

## EAORC BULLETIN 1,022 – 15 January 2023

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## NOTICES

### PUBLICATION ALERTS

If you have had a paper or book published, or you see something which would be of interest to the group, please send me a publication alert so that I can include it in the newsletter. Many thanks to those who have already sent in alerts.

If there is a journal you feel I should be tracking on a regular basis, let me know.

And if you have any other ideas for extending the “EAORC experience”, please contact me.

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### ACADEMIA.EDU – Butchering knives and hafting at Nahal Mahanayeem

*Nature Scientific Reports* 13, 112 (2023).

#### JUAN IGNACIO MARTIN-VIVEROS et al with GONEN SHARON – Butchering knives and hafting at the Late Middle Paleolithic open-air site of Nahal Mahanayeem Outlet (NMO), Israel

Much of what is known about human behavior and subsistence strategies in the Levantine Middle Paleolithic comes from long sequences from caves and rock shelters. In this context, studies of stone tool function have traditionally focused on determining the use of Levallois points and triangular elements, either as projectiles or, more rarely, multipurpose knives. Little is known about such tool use and hafting in Middle Paleolithic open-air sites in the Levant through the systematic application of micro-wear analysis. Here we report the results of a low and high-power study performed on the lithic assemblage of the Late Middle Paleolithic open-air site of Nahal Mahanayeem Outlet (NMO, Israel). Most pointed items, including Levallois and non-Levallois points, were used as butchering knives, many of them while hafted; to a much lesser extent they were also used for hide, bone, and wood/plant processing activities. Blades and flakes were mostly handheld and used as butchering knives, with hide, bone, antler, and wood/plant-processing tasks being rare. Hafted artifacts include morphologies and activities for which hafting is not required, indicating that NMO inhabitants possessed varied hafting expertise. Wood/plant processing tools, some of which were hafted, attest that manufacture and maintenance tasks were planned well in advance of game procurement at the site. These results attest to early evidence of hafted butchering knives and hafted plant processing tools for a Late Middle Paleolithic open-air site in the Levant, and support previous interpretations of NMO as a short-term task-specific location focused on animal processing activities, mostly butchery.

[https://www.academia.edu/94576097/Butchering\\_knives\\_and\\_hafting\\_at\\_the\\_Late\\_Middle\\_Paleolithic\\_open\\_air\\_site\\_of\\_Nahal\\_Mahanayeem\\_Outlet\\_NMO\\_Israel](https://www.academia.edu/94576097/Butchering_knives_and_hafting_at_the_Late_Middle_Paleolithic_open_air_site_of_Nahal_Mahanayeem_Outlet_NMO_Israel)

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## NEWS

### GUARDIAN SCIENCE – Dolphins ‘shout’ to compensate for human-made background noise

Research adds to concerns about the impact of human noise pollution on marine life.

<https://www.theguardian.com/environment/2023/jan/12/dolphins-shout-compensate-human-made-background-noise>

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### SAPIENS – Creative Cooks in the Ice Age

New archaeological evidence stands to change what we thought about how humans prepared food during the Paleolithic.

<https://sapiens.us11.list-manage.com/track/click?u=80f6cf678900daf984bf763b7&id=b68495bb7f&e=dc0eff6180>

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### SCIENCE NEWS – Native Americans—and their genes—traveled back to Siberia, new genomes reveal

Other ancient DNA sheds light on the tangled human history of northern Asia after the ice age.

<https://www.science.org/content/article/native-americans-and-their-genes-traveled-back-siberia-new-genomes-reveal>

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## THE CONVERSATION – Are dogs left- or right-handed? What the science says

Dogs have paw preferences, just like humans.

<https://theconversationuk.cmail20.com/t/r-l-tjhlhuhk-khhllilahh-b/>

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## PUBLICATIONS

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### American Journal of Biological Anthropology

#### PAPERS

#### **KATHLEEN S. PAUL et al – Integrating genealogy and dental variation: contributions to biological anthropology**

Genealogical samples that couple dental data and documented relatedness information provide unique opportunities to examine the biological foundations of tooth variation. Over the past century, these resources have been critical for examining the various factors that influence dental phenotypes—the same traits that anthropologists regularly apply to reconstructions of past phenomena. Genealogical samples are uniquely suited to test long-standing assumptions underlying bioanthropological practice, for example, biodistance and phylogenetic analysis, which commonly reference aspects of tooth size and form as proxies for latent genetic information. This article provides an overview of published genealogical research, with a focus on the practical implications of quantitative genetic and environmental studies of (non)human primate dentitions. To highlight the utility of genealogical samples for understanding the influence of specific non-genetic factors on dental characters, we also present novel data on gestational hormone effects in opposite-sex dizygotic twin pairs as a test of the twin testosterone transfer (TTT) hypothesis. This article discusses fruitful next steps in genealogical dental research, as well as important ethical considerations surrounding the use of associated datasets, which are sensitive in nature. As we forge ahead in an age of phenomics, genealogical samples are likely to play a key role in generating comprehensive genotype–phenotype maps of the dentition and in refining bioanthropological methods.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24662>

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### Current Biology

#### PAPERS

#### **PERNILLE M. SØRENSEN et al with STEPHANIE L. KING – Anthropogenic noise impairs cooperation in bottlenose dolphins**

Understanding the impact of human disturbance on wildlife populations is of societal importance, with anthropogenic noise known to impact a range of taxa, including mammals, birds, fish, and invertebrates. While animals are known to use acoustic and other behavioral mechanisms to compensate for increasing noise at the individual level, our understanding of how noise impacts social animals working together remains limited. Here, we investigated the effect of noise on coordination between two bottlenose dolphins performing a cooperative task. We previously demonstrated that the dolphin dyad can use whistles to coordinate their behavior, working together with extreme precision. By equipping each dolphin with a sound-and-movement recording tag (DTAG-3) and exposing them to increasing levels of anthropogenic noise, we show that both dolphins nearly doubled their whistle durations and increased whistle amplitude in response to increasing noise. While these acoustic compensatory mechanisms are the same as those frequently used by wild cetaceans, they were insufficient to overcome the effect of noise on behavioral coordination. Indeed, cooperative task success decreased in the presence of noise, dropping from 85% during ambient noise control trials to 62.5% during the highest noise exposure. This is the first study to demonstrate in any non-human species that noise impairs communication between conspecifics performing a cooperative task. Cooperation facilitates vital functions across many taxa and our findings highlight the need to account for the impact of disturbance on functionally important group tasks in wild animal populations.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(22\)02000-0](https://www.cell.com/current-biology/fulltext/S0960-9822(22)02000-0)

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### iScience

#### PAPERS

#### **NANCY KANWISHER, PRANJUL GUPTA & KATHARINA DOBS – CNNs Reveal the Computational Implausibility of the Expertise Hypothesis**

Face perception has long served as a classic example of domain specificity of mind and brain. But an alternative “expertise” hypothesis holds that putatively face-specific mechanisms are actually domain-general, and can be recruited for the perception of other objects of expertise (e.g., cars for car experts). Here, we demonstrate the computational implausibility of this hypothesis: neural network models optimized for generic object categorization provide a better foundation for expert fine-grained discrimination than do models optimized for face recognition.

[https://www.cell.com/iscience/fulltext/S2589-0042\(23\)00053-6](https://www.cell.com/iscience/fulltext/S2589-0042(23)00053-6)

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## Linguistic Anthropology

### PAPERS

#### **JAN DAVID HAUCK – Language otherwise: Linguistic natures and the ontological challenge**

Linguistic anthropology has remained largely unaffected by debates about ontology in other subfields. In turn, the concept of language has been conspicuously absent from ontological debates. The past few years, however, have seen attempts at articulating the two, interrogating what language is from ethnographic perspectives and extending the analytic focus to ontologies of language or linguistic natures. This article discusses such efforts and compares them to previous critical engagements with the concept of language. Calling into question the ontological equivalence of language within and across cultures, communities, and regions, it explores understandings of what language is that go against the grain of existing theoretical models.

<https://anthrosource.onlinelibrary.wiley.com/doi/full/10.1111/jola.12384>

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## Nature

### NEWS

#### **Dads older than mums since dawn of humanity, study suggests**

Scientists used modern human DNA to estimate when new generations were born over 250,000 years — and the age of parents at conception.

<https://www.nature.com/articles/d41586-023-00076-3>

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### ARTICLES

#### **FLORA GRAHAM – Daily briefing: ‘Disruptive’ science has declined since 1950s**

Why has the proportion of papers that shake up a field plummeted over the last 50 years? Plus, Brazil’s president takes steps to protect the Amazon and a new class of obesity drugs shows striking results.

<https://www.nature.com/articles/d41586-023-00046-9>

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## Nature Communications

### PAPERS

#### **MOE OKAYASU et al – The Stroop effect involves an excitatory–inhibitory fronto-cerebellar loop**

The Stroop effect is a classical, well-known behavioral phenomenon in humans that refers to robust interference between language and color information. It remains unclear, however, when the interference occurs and how it is resolved in the brain. Here we show that the Stroop effect occurs during perception of color–word stimuli and involves a cross-hemispheric, excitatory–inhibitory loop functionally connecting the lateral prefrontal cortex and cerebellum. Participants performed a Stroop task and a non-verbal control task (which we term the Swimmy task), and made a response vocally or manually. The Stroop effect involved the lateral prefrontal cortex in the left hemisphere and the cerebellum in the right hemisphere, independently of the response type; such lateralization was absent during the Swimmy task, however. Moreover, the prefrontal cortex amplified cerebellar activity, whereas the cerebellum suppressed prefrontal activity. This fronto–cerebellar loop may implement language and cognitive systems that enable goal-directed behavior during perceptual conflicts.

<https://www.nature.com/articles/s41467-022-35397-w>

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## Nature Scientific Reports

### PAPERS

#### **CARLOS ANTONIO RODRÍGUEZ-SALTOS et al – Song preferences predict the quality of vocal learning in zebra finches**

In songbirds, learning to sing is a highly social process that likely involves social reward. Here, we tested the hypothesis that during song learning, the reward value of hearing a particular song predicts the degree to which that song will ultimately be learned. We measured the early song preferences of young male zebra finches (*Taeniopygia guttata*) in an operant key-pressing assay; each of two keys was associated with a higher likelihood of playing the song of the father or that of another familiar adult (“neighbor”). To minimize the effects of exposure on learning, we implemented a novel reinforcement schedule that allowed us to detect preferences while balancing exposure to each song. On average, the juveniles significantly preferred the father’s song early during song learning, before actual singing occurs in this species. When they reached adulthood, all the birds copied the father’s song. The accuracy with which the father’s song was imitated was positively correlated with the peak strength of the preference for the father’s song during the sensitive period of song learning. Our results show that preference for the song of a chosen tutor, in this case the father, predicted vocal learning during development.

<https://www.nature.com/articles/s41598-023-27708-y>

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**VEERA M. RAJAGOPAL et al with IPSYCH-BROAD CONSORTIUM & ROBERT PLOMIN – Genome-wide association study of school grades identifies genetic overlap between language ability, psychopathology and creativity**

Cognitive functions of individuals with psychiatric disorders differ from that of the general population. Such cognitive differences often manifest early in life as differential school performance and have a strong genetic basis. Here we measured genetic predictors of school performance in 30,982 individuals in English, Danish and mathematics via a genome-wide association study (GWAS) and studied their relationship with risk for six major psychiatric disorders. When decomposing the school performance into math and language-specific performances, we observed phenotypically and genetically a strong negative correlation between math performance and risk for most psychiatric disorders. But language performance correlated positively with risk for certain disorders, especially schizophrenia, which we replicate in an independent sample ( $n = 4547$ ). We also found that the genetic variants relating to increased risk for schizophrenia and better language performance are overrepresented in individuals involved in creative professions ( $n = 2953$ ) compared to the general population ( $n = 164,622$ ). The findings together suggest that language ability, creativity and psychopathology might stem from overlapping genetic roots.

<https://www.nature.com/articles/s41598-022-26845-0>

**Neuron****PAPERS****SEAN WHALEN et al – Machine learning dissection of human accelerated regions in primate neurodevelopment**

Using machine learning (ML), we interrogated the function of all human-chimpanzee variants in 2,645 human accelerated regions (HARs), finding 43% of HARs have variants with large opposing effects on chromatin state and 14% on neurodevelopmental enhancer activity. This pattern, consistent with compensatory evolution, was confirmed using massively parallel reporter assays in chimpanzee and human neural progenitor cells. The species-specific enhancer activity of HARs was accurately predicted from the presence and absence of transcription factor footprints in each species. Despite these striking cis effects, activity of a given HAR sequence was nearly identical in human and chimpanzee cells. This suggests that HARs did not evolve to compensate for changes in the trans environment but instead altered their ability to bind factors present in both species. Thus, ML prioritized variants with functional effects on human neurodevelopment and revealed an unexpected reason why HARs may have evolved so rapidly.

[https://www.cell.com/neuron/fulltext/S0896-6273\(22\)01123-0](https://www.cell.com/neuron/fulltext/S0896-6273(22)01123-0)

**PLoS One****PAPERS****EROL J. OZMERAL & KATHERINE N. MENON – Selective auditory attention modulates cortical responses to sound location change for speech in quiet and in babble**

Listeners use the spatial location or change in spatial location of coherent acoustic cues to aid in auditory object formation. From stimulus-evoked onset responses in normal-hearing listeners using electroencephalography (EEG), we have previously shown measurable tuning to stimuli changing location in quiet, revealing a potential window into the cortical representations of auditory scene analysis. These earlier studies used non-fluctuating, spectrally narrow stimuli, so it was still unknown whether previous observations would translate to speech stimuli, and whether responses would be preserved for stimuli in the presence of background maskers. To examine the effects that selective auditory attention and interferers have on object formation, we measured cortical responses to speech changing location in the free field with and without background babble (+6 dB SNR) during both passive and active conditions. Active conditions required listeners to respond to the onset of the speech stream when it occurred at a new location, explicitly indicating 'yes' or 'no' to whether the stimulus occurred at a block-specific location either 30 degrees to the left or right of midline. In the aggregate, results show similar evoked responses to speech stimuli changing location in quiet compared to babble background. However, the effect of the two background environments diverges somewhat when considering the magnitude and direction of the location change and where the subject was attending. In quiet, attention to the right hemifield appeared to evoke a stronger response than attention to the left hemifield when speech shifted in the rightward direction. No such difference was found in babble conditions. Therefore, consistent with challenges associated with cocktail party listening, directed spatial attention could be compromised in the presence of stimulus noise and likely leads to poorer use of spatial cues in auditory streaming.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0268932>

**BENEDIKT ZOEFELE, REBECCA A. GILBERT & MATTHEW H. DAVIS – Intelligibility improves perception of timing changes in speech**

Auditory rhythms are ubiquitous in music, speech, and other everyday sounds. Yet, it is unclear how perceived rhythms arise from the repeating structure of sounds. For speech, it is unclear whether rhythm is solely derived from acoustic properties (e.g., rapid amplitude changes), or if it is also influenced by the linguistic units (syllables, words, etc.) that listeners extract from intelligible speech. Here, we present three experiments in which participants were asked to detect an irregularity in rhythmically spoken speech sequences. In each experiment, we reduce the number of possible stimulus properties that differ between intelligible and unintelligible speech sounds and show that these acoustically-matched intelligibility conditions nonetheless lead to differences in rhythm perception. In Experiment 1, we replicate a previous study showing that rhythm



perception is improved for intelligible (16-channel vocoded) as compared to unintelligible (1-channel vocoded) speech—despite near-identical broadband amplitude modulations. In Experiment 2, we use spectrally-rotated 16-channel speech to show the effect of intelligibility cannot be explained by differences in spectral complexity. In Experiment 3, we compare rhythm perception for sine-wave speech signals when they are heard as non-speech (for naïve listeners), and subsequent to training, when identical sounds are perceived as speech. In all cases, detection of rhythmic regularity is enhanced when participants perceive the stimulus as speech compared to when they do not. Together, these findings demonstrate that intelligibility enhances the perception of timing changes in speech, which is hence linked to processes that extract abstract linguistic units from sound.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0279024>

#### **KAI-YIN LIN & JEFFREY C. SCHANK – Small group size promotes more egalitarian societies as modeled by the hawk-dove game**

The social organization of groups varies greatly across primate species, ranging from egalitarian to despotic. Moreover, the typical or average size of groups varies greatly across primate species. Yet we know little about how group size affects social organization across primate species. Here we used the hawk-dove game (HDG) to model the evolution of social organization as a function of maximum group size and used the evolved frequency of hawks as a measure of egalitarian/despotism in societies. That is, the lower the frequency of hawks, the more egalitarian a society is, and the higher the frequency of hawks, the more despotic it is. To do this, we built an agent-based model in which agents live in groups and play the HDG with fellow group members to obtain resources to reproduce offspring. Offspring inherit the strategy of their parent (hawk or dove) with a low mutation rate. When groups reach a specified maximum size, they are randomly divided into two groups. We show that the evolved frequency of hawks is dramatically lower for relatively small maximum group sizes than predicted analytically for the HDG. We discuss the relevance of group size for understanding and modeling primate social systems, including the transition from hunter-gather societies to agricultural societies of the Neolithic era. We conclude that group size should be included in our theoretical understanding of the organization of primate social systems.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0279545>

#### **THARINA L. BIRD et al – Orb-web spider *Argiope* (Araneidae) as indigenous arrow poison of G//ui and G//ana San hunters in the Kalahari**

Hunting has been crucial in early human evolution. Some San (Bushmen) of southern Africa still practice their indigenous hunting. The use of poisons is one remarkable aspect of their bow-and-arrow hunting but the sources, taxonomic identifications of species used, and recipes, are not well documented. This study reports on fieldwork to investigate recent indigenous hunting practices of G//ui and G//ana San communities in the Central Kalahari Game Reserve (CKGR), Botswana. Here we discuss their use of spider poison. The hunters use the contents of the opisthosoma ('abdomen') of a spider as sole ingredient of the arrow poison and discard the prosoma that contains the venom-glands. Using taxonomic keys, we identified the spider as the garden orb-web spider *Argiope australis* (Walckenaer 1805) (Araneidae). The hunters' choice of this species is remarkable given the scientific perception that *A. australis* is of little medical importance. The species choice raises questions about how the spider fluids could kill game, particularly when the prosoma, which contains the venom glands, is not used. Possibilities include trauma, as a source of pathogens, or abdomen-containing toxins. Based on characteristics of *Argiope* Audouin 1826, we hypothesize that the choice of this species for arrow poisons might have evolved from the recognition of aposematic signalling or spiritual symbolism. Indigenous knowledge (IK) is an important source for advances in biotechnology but is in decline worldwide. The study contributes to the documentation of the San people, and their ancient IK, which is threatened by marginalization, political pressures, and climate change.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0276557>

### Proceedings of the Royal Society B

#### PAPERS

#### **JOHN F. HOFFECKER et al – Beringia and the peopling of the Western Hemisphere**

Did Beringian environments represent an ecological barrier to humans until less than 15 000 years ago or was access to the Americas controlled by the spatial-temporal distribution of North American ice sheets? Beringian environments varied with respect to climate and biota, especially in the two major areas of exposed continental shelf. The East Siberian Arctic Shelf ('Great Arctic Plain' (GAP)) supported a dry steppe-tundra biome inhabited by a diverse large-mammal community, while the southern Bering-Chukchi Platform ('Bering Land Bridge' (BLB)) supported mesic tundra and probably a lower large-mammal biomass. A human population with west Eurasian roots occupied the GAP before the Last Glacial Maximum (LGM) and may have accessed mid-latitude North America via an interior ice-free corridor. Re-opening of the corridor less than 14 000 years ago indicates that the primary ancestors of living First Peoples, who already had spread widely in the Americas at this time, probably dispersed from the NW Pacific coast. A genetic 'arctic signal' in non-arctic First Peoples suggests that their parent population inhabited the GAP during the LGM, before their split from the former. We infer a shift from GAP terrestrial to a subarctic maritime economy on the southern BLB coast before dispersal in the Americas from the NW Pacific coast.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2022.2246>

**TERESA RAIMONDI et al – Isochrony and rhythmic interaction in ape duetting**

How did rhythm originate in humans, and other species? One cross-cultural universal, frequently found in human music, is isochrony: when note onsets repeat regularly like the ticking of a clock. Another universal consists in synchrony (e.g. when individuals coordinate their notes so that they are sung at the same time). An approach to biomusicology focuses on similarities and differences across species, trying to build phylogenies of musical traits. Here we test for the presence of, and a link between, isochrony and synchrony in a non-human animal. We focus on the songs of one of the few singing primates, the lar gibbon (*Hylobates lar*), extracting temporal features from their solo songs and duets. We show that another ape exhibits one rhythmic feature at the core of human musicality: isochrony. We show that an enhanced call rate overall boosts isochrony, suggesting that respiratory physiological constraints play a role in determining the song's rhythmic structure. However, call rate alone cannot explain the flexible isochrony we witness. Isochrony is plastic and modulated depending on the context of emission: gibbons are more isochronous when duetting than singing solo. We present evidence for rhythmic interaction: we find statistical causality between one individual's note onsets and the co-singer's onsets, and a higher than chance degree of synchrony in the duets. Finally, we find a sex-specific trade-off between individual isochrony and synchrony. Gibbon's plasticity for isochrony and rhythmic overlap may suggest a potential shared selective pressure for interactive vocal displays in singing primates. This pressure may have convergently shaped human and gibbon musicality while acting on a common neural primate substrate. Beyond humans, singing primates are promising models to understand how music and, specifically, a sense of rhythm originated in the primate phylogeny.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2022.2244>

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## Science Advances

### PAPERS

**BAHAR TUNÇGENÇ, VALERIE VAN MULUKOM & MARTHA NEWSON – Social bonds are related to health behaviors and positive well-being globally**

At times of turmoil, such as during disasters, social crises, or pandemics, our social bonds can be key to receiving support and gaining certainty about the right course of action. In an analysis combining two global datasets (N = 13,264) collected during the first wave of the COVID-19 pandemic, this study examined how social bonds with close social circles (i.e., family and friends) and extended groups (i.e., country, government, and humanity) relate to engagement in health behaviors and psychological well-being. Results revealed that only family bonding was associated with self-reported engagement in health behaviors. Being strongly bonded with both close circles and extended groups predicted less anxiety and depression and better well-being, particularly for those who were bonded with more groups. These findings highlight that close and extended social bonds offer different sources of support and direction during the most challenging of circumstances and that continuous investment is needed to forge and maintain both.

<https://www.science.org/doi/full/10.1126/sciadv.add3715>

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## Trends in Cognitive Sciences

### PAPERS

**SASKIA L. FRISBY et al – Decoding semantic representations in mind and brain**

A key goal for cognitive neuroscience is to understand the neurocognitive systems that support semantic memory. Recent multivariate analyses of neuroimaging data have contributed greatly to this effort, but the rapid development of these novel approaches has made it difficult to track the diversity of findings and to understand how and why they sometimes lead to contradictory conclusions. We address this challenge by reviewing cognitive theories of semantic representation and their neural instantiation. We then consider contemporary approaches to neural decoding and assess which types of representation each can possibly detect. The analysis suggests why the results are heterogeneous and identifies crucial links between cognitive theory, data collection, and analysis that can help to better connect neuroimaging to mechanistic theories of semantic cognition.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(22\)00323-0](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(22)00323-0)

### COMMENTARIES

**BEATRICE DE GELDER – Social affordances, mirror neurons, and how to understand the social brain**

Gibson's notion of affordances refers to the opportunities for action that the environment offers, and that the organism can act upon. A good decade later, the discovery of mirror neurons (MNs) in rhesus macaques demonstrated that motor sequences are best viewed as actions (grasping) because they are organized by high-level goals (e.g., eating food) rather than by the physics of the effectors. The notion of affordance may resonate with MN researchers because it fits the idea that movements are organized as ensembles best defined by the agents' intention rather than by agent-independent physical properties. Recently, Bonini et al. [EAORC Bulletin 995] extended MN research on instrumental actions in the physical world to social interactions and linked MNs to a social affordance framework, placing the perception of conspecifics ('others') at the center. MNs and social affordance theory have been criticized for lack of clarity: does combining them promise a step forward in understanding the social brain?

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**LUCA BONINI et al with VITTORIO GALLESE – The mirror mechanism: linking perception and social interaction**

We thank Beatrice de Gelder for the opportunity to clarify some important points about our recent article in TiCs on the trends in mirror neuron research 30 years after their first description. The mainstream view of the mirror mechanism classically focused on agent-shared representations as a ground for social perception. Based on evidence accumulated over the past few years, even outside the mirror neuron literature, we proposed a new framework that marks a departure from the traditional view in three main ways. First, individual ‘mirror’ neurons do not constitute the unique core of the mechanism, which is locally distributed among a variety of cell types, encompassing inhibitory interneurons and corticostriatal neurons, in addition to corticospinal neurons; second, the mirror mechanism relies on a network of brain regions, linking areas primarily involved in perceptual processes with motor and visceromotor brain structures; and third, although having a well-established role in high-order perceptual functions, such as speech perception in humans, a hallmark function of the mirror mechanisms, which is phylogenetically preserved across vertebrate species, appears to be related to social interaction rather than social perception. We are pleased to address the three questions raised by de Gelder aimed at guiding future progress in social brain research, but we also take this occasion to clarify three misunderstandings we believe can be inferred from her reading of our perspective.

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**Trends in Ecology and Evolution**

**PAPERS**

**CARSTEN SCHRADIN et al – Harshness is not stress**

We must differentiate between stressful and harsh environments to understand animals’ resilience to global change. Harshness is not stress. Stressful environments activate the physiological stress response to increase energy availability, while harsh environments inhibit the physiological stress response to save energy.

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