83) A wrong etymology of ^{mul}saĝ-me-ĝar "Jupiter" — In NABU 2021/52 Immanuel Freedman writes: "Noting Turk: sağma = milking and Turk gar = station, I propose that SAG-ME-GAR is a loanword of Turkic origin with meaning similar to 'milking station'." But gar means "train station" and is without any doubt a loanword from French gare. See Türkçe Sözlük, Türk Dil Kurumu, Ankara 1988, 522. Even if gar would be of best Turkic origin, a similar sound and that Jupiter is described as babbar "white" wouldn't be enough for discussing a Turkic origin. Such similar words may be found everywhere simply since languages have many words. Freedman is not alone. Many other scholars have built etymologies of Sumerian words on the thin air of such similarities and if nothing helps the word is surely from a hypothetic substrate language. That among other designations Jupiter is called "white star" is to be seen in the row with "red star" = Mars, "black star" = Saturn. The Saturn, *kajamānu* has the Sumerian name saĝ-ús. Because of this we may isolate saĝ = *rēšu* and me ĝar = *qâlu* "the silent head" as a designation of a majestic slow going planet which was at one time equalled with Marduk. It has the Turk name Erendiz, not known from cuneiform sources like other original Turk names of celestial bodies like yıldız "star", gezegen "planet", ay "moon", güneş "sun", Çulpan "Venus".

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84) Omens as logic — Divinations played a very significant role in Mesopotamian cultic, religious and ideological practices (see, e.g., Abusch 1972; Snell 1974; Starr 1977; Biggs 1985; Jeyes 1989, Reiner 1998; Richardson 2006; Maul 2007; Archi 2009; Glassner 2012; Annus 2010; Annus 2015; Maul 2013; Koch-Westenholz 2015; Winitzer 2017), among other forms of witchcraft (see, e.g., Abusch 2002; Abusch 2008, Abusch 2010, Abusch 2020). One of the forms of Mesopotamian divination was presented by omens –a list of signs on the basis of which a prediction can be made about appropriate events in the future. At the same time, there was a strong correlation between an omen (sign) and a forecasted event such that the prediction was formulated as a conditional statement (implication): "if an omen, then an event".

So, omens could be an important source for reconstructing the everyday lives, religious beliefs and ideological views of the Mesopotamians. U. Jeyes (1989: 1) argues that "divination played a major role in Ancient Mesopotamia and of the various types of divination in use, extispicy was perennially the most esteemed". As Winitzer (2017: 456) correctly remarks: "Mesopotamian divination, as met in the early omen collections, reflects the realization of a new way to conceptualize knowledge, or, indeed, a new attitude toward what the very meaning of knowledge is or could be." But omens can be also considered sources for reconstructing the logical thinking accepted by the people of Ancient Mesopotamia. The point is that logical thinking is now understood by logicians not only as rational thinking but also as mechanical thinking within an algebraic structure. Therefore we do not think logically in everyday life because it is not a natural way of thinking. So, logic is not innate knowledge and we can know it only after deep learning. Nevertheless, in the list of omens we can reconstruct an algebraic structure (see the truth tables below) which show that the Mesopotamians were the first to propose an algebraic way of drawing conclusions.

The earliest rule for composing omens is now denoted by scholars as "divinatory empiricism" (Manetti 1993, p. 7). It consists of recording events which actually occurred in the past one after the other (*vaticinium ex eventu*): "if a sign (omen) [was], then an event [was]". Hence, we very often detect there the logical fallacy "after this, therefore because of this" (*post hoc ergo propter hoc*). This rule of composing omens is typical for "historical oracles" where the apodosis of the conditional rather occurs in the past tense.

The second rule of composing omens involves a "chain of association between elements of the protasis and elements of the apodosis" of conditionals (Manetti 1993: 7), i.e., a chain of association between the first part of implication (antecedent) and the second part of implication (consequent). Here we deal either with a phonetic association between the signifiers or with a tropic association between the signifieds.

The third rule of composing omens offers "codes which cover a finite series of completely identifiable cases" (Manetti 1993: 7). This type of structure of omen series started to appear from the second quarter of the second millennium BC in the Old Babylonian period. Here we find codes or systematic collections of very detailed divinatory signs presented in all possible combinations. For instance, let us take

the following four signs: 'the threshold of the Door of the Palace', 'the middle of the Door of the Palace', 'on the right', 'on the left' (Manetti 1993: 11). So, we have the four signs (omens) where there are the two possible locations 'the threshold of the Door of the Palace' and 'the middle of the Door of the Palace' along with the two possible additional details 'on the right' and 'on the left'. As a consequence, we have 2^2 possible combinations: (i) 'the threshold of the Door of the Palace' & 'on the right'; (ii) 'the threshold of the Door of the Palace' & 'on the left'; (iii) 'the middle of the Door of the Palace' & 'on the right'; (iv) 'the middle of the Door of the Palace' & 'on the left'. Hence, the algorithm for composing omens of this type is as follows. Let us take $2k$ signs, where $k \geq 1$, since only binary oppositions are considered. Then we have 2^k of all possible combinations of the antecedents in conditionals. At the same time, each possible combination is presented as an item in long lists of divinations containing all the combinations.

As a result, we deal with a code of conditionals: (i) **if** 'the threshold of the Door of the Palace' **&** 'on the right', **then**…; (ii) **if** 'the threshold of the Door of the Palace' **&** 'on the left', **then**…; (iii) **if** 'the middle of the Door of the Palace' **&** 'on the right', **then**…; (iv) **if** 'the middle of the Door of the Palace' **&** 'on the left', **then**…, where for $2k$ signs, where $k \geq 1$, we always have 2^k conditionals for foreseeing. In this foreseeing any logical inconsistency or contradiction is thereby avoided. Each opposite sign is contained in another antecedent of another conditional. And for different oppositions at the place of consequent we observe different oppositions at the place of antecedent. As a consequence, we obtain a rule-based expert system, to name it within modern AI and symbolic logic terms. This system assumes a binary logic of always opposite signs. Therefore, by applying logical inference rules we cannot draw any contradiction here. In any case, this is the first example of a rule-based expert system in its explicit form in world history.

Let us consider some examples. In Zorzi (2009), it was detected that there is an asymmetry in implications with opposite signs:

1. *šumma*-DIŠ *amēlu*-NA *ana ṣibûtīšu*-Á.ÁŠ^{šú} *itebbīma* ZI^{ma} *kakkabu*-MUL *ištu*-TA *imitti*-15 *amēli*-NA *ana šumēl*-GÙB *amēli*-NA *iṣarriḫ*-SUR *damqu*-SIG$_5$
2. *šumma*-DIŠ *ištu*-TA *šumēli*-150 *ana imitti*-15 *iṣarriḫ*-SUR *aḫītu*-BAR
3. *šumma*-DIŠ *kakkabu*-MUL *ina ku-tál amēli*-NA *ištu*-TA *imitti*-15 *ana šumēli*-150 *iṣarriḫ*-SUR *aḫītu*-BAR
4. *šumma*-DIŠ *kakkabu*-MUL *ina ku-tál amēli*-NA *ištu*-TA *šumēli*-150 *ana imitti*-15 *iṣarriḫ*-SUR *damqu*-SIG$_5$

If a man leaves (in order to achieve) his purpose and a star twinkles **from the right** of the man **to the left** of the man **–** favourable.
If (it) twinkles **from the left to the right –** unfavourable.
If a star twinkles **on the back** of the man **from the right to the left –** unfavourable.
If a star twinkles **on the back** of the man **from the left to the right –** favourable (Zorzi 2009: 97).

Symbolically:

(i) ("a man leaves" & "a star twinkles **from the right** of the man **to the left** of the man") ⇒ "favourable"
(ii) ("a man leaves" & "a star twinkles **from the left** of the man **to the right** of the man") ⇒ "unfavourable"
(iii) ("a man leaves" & "a star twinkles **on the back** of the man **from the right to the left**") ⇒ "unfavourable"
(iv) ("a man leaves" & "a star twinkles **on the back** of the man **from the left to the right**") ⇒ "favourable"

We have the four opposite combinations: (i) "a star twinkles **from the right** of the man **to the left** of the man"; (ii) "a star twinkles **from the left** of the man **to the right** of the man"; (iii) "a star twinkles **on the back** of the man **from the right to the left**"; (iv) "a star twinkles **on the back** of the man **from the left to the right**".

Each combination from (i) to (iv) gives either the positive sign "favourable" or negative sign "unfavourable". We know that 'to be in front' is a positive sign in the omens and 'to be on the back' is a negative sign. At the same time, 'to move from right to left' is a positive sign and 'to move from left to right' is a negative sign. Let us denote a positive sign by +1 and a negative sign by -1. Then we have:

(i) (+1 & +1) ⇒ +1;
(ii) (+1 & -1) ⇒ -1;
(iii) (-1 & +1) ⇒ -1;
(iv) (-1 & -1) ⇒ +1.

Logically, we can reconstruct the following truth tables for ¬ (negation or opposition), & (conjunction), and ⇒ (implication), respectively:

Truth table for ¬, where ¬ "sign/event" means an opposition to "sign/event", e.g. "from the right" = ¬ "from the left":

"sign/event"	¬ "sign/event"
+1	-1
-1	+1

Truth table for &

"sign/event 1"	"sign/event 2"	"sign/event 1" & "sign/event 2"
+1	+1	+1
+1	-1	-1
-1	+1	-1
-1	-1	-1

Truth table for ⇒

"sign/event 1"	"sign/event 2"	"sign/event 1" ⇒ "sign/event 2"
+1	+1	+1
+1	-1	-1
-1	+1	+1
-1	-1	+1

Indeed, according to these truth tables, we have:

(i) ((+1 & +1) ⇒ +1) = (+1 ⇒ +1) = +1;
(ii) ((+1 & -1) ⇒ -1) = (-1 ⇒ -1) = +1;
(iii) ((-1 & +1) ⇒ -1) = (-1 ⇒ -1) = +1;
(iv) ((-1 & -1) ⇒ +1) = (-1 ⇒ +1) = +1.

As we see, verses of divinations from (i) to (iv) give propositional tautologies (axioms) –expressions which always true (positive).

To sum up, in the divination list of (Zorzi 2009: 97) we see an intuition of Boolean algebra <{-1, +1}, ¬, &, ⇒>, and all the implications from the analyzed divination list are considered axioms, i.e., they always have the truth value +1.

Let us look at another example to determine whether its implications are axioms according to reconstructed truth tables:

122. *šum*$_4$*-ma alpu*-GUD *is-su-us-ma it-bi kašād*-KUR^{ad} *ṣibûti*-ÁŠ
123. *šum*$_4$*-ma alpu*-GUD *is-su-us-ma ul*-NU *it-bi lā*-NU *kašād*-KUR^{ad} *ṣibûti*-ÁŠ
124. *šum*$_4$*-ma alpu*-GUD *itbīma*-ZI^{ma} *lēssu*-TE^{su} *ana imittīšu*-15^{šú} *iddi*-ŠUB *lā*-NU *kašād*-KUR^{ad} *ṣibûti*-ÁŠ
125. *šum*$_4$*-ma alpu*-GUD *itbīma*-ZI^{ma} *lēssu*-TE^{su} *ana šumēlīšu*-150^{šú} *iddi*-ŠUB *kašād*-KUR^{ad} *ṣibûti*-ÁŠ

122. If an ox **wailed and (then) got up –** attaining the desire.
123. If an ox **wailed and (then) didn't get up –** not attaining the desire.
124. If an ox **got up and lowered his cheek to the right –** not attaining the desire.
125. If an ox **got up and lowered his cheek to the left –** attaining the desire (Zorzi 2009:103-104).

Symbolically:

(i) ("an ox **wailed**" & "an ox **got up**") ⇒ "attaining the desire"
(ii) ("an ox **wailed**" & "an ox **didn't get up**") ⇒ "not attaining the desire"
(iii) ("an ox **wailed**" & "an ox **got up**" & "an ox **lowered his cheek to the right**") ⇒ "not attaining the desire"
(iv) ("an ox **wailed**" & "an ox **got up**" & "an ox **lowered his cheek to the left**") ⇒ "attaining the desire"

We see that "an ox **wailed**", "an ox **got up**" and "an ox **lowered his cheek to the left**" are positive signs, and "an ox **didn't get up**" and "an ox **lowered his cheek to the right**" are negative signs. Therefore, we can formalize these conditional statements in the following manner, according to truth tables:

(v) ((+1 & +1) ⇒ +1) = +1;
(vi) ((+1 & -1) ⇒ -1) = +1;
(vii) ((+1 & +1 & -1) ⇒ -1) = +1;
(viii) ((+1 & +1 & +1) ⇒ +1) = +1.

The expressions (i)–(viii) are axioms, too –they always have their true value +1.

Conclusion

Thus, the algebraic structure of omen codes reconstructed by the truth tables defined above is a kind of binary calculus applicable to all forms of Mesopotamian omens presented as a codex. This binary logic is a by-product of Akkadian *šumma*-clauses (conditional statements of the form "if…, then…") which were simply treated by the Mesopotamians logically, in the same way as how conditional statements are understood nowadays in modern logic. Therefore, ideas of binary logic can also be reconstructed in two other genres using the *šumma*-clauses: (i) hermeneutic texts ("if there is a sign *A*, then it is treated as another sign *B*"; (ii) legal texts ("if an action *A* is performed, then its actor should be sentenced to a punishment *B*").

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85) BM 77046 – A Duplicate to SpTU I, no. 76 (*Šumma ālu*-Omens on Spittle and Spitting) — The Late Babylonian text BM 77046 (1883,0118,AH.2422), which supposedly originates from Sippar, represents an up to now unidentified duplicate to the passage on spitting and spittle observations, likewise preserved within the Late Babylonian text W. 22307/22 (SpTU I, no. 76) reverse 4′–49′. Mentioned therein along with omens concerning different phenomena while a man is leaving, entering or being on his way, the passages in the Uruk-Ms. have been more generally labelled as "Omina teils vom Typ *šumma ālu*, teils physiognomisch" within the first edition of W. 22307/22 by H. Hunger (SpTU I, 78). And indeed, newly identified excerpts from the Neo Assyrian period (see below) suggest a particular context within the last part of the extensive divinatory series *Šumma ālu ina mēlê šakin*. The respective parallels (and the duplicate as in the case of SpTU I, no. 76) are as follows:

W. 22307/22 rev. 21′–49′ // BM 77046 obv. 1′–17′, rev. 1–13
K. 2988 obv. 6′–9′ // BM 77046 obv. 3′–6′
K. 8042+ ii 22′–29′ // BM 77046 obv. 8′–13′
1879,0708.213+ i 7–14, 17 // BM 77046 obv. 8′–13′, rev. 9

While the first two preserved sections in W. 22307/22 are provided with a rubric-like ruled-off line, which might have indicated the number of the excerpt (obv. 30 notes the numeral "33 […]" and rev. 3′ "34 […]"), the last section on spittle shows no such but ends with supposedly a catchline referring to a tablet beginning with the lines "If a man […] his garment in/during(?) […]" (rev. 50′: DIŠ NA *lu-bu-uš-ta-šu*$_2$ *ina*$^?$ x^1 […]) –a catchline, which might be connectable with the similar sounding omens in texts like K.9812+ as well as a couple of other Neo Assyrian fragments concerned with garments. Unfortunately, the here presented text BM 77046 does not preserve any colophon or rubric and thus offers no further information of the status of the text itself or of what is following.

Despites this, it is noteworthy that both texts, BM 77046 as well as W. 22307/22, seem to duplicate each other, including the additional line concerning "(nose) mucus" (*upāṭu*, cf. entry rev. 9) and the following Namburbi-ritual (cf. also Maul (1994), 445–452). Even though it cannot be excluded that BM 77046 might have contained other sections preceding the preserved text portions, the distribution of the text on obverse and reverse suggests otherwise –in particular in contrast to the Uruk Ms., which displays the whole section on spittle at its reverse' second part. The status of both Mss. as excerpts is further questioned by the fact that the Neo Assyrian excerpts note much less entries and seem to exclude the ritual entirely, even though K. 8042+ and 1879,0708.213+ seem to have a similar focus on certain entries in particular. However, due to the most likely excerpted content within the preceding sections in W. 22307/22, a final statement concerning the scope of the section on spittle omens (i.e. if it represents the whole "tablet"-content or not) preserved within the Late Babylonian witnesses remains unclear for now.

The information about the identifications of Neo Assyrian excerpts (except for the small, already known fragment K. 2988) has been kindly communicated to me by C. Mittermayer and F. Huber Vulliet (Geneva Šumma ālu project). The relevant excerpt texts (K. 8042+ (+ K. 2238), 1879,0708.213 + Sm. 958, K. 2988) and their possible localisation in respect to the whole series will be discussed in Boddy, Huber Vulliet & Mittermayer (2021). The restorations within the following edition of BM 77046 base on the parallel instances of the Mss. mentioned above. A transliteration in partition of all relevant Mss. of this section will be accessible at the open-source repository "Archive ouverte" of the University of Geneva (https://archive-ouverte.unige.ch). The cuneiform hand copies presented at the end of the edition have been made by the present author.

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Edition

o 1′ ⌜DIŠ NA KIMIN (UH$_2$-*su* ŠUB)-*ma* GIM SAG NIG$_2$⌝.GUL […]
If a man ditto (throws his spittle) and (it looks) like the head of a hatchet(?) […]