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"Amazonian time": necessary review on traditional peoples and communities

"O tempo amazônico": uma revisão necessária sobre povos e comunidades tradicionais

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ABSTRACT: In the scientific literature, a pattern of "Amazonian winter" and "Amazonian summer" has been standardized through generalizations of classic literatures about the region. Nonetheless, these literatures exhibit the existence of a multiplicity of times and calendars produced by different social groups. This article aims to analyze the traditional calendars produced by these actors and compare them with the normalized Amazonian "winter" and "summer" based on the work of Galvão (1955). Towards achieving this objective, a bibliographical search was conducted, and research was selected that allowed the analysis of the time characteristics of traditional calendars at the levels of analysis: conceptual cycles and cycles of activities. As a consequence, the time of the peoples and communities analyzed have common characteristics, although the Amazon is multi calendar. Therefore, plentiful research on Amazonian "winter" and "summer" normalizing an impoverished conceptual cycle, which almost nothing expresses the socio-biodiversity of the region.

Keywords: socio-biodiversity; structural time; ecological time; traditional calendar; multi calendar.

RESUMO: Ficou normalizado, na literatura científica, um padrão de "inverno" e "verão" amazônicos mediante generalizações de obras clássicas sobre a região. No entanto, nessas literaturas, evidencia-se a existência de uma multiplicidade de tempos e de calendários produzidos pelos diferentes grupos sociais. Este artigo objetiva analisar os calendários tradicionais produzidos por esses atores e compará-los com os "inverno" e "verão" amazônicos normalizados a partir da obra de Galvão (1955). Para atingir esse objetivo, realizou-se levantamento bibliográfico, em que foram selecionadas pesquisas que permitiram analisar as características do tempo dos calendários tradicionais nos níveis de análise: ciclos conceituais e ciclos de atividades. Como

resultado, o tempo dos povos e comunidades analisados possuem características comuns entre si, embora a Amazônia seja multicalendárica. Portanto muitas pesquisas sobre "inverno" e "verão" amazônicos normalizam um ciclo conceitual empobrecido, que pouco expressa a sociobiodiversidade da região.

Palavras-chave: sociodiversidade; tempo estrutural; tempo ecológico; calendário tradicional; múltiplos calendários.

1. Introduction

Mastering time and space is essential for those who seek to rule the natural and social environment, and it has happened throughout history in several societies and cultures. Therefore, time and space are objects of power relationships. The association between power and time depends on cultural and historical contexts, and it is essential understanding these two elements as social constructs based on two key propositions that, in their turn, emerge from discussions on the politics of time (Rutz, 1992; Le Goff, 2003; Moura, 2017). One of them lies on the fact that different cultures build different times (Rutz, 1992; Hassig, 2001), which derive from a whole variety of time experiences associated with the historical processes that build their respective cultural matrices (Rehfeld, 1988). These elements refer to the non-homogeneity of time in this same social formation, although it presents variations in time perception depending on social class, occupation, ethnicity, among others, even if these factors are related to a hegemonic time (Rutz, 1992; Hassig, 2001; Le Goff, 2003; Moura, 2017). Thus, both propositions deal with multiple times.

Accordingly, the calendar is the organizing principle linked to the collective perception of ordinary time in all cultures because it gathers an activity cycle (*structural time*) and a conceptual cycle *(ecological time of ecological changes*). Calendars, seen as the main instrument of time chronology, provide the timeframe for the basis of society functioning (Le Goff, 2003; Evans-Pritchard, 2007). Therefore, a given social group's concept of time is added to its calendar (Hassig, 2001).

On the other hand, the concept of time developed by indigenous peoples, *quilombolas* and traditional communities, the so-called *traditional time*, associates time with the natural environment. Thus, time references materialize in natural cycles (rooster crowing, the beginning or the end of the rainy season, full moon, among others) because they foreshadow the periodic return of nature's material phenomena. These temporal references, or *memory signs*, "[…] must be contextualized in a set of concrete manifestations of nature, which are typical of the time launched by it"; in other words, it is based on a conceptual cycle (Moura, 2012, p. 174). According to Evans-Pritchard (2007, p. 113): "the calendar is moored on the cycle of ecological changes".

As for Le Goff, this statement applied to both traditional and modern societies:

> The construction of a calendar results from the observation of cosmic cycles, […] often carried out by specialists, members of a clergy […] or intellectuals working for state authorities. These cycles are projected onto the organization of human activities, since nature provides culture […] with a distinction between festivities and normal days, good and bad times (astrology), among others. (2003, p. 477).

However, modern times are subtracted from memory signs. The modern world has ruled out variations in celestial bodies at time marking and it changed the individual and collective perspective focus from nature to that created by humans, namely: clocks. The concrete experience of time became abstract, mechanical, homogeneous/fixed/strict, linear and irreversible (Moura, 2017).

According to Ross Hassig (2001), the concept of time and the calendar are created, manipulated and used for practical purposes; they are inscribed in a set of social and power relationships. Thus, *time* is inscribed in a whole set of production relationships linked to knowledge on time, which means a way of getting to know time; therefore, a way to produce it. Consequently, the *conceptual* and *activity cycles* are social productions applicable to traditional and modern times (Moura, 2017).

Moura (2017) stated that the time of any society has five features that emerge from the association between the conceptual and activity cycles, namely: *shape, quantitative and chronological aspects, qualitative content, quality* (or pace) and *deadlines*.

Traditional time is cyclical and reversible, or spiral, because it is moored on both the conceptual cycle and on memory signs. The second feature relates to time measurement units (setting dates) that take place through the production of memory signs and social activities in traditional time. The third one refers to time heterogeneity, when time is individualized by a certain memory sign - the "time of this or that". Individualized time duration depends on the validity of this "time of this or that". Thus, the memory sign sets the deadlines, which are the fifth feature. Finally, the quantitative aspect, and its associated qualitative content, set the speed time will flow at - time pace (Moura, 2017).

Mobilized traditional knowledge in the Amazonian region is essential to the organization of economic activities (agriculture, fishing and hunting) associated with the cycles of nature (Mendes, 2002; Garcia, 2010; Robert et al., 2012). The water cycle (drought season, floods, ebb tides and rainfall), among all environmental cycles, is the factor influencing Amazonian peoples' way of life, since it provides the foundations for the organization of year calendars (Benchimol, 1995; Rente Neto & Furtado, 2015).

Based on Galvão (1955) and Veríssimo (1970), the Amazonian annual cycle comprises the time of the great floods in the rainy season (the "winter") - from November/December to June/July - and the time of ebb tides (the "summer") - from August to November/December. Assumingly, winter and summer feature the lower sections and mouths of Amazonian rivers, which were standardized by several authors for the entire Amazonian basin, even for the whole Amazon region (Domingues, 2008; Rente Neto & Furtado, 2015; Borborema & Silva, 2022), mainly after Galvão (1955). More than standardized, this sense of two reference seasons, "Amazonian winter" and "summer" (written in the singular) will prevail in research dealing with water cycle's influence and/or with Amazonian peoples' calendar and time. In other words, it was turned into the hegemonic concept in this scientific research field.[1]

[1] The sense of "Amazonian winter" and "summer" is not limited to debates on traditional peoples and communities in the region, but also covers a common concept, as observed in Silva (2022), and in news portals (UFRA, 2022; Portal Amazônia, 2022), namely: the idea that the Amazonian winter and summer are correlated to meteorological/climatological data aimed at explaining the region's weather. Thus, it cannot be said that this concept turned out as a standard, based on Galvão's research.

However, Fisch, Marengo & Nobre (1998) pointed out another annual cycle for this region, according to which, winter corresponds to months from November to March, and summer would take place from May to late September. April and October would correspond to transition times between seasons. Even Galvão (1955), by citing Francisco Bernardino de Souza (1874-1875, p. 70), pointed out another "summer" duration, which is based on natives from a district of Porto de Moz municipality, lower Amazon region, is observed between September to January. Veríssimo (1970), in his turn, warns about a likely variation in the beginning and in the end of both the floods and the ebb tides, which depends on the longitudinal distance between the headwaters of the Amazon River and the middle and upper zones of its large tributaries.

Given the evidence provided by the aforementioned authors, and the two key propositions of the politics of time, it is possible advocating for the hypothesis that there are multiple times in the Amazonian region, and these times would be expressed by a whole diversity of flexible Amazonian "winters" and "summers" produced by different traditional peoples and communities. The evidence of these multiple times is a reason for recommending future studies on this topic (see Rente Neto & Furtado, 2015) and for the worrisome incorporation of the aforementioned hegemonic standard into public policies developed for this entire region (see Benchimol, 1995). Accordingly, the aims of the present article are to analyze traditional calendars developed by Amazonian traditional peoples and communities, and to compare them to the standardized "winter" and "summer" in the region, based on extrapolation made by Galvão (1955).

2. Methodology

2.1. Study site description

Secondary sources on the traditional calendar topic are limited to the Brazilian Amazon, whose area covers 5,015,067.749 km² (approximately 58.9% of the Brazilian territory) and encompasses Acre, Amapá, Amazonas, Mato Grosso, Pará, Rondônia, Roraima and Tocantins states, and part of Maranhão State. Its estimated population is 29.5 million – it means increase by 12% in comparison to 2012 (IBGE, 2022). According to Simonian, Silva & Baptista (2015), the region holds two transition areas, one with the *Cerrado* biome (in its Southern portion) and another with the *Caatinga* biome (to the East).

Five ecosystems prevail in the Amazonian region. They are diverse and encompass areas of dense forests, *cerrado*, floodplain forests, mangroves and natural grasslands (Guerra, 2015; Simonian; Silva & Baptista, 2015). These biomes are subjected to two yearly environmental variations in rainfall intensity and in river levels - the dry season (summer) and the flood season (winter) (Neves, 2006).

Just like biodiversity, Fraxe, Witkoski & Miguez (2009) argue that Amazonian cultures are diverse and represented by indigenous peoples, riverside communities, *caboclos* and rubber tappers. Such diversity results from a mix of social groups from different origins. The prevailing Amazonian socio-biodiversity reflects on the diversity of its territories and emerges from the interaction between human beings and the environment (Pereira, 2007).

2.2. Data collection technique

Bibliographic research was the methodology of choice to reach the study aims. According to Oliveira (2007b), the aim of this approach is to enable researchers to reach *secondary documents in the scientific domain* (books, articles, technical reports, critical essays, dictionaries, encyclopedias, among others) related to the assessed topic, without necessarily resorting to the empirical reality. Thus, the scientific literature discussing the traditional calendars of indigenous peoples, *quilombolas* and traditional communities in the Brazilian Amazon was searched.

This search was carried out in the following databases: Google Scholar, *Sistemas de Bibliotecas da UFPA, Sistema de Bibliotecas do Museu Paraense Emílio Goeldi, Portal Periódicos CAPES*, in 2017, and from February to March 2022. The selected keywords were "*tempo tradicional*"/"traditional time", "*calendário*"/"calendar", "*calendário tradicional*"/"traditional calendar", "*inverno amazônico*"/"Amazonian winter" and "*verão amazônico*"/"Amazonian summer", all of them were associated with "*sociedades tradicionais*"/"traditional societies", "*comunidades tradicionais*"/"traditional communities", "*populações amazônicas*"/"Amazonian populations", "*dinâmica social*"/"social dynamics", "*ribeirinhos*"/"riverside communities", "*pesca*"/"fishing" or with "*agricultura*"/"agriculture". Whenever there was no variation of the word "Amazon", in the keywords, it was added to the search as a third keyword.

This procedure led to 24 articles (see Table 1) about calendars in the Brazilian Amazon. Five of them (those belonging to Ashaninka people, which live on the banks of the Amônia River, Upper Juruá/Acre State; to Desana indigenous people, from Upper Negro River, São Gabriel da Cachoeira municipality/Amazonas State; to Baré people, from Upper Negro River/Amazonas State; to Pirahã people, which live on the banks of Maici River, Humaitá municipality/Amazonas State; and to Awá-Guajá indigenous people, which live in Northwestern Maranhão State) explained the five features of time. They allowed comparing the calendars based on features such as time shape, quantitative aspect, qualitative content, deadlines and quality. These five features also allowed comparing these cycles to the standardized annual cycle: "winter" and "summer", based on the study by Galvão (1955). This procedure is in compliance with that adopted by Moura (2017) to compare traditional calendars to themselves, and to official calendars.

The five aforementioned features of time are cross-sectional to two analysis levels applied to calendars. According to Evans-Pritchard (2007), calendars result from the association between the conceptual and activity cycles, which are the first and second analysis levels, respectively. Moura (2017) stated that the first cycle allows developing the very basis of the assessed traditional peoples and communities' calendars. Therefore, both analysis levels and the five features of time enable comparing the different concepts of calendar times, and this is what will be done next.

TABLE 1 – Scientific productions on traditional calendar in the Brazilian Amazon.

Sorting by ascending publication date	Bibliographic references	Selected works
01	Veríssimo (1970): Riverside communities - fishing	
02	Silveira (1979): Riverside communities	
03	Furtado (1987): Riverside communities - fishing	
04	Furtado (1993): Riverside communities - fishing	
05	Benchimol (1995): Amazonian populations	
06	Ribeiro (1995): Indigenous populations	**X**
07	Gonçalves (2001): Indigenous populations	**X**
08	Franco *et al*. (2002): Rubber tappers	
09	Mendes (2002): Traditional people	**X**
10	Fraxe; Pereira & Witkoski (2007): Riverside communities.	
11	Oliveira (2007a): Indigenous populations	
12	Pereira (2007): Riverside communities	
13	Garcia (2010): Indigenous populations	**X**
14	Martins (2010): fishing	
15	Almeida *et al*. (2011): fishing	
16	Belota (2012): Indigenous populations	
17	Noda *et al*. (2012): Indigenous populations and agriculture	
18	Robert *et al*. (2012): Indigenous populations - agriculture	
19	Rente Neto & Furtado (2015): Riverside communities - fishing	
20	Vogt *et al.* (2016): fishermen/farmers	
21	Ferreira (2017): Indigenous populations	**X**
22	Apolinário (2018): Indigenous populations	
23	Vasconcelos *et al*. (2018): Riverside communities, farmers	
24	Funatsu *et al*. (2019): fishing	

SOURCE: Elaborated by the authors.

3. 'Traditional Amazonian times'

3.1. Ecological time(s)

Ashaninka people live on the banks of Amônia River, Upper Juruá, Acre State, Brazil, and their ecological cycle is based on the flood (winter) and dry (summer) seasons. Winter (the rainy season, or *Kiyawõtsi*) is announced by the singing of '*uru*' (*katsinarite*) and *jia-do-baixo* birds, which are characteristic memory signs of this time of the year. The rain starts between November and December, when dark clouds prevail in the sky, intense lightning takes place, and the rivers and lakes take on a muddy and cloudy color. During this time, '*socó*' sings on starry nights (*Kamori* or Milky Way) to announce the heavy rains and floods over the winter. Fish start to spawn along with the heavy rains of January and the dry leaves fall to the ground and decompose when they get in contact with the muddy waters. '*Copaíba*' flowers blossom in February and it marks the peak of the heavy rains, which last until mid-April. The 'flood frogs' mate between March and April and, when they sing, they announce heavy rains and flooding. '*Mulateiro*' flowers bloom in the following months and they announce the time of the 'fat-monkeys' who feed on '*embaúba*' fruits. *A*çaí fruits ripe between late April and early May, and it marks the transition from the "time of rain" to the dry season (*Osarentsi*). The 'canoe frog' opens the summer, when stars *Patsikiri* and *Shintakiri* turn visible at night. The 'sleepy' bird and the *owiiro* hawk sing on summer nights, and the cold star – ãtari inpokiro – shows up in the sky, at night, to announce the arrival of the cold weather. Water in the rivers, which used to be murky and muddy, becomes crystal clear in this season, and the beaches emerge back. This is the time of abundant fishing. The hottest summer is featured by '*pau-d'arco*' flowers, which bloom in early August, when '*jarina*' fruits are ripe and will feed the piglets. This is the time when the '*nambus*' sing. The 'diving-birds' mate in September and October, and they look for places to build their nests on lake banks. '*Assa-peixe*' flowers dry up in October, when the end of the season approaches. *Tachi* and *ingá* flowering restarts the cycle. The *summer of the arrow*, or *the sun of the arrow* (*ooriyatatsiri txekopi*) begins in mid-December, at early winter, when the sun warms up and the wind is constant and strong, and reflects on *chicosa*'s tassel, which is the raw material used to make the arrows. This summer holds the same elements of this season: lack of rain, ebb tides and strong winds (Mendes, 2002).

Desana people live at Upper Negro River, in São Gabriel da Cachoeira municipality, and they believe that the "year" is split into "winter" (floods) and "summer" (dry seasons), which are marked by memory signs linked to constellations, rainfall, cold, heat and animals. However, there are ten subcategories of summer (summer of 'this or that') in the dry season, or in the transition between drought/flood times, or vice versa. Summers last eight to fifteen days interspersed by rain, they will be shorter than or equal to five days, since they are considered "short summers". The "Seven-stars" come up in May and they announce the beginning of heavy rains, when the rivers start to fill up. There are three successive 'short summers' throughout the transitional time between drought and flood. The first one, known as "*enxó-encorte emplumado* short summer", lasts three days. Then, the constellation known as "*enxó-enfeite emplumado* flood short

summer" opens the rainfall time, which is called by this same name, when the "lazy" air currents come up, in July. The "old larvae short summer" comes within the following two or three days, and it is followed by heavy rainfall. Soon after, the "nice larvae short summer" takes place for five days, and it is followed by October rains and by the "*abiu* short summer", which lasts five days in January. *Ingá* summer starts at the end of "*ingá* harvest and it last from 8 to 15 days. Between late January and early February, constellation "armadillo femur" comes up and the 'armadillo femur' rains fall. This time is followed by "*cucura* short summer", which lasts four days. The "*pupunha* summer" starts in mid-March or early April, and it lasts from one to two weeks, when the harvest of this palm tree ends and the rains of both "constellation shrimp" and "constellation beard of the jaguar's chin" fall. Subsequently, there are two or three days of sunshine interspersed with light rainfall. Finally, the "*umari* summer" begins, and it is marked by the end of this harvest, which is over when the rains of the "Seven Stars" fall (Ribeiro, 1995).

The Awá-Guajá people lives in Northwestern Maranhão State and it also has a conceptual "annual" cycle, which is organized based on "winter" and "summer". The rainy season starts between late December and early January, and it opens the winter (rain or *amyna*), which lasts until June. The cycle starts in the sky (*iwá*), where one finds a "hot water reservoir", which is the first celestial level. This reservoir is filled with water when the rainy season approaches and water overflows to Earth (*wy'*) as rain (*amyna*); this is when winter starts. The season is over when *karawara* (celestial beings who inhabit *iwá*) go hunting on Earth; therefore, they control the rainfall. Winter is the time of strong thunders when the "*tapãna*" screams. It is the time when plants bear fruit to feed the animals, a time of very fat animals (*ikirá hamãe*) or of fat rain (*Amyna ikirá*) and floods in marshes and rivers, when *ig-após* are formed. Strong winds are associated with rain at this time, and they make tree trunks' fall in the forest (*Ka'á*). The Winter/Summer (*Kwarahy*) transition takes place at early July, when *Maíra* is absent from the celestial levels, where she controls the tap of the "heavenly reservoir", because this is the time when the summer starts. Rain stops in this season, and it provides the right conditions for humans to go to heaven and to sing with *karawá*, when the celestial *Awá* descends to Earth to sing with humans until mid-December.

Winter and summer, together, balance the celestial waters, which fall on Earth, because they are "red" (*pinã*) and "hot" (*hakú*), and harmful to humans. The celestial waters cool down as they fall and reach Earth under suitable conditions, so they can be used by the *Awá* people. The rainy season starts in the river/Sky water: *iwá 'ya* (Garcia, 2010).

According to the Baré people, which live at Upper Negro River (AM), there are two "winters" and two "summers" in an annual cycle. When "small stars" disappear from the sky and are followed by "*repiquete*" with "fish water", between August and September, one sees the beginning of the "small summer" (*Kurasiara koairãtu),* which lasts until the "Big Snake Star" falls and rainfall brings the flood, from late October to early November, when the "small winter" *(Buya Wasu*) shows up. When "Cruzeiro do Sul" (*Kurusá*) reaches its highest point, the rains end and the river starts to dry up, which marks the end of the "small winter" and the beginning of the "big summer" (*Kurasiara wasu*), from mid-December to early January, at "fish arrival

time", when fish migrate to the river's headwaters. The fall of constellations "Lontra' and "Pleiades" (*Siusi*), and the beginning of the last flood, announce the end of the "big summer" and the beginning of the "big winter" (*Paraná wasu*), from late March to mid-April, when the "small summer" begins and the cycle starts all over again (Ferreira, 2017).

Pirahã people live on the banks of Maici River (Humaitá/AM). According to them, *peehoehiai* time (one 'year'/one water) is conceived as alternation between two seasons: *peeaiso* ("low water", summer) and *peeaabiso* ("full water", winter). The "low water" time begins when rainfall decreases, the river's ebb tide comes up and the beaches emerge, from mid-April to early June, and reaches its peak between September and October. The beginning of the rainy season sets the "full water time", which lasts until rainfall decreases, between March and April, and the *pee kapió'io* (another year/'another water') starts over (Gonçalves, 2001).

Accordingly, the same elements are exemplified below (Table 2) to compare the times of the herein analyzed peoples.

This first analysis level allowed discussing about the likely diversification of three, out of the five, time features, namely: quantitative aspect, qualitative content and timeframes. All "annual" conceptual cycles time-measurement units, namely: "winter" and "summer" (quantitative aspect), are organized from building heterogeneities individualized into "flood time" and "drought time" (qualitative content). Galvão (1955) observed the Amazonian "winter" and "summer" linked to floods and droughts in the region, but he did not foresee multiple "winters" and "summers" in the same conceptual cycle, as observed among the previously analyzed Baré, Desana and Ashaninka peoples.

In addition to several "winter" and "summer" categories, these multiple times also reflect the qualitative contents of time, which are given by different time references that are materialized into natural cycles that foreshadow the periodic return of nature's material phenomena. Although they are marked by "rain"/"floods" and "drought"/"low tides", "winter" and "summer" are built from different memory signs.

According to Baré people, for instance, the memory sign "drought" in association with the disappearance of "small stars" and "*repiquete*' with 'fish water' opens the "small summer". When constellation "Cruzeiro do Sul" reaches its highest point and "fish arrive", it is time for the "big summer". The memory sign "rain"/"floods", in its turn, opens the "small winter", which is associated with the fall of the "big snake". The "big winter" opens with the fall of constellations "Lontra" and "Pleiades". The Awá-Guajá people associate the memory sign "rain"/"floods" with the "time of fattening animals", of strong winds, of "*tapãna* thunders"; and with winter fruits' production. Summer associates "drought" with the "time to hunt". Desana people produce a "winter" and ten subcategories of "summer" by differentiating them from each other through memory signs "rain"/"floods" and "dry seasons," respectively, as well as with successive constellations, crops and animals. Ashaninka people distinguish winter from summer, and their successive phases, by associating "rain"/"floods" with the singing of the *uru* and *jia-do-baixo* birds, with lightning, muddy waters, with the singing of the *socó* on starry nights, as well as with fish spawning. The "dry season" is associated with the singing frogs, with stars *Patrikiri* and *Shintakiri*, with crystal-clear waters, with the sleepy and *owiiro* birds, with the

TABLE 2 –Time features of the analyzed traditional peoples and communities.

Months	Ashaninka people	Desana people	Awá-Guajá people	Baré people	Pirahã people
November	Winter starts between November and December.				
December		… rains from October to the “April summer” in January			The beginning of the rainy season sets the “time of high water”, which lasts until rainfall decreases between March and April, when another year (‘another water’) starts.
January	Fish spawn and leaves decompose when they get in contact with the water			The end of the rainy season closes the “little winter” and opens the “big summer”.	
February		“Armadillo femur” rains start.	Winter starts in late December/ early January and lasts until June.		
March	Heavy rains happen in February and/or April;	The “*pupunha* summer begins. Soon after, the “*umari* summer” begins, and it lasts until the rains of the following month come. The rise of the Seven Stars announces the heavy rains.		The last flood announces the end of the “big summer” and the beginning of the “big winter”.	
April					
May	The canoe toad opens the summer, when the abundance of fish begins.				
June					Rainfall decreases from mid-April to early June, and the “low water” period begins and reaches its peak between September and October.
July		The constellation “*enxó-enfeite emplumado* flood” opens winter, in July, when the “lazy” air currents come up.			
August	The hottest summer is marked by *pau-d’arco* flower blooming.		Summer begins, and it is the time when *Maíra* is absent from the celestial heights, until mid-December.	When the river dries up, the “little summer” begins, and it lasts until the rain brings the flood, time when the “little winter” begins.	
September	Dried *assa-peixe* flowers announce the end of the season.	The “nice larvae summer” happens and is followed by the October rains			
October					

LEGEND: * Horizontal lines were not included due to these events’ deadline flexibility, as observed in the described data.

"cold star" and with *pau d'arco* flowers' blooming. Other authors have recorded the non-homogeneity of time within the same social formation, based on time perceptions that change depending on ethnicity (Rutz, 1992; Hassig, 2001; Le Goff, 2003), including their construction by associating different memory signs (Moura, 2017).

Furthermore, "summers" and "winters", based on different memory signs, also differ in time. The "winter" takes place from September/October to March/April, according to the *Pirahã*; from late December/early January to June, based on the Awá-Guajá; from May to October, according to the Desana; and from November/December to late April/early May, according to the Ashaninka people. There is also the "big winter", from late March/mid-April to August/September; and the "small winter", from late October/early November to mid-December/early January, based on the Baré people. The "winter" standardized in the region ('Amazonian winter') (Galvão, 1955) opens between November/December and June/July, and starts along with that described by the Ashaninka and Awá-Guajá peoples, and with the "little winter" of the Baré people; and it ends along with that described by the Awá-Guajá. Its duration (6 to 8 months) meets that of the Pirahã and Ashaninka people.

Summer lasts from mid-April/early June to September/October, according to the Pirahã; from July to mid-December, for the Awá-Guajá; and from early May to late October, based on the Ashaninka - the "arrow summer" is also in December. The "big summer" and the "little summer" of the Baré people open from mid-December/early January to late March/early April, and from August/September to late October/early November, respectively. The ten categories of "summers" and "short summers" of the Desana people open between November and April, and last from 8 to 15 days (summers) and 5 days - at most – (Short summers). The timeframes standardized for the region's "summer" (Amazonian summer) range from August and November/December (Galvão, 1955), and it meets the beginning of Baré's "short summer" and the summer of the Awá-Guajá people. This season lasts from 4 to 5 month and overlaps with that of the Baré and Pirahã people. Therefore, none of the assessed cases has the same annual cycle as that assumed by Galvão (1995). According to Moura (2017), traditional communities in this region have different "years" and seasons.

All timeframes are flexible. Moura (2017) stated that the link between time and nature, based on memory signs, allows traditional communities, such as the aforementioned social groups, to adapt to the social and natural dynamics of the world. Embodying ecosystems' flexible and irregular time to produce the conceptual cycle are the qualities of traditional time (Moura, 2017).

3.2. Activity cycle and the traditional calendar

Ashaninka activity cycles are in compliance with winter and summer. Natives tend to take care of their crops during the few sunny days before the January rains. At this time, the dry leaves on the ground no longer make a sound when stepped on because they are in contact with the February waters. April is the time to hunt fat animals. The fat-monkey season is ideal to fish with *oaca*, which is more often found in late winter, when *açaí* fruits ripe and the dry season approaches. Summer arrival

(May) is announced by the canoe-frog, and it opens the time to work on the new crops. When water is low, in the following months, the Ashaninka fish with bows and arrows and dive, because this is a time of fish abundance. They prepare the fields they cleaned in May to plant corn seeds. August is the hottest month of the year, when *pau-d'arco* flowers bloom. It is a good time to burn new fields and to go camping on the beaches. Cassava is planted in September, in the new fields, and cotton, yam and potatoes, in October, when *tachi* and *ingá* plants blossom and open the transition between seasons (Mendes, 2002).

The conceptual cycle is also associated with activities by the Desana people. When the "Seven Stars" come up in May, they open the "winter" and the "time to fish *daguirus*". It is also the time for the undergrowth to fell, since it is burned in the "*enxó-enfeite emplumado* short summer" to be sown with corn seeds, in June. In August, new fields are cleared in "virgin" forest and undergrowth is burned in the "old larvae and nice larvae short summers" (September) when the intermittent rains of late winter begin. New fields are cleared in October for the "*abiu* summer"; *abiu* and *ingá* harvest starts in the following month and ends in their respective summers. The fields are burned in the *ingá* summer, cleared in October, when *cucura* and *pupunha* harvest begins, and it ends in their respective summers. *Pupunha summer* is the time to burn the fields, which are cleared in November, when *umari* harvest begins; and ends in *umari* summer, so the whole cycle restarts, between the end of the *ingá* and *pupunha* harvests. Fishing with *timbó* takes place between the end of the *ingá* and *pupunha* harvests. *Aracu* are fished in the '*piracema'* with gillnets after the rains that are brought by constellation "*Barba do queixo da onça*". *Pirás mirins* are captured with "*eminó*" traps during the floods of June (Ribeiro, 1995).

The Awá people lives in small villages during the rainy season, between late December/early January and June; they go into the forest in the morning and return in the evening. This is the time when *karawara* (non-human entities) go to Earth (*wy'*) to hunt and, in doing so, they control the rainfall frequency. Rainfall enables them to move around the forest, because of the formed *igapós*; trails become flooded and strong winds knock down the trees. On the other hand, when summer begins, Maíra leaves the celestial level and the rain stops. The season of the Sun (*Kwarahy*) takes place between July and December, and it opens the time of greater territorial dynamics and of less fat animals in the forest (*Ka'á*). Different nuclear groups live in their "*aripá*" (my village) to the detriment of winter rains; they meet in the central village to discuss the forest, as well as what and where to hunt, and the strategies to be applied. Life revolves around *Ka'á*, where indigenous people spend most of their time socializing and hunting (Garcia, 2010).

According to the Baré people, the year begins with the "small summer", when they fish hake in August's '*repiquete*', which lasts until November, so the "small winter" arrives. In September, they burn the fields they cut down months ago. The "big summer" is the time to make *cacuri* and to catch fish when they arrive. The flooded waters of "big winter" (June) mark the time of *piabinha*'s *piracema*, which are caught with the aid of *jequi* (Ferreira, 2017).

Pirahã people settle on the beaches when the dry season begins and the river waters begin to recede and abundance begins; they go out into their territory to fish (*piranha, tucunaré, traíra,*

cará, among others), to hunt (*paca, tapir, cutiuaia*, monkeys, among others) and to collect (*tucumã, ingá, copaíba*, honey, among others). Fishing is the main protein source in this season, when they prepare their crops (cassava, yam, banana, among others) and choose some forest areas to have their fields cleared at the end of the rainy season, in mid-March. The forest is cut down from mid-April to late July; and the burning and planting times take place in August. Some of the agricultural products are consumed in the summer and the rest of them are saved for the winter. At this time, they fish (catfish, dogfish, *jatuarana*, among others), hunt (*agouti, curassow, inhambu, peccary*, among others) and collect (chestnuts, roots and fruits) products that are less frequent, and account for lower yield, in the summer (Gonçalves, 2001).

Thus, the time qualitative contents of these social groups become more complex when the conceptual cycle is linked to the activity cycle, because "winters" and "summers" gather new and unique meanings for each one of them. "Winters" assumingly mean the time "*karawara* goes to Earth to hunt", "of fishing *piabinha* with *jequi*" and "of collecting chestnuts", and it refers to the "time of scarcity"/"time of hunger", as it was featured by Galvão (1955). Nevertheless, time qualitative contents differ from those described by this author, who limited winter to the time when "only the chestnut pickers work" (p. 01). As observed in the aforementioned information, hunting, fishing, collecting and agricultural activities also take place in winter, and it allows translating this time as "time of fishing *daguirus*" and "time of hunting fat animals", for example.

Summer may mean "time to fish in August's *repiquete*", "time to make *cacuri*", "time to fish at fish arrival", among others, and it refers to the "time of greater abundance", as Galvão (1955) calls it. Yet, it is also "time to hunt lean animals" and "time to prepare new crops". "Summer" means the time to wait and to get prepared for "winter". According to Galvão (1955), only the Amazonian "winter" is the "time for waiting".

Based on the results recorded for time quantitative aspect and qualitative content, the analyzed time concepts are heterogeneous given the different measurement units and contents of "times of this or that" created by the Amazonian social groups. Galvão (1955) also pointed out the heterogeneity of "winter" and "summer". However, he did not describe multiple time quantitative aspects and qualitative contents among social groups in this region, because he limited himself to a case study.

Time pace between seasons in an "annual" cycle is different among different social groups due to flexible deadlines, heterogeneous quantitative aspects and qualitative content. According to Galvão (1955), the "paces of life" in summer are more intense than in winter given the larger number of productive practices and the shorter time for their completion. According to the data analysis, only chestnuts are collected in the winter, which lasts from 6 to 8 months. Summer is the time to collect, hunt, fish and grow crops, from 4 to 5 months. Most of the herein analyzed literature shows that winters hinder the mobility of Amazonian social groups throughout their territory and it limits their productive activities and the amount of food available to them.

There are natural events, activities and timeframes marking different "winters" and "summers" among these peoples, in addition to time pace heterogeneity in a same social group, between seasons.

Galvão (1955) observed variations in timeframes between social groups, in a community in Porto de Moz/PA. However, there is timeframe variation in "winter" and "summer", as well as in time's quantitative aspect and qualitative content among the social groups analyzed in the current study, and it refers to different paces. Therefore, it is not possible to homogenize a given pace for "winter" and "summer" in the Amazon as scientific references based on Galvão's (1955) statements. These homogenized Amazonian times have been observed by several authors when it comes to their incorporation into public policies (Benchimol, 1995) and to the recommendation of future studies in this field (Rente Neto & Furtado, 2015).

If the association between the conceptual and the activity cycles defines a calendar (Evans-Pritchard, 2007), the diversity of these associations allows stating that the Amazon is multi-calendar. The calendar, based on the analysis applied to the conceptual and activity cycles, provided the conditions to qualify the flexible and heterogeneous time paces that, according to Moura (2017), are the constituents of traditional peoples and communities' timeframe.

3.3. The shape of the world's time

Most of the scientific literature shows traditional time as circular/cyclical. According to Eliade (2004), the cyclical and reversible traditional time helps humans to build "reality" by transforming the landscape and conquering the world. However, data about the Pirahã people pointed out that this may not be the case of some Amazonian social groups, since they mention the restart of the "annual" cycle after rainfall decreases in March/April; it is the *pee kapió'io* or "another year"/"another water." Assumingly, it would not be the restart of the same cycle, but of a new one ("year").

According to Ferreira (2017), the Baré people shows differences between the "summers" of the years, such as in 1912, 1926, 1950 and 1960, when summers were marked by "strong drought" - up to thirty days ("normal" droughts last 15 days, at most). There were also "more intense summers" and "less intense summers", besides "winters with more rain" and "less rain", which reflect on the activity cycle. The "less intense summers" make it difficult to "burn the fields" and to fish. According to the Pirahã, there are "summers" when the beaches dry more and when they dry less, and it reflects on the time length ('summer') spent on the beaches (Gonçalves, 2001). Desana people suggest variations in 'summer' duration calculations (8-15 days) and in "short summers" (5 days, at most), and it echoes on their activities; the shorter these "summers", the fewer opportunities there will be to burn the fields, for example (Ribeiro, 1995).

Thus, the aforementioned studies show 'interannual' variation between "winters" and/or "summers" due to "more" or "lesser rain" and to "more" or "lesser intense" rain, respectively. There are "normal years" and years accounting for "strong droughts", which are considered "abnormal". The cycle is open to other years, to "start all over again" in the "years" to come. Unlike the cyclical profile of the "Amazonian winter" and "summer" generalized after Galvão (1955), time is spiral and the succession of cycles goes around a linear axis. This same time shape was observed in the calendar of Bantu people (Kagame, 2015), of Aztecs (Hassig, 2001;

Le Goff, 2003) and artisanal fishermen living in Far Southern Brazil (Moura, 2012).

3.4. Multiple times based on gender cut

All selected articles showed differences between genders in the activity cycle, except for the Awá-Guajá people. The main crops (cassava and pepper) are mostly on the hands of women among the Desana people, for example, and the secondary crops (sweet potato, yam, corn, among other) are cultivated by men and women, together. Only men account for growing stimulants and drugs (*tobacco, caapi, coca*, among others) (Ribeiro, 1995). Pirahã men carry out agriculture and night *paca* hunting, but only women carry out daytime hunting. Calendars are also different due to different activities and to their respective paces (Gonçalves, 2001).

Gender differences can be observed in the activity cycles of Ashaninkas. Preparing the field and planting cassava are men's duties. Harvesting cassava is a joint activity because women always follow their husbands, sisters or sisters-in-law. Women are exclusively responsible for planting cotton, potato, yam and pepper, and they do the harvesting themselves. Cotton is used by women to produce thread and to make tunics (Mendes, 2002). There is no hunting division between sexes among the Awá-Guajá. Men and women perform the same tasks, such as handling bows and arrows, talking to hunting dogs or deciding the path to take to seek the animals they are hunting (Garcia, 2010).

Qualitative content is also different among peoples that present gender divisions because each activity performed in the "annual" cycle requires specific techniques, knowledge about the environment and about execution times. The calendar is an association between the conceptual and activity cycles; therefore, from the cross-sectional gender perspective, different calendars are recorded among Amazonian peoples, and it broadens the multi-calendar diversity in this region. These elements are not observed in the Amazonian "winter" and "summer" described by Galvão (1955).

4. Final considerations

Based on the bibliographic analysis, there is a multi-calendar Brazilian Amazon as there are different conceptual and activity cycles, as well as time features specific for each of the assessed peoples, including the cross-sectional gender perspective. Furthermore, the recorded timeframe allowed defining these peoples' time as traditional. Accordingly, standardizing "winter" and "summer" in the entire Amazonian region means erasing and impoverishing the multiple conceptual and activity cycles, and the traditional on-going concepts of time in this region; in other words, it means making the Brazilian Amazon invisible as multi-calendar region.

These conclusions raise a warning for future scientific studies on calendars, in this region. Some of the studies surveyed and presented in the methodology section did not meet the present analytical criteria, recorded traditional calendars with fixed/strict seasons and deadlines, and extended a modern concept of time to traditional Amazonian peoples and communities. Assumingly, these results (recording traditional calendars based on a fixed/strict concept of time) emerge from translation issues, when researchers extend their own (modern) concepts of time to traditional peoples and communities.

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