

## Literatur

### Aktuell

BEDNY 2011

Marina Bedny, Alvaro Pascual-Leone, David Dodell-Feder, Evelina Fedorenko & Rebecca Saxe, *Language processing in the occipital cortex of congenitally blind adults*. [PNAS 108 \(2011\), 4429–4434](#).

[pnas108-04429-Supplement.pdf](#)

Humans are thought to have evolved brain regions in the left frontal and temporal cortex that are uniquely capable of language processing. However, congenitally blind individuals also activate the visual cortex in some verbal tasks. We provide evidence that this visual cortex activity in fact reflects language processing. We find that in congenitally blind individuals, the left visual cortex behaves similarly to classic language regions: (i) BOLD signal is higher during sentence comprehension than during linguistically degraded control conditions that are more difficult; (ii) BOLD signal is modulated by phonological information, lexical semantic information, and sentence-level combinatorial structure; and (iii) functional connectivity with language regions in the left prefrontal cortex and thalamus are increased relative to sighted individuals. We conclude that brain regions that are thought to have evolved for vision can take on language processing as a result of early experience. Innate microcircuit properties are not necessary for a brain region to become involved in language processing.

plasticity | language evolution

COLLIGNON 2011

Olivier Collignon et al., *Functional specialization for auditory-spatial processing in the occipital cortex of congenitally blind humans*. [PNAS 108 \(2011\), 4435–4440](#).

[pnas108-04435-Supplement.pdf](#)

Olivier Collignon, Gilles Vandewalle, Patrice Voss, Geneviève Albouy, Geneviève Charbonneau, Maryse Lassonde and Franco Lepore

The study of the congenitally blind (CB) represents a unique opportunity to explore experience-dependant plasticity in a sensory region deprived of its natural inputs since birth. Although several studies have shown occipital regions of CB to be involved in nonvisual processing, whether the functional organization of the visual cortex observed in sighted individuals (SI) is maintained in the rewired occipital regions of the blind has only been recently investigated. In the present functional MRI study, we compared the brain activity of CB and SI processing either the spatial or the pitch properties of sounds carrying information in both domains (i.e., the same sounds were used in both tasks), using an adaptive procedure specifically designed to adjust for performance level. In addition to showing a substantial recruitment of the occipital cortex for sound processing in CB, we also demonstrate that auditory-spatial processing mainly recruits the right cuneus and the right middle occipital gyrus, two regions of the dorsal occipital stream known to be involved in visuospatial/motion processing in SI. Moreover, functional connectivity analyses revealed that these reorganized occipital regions are part of an extensive brain network including regions known to underlie audiovisual spatial abilities (i.e., intraparietal sulcus, superior frontal gyrus). We conclude that some regions of the right dorsal occipital stream do not require visual experience to develop a specialization for the processing of spatial

information and to be functionally integrated in a preexisting brain network dedicated to this ability.

blindness | cross-modal plasticity | ventral-dorsal auditory streams | modularity

## SCHENKMAN 2011

Lauren Schenkman, *Second Thoughts About CT Imaging*. [science](#) **331** (2011), 1002–1004.

Concern that CT scan radiation is causing cancer has focused public scrutiny on radiologists and medical physicists—and riled up controversy among them. Can they find a solution? Hedvig Hricak, the chair of radiology at Memorial Sloan-Kettering Cancer Center in New York City, sees a pattern of use in emergency departments “when the CT would be done before you even examine the patient.” There is also, Smith-Bindman says, “a financial cost motivation. It’s extremely profitable to do these tests.” Brenner adds that doctors may do the scans to help insulate themselves from malpractice suits. “There’s no doubt that people are doing CTs for defensive medicine.”

## Grabung

## POTTER 2011

Ben A. Potter, Joel D. Irish, Joshua D. Reuther, Carol Gelvin-Reymiller & Vance T. Holliday, *A Terminal Pleistocene Child Cremation and Residential Structure from Eastern Beringia*. [science](#) **331** (2011), 1058–1062.

s331-1058-Supplement.pdf

The dearth of human remains and residential sites has constrained inquiry into Beringian lifeways at the transition of the late Pleistocene-early Holocene. We report on human skeletal remains and a residential structure from central Alaska dated to  $\approx 11,500$  calendar years ago. The remains are from a  $\approx 3$ -year-old child who was cremated in a pit within a semisubterranean house. The burial-cremation and house have exceptional integrity and preservation and exhibit similarities and differences to both Siberian Upper Paleolithic and North American Paleoindian features.

## Klima

## WATANABE 2011

Tsuyoshi Watanabe et al., *Permanent El Niño during the Pliocene warm period not supported by coral evidence*. [nature](#) **471** (2011), 209–211.

n471-0209-Supplement.pdf

Tsuyoshi Watanabe, Atsushi Suzuki, Shoshiro Minobe, Tatsunori Kawashima, Koji Kameo, Kayo Minoshima, Yolanda M. Aguilar, Ryoji Wani, Hodaka Kawahata, Kohki Sowa, Takaya Nagai & Tomoki Kase

The El Niño/Southern Oscillation (ENSO) system during the Pliocene warm period (PWP; 3–5 million years ago) may have existed in a permanent El Niño state with a sharply reduced zonal sea surface temperature (SST) gradient in the equatorial Pacific Ocean<sup>1</sup>. This suggests that during the PWP, when global mean temperatures and atmospheric carbon dioxide concentrations were similar to those projected for near-term climate change<sup>2</sup>, ENSO variability—and related global climate teleconnections—could have been radically different from that today. Yet, owing to a lack of observational evidence on seasonal and interannual SST variability from crucial low-latitude sites, this fundamental climate characteristic of the PWP remains controversial<sup>1,3–10</sup>. Here we show that permanent El Niño conditions did not exist during the PWP. Our spectral analysis of the d18OSST and salinity proxy, extracted from two 35-year, monthly resolved PWP Porites corals in the

Philippines, reveals variability that is similar to present ENSO variation. Although our fossil corals cannot be directly compared with modern ENSO records, two lines of evidence suggest that Philippine corals are appropriate ENSO proxies. First,  $\delta^{18}\text{O}$  anomalies from a nearby live *Porites* coral are correlated with modern records of ENSO variability. Second, negative- $\delta^{18}\text{O}$  events in the fossil corals closely resemble the decreases in  $\delta^{18}\text{O}$  seen in the live coral during El Niño events. Prior research advocating a permanent El Niño state may have been limited by the coarse resolution of many SST proxies, whereas our coral-based analysis identifies climate variability at the temporal scale required to resolve ENSO structure firmly.

## Kultur

### BOYD 1990

Robert Boyd & Peter J. Richerson, *Group Selection among Alternative Evolutionarily Stable Strategies*. [Journal of Theoretical Biology](#) **145** (1990), 331–342.

Many important models of the evolution of social behavior have more than one evolutionarily stable strategy (ESS). Examples include co-ordination games, contests, mutualism, reciprocity, and sexual selection. Here we show that when there are multiple evolutionarily stable strategies, selection among groups can cause the spread of the strategy that has the lowest extinction rate or highest probability of contributing to the colonization of empty habitats, and that this may occur even when groups are usually very large, migration rates are substantial, and “extinction” entails only the disruption of the group and the dispersal of its members. The main requirements are: (1) individuals drawn from a single surviving group make up a sufficiently large fraction newly formed groups, and (2) the processes increasing the frequency of successful strategies within groups are strong compared to rate of migration among groups. The latter condition suggests that this form of group selection will be particularly important when behavioral variation is culturally acquired.

### BOYD 2005

Robert Boyd & Peter J. Richerson, *Solving the Puzzle of Human Cooperation*. In: STEPHEN C. LEVINSON AND PIERRE JAISON (Hrsg.), *Evolution and Culture, A Fyssen Foundation Symposium*. (Cambridge 2005), 105–132.

Cooperation in human groups is a serious puzzle because we cooperate extensively with distantly related and even unrelated individuals. Hamilton’s (1964) theory of inclusive fitness and Trivers (1971) theory of reciprocal altruism predicted that cooperation can only evolve under highly restricted circumstances. At the time they advanced these ideas, many evolutionary biologists assumed that large-scale animal cooperation was common and that large-scale group selection for altruism was the explanation for it. The work inspired by these theories has resulted in a nearly total triumph for Hamilton and Trivers, although vigorous and sophisticated dissent is still heard (Sober and Wilson, 1998). However, human politics is the only really good example to hand of cooperation on large and even very large scales among nonrelatives. For the rest of the organic world Hamilton’s and Trivers’ mechanisms seem virtually as unexceptional as the law of gravity. Indeed, human societies themselves show ample evidence of individual selfishness, nepotism, and small-scale cabals but nevertheless manage, to highly variable degrees, to provide the benefits of cooperation on considerable scales. While we do not regard the case closed by any means, we think that group selection on cultural variation together with moralistic punishment and tribal social instincts are the strongest current candidates to explain how human societies evolve to fly in a world where strong selective forces favoring only small-scale cooperation act against their existence.

## HENRICH 2008

Joseph Henrich, Robert Boyd & Peter J. Richerson, *Five Misunderstandings About Cultural Evolution*. *Human Nature* **19** (2008), 119–137.

Recent debates about memetics have revealed some widespread misunderstandings about Darwinian approaches to cultural evolution. Drawing from these debates, this paper disputes five common claims: (1) mental representations are rarely discrete, and therefore models that assume discrete, gene-like particles (i.e., replicators) are useless; (2) replicators are necessary for cumulative, adaptive evolution; (3) content-dependent psychological biases are the only important processes that affect the spread of cultural representations; (4) the “cultural fitness” of a mental representation can be inferred from its successful transmission; and (5) selective forces only matter if the sources of variation are random. We close by sketching the outlines of a unified evolutionary science of culture.

Keywords Dual inheritance theory . Memes . Cultural evolution . Epidemiology of representations . Cultural transmission . Replicators

## KLINE 2010

Michelle A. Kline & Robert Boyd, *Population size predicts technological complexity in Oceania*. *Proc. Royal Society B* **277** (2010), 2559–2564.

ProcRSocB277-2559-Supplement.doc

Much human adaptation depends on the gradual accumulation of culturally transmitted knowledge and technology. Recent models of this process predict that large, well-connected populations will have more diverse and complex tool kits than small, isolated populations. While several examples of the loss of technology in small populations are consistent with this prediction, it found no support in two systematic quantitative tests. Both studies were based on data from continental populations in which contact rates were not available, and therefore these studies do not provide a test of the models. Here, we show that in Oceania, around the time of early European contact, islands with small populations had less complicated marine foraging technology. This finding suggests that explanations of existing cultural variation based on optimality models alone are incomplete because demography plays an important role in generating cumulative cultural adaptation. It also indicates that hominin populations with similar cognitive abilities may leave very different archaeological records, a conclusion that has important implications for our understanding of the origin of anatomically modern humans and their evolved psychology.

Keywords: technological complexity; demography; cultural evolution