—probably in an octave relationship, as already stated) is loosened. In the tightening section, string 5 is tightened. A further difference in the tightening section is that in each procedure the resulting mode bears the same name as the dichord which has just been made clear. In the tightening section, there is no need to confirm the fact that the instrument is now tuned to the new mode, at the end of each procedure (as in the loosening section). This is implied, and in any case it is confirmed at the beginning of the next procedure, e.g. lines 4-11:

If the lyre is *embūbum* and *kitmum* is not clear, you tighten the fourth string from behind (for me) and *kitmum* will become clear.

If the lyre is *kitmum* and *išartum* is not clear, you tighten the second string and the back string (for me) and *išartum* will become clear.

The widely accepted, and most elegant, interpretation of this system of cyclical tuning and/or modulation is to propose that the unclear interval is a tritone, which becomes clear by resolving to a perfect 5th or 4th by tightening or loosening. We cannot be sure that such an interpretation is correct. Indeed, it seems uncomfortably familiar and Eurocentric. I propose to leave the question of the precise nature of the Mesopotamian tuning system open. Jay Rahn has very ably examined the possibilities in great detail in recent AAWM papers. What I have attempted to demonstrate here are the bare facts—what we know that is beyond doubt.

The limitations to what we can know only from texts must also be borne in mind when we consider the oral dimension in Mesopotamian culture. It is likely that the Mesopotamian music texts are examples of what might be called “orality in written form”. It is well known that many cultures transmit knowledge (including musical knowledge) in an essentially oral form, which may be supplemented by writing. Certainly, this is the case with notation in its use almost everywhere, even in Europe. Indeed, it has been convincingly argued that Western Medieval musical culture relied to a great degree on oral transmission, despite the use of notation and written treatises. Similarly, in cultures such as ancient India and China, notation and theoretical writings survive, but any attempt to reconstruct and decipher these materials must be tempered by the knowledge that they originated in a musical culture in which notation was not intended to be understood by those who are uninitiated in the oral tradition. Similarly, the culture of ancient Mesopotamia was one in which orality certainly played an important role, despite our knowledge of tens of thousands of texts.

To sum up, certain characteristics of Mesopotamian music theory are apparent from the tuning text which are undisputable:

- The tuning text demonstrates the fact that about 4000 years ago, human musical ability was not less advanced than it is today. Indeed, what has survived (by fortunate accident) from this period probably represents the culmination of a development of tuning and modal procedure which is considerably older than 4000 years.

- The tuning text applies to a particular instrument, the *sammû*; it is not a universal tuning manual for any instrument.
- According to this text, the instrument's "mode" is defined by a particular tuning of the instrument's open strings
- The dichord formed by 2 open strings spanning 5 consecutive strings is the basis of the system.
- The system is heptatonic: there are 7 modes, and the conception of string dichords spans a heptatonic system, where 7 is followed by 1, etc.
- There are nine strings; strings 8 and 9 are tuned together with strings 1 and 2, suggesting a unison or octave relationship. It also confirms the heptatonic nature of the system.
- The system is a modulation cycle which can be traversed through loosening or tightening. It demonstrates that the principle of gradual modulation through related modes was understood in this period. From the text itself the principle of modulation is conceived as the transformation of an instrument's tuning through the alteration of a single string.
- If the accepted interpretation of the tuning text is correct, it would mean that relative pitch was important to the Mesopotamians, but precise pitch was not. For example, going through the loosening section from *išartum* through *qablītum* and then onto *išartum* again would result in the instrument being in *išartum*, but one semitone lower than at the start. This view is reinforced by the fact that there seems to be no term for precise pitch in Mesopotamian music theory; there are only terms for strings and dichords (which can also be modes depending on context).