JoSTrans
The Journal of Specialised Translation

www.jostrans.org · ISSN: 1740-367X

Darani, A. (2012). Date conversion essentials: The case of Persian to English official translation. *The Journal of Specialised Translation, 17*, 224-234.
https://doi.org/10.26034/cm.jostrans.2012.467

Date conversion essentials: the case of Persian to English official translations

Parviz Ahmadi Darani, Mohajer Technical-Vocational University of Isfahan

ABSTRACT

Although ready access to the Internet makes everything easy, if no online date calculator is available, the only solution with official translations is to convert dates by manual calculation. This article examines conversion and interconversion in relation to three kinds of calendar used in official translations in Iran: the Solar, the Lunar and the Gregorian. To this end the article offers a thorough discussion of conceptual (calendarical) knowledge, focusing on the inherent discrepancies existing between these calendars; it then provides further information about manual date calculation, and finally offers information on some useful websites and software.

KEYWORDS

Conversion, interconversion, solar, lunar, Gregorian calendar, official translation.

1. Date conversion in official translation

Official documents in Iran are dated based on the solar (Hejri-e Shamsi) calendar.[1] Certain documents of a religious nature may also contain lunar (Hejri-e Qamari) dates and captions. Yet this information is only secondary and is not used for recording or referring to the document unless it dates back to the time of Prophet Muhammad. This is because the Hijri calendar, which is based on lunar movement in the solar system, involves changes that are difficult to track. Therefore the solar calendar, which largely excludes such fluctuations, is used for the recording of dates.

Any good translation must thus take into account the need to convert dates between different calendars. It is necessary to know how to convert solar dates into the Gregorian calendar and vice versa. This requires a full understanding of the Gregorian, solar and lunar months including how many days each contains, what a leap year is, and so on.

2. Calendars

2.1. The Solar calendar

The modern Persian calendar was adopted in 1925, replacing (while retaining the month names of) a traditional calendar dating from the eleventh century. The calendar consists of 12 months, the first six of which have 31 days, the next five 30 days, and the final month 29 days in a normal year and 30 days in a leap year. The Solar months are as follows:

Months	Days	Months	Days
1. Farvardin	31	7. Mehr	30
2. Ordibehesht	31	8. Aban	30
3. Khordad	31	9. Azar	30
4. Tir	31	10. Dey	30
5. Mordad	31	11. Bahman	30
6. Shahrivar	31	12. Esfand	29

Each year begins on the day in which the March equinox occurs, at or after solar noon at the longitude reference for Iran Standard Time (52°30' E). Days begin at midnight in the standard time zone. There is no leap year rule; 366-day years do not recur in a regular pattern, but instead occur whenever that number of days elapses between equinoxes at the reference meridian. The calendar, therefore, stays perfectly aligned with the seasons. No attempt is made to synchronise months with the phases of the Moon.

There is some controversy about the reference meridian at which the equinox is determined in this calendar. Various sources cite Tehran, Esfahan, and the central meridian of Iran Standard Time as the determiner of the equinox. Here, Iran Standard Time longitude is used, as it appears that this is the criterion used in Iran today. As this calendar is proleptic for all years prior to 1925 C.E., historical considerations regarding the capitals of Persia and Iran do not seem to apply.

Ahmad Birashk (1993) proposed an alternative means of determining leap years for the Persian calendar. His technique avoids the need to determine the moment of the astronomical equinox, replacing it with a very complex leap year structure. Years are grouped into cycles, which begin with four standard years after which every fourth subsequent year in the cycle is a leap year. Cycles are grouped into grand cycles of

either 128 years (composed of cycles of 29, 33, 33, and 33 years) or 132 years, containing cycles of 29, 33, 33, and 37 years. A great grand cycle is composed of 21 consecutive 128-year grand cycles and a final 132 grand cycle, for a total of 2820 years. The pattern of standard and leap years which began in 1925 will not repeat until the year 4745!

Each 2820-year great grand cycle contains 2137 standard years of 365 days and 683 leap years of 366 days; with an average year length in days over the great grand cycle of 365.24219852. This is so close to the actual solar tropical year of 365.24219878 days, that this calendar accumulates an error of one day only every 3.8 million years.

2.2. The Gregorian calendar

The Gregorian calendar was proclaimed by Pope Gregory XIII and came into effect in most Catholic states in 1582. October 4, 1582 of the Julian calendar was followed by October 15 in the new calendar, correcting the accumulated discrepancy between the Julian calendar and the equinox from that date. When comparing historical dates, it is important to note that the Gregorian calendar used universally today in Western countries and in international commerce was adopted at different times by different countries. Britain and her colonies (including what is now the United States), did not switch to the Gregorian calendar until 1752, when Wednesday 2nd September in the Julian calendar dawned as Thursday the 14th of September in the Gregorian. The Gregorian months are as follows:

Months	Days	Months	Days
1. January	31	7. July	31
2. February	28	8. August	31
3. March	31	9. September	30
4. April	30	10. October	31
5. May	31	11. November	30
6. June	30	12. December	31

February, the shortest month in the Gregorian calendar, is 28 or 29 days depending on whether it occurs in a leap year or not. The Gregorian calendar offers a minor correction to the Julian. In the Julian calendar, every fourth year is a leap year in which February has 29 rather than 28 days, but in the Gregorian calendar, years divisible by 100 are not leap years unless they are also divisible by 400. As in the Julian calendar, days are considered to begin at midnight.

The average length of a year in the Gregorian calendar is 365.2425 days compared with the actual solar tropical year (time from equinox to equinox) of 365.24219878 days, so the calendar accumulates one day of error with respect to the solar year about every 3300 years. As this is a purely solar calendar, no attempt is made to synchronise the start of months to the phases of the Moon.

While one cannot properly speak of 'Gregorian dates' prior to the adoption of the calendar in 1582, the calendar can be extrapolated to prior dates. When this is done, a convention is applied that the year prior to year 1 is year 0. This differs from the Julian calendar in which there is no year 0—the year before year 1 in the Julian calendar is year ?1(minus 1). The date December 30th in the Gregorian calendar corresponds to January 1st in the Julian calendar.

A slight modification of the Gregorian calendar would make it even more precise. If the additional rule that years evenly divisible by 4000 are not leap years is given effect, an average solar year of 365.24225 days per year is obtained, which, compared to the actual mean year of 365.24219878, is equivalent to an error of one day over a period of about 19,500 years; this is comparable to errors resulting from tidal braking of the rotation of the Earth.

2.3. Lunar calendar

The lunar calendar (also known as the Islamic, Muslim and Hijri calendar) is purely lunar and consists of twelve alternating months of 30 and 29 days, with the final 29-day month extending to 30 days during leap years. Leap years follow a 30-year cycle and occur in years 1, 5, 7, 10, 13, 16, 18, 21, 24, 26, and 29. Days are considered to begin at sunset. The calendar begins on Friday, July 16th, 622 C.E. in the Julian calendar, Julian day 1948439.5, the day of Muhammad's migration from Mecca to Medina, with sunset on the preceding day reckoned as the first day of the first month of year 1 A.H., (Anno Hegiræ, the Arabic word for 'separate' or 'go away'.) The days are named in accordance with their position in the week; thus : Sunday is the first day and Saturday the 7th, and the week is considered to begin on Saturday. The lunar months are as follows:

Months	Days	Months	days
1. Muharram	30	7. Rajab	30
2. Safar	29	8. Shaban	29
3. Rabi al-Awwal	30	9. Ramadan	30
4. Rabi ath-Thani	29	10. Shawwal	29
5. Jumad al-Ula	30	11. Dhul-Qada	30
6. Jumad al-Thani	29	12. Dhul-Hijja	29

The calendar presented here is the most commonly used civil calendar in the Islamic world; for religious purposes, months are marked to start with the first observation of the crescent of the new Moon. As a result of this, the same Gregorian date may have two to four Hijri equivalent dates depending on the place and time of the crescent sighting.

As an attempt to rationalise the various systems in use at that time, it was agreed that the most appropriate reference point for the Islamic Calendar was the Hijra (Hijrah, Hegira). The Islamic (Hijri) Calendar - with dates that fall within the Muslim Era- is usually abbreviated to AH in Western languages from the Latinised 'Anno Hejirae' (meaning 'in the year of the Hijra').

3. Calculations

3.1. Solar to Gregorian conversion

As in the case of February in the Gregorian calendar, Esfand may fluctuate between 29 days in an ordinary year and 30 days in a leap year in the solar calendar. Nevertheless, the calendars do not seasonally match, in that while February marks mid-winter in the Gregorian calendar, Esfand denotes the last month of winter and the last month of a year in the solar calendar. Thus, while a Gregorian New Year starts shortly after the beginning of winter, the Persian New Year begins approximately at the beginning of spring.

A potential source of confusion is the turning point of years, which is different across the two cultures. In the Gregorian calendar, the turning point is always at 12:00 midnight on December 31; hence there is no concern about the extra 6 hours or so for the next leap year, whereas the Islamic calendar does not consider the turning point t to be at 12 midnight necessarily. In the AH calendar the turning point may be early morning one year, late afternoon another year, even 3:00 a.m. another year and so on and so forth (Raee, 2007:187).

This discrepancy, of course, not only creates confusion in terms of date conversion between the two calendars, but also leaves the Persians with some extra time between the end of one year and the start of the New Year that seemingly belongs to neither! Thus, when a New Year starts at, say, 6:00 p.m. there is no consensus as to which year the time between 6:01pm and midnight belongs. This is why sometimes there is no complete match between converted dates. Only sophisticated software which can actually keep a record of every single year in the history of both the Gregorian and the solar calendars can come up with the exact date matches between the two calendars.[2]

Below is a manual method of date conversion between the calendars mentioned above, with the reservation, however, that applying this method could result in an error margin of one or two days. This, of course, is due to the discrepancies explained above. To convert a solar date to its Gregorian counterpart, add the sums 2/21/621 to the months/days/years figures respectively.[3] However, if a person was born on or after Dey (the Persian month), we must add 622 to the year figure. For instance, if the Iranian date is Farvardin 7th, the Gregorian equivalent will be something like:

Day: 7+21=28
Month: 1+2=3
Year: 1377+621=1998

Therefore the converted date (with a possible error margin of one to two days) is March 28, 1998.However, things are not always so straightforward. What if the figures exceed their ceilings, for example if a 'days' figure exceeds a maximum of 31, or a 'months' figure exceeds 12? Consider this Persian date: Bahman 17, 1354. Applying the above formula, we get:

Day: 17+21=38
Month: 11+2=13
Year: 1354+622=1976

38 for 'days' and 13 for 'months' are not acceptable figures because there is no month with 38 days or year with 13 months in the Gregorian calendar. To solve this dilemma, we subtract the months from 12 (a whole year), and add one unit to the 'years' figure. The remainder represents the 'months.' In the example above, the 'months' figure will then be 1(13 minus 12).

However, we are not finished yet, as our 'days' figure still stands at 38, which is not acceptable. To solve this problem, we look back at the 'months' figure 1, and check the Gregorian calendar to see how many days the corresponding month (January) has. January has 31 days, so of the 38 in our 'days' figure, 31 belong to January. The remainder, whatever this is, will be carried forward into February. Thus the ultimate date will be something close to February 7, 1976.

As has been noted, the converted dates are unfortunately not precise. Different techniques have been used to try to resolve the issue, but so far none has provided the perfect solution, at least to the author's knowledge. With this in mind, the best way forward would probably be to design a piece of software that can record previous Iranian years and then match them up with their Gregorian counterparts year by year. Such software is now being developed. Yet in my opinion, their precision is not ascertained as I personally converted dates based on an existing Persian calendar, and this is what I came up with:

Months	Days	Months	Days
1. Farvardin	+1	7. Mehr	-1
2. Ordibehesht	+1	8. Aban	-1
3. Khordad	P	9. Azar	P
4. Tir	P	10. Dey	P
5. Mordad	+1	11. Bahman	+1
6. Shahrivar	-1	12 Esfand	+2

The (+) and (-) signs indicate the number of 'days' that the conversion is either ahead or behind the exact date. The letter (P) stands for precision.

Obviously, it is difficult to discern a pattern that provides for the uniform conversion of all dates. Remember this holds true only for the current year. No guarantee is made as to converted dates extending further into the past.

The reverse also holds true when converting dates from the Gregorian calendar into the solar calendar. If you deduct 21 from the 'days', 2 from the 'months', and 621 from the 'years' figure, you obtain the approximate solar date equivalent. The situation, again, is straightforward as long as the subtraction yields positive numbers. However, when negative figures result, things again become more complicated Yet the reader should, by now, be able to solve the problem by recognising that minus figures indicate that the date

should extend back into the previous day or month. This represents the opposite of the procedure explained above, and thus should not pose any problems.

3.2. Lunar to Gregorian conversion

One formula for converting an Islamic date into its Gregorian counterpart is to divide the lunar date by 33.7, subtract the result from the lunar date and then add 622, or for an approximate equivalent, to add 583 to the lunar date. Since the Islamic year is a lunar year, it is shorter than the western solar year. Therefore 622 can just be added or subtracted for a start date. For example, the Year 2008 (Gregorian date) is equal to 2008 –622 = 1386. However, this is not the real Muslim year; it is the year in the Persian calendar, because the Muslim calendar is a lunar calendar, not a solar one like the Gregorian or the Persian calendars. One lunar year has about 354 days, so we need additional correction to find the real year. The easiest way to do this is to multiply or divide a year of 354/365 by 0.97. In our case, (2008-622)/0.97=1429. Thus the year in the Muslim calendar is 1429. Therefore, finally if we want to convert a Muslim date to a Gregorian date, we need to multiply the original year by 0.97 and add 622:

$$\text{Year}_{\text{Gregorian}} = \text{Year}_{\text{Muslim}} \times 0.97 + 622.$$

If you want to convert a Gregorian date to a Muslim date, you need to subtract 622 from the original year and then multiply by 1.03:

$$\text{Year}_{\text{Muslim}} = (\text{Year}_{\text{Gregorian}} - 622) \times 1.03.$$

As already mentioned, the manually calculated formulas described are very approximate, so this way provides for precise calculations. Moreover, the Muslim year does not start on 1st of January, so the year 2008 corresponds to the years 1428-1429 in the Islamic calendar.

3.3. Lunar to solar conversion

No lunar dates are truly convertible because of the complexities attached to the conversion. There is considerable incompatibility between the two calendars. The Islamic calendar is purely lunar, as opposed to solar or like some calendars luni-solar, the lunar year is shorter than the solar year by about 11 days (10 days and 21 hours),

and months in the lunar year are not related to any seasons at all and seasons are related to the solar cycle not lunar cycles. As a result, what we have is a long cycle date system: a 33-year cycle of lunar months is required for a month to take a complete turn and fall during the same season again. Therefore the two numbers 33 and 34 can be used for rough reckoning between the calendars. In accordance with this formula, the solar year is divided by 33 and the result is added to the present solar year in the lunar-to-solar conversion. For a solar-to-lunar conversion, a solar year roughly equals a lunar year divided by 34, and then subtracted from the present lunar year:

$$\text{Year}_{\text{Muslim}} = \text{Year}_{\text{Solar}} /33+1389$$
$$\text{Year}_{\text{Solar}} = \text{Year}_{\text{Muslim}} /34-1429$$

In the interest of greater precision in time reckoning, another formula can be applied by converting the Lunar calendar to the Gregorian first, and then from January1 to March 20th, 622, and in the case of March 21st to the end of December 621 subtracted from the result. To avoid redundancy, check the related formulas in the Lunar to Gregorian Conversion Section (3.2.).

4. Interconversion into other calendars

There are several reliable software products for converting the Persian calendar dates into other calendar systems and vice-versa. The Khayyam Program is recommended for conversion between the Persian and Gregorian calendars (Khayyam Program). Currently the leap years in the 33-year cycles are those years that after dividing by 33 leave a remainder of 1, 5, 9, 13, 17, 22, 26 and 30. For example, the year A.P. 1375 that began on March 20, 1996 has a remainder of 22 and is thus a leap year. The rules are implemented in the Khayyam program. Borkowski (1996) argues that the algorithm used in the program is valid for the years A.D. 1799 to 2256 (A.P. 1178 to 1634). Moreover, he presents a concise code which reconstructs the pattern of leap years over a time span of about 3000 years.

Another interesting tool is the Calendrica 2.0 software package, based on the algorithms in *Calendrical Calculations* (Reingold and Nachum Dershowitz 2008). It allows conversion not only between the Persian and Gregorian systems, but also among several other calendars, mainly: Armenian, Chinese, French revolutionary, Hebrew, Hindu, Islamic, and Mayan to name but a few (Memari, 1997:94).

5. Conclusion

Before embarking on the translation of any official document, translators must know how to convert dates. Although the internet abounds in online date convertors equipped with diverse facilities such as high-resolution graphics as well as multipurpose options, translators must know how to make manual date reckonings should internet access not be available. The aim of this article is to shed light on the issues surrounding calendars such as conversion and interconversion, fluctuations, and discrepancies among them, by focusing on the conceptual understanding of each calendar. Undoubtedly, the methods described, viz, manual date reckoning and online date convertors are not without flaws, but complementing one method with another can help to ensure accuracy.

References

- **Bagher Zadeh, Hossein** (2005). *Date conversion*.
- http://www.payvand.com/ calendar (consulted 01.08.2010)

- **Birashk, Ahmad** (1993). *A Comparative Calendar of the Iranian, Muslim Lunar and Christian Eras for 3000 Years*. Tehran: Mazda Publications.

- **Borkowski, Kazimierz** (1996)."The Persian calendar for 3000 years." *Earth, Moon and Planets* 74(3), 223-230.

- **Memari, Mohammad** (1997). *Documents and Correspondence Translation*. Tehran: Ayat Publishers Company.

- **Raee Sharif, Masoud** (2007).*Translation of Legal Correspondence and Deeds*. Vol 1. Tehran: SAMT Publications.

- **Reingold, Edward and Dershowitz, Nachum** (2008) (3rd edition). *Calendrical Calculations*. Cambridge: Cambridge University Press.

Websites

- **Date Conversion**. http://www.cob.ohio.edu/muhanna1/ /hijri-intro.html (consulted 11.08.2010)

- **The Khayyam Program**. http://payvand.com/calendar (consulted 11.08.2010) (To use this online dates calculator, activate JavaScript support in your browser.)

Biography

I am a simultaneous interpreter and lecturer at Mohajer Technical-Vocational University of Isfahan. I obtained my MA degree in Translation from the State University of Isfahan in 2002. My research interests include simultaneous, consecutive, legal, and scientific translation.

Contact:pahmadi05@gmail.com

[1] It is transliterated for solar calendar. Contrary to the Hijri calendar, which has a lunar basis and is used as a religious reference in Persian, the Hejri e-Shamsi calendar is based on the 24-hour rotation of the Earth around its axis, and is thus more precise than the Hirji calendar.

[2] In this respect then, Persian is still using a calendar similar to the Julian calendar of the old Roman Empire which was introduced by Julius Caesar in 46 B.C. It consists of 365 days with an extra day every four years for the leap year.

[3] Throughout this article, the American method of writing dates, wherein days appear between the month and year, will be applied.