EAORC BULLETIN 671 – 24 April 2016

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PNAS – 20 April 2016 ....................................................................................... 6

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SCIENCE NEWS – No need for males: Female lyrebirds evolved their own complex calls
Plenty of female birds sing songs, but researchers have in the past often dismissed them as simply being evolutionary tag-alongs of the males’ “come hither” calls. Now, by recording the calls of female superb lyrebirds, researchers have found that they can keep up with the boys just fine.

SCIAM NEWS – New Evidence Points to Personal Brain Signatures
Brain scans of a person doing nothing at all can predict how neural circuits will light up when that same individual is gambling or reading a book

SCI-NEWS.COM – Yiddish Language was Invented by Slavo-Iranian Jewish Merchants, Scientists Say
A new tool called the Geographic Population Structure (GPS), which converts DNA data into its ancestral coordinates, has pinpointed origin of Yiddish speakers, according to a team of researchers led by Dr. Eran Elhaik of the University of Sheffield, UK.

SCI-NEWS.COM – Neuroscientists Can Identify You by Your ‘Brainprint’ with 100% Accuracy
A novel technology being developed by a team of researchers at Binghamton University has delivered outstanding results over the ability to identify persons through brain scans.
**SCIENCE DAILY – Do we judge distance based on how a word sounds?**
Marketers and brand managers responsible for naming new products should be interested to learn that people associate certain sounds with nearness and others with distance, say researchers, whose new study adds to the body of knowledge about symbolic sound.
https://www.sciencedaily.com/releases/2016/04/160418145453.htm

**SCIENCE DAILY – Vocal signals reveal intent to dominate or submit, study finds**
You may not win friends, but a new study finds that you can influence people simply by lowering the pitch of your voice in the first moments of a conversation.

**SCIENCE DAILY – Bigger brains led to bigger bodies in our ancestors**
New research suggests that humans became the large-brained, large-bodied animals we are today because of natural selection to increase brain size. The work contradicts previous models that treat brain size and body size as independent traits. Instead, the study shows that brain size and body size are genetically linked and that selection to increase brain size will ‘pull along’ body size.
https://www.sciencedaily.com/releases/2016/04/160418120710.htm

**SCIENCE DAILY – How much do we really see?**
Glance out the window and then close your eyes. Maybe you noticed it’s raining and there was a man carrying an umbrella. Did you catch the shape of its handle? Probably not. Some neuroscientists would say that your eyes still capture everything in front of you. But there are flaws to this logic, researchers argue. It may be that our vision only reflects the gist of what we see.
https://www.sciencedaily.com/releases/2016/04/160419130010.htm

**SCIENCE DAILY – Baboons watch neighbors for clues about food, but can end up in queues**
Baboons learn about food locations socially through monitoring the behavior of those around them. While proximity to others is the key to acquiring information, research shows that accessing food depends on the complex hierarchies of a baboon troop, and those lower down the pecking order can end up queuing for leftovers.
https://www.sciencedaily.com/releases/2016/04/160420111137.htm

**SCIENCE DAILY – Brain processes which lead to the concept of ‘zero’ on the number line**
Neuroscientists discover brain processes which lead to the concept of “zero” on the number line.
https://www.sciencedaily.com/releases/2016/04/160421133944.htm

**SCIENCE DAILY – Novel collagen fingerprinting identifies a Neanderthal bone among 2,000 fragments**
Scientists have used a new molecular fingerprinting technique to identify one Neanderthal bone from around 2,000 bone fragments. All the tiny pieces of bone were recovered from a key archaeological site, Denisova Cave in Russia, with the remaining fragments found to be from animal species like mammoths, woolly rhino, wolf and reindeer. It is the first time that researchers have identified traces of an extinct human from an archaeological site using a technique called ‘Zooarchaeology by Mass Spectrometry’ or ZooMS.
https://www.sciencedaily.com/releases/2016/04/160422120733.htm

**SCIENCE DAILY – Study of chimpanzees explores early origins of human hand dexterity**
Chimpanzees use manipulative dexterity to evaluate and select figs, a vital resource when preferred foods are scarce, according to a new study. The action resembles that of humans shopping for fruits, and the study demonstrates the foraging advantages of opposable fingers and careful manual prehension, or the act of grasping an object with precision. The findings shed new light on the ecological origins of hands with fine motor control.
https://www.sciencedaily.com/releases/2016/04/160422075146.htm

**BOOK – Thread of Life: The Immaterial Side of Existence**
Jean-Louis Dessalles, Cédric Gaucherel & Pierre-Henri Gouyon
What is life made of? What is the substance of it? When a living thing dies, what endures and continues among the living? What makes an ecosystem, an animal population, a human culture, have a memory that far exceeds the duration of the lives that compose it? To these fundamental questions, this book provides an original scientific answer: the thread of life, the one that runs through all beings, from our distant amphibian ancestors to us modern human beings, is not material: it is a message. An inherited message that is built up from generation to generation, whose imprint is on the DNA of our chromosomes but which is also expressed through the way we live and talk.
Although not material, this thread of life affects our existence and that of our descendants; it evolves and changes. It is the very structure of the living, the warp threads on which are woven our lives.


ONE-DAY MASTERCLASS – Instant Expert: How Your Brain Works
Have you ever wondered how your brain works? How that stuff in your head enables you to see, hear and think about the world around you, make decisions and act on them? New Scientist presents Instant Expert – How Your Brain Works, a one-day masterclass where leading brain experts will take you on a journey into “the most complicated kilo of matter in the universe”. There are limited early bird discount tickets left – book your place now.

Join host Claudia Hammond (psychologist, presenter of BBC Radio 4’s All in the Mind and author of Time Warped: Unlocking the Mysteries of Time Perception) and six leading brain experts including Andrew Jackson, Mary Morrell and Dean Burnett – by the end of the day you’ll feel like an expert too.

The brain has long been a source of fascination. In 1819, the radical thinker and surgeon William Lawrence put it like this: “It is strongly suspected that a Newton or Shakespeare excels other mortals only... by having an extra inch of brain in the right place.”

Today, many such suspicions are certainties. We understand the structures of the brain, minor and major, and their roles in making us who we are. We can record electrical signals from individual brain cells or networks of them. Imaging technology lets us see both snapshots of the brain and also videos of it in action. We can follow connections within the brain and watch them reform after an injury.

This event will introduce you to the evolution and anatomy of the brain. We will view it through traits such as: memory, emotions, sleep, sensing and perception. We'll also investigate techniques for controlling the brain using electric and magnetic fields, as well as the latest technologies that allow you to control the outside world using your mind alone.

Saturday 21 May 2016, 10am - 5pm (Doors open at 9:15am)
Royal College of General Practitioners, 30 Euston Square, London, NW1 2FB
Ticket includes hot buffet lunch and refreshments during the day.

PUBLICATIONS

Proceedings of the Royal Society B – No issue this week

Philosophical Transactions of the Royal Society B – No issue this week

Royal Society Biology Letters – No issue this week

Royal Society Open Science – No issue this week

New Scientist – 23 April 2016

ARTICLES

COLIN BARRAS – Meet our hybrid ancestors who kept extinct humans’ DNA alive

Neanderthals, Denisovans and other extinct humans live on inside our cells – but what was life like for the hybrid humans who carried their genes?


ROBIN WYLIE – Dolphins have a language that helps them solve problems together

Bottlenose dolphins have been observed chattering while cooperating to solve a tricky puzzle – a feat that suggests they have a type of vocalisation dedicated to cooperating on problem solving.

https://www.newscientist.com/article/2084557-dolphins-have-a-language-that-helps-them-solve-problems-together/?cmpid=nlc%7cnsns%7c2016-2104-newglobal&utm_medium=nlc&utm_source=nsns

Science – 22 April 2016

ARTICLES

CATHERINE MATACIC – How sign languages evolve

Simi Etedgi is one of about 10,000 signers of Israeli Sign Language (ISL), a language that emerged only 80 years ago, but the signs used in the Morocco of her childhood are very different from those she uses now in Israel. In fact, younger signers of ISL have different ways to express many of the same meanings. A new study presented at the Evolution of Language meeting in New Orleans, Louisiana, last month shows that the new generation has come up with richer, more grammatically complex utterances that use ever more parts of the body for different purposes. Most intriguing for linguists: These changes seem to happen in a predictable order from one generation to the next. That same order has been seen in young sign languages
around the world, showing in visible fashion how linguistic complexity unfolds. This leads some linguists to think that they may have found a new model for the evolution of language. 

http://science.sciencemag.org/content/352/6284/392?utm_campaign=*

Science Express – 22 April 2016
NOTHING OF INTEREST

Science Advances – 22 April 2016
NOTHING OF INTEREST

Nature – 21 April 2016
REVIEWS
JILL COOK – Palaeolithic art: Old masters, early cultures
Review of ‘What Is Paleolithic Art? Cave Paintings and the Dawn of Human Creativity’ by Jean Clottes
http://www.nature.com/nature/journal/v532/n7599/full/532310a.html

Nature Communications – 20 April 2016
NOTHING OF INTEREST

Nature Scientific Reports – 19 April 2016
PAPERS
SANDRA A. HELDSTAB et al with CAREL P. VAN SCHAIK – Manipulation complexity in primates coevolved with brain size and terrestriality
Humans occupy by far the most complex foraging niche of all mammals, built around sophisticated technology, and at the same time exhibit unusually large brains. To examine the evolutionary processes underlying these features, we investigated how manipulation complexity is related to brain size, cognitive test performance, terrestriality, and diet quality in a sample of 36 non-human primate species. We categorized manipulation bouts in food-related contexts into unimanual and bimanual actions, and asynchronous or synchronous hand and finger use, and established levels of manipulative complexity using Guttman scaling. Manipulation categories followed a cumulative ranking. They were particularly high in species that use cognitively challenging food acquisition techniques, such as extractive foraging and tool use. Manipulation complexity was also consistently positively correlated with brain size and cognitive test performance. Terrestriality had a positive effect on this relationship, but diet quality did not affect it. Unlike a previous study on carnivores, we found that, among primates, brain size and complex manipulations to acquire food underwent correlated evolution, which may have been influenced by terrestriality. Accordingly, our results support the idea of an evolutionary feedback loop between manipulation complexity and cognition in the human lineage, which may have been enhanced by increasingly terrestrial habits.
http://www.nature.com/articles/srep24528?WT.ec_id=SREP-

PAPERS
ALICIA GALLEGGO et al – Functional Implications of Human-Specific Changes in Great Ape microRNAs
microRNAs are crucial post-transcriptional regulators of gene expression involved in a wide range of biological processes. Although microRNAs are highly conserved among species, the functional implications of existing lineage-specific changes and their role in determining differences between humans and other great apes have not been specifically addressed. We analyzed the recent evolutionary history of 1,595 human microRNAs by looking at their intra- and inter-species variation in great apes using high-coverage sequenced genomes of 82 individuals including gorillas, orangutans, bonobos, chimpanzees and humans. We explored the strength of purifying selection among microRNA regions and found that the seed and mature regions are under similar and stronger constraint than the precursor region. We further constructed a comprehensive catalogue of microRNA species-specific nucleotide substitutions among great apes and, for the first time, investigated the biological relevance that human-specific changes in microRNAs may have had in great ape evolution. Expression and functional analyses of four microRNAs (miR-299-3p, miR-503-3p, miR-508-3p and miR-541-3p) revealed that lineage-specific nucleotide substitutions and changes in the length of these microRNAs alter their expression as well as the repertoires of target genes and regulatory networks. We suggest that the studied molecular changes could have modified crucial microRNA functions shaping phenotypes that, ultimately, became human-specific. Our work provides a frame to study the impact that regulatory changes may have in the recent evolution of our species.
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0154194
IZUMI MATSUDAIRA et al – Parental Praise Correlates with Posterior Insular Cortex Gray Matter Volume in Children and Adolescents

A positive parenting style affects psychological and cognitive development in children. Neuroimaging studies revealed that a positive parenting style influenced brain structure in children. Parental praise is a concrete behavior observed in positive parenting. Although previous psychological studies revealed a positive effect of parental praise on children, little is known about the relationship between parental praise and brain structure in children. Thus, the purpose of the present study was to determine whether there was a correlation between the parental attitude towards praising their child and gray matter volume in the children (116 boys and 109 girls; mean age, 10.6 years old). We examined the correlation between regional gray matter volume and parental praise using voxel-based morphometry (VBM) following magnetic resonance imaging (MRI). In addition, to confirm the positive effects of parental praise, we analyzed the correlation between the frequency of parental praise and personality traits in children. We showed that the parental attitude towards praising their child was significantly and positively correlated with the gray matter volume of the left posterior insular cortex in children. Moreover, we found a significant positive correlation between parental attitude towards praising their child and the personality traits of conscientiousness and openness to experience in the children. Prior studies said that gray matter volume in the posterior insula was correlated with empathy, and the functional connectivity between this area and the amygdala was associated with emotional regulation. Furthermore, the posterior insula relates to auditory function, and therefore, was likely involved in the processing of parental praise. Considering the possibility of experience-dependent plasticity, frequent parental praise would lead to increased posterior insular gray matter volume in children. Our study is the first to elucidate the relationship between a specific positive parenting behavior and brain structure in children.

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0154220

TONI PÉREZ, JORDI ZAMORA & VÍCTOR M. EGUÍLUZ – Collective Intelligence: Aggregation of Information from Neighbors in a Guessing Game

Complex systems show the capacity to aggregate information and to display coordinated activity. In the case of social systems the interaction of different individuals leads to the emergence of norms, trends in political positions, opinions, cultural traits, and even scientific progress. Examples of collective behavior can be observed in activities like the Wikipedia and Linux, where individuals aggregate their knowledge for the benefit of the community, and citizen science, where the potential of collectives to solve complex problems is exploited. Here, we conducted an online experiment to investigate the performance of a collective when solving a guessing problem in which each actor is endowed with partial information and placed as the nodes of an interaction network. We measure the performance of the collective in terms of the temporal evolution of the accuracy, finding no statistical difference in the performance for two classes of networks, regular lattices and random networks. We also determine that a Bayesian description captures the behavior pattern the individuals follow in aggregating information from neighbors to make decisions. In comparison with other simple decision models, the strategy followed by the players reveals a suboptimal performance of the collective. Our contribution provides the basis for the micro-macro connection between individual based descriptions and collective phenomena.

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0153586

NOTHING OF INTEREST

PLoS Genetics – 21 April 2016
NOTHING OF INTEREST

PNAS – 20 April 2016
PAPERS

KRIST VAESEN et al with WIL ROEBROEKS – Population size does not explain past changes in cultural complexity

Archaeologists have long tried to understand why cultural complexity often changed in prehistory. Recently, a series of highly influential formal models have suggested that demography is the key factor. According to these models, the size of a population determines its ability to invent and maintain cultural traits. In this paper, we demonstrate that the models in question are flawed in two important respects: They use questionable assumptions, and their predictions are not supported by the available archaeological and ethnographic evidence. As a consequence, little confidence can be invested in the idea that demography explains the changes in cultural complexity that have been identified by archaeologists. An alternative explanation is required.

http://www.pnas.org/content/113/16/E2241.abstract

SILKE ANDERS et al – A neural link between affective understanding and interpersonal attraction

Humans interacting with other humans must be able to understand their interaction partner’s affect and motivations, often without words. We examined whether people are attracted to others whose affective behavior they can easily understand. For this, we asked participants to watch different persons experiencing different emotions. We found the better a participant thought they could understand another person’s emotion the more they felt attracted toward that person. Importantly,
these individual changes in interpersonal attraction were predicted by activity in the participant’s reward circuit, which in turn signaled how well the participant’s “neural vocabulary” was suited to decode the other’s behavior. This research elucidates neurobiological processes that might play an important role in the formation and success of human social relations.

http://www.pnas.org/content/113/16/E2248.abstract

BILL THOMPSON, SIMON KIRBY & KENNY SMITH – Culture shapes the evolution of cognition

A central debate in cognitive science concerns the nativist hypothesis: the proposal that universal human behaviors are underpinned by strong, domain-specific, innate constraints on cognition. We use a general model of the processes that shape human behavior—learning, culture, and biological evolution—to test the evolutionary plausibility of this hypothesis. A series of analyses shows that culture radically alters the relationship between natural selection and cognition. Culture facilitates rapid biological adaptation yet rules out nativism: Behavioral universals arise that are underpinned by weak biases rather than strong innate constraints. We therefore expect culture to have dramatically shaped the evolution of the human mind, giving us innate predispositions that only weakly constrain our behavior.

http://www.pnas.org/content/113/16/4530.abstract

Frontiers in Psychology – 22 April 2016

PAPERS

JACQUELINE FAGARD et al – What Does It Take for an Infant to Learn How to Use a Tool by Observation?

Observational learning is probably one of the most powerful factors determining progress during child development. When learning a new skill, infants rely on their own exploration; but they also frequently benefit from an adult’s verbal support or from demonstration by an adult modeling the action. At what age and under what conditions does adult demonstration really help the infant to learn a novel behavior? In this review, we summarize recently published work we have conducted on the acquisition of tool use during the second year of life. In particular, we consider under what conditions and to what extent seeing a demonstration from an adult advances an infant’s understanding of how to use a tool to obtain an out-of-reach object. Our results show that classic demonstration starts being helpful at 18 months of age. When adults explicitly show their intention prior to demonstration, even 16-month-old infants learn from the demonstration. On the other hand, providing an explicit demonstration (“look at how I do it”) is not very useful before infants are ready to succeed by themselves anyway. In contrast, repeated observations of the required action in a social context, without explicit reference to this action, considerably advances the age of success and the usefulness of providing a demonstration. We also show that the effect of demonstration can be enhanced if the demonstration makes the baby laugh. Taken together, the results from this series of studies on observational learning of tool use in infants suggest, first, that when observing a demonstration, infants do not know what to pay attention to: demonstration must be accompanied by rich social cues to be effective; second, infants’ attention is inhibited rather than enhanced by an explicit demand of “look at what I do”; and finally a humorous situation considerably helps infants understand the demonstration.


Frontiers in Neuroscience – 22 April 2016

PAPERS

ATSUNOBU SUZUKI et al – Involvement of the Ventrolateral Prefrontal Cortex In Learning Others’ Bad Reputations and Indelible Distrust

A bad reputation can persistently affect judgments of an individual even when it turns out to be invalid and ought to be disregarded. Such indelible distrust may reflect that the negative evaluation elicited by a bad reputation transfers to a person. Consequently, the person him/herself may come to activate this negative evaluation irrespective of the accuracy of the reputation. If this theoretical model is correct, an evaluation-related brain region will be activated when witnessing a person whose bad reputation one has learned about, regardless of whether the reputation is deemed valid or not. Here, we tested this neural hypothesis with functional magnetic resonance imaging (fMRI). Participants memorized faces paired with either a good or a bad reputation. Next, they viewed the faces alone and inferred whether each person was likely to cooperate, first while retrieving the reputations, and then while trying to disregard them as false. A region of the left ventrolateral prefrontal cortex (vlPFC), which may be involved in negative evaluation, was activated by faces previously paired with bad reputations, irrespective of whether participants attempted to retrieve or disregard these reputations. Furthermore, participants showing greater activity of the left ventrolateral prefrontal region in response to the faces with bad reputations were more likely to infer that these individuals would not cooperate. Thus, once associated with a bad reputation, a person may elicit evaluation-related brain responses on their own, thereby evoking distrust independently of their reputation.

Justin W. Adams et al – Macromammalian faunas, biochronology and palaeoecology of the early Pleistocene Main Quarry hominin-bearing deposits of the Drimolen Palaeocave System, South Africa

The Drimolen Palaeocave System Main Quarry deposits (DMQ) are some of the most prolific hominin and primate-bearing deposits in the Fossil Hominids of South Africa UNESCO World Heritage Site. Discovered in the 1990s, excavations into the DMQ have yielded a demographically diverse sample of Paranthropus robustus (including DNH 7, the most complete cranium of the species recovered to date), early Homo, Papio hamadryas robinsoni and Cercopithecoides williamsi. Alongside the hominin and primate sample is a diverse macromammalian assemblage, but prior publications have only provided a provisional species list and an analysis of the carnivores recovered prior to 2008. Here we present the first description and analysis of the non-primate macromammalian faunas from the DMQ, including all 826 taxonomically identifiable specimens catalogued from over two decades of excavation. We also provide a biochronological interpretation of the DMQ deposits and an initial discussion of local palaeoecology based on taxon representation. The current DMQ assemblage consists of the remains of minimally 147 individuals from 9 Orders and 14 Families of mammals. Despite the diversity within the DMQ macromammalian faunas, there are few habitat- or biochronologically-sensitive species that provide specific ecologic or age boundaries for the deposits. Recovered species can only support the non-specific, mixed open-to-closed palaeohabitats around Drimolen that have been reconstructed for the other penecontemporaneous South African palaeokarst deposits. The identified Equus quagga ssp. specimens recovered from the floor of the current excavation (≈4.5–5 m below datum) suggests that most, if not all the DMQ specimens, were deposited after 2.33 Ma. Simultaneously, the carnivore specimens (D. cf. barlowi, L. silberbergi) suggest earlier Pleistocene (pre-2.0–1.8 Ma) to maximally 1.6 Ma deposition (D. aff. piveteaui) for most of the DMQ fossil assemblage.

Nicholas A Badcock et al – What Box: a task for assessing language lateralisation in young children

The assessment of active language lateralisation in infants and toddlers is challenging. It requires an imaging tool that is unimmitigating, quick to setup, and robust to movement, in addition to an engaging and cognitively simple procedure that elicits language processing. Functional Transcranial Doppler Ultrasound (fTCD) offers a suitable technique and here we report on a suitable method to elicit active language production in young children. The 34-second ‘What Box’ trial presents an animated face ‘searching’ for an object. The face ‘finds’ a box that opens to reveal an object, which may be labelled spontaneously, in response to a “What’s this?” prompt, or in response to the object label. What Box conducted with 95 children (1 to 5 years-of-age, completing a median of 7 trials), who were left-lateralised on average. The task was validated (\(\rho = 0.4\)) against the gold standard Word Generation task in a group of older adults (n = 65, 60 to 85 years-of-age, median of 24 trials). Existing methods for assessing lateralisation of active language production have been used with 4-year-old children while passive listening has been conducted with sleeping 6-month-olds. This is the first active method to be successfully employed with infants, toddlers, and pre-schoolers, and show good correspondence to Word Generation in older adults.

Michael Balter – Farmers vs. Nomads: Whose Lingo Spread the Farthest?

Did the most successful family of languages in history originate in Turkey or the Pontic steppes? New evidence from DNA and evolutionary biology has only heightened the scientific disagreements.

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EAORC website information is at http://martinedwardes.webplus.net/eaorc.html