Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira [1]
Thiago Philipe de Camargo e Timo [2]
Juliana de Paula-Souza [3]
William Balée [4]

ABSTRACT

Theoretical concepts of Historical Ecology were used to assess the traditional knowledge at one coastal region of São Paulo State, Pedro de Toledo Nucleus, at Serra do Mar State Park. Free listing exercises accessing semantic domains considered relevant to traditional knowledge were applied to local settlers. Forty-two interviews were carried out with adults (between 18 and 75 y.o.) regarding information on cultivated plants and trees that were part of the interviewees' knowledge and data were analyzed through Smiths' S, an index of data frequency. Results show that "cultivated plants" and "trees" are high psychological reality domains for that community. Methodological resources of cognitive anthropology which apply to the understanding of historical ecology showed to be high value multidisciplinary tools of easy and broad applicability on ecological studies.

Keywords: Free Listings; Ethnobotany; Historical Ecology; Quantitative Ethnobotany; Vale do Ribeira.

[1] Doutorado em Ecologia Aplicada pela ESALQ, USP, Brasil. / Docente na Universidade Sagrado Coração, USC, Brasil. mvbsiqueira@gmail.com

[2] Doutorado em Ecologia Aplicada pela Escola Superior de Agricultura "Luiz de Queiroz", ESALQ/USP, Brasil. C&T Assessoria e Consultoria Ambiental. thiago.timo@gmail.com

[3] Doutorado em Ciências Biológicas (Botânica) pela Universidade de São Paulo, USP, Brasil. Universidade Federal de São João Del-Rei, UFSJ, Brasil. jupsouza@ufsj.edu.br

[4] Ph.D. em Anthropology pela Columbia University, COLUMBIA, Estados Unidos. Tulane University, TULANE, Estados Unidos. wbalee@gmail.com

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo;
Juliana de Paula-Souza; William Balée

Historical Ecology is a research field that arose from the observation that in different historical contexts, human populations may have played varying roles in transforming the nature and used species diversity. The central unit of analysis of this research field is the landscape that is the material result of the interaction between societies and environments (Balée 1999, 2006). The idea of landscape as the material result of human action over nature was first developed by the North American Carl Sauer. In his definition of cultural landscapes, Sauer (1925) established that these are formed from natural landscapes, by the action of a particular cultural group. Culture is the agent, the nature of the environment and the cultural landscape is the result. The term "Cultural Forests", coined by Balée (1989), appears as an application of this concept. These forest types have been studied and confirmed in several studies on the Amazon in recent years, contributing to the repositioning of human action on the diversity of species and landscapes of this region (Heckenberger et al. 2003; Erickson & Balée 2006; Schann et al. 2007; Erickson 2008; Heckenberger et al. 2008).

As a field of research, Historical Ecology works with the following postulates: (01) virtually all terrestrial environments were affected by human activities; (02) human nature is not programmed to necessarily decrease or increase species diversity and other environmental parameters; (03) societies defined by distinct socioeconomic, political and cultural variables will have different impacts on the landscape, causing some landscapes to be more disturbed than others, and (04) human interactions with the landscape, in a wide variety of historical and ecological contexts, can be studied as a total and integrated phenomenon (Balée 2006).

One of the ways to understand the perceptions and actions of cultural groups and their connections with the nature habitat is the exploration of their respective semantic domains (Romney & Moore 1998). A semantic domain is the group of nouns that make up the knowledge of a particular group of people about a certain element (Gunter & Scott 1994). For example, to set the semantic field of "trees" of a cultural group, you can generate a list of items that this group classifies as "trees". One way to prepare such lists is the use of free listings from semantic domains that represent the psychological reality of a specific group of people (Erickson & Balée 2006). Thus, to obtain data on the composition of the cultural domain of one group, some members of this group are asked to draw up a list of the items that match a certain word or phrase. The objective of the listing is often to obtain a group of terms to be used for additional data collection tasks, or subjected to the consensus analysis (Romney et al. 1986). Finding key informants, that is, community members who have greater mastery of knowledge on a particular subject is of paramount importance for reaching the objective. Therefore, the delimitation of a domain consists of the recognition of a set of items that are mentioned by many

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo
State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo;
Juliana de Paula-Souza; William Balée

individuals and also a large number of items that are mentioned by a few or just one person. Presumably, the set of items reflects the existence of a shared cultural norm for the group on the questioned topic (Borgatti 1996).

Departing from the hypothesis that the higher the economic/subsistence importance of an item to a given population, the higher the psychologic importance of this same item to this same population, this study was conducted in order to describe the lists and psychological positions of cultivated plants and native trees in the semantic domain of Pedro de Toledo Nucleus residents, one of the less studied traditional populations in São Paulo state.

The objectives of this study were (i) to promote the knowledge of the research area termed "Historical Ecology" and its applications to the study of landscapes and cultures located in the Atlantic Forest remnants of the São Paulo state coast; and (ii) to access the semantic domain of some of the populations living in this area on the local diversity of crops and tree species.

A HISTORICAL CONTEXT

The history of human occupation at the region where the study was conducted dates back to the mid Holocene, with convincing evidence that put the human presence in South America by 10,000 years before present (Roosevelt et al. 1996), recently extended to more than 20,000 years BP (Vialou et al. 2017). The *sambaquis* (shell middens) in Southeastern Brazil are dated up to 6,000 years BCE (Colonese et al. 2014) and in São Paulo state, the oldest dating back about 4,900 years (Scheel-Ybert et al. 2003). These conspicuous structures in the Atlantic coastal landscape were built by fishermen-hunters-gatherers (Scheel-Ybert 2000) whose production system lasted until the arrival of populations of the Itararé-Taquara traditions, at approximately 1,500 years ago (Iriarte & Behling 2007). The Itararé-Taquara traditions expanded to the coastal plains from plateau at the interior (Noelli 1999) and added to the livelihood of coastal new economic practices and more intense social relationships (Colonese et al. 2014).

The study region is located at the boundary between Vale do Ribeira (Ribeira River Valley) and Baixada Santista (Santista Lowlands), both occupied early by Iberian colonizers (Diegues 2007). Besides the Itararé-Taquara, the Europeans that landed on these vicinities in the 16th century (Martim Afonsos de Sousa's expedition in 1531) found *Tupi-Guaraní* communities (Fausto 2000; Noelli 2008). Before the arrival of the Europeans, the *Tupiniquim* and *Guarani* cultures already occupied this territory for at least 2,000 years (Fausto 2000; Noelli 2008). Unlike the mound-builders (*sambaquizeiros*), the *Tupi-Guarani* were sedentary, manned crops and carried with them the plants they used when they moved to

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo; Juliana de Paula-Souza; William Balée

a new settlement. Their shifting cultivation and management of forest species have shaped much of the tree vegetation of the Atlantic Forest, formerly occupied by less intensive farmers and a greater number of hunter-gatherers. Thus, when European settlers began to settle on the Brazilian coast, the forests that they found were probably mostly cultural forests (Balée 2008; Clement & Junqueira 2010).

Immediately after the arrival of colonizers the gold cycle in the region began and lasted until mid 1800's in the *Vale do Ribeira*. Other production cycles overlap the gold mining activity, including naval construction, whale hunt and food production, manly rice (from the 18th century to, at least, mid 1920's) (Nunes 2003). Furthermore, as early as 1532 sugar cane became the production target of European residents at the north coast of São Paulo state, increasing the demand for slave labor (Buarque de Holanda 1994), and the *Tupinambás* were readily assimilated by European invaders as manpower providers, in addition to the ones that were brought from Africa. After slavery abolition (1888), the coffee cycle was intensified in the hinterland of São Paulo state, boosted by the construction of railroads and, later, motorways, which contributed to the deterioration of Ribeira de Iguape River as a waterway, as well as the activities in the coastal town of *Iguape*, whose the harbor has been increasingly and intensively silted since the opening of Valo Grande Canal in 1860 (Nunes 2003; Diegues 2007). All these events contributed to turn the *Vale do Ribeira* into one of the poorest regions of the state.

Today the remaining indigenous population in the coastal Atlantic forest (as in the rest of the country) is only a fraction of the occupied at the time of discovery, and the traditional population in this region of São Paulo is generally known as *caiçaras*, which include mainly the descendants of Indians and Portuguese in many communities scattered along the coast. The *caiçaras* live on subsistence farming and a small income obtained from fishing and agricultural surpluses in small scale (Begossi 1995; Adams 2002), the cassava being the basic crop, although local plants are used for a wide variety of purposes (Begossi et al. 1993; Adams 2000).

MATERIAL AND METHODS

STUDY AREA

The study was conducted within the group of residents of *Bananal* neighborhood, located at the Pedro Toledo Nucleus of the Serra do Mar State Park (Figure 1), north rural zone of Peruíbe municipality in *Vale do Ribeira* region, São Paulo state (Figure 2). The study area is located in the *Serra do Mar*, with Cfa climate (Köppen 1931; Köppen & Geiger 1936; Alvares et al. 2013) - tropical humid with constant rainfall. The terrain is wavy to strongly wavy and the vegetation is Dense Rain Forest and Lower Montane Forest (IBGE 2012).

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo
State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo;
Juliana de Paula-Souza; William Balée

Figure 01. Location of Serra do Mar State Park; Pedro de Toledo Nucleus situated at the westernmost area (dark green).
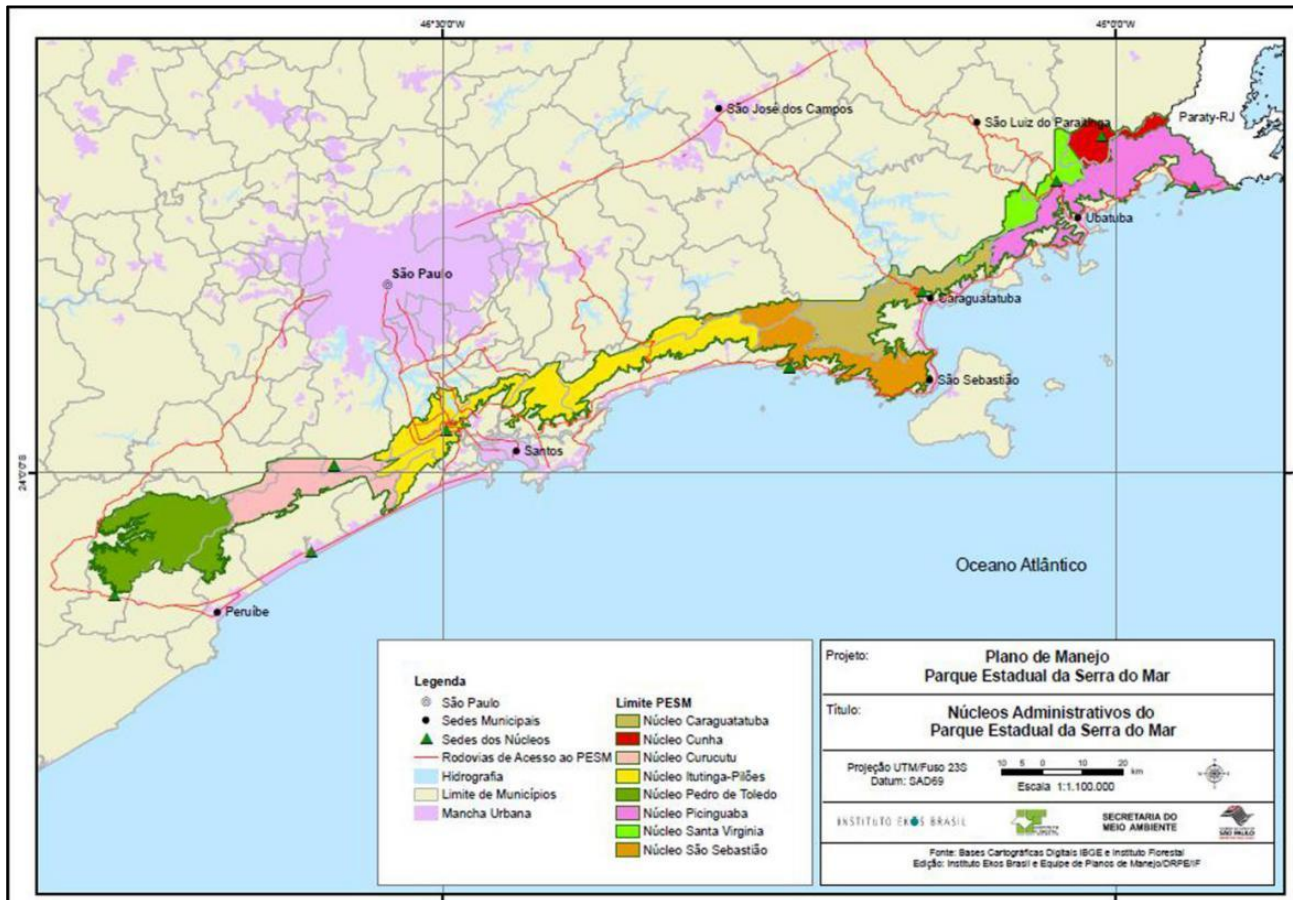

Source: Plano de Manejo PESM (Instituto Florestal 2009).

CHARACTERIZATION OF THE INTERVIEWED GROUP

Each economic cycle succession leaves forsaken migrants that flowed (voluntarily or not) to supply emergent production with necessary labor. Original natives, African slaves, Portuguese, Spanish, Azoreans, Santa Catarina's fisherman and ship-builders, Japanese, German, Irish and North-Americans, among others influenced the formation of rural and urban populations of this region, resulting in some cases in well-defined ethnic groups such as Quilombolas, Caiçaras and Caipiras or Capuavas (Diegues 2003). In this cultural melting pot, fostered by the highs and lows of economic cycles, the amalgam loses mass, but not information, and creates particular knowledges and cultures which intermingle in a landscape trimmed by the sea and the mountains. Nowadays, this region has important banana production and is intensely aimed by estate speculation. Its current population inputs come from São Paulo (state capital), Paraná, Minas Gerais, and other states of the Northeastern Region (Nunes 2003).

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo
State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo;
Juliana de Paula-Souza; William Balée

Figure 02. Pedro de Toledo Nucleus at the Western part of Serra do Mar State Park (in grey). Data collection took place within the limits of Peruíbe municipality (in red).
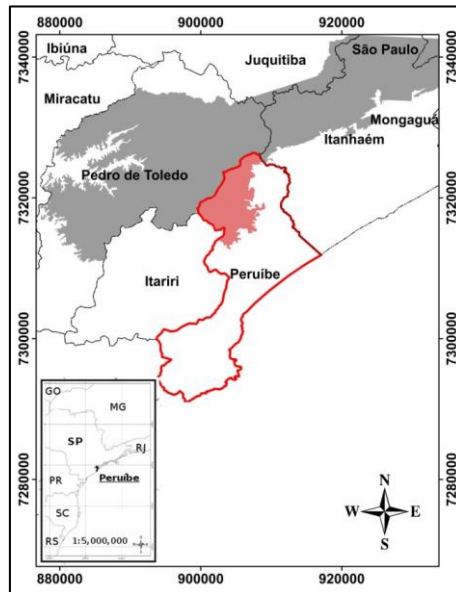
Source: The Authors.

FREE LISTING METHODOLOGY

The methodology used in this study was based on the free listing technique, which consists of registering items corresponding to a given description. According to Quinlan (2005) free listings can identify the items in an emic category, or cultural domain, and can amass focused data quickly and easily. A free list interview simply entails listing things in a domain in whatever order they come to mind. In the present study case the following questions were used: (01) "what do you plant here?" with a total of 42 valid informants and (02) "what trees do you have here?" with a total of 27 valid informants.

The term trees, here, was used for any species of trees that spontaneously occur at the region, introduced or not by humans. Cultivated plants were used to define plants that are grown homebound, either as garden, orchard or crop plants and demand nursery by any management practices, regardless the purpose, be it commercial or subsistence.

The interviews were conducted in Portuguese, in which the researchers were divided into four groups with an average of four members each, each member having a specific function, such as: writing down the answers, writing down the conditions and the context of the interview, making a "back up" of the answers to the questions and, finally, identifying possible ways of contamination of the collected data.

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo;
Juliana de Paula-Souza; William Balée

The members of the interviewed group were chosen, considering an ideal minimum of 20 informants. For the selection of valid informants the following aspects were considered: age (adults - over 18 y.o.), place of origin, place and time of residence in the region (older residents were considered and vacationers were excluded), and both sexes. In addition, we tried to avoid contamination or confusion of data from external influences in the interview, for example, the influence on the response by third parties. The rules of the Ethics Committee on Human Research of the University of São Paulo (USP) were strictly followed. For this, we designed a Term of Free and Informed Consent (*Termo de Consentimento Livre e Esclarecido*, TCLE) to ensure the anonymity of informants. During the presentation of the TCLE we were able to consult them about the possibility of image and voice recording use, as well as to inform them about the objectives of the work, and lack of financial benefits and direct risks of this research. This term also contained the data of the survey and the personal information of the head researcher at the institution, for any eventual contact of the informant.

After the application of the free listings, the data were processed in order to discard repetitions, free variations or synonyms so that they could be analyzed using the ANTHROPAC Software© 4.0 (Borgatti 1996). This program is interesting to gather and analyze data on cultural domains, both qualitative and quantitative, including free listings, triads, paired comparisons, and ratings.

Lists were generated based on the analysis of the Smith's S (1993), variable 0-1. Smith's S is a more interesting tool over simple frequency analysis from a methodological point of view, since it can establish the relationships among the items found in the analysis, simultaneously considering both the number of occurrences and the position in these listings. That is, these relationships better represent the semantic domain of the group, since they reflect, in general, their culture as a collective phenomenon.

SMITH´S S INDEX

$$S = \left(\left(\mathit{\Sigma}\left(L - R_j + 1\right)\right)/L\right)/N \tag{1}$$

Where *S* is the average position of an item across all lists in the sample, weighted by the ranges of the lists in which it actually occurs; *L* = the range of (number of items in) a list; *R* = position of an item in a list (first = 1); and *N* = number of lists in the sample (Smith & Borgatti 1997).

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo State, Brazil: A cognitive experience
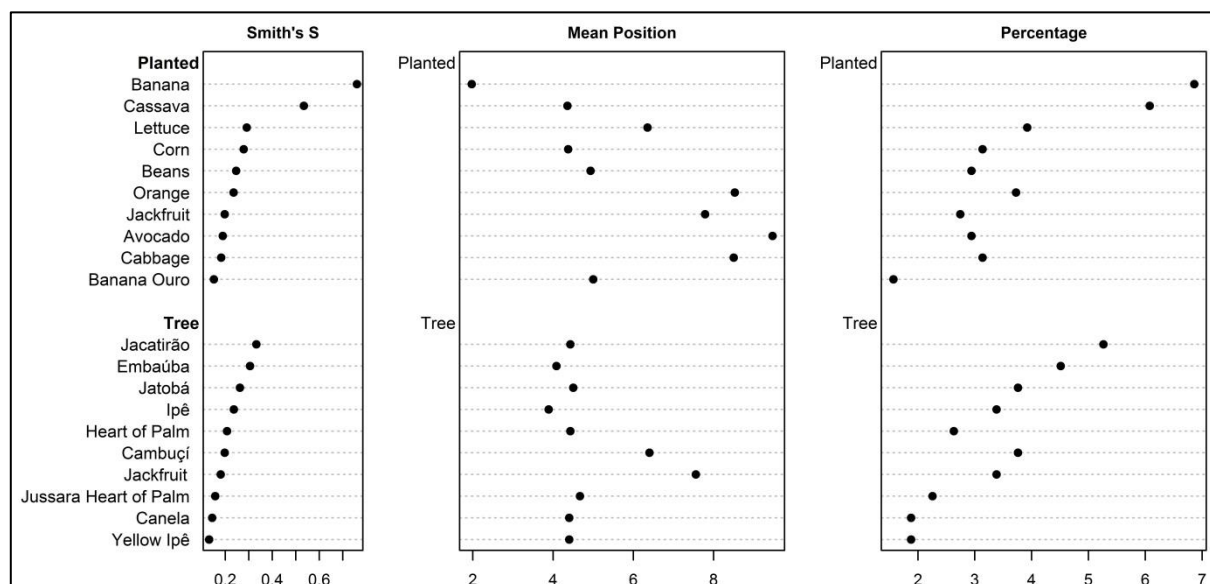
Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo; Juliana de Paula-Souza; William Balée

Anthropac 4.0 (Borgatti 1996) applies a slightly different formula for the estimation of *S* than the above presented, attributing zero value to items at last position in the lists. The same value is attributed to items that don't appear in a particular list at all (Smith & Borgatti 1997).

RESULTS

The cultivated plants listed by the informants with higher Smith S values are shown in Figure 3. The species with very low S-values (<0.04 for cultivated plants and <0.03 for tree species) were not presented here. The species were classified according to Smith's S (Balée & Badie 2009). It considers the number of times the item was cited and the position it occupied in the list mentioned by the informants not explaining further details, as in the case of the banana (and others), which can include all varieties of a species. The 10 items of cultivated plants with higher values for Smith's S were (Figure 3): banana (0.760), cassava (0.534), lettuce (0.291), corn (0,278), beans (0.246), orange (0.235), jackfruit (0.197), avocado (0.189), cabbage (0.182) and banana *ouro* (0.151). A total list of cultivated plants was composed of 122 items, the last value being taro with 0.001 of Smith's S.

Figure 03. Highest ten Smith's S and respective mean position and percentage of occurrences for planted and tree ethno species. Smith's S (left panel) summarizes the importance of an item in all lists by its frequency and position. Mean position (central panel) is the average order of appearance of a given item in all lists. Percentage (right panel) is the proportion of appearance of a given item in all lists.

Source: The Authors.

The 10 items of tree species that had higher values for Smith's S were (Figure 3): jacatirão (*Tibouchina* sp.) (0.332), embaúba (*Cecropia* sp.) (0.305), jatobá (*Hymenaea courbaril* L.) (0.262), ipê (0.236), heart of palm tree (0.207), cambuci (*Campomanesia phaea* (O.Berg) Landrum) (0.197), jackfruit (0.180),

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo
State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo;
Juliana de Paula-Souza; William Balée

jussara heart of palm tree (*Euterpe edulis* Mart.) (0.157) canela (0.144) and yellow ipê (0.131). This list was composed of 115 items, the latest of which being urucurana (*Croton urucurana* Baill.) with Smith's S equal to 0.002 (note: trees are identified by their local popular names as they were provided by the informants, unless there is unquestionable evidence that a scientific name can be assigned).

DISCUSSION

The highest Smith's S values listed above indicate that the cited term has high psychological importance for the group of informants, which is strongly related to the psychological reality of them. Lower values show low psychological importance; thus, the last items on the list have low psychological importance to informants. It is observed that ethnogenera (commonly represented by a word such as, "banana" with a Smith's S Index of 0.76) generally appear before ethnospecies (usually represented by compound words, such as "banana ouro", Smith's S Index = 0.151) in the listings. This is also in concordance with Zipf's Law (Balée & Badie 2009), which dictates that smaller words are usually cited before the larger ones. A second case, "jackfruit", has the same position (7th) and very close Smith's S Index both for "cultivated plants" (0.197) and "trees" (0,18) lists. This pattern may be due to the fact that, although this particular plant is exotic and has strict use as a feeding item and shadow source, it is a long living tree and its structure and habit resemble those of common "trees", causing this notable overlap.

The psychological reality refers to a set of concepts that are part of the daily reality of a population, that is, what matters and makes sense within the reality in which they live (Pylyshyn 1972). In turn, a semantic domain has many items that are recognized by a specific population as part of this domain. For example, within the semantic domain "trees", we sought to understand what interviewees recognize as native trees within everything growing there. Whereas culture is a collective phenomenon, it is part of a semantic set of words and phrases, some with more expressions, either by their presence, and/or its usefulness. It is important to highlight that the semantic domain is directly related to the psychological reality of the group of respondents. Thus, within the semantic domain "cultivated plants" through Smith's S analysis, banana (*Musa* sp.) showed high psychological importance, since in this analysis it has the value of 0.760, which is significantly high. This translates the relevance of this plant in the daily life of respondents. In contrast, the cultivated plant purple yam (*Dioscorea trifida* L.f.) had a value of 0.008, which represents the lesser importance of this plant to the local routine, and therefore, a low psychological reality.

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo; Juliana de Paula-Souza; William Balée

Similar results, however using different methodology, were found by Peroni and Hanazaki (2002). The authors recorded 251 varieties of 53 species grown in various regions dominated by *caiçara* culture. The psychological reality of the groups analyzed by these authors reflected similar data to the ones obtained in this study, mainly related to the banana and cassava as cultivated plants of high psychological relevance. However, rice, sweet potato and yams, appointed by Peroni and Hanazaki (2002) as highly relevant did not have the same importance in the results obtained in our study. One possible explanation for this may be associated with cultural differences. The population interviewed, although residing in coastal areas, is not made up of the native population, but by migrants from elsewhere, especially Minas Gerais and Northeastern states, as mentioned above.

Regarding the content of the semantic domain "trees", it was observed through the Smith's S analysis that the jacatirão tree (*Tibouchina* sp.) has higher psychological importance than the others, since it bears the highest value of Smith's S (0.332) among the species listed.

It is possible to notice that although banana and jacatirão presented the highest values for Smith's S in their respective lists, there is a difference between them. While banana scored 0.760 in the analysis, this value for jacatirão was 0.332, which indicates that the item banana is largely shared among informants within the semantic domain "cultivated plants", while jacatirão is a less shared item (compared to banana) by respondents, despite having the highest value of Smith's S among the items for the semantic domain "trees". This suggests that the banana is more present in the daily lives of all respondents, compared with jacatirão.

The psychological reality and the semantic domains associated with it are closely related to the reality and the daily lives of the informants. Thus, the results obtained from this group of interviewees can be useful in the characterization of the cultural communities in these neighborhoods, which may not share this pattern with other rural populations of the north coast of São Paulo.

One can illustrate this conclusion with the species of higher values for Smith's S in this study: the position of banana and cassava as cultivated plants of greater psychological significance among respondents is consistent with the economic reality of the Vale do Ribeira. In addition to its history of occupation by *caiçaras* whose agriculture is based on the cultivation of cassava, this region is known for its poor socioeconomic indicators rates and for being the major producer of banana of the Vale do Ribeira, being responsible for about 96% of the state production (Arruda et al. 1993). In this region, however, a significant portion of the areas are occupied by low-income family farms, predominantly directed to local or subsistence consumption, therefore not having appropriate infrastructure for

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo; Juliana de Paula-Souza; William Balée

mechanized agricultural practices, which is aggravated by the fact that many of these farms are located on slopes (Moraes 2007; Borges et al. 2009). Arruda et al. (1993) point out that in more than 90% of the farms surveyed by the authors, the banana figures as a monoculture, with the remaining land predominantly occupied by native forest reserves and pastures, which may explain the enormous importance of this species among the cultivated plants mentioned by the participants in our study.

Given the importance of this culture in our survey, we experimentally built a second listing for the item "banana", with the aim of structuring the semantic domain. However, the number of respondents was low, and the number of listed items (e.g. *banana ouro*, *banana prata*, *banana maçã*, etc.), so it was not possible to analyze the structure of the semantic domain "bananas" characterizing ethnospecies. This result, although it seems non-informative, once again illustrates the idea mentioned in the previous paragraph: the reality and the daily life of local residents may explain the inability to characterize the ethnospecies, as subsistence farming on a small scale without the demands of a competitive market would tend to turn irrelevant such classification in the routine of the local population.

The idea that the reality of the informants is closely related to the psychological reality and its associated semantic domains can also be illustrated by two examples from the tree list. The second higher value for Smith's S in this list belongs to embaúba, a popular designation to species of the genus *Cecropia* consisting of pioneer trees, and thus very common in clearings of preserved forested areas and sites under heavy anthropic influence, which is precisely the reality of the studied area.

The other example is the "palmito" (heart of palm) – *Euterpe edulis* is one of the most renowned species of the Atlantic Forest, whose exploitation is frequently associated to the forest's destruction. This species is generally known as palmito jussara; however, some other species were introduced and have been tentatively used as an alternative to *E. edulis*, namely *E. oleracea* Mart. (*açaí*) and *Bactris gasipaes* (Kunth) L.H.Bailey (*pupunha*). Our results show explicit references to the three types of palmitos, palmito jussara having the highest score, reflecting the reality of the region. Most informants mentioned only "palmito", preventing its precise classification and thus it was treated as a fourth entry in our analysis. However, the reference of "palmito" alone most probably refers to the native and most common species *E. edulis* (palmito jussara). If we merge both categories together we have an even more realistic picture of the area, palmito jussara jumping to the second highest value of S Smith, and therefore, the second most important plant of psychological reality/significance for the community, instead of the embaúba. Considering the social and ecological impact of the palmito on the

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo; Juliana de Paula-Souza; William Balée

Atlantic Forest and associated human communities, this information holds a great potential related to conservation actions and management of the local biodiversity.

The lists obtained by the method of free listings ("cultivated plants" and "trees") were different regarding the number of listed items and number of informants. The most numerous lists in items and informants were the ones of cultivated plants (121 items and 42 informants) followed by trees (115 items and 27 informants), the former being more coherent in the relation between the listed terms. This meaning relates words that denominate plants used in their day-to-day lives and commerce. In this list, the first two items had psychological meaning (Smith's S) that was more significant (banana S = 0.76, cassava, S = 0.53) than the other terms listed.

In view of the growing impoverishment of the traditional knowledge of communities around the globe together with the reduction of natural ecosystems, studies in ethnobotany are becoming more urgent. In this sense, this study has basic applications for the objective of unraveling the traditional knowledge of a population and its relationship with the environment (Atran et al. 2002; Atran & Medin 2008; Orr & Hallmark 2014) and it can provide valuable data to establish guidelines and decisions in public policy and in the elaboration of management plans in this region that is considered the most deprived of financial resources and infrastructure in São Paulo state.

This study points to a well-defined distinction among "cultivated plants" and "trees" as psychological reality domains for Pedro de Toledo's community where higher values of Smith's S Index show the position of banana and cassava as cultivated plants of greater psychological significance, consistent with the economic reality of Vale do Ribeira.

This descriptive study in the region of Pedro Toledo Nucleus provided basis for several future studies. It was observed that in order to complement this effort, it is necessary to conduct further interviews with a larger number of informants, which could facilitate additional analysis, such as the structure of the items within the lists already obtained. In order to complement the knowledge about the trees that occur in the study area, obtained through free listings, it would be important to conduct floristic and phytosociological surveys for data comparison and better understanding of the semantic domain. In addition, the Triads methodology (Borgatti 1996) can be applied with the top ten items of the lists in order to locate the key-informants, to identify the relationships between items as understood by local people, to establish the differences between the terms and to identify good informers for comparisons between systematic botanical surveys and traditional knowledge (Zuchiwschi et al. 2010). Another study of great importance would be to identify cultural forests, whose occurrence is suggested

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo; Juliana de Paula-Souza; William Balée

by the historical characteristics of the region. This study would have a huge social and ecological value, in order to rescue the history of the local community and to strengthen their identity grounded to the land from which they take their sustenance.

ACKNOWLEDGEMENTS

REFERENCES

Adams C 2000. As roças e o manejo da Mata Atlântica pelos caiçaras: uma revisão. *Interciência*, 25(3):143-150.

Adams C 2002. Identidade Caiçara: exclusão histórica e sócio-ambiental. In UP Albuquerque, *Atualidades em Etnobiologia e Etnoecologia*. Palestras Convidadas do IV Simpósio Brasileiro de Etnobiologia e Etnoecologia, Recife. p. 27-43.

Alvares CA, Stape JL, Sentelhas PC, de Moraes Gonçalves JL, Sparovek G 2013. Köppen's climate classification map for Brazil. *Meteorologische Zeitschrift*, 22(6):711-728.

Arruda ST, Perez, LH, Bessa Jr. AA 1993. A Bananicultura no Vale do Ribeira – Caracterização dos Sistemas de Produção. *Agricultura em São Paulo*, 40(1):1-17.

Atran S, Medin D 2008. *The Native Mind and the Cultural Construction of Nature*. MIT Press, Cambridge, 333 pp.

Atran S, Medin D, Ross R, Lynch E, Vapnarsky V, Ek' EU, Coley J, Timura C, Baran M 2002. Folk Ecology, Cultural Epidemiology, and the Spirit of the Commons. *Curr Anthropol*, 43(3):421-450.

Balée WL 1989. Resource Management in Amazonia: indigenous and folk strategies. In DA Posey, WL Balée, *The culture of Amazonian forests*. The New York Botanical Garden Press, New York. p. 1-21.

Balée WL 1999. *Footprints of the Forest: Ka'apor Ethnobotany - The Historical Ecology of Plant Utilization by an Amazonian People*. Columbia University Press, New York, 416 pp.

Balée WL 2006. The research program of historical ecology. *Annu Rev Anthropol*, 35(1): 75-98.

Balée WL 2008. Sobre a indigeneidade das paisagens. *Rev Arqueol*, 21(2): 9-23.

Balée WL, Badie MC 2009. The Meaning of "Tree" in Two Different Tupí-Guaraní Languages from Two Different Neotropical Forests. *Amazônica*, 1(1): 96-135.

Begossi A 1995. Fishing spots and sea tenure: incipient forms of local management in Atlantic Forest coastal communities. *Hum Ecol*, 23(3): 387-406.

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo; Juliana de Paula-Souza; William Balée

Begossi A, Leitão-Filho HF, Richerson P 1993. Plant uses in a Brazilian coastal fishing community (Búzios Island). *J Ethnobiol*, 13(2): 233-256.

Borgatti SP 1996. *ANTHROPAC 4.0 Methods Guide*. Analytic Technologies, Natick, MA.

Borges AL, Silva AL, Batista DC, Moreira FRB, Fliri JE, Oliveira JEM, Araújo JLP, Pinto JM, Castro JMC, Moura MSB, Azoubel PM, Cunha TJF, Silva SO, Cordeiro ZJM 2009. *Sistema de Produção da Bananeira Irrigada*. Embrapa Semiárido, Sistemas de Produção, 4. Available from: https://ainfo.cnptia.embrapa.br/digital/bitstream/item/110622/1/Sistema-de-Producao-da-Bananeira-Irrigada.pdf.

Buarque de Holanda S 1994. *Caminhos e Fronteiras*. Companhia das Letras, São Paulo, 301 pp.

Clement CR, Junqueira AB 2010. Between a pristine myth and an impoverished future. *Biotropica*, 42: 534-536.

Colonese AC, Collins M, Lucquin A, Eustace M, Hancock Y, Ponzoni RAR, Mora A, Smith C, DeBlasis P, Figuti L, Wesolowski V, Plens CR, Eggers S, Farias DSE, Gledhill A, Craig OE 2014. Long-Term Resilience of Late Holocene Coastal Subsistence System in Southeastern South America. *Plos One*, 9(8): e107034.

Diegues AC 2003. Aspectos sociais e culturais do uso dos recursos naturais da Mata Atlântica. In LL Simões, CF Lino, *Sustentável Mata Atlântica: a exploração de seus recursos florestais*. 2.ed. Editora SENAC, São Paulo, p.135-158.

Diegues AC 2007. *O Vale do Ribeira e litoral de São Paulo: meio-ambiente, história e população*. CENPEC, São Paulo. Available from: https://www.usp.br/nupaub/cenpec.pdf.

Erickson CL 2008. Amazonia: the historical ecology of a domesticated landscape. In H Silverman, W Isbell, *Handbook of South American Archaeology*. Springer, New York, p. 157-183.

Erickson CL, Balée WL 2006. The Historical Ecology of a Complex Landscape in Bolivia. In WL Balée, CL Erickson, *Time and Complexity in Historical Ecology*. Columbia University Press, New York, p. 186-233.

Fausto C 2000. *Os Índios antes do Brasil*. Jorge Zahar Editora, Rio de Janeiro, 94 pp.

Gunter CA, Scott DS 1994. Semantic Domains. In J van Leeuwen, *Handbook of Theoretical Computer Science v.2*. MIT Press, Cambridge, p. 633-674.

Heckenberger MJ, Kuikuro A, Kuikuro UT, Russell JC, Schmidt M, Fausto C, Franchetto B 2003. Amazonia 1492: pristine forest or cultural Parkland?. *Science*, 301(5640):1710-1714.

Heckenberger MJ, Russell JC, Fausto C, Toney JR, Schmidt M, Pereira E, Franchetto B, Kuikuro A 2008. Pre-Columbiam Urbanism, Anthropogenic Landscapes and the Future of the Amazon. *Science*, 321(5893):1214-1217.

IBGE 2012. *Manual técnico da vegetação brasileira*. 2.ed. Série Manuais Técnicos em Geociências, IBGE, v.1, 271 pp.

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo; Juliana de Paula-Souza; William Balée

Instituto Florestal 2009. Plano de Manejo PESM.

Iriarte J, Behling H 2007. The expansion of Araucaria forest in the southern Brazilian highlands during the last 4000 years and its implications for the development of the Taquara/Itararé Tradition. *Env Archaeol*, 12(2): 115-127.

Köppen W 1931. *Grundriss der Klimakunde*. W. de Gruyter, 388pp.

Köppen W, Geiger R 1936. *Handbuch der klimatologie*. Gebrüder Borntraeger, Berlin

Moraes GI 2007. Estratégias para a comercialização da banana no Vale do Ribeira. *Cad Econ*, 11(20):1-10.

Noelli FS 1999. A ocupação humana na Região Sul do Brasil: Arqueologia, debates e perspectivas 1872 – 2000. *Revista USP*, 44: 218-269.

Noelli FS 2008. The Tupi Expansion. In H Silverman, WH Isbell, *Handbook of South American Archaeology*. Springer Science+Business Media, New York. p. 659-670.

Nunes M 2003. *Do passado ao futuro dos moradores tradicionais da Estação Ecológica Juréia-Itatins/SP*. MSc. Thesis, Faculdade de Filosofia, Letras e Ciências Humanas, Universidade de São Paulo. 152pp.

Orr Y, Hallmark B 2014. Folk Food Webs and the Role of Praxis in Substantive Ecological Knowledge. *Hum Ecol*, 42: 339-346.

Peroni N, Hanazaki N 2002. Current and lost diversity of cultivated varieties, especially cassava, under swidden cultivation systems in the Brazilian Atlantic Forest. *Agric Ecosyst Environ*, 92(2-3): 171-183.

Pylyshyn ZW 1972. Competence and psychological reality. *Am Psychol*, 27(6): 546-552.

Quinlan M 2005. Considerations for Collecting Freelists in the Field: Examples from Ethobotany. *Field Methods*, 17: 1-16.

Romney AK, Moore CC 1998. Toward a Theory of Culture as Shared Cognitive Structures. *Ethos*, 26(3): 314-337

Romney AK, Weller SC, Batchelder WH 1986. Culture as Consensus: A Theory of Culture and Informant Accuracy. *Am Anthropol*, 88(2): 313-338.

Roosevelt AC, Costa ML, Machado CL, Michab M, Mercier N, Valladas H, Feathers J, Barnett W, Silveira MI, Henderson A 1996. Paleoindian cave dwellers in the Amazon: the peopling of the Americas. *Science*, 272: 373-384.

Sauer CO 1925. The Morphology of Landscape. *University of California Publications in Geography*, 22: 19-53.

Schann D, Pärssinen M, Ranzi A, Piccoli JC 2007. Geoglifos da Amazônia ocidental: evidência de complexidade social entre os povos da terra firme. *Revista de Arqueologia*, 20(20): 67-82.

Scheel-Ybert R 2000. Vegetation stability in the Southeastern Brazilian coastal area from 5500 to 1400 ^{14}C yr BP deduced from charcoal analysis. *Rev Palaeobot Pal*, 110(1-2): 111-138.

Traditional Knowledge of Trees and Cultivated Plants in a Coastal Municipallity in Sao Paulo State, Brazil: A cognitive experience

Marcos Vinicius Bohrer Monteiro Siqueira; Thiago Philipe de Camargo e Timo; Juliana de Paula-Souza; William Balée

Scheel-Ybert R, Eggers S, Wesolowski V, Petronilho C, Boyadjian C, DeBlasis P, Barbosa-Guimarães M, Gaspar MD 2003. Novas perspectivas na reconstituição do modo de vida dos sambaquieiros: uma abordagem multidisciplinar. *Revista de Arqueologia*, 16: 109-137.

Smith JJ, Borgatti SP 1997. Salience counts – and so does accuracy: Correcting and updating a measure for free-list-item salience. *J Ling Anthropol*, 7: 208-209.

Vialou D, Benabdelhadi M, Feathers J, Fontugne M and Vialou AV 2017. Peopling South America's centre: the late Pleistocene site of Santa Elina. *Antiquity*, 91(358): 865-884.

Zuchiwschi E, Fantini AC, Alves AC, Peroni N 2010 Limitações ao uso de espécies florestais nativas pode contribuir com a erosão do conhecimento ecológico tradicional e local de agricultores familiares. *Acta Bot Bras ,*24(1): 270-282.

Conhecimento Tradicional sobre Árvores e Plantas Cultivadas em um Município da Região Costeira no Estado de São Paulo, Brasil: uma experiência cognitiva

RESUMO

Os conceitos teóricos da Ecologia histórica foram utilizados para acessar o conhecimento tradicional em uma região litorânea do estado de São Paulo, Núcleo Pedro de Toledo, no Parque Estadual da Serra do Mar. Exercícios de listagem livre que acessam domínios semânticos considerados relevantes para o conhecimento tradicional foram aplicados aos moradores locais. Quarenta e duas entrevistas foram realizadas com adultos (entre 18 e 75 anos de idade) sobre as plantas cultivadas e árvores na região. Os conhecimentos e os dados dos entrevistados foram analisados através dos Smiths 'S, um índice de frequência de dados. Os resultados mostraram que as plantas cultivadas e árvores são domínios da realidade psicológica para essa comunidade. Recursos metodológicos da antropologia cognitiva que se aplicam para a compreensão da ecologia histórica mostraram-se de alto valor como ferramenta multidisciplinar e de fácil e ampla aplicabilidade em estudos ecológicos.

Palavras-Chave: Listagens Livres; Etnobotânica, Ecologia Histórica, Etnobotânica Quantitativa; Vale do Ribeira.