

Technology, Behavior, and Human Evolution
HEB 45
Department of Human Evolutionary Biology, Harvard University
Fall 2024

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Office hours: Thursdays 12-2pm (11 Divinity Ave, 5th floor above the Peabody Museum) as well as by appointment via advance arrangement.

Course Days and Times: Tuesdays and Thursdays, 10:30-11:45 am

Location: Sever 102

Course website: <https://canvas.harvard.edu/courses/111597>

Course Description:

When does human history begin? We now know that some of the first *Homo sapiens* appeared over 315,000 years ago. Looking back to even earlier human species, around 2-3 million years ago, we would perhaps be surprised to encounter familiar behaviors: people walking upright, cooperating and socializing, hunting, and using technology. Everything that exists as written history represents less than 2% of what has happened since we emerged as a species, and less than 0.3% of what has happened since archaic humans first appeared. If we want to understand who we are, and why we do the things we do, we need to take a closer look at our relatives in the Paleolithic.

Technology, Behavior, and Human Evolution is an introductory course which offers primatological, fossil, environmental, genetic, and archaeological perspectives on the origins of human technology and behavior. Starting with the earliest hominins, each week we will examine central themes and developments in human evolution over the last 7 million years. Students will consider how the emergence and spread of new technologies, biological capacities, changing social dynamics, symbolic behaviors, and cultural complexity shaped human evolutionary trajectories. The behavioral repertoire of modern humans at the end of the last ice age will form the final part of the course.

Keywords: Human evolution, human behavior, cultural evolution, human origins, Palaeoanthropology, Paleolithic archaeology, behavioral evolution, hominins, hominids, technological development, history of technology, symbolic behavior, cultural complexity, deep history

Course Structure

We will meet twice a week to discuss topics in the evolution of human technology and behavior, beginning with our last common ancestor with

chimpanzees and ending with modern humans at the end of the last ice age. Our classes will be a combined lecture/discussion format. Museum visits and collections workshops will take place during our weekly meetings, details will be announced on Canvas in due course. **Our weekly topics and a course overview are as follows:**

Week .5: Introduction

- 3 and 5 September

Week 1: Pre- and non-human technology and culture

- 10 and 12 September

Week 2: Hello Great (10⁵) Grandma: Orienting ourselves in the human family tree

- 17 and 19 September

Week 3: Early hominin behaviors and technologies: 4-2 MYA

- 24 and 26 September

Week 4: Control of fire, nurturance, reciprocity, cooperation, and social learning

- 1 and 3 October

Week 5: Different strokes for different folks; or, Middle Pleistocene human diversity

- 8 and 10 October

Week 6: Cultural complexity and symbolic behavior in the Lower and Middle Palaeolithic

- Take-home midterm distributed: Available on Canvas Sunday, 6 October
- 15 and 17 October

Week 7: Universal intangibles: language, music, and dance

- Midterm due Sunday, 13 October by midnight on Canvas
- 22 and 24 October

Week 8: Human technology in development: 2 MYA-the Last Glacial Maximum

- 29 and 31 October

Week 9: Cultural complexity and symbolic behavior: *H. sapiens* and contemporaries

- 5 and 7 November

Week 10: Demography, exchange, conflict, and extinction

- 12 and 14 November

Week 11: Cumulative Culture

- 19 and 21 November

Your overall grade in the class will be determined by the following:

- 10% participation and attendance
- 20% weekly short-answer prompts
- 35% take-home midterm
- 35% in-class (seated) final examination

Each week you will need to submit **250-300 words** responding to a prompt. These responses will need to be **submitted on Canvas by 11:59 (at the**

latest) on the Friday following the second weekly class meeting. Students' name, ID number, date, instructor name, and word count are to appear at the top left corner of the first page of the essay. All pages must be numbered. Papers are to be double spaced, 12 point font (Palatino or Times New Roman) with 1.5" margins. A stylistically consistent AAA style Works Cited must be included at the end of the paper. **Generative AI may not be used in any capacity for the completion of course work.**

Formatting guidelines can be found here:

<https://americananthro.org/publications/publishing-style-guide/>

Weekly essay prompts will be uploaded to Canvas before the course start-date. Guides to help you write your short-answers, as well as study guides and practice questions for the midterm and final exams will be uploaded to Canvas in due course.

Course Policies and Expectations

Generative AI may not be used in any capacity for the completion of course work. This course offers students repeated, low-stakes opportunities for incisive and personalized feedback on your written work. This is a rare opportunity to improve and/or calibrate your academic and scientific writing. Please use it to best advantage!

Attendance and participation: To encourage in-class participation, 10% of your grade will be assessed from in-class attendance as assessed by exit tickets and participation in course discussions. Attendance at lectures and participation in discussions are crucial. Our time in the classroom provides the bulk of the information relating to the week's theme, and it is here that we unpack and critically evaluate the readings and material presented. **Please refrain from using laptops and phones for other purposes during our lecture time.**

Absences: If you need to miss a lecture or discussion due to illness or other extenuating circumstance, please email myself/Ellie **before** the class you need to miss. **Absences communicated after course meetings will only be excused with documentation.**

PLEASE NOTE: Students are prohibited from recording any class activity including lecture, lab, office hours or posting any class materials to any website. Following Harvard College rules, students that violate this policy will be referred to the Harvard College Administrative board.

Collaboration Policy: Collaboration between students plays an integral role in the learning and processing of information presented in this course. Students are therefore encouraged to discuss course material with classmates to better understand the material. However, any work that you submit for evaluation after such a discussion must be the result of your own effort and must be

submitted in your own words. To ensure the proper use of sources while at the same time recognizing and preserving the importance of the discussion and collaboration, the Faculty of Arts and Sciences adopted the following policy:

“It is expected that all homework assignments, projects, lab reports, papers, theses, and examinations and any other work submitted for academic credit will be the student’s own. Students should always take great care to distinguish their own ideas and knowledge from information derived from sources. The term ‘sources’ includes not only primary and secondary material published in print or online, but also information and opinions gained directly from other people. Quotations must be placed properly within quotation marks and must be cited fully. In addition, all paraphrased material must be acknowledged completely. Whenever ideas or facts are derived from a student’s reading and research or from a student’s own writings, the sources must be indicated.”
(from Student Handbook)

Academic Integrity: Discussion and the exchange of ideas are essential to developing a good understanding of the material. For weekly assignments you are encouraged to use lecture material and outside sources, and may consult with your classmates in formulating answers. However, after any discussions with peers, ensure that any answers you submit for evaluation are the result of your own research efforts and are written in your own words. In addition, you must cite any books, articles, websites, lectures, etc. that have helped you with your work using appropriate citation practices ([Harvard Guide to Using Sources](#)).

[The Harvard College Honor Code](#).: Members of the Harvard College community commit themselves to producing academic work of integrity – that is, work that adheres to the scholarly and intellectual standards of accurate attribution of sources, appropriate collection and use of data, and transparent acknowledgement of the contribution of others to their ideas, discoveries, interpretations, and conclusions. Cheating on exams or assignments, plagiarizing or misrepresenting the ideas or language of someone else as one’s own, falsifying data, or any other instance of academic dishonesty violates the standards of our community, as well as the standards of the wider world of learning and affairs.

Accommodations for students with disabilities: Students needing academic adjustments or accommodations because of a documented disability must present their Faculty Letter from the [Accessible Education Office \(AEO\)](#), and speak with me by the end of the second week of the term. All discussions will remain confidential, although we may need to contact the AEO to discuss appropriate implementation.

Late assignments and missed tests: Extensions will only be granted in exceptional circumstances, usually requiring documentation. If you require an extension on an assignment because of an emergency or Harvard-related reason

(e.g., for seniors with thesis deadlines), please let us know right away. Otherwise, late assignments will be downgraded by 5%/day late, with a maximum late submission of 72 hours (-15%). Missed tests cannot be made up unless you (a) arrange an alternative sufficiently in advance, or (b) are ill and obtain proper University Health Services documentation.

We will not curve this class. Following FAS guidelines, we will grade as follows: A range = excellent quality, full mastery of subject; B range = good comprehension of course material, and good commandment of skills; C range = adequate and satisfactory, basic requirements met; D range = unsatisfactory with minimal commandment of material. This course may be taken pass/fail. In order to receive a passing grade, a student must receive the equivalent of a C grade or higher. If you would like to take the course pass/fail, please contact me.

Equity, Diversity, Inclusion, and Belonging

In an academic context, promoting diversity, inclusion, and belonging hinges on facilitating a collegial and respectful classroom environment, acknowledging harm caused by prejudicial and discriminatory historical biases within the field, and taking steps to overcome these where they arise in modern scholarship. The study of human evolution raises numerous issues relevant to equity, diversity, inclusion, and belonging. Like many academic fields, these areas of inquiry were established when only certain groups of people were able or permitted to engage in and publish formal scientific research. In some cases, this research was informed by implicit or explicit bias and discrimination. Our course will attempt to overcome such biases through modeling sensitivity towards - and inclusiveness of - a variety of cultural norms and values. For example, lectures will not include photographs of human remains from cultures whose descendant communities have a cultural prohibition against this, and students will be warned at the beginning of class when lecture slides include photographs of modern human remains from any context (here defined as *Homo sapiens* remains post-dating 10,000 years ago). In a more general way, fostering diversity, inclusion, and belonging means respecting the plurality of lived experience. We will place an emphasis on communicating questions and differences in opinion respectfully and collegially. Scrutinizing bias is a valuable learning opportunity. This course will emphasize training students to think critically, to evaluate the reliability of information, and to use these skills to reject discriminatory, simplistic, or prejudicial ideas.

Technology, Behavior, and Human Evolution aims to teach what happened in human evolution and how that evolutionary history is relevant to people today, while maintaining an awareness of the harm that can be and has been inflicted by consciously or unconsciously misusing scientific findings. We hope that we can respectfully discuss issues of bias and representation should they arise, but please know that you can contact me (I will keep your identity confidential) if you have any suggestions to improve the quality of the course materials, or if

you feel something was said in class (by anyone) that you felt was disrespectful or discriminatory. If there is any way we can help your performance in this class, please know that we and others in the University are here to help. Additional resources include your Allston Burr Resident Dean, the Harvard Office for Equity, Diversity, Inclusion, and Belonging, and if you are experiencing emotional distress Harvard CAMHS has a Cares Line (617-495-2042) with mental health counselors available 24/7 along with many other mental health resources.

Course Materials and Access

Course Website: The Canvas website contains the syllabus and links to required readings and assignments. Class related announcements will also be disseminated through this page.

Below you will find the reading list for each week's class meeting. Please complete the assigned readings **before our first class meeting** each week, and be prepared to talk about them. Recommended reading denotes papers which will be useful to you in understanding key concepts but which are optional.

Week .5 Reading: Introduction to the course

- Desmond, A., & Haslam, M. (2024, June 17). What is intelligent life? *Aeon*.
<https://aeon.co/essays/why-intelligence-exists-only-in-the-eye-of-the-beholder>

Week 1 Reading: Pre- and non-human technology and culture

- Haslam, M., & Desmond, A. (2024, February 7). Tools of the Wild: Unveiling the Crafty Side of Nature. *Sapiens*. <https://www.sapiens.org/archaeology/archaeology-tool-user-intelligence/>
- McGrew, W.C. 2010. In search of the last common ancestor: new findings on wild chimpanzees. *Philosophical Transactions of the Royal Society B*, 365, 3267- 3276.
- Whiten, A., 2021. The burgeoning reach of animal culture. *Science*, 372(6537), p.eabe6514.

Week 2 reading: Hello Great (10⁵) Grandma: Orienting ourselves in the human family tree

- Lieberman, D.E. (2013). *The Story of the Human Body*. New York: Pantheon Books. Ch. 2, Upstanding Apes. pp 25-47.
- Maslin, M.A., Shultz, S. and Trauth, M.H., 2015. A synthesis of the theories and concepts of early human evolution. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 370(1663), p.20140064.

- Wrangham, R., & Pilbeam, D. (2001). African apes as time machines. In B. Galdikas, N.E. Briggs, L.K. Sheeran, G.L. Shapiro, & J. Goodall, (Eds.), *All Apes Great and Small Volume 1: African Apes* (pp. 5-18). Berlin: Springer-Verlag.
- **Recommended:** Wood, B. and Richmond, B.G., 2000. Human evolution: taxonomy and paleobiology. *The Journal of Anatomy*, 197(1), pp.19-60.

Week 3 reading: Early hominin technologies: 4-1.5 MYA

- Lieberman, D.E. (2013). *The Story of the Human Body*. New York: Pantheon Books. Chs. 3-4, Much Depends on Dinner and The First Hunter Gatherers
- Stout, D. 2011. Stone toolmaking and the evolution of human culture and cognition. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 366(1567), 1050-1059.
- Ungar, P.S. and Sponheimer, M., 2011. The diets of early hominins. *Science*, 334(6053), pp.190-193.

Week 4 Reading: Control of fire, nurturance, reciprocity, cooperation, and social learning

- Gowlett, J.A. and Wrangham, R.W., 2013. Earliest fire in Africa: towards the convergence of archaeological evidence and the cooking hypothesis. *Azania: Archaeological Research in Africa*, 48(1), pp.5-30.
- Hlubik, S., Cutts, R., Braun, D. R., Berna, F., Feibel, C. S., & Harris, J. W. (2019). Hominin fire use in the Okote member at Koobi for, Kenya: New evidence for the old debate. *Journal of Human Evolution*, 133, 214-229. <https://doi.org/10.1016/j.jhevol.2019.01.010>
- Tomasello, M., Melis, A.P., Tennie, C., Wyman, E. and Herrmann, E., 2012. Two key steps in the evolution of human cooperation: The interdependence hypothesis. *Current anthropology*, 53(6), pp.673-692.
- **Recommended:** Foley, R. and Gamble, C., 2009. The ecology of social transitions in human evolution. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1533), pp.3267-3279.

Week 5 Reading: Different strokes for different folks; or, Middle Pleistocene human diversity

- DeLoache, J. S. (2004). Becoming symbol-minded. *Trends in Cognitive Sciences*, 8(2). 66-70
- Harvati, K., & Reyes-Centeno, H. (2022). Evolution of Homo in the Middle and Late Pleistocene. *Journal of human evolution*, 173, 103279.
- Scardia, G., Neves, W.A., Tattersall, I. and Blumrich, L., 2021. What kind of hominin first left Africa?. *Evolutionary Anthropology: Issues, News, and Reviews*, 30(2), pp.122-127.

Week 6 Reading: Cultural complexity and symbolic behavior in the Lower and Middle Paleolithic

- Alpers-Afil, Nira, 'Acheulian Cognition and Behavior at Gesher Benot Ya'aqov', in Thomas Wynn, Karenleigh A. Overmann, and Frederick L. Coolidge (eds), *The Oxford Handbook of Cognitive Archaeology* (online edn, Oxford Academic, 19 May 2022),
- Clark, A., & Chalmers, D. (1998). The extended mind. *Analysis*, 58(1), 7-19.
- Conard, N.J., Serangeli, J., Böhner, U., Starkovich, B.M., Miller, C.E., Urban, B. and Van Kolfschoten, T., 2015. Excavations at Schöningen and paradigm shifts in human evolution. *Journal of Human Evolution*, 89, pp.1-17.
- **Recommended:** Hovers, E., & Belfer-Cohen, A. 2006. "Now You See it, Now You Don't"—Modern Human Behavior in the Middle Paleolithic. In *Transitions before the transition* (pp. 295-304). Springer US.

Week 7 Reading: Universal intangibles: language, music, and dance

- Everett, D. (2017). Did *Homo erectus* speak? *Aeon*.
<https://aeon.co/essays/tools-and-voyages-suggest-that-homo-erectus-invented-language>
- Ian, C., & Morley, I. (2010). The evolution of music: Theories, definitions and the nature of the evidence (S. Malloch & C. Trevarthen, Eds.; Issue 5, pp. 61-81). Oxford University Press.
- Laland, K., Wilkins, C., & Clayton, N. (2016). The evolution of dance. *Current Biology*, 26(1), R5-R9.
- Tattersall, I., 2014. An evolutionary context for the emergence of language. *Language Sciences*, 46, pp.199-206.
- **Recommended:** D'Errico, F., Henshilwood, C., Lawson, G et al. 2003. Archaeological evidence for the emergence of language, symbolism and music - an alternative multidisciplinary perspective. *Journal of World Prehistory* 17, 1, 1-70.
- **Recommended:** Mithen, S.J. 2007. The Network of Brain, Body, Language, and Culture. In W. Henke and I. Tattersall (eds), *Handbook of Paleoanthropology*. Berlin, Springer: 1965-2000.

Week 8 Reading: Human technology in development

- Berecz, B., Cyrille, M., Casselbrant, U., Oleksak, S., & Norholt, H. (2020). Carrying human infants—An evolutionary heritage. *Infant Behavior and Development*, 60, 101460.
- Wadley, L. 2013. Recognizing Complex Cognition through Innovative Technology in Stone Age and Palaeolithic Sites. *Cambridge Archaeological Journal*, 23, 163-183 doi:10.1017/S0959774313000309.
- Wadley, L., 2021. What stimulated rapid, cumulative innovation after 100,000 years ago?. *Journal of Archaeological Method and Theory*, 28(1), pp.120-141.
- **Recommended:** Kuhn, S.L., 2014. Mousterian lithic technology. In *Mousterian Lithic Technology*. Chapter 1: Neanderthals and the Mousterian. Princeton University Press.

Week 9 Reading: Cultural complexity and symbolic behavior: *H. sapiens* and contemporaries

- d'Errico, F. and Stringer, C. B. 2011. Evolution, revolution or saltation scenario for the emergence of modern cultures? *Philosophical Transactions of the Royal Society B-Biological Sciences*, 366(1567). 1060-1069.
- Mithen, S.J., 1988. Looking and learning: Upper Palaeolithic art and information gathering. *World Archaeology*, 19(3), pp.297-327.
- Tennie, C., Call, J., & Tomasello, M. (2009). Ratcheting up the ratchet: on the evolution of cumulative culture. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1528), 2405-2415.
- **(Highly!) Recommended:** A podcast on the subject can be found here: https://downloads.royalsociety.org/audio/DM/DM2010_06/dErrico.mp3

Week 10 Reading: Demography, exchange, conflict, and extinction

- Kolodny, O. and Feldman, M.W., (2017). A parsimonious neutral model suggests Neanderthal replacement was determined by migration and random species drift. *Nature communications*, 8(1), pp.1-13.
- Powell, A., Shennan, S., Thomas, M.G. 2009. Late Pleistocene Demography and the Appearance of Modern Human Behavior. *Science* 324 (5932). 298-1301 <https://doi: 10.1126/science.1170165>
- Stringer, C. (2012). Evolution: What makes a modern human. *Nature*.
- **(Highly!) Recommended:** a great youtube video here which synthesizes lots of the themes we've been talking about (**first 35 mins** and subsequent Q&A if you like): <https://www.youtube.com/watch?v=PbsuzQA41wU> **Seminar by Professor Chris Stringer: Some current issues in the later stages of human evolution.**
- **Recommended:** Villa, P., Roebroeks, W., 2014. Neandertal Demise: An Archaeological Analysis of the Modern Human Superiority Complex. *PLoS ONE* 9(4): e96424. Doi:10. 1371/journal.pone.0096424

Week 11 Reading: Cumulative Culture

- Boyd, R., Richerson, P. J. and Henrich, J. 2011. Colloquium Paper: The cultural niche: Why social learning is essential for human adaptation. *Proceedings of the National Academy of Sciences*, 108(Supplement_2), 10918-10925.
- Tomasello, M. and Moll, H., 2010. The Gap is Social: Human Shared Intentionality and Culture. In: Kappeler, P. M. and Silk, J. eds. *Mind the Gap*. Springer Berlin Heidelberg, 331-349.
- Whiten, A. & Erdal, D. 2012. The human socio-cognitive niche and its evolutionary origins.
- **Recommended:** Bjorklund, D., Causey, K. and Periss, V., 2010. The Evolution and Development of Human Social Cognition. In: Kappeler, P. M. and Silk, J. eds. *Mind the Gap*. Springer Berlin Heidelberg, 351-371.