

40. Hunter-gatherers Behavioural Ecology & Evolutionary Modelling

16208 - THE SHARING OF PLANT KNOWLEDGE AND USE IN MBENDJELE BAYAKA HUNTER-GATHERERS OF THE NORTHERN REPUBLIC OF CONGO

Presentation type: Oral presentation

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The use of plants has historically been an essential function of culture. The intergenerational transmission of plant knowledge is especially important for health and nutrition in small-scale populations. The wide sharing of adaptive knowledge, which contributes to an individual's chance of survival and reproductive success, may explain the resilience of current day hunter-gatherers.

Some extant hunter-gatherers are characterized by their highly mobile and egalitarian social structure along with multi-local co-residence patterns where both sexes disperse and inter-camp relationships are maintained through kin and affinal relationships. Together these factors result in large interaction networks where the knowledge can be easily transmitted, however cultural and economic transitions associated with globalisation may weaken this extensive sharing of knowledge.

Here, we investigate the knowledge and use of 33 plant species in 219 Mbendjele BaYaka hunter-gatherers living in the northern rainforests of the Republic of Congo. We conducted fieldwork in four different camps, three of which were located in the forest, and one of which was located in a logging town. We recorded the participant's knowledge and use of each of the 33 plants. We investigated 1) the levels of plant knowledge and use in each camp, 2) how much plant knowledge and use were shared between different camps, 3) when individuals gathered in large, more sedentary camps whether they shared knowledge widely or formed clusters based on the regions they came from, 4) if the extent of knowledge share differed between non-medicinal and medicinal uses.

We hypothesize that in highly mobile groups where there are frequent visits between camps, the knowledge and use of plants will be higher and shared more widely. However, in more sedentary camps (often as a result of market integration) the level and sharing of plant knowledge will be more limited. Moreover, information on the frequency and the extent of the use of certain plant species, regardless of the camp membership, may inform us about the adaptive value of the knowledge. For instance, knowledge about the highly toxic or medicinal plants may be shared more widely because of its influence on an individual's fitness.

16201 - Hunting with dogs in a Maya-Mopan Village (Southern Belize): are the hunting movements of dogs and humans coordinated?

Presentation type: Oral presentation

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Archaeologists and behavioral ecologists have actively studied the human-dog mutualism in order to describe different aspects of this relationship (i.e. time of first domestication, symbolism, uses, communication, and subsistence economics). Ethnographic descriptions have provided valuable information in regard to how dogs are used to hunt in different societies. Anthropologists implementing behavioral ecology models have used such descriptions to define the costs and benefits of hunting with dogs. However, up to date there are no studies providing high-resolution records of the hunting movements of dogs and humans as it occurs in real time. During 12 months of field research in a Mopan-Maya community in Toledo District [Belize], we GPS-tracked the hunting movements of dogs and humans hunting for medium-size mammals considered pests of milpa maize agricultural fields. We set GPS units, collars (dogs) and wrists (humans), to record the geographical position of the members of the hunting party being tracked. Hunting parties varied in their composition, with an average of 4 humans and 6 dogs per trip. Some hunters did describe their dogs according to their hunting skills ('chabe' and 'alka' for leading and following subjects, respectively), revealing that they categorize their canine fellows based on behavioral performance or preferences. We analyze our hunting with dogs spatio-temporal evidence, magnitude (velocity) and distance, to test if the gradient fields of movement of dogs and humans are correlated. That is, if they are showing coordinated hunting movements. We also use the spatial, time and behavioral markers about the hunt (e.g. footprints, chases, communications) registered by LPC as these occurred, to find out their effect on the movement patterns. We discuss our preliminary results in the light of human behavioral evolution, attending in particular to the contribution of dogs for guarding milpa fields and implications for the development of one of the most diverse human interaction with a mammal ally.

16195 - Linking individual foraging and residential mobility: models and data from southeast Asian tropical rainforest foragers

Presentation type: Oral presentation

Author(s): Venkataraman, Vivek (Dartmouth College, Hanover, NH, USA); Kraft, Thomas; Endicott, Kirk (Dartmouth College, Hanover, USA)

Mobility is a central element of foragers' lives. Ethnographic accounts demonstrate that the nature of individual foraging heavily influences the movement patterns of residential groups, yet a lack of quantitative data has precluded a direct connection between the individual and group levels. In this contribution we first discuss the theoretical basis of such a connection, including optimal foraging and central place foraging. We also consider the empirical and ethnographic data: factors mediating the link are thought to include return rates, resource transport time and transportability, and the perceived and actual costs of foraging and camp movement. Next we present analyses of a historical dataset collected by Kirk and Karen Endicott in 1975-1976 on the foraging behavior of nomadic Batek foragers in Peninsular Malaysia (n = 93 days). During this time the Batek subsisted largely on foraged foods and moved camp 11 times. Data on the following variables were collected at the individual level on a daily basis: return rates, travel time, and time allocation. Social and demographic data were also collected on a daily basis. The quantitative richness of this dataset permits the construction of competing statistical models that predict camp movements. We conclude by discussing the broader implications of these models for human behavioral ecology.

16128 - Hunting Megafauna and the Emergence of Social Niche Specialization: What does it take to Kill a Mammoth?

Presentation type: Oral presentation

Author(s): Lupo, Karen (Southern Methodist University, Dallas, USA); Schmitt, David (Southern Methodist University, Dallas, USA)

Big-game acquisition is viewed as a pivotal event in the evolution of early hominins and is often associated with the appearance of the sexual division of labor, use of central places, paternal provisioning and food sharing. In addition, big-game hunting is attributed, at least in part, to the evolution of important anatomical and physiological features that are hallmarks of Homo, including modern brain and gut proportions, prolonged infant dependency, and extended life-spans. Among contemporary hunting populations, hunting and meat-eating not only play important dietary roles, but hunters who generously share meat may also receive social and political benefits. In contemporary contexts, hunters who target large-sized game and share meat often gain prestige and other social benefits such as supportive friendships, political allies, access to guarded information, and deference in decision-making. The idea that big-game are always preferentially targeted by hunters is often further justified on theoretical grounds. Larger-sized prey yield greater amounts of calorically dense protein and fat, but extremely large-sized game can also come at a very high cost. Because of the known relationship between body-size and animal abundances and densities across the landscape, larger-sized prey tend to have higher search costs than smaller-sized prey, and acquiring megafauna often involves very long and often unsuccessful pursuits and high processing and transport costs. In this paper we use quantitative cost/benefit analyses based on data derived from ethnographic and ethnohistoric sources to show the high costs of acquisition associated with extremely large-sized and potentially dangerous game. These data show that megafauna are often not the most efficient prey choice. Furthermore, although social benefits accrue to those who pursue expensive and large-sized prey, these benefits are often only enjoyed by specialists who comprise a small segment of the population. We argue that hunting specialists can be viewed as occupying a specific social role or niche within a given population (or social niche specialization). We discuss the evolutionary implications for the emergence of social niches as reflected by hunting large and dangerous prey.

16126 - Modelling social norms on food sharing in forager societies

Presentation type: Oral presentation

Author(s): *Caro, Jorge (GSADI, Dept. Sociology (UAB), Bellaterra, Spain / Spanien); Miguel Quesada, Francesc Josep (GSADI, Dept. Sociology (UAB), Bellaterra, Spain / Spanien)*

Food sharing has been traditionally considered a distinguishing feature of human societies.

Indeed, it is one of the most important forms of social cooperation and a constant feature of hunter-gatherer populations.

More specifically, meat sharing appears to be an element that produces social structure around its acquisition (which is mostly cooperative) and its distribution.

Researchers from different disciplines have explored different mechanisms and designed several theoretical models (basically kin selection, tolerated theft, costly signaling and reciprocal altruism) to explain the different patterns in food transfers among human groups.

This research aims to

- 1) identify patterns on food distribution.
- 2) develop an Agent Based Model to explore the role of social norms on those patterns of food distribution within hunter-gatherer groups.

These objectives will be achieved through a cross-cultural study of ethnographical and historical documentation of specific social norms related with food sharing in forager societies.

16118 - Sexual division of labour and differential cooperative tasks in hunter-gatherers: a study on social simulation

Presentation type: Oral presentation

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Social differences between men and women are still an object of debate among several areas of knowledge. These differences are the result of a long historical process that led to the establishment of the sexual division of labour, although we do not know the original circumstances and steps that initially originated it.

In order to throw light on this and evaluate the different theories that have been developed to explain this universal phenomena, our research will focus on the social organization of hunter-gatherer societies that will be artificially replicated.

This project aims at evaluating the role of the variables that could have been involved in the original design of the sexual division of labour, considering that both ethnographical and historical documentation about hunter-gatherer societies points to sexually differentiated cooperative strategies, so that the variables that get involved in cooperative activities for women are not necessarily relevant for men and vice versa.

Within this scenario, not only foraging (hunting, fishing and gathering) but also childcare and cooperative breeding will be considered as we already know they play an essential role in hunter-gatherer societies.

We also explore which are the mechanisms that institutionalize this specific organization of labour that finally lead to patriarchy as we know it.

Social Simulation, as a virtual laboratory, allows to generate an ad hoc scenario and agents in order to explore this question.

16096 - Sharing is not caring: The evolution of demand sharing through an agent-based model of tolerated theft

Presentation type: Oral presentation

Author(s): Strods, Janis (*Department of Anthropology, UCL, London, Un. Kingdom / Ver Königr.*)

Immediate return hunter-gatherer societies often exhibit demand sharing behaviours, where food is distributed within a camp through sharing initiated by the recipients, not the initial holder of the food. This system of distribution creates the 'problem of altruism', as free-riding individuals who do not spend their energy on hunting still receive food from the successful hunters. Here we propose a solution to the problem of altruism through an agent-based model of 'tolerated theft'. The tolerated theft hypothesis suggests that protecting valuable resources such as hunter meat becomes gradually less advantageous for their holder due to the principle of diminishing returns from food, a circumstance that eventually leads to surrendering the resources to other individuals who end up partaking in their consumption. We implemented a model of tolerated theft through a simulated 'optional bidding system' whereby individuals may choose to either share their resources (and tolerate theft) or participate in an open bid of effort to acquire the food.

Our results show that choosing unconditional sharing and tolerating theft of food resources may emerge as a dominant strategy, where the alternative is participating in the scramble for food.

We conclude that tolerated theft is a viable model for the evolution of demand sharing and provides a possible solution to the problem of altruism in cases, where resources in question provide diminishing returns to their initial owner.

16055 - Gatherer-hunters; Hadza Men's self-provisioning on walkabout

Presentation type: Oral presentation

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Data describing the foraging and food sharing of hunter-gatherers have provided the backdrop to several different evolutionary hypotheses about human life history and behavioral ecology. Men's foraging has often been characterized as primarily targeting animals, with high variance and high rates of failure. To the best of our knowledge, however, there are as yet no quantitative studies reporting the amounts of food or types of food that men target and eat while foraging, before returning to their households either empty-handed or with foods. We aim to document an under-reported part of forager's diets—men's eating while out of camp foraging. Here, we analyze focal follows of Hadza men while foraging. Our focal dataset consists of 147 person/day follows (890.5 hours total) collected over a period of 12 years (from 2001-2013, including 12 camps). We find that men consumed a substantial amount of food while out of camp foraging (mean of 2,206 kilocalories per foray). Men did more than just "snack" while out of camp foraging, they consumed approximately 83% of what is estimated to be Hadza men's mean daily Total Energy Expenditure (TEE). The vast majority of these kilocalories eaten out of camp came from honey (82%). Older men tended to acquire more kilocalories, but they did not eat more before returning to camp, suggesting they provisioned others more than younger men. These data are relevant to evolutionary theories concerning the role of male provisioning. Men's high rate of self-provisioning while out of camp means that they are less likely to place demands upon others in camp for shares of food, thus indirectly facilitating the provisioning of others. The well-documented, widespread food sharing in camp is less costly to men when they have already fed themselves while foraging out of camp.

16018 - Mbendjele food sharing and the transition to delayed return subsistence

Presentation type: Oral presentation

Author(s): *Thompson, James (UCL, London, Un. Kingdom / Ver Königr.)*

Like other cooperative behaviours, food sharing, a common practice in hunter gatherer societies, has attracted a great deal of attention from evolutionary anthropologists. Whilst the initial costs of sharing are apparent, the fitness benefits necessary for the behaviour to have evolved are less obvious. Both kin and sexual selection models have been proposed, arguing that benefits of sharing may be indirect. However, the current most popular theory, risk reduction reciprocity, posits a direct in-kind benefit, with individuals giving away food when they have a surplus and in turn receiving food during a shortfall. In an immediate return society where there is little or no food storage this is an important means of buffering the daily variability in gathered resources.

The Mbendjele of Congo have traditionally practiced an immediate return form of subsistence foraging in the forest for bush meat, wild yams, nuts and fruits. However, recent decades have seen large changes to the lifestyle of these forager. Greater participation in the bush meat trade, access to cultivated produce, opportunities for wage labour and sedentarisation have all contributed to a transition towards a delayed return system. Using sharing data of a number of groups of Mbendjele with varying levels of market integration and sedentarisation I examine the effect this has had on the sharing networks.

Results suggest that, as we would predict from the risk reduction reciprocity model, levels of food sharing are lower than previously reported for the Mbendjele. Transfers between relatives remain a frequent occurrence suggesting that kin provisioning may be of importance in these groups. Whilst both money and cultivated produce can be used as a fall back when foraged resources are in low supply it appears that the latter has a larger effect on sharing networks greatly reducing the levels of reciprocity.

16005 - Sex, Social Capital and Inheritance amongst the Mbendjele BaYaka

Presentation type: Oral presentation

Author(s): Chaudhary, Nikhil (University College London, London, Un. Kingdom / Ver Königr.)

Human behavioural ecologists have conducted a large body of research investigating wealth, inequality and inheritance systems across cultures from an evolutionary standpoint. However, given the relative absence of material wealth accumulation amongst hunter-gatherers, the study of wealth and inheritance remains largely unexplored in this subsistence mode. Here we examine a form of wealth relevant to hunter-gatherers, specifically social capital – wealth in people. Using experimental and observational data collected from the Mbendjele BaYaka Pygmies from Congo, we examine 1) whether there are inequalities in social capital amongst this group; 2) whether social capital is likely to have advantageous consequences for evolutionary fitness; 3) whether social capital is heritable. Our economic games indicate that there are inequalities in social resources, in particular amongst men where a few individuals are extremely prestigious and receive substantially more gifts than other members of the camp. Social capital is also correlated with the number of observed food sharing partners an individual has, and increases the chance of men marrying polygynously; suggesting it is likely to increase biological fitness. Finally, we find that social capital is highly heritable and there is a strong association between parent and offspring popularity in gift games. These results offer an extra dimension to our understanding of how individual variation in evolutionary fitness emerges in hunter-gatherer societies that do not accumulate material resources.

15999 - Cooperation in Hunter-Gatherers: The Role of Experimental Games in Understanding Hunter-Gatherer Prosociality

Presentation type: Oral presentation

Author(s): *Smith, Daniel (University College London, London, Un. Kingdom / Ver Königr.)*

The use of quantitative experimental games to elicit norms of cooperation in hunter-gatherers and other small-scale societies has garnered much attention in recent years, yet the assumptions on which these games rely have rarely been formally tested. This topic is of particular importance, as examining prosocial behaviour and cooperative networks in hunter-gatherers, and exploring from a behavioural ecological perspective the factors which influence levels of prosociality, insights may be revealed into the evolution of the widespread cooperation found in our species, when compared with chimpanzees, other primates, and much of the animal world. Here, I re-analyse existing datasets of these games, as well as present my own data working with the Agta, a group of Philippine hunter-gatherers, to explore what conclusions can be drawn from this experimental paradigm, as well as point towards potential future directions. From a literature search and re-analysis of existing data I find that the application of traditional economic games in small-scale societies may be of questionable theoretical value, due to methodological issues and poor internal and external reliability which hinder clear interpretation of the results. Despite this, experimental methods for measuring cooperation may still be of utility if the games are designed to be more intuitive and relatable to members of small-scale societies. Using a multi-level model to control for hierarchical data structure (i.e., individuals nested within groups), game behaviour can be shown to be predicted by theoretically-relevant social, ecological, and demographic variables. Also noticeable is the large amount of variation found between camps of the same social group, indicating great inter-camp variation in game behaviour. In summary, although classic economic games may be difficult to interpret, different experimental methodologies aimed to be more ecologically-relevant have been shown to be a more promising alternative.

15917 - Healthy hunters or unhealthy farmers? The behavioural ecology of health and transition in an extant foraging group

Presentation type: Oral presentation

Author(s): Page, Abigail (University College London, London, Un. Kingdom / Ver Königr.)

Human behavioural ecology examines the variance in behaviour as result of environmental traits and constraints. The environmental disease burden is one such fundamental constraint which varies significantly, particularly theoretically between the atypical direct-return hunter-gatherer environment (small group sizes, mobility, lack of permanent residence) and farming populations (sedentary, permanent residence, higher population density). Major evolutionary theories, particularly in Darwinian Medicine, have arisen from the concept of the 'original' disease milieu of hunter-gatherers (chronic but low-level parasitic diseases) compared to the more 'modern' diseases (acute infectious diseases) prevalent after the Neolithic revolution. However, due to a multitude of practical limitations of data collection actually testing these theories in extant foragers has been overlooked. Such work is critical as modern day foragers come under significant societal pressure to conform to sedentary ideals and alter key aspects of their lifestyle causing drastically different health consequences. By creating quantifiable risk indices for the transition between foraging and farming lifestyles, based not only on the disease load but the specific nature of this burden (nutritional, parasitic or infectious) we can develop context specific pathways to help improve the health of foragers today while understanding humanity's evolutionary past.

To examine these themes I collected data on the infectious and parasitic disease load and nutritional metrics from the Agta from Palanan. The Agta are a Philippine population of 1000 foragers who reside in North-Eastern Luzon. This is not a homogenous population, however. In particular, the Agta of Palanan reside in a range of habitats, including jungles, river basins and coastal areas. Furthermore, they vary in the degree of settlement and distance to non-Agta farmers. Therefore, the Agta present a perfect testing ground for the effects of acculturation on health.

My research asks how ecology and behaviour interact to impact both disease type and the degree of disease burden. Specifically I examine the effects of sedentarisation and close contact with farming and further explore what this reflects about not only human evolutionary past but the Agta's immediate future? To answer these questions I collected data from 420 Agta over three months (July – September 2014). Data was collected on haemoglobin levels, white blood cell composition, faecal analysis, short-term medical histories and anthropometric data. With this battery of data, analysed in multi-level models, it is possible to examine exactly the condition of the Agta in each location. Such data can go far to inform our understanding about the evolution of humans and the current processes impact modern day foragers and their survival.

15913 - Hunter-gatherer community composition; who lives with whom, and why?

Presentation type: Oral presentation

Author(s): Dyble, Mark (UCL Anthropology, London, Un. Kingdom / Ver Königr.)

The social organization of modern hunter-gatherers has several distinctive features including low within-camp relatedness and fluid and expansive meta-groups. I present data on co-residence patterns among Agta hunter-gatherers (Philippines) and compare them to the results of an agent based model which suggests that even if all individuals in a community seek to live with as many kin as possible, within-camp relatedness is constrained if both men and women are able to influence camp composition (multi-locality). I then present data on the frequency of between-person interactions and food sharing in Agta communities, exploring the extent to which individuals engage in cooperative or social activities with unrelated individuals. I explore the implications of this work for hunter-gatherer behavioral ecology and models of human social evolution.

15743 - Determinants of reproductive success in Batek hunter-gatherers in Peninsular Malaysia

Presentation type: Oral presentation

Author(s): Kraft, Thomas (Dartmouth College, Hanover, USA); Venkataraman, Vivek (Dartmouth College, Hanover, USA); Tacey, Ivan (Université Lumière Lyon 2, Lyon, France / Frankreich); Kawai, Aya (Chiba University, Chiba, Japan); Endicott, Kirk (Dartmouth College, Hanover, USA)

Reproductive success is the fundamental currency of evolution and reflects the contribution of social, behavioral, physiological, and ecological factors. In humans, a correlation between reproductive success and hunting ability has been demonstrated in several hunting and gathering populations, but alternative predictors of reproductive success such as social properties or non-hunting foraging success have not been examined. In addition, the long lifespan of humans makes it difficult to measure lifetime reproductive success and previous studies have focused on the determinants of age-corrected reproductive success. In this study we used a historical economic dataset from the 1970's in combination with long-term genealogical data to examine the determinants of lifetime reproductive success in Batek hunter-gatherers in Peninsular Malaysia. We examined the alternative hypotheses that hunting success, gathering success, and/or social attributes derived from cooperative foraging networks predict reproductive success. We present an information-theoretic analysis to test these alternative hypotheses and discuss the implications of investigating lifetime reproductive success rather than age-corrected reproductive success. Our results demonstrate the potential for using quantitative attributes from social network analysis to address outstanding questions in human behavioral ecology and attest to the critical advantages of collecting longitudinal data in hunter-gatherer studies.