= Daylight saving time =

Daylight saving time ( DST ) or summer time is the practice of advancing clocks during summer months by one hour so that evening daylight lasts an hour longer , while sacrificing normal sunrise times . Typically , regions with summer time adjust clocks forward one hour close to the start of spring and adjust them backward in the autumn to standard time . People use the terms " spring forward " and " fall back " when referring to this .

New Zealander George Hudson proposed the idea of daylight saving in 1895 . The German Empire and Austria @-@ Hungary organized the first nationwide implementation , starting on April 30 , 1916 . Many countries have used it at various times since then , particularly since the energy crisis of the 1970s .

The practice has both advocates and critics . Putting clocks forward benefits retailing , sports , and other activities that exploit sunlight after working hours , but can cause problems for outdoor entertainment and other activities tied to sunlight , such as farming . Though some early proponents of DST aimed to reduce evening use of incandescent lighting ? once a primary use of electricity ? today 's heating and cooling usage patterns differ greatly , and research about how DST affects energy use is limited or contradictory .

DST clock shifts sometimes complicate timekeeping , and can disrupt travel , billing , record keeping , medical devices , heavy equipment , and sleep patterns . Computer software often adjusts clocks automatically , but policy changes by various jurisdictions of DST dates and timings may be confusing .

= = Rationale = =

Industrialized societies generally follow a clock @-@ based schedule for daily activities that do not change throughout the course of the year . The time of day that individuals begin and end work or school , and the coordination of mass transit , for example , usually remain constant year @-@ round . In contrast , an agrarian society 's daily routines for work and personal conduct are more likely governed by the length of daylight hours and by solar time , which change seasonally because of the Earth 's axial tilt . North and south of the tropics daylight lasts longer in summer and shorter in winter , the effect becoming greater as one moves away from the tropics .

By synchronously resetting all clocks in a region to one hour ahead of standard time ( one hour " fast " ) , individuals who follow such a year @-@ round schedule will wake an hour earlier than they would have otherwise ; they will begin and complete daily work routines an hour earlier , and they will have available to them an extra hour of daylight after their workday activities . However , they will have one less hour of daylight at the start of each day , making the policy less practical during winter .

While the times of sunrise and sunset change at roughly equal rates as the seasons change , proponents of Daylight Saving Time argue that most people prefer a greater increase in daylight hours after the typical " nine to five " workday . Supporters have also argued that DST decreases energy consumption by reducing the need for lighting and heating , but the actual effect on overall energy use is heavily disputed .

The manipulation of time at higher latitudes ( for example Iceland , Nunavut or Alaska ) has little impact on daily life , because the length of day and night changes more extremely throughout the seasons ( in comparison to other latitudes ) , and thus sunrise and sunset times are significantly out of phase with standard working hours regardless of manipulations of the clock . DST is also of little use for locations near the equator , because these regions see only a small variation in daylight in the course of the year . The effect also varies according to how far east or west the location is within its time zone , with locations further east inside the time zone benefiting more from DST than locations further west in the same time zone .

= = History = =

Although they did not fix their schedules to the clock in the modern sense , ancient civilizations adjusted daily schedules to the sun more flexibly than DST does , often dividing daylight into twelve hours regardless of daytime , so that each daylight hour was longer during summer . For example , Roman water clocks had different scales for different months of the year : at Rome 's latitude the third hour from sunrise , hora tertia , started by modern standards at 09 : 02 solar time and lasted 44 minutes at the winter solstice , but at the summer solstice it started at 06 : 58 and lasted 75 minutes ( see also : Roman timekeeping ) . After ancient times , equal @-@ length civil hours eventually supplanted unequal , so civil time no longer varies by season . Unequal hours are still used in a few traditional settings , such as some monasteries of Mount Athos and all Jewish ceremonies .

During his time as an American envoy to France , Benjamin Franklin , publisher of the old English proverb , " Early to bed , and early to rise , makes a man healthy , wealthy and wise " , anonymously published a letter suggesting that Parisians economize on candles by rising earlier to use morning sunlight . This 1784 satire proposed taxing window shutters , rationing candles , and waking the public by ringing church bells and firing cannons at sunrise . Despite common misconception , Franklin did not actually propose DST ; 18th @-@ century Europe did not even keep precise schedules . However , this soon changed as rail transport and communication networks came to require a standardization of time unknown in Franklin 's day .

Modern DST was first proposed by the New Zealand entomologist George Hudson , whose shift work job gave him leisure time to collect insects , and led him to value after @-@ hours daylight . In 1895 he presented a paper to the Wellington Philosophical Society proposing a two @-@ hour daylight @-@ saving shift , and after considerable interest was expressed in Christchurch , he followed up in an 1898 paper . Many publications credit DST 's proposal to the prominent English builder and outdoorsman William Willett , who independently conceived DST in 1905 during a pre @-@ breakfast ride , when he observed with dismay how many Londoners slept through a large part of a summer 's day . An avid golfer , he also disliked cutting short his round at dusk . His solution was to advance the clock during the summer months , a proposal he published two years later . The proposal was taken up by the Liberal Member of Parliament ( MP ) Robert Pearce , who introduced the first Daylight Saving Bill to the House of Commons on February 12 , 1908 . A select committee was set up to examine the issue , but Pearce 's bill did not become law , and several other bills failed in the following years . Willett lobbied for the proposal in the UK until his death in 1915 .

William Sword Frost , mayor of Orillia , Ontario , introduced daylight saving time in the municipality during his tenure from 1911 to 1912 .

Starting on April 30 , 1916 , the German Empire and its World War I ally Austria @-@ Hungary were the first to use DST ( German : Sommerzeit ) as a way to conserve coal during wartime . Britain , most of its allies , and many European neutrals soon followed suit . Russia and a few other countries waited until the next year and the United States adopted it in 1918 .

Broadly speaking , Daylight Saving Time was abandoned in the years after the war ( with some notable exceptions including Canada , the UK , France , and Ireland ) . However , it was brought back for periods of time in many different places during the following decades , and commonly during World War II . It became widely adopted , particularly in North America and Europe , starting in the 1970s as a result of the 1970s energy crisis .

Since then , the world has seen many enactments , adjustments , and repeals . For specific details , an overview is available at daylight saving time by country .

= = Procedure = =

In the case of the United States where a one @-@ hour shift occurs at 02 : 00 local time , in spring the clock jumps forward from the last moment of 01 : 59 standard time to 03 : 00 DST and that day has 23 hours , whereas in autumn the clock jumps backward from the last moment of 01 : 59 DST to 01 : 00 standard time , repeating that hour , and that day has 25 hours . A digital display of local time does not read 02 : 00 exactly at the shift to summer time , but instead jumps from 01 : 59 : 59 @.@ 9 forward to 03 : 00 : 00 @.@ 0 .

Clock shifts are usually scheduled near a weekend midnight to lessen disruption to weekday schedules . A one @-@ hour shift is customary . Twenty @-@ minute and two @-@ hour shifts have been used in the past .

Coordination strategies differ when adjacent time zones shift clocks . The European Union shifts all at once , at 01 : 00 UTC or 02 : 00 CET or 03 : 00 EET ; for example , Eastern European Time is always one hour ahead of Central European Time . Most of North America shifts at 02 : 00 local time , so its zones do not shift at the same time ; for example , Mountain Time is temporarily ( for one hour ) zero hours ahead of Pacific Time , instead of one hour ahead , in the autumn and two hours , instead of one , ahead of Pacific Time in the spring . In the past , Australian districts went even further and did not always agree on start and end dates ; for example , in 2008 most DST @-@ observing areas shifted clocks forward on October 5 but Western Australia shifted on October 26 . In some cases only part of a country shifts ; for example , in the US , Hawaii and most of Arizona do not observe DST .

Start and end dates vary with location and year . Since 1996 , European Summer Time has been observed from the last Sunday in March to the last Sunday in October ; previously the rules were not uniform across the European Union . Starting in 2007 , most of the United States and Canada observe DST from the second Sunday in March to the first Sunday in November , almost two @-@ thirds of the year . The 2007 US change was part of the Energy Policy Act of 2005 ; previously , from 1987 through 2006 , the start and end dates were the first Sunday in April and the last Sunday in October , and Congress retains the right to go back to the previous dates now that an energy @-@ consumption study has been done . Proponents for permanently retaining November as the month for ending DST point to Halloween as a reason to delay the change ? to provide extra daylight on October 31 .

Beginning and ending dates are roughly the reverse in the southern hemisphere . For example , mainland Chile observed DST from the second Saturday in October to the second Saturday in March , with transitions at 24 : 00 local time . The time difference between the United Kingdom and mainland Chile could therefore be five hours during the Northern summer , three hours during the Southern summer and four hours a few weeks per year because of mismatch of changing dates .

DST is generally not observed near the equator , where sunrise times do not vary enough to justify it . Some countries observe it only in some regions ; for example , southern Brazil observes it while equatorial Brazil does not . Only a minority of the world 's population uses DST because Asia and Africa generally do not observe it .

= = Politics = =

Daylight saving has caused controversy since it began . Winston Churchill argued that it enlarges " the opportunities for the pursuit of health and happiness among the millions of people who live in this country " and pundits have dubbed it " Daylight Slaving Time " . Historically , retailing , sports , and tourism interests have favored daylight saving , while agricultural and evening entertainment interests have opposed it , and its initial adoption had been prompted by energy crisis and war .

The fate of Willett 's 1907 proposal illustrates several political issues involved . The proposal attracted many supporters , including Arthur Balfour , Churchill , David Lloyd George , Ramsay MacDonald , Edward VII ( who used half @-@ hour DST at Sandringham or " Sandringham time " ) , the managing director of Harrods , and the manager of the National Bank . However , the opposition was stronger : it included Prime Minister H. H. Asquith , Christie ( the Astronomer Royal ) , George Darwin , Napier Shaw ( director of the Meteorological Office ) , many agricultural organizations , and theatre owners . After many hearings the proposal was narrowly defeated in a Parliament committee vote in 1909 . Willett 's allies introduced similar bills every year from 1911 through 1914 , to no avail . The US was even more skeptical : Andrew Peters introduced a DST bill to the United States House of Representatives in May 1909 , but it soon died in committee .

After Germany led the way with starting DST ( German : Sommerzeit ) during World War I on April 30 , 1916 together with its allies to alleviate hardships from wartime coal shortages and air raid blackouts , the political equation changed in other countries ; the United Kingdom used DST first on

May 21 , 1916 . US retailing and manufacturing interests led by Pittsburgh industrialist Robert Garland soon began lobbying for DST , but were opposed by railroads . The US 's 1917 entry to the war overcame objections , and DST was established in 1918 .

The war 's end swung the pendulum back . Farmers continued to dislike DST , and many countries repealed it after the war . Britain was an exception : it retained DST nationwide but over the years adjusted transition dates for several reasons , including special rules during the 1920s and 1930s to avoid clock shifts on Easter mornings . The US was more typical : Congress repealed DST after 1919 . President Woodrow Wilson , like Willett an avid golfer , vetoed the repeal twice but his second veto was overridden . Only a few US cities retained DST locally thereafter , including New York so that its financial exchanges could maintain an hour of arbitrage trading with London , and Chicago and Cleveland to keep pace with New York . Wilson 's successor Warren G. Harding opposed DST as a " deception " . Reasoning that people should instead get up and go to work earlier in the summer , he ordered District of Columbia federal employees to start work at 08 : 00 rather than 09 : 00 during summer 1922 . Some businesses followed suit though many others did not ; the experiment was not repeated .

Since Germany 's adoption in 1916 , the world has seen many enactments , adjustments , and repeals of DST , with similar politics involved .

The history of time in the United States includes DST during both world wars , but no standardization of peacetime DST until 1966 . In May 1965 , for two weeks , St. Paul , Minnesota and Minneapolis , Minnesota were on different times , when the capital city decided to join most of the nation by starting Daylight Saving Time while Minneapolis opted to follow the later date set by state law . In the mid @-@ 1980s , Clorox ( parent of Kingsford Charcoal ) and 7 @-@ Eleven provided the primary funding for the Daylight Saving Time Coalition behind the 1987 extension to US DST , and both Idaho senators voted for it based on the premise that during DST fast @-@ food restaurants sell more French fries , which are made from Idaho potatoes .

In 1992 , after a three @-@ year trial of daylight saving in Queensland , Australia , a referendum on daylight saving was held and defeated with a 54 @.@ 5 % ' no ' vote ? with regional and rural areas strongly opposed , while those in the metropolitan south @-@ east were in favor . In 2005 , the Sporting Goods Manufacturers Association and the National Association of Convenience Stores successfully lobbied for the 2007 extension to US DST . In December 2008 , the Daylight Saving for South East Queensland ( DS4SEQ ) political party was officially registered in Queensland , advocating the implementation of a dual @-@ time zone arrangement for Daylight Saving in South East Queensland while the rest of the state maintains standard time . DS4SEQ contested the March 2009 Queensland State election with 32 candidates and received one percent of the statewide primary vote , equating to around 2 @.@ 5 % across the 32 electorates contested . After a three @-@ year trial , more than 55 % of Western Australians voted against DST in 2009 , with rural areas strongly opposed . On April 14 , 2010 , after being approached by the DS4SEQ political party , Queensland Independent member Peter Wellington , introduced the Daylight Saving for South East Queensland Referendum Bill 2010 into Queensland Parliament , calling for a referendum at the next State election on the introduction of daylight saving into South East Queensland under a dual @-@ time zone arrangement . The Bill was defeated in Queensland Parliament on June 15 , 2011 .

In the UK the Royal Society for the Prevention of Accidents supports a proposal to observe SDST 's additional hour year @-@ round , but is opposed in some industries , such as postal workers and farmers , and particularly by those living in the northern regions of the UK .

In some Muslim countries DST is temporarily abandoned during Ramadan ( the month when no food should be eaten between sunrise and sunset ) , since the DST would delay the evening dinner . Ramadan took place in July and August in 2012 . This concerns at least Morocco and Palestine , although Iran keeps DST during Ramadan . Most Muslim countries do not use DST , partially for this reason .

The 2011 declaration by Russia that it would not turn its clocks back and stay in DST all year long was subsequently followed by a similar declaration from Belarus . Russia 's plan generated widespread complaints due to the dark of wintertime morning , and thus was abandoned in 2014 . The country changed its clocks to Standard Time on October 26 , 2014 and intends to stay there

permanently .

= = Dispute over benefits and drawbacks = =

Proponents of DST generally argue that it saves energy , promotes outdoor leisure activity in the evening ( in summer ) , and is therefore good for physical and psychological health , reduces traffic accidents , reduces crime , or is good for business . Groups that tend to support DST are urban workers , retail businesses , outdoor sports enthusiasts and businesses , tourism operators , and others who benefit from increased light during the evening in summer .

Opponents argue that actual energy savings are inconclusive , that DST increases health risks such as heart attack , that DST can disrupt morning activities , and that the act of changing clocks twice a year is economically and socially disruptive and cancels out any benefit . Farmers have tended to oppose DST .

Common agreement about the day 's layout or schedule confers so many advantages that a standard DST schedule has generally been chosen over ad hoc efforts to get up earlier . The advantages of coordination are so great that many people ignore whether DST is in effect by altering their nominal work schedules to coordinate with television broadcasts or daylight . DST is commonly not observed during most of winter , because its mornings are darker ; workers may have no sunlit leisure time , and children may need to leave for school in the dark . Since DST is applied to many varying communities , its effects may be very different depending on their culture , light levels , geography , and climate ; that is why it is hard to make generalized conclusions about the absolute effects of the practice . Some areas may adopt DST simply as a matter of coordination with others rather than for any direct benefits .

= = = Energy use = = =

DST 's potential to save energy comes primarily from its effects on residential lighting , which consumes about 3 @.@ 5 % of electricity in the United States and Canada . Delaying the nominal time of sunset and sunrise reduces the use of artificial light in the evening and increases it in the morning . As Franklin 's 1784 satire pointed out , lighting costs are reduced if the evening reduction outweighs the morning increase , as in high @-@ latitude summer when most people wake up well after sunrise . An early goal of DST was to reduce evening usage of incandescent lighting , once a primary use of electricity . Although energy conservation remains an important goal , energy usage patterns have greatly changed since then , and recent research is limited and reports contradictory results . Electricity use is greatly affected by geography , climate , and economics , making it hard to generalize from single studies .

The United States Department of Transportation ( DOT ) concluded in 1975 that DST might reduce the country 's electricity usage by 1 % during March and April , but the National Bureau of Standards ( NBS ) reviewed the DOT study in 1976 and found no significant savings .

In 2000 when parts of Australia began DST in late winter , overall electricity consumption did not decrease , but the morning peak load and prices increased .

In Western Australia during summer 2006 ? 2007 , DST increased electricity consumption during hotter days and decreased it during cooler days , with consumption rising 0 @.@ 6 % overall .

Although a 2007 study estimated that introducing DST to Japan would reduce household lighting energy consumption , a 2007 simulation estimated that DST would increase overall energy use in Osaka residences by 0 @.@ 13 % , with a 0 @.@ 02 % decrease due to less lighting more than outweighed by a 0 @.@ 15 % increase due to extra cooling ; neither study examined non @-@ residential energy use . This is probably because DST 's effect on lighting energy use is mainly noticeable in residences .

A 2007 study found that the earlier start to DST that year had little or no effect on electricity consumption in California .

A 2007 study estimated that winter daylight saving would prevent a 2 % increase in average daily electricity consumption in Great Britain . This paper was revised in October 2009 .

A 2008 study examined billing data in Indiana before and after it adopted DST in 2006 , and concluded that DST increased overall residential electricity consumption by 1 % to 4 % , due mostly to extra afternoon cooling and extra morning heating ; the main increases came in the fall . A study estimated the overall annual cost of DST to Indiana households $ 9 million , with an additional $ 1 @.@ 7 ? 5 @.@ 5 million for social costs due to increased pollution .

The United States Department of Energy ( DOE ) concluded in a 2008 report that the 2007 United States extension of DST saved 0 @.@ 5 % of electricity usage during the extended period . This report analyzed only the extension , not the full eight months of DST , and did not examine the use of heating fuels .

Several studies have suggested that DST increases motor fuel consumption . The 2008 DOE report found no significant increase in motor gasoline consumption due to the 2007 United States extension of DST .

= = = Economic effects = = =

Retailers , sporting goods makers , and other businesses benefit from extra afternoon sunlight , as it induces customers to shop and to participate in outdoor afternoon sports . In 1984 , Fortune magazine estimated that a seven @-@ week extension of DST would yield an additional $ 30 million for 7 @-@ Eleven stores , and the National Golf Foundation estimated the extension would increase golf industry revenues $ 200 million to $ 300 million . A 1999 study estimated that DST increases the revenue of the European Union 's leisure sector by about 3 % .

Conversely , DST can adversely affect farmers , parents of young children , and others whose hours are set by the sun and they have traditionally opposed the practice , although some farmers are neutral . One reason why farmers oppose DST is that grain is best harvested after dew evaporates , so when field hands arrive and leave earlier in summer their labor is less valuable . Dairy farmers are another group who complain of the change . Their cows are sensitive to the timing of milking , so delivering milk earlier disrupts their systems . Today some farmers ' groups are in favor of DST .

DST also hurts prime @-@ time television broadcast ratings , drive @-@ ins and other theaters .

Changing clocks and DST rules has a direct economic cost , entailing extra work to support remote meetings , computer applications and the like . For example , a 2007 North American rule change cost an estimated $ 500 million to $ 1 billion , and Utah State University economist William F. Shughart II has estimated the lost opportunity cost at around $ 1 @.@ 7 billion USD . Although it has been argued that clock shifts correlate with decreased economic efficiency , and that in 2000 the daylight @-@ saving effect implied an estimated one @-@ day loss of $ 31 billion on US stock exchanges , the estimated numbers depend on the methodology . The results have been disputed , and the original authors have refuted the points raised by disputers .

= = = Public safety = = =

In 1975 the US DOT conservatively identified a 0 @.@ 7 % reduction in traffic fatalities during DST , and estimated the real reduction at 1 @.@ 5 % to 2 % , but the 1976 NBS review of the DOT study found no differences in traffic fatalities . In 1995 the Insurance Institute for Highway Safety estimated a reduction of 1 @.@ 2 % , including a 5 % reduction in crashes fatal to pedestrians . Others have found similar reductions . Single / Double Summer Time ( SDST ) , a variant where clocks are one hour ahead of the sun in winter and two in summer , has been projected to reduce traffic fatalities by 3 % to 4 % in the UK , compared to ordinary DST . However , accidents do increase by as much as 11 % during the two weeks that follow the end of British Summer Time . It is not clear whether sleep disruption contributes to fatal accidents immediately after the spring clock shifts . A correlation between clock shifts and traffic accidents has been observed in North America and the UK but not in Finland or Sweden . If this effect exists , it is far smaller than the overall reduction in traffic fatalities . A 2009 US study found that on Mondays after the switch to DST , workers sleep an average of 40 minutes less , and are injured at work more often and more severely .

In the 1970s the US Law Enforcement Assistance Administration ( LEAA ) found a reduction of 10 % to 13 % in Washington , D.C. ' s violent crime rate during DST . However , the LEAA did not filter out other factors , and it examined only two cities and found crime reductions only in one and only in some crime categories ; the DOT decided it was " impossible to conclude with any confidence that comparable benefits would be found nationwide " . Outdoor lighting has a marginal and sometimes even contradictory influence on crime and fear of crime .

In several countries , fire safety officials encourage citizens to use the two annual clock shifts as reminders to replace batteries in smoke and carbon monoxide detectors , particularly in autumn , just before the heating and candle season causes an increase in home fires . Similar twice @-@ yearly tasks include reviewing and practicing fire escape and family disaster plans , inspecting vehicle lights , checking storage areas for hazardous materials , reprogramming thermostats , and seasonal vaccinations . Locations without DST can instead use the first days of spring and autumn as reminders .

= = = Health = = =

DST has mixed effects on health . In societies with fixed work schedules it provides more afternoon sunlight for outdoor exercise . It alters sunlight exposure ; whether this is beneficial depends on one 's location and daily schedule , as sunlight triggers vitamin D synthesis in the skin , but overexposure can lead to skin cancer . DST may help in depression by causing individuals to rise earlier , but some argue the reverse . The Retinitis Pigmentosa Foundation Fighting Blindness , chaired by blind sports magnate Gordon Gund , successfully lobbied in 1985 and 2005 for US DST extensions .

Clock shifts were found to increase the risk of heart attack by 10 percent , and to disrupt sleep and reduce its efficiency . Effects on seasonal adaptation of the circadian rhythm can be severe and last for weeks . A 2008 study found that although male suicide rates rise in the weeks after the spring transition , the relationship weakened greatly after adjusting for season . A 2008 Swedish study found that heart attacks were significantly more common the first three weekdays after the spring transition , and significantly less common the first weekday after the autumn transition . The government of Kazakhstan cited health complications due to clock shifts as a reason for abolishing DST in 2005 . In March 2011 , Dmitri Medvedev , president of Russia , claimed that " stress of changing clocks " was the motivation for Russia to stay in DST all year long . Officials at the time talked about an annual increase in suicides .

An unexpected adverse effect of daylight saving time may lie in the fact that an extra part of morning rush hour traffic occurs before dawn and traffic emissions then cause higher air pollution than during daylight hours .

= = = Complexity = = =

DST 's clock shifts have the obvious disadvantage of complexity . People must remember to change their clocks ; this can be time @-@ consuming , particularly for mechanical clocks that cannot be moved backward safely . People who work across time zone boundaries need to keep track of multiple DST rules , as not all locations observe DST or observe it the same way . The length of the calendar day becomes variable ; it is no longer always 24 hours . Disruption to meetings , travel , broadcasts , billing systems , and records management is common , and can be expensive . During an autumn transition from 02 : 00 to 01 : 00 , a clock reads times from 01 : 00 : 00 through 01 : 59 : 59 twice , possibly leading to confusion .

Damage to a German steel facility occurred during a DST transition in 1993 , when a computer timing system linked to a radio time synchronization signal allowed molten steel to cool for one hour less than the required duration , resulting in spattering of molten steel when it was poured . Medical devices may generate adverse events that could harm patients , without being obvious to clinicians responsible for care . These problems are compounded when the DST rules themselves change ; software developers must test and perhaps modify many programs , and users must install updates

and restart applications . Consumers must update devices such as programmable thermostats with the correct DST rules , or manually adjust the devices ' clocks . A common strategy to resolve these problems in computer systems is to express time using the Coordinated Universal Time ( UTC ) rather than the local time zone . For example , Unix @-@ based computer systems use the UTC @-@ based Unix time internally .

Some clock @-@ shift problems could be avoided by adjusting clocks continuously or at least more gradually ? for example , Willett at first suggested weekly 20 @-@ minute transitions ? but this would add complexity and has never been implemented .

DST inherits and can magnify the disadvantages of standard time . For example , when reading a sundial , one must compensate for it along with time zone and natural discrepancies . Also , sun @-@ exposure guidelines such as avoiding the sun within two hours of noon become less accurate when DST is in effect .

= = Terminology = =

As explained by Richard Meade in the English Journal of the ( American ) National Council of Teachers of English , the form daylight savings time ( with an " s " ) was already in 1978 much more common than the older form daylight saving time in American English ( " the change has been virtually accomplished " ) . Nevertheless , even dictionaries such as Merriam @-@ Webster 's , American Heritage , and Oxford , which describe actual usage instead of prescribing outdated usage ( and therefore also list the newer form ) , still list the older form first . This is because the older form is still very common in print and preferred by many editors . ( " Although daylight saving time is considered correct , daylight savings time ( with an " s " ) is commonly used . " ) The first two words are sometimes hyphenated ( daylight @-@ saving [ s ] time ) . Merriam @-@ Webster 's also lists the forms daylight saving ( without " time " ) , daylight savings ( without " time " ) , and daylight time .

In Britain , Willett 's 1907 proposal used the term daylight saving , but by 1911 the term summer time replaced daylight saving time in draft legislation . Continental Europe uses similar phrases , such as Sommerzeit in Germany , zomertijd in Dutch @-@ speaking regions , kesäaika in Finland , horario de verano or hora de verano in Spain and heure d 'été in France , whereas in Italy the term is ora legale , that is , legal time ( legally enforced time ) as opposed to " ora solare " , solar time , in winter .

The name of local time typically changes when DST is observed . American English replaces standard with daylight : for example , Pacific Standard Time ( PST ) becomes Pacific Daylight Time ( PDT ) . In the United Kingdom , the standard term for UK time when advanced by one hour is British Summer Time ( BST ) , and British English typically inserts summer into other time zone names , e.g. Central European Time ( CET ) becomes Central European Summer Time ( CEST ) .

The North American mnemonic " spring forward , fall back " ( also " spring ahead ... " , " spring up ... " , and " ... fall behind " ) helps people remember which direction to shift clocks .

= = Computing = =

Changes to DST rules cause problems in existing computer installations . For example , the 2007 change to DST rules in North America required that many computer systems be upgraded , with the greatest impact on e @-@ mail and calendar programs . The upgrades required a significant effort by corporate information technologists .

Some applications standardize on UTC to avoid problems with clock shifts and time zone differences . Likewise , most modern operating systems internally handle and store all times as UTC and only convert to local time for display .

However , even if UTC is used internally , the systems still require information on time zones to correctly calculate local time where it is needed . Many systems in use today base their date / time calculations from data derived from the IANA time zone database also known as zoneinfo .

= = = IANA time zone database = = =

The IANA time zone database maps a name to the named location 's historical and predicted clock shifts . This database is used by many computer software systems , including most Unix @-@ like operating systems , Java , and the Oracle RDBMS ; HP 's " tztab " database is similar but incompatible . When temporal authorities change DST rules , zoneinfo updates are installed as part of ordinary system maintenance . In Unix @-@ like systems the TZ environment variable specifies the location name , as in TZ = ' : America / New _ York ' . In many of those systems there is also a system @-@ wide setting that is applied if the TZ environment variable is not set : this setting is controlled by the contents of the / etc / localtime file , which is usually a symbolic link or hard link to one of the zoneinfo files . Internal time is stored in timezone @-@ independent epoch time ; the TZ is used by each of potentially many simultaneous users and processes to independently localize time display .

Older or stripped @-@ down systems may support only the TZ values required by POSIX , which specify at most one start and end rule explicitly in the value . For example , TZ = ' EST5EDT , M3.2.0 / 02 : 00 , M11.1.0 / 02 : 00 ' specifies time for the eastern United States starting in 2007 . Such a TZ value must be changed whenever DST rules change , and the new value applies to all years , mishandling some older timestamps .

= = = Microsoft Windows = = =

As with zoneinfo , a user of Microsoft Windows configures DST by specifying the name of a location , and the operating system then consults a table of rule sets that must be updated when DST rules change . Procedures for specifying the name and updating the table vary with release . Updates are not issued for older versions of Microsoft Windows . Windows Vista supports at most two start and end rules per time zone setting . In a Canadian location observing DST , a single Vista setting supports both 1987 ? 2006 and post @-@ 2006 time stamps , but mishandles some older time stamps . Older Microsoft Windows systems usually store only a single start and end rule for each zone , so that the same Canadian setting reliably supports only post @-@ 2006 time stamps .

These limitations have caused problems . For example , before 2005 , DST in Israel varied each year and was skipped some years . Windows 95 used rules correct for 1995 only , causing problems in later years . In Windows 98 , Microsoft marked Israel as not having DST , forcing Israeli users to shift their computer clocks manually twice a year . The 2005 Israeli Daylight Saving Law established predictable rules using the Jewish calendar but Windows zone files could not represent the rules ' dates in a year @-@ independent way . Partial workarounds , which mishandled older time stamps , included manually switching zone files every year and a Microsoft tool that switches zones automatically . In 2013 , Israel standardized its daylight saving time according to the Gregorian calendar .

Microsoft Windows keeps the system real @-@ time clock in local time . This causes several problems , including compatibility when multi booting with operating systems that set the clock to UTC , and double @-@ adjusting the clock when multi booting different Windows versions , such as with a rescue boot disk . This approach is a problem even in Windows @-@ only systems : there is no support for per @-@ user timezone settings , only a single system @-@ wide setting . In 2008 Microsoft hinted that future versions of Windows will partially support a Windows registry entry RealTimeIsUniversal that had been introduced many years earlier , when Windows NT supported RISC machines with UTC clocks , but had not been maintained . Since then at least two fixes related to this feature have been published by Microsoft .

The NTFS file system used by recent versions of Windows stores the file with a UTC time stamp , but displays it corrected to local ? or seasonal ? time . However , the FAT filesystem commonly used on removable devices stores only the local time . Consequently , when a file is copied from the hard disk onto separate media , its time will be set to the current local time . If the time adjustment is changed , the timestamps of the original file and the copy will be different . The same effect can be observed when compressing and uncompressing files with some file archivers . It is the NTFS file

that changes seen time . This effect should be kept in mind when trying to determine if a file is a duplicate of another , although there are other methods of comparing files for equality ( such as using a checksum algorithm ) .

= = Permanent daylight saving time = =

A move to " permanent daylight saving time " ( staying on summer hours all year with no time shifts ) is sometimes advocated , and has in fact been implemented in some jurisdictions such as Argentina , Chile , Iceland , Singapore , Uzbekistan and Belarus . Advocates cite the same advantages as normal DST without the problems associated with the twice yearly time shifts . However , many remain unconvinced of the benefits , citing the same problems and the relatively late sunrises , particularly in winter , that year @-@ round DST entails . Russia switched to permanent DST from 2011 to 2014 , but the move proved unpopular because of the late sunrises in winter , so the country switched permanently back to " standard " or " winter " time in 2014 .

Xinjiang , China ; Argentina ; Chile ; Iceland ; Russia and other areas skew time zones westward , in effect observing DST year @-@ round without complications from clock shifts . For example , Saskatoon , Saskatchewan , is at 106 ° 39 ? W longitude , slightly west of center of the idealized Mountain Time Zone ( 105 ° W ) , but the time in Saskatchewan is Central Standard Time ( 90 ° W ) year @-@ round , so Saskatoon is always about 67 minutes ahead of mean solar time , thus effectively observing daylight saving time year @-@ round . Conversely , northeast India and a few other areas skew time zones eastward , in effect observing negative DST . The United Kingdom and Ireland experimented with year @-@ round DST from 1968 to 1971 but abandoned it because of its unpopularity , particularly in northern regions .

Western France , Spain , and other areas skew time zones and shift clocks , in effect observing DST in winter with an extra hour in summer . Nome , Alaska , is at 165 ° 24 ? W longitude , which is just west of center of the idealized Samoa Time Zone ( 165 ° W ) , but Nome observes Alaska Time ( 135 ° W ) with DST , so it is slightly more than two hours ahead of the sun in winter and three in summer . Double daylight saving time has been used on occasion ; for example , it was used in some European countries during and shortly after World War II when it was referred to as " Double Summer Time " . See British Double Summer Time and Central European Midsummer Time for details .

= = By country and region = =

Daylight saving time by country
Africa
Asia
Brazil
Europe
North and South America
Oceania
United States