Literatur

Aktuell

Lafourcade 2011

Mathieu Lafourcade et al., *Nutritional omega-3 deficiency abolishes endocannabinoid-mediated neuronal functions.* NatNeur (2011) preprint, 1–6. <http://dx.doi.org/10.1038/nn.2736>.
NatNeur2011-preprint-Supplement.pdf
Mathieu Lafourcade, Thomas Larrieu, Susana Mato, Anais Duffaud, Marja Sepers, Isabelle Matias, Veronique De Smedt-Peyrusse, Virginie F Labrousse, Lionel Bretillon, Carlos Matute, Rafael Rodríguez-Puertas, Sophie Layé & Olivier J Manzoni
The corollaries of the obesity epidemic that plagues developed societies are malnutrition and resulting biochemical imbalances. Low levels of essential n-3 polyunsaturated fatty acids (n-3 PUFAs) have been linked to neuropsychiatric diseases, but the underlying synaptic alterations are mostly unknown. We found that lifelong n-3 PUFAs dietary insufficiency specifically ablates long-term synaptic depression mediated by endocannabinoids in the prelimbic prefrontal cortex and accumbens. In n-3-deficient mice, presynaptic cannabinoid CB1 receptors (CB1Rs) normally responding to endocannabinoids were uncoupled from their effector Gi/o proteins. Finally, the dietary-induced reduction of CB1R functions in mood-controlling structures was associated with impaired emotional behavior. These findings identify a plausible synaptic substrate for the behavioral alterations caused by the n-3 PUFAs deficiency that is often observed in western diets.

Moro 2011

Andrea Moro, *A closer look at the turtle's eyes.* PNAS **108** (2011), 2177–2178.
I do rather belong among those who think that our species will never be able to reach the totality of what is known as language-syntax, in particular-or, even more radically, that we will actually have to give up the idea of language as a unitary neurobiological object and rather think of it as partially created by our cognitive system as a whole; much like the Kanizsa triangle, its unitary nature could well be made up by our brain, but it is not really there: it is a cognitive mirage.
Like Achilles with the turtle, whenever we get closer to language structure our object of inquiry seems to get a little farther away. Nevertheless, it is because of studies like the one presented by Pallier et al. and all those they cite in their article that even if we may not ultimately put our hands on our turtle, at least we will get so close as to get a direct look into its eyes.

Pallier 2011

Christophe Pallier, Anne-Dominique Devauchelle & Stanislas Dehaene, *Cortical representation of the constituent structure of sentences.* PNAS **108** (2011), 2522–2527.
pnas108-02522-Supplement.pdf
Linguistic analyses suggest that sentences are not mere strings of words but possess a hierarchical structure with constituents nested inside each other. We used functional magnetic resonance imaging (fMRI) to search for the cerebral mechanisms of this theoretical construct. We hypothesized that the neural assembly that encodes a constituent grows with its size, which can be approximately indexed by the number of words it encompasses.

We therefore searched for brain regions where activation increased parametrically with the size of linguistic constituents, in response to a visual stream always comprising 12 written words or pseudowords. The results isolated a network of left-hemispheric regions that could be dissociated into two major subsets. Inferior frontal and posterior temporal regions showed constituent size effects regardless of whether actual content words were present or were replaced by pseudowords (jabberwocky stimuli). This observation suggests that these areas operate autonomously of other language areas and can extract abstract syntactic frames based on function words and morphological information alone. On the other hand, regions in the temporal pole, anterior superior temporal sulcus and temporo-parietal junction showed constituent size effect only in the presence of lexico-semantic information, suggesting that they may encode semantic constituents. In several inferior frontal and superior temporal regions, activation was delayed in response to the largest constituent structures, suggesting that nested linguistic structures take increasingly longer time to be computed and that these delays can be measured with fMRI.

Tan 2011

Li Hai Tan, Lin Chen, Virginia Yip, Alice H. D. Chan, Jing Yang, Jia-Hong Gao & Wai Ting Siok, *Activity levels in the left hemisphere caudate–fusiform circuit predict how well a second language will be learned.* PNAS **108** (2011), 2540–2544.

pnas108-02540-Supplement.pdf

How second language (L2) learning is achieved in the human brain remains one of the fundamental questions of neuroscience and linguistics. Previous neuroimaging studies with bilinguals have consistently shown overlapping cortical organization of the native language (L1) and L2, leading to a prediction that a common neurobiological marker may be responsible for the development of the two languages. Here, by using functional MRI, we show that later skills to read in L2 are predicted by the activity level of the fusiform-caudate circuit in the left hemisphere, which nonetheless is not predictive of the ability to read in the native language. We scanned 10-y-old children while they performed a lexical decision task on L2 (and L1) stimuli. The subjects' written language (reading) skills were behaviorally assessed twice, the first time just before we performed the fMRI scan (time 1 reading) and the second time 1 y later (time 2 reading). A whole-brain based analysis revealed that activity levels in left caudate and left fusiform gyrus correlated with L2 literacy skills at time 1. After controlling for the effects of time 1 reading and nonverbal IQ, or the effect of in-scanner lexical performance, the development in L2 literacy skills (time 2 reading) was also predicted by activity in left caudate and fusiform regions that are thought to mediate language control functions and resolve competition arising from L1 during L2 learning. Our findings suggest that the activity level of left caudate and fusiform regions serves as an important neurobiological marker for predicting accomplishment in reading skills in a new language.

basal ganglia | biomarker | extrastriate cortex | visual system

Tucker-Drob 2011

Elliot M. Tucker-Drob, Mijke Rhemtulla, K. Paige Harden, Eric Turkheimer & David Fask, *Emergence of a Gene × Socioeconomic Status Interaction on Infant Mental Ability Between 10 Months and 2 Years.* Psychological Science **22** (2011), 125–133.

PsychSci022-0125-Supplement.pdf

Recent research in behavioral genetics has found evidence for a Gene × Environment interaction on cognitive ability: Individual differences in cognitive ability among children raised in socioeconomically advantaged homes are primarily due to genes, whereas environmental factors are more influential for children from disadvantaged homes. We investigated

the developmental origins of this interaction in a sample of 750 pairs of twins measured on the Bayley Short Form test of infant mental ability, once at age 10 months and again at age 2 years. A Gene × Environment interaction was evident on the longitudinal change in mental ability over the study period. At age 10 months, genes accounted for negligible variation in mental ability across all levels of socioeconomic status (SES). However, genetic influences emerged over the course of development, with larger genetic influences emerging for infants raised in higher-SES homes. At age 2 years, genes accounted for nearly 50 % of the variation in mental ability of children raised in high-SES homes, but genes continued to account for negligible variation in mental ability of children raised in low-SES homes. Keywords: gene-environment interaction, socioeconomic status, infancy, cognitive development, intelligence, behavioral genetics

Anthropologie

Armitage 2011

Simon J. Armitage, Sabah A. Jasim, Anthony E. Marks, Adrian G. Parker, Vitaly I. Usik & Hans-Peter Uerpmann, *The Southern Route "Out of Africa": Evidence for an Early Expansion of Modern Humans into Arabia.* science **331** (2011), 453–456.

s331-0453-Supplement.pdf

The timing of the dispersal of anatomically modern humans (AMH) out of Africa is a fundamental question in human evolutionary studies. Existing data suggest a rapid coastal exodus via the Indian Ocean rim around 60,000 years ago. We present evidence from Jebel Faya, United Arab Emirates, demonstrating human presence in eastern Arabia during the last interglacial. The tool kit found at Jebel Faya has affinities to the late Middle Stone Age in northeast Africa, indicating that technological innovation was not necessary to facilitate migration into Arabia. Instead, we propose that low eustatic sea level and increased rainfall during the transition between marine isotope stages 6 and 5 allowed humans to populate Arabia. This evidence implies that AMH may have been present in South Asia before the Toba eruption.

Gibbons 2011

Ann Gibbons, *A New View Of the Birth of Homo sapiens.* science **331** (2011), 392–394.

New genomic data are settling an old argument about how our species evolved

Petraglia 2011

Michael D. Petraglia, *Trailblazers across Arabia.* nature **470** (2011), 50–51.

What role did the Arabian peninsula play in the expansion of our species out of Africa? An archaeological site in the United Arab Emirates provides tantalizing new evidence that supports an early human migration from Africa.

Grundlagen

Ullah 2011

Isaac I. T. Ullah, *A GIS method for assessing the zone of human-environmental impact around archaeological sites: a test case from the Late Neolithic of Wadi Ziqlâb, Jordan.* Journal of Archaeological Science **38** (2011), 623–632.

Assessing the impact of prehistoric sites on their local environment is difficult to accomplish with standard archaeological methods. Simulation modeling offers a solution to this issue, but it is first necessary to delimit a site catchment, or "zone of impact", around archaeological sites in which to carry out humaneenvironment interaction modeling. To that end, I have developed a new method for GIS-based catchment reconstruction and distilled it into a custom module (r.catchment) for GRASS GIS, which calculates catchments of a given area based on anisotropic travel costs from a point of origin. One method of applying this new module in exploratory catchment modeling is discussed using the pastoral economy of the Late Neolithic period in Wadi Ziqlâb, Northern Jordan as a test case. A model of Late Neolithic herding economy and ecology is constructed, which combines data from archaeology, phytogeography, range science, agronomy, and ethnohistory. Four sizes of pastoral catchments are then derived using r.catchment, and the herd ecology model is used to estimate the stocking-rate (carrying capacity) of mixed goat and sheep herds for each catchment. The human populations these herd numbers could support (between 3 and 630 people in the Wadi) are then compared with human population estimates derived from household architectural analyses (between 18 and 54 people in theWadi) to determine the most probable catchment configurations. The results indicate that the most probable zone of impact around the known Late Neolithic sites in Wadi Ziqlâb was somewhere between 9 and 20 square kilometers, delineated by 3 and 4.5 km pasture radii respectively.
Keywords: Site catchment analysis; Simulation modeling; Environmental impacts; Pastoralism; GIS; Cost-surface modeling

Isotope

Reynard 2011

L. M. Reynard, G. M. Henderson & R. E. M. Hedges, *Calcium isotopes in archaeological bones and their relationship to dairy consumption.* Journal of Archaeological Science **38** (2011), 657–664.

The calcium isotope ratios (d44/42Ca) of bones from humans and fauna from three archaeological sites, Taforalt, Abu Hureyra, and Danebury, are evaluated in order to assess whether calcium isotope ratios of bones can be used to detect dairy consumption by adult humans. At each site the fauna d44/42Ca is the same regardless of species, while the humans have lower d44/42Ca than the local animals by 0.24±0.41‰ (site means). However we cannot ascribe this difference to dairy consumption, given this humanefaunal difference also occurs in Epipalaeolithic and Mesolithic adult humans, where dairy consumption is unlikely. Rather, this difference appears to be a result of differences in metabolic processes or other aspects of diet between humans and fauna. Minimal isotopic change in sequential acid leaches of bone powders and consideration of the high calcium concentration in bone suggest that bone calcium isotope ratios are not substantially affected by diagenetic change.

Keywords: Calcium; Ca; Isotope; Bone; Dairy; Milk; Diet; Taforalt; Abu Hureyra; Danebury

Klima

Singarayer 2011

Joy S. Singarayer, Paul J. Valdes, Pierre Friedlingstein, Sarah Nelson & David J. Beerling, *Late Holocene methane rise caused by orbitally controlled increase in tropical sources.* nature **470** (2011), 82–85.

n470-0082-Supplement.pdf

Considerable debate surrounds the source of the apparently 'anomalous'1 increase of atmospheric methane concentrations since the mid-Holocene (5,000 years ago) compared to previous interglacial periods as recorded in polar ice core records2. Proposed mechanisms for the rise in methane concentrations relate either to methane emissions from anthropogenic early rice cultivation1,3 or an increase in natural wetland emissions from tropical4 or boreal sources5,6. Here we show that our climate and wetland simulations of the global methane cycle over the last glacial cycle (the past 130,000 years) recreate the ice core record and capture the late Holocene increase in methane concentrations. Our analyses indicate that the lateHolocene increase results fromnatural changes in the Earth's orbital configuration, with enhanced emissions in the Southern Hemisphere tropics linked to precession-induced modification of seasonal precipitation. Critically, our simulations capture the declining trend in methane concentrations at the end of the last interglacial period (115,000-130,000 years ago) that was used to diagnose the Holocene methane rise as unique. The difference between the two time periods results from differences in the size and rate of regional insolation changes and the lack of glacial inception in the Holocene. Our findings also suggest that no early agricultural sources are required to account for the increase in methane concentrations in the 5,000 years before the industrial era.

Spielhagen 2011

Robert F. Spielhagen et al., *Enhanced Modern Heat Transfer to the Arctic by Warm Atlantic Water.* science **331** (2011), 450–453.
s331-0450-Supplement.pdf
Robert F. Spielhagen, Kirstin Werner, Steffen Aagaard Sørensen, Katarzyna Zamelczyk, Evguenia Kandiano, Gereon Budeus, Katrine Husum, Thomas M. Marchitto & Morten Hald
The Arctic is responding more rapidly to global warming than most other areas on our planet. Northward-flowing Atlantic Water is the major means of heat advection toward the Arctic and strongly affects the sea ice distribution. Records of its natural variability are critical for the understanding of feedback mechanisms and the future of the Arctic climate system, but continuous historical records reach back only ≈150 years. Here, we present a multidecadal-scale record of ocean temperature variations during the past 2000 years, derived from marine sediments off Western Svalbard (79°N). We find that early-21st-century temperatures of Atlantic Water entering the Arctic Ocean are unprecedented over the past 2000 years and are presumably linked to the Arctic amplification of global warming.

Wolff 2011

Eric W. Wolff, *Methane and monsoons.* nature **470** (2011), 49–50.
The rising trend in atmospheric concentrations of methane over the past 5,000 years has been attributed to human agency. A modelling study, of a power that has only now become possible, points to another cause.

Neolithikum

Kuijt 2000

Ian Kuijt, *People and Space in Early Agricultural Villages: Exploring Daily Lives, Community Size, and Architecture in the Late Pre-Pottery Neolithic.* Journal of Anthropological Archaeology **19** (2000), 75–102.
Population growth, or, more specifically, pressure, is often viewed as being critical to the development of food production in the Pre-Pottery Neolithic of the Near East. It is surprising, therefore, to recognize how little detailed archaeological research has explored the rates of population growth and how they might be related to social crowding in early

village social environments. Combining archaeological and ethnographic perspectives, this article explores the possible links between demographic change, possible social crowding, and reasons for the "collapse" of large aggregate villages occupied between approximately 8500 to 8000 years before present. Reflection upon the timing, estimated magnitude, and rate of demographic change prompts the researcher to reconsider the perceived links between sedentism, food production, and the emergence of social inequality in the context of early agricultural villages of the south-central Levant.