

CONTENTS

NOTICES	1
PUBLICATION ALERTS.....	1
SCIENCE NEWS – Bullying allegations lead to firing of prominent ancient DNA expert.....	2
SCIENCE NEWS – What is love? It depends which language you speak.....	2
SCIENCE NEWS – Dancing chimpanzees may reveal how humans started to boogie.....	2
SOCIETY FOR SCIENCE – In some languages, love and pity get rolled into the same word.....	2
SCIENCE DAILY – Evolutionary changes in brain potentially make us more prone to anxiety.....	2
SCIENCE DAILY – The link between drawing and seeing in the brain.....	2
SCIENCE DAILY – Chimpanzees more likely to share tools, teach skills when task is complex.....	2
NATURE BRIEFING – Unknown human relative discovered in Philippine cave.....	2
GUARDIAN SCIENCE – Cha-cha-chimp? Ape study suggests urge to dance is prehuman.....	3
PUBLICATIONS	3
American Journal of Physical Anthropology.....	3
PAPERS	3
ELIZABETH V. LONSDORF et al – Sources of variation in weaned age among wild chimpanzees in Gombe National Park, Tanzania.....	3
Evolutionary Anthropology.....	3
PAPERS	3
SHI-XIA YANG et al with MICHAEL D. PETRAGLIA – The Paleolithic in the Nihewan Basin, China: Evolutionary history of an Early to Late Pleistocene record in Eastern Asia.....	3
Frontiers in Psychology.....	3
PAPERS	3
MICHAEL LEVIN – The Computational Boundary of a “Self”: Developmental Bioelectricity Drives Multicellularity and Scale-Free Cognition.....	3
LJILJANA PROGOVAC & ANTONIO BENÍTEZ-BURRACO – From Physical Aggression to Verbal Behavior: Language Evolution and Self-Domestication Feedback Loop.....	4
Nature Scientific Reports.....	4
PAPERS	4
KATHLEEN M. MCCARTHY – Development of neural perceptual vowel spaces during the first year of life.....	4
AURÉLIEN MIRALLES, MICHEL RAYMOND & GUILLAUME LECOINTRE – Empathy and compassion toward other species decrease with evolutionary divergence time.....	4
PNAS.....	5
ARTICLES	5
ANDREW WHITEN – Wild chimpanzees scaffold youngsters’ learning in a high-tech community.....	5
PAPERS	5
STEPHANIE MUSGRAVE et al with ELIZABETH LONSDORF & CRICKETTE SANZ – Teaching varies with task complexity in wild chimpanzees.....	5
LORENZO ROOK et al – Insights into the lower torso in late Miocene hominoid <i>Oreopithecus bambolii</i>	5
RICHARD A. ANDERSEN, TYSON AFLALO & SPENCER KELLIS – From thought to action: The brain–machine interface in posterior parietal cortex...5	5
GRAHAM L. BAUM et al – Development of structure–function coupling in human brain networks during youth.....	6
Trends in Cognitive Sciences.....	6
PAPERS	6
AXEL CLEEREMANS et al – Learning to Be Conscious.....	6
Trends in Ecology and Evolution.....	6
PAPERS	6
JOLLE W. JOLLES, ANDREW J. KING & SHAUN S. KILLEN – The Role of Individual Heterogeneity in Collective Animal Behaviour.....	6
To subscribe to the EAORC Bulletin	6
To unsubscribe from the EAORC Bulletin	6
Produced by and for the EAORC email group	7

NOTICES

PUBLICATION ALERTS

If you have had a paper or book published, or you see something which would be of interest to the group, do 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, do let me know.
And if you have any other ideas for extending the “EAORC experience”, please contact me.

SCIENCE NEWS – Bullying allegations lead to firing of prominent ancient DNA expert

Prominent evolutionary biologist Alan Cooper has been fired as director of the University of Adelaide’s Australian Centre for Ancient DNA (ACAD), the university announced today. Cooper’s ouster followed multiple allegations of bullying, which led the university to launch a probe and suspend him in August. The university said in a statement that it terminated Cooper “for reasons of serious misconduct.”

https://www.sciencemag.org/news/2019/12/bullying-allegations-lead-firing-prominent-ancient-dna-expert?utm_campaign=news_daily_2019-12-20&et rid=17774313&et cid=3133548

SCIENCE NEWS – What is love? It depends which language you speak

Falling in love is never easy. But do it in a foreign language, and complications pile up quickly, from your first fumbling attempts at deep expression to the inevitable quarrel to the family visit punctuated by remarks that mean so much more than you realize. Now, a study of two dozen terms related to emotion in nearly 2500 languages suggests those misunderstandings aren’t all in your head. Instead, emotional concepts like love, shame, and anger vary in meaning from culture to culture, even when we translate them into the same words.

https://www.sciencemag.org/news/2019/12/what-love-it-depends-which-language-you-speak?utm_campaign=news_daily_2019-12-20&et rid=17774313&et cid=3133548

SCIENCE NEWS – Dancing chimpanzees may reveal how humans started to boogie

One day in 2014, primatologist Yuko Hattori was trying to teach a mother chimpanzee in her lab to keep a beat. Hattori would play a repetitive piano note, and the chimp would attempt to tap out the rhythm on a small electronic keyboard in hopes of receiving a tasty piece of apple. Everything went as expected in the experiment room, but in the next room over, something strange was happening. Another chimpanzee, the mother’s son, heard the beat and began to sway his body back and forth, almost as if he were dancing. “I was shocked,” Hattori says. “I was not aware that without any training or reward, a chimpanzee would spontaneously engage with the sound.”

https://www.sciencemag.org/news/2019/12/dancing-chimpanzees-may-reveal-how-humans-started-boogie?utm_campaign=news_daily_2019-12-23&et rid=17774313&et cid=3137668

SOCIETY FOR SCIENCE – In some languages, love and pity get rolled into the same word

By studying semantic ties among words used to describe feelings in over 2,000 languages, researchers turned up cultural differences.

<http://click.societyforscience-email.com/?qs=97eae58c496005221f73d93c613ae53ba8123851d8f387c94778f0d7d6a01099f3022ac49f2a76a081db5e3009a080b5467fb8d6ac3c3203>

SCIENCE DAILY – Evolutionary changes in brain potentially make us more prone to anxiety

Neurochemicals such as serotonin and dopamine play crucial roles in cognitive and emotional functions of our brain. Vesicular monoamine transporter 1 (VMAT1) is one of the genes responsible for transporting neurotransmitters and regulating neuronal signaling. A research team has reconstructed ancestral VMAT1 proteins, revealing the functional changes in neurotransmitter uptake of VMAT1 throughout the course of human evolution.

<https://www.sciencedaily.com/releases/2019/12/191223095341.htm>

SCIENCE DAILY – The link between drawing and seeing in the brain

Drawing an object and naming it engages the brain in similar ways. The finding demonstrates the importance of the visual processing system for producing drawings of an object.

<https://www.sciencedaily.com/releases/2019/12/191223135500.htm>

SCIENCE DAILY – Chimpanzees more likely to share tools, teach skills when task is complex

A new study finds that chimpanzees that use a multi-step process and complex tools to gather termites are more likely to share tools with novices. The study helps illuminate chimpanzees' capacity for prosocial -- or helping -- behavior, a quality that has been recognized for its potential role in the evolution of human cultural abilities.

<https://www.sciencedaily.com/releases/2019/12/191224085703.htm>

NATURE BRIEFING – Unknown human relative discovered in Philippine cave

Bone fragments reveal a short-statured species — which researchers have named *Homo luzonensis* — that lived more than 50,000 years ago.

<https://www.nature.com/articles/d41586-019-01152-3>

GUARDIAN SCIENCE – Cha-cha-chimp? Ape study suggests urge to dance is prehuman

Chimpanzees seen clapping, tapping and swaying along to piano rhythms in a music booth

<https://www.theguardian.com/science/2019/dec/23/cha-cha-chimp-ape-study-suggests-urge-to-dance-is-prehuman>

PUBLICATIONS

American Journal of Physical Anthropology

PAPERS

ELIZABETH V. LONSDORF et al – Sources of variation in weaned age among wild chimpanzees in Gombe National Park, Tanzania

We analyzed 41 years of observational behavioral data from 65 offspring of 29 mothers to examine the relationships between weaned age (defined as cessation of suckling) in wild chimpanzees and maternal age, dominance rank and parity, and offspring sex. We used Cox proportional hazards regression with mixed effects to model time to weaning and to examine potential sources of variation in offspring weaned age.

We found that male offspring were less likely than female offspring to wean by a given age and that weaned age of males varied more than weaned age of females. In addition, maternal dominance rank interacted with offspring age, such that low-ranking mothers were less likely to wean offspring early, but this effect decreased with offspring age.

We found that male offspring and offspring of low-ranking females were less likely to wean early, but did not find evidence for variable weaning according to maternal age or parity. As more data accumulate, we will be better able to disentangle the effects of maternal dominance rank, age and parity. Such studies will not only provide a richer understanding of living ape life history characteristics, but will also provide an important framework for understanding the evolution of early weaning in humans.

<https://onlinelibrary.wiley.com/doi/full/10.1002/ajpa.23986?campaign=wolearlyview>

Evolutionary Anthropology

PAPERS

SHI-XIA YANG et al with MICHAEL D. PETRAGLIA – The Paleolithic in the Nihewan Basin, China: Evolutionary history of an Early to Late Pleistocene record in Eastern Asia

The Nihewan Basin of China preserves one of the most important successions of Paleolithic archeological sites in Eurasia. Stratified archeological sites and mammalian fossils, first reported in the 1920s, continue to be recovered in large-scale excavation projects. Here, we review key findings from archeological excavations in the Nihewan Basin ranging from ~1.66 Ma to 11.7 ka. We place particular emphasis on changes in stone tool technology over the long term. Though Pleistocene lithic industries from East Asia are often described as simple in character, re-evaluation of the stone tool evidence from the Nihewan Basin demonstrates significant, though periodic, innovations and variability in manufacturing techniques through time, indicating adaptive and technological flexibility on the part of hominins. Synthesis of paleoenvironmental and archeological data indicate changes in hominin occupation frequency in the Nihewan Basin, with chronological gaps suggesting that continuous presence in high, seasonal latitudes was not possible prior to the Late Pleistocene.

<https://onlinelibrary.wiley.com/doi/full/10.1002/evan.21813?campaign=wolearlyview>

Frontiers in Psychology

PAPERS

MICHAEL LEVIN – The Computational Boundary of a “Self”: Developmental Bioelectricity Drives Multicellularity and Scale-Free Cognition

All epistemic agents physically consist of parts that must somehow comprise an integrated cognitive self. Biological individuals consist of subunits (organs, cells, and molecular networks) that are themselves complex and competent in their own native contexts. How do coherent biological individuals result from the activity of smaller sub-agents? To understand the evolution and function of metazoan creatures' bodies and minds, it is essential to conceptually explore the origin of multicellularity and the scaling of the basal cognition of individual cells into a coherent larger organism. In this article, I synthesize ideas in cognitive science, evolutionary biology, and developmental physiology toward a hypothesis about the origin of Individuality: “Scale-Free Cognition.” I propose a fundamental definition of an Individual based on the ability to pursue goals at an appropriate level of scale and organization and suggest a formalism for defining and comparing the cognitive capacities of highly diverse types of agents. Any Self is demarcated by a computational surface – the spatio-temporal boundary of events that it can measure, model, and try to affect. This surface sets a functional boundary - a cognitive “light cone” which defines the scale and limits of its cognition. I hypothesize that higher level goal-directed activity and agency, resulting in larger cognitive boundaries, evolve from the primal homeostatic drive of living things to reduce stress – the difference between current conditions and life-optimal conditions. The mechanisms of developmental bioelectricity - the ability of all cells to form electrical networks that process information - suggest a plausible set of gradual evolutionary steps that naturally lead from physiological homeostasis in single cells to memory, prediction, and ultimately

complex cognitive agents, via scale-up of the basic drive of infotaxis. Recent data on the molecular mechanisms of pre-neural bioelectricity suggest a model of how increasingly sophisticated cognitive functions emerge smoothly from cell-cell communication used to guide embryogenesis and regeneration. This set of hypotheses provides a novel perspective on numerous phenomena, such as cancer, and makes several unique, testable predictions for interdisciplinary research that have implications not only for evolutionary developmental biology but also for biomedicine and perhaps artificial intelligence and exobiology.

https://www.frontiersin.org/articles/10.3389/fpsyg.2019.02688/full?utm_source=F-AAE&utm_medium=EMLF&utm_campaign=MRK_1191386_69_Psycho_20191224_arts_A

LJILJANA PROGOVAC & ANTONIO BENÍTEZ-BURRACO – From Physical Aggression to Verbal Behavior: Language Evolution and Self-Domestication Feedback Loop

We propose that human self-domestication favored the emergence of a less aggressive phenotype in our species, more precisely phenotype prone to replace (reactive) physical aggression with verbal aggression. In turn, the (gradual) transition to verbal aggression and to more sophisticated forms of verbal behavior favored self-domestication, with the two processes engaged in a mutually reinforcing feedback loop, considering that verbal behavior entails not only less violence and better survival but also more opportunities to interact longer and socialize with more conspecifics, ultimately enabling the emergence of more complex forms of language. Whereas in the case of self-domestication, sexual selection has been proposed to work against physical aggression traits, in the case of verbal insult, the selection has been proposed to work in favor of verbal aggression. The tension between these two seemingly opposing forces gets resolved/alleviated by a tendency to replace physical aggression with verbal aggression and with verbal behavior more generally. This also helps solve the paradox of the Self-Domestication Hypothesis regarding aggression, more precisely why aggression in humans has been reduced only when it comes to reactive aggression, but not when it comes to proactive aggression, the latter exhibiting an increase in the advent of modern language. We postulate that this feedback loop was particularly important during the time period arguably between 200 and 50 kya, when humans were not fully modern, neither in terms of their skull/brain morphology and their behavior/culture nor in terms of their self-domestication. The novelty of our approach lies in (1) giving an active role to early forms of language in interacting with self-domestication processes; (2) providing specific linguistic details and functions of this early stage of grammar (including insult and humor); (3) supplying neurobiological, ontogenetic, and clinical evidence of a link between (reactive) aggression and (reactive) verbal behavior; (4) identifying proxies of the earlier stages in evolution among cognitive disorders; and (5) identifying specific points of contact and mutual reinforcement between these two processes (self-domestication and early language evolution), including reduction in physical aggression and stress/tension, as well as sexual selection.

https://www.frontiersin.org/articles/10.3389/fpsyg.2019.02807/full?utm_source=F-AAE&utm_medium=EMLF&utm_campaign=MRK_1191386_69_Psycho_20191224_arts_A

Nature Scientific Reports

PAPERS

KATHLEEN M. MCCARTHY – Development of neural perceptual vowel spaces during the first year of life

This study measured infants' neural responses for spectral changes between all pairs of a set of English vowels. In contrast to previous methods that only allow for the assessment of a few phonetic contrasts, we present a new method that allows us to assess changes in spectral sensitivity across the entire vowel space and create two-dimensional perceptual maps of the infants' vowel development. Infants aged four to eleven months were played long series of concatenated vowels, and the neural response to each vowel change was assessed using the Acoustic Change Complex (ACC) from EEG recordings. The results demonstrated that the youngest infants' responses more closely reflected the acoustic differences between the vowel pairs and reflected higher weight to first-formant variation. Older infants had less acoustically driven responses that seemed a result of selective increases in sensitivity for phonetically similar vowels. The results suggest that phonetic development may involve a perceptual warping for confusable vowels rather than uniform learning, as well as an overall increasing sensitivity to higher-frequency acoustic information.

<https://www.nature.com/articles/s41598-019-55085-y>

AURÉLIEN MIRALLES, MICHEL RAYMOND & GUILLAUME LECOINTRE – Empathy and compassion toward other species decrease with evolutionary divergence time

Currently the planet is inhabited by several millions of extremely diversified species. Not all of them arouse emotions of the same nature or intensity in humans. Little is known about the extent of our affective responses toward them and the factors that may explain these differences. Our online survey involved 3500 raters who had to make choices depending on specific questions designed to either assess their empathic perceptions or their compassionate reactions toward an extended photographic sampling of organisms. Results show a strong negative correlation between empathy scores and the divergence time separating them from us. However, beyond a certain time of divergence, our empathic perceptions stabilize at a minimum level. Compassion scores, although based on less spontaneous choices, remain strongly correlated to empathy scores and time of divergence. The mosaic of features characterizing humans has been acquired gradually over the course of the evolution, and the phylogenetically closer a species is to us, the more it shares common traits with us. Our results could

be explained by the fact that many of these traits may arouse sensory biases. These anthropomorphic signals could be able to mobilize cognitive circuitry and to trigger prosocial behaviors usually at work in human relationships.

<https://www.nature.com/articles/s41598-019-56006-9>

PNAS

ARTICLES

ANDREW WHITEN – Wild chimpanzees scaffold youngsters' learning in a high-tech community

Across human history, the spiraling complexities of our technologies have been accompanied by a progressive elaboration in the schooling necessary to instill the skills that increasingly technological societies require. Among peoples who still subsist by foraging for wild foodstuffs using a toolkit that can be carried on one's back, there is much to learn, but extensive formal schooling is unnecessary, as seems likely for our species' long hunting and gathering past. By contrast, children in the societies that read this journal experience over a decade of schooling, and technical apprenticeships often last many years. Ape technologies, although much simpler than our own, also have been found, in recent years, to show much regional variation in complexity. Some populations display unimagined levels of sophistication in their manufacture and use of tools, significantly exceeding the complexity seen in other communities. Comparing 2 such relatively high-tech and low-tech communities, Musgrave et al. report in PNAS that, by analogy with the human technology–education linkages sketched above, young chimpanzees' social learning is more highly structured in the high-tech population, differing especially in the ways mothers offer costly support to the efforts of their offspring, which the authors class as an elementary form of teaching.

<https://www.pnas.org/content/early/2019/12/17/1920430117?etoc=>

PAPERS

STEPHANIE MUSGRAVE et al with ELIZABETH LONSDORF & CRICKETTE SANZ – Teaching varies with task complexity in wild chimpanzees

Cumulative culture is a transformative force in human evolution, but the social underpinnings of this capacity are debated. Identifying social influences on how chimpanzees acquire tool tasks of differing complexity may help illuminate the evolutionary origins of technology in our own lineage. Humans routinely transfer tools to novices to scaffold their skill development. While tool transfers occur in wild chimpanzees and fulfill criteria for teaching, it is unknown whether this form of helping varies between populations and across tasks. Applying standardized methods, we compared tool transfers during termite gathering by chimpanzees in the Goulougo Triangle, Republic of Congo, and in Gombe, Tanzania. At Goulougo, chimpanzees use multiple, different tool types sequentially, choose specific raw materials, and perform modifications that improve tool efficiency, which could make it challenging for novices to manufacture suitable tools. Termite gathering at Gombe involves a single tool type, fishing probes, which can be manufactured from various materials. Multiple measures indicated population differences in tool-transfer behavior. The rate of transfers and probability of transfer upon request were significantly higher at Goulougo, while resistance to transfers was significantly higher at Gombe. Active transfers of tools in which possessors moved to facilitate possession change upon request occurred only at Goulougo, where they were the most common transfer type. At Gombe, tool requests were typically refused. We suggest that these population differences in tool-transfer behavior may relate to task complexity and that active helping plays an enhanced role in the cultural transmission of complex technology in wild apes.

<https://www.pnas.org/content/early/2019/12/17/1907476116.abstract?etoc>

LORENZO ROOK et al – Insights into the lower torso in late Miocene hominoid *Oreopithecus bambolii*

Oreopithecus bambolii (8.3–6.7 million years old) is the latest known hominoid from Europe, dating to approximately the divergence time of the Pan-hominin lineages. Despite being the most complete nonhominin hominoid in the fossil record, the *O. bambolii* skeleton IGF 11778 has been, for decades, at the center of intense debate regarding the species' locomotor behavior, phylogenetic position, insular paleoenvironment, and utility as a model for early hominin anatomy. Here we investigate features of the IGF 11778 pelvis and lumbar region based on torso preparations and supplemented by other *O. bambolii* material. We correct several crucial interpretations relating to the IGF 11778 anterior inferior iliac spine and lumbar vertebrae structure and identifications. We find that features of the early hominin *Ardipithecus ramidus* torso that are argued to have permitted both lordosis and pelvic stabilization during upright walking are not present in *O. bambolii*. However, *O. bambolii* also lacks the complete reorganization for torso stiffness seen in extant great apes (i.e., living members of the Hominidae), and is more similar to large hylobatids in certain aspects of torso form. We discuss the major implications of the *O. bambolii* lower torso anatomy and how *O. bambolii* informs scenarios of hominoid evolution.

<https://www.pnas.org/content/early/2019/12/17/1911896116.abstract?etoc>

RICHARD A. ANDERSEN, TYSON AFLALO & SPENCER KELLIS – From thought to action: The brain–machine interface in posterior parietal cortex

A dramatic example of translational monkey research is the development of neural prosthetics for assisting paralyzed patients. A neuroprosthesis consists of implanted electrodes that can record the intended movement of a paralyzed part of the body, a computer algorithm that decodes the intended movement, and an assistive device such as a robot limb or computer that is controlled by these intended movement signals. This type of neuroprosthetic system is also referred to as a brain–machine interface (BMI) since it interfaces the brain with an external machine. In this review, we will concentrate on

BMIs in which microelectrode recording arrays are implanted in the posterior parietal cortex (PPC), a high-level cortical area in both humans and monkeys that represents intentions to move. This review will first discuss the basic science research performed in healthy monkeys that established PPC as a good source of intention signals. Next, it will describe the first PPC implants in human patients with tetraplegia from spinal cord injury. From these patients the goals of movements could be quickly decoded, and the rich number of action variables found in PPC indicates that it is an appropriate BMI site for a very wide range of neuroprosthetic applications. We will discuss research on learning to use BMIs in monkeys and humans and the advances that are still needed, requiring both monkey and human research to enable BMIs to be readily available in the clinic.

<https://www.pnas.org/content/early/2019/12/17/1902276116.abstract?etoc>

GRAHAM L. BAUM et al – Development of structure–function coupling in human brain networks during youth

The protracted development of structural and functional brain connectivity within distributed association networks coincides with improvements in higher-order cognitive processes such as executive function. However, it remains unclear how white-matter architecture develops during youth to directly support coordinated neural activity. Here, we characterize the development of structure–function coupling using diffusion-weighted imaging and n-back functional MRI data in a sample of 727 individuals (ages 8 to 23 y). We found that spatial variability in structure–function coupling aligned with cortical hierarchies of functional specialization and evolutionary expansion. Furthermore, hierarchy-dependent age effects on structure–function coupling localized to transmodal cortex in both cross-sectional data and a subset of participants with longitudinal data (n = 294). Moreover, structure–function coupling in rostralateral prefrontal cortex was associated with executive performance and partially mediated age-related improvements in executive function. Together, these findings delineate a critical dimension of adolescent brain development, whereby the coupling between structural and functional connectivity remodels to support functional specialization and cognition.

<https://www.pnas.org/content/early/2019/12/23/1912034117.abstract?etoc>

Trends in Cognitive Sciences

PAPERS

AXEL CLEEREMANS et al – Learning to Be Conscious

Consciousness remains a formidable challenge. Different theories of consciousness have proposed vastly different mechanisms to account for phenomenal experience. Here, appealing to aspects of global workspace theory, higher-order theories, social theories, and predictive processing, we introduce a novel framework: the self-organizing metarepresentational account (SOMA), in which consciousness is viewed as something that the brain learns to do. By this account, the brain continuously and unconsciously learns to redescribe its own activity to itself, so developing systems of metarepresentations that qualify target first-order representations. Thus, experiences only occur in experiencers that have learned to know they possess certain first-order states and that have learned to care more about certain states than about others. In this sense, consciousness is the brain's (unconscious, embodied, enactive, nonconceptual) theory about itself.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(19\)30287-6?dgcid=raven_jbs_aip_email](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(19)30287-6?dgcid=raven_jbs_aip_email)

Trends in Ecology and Evolution

PAPERS

JOLLE W. JOLLES, ANDREW J. KING & SHAUN S. KILLEN – The Role of Individual Heterogeneity in Collective Animal Behaviour

Social grouping is omnipresent in the animal kingdom. Considerable research has focused on understanding how animal groups form and function, including how collective behaviour emerges via self-organising mechanisms and how phenotypic variation drives the behaviour and functioning of animal groups. However, we still lack a mechanistic understanding of the role of phenotypic variation in collective animal behaviour. Here we present a common framework to quantify individual heterogeneity and synthesise the literature to systematically explain and predict its role in collective behaviour across species, contexts, and traits. We show that individual heterogeneity provides a key intermediary mechanism with broad consequences for sociality (e.g., group structure, functioning), ecology (e.g., response to environmental change), and evolution. We also outline a roadmap for future research.

[https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347\(19\)30319-2?dgcid=raven_jbs_aip_email](https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347(19)30319-2?dgcid=raven_jbs_aip_email)

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