

ARCL0169 – Technology within Society

2023/24, Term 1

MA/MSc optional module, 15 credits



Co-ordinators: **Mike Charlton** and **Miljana Radivojević**
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Room 210, office hours during term time: Tuesdays 14:00-16:00

Moodle: ARCL0169

with contributions from **Maja Miše**, **Bill Sillar** and **Stephen Shennan**

Key Dates:

Assessment 1: Project Proposal

- **Draft:** 24 November
- **Peer Review:** 1 December
- **Integrated proposal:** 19 December

Assessment 2: Standard Essay

- 9 January 2024

IMPORTANT INFORMATION REGARDING ASSESSMENTS:

The **coursework coversheet** is available on the course Moodle pages and [here](#): under "Policies, Forms and Guidelines".

Please enter **your five-digit candidate code on the coversheet and *in the subject line*** when you upload your work in Moodle.

Please use **your five-digit candidate code as the name of the file** you submit.

Please refer to the [IoA Student Handbook](#) and [IoA Study Skills Guide](#) for instructions on coursework submission, IoA referencing guidelines and marking criteria, as well as UCL policies on penalties for late submission, over-length work and academic misconduct.

The use of software to generate content is not allowed for assessments for this course and will be penalised; the use of software for language and writing review and improvement is permitted, and the software and the way it has been used must be indicated in the relevant boxes on the coursework coversheet. UCL defines language and writing review as checking "areas of academic writing such as structure, fluency, presentation, grammar, spelling, punctuation, and language translation".

Module overview

Module description

This module introduces concepts and theories used to study the social significance of technology and material culture. Students will debate how these are being applied in the analysis of archaeological artefacts. Seminars will use case studies to explore anthropological, archaeological and material science approaches to the study of technology and material culture. The module follows the life-history of artefacts, exploring the sequence of raw-material acquisition, production, use, and disposal, as well as site formation processes and archaeological excavation. We will also consider how artefacts and their methods of manufacture are embedded in society, and how archaeologists can investigate their use and meaning. On a more practical level, we will discuss the description of assemblages using simple statistics and how to deal with very large assemblages by sampling.

Debating technology from an anthropologically-informed perspective should help students to think creatively about how the analysis of artefacts can be used to address wider research questions.

A group project will require students to work together on one or several archaeological sites and to develop an overarching research project that will then be addressed by several individual projects focusing on a specific type of artefact, using either scientific or typological analysis.

The wide-ranging introduction to theories and approaches used in the study of archaeological artefacts and technologies should equip students to consider these ideas in relation to their other module options and dissertation projects.

Module Aims

This module introduces a wide range of concepts and ideas used in artefact studies, with a strong critical consideration of the academic and theoretical significance of such research. More specifically, the module aims:

- to provide a wide-ranging and challenging introduction to the role of artefact studies in modern archaeology
- to encourage students to think about technology from an anthropologically informed perspective that focuses on how and why people make and use artefacts
- to encourage an interdisciplinary approach to artefact studies and the scientific analysis of materials.

On successful completion of this module a student should:

- be familiar with a wide range of recent archaeological, anthropological, and theoretical debates about the role of material culture and technology in society
- participate in debates about how to apply practical approaches to the study of artefacts to address wider archaeological research questions
- consider the potential advantages and constraints inherent in different approaches to artefact analysis.

Learning Outcomes

On successful completion of the module students should have developed the following abilities:

- to identify and develop relevant research questions
- to identify relevant data to be identified and recorded to answer specific research questions
- to reflect on the available analytical methods with which to address specific research questions
- to work as an individual and as a group to develop a project proposal
- use their knowledge of different approaches to a topic to participate in discussion and to develop a reasoned argument as to why they favour one or more of these
- ability to comment of the work of fellow students in a constructive way.

Methods of Assessment

-Research Proposal (50%)

- Part 1 – proposal draft (20%)
- Part 2 – peer review (10%)
- Part 3 – Final integrated draft (20%)

-Standard Essay (50%)

Communications

- **The Moodle is the main hub** for this course.
- Important information will be posted by staff in the **Course Information section of the Moodle** and you will automatically receive an email notification for these.
- Please post any general queries relating to module content, assessments and administration in the Moodle Q&A or via email. The forum will be checked regularly.
- For personal queries, please contact the module co-ordinator by email.

Workload

This is a 15-credit module which equates to 150 hours of learning time, including session preparation, background reading, and researching and producing your assignments. With that in mind you should expect to organise your time in roughly this way:

20 hours	Staff-led teaching sessions (lectures, seminars, discussion sessions)
60 hours	Self-guided session preparation (reading, listening, note-taking, online activities, independent practice), about six hours a week
35 hours	Research for and writing the Standard Essay (50%)
35 hours	Research for and writing the Research Proposal (50%)

Week-by-week summary

Schedule

Tuesdays 11:00-13:00, term 1

Week	Lecture	Date	Title	Name
1	1	3/10	Introduction to the course: what is technology? Research projects presentation and design	MC/MR
2	2	10/10	Chaîne opératoire and operating chains Project discussion	MC
3	3	17/10	Technological style and technological choice proposal meeting	BS
4	4	24/10	Assemblages: sampling and descriptive statistics	MC
5	5	31/10	Archaeology of production	MC
6		6-12/11	Reading Week	
7	6	14/11	Distribution and circulation	MM
8	7	21/11	Raw materials selection and materials analysis	MR
9	8	28/11	Invention and innovation	MR
10	9	5/12	Technology as an extended phenotype of human behaviour	SS
11	10	12/12	Research project feedback and discussion	MR/MC

MC Mike Charlton

MR Miljana Radivojević

BS Bill Sillar

SS Stephen Shennan

MM Maja Miše

Weekly Module Plan

The module is taught through lectures, demonstrations and discussions. Students will be required to undertake set readings, complete pre-class activities in order to participate in the discussion.

Tuesdays 11:00-13:00: Live seminar discussions

Monday 17.00: deadline to complete discussion board activity.

There is a weekly online discussion (Discussion Forum, <https://moodle.ucl.ac.uk/mod/forum/view.php?id=2349835>). Lecturers will pose a question on the Moodle one week in advance of the Online Meeting on Tuesday, and you all should post an answer and join the discussion till the Friday before the Online Meeting. You should be able to use your knowledge from your Undergraduate Studies and the other courses you are taking to provide examples, so we will have the chance to look at a given problem using the archaeology of a wide range of time periods and regions.

Depending on class-size, we will have one or several groups for the Research Project. You will need to meet/communicate to discuss the common introduction and the allocation of sub-projects. The scheduling of this is up to you.

Recommended basic texts and online resources

General texts

- Boivin, N. 2008. *Material cultures, material minds: the impact of things on human thought, society, and evolution*. Cambridge, Cambridge University Press. INST ARCH AH BOI
- Boyd, B. L. 2018. Archaeologies of Technology. In: Varela, S. L. (ed.), *The Encyclopedia of Archaeological Sciences*. Hoboken, John Wiley & Sons, 1-4. Online
- Dant, T. 1999. *Material culture in the social world: values, activities, lifestyles*. Buckingham, Open University Press. ANTHROPOLOGY C 9 DAN
- Dobres, M.-A. 2009. Archaeologies of technology. *Cambridge Journal of Economics* 34/1, 103-114. Open Access
- Dobres, M.-A. 2000. *Technology and social agency: outlining a practice framework for archaeology*. Oxford, Blackwell.
- Hallam, E., Ingold, T. 2014. Making and growing: an introduction. In: Hallam, E., Ingold, T. (eds), *Making and Growing: Anthropological studies of organisms and artefacts*. Farnham, Ashgate, 1-24. Online
- Henare, A., Holbraad, M., Wastell, S. (eds) 2007. *Thinking through things: theorising artefacts ethnographically*. Abingdon, Routledge. ANTHROPOLOGY C 9 HEN
- Hodder, I. The paradox of the long term: human evolution and entanglement. *Journal of the Royal Anthropological Institute* 26/2, 389-411. Online
- Kozatsas, J. 2020. *The Dialectic of Practice and the Logical Structure of the Tool: Philosophy, Archaeology and the Anthropology of Technology*. Oxford, [Archaeopress](#). DOI: 10.2307/j.ctvwh8c23
- Lemonnier, P. 1986. The study of material culture today: towards an anthropology of technical systems. *Journal of Anthropological Archaeology* 5, 147-86. Online
- Lemonnier, P. 1992. *Elements for an anthropology of Technology*. Anthropological Papers Museum of Anthropology University of Michigan 88, Ann Arbor Michigan
- Maldonado, B. E. 2018. *Tarascan Copper Metallurgy: A multiapproach Perspective*, Oxford, Archaeopress, Chapter 2. Online
- Miller, H. M.-L. 2007. *Archaeological approaches to technology*. London/Amsterdam, Elsevier/Academic Press. INST ARCH K MIL
- Olsen, Bj. 2010. *In defense of things. Archaeology and the ontology of objects*. Lanham, Altamira. INST ARCH AH OLS
- Schiffer, M. B. 1999. *The material life of human beings: artefacts, behavior and communication*. London, Routledge. INST ARCH BD SCH
- Sigaut, F. 1994. Technology. In: T. Ingold (ed.), *Companion Encyclopedia of Anthropology*. Routledge, London, 420-459.
- Thornton, Chr. P. 2009. Archaeometallurgy: Evidence of a paradigm shift? In: Kienlin, T. L.; Roberts, B. W. (eds), *Metals and societies. Studies in honour of Barbara S. Ottaway*. Universitätsforschungen zur prähistorischen Archäologie 169, Bonn Habelt, 25-33. Inst Arch KEA QTO KiE

Syllabus

Week 1: Introduction to the course: what is technology? Research projects presentation and design

Mike Charlton and Miljana Radivojevic

This introductory lecture will explore some basic properties of technology and its entangled relationships with culture and society. Following a summary of course structure and aims, we will explore the way research projects are designed and organized in archaeology. This will help you to design your own Research Project (assessment 1) and should also help you in planning your dissertation. Depending on the number of students in the class, we will suggest some sites your project can be based on and decide group-membership.

Basic reading

Buxeda i Garrigós, J., Madrid i Fernandez, M. 2016. Designing rigorous Research: Integrating Science and Archaeology. In: A. Hunt (ed.), *The Oxford Handbook of Archaeological Ceramic Analysis*. Oxford, Oxford University Press.

DOI: 10.1093/oxfordhb/9780199681532.013.3

Lee, E. (2006) 'Management of research projects in the historic environment : The MoRPHE Project Managers Guide', *The MoRPHE Project Managers Guide*, 1.

Jones, A. 2002. *Archaeological Theory and Scientific practice*. Cambridge, Cambridge University Press.

Silliman, St. W. (ed.) 2018. *Engaging Archaeology, 25 Case Studies in Research Practice*. Chichester, Wiley Blackwell. ONLINE

Further Reading

Binford, L. R. 1964. A consideration of archaeological research Design. *American Antiquity* 29/4, 425-441. Online

Gorard, St. 2017. *Research Design: Creating Robust Approaches for the Social Sciences*. London, Sage. Online

Hodder, I. 1999. *The Archaeological Process: an introduction*. London, Blackwell. INST ARCH AH HOD

Examples from Archaeology

Haggis, D. C. 2015. The Archaeology of Urbanization: Research Design and the Excavation of an Archaic Greek City on Crete. In: Haggis, D. C., Antonaccio, C. (eds.), *Classical Archaeology in Context, Theory and Practice in Excavation in the Greek World*. Berlin, De Gruyter, 219–258. DOI: <https://doi.org/10.1515/9781934078471>

Halpern, B. 1998. Research Design in Archaeology: The Interdisciplinary Perspective. *Near Eastern Archaeology* 61/1, 53-65. Stable URL: <https://www.jstor.org/stable/3210676>

Hanks, B., Doonan, R. 2007. From Scale to Practice: A New Agenda for the Study of Early Metallurgy on the Eurasian Steppe. *Journal of World Prehistory* 22/4, 329-356. Online

*Museum of London 2002. *A research framework for London archaeology* London, Museum of London. INST ARCH DAA 416 Qto MUS

Prehistoric Ceramics Research Group 1995. *The study of later prehistoric pottery: general policies and guidelines for analysis and publication*. Prehistoric Ceramics Research Group Occasional Papers 1 and 2. INST ARCH KD PRE

Shimada I., Wagner, U. 2007. A holistic Approach to Pre-Hispanic Craft Production. In: Skibo, J. M. et al. (eds.), *Archaeological anthropology: perspectives on method and theory*. Tucson, University of Arizona Press, 163-197.

Examples from other countries:

Netherlands: Programme Future directions in Dutch archaeological research

<https://www.nwo.nl/en/research-and-results/programmes/future+directions+in+dutch+archaeological+research>

Wesson, C. B., Cottier, J. W. 2014. Big Sites, Big Questions, Big Data, Big Problems: Scales of Investigation and Changing Perceptions of Archaeological Practice in the Southeastern United States. *Bulletin of the History of Archaeology*, 24/16, 1–11. DOI: <http://dx.doi.org/10.5334/bha.2416>

Week 2: Chaîne opératoires and operating Chains

Mike Charlton

Artefact life-histories can be studied as a process, investigating the changing composition, morphology and meaning of artefacts from resource procurement through manufacture and use to discard, or even beyond this stage. We will consider the concepts of *chaîne opératoire* and artefact biography as analytical methods and interpretative theories.

Essential Reading

Gosden C., Malafouris, L. 2015. Process archaeology (P-Arch). *World Archaeology* 47/5, 701-717. Online

Joy, J. 2009 Reinvigorating object biography: reproducing the drama of object lives, *World Archaeology*, 41:4, 540-556, DOI: 10.1080/00438240903345530

Schlanger, N. 2005. The chaîne opératoire. In: C. Renfrew, P. Bahn (eds.), *Archaeology, The key concepts*. London, Routledge. INST ARCH AG REN

Further Reading

Appadurai, A. (ed.) 1986. *The social life of things: commodities in cultural perspective*. Cambridge, Cambridge University Press. INST ARCH BD APP

Audouze, F. 2002. Leroi-Gourhan, a philosopher of technique and evolution. *Journal of Archaeological Research* 10/4, 277-306. On-line

Bar-Yosef, O., Van De Meer, P. 2009. The Chaîne Opératoire approach in Middle Palaeolithic archaeology. *Current Anthropology* 50/1, 103–131. ONLINE

Benco, N. L., Ettahiri, A., Loyet, M. 2002. Worked bone tools: linking metal artisans and animal processors in medieval Islamic Morocco. *Antiquity* 76, 447-57. Online

Binford, L. 1983. *In Pursuit of the past*. London, Thames and Hudson. Chapter 6: Hunters in a Landscape, 109-143. INST ARCH AH BIN

Boschung, D., Kreuz, P. A., Kienlin, T. (eds) 2015. *Biography of Objects: Aspekte eines kulturhistorischen Konzepts*. Paderborn, Wilhelm Fink.

Chanteller, Ch. 2008. Lithic technology and the Chaîne Opératoire. In: Pollard, J. (ed.), *Prehistoric Britain*. London, Blackwell, 160-176. INST ARCH DAA 100 POL

Collins, M. B. 1975. Lithic technology as a means of processual inference. In: Swanson E. (ed.) *Lithic technology: Making and using stone tools*. The Hague, Mouton, 15-34. INST ARCH KA 3 SWA

Crabtree, D. E. 1975. Comments on lithic technology and experimental archaeology. In: Swanson, E. (ed.) *Lithic technology: Making and using stone tools*. The Hague: Mouton, 105-113. INST ARCH KA SWA

David, N., Kramer C. 2001. *Ethnoarchaeology in action*. Cambridge, Cambridge University Press, Chapter 6. INST ARCH AH DAV

- Dobres, M.-A. 1999. Technology's links and *chaînes*: the processual unfolding of technique and technician. In: Dobres, M.-A., Hoffman, C. R. (eds.), *The social dynamics of technology: Practice, politics, and world views*. Washington: Smithsonian Institution Press, 124-146. INST ARCH AH DOB
- Gosden, Chr., Marshall, Y. 1999. The cultural biography of objects. *World Archaeology* 31/2, 169-178. INST ARCH PERS, On-line
- Holtorf, C. 2002. Notes on the life history of a pot sherd. *Journal of Material Culture* 7/1, 49-71.
- Hoskins, J. 1998. *Biographical objects: How things tell the stories of people's lives*. London, Routledge. INST ARCH DNB HOS MAIN.
- Ingold, T. 1999. Tools for the hand, language for the face: An appreciation of Leroi-Gourhan's *Gesture and Speech*. [Studies in History and Philosophy of Biological and Biomedical Sciences](#) 30, 411-453. Online
- Jennings, J., et al. 2005. Drinking beer in a blissful mood: Alcohol production, operational chains, and feasting in the Ancient World. *Current Anthropology* 46/2, 275-303. Online
- Kopytoff, I. 1986. The cultural biology of things: Commoditization as process. In: Appadurai, A. (ed.), *The social life of things: commodities in cultural perspective*. Cambridge, Cambridge University Press, 64-94. INST ARCH BD APP
- Lucas, G. 2005. *The archaeology of time*. London, Routledge. Chapter 4: Case study: the life and times of a Roman jar, 95-113. INST ARCH AH LUC
- Meskel, L. 2004. *Object worlds in Ancient Egypt: Material biographies past and present*. Berg, Oxford. EGYPTOLOGY B 20 MES, ANTHROPOLOGY D 9 MES
- Oras, E., et al. 2017. Archaeological science and object biography: A Roman bronze lamp from Kavastu bog (Estonia). *Antiquity* 91 (355), 124-138. doi:10.15184/aqy.2016.247
- Schiffer, M. B. 1975. Behavioural Chain Analysis: Activities, organization, and the use of space. *Fieldiana* 65, 103-174 (reprinted in M. B. Schiffer 1995, *Behavioral Archaeology: first principles*. Salt Lake City, University of Utah Press, 55-66.). INST ARCH AH SCH
- Schiffer, M. B. 1999. *The material life of human beings: artefacts, behavior, and communication*. London, Routledge. INST ARCH BD SCH
- Schlanger, N. 1994. Mindful technology: unleashing the *chaîne opératoire* for an archaeology of mind. In: C. Renfrew, E. Zubrow (eds), *The Ancient Mind: elements for cognitive archaeology* Cambridge, Cambridge University Press, 143-151. INST ARCH AH REN
- Schlanger, N., Sinclair, A. (eds.) 1990. Technology in the humanities. *Archaeological Review from Cambridge* 9/1, INST ARCH 2194, INST ARCH Pers, especially:
- o Ingold, T. Society, nature and the concept of technology, 5-17,
 - o Cresswell, R., 'A New Technology' revisited, 39-54,
 - o Edmonds, M., Description, understanding and the *chaîne opératoire*, 55-70,
 - o Pigeot, N., Flintknapping specialists and apprentices at Magdalenian Etiolles, 126-41.
- Shanks, M. 1998. The life of an artefact in an interpretive archaeology. *Fennoscandia Archaeologica* 15, 15-30. INST ARCH PERS
- Skibo, J. M., Schiffer, M. B. 2001. Understanding artefact variability and change: a behavioral framework. In M. B. Schiffer (ed.), *Anthropological Perspectives on Technology*. Albuquerque, University of New Mexico Press, 139-149. INST ARCH K Qto SCH
- Takigami, M. K. et al., 2014. Assessing the chronology and rewrapping of funerary bundles at the Prehispanic religious center of Pachacamac, Peru. *Latin American Antiquity* 25/3, 322-43.
- Vidale, M. 1998. Operational sequences beyond linearity. In: S. Milliken, M. Vidale (eds.), *Craft Specialization: Operational Sequences and Beyond*. BAR International Series 720. Oxford, Archaeopress, 179-184. INST ARCH DA Qto EUR

Week 3: Technological style and technological choice

Bill Sillar

While all artefacts have a function, there are also many functional equivalents. This week we explore the ways people solve similar problems with different technological behaviours. Technological style and technological choice provide frameworks for understanding the emergence of technical variety along multiple scales and dimensions.

Essential Reading

Lemonnier P. 1993 Introduction in P. Lemonnier (ed.) *Technological Choices: transformation in material culture since the Neolithic* London: Routledge 1-35

Sillar B. and M. Tite 2000 The challenge of 'technological choices' for material science approaches in archaeology. *Archaeometry* 2-20.

Further readings:

Childs, S. Terry (1991). Style, technology, and iron smelting furnaces in Bantu-speaking Africa. *Journal of Anthropological Archaeology*, 10(4), 332–359. [https://doi.org/10.1016/0278-4165\(91\)90006-J](https://doi.org/10.1016/0278-4165(91)90006-J)

Ehrenreich, R M, 1985. Trade, Technology and the Ironworking Community in the Iron Age of Southern Britain. (BAR British Series 144). Oxford.

Forte, V., 2018. Cooking traces on Copper Age pottery from central Italy: An integrated approach comprising use wear analysis, spectroscopic analysis and experimental archaeology. *Journal of Archaeological Science: Reports* 18 (April), pp. 121-138.

Grave, P., Kealhofer, L., Hnila, P., Marsh, B., Aslan, C., Thumm-Doğrayan, D., & Rigter, W. (2013). Cultural dynamics and ceramic resource use at Late Bronze Age/Early Iron Age Troy, northwestern Turkey. *Journal of Archaeological Science*, 40(4), 1760–1777. <https://doi.org/10.1016/j.jas.2012.10.027>

Lechtman, H. (1977). Style in Technology - Some Early Thoughts. In H. Lechtman (Ed.), *Material Culture: Styles, Organization, and Dynamics of Technology* (pp. 3–20). West Publishing Co.

Lechtman, H, 1979. Issues in Andean Metallurgy, in E P Benson (ed), *Pre-Columbian Metallurgy of South America*, 1-40. Washington D. C.: *Dumbarton Oaks Research Library and Collections: Trustees for Harvard University*

Lechtman, H and A Steinberg, 1979. The History of Technology: An Anthropological Point of View, in G Bugliarello and D B Doner (eds), *The History and Philosophy of Technology*, 135-160. London: University of Illinois Press.

Leroy, S., Hendrickson, M., Bauvais, S., Vega, E., Blanchet, T., Dissler, A., & Delque-Kolic, E. (2018). The ties that bind: archaeometallurgical typology of architectural crampons as a method for reconstructing the iron economy of Angkor, Cambodia (tenth to thirteenth c.). *Archaeological and Anthropological Sciences*, 10(8), 2137–2157. <https://doi.org/10.1007/s12520-017-0524-3>

Pfaffenberger, B, 1992. Social Anthropology of Technology, *Annual Review of Anthropology*, 21, 491-516.

Petréquin, P, 1993. North Wind, South Wind: Neolithic Technical Choices in the Jura Mountains, 3700-2400 BC, in P Lemonnier (ed), *Technological Choices: Transformation in Material Cultures Since the Neolithic*, 36-76. London: Routledge.

Week 4: Assemblages: sampling and descriptive statistics

Mike Charlton

Artefacts are not found in isolation, but normally as a part of an assemblage. These assemblages can be so large that we may not want to describe every single artefact, but rather give some more general information (for example, the number and amount of different vessel shapes, the size distribution of sherds).

In many cases, we will not be able to analyse all artefacts present and will have to make a selection. We will discuss different sampling procedures and their advantages and disadvantages, as well as ways of describing and analysing them with simple statistics

Essential Reading

Orton, Cl. 2000. *Sampling in Archaeology*. Cambridge, Cambridge University Press. <https://doi.org/10.1017/CBO9781139163996>

Cowgill, G.L., 2015. Some Things I Hope You Will Find Useful Even if Statistics Isn't Your Thing. *Annu. Rev. Anthropol.* 44, 1–14. <https://doi.org/10.1146/annurev-anthro-102214-013814>

Drennan, D. 2008. Statistics in Archaeology. In: Pearsall, D. (ed.), *Encyclopedia of Archaeology*. San Diego, Academic Press 2093-2100. <https://doi.org/10.1016/B978-012373962-9.00299-5>

Further Reading

Baxter, M. J. 2003. *Statistics in Archaeology*. London, Arnold. INST ARCH AK 10 BAX

Shennan, St. 1996. *Quantifying archaeology*. Edinburgh, Edinburgh University Press: 2nd ed. INST ARCH AK 10 SHE

Carlson, D. L. 2018. Statistics in Archaeology. In: Varela, S. L. (ed.), *The Encyclopedia of Archaeological Sciences*. Hoboken, John Wiley & Sons.

DOI: 10.1002/9781119188230.saseas0553

Cherry, J. et al. 1978. *Sampling in contemporary British Archaeology*. Oxford, British Archaeological Reports, BAR British series 50.

Orton, Cl. 2000. *Sampling in Archaeology*. Cambridge, Cambridge University Press. <https://doi.org/10.1017/CBO9781139163996>

Week 5: Archaeology of production

Mike Charlton

What can we learn about past societies from the nature and organization of production? We will consider examples of craft specialization and mass production in various technologies, including how evidence from artefact composition, morphology and the spatial organisation can be used.

Essential Listening:

<https://freakonomics.com/podcast/how-can-this-possibly-be-true/>

Essential reading

- Martinón-Torres, M. et al. 2014. Forty-thousand arrows for a single emperor: from chemical data to labour organisation in the production of bronze arrows for the Terracotta Army. *Journal of Archaeological Method and Theory* 21/3, 534-562. Online
- Roux, V., 2003. Ceramic standardization and intensity of production: quantifying degrees of specialization. *American Antiquity* 68/4, 768-782. Online
- Costin, C. L. 2000. The use of ethnoarchaeology for the archaeological study of ceramic production. *Journal of Archaeological Method and Theory* 7/4, 377-403. Online

Further reading

- Blackman, M. J., et al. 1993. The standardization hypothesis and ceramic mass production: technological, compositional, and metric indexes of craft specialization at Tell Leilan, Syria. *American Antiquity* 58/1, 60-80. ONLINE
- Bernier, H. 2010. Craft Specialists at Moche: Organization, Affiliations and Identities *Latin American Antiquity* 21/1, 22-43. <http://www.jstor.org/stable/25766977>.
- Burri, E. 2007. Production and use: temper as a marker of domestic production in the case of two middle Neolithic villages in Concise (VD, CH). In: Waksman, S. Y. (ed.), *Archaeometric and Archaeological Approaches to Ceramics*. Oxford, BAR International Series 1691, 33-39.
- Castano, R. A. 2009. Ceramics on the side: pottery making as an augmentation of household economy in the Valley of Puebla during the Formative Period. *Archaeological Papers of the American Anthropological Association* 19, 133-147.
- Costin, C. L. 1991. Craft Specialization: Issues in defining, documenting, and explaining the organization of Production. In: M. B. Schiffer (ed.), *Archaeological Method and Theory* 3. Tucson, University of Arizona Press, 1-56.
- Freestone, I., Gaimster, D. (eds) 1997. *Pottery in the Making: World Ceramic Traditions*. London, British Museum.
- Haines, H. R. et al. 2004. Household economic specialisation and social differentiation: The stone tool assemblage at El Palmillo, Oaxaca. *Ancient Mesoamerica* 15, 251-266.
- Hayden, B. 1998. Practical and prestige technologies: the evolution of material systems. *Journal of Archaeological Method and Theory* 5/1, 1-55. INST ARCH PERS, Online
- Hodder, I. 2005. Changing entanglement and temporalities. In: Hodder, I., *Changing materialities at Çatalhöyük: reports from the 1995-99 seasons*. Cambridge, McDonald Institute for Archaeological Research, 1-22.
- Humphris, J., et al. 2009. Variability in single smelting episodes - a pilot study using iron slag from Uganda. *Journal of Archaeological Science* 36, 359-369.
- Peacock, D. P. S. 1982. *Pottery in the Roman World - an ethnoarchaeological approach*. London, Longman. Chapter 2, 6-11. INST ARCH DA 170 PEA
- Poblome, J. 2002. The concept of a pottery production centre. An archaeometrical contribution from ancient Sagalassos. *Journal of Archaeological Science* 29, 873-882.
- Quinn, P., et al. 2017. Building the Terracotta Army: Ceramic craft technology and organisation of production at Qin Shihuang's mausoleum complex. *Antiquity* 91 (358), 966-979. doi:10.15184/aqy.2017.126
- Rehren, Th. et al. 2001. Qantir-Piramesses and the organisation of the Egyptian glass industry. In: A. Shortland (ed.), *The social context of technological change*. Oxford: Oxbow, 223-238. INST ARCH DBA 100 SHO, ISSUE DESK IOA SHO
- Rice, P. M. 2009. Late Maya pottery production: review and synthesis. *Journal of Archaeological Method and Theory* 16, 117-156.
- Shennan, St. 1999. Cost, benefit and value in the organization of early European copper production. *Antiquity* 73, 352-363.
- Shortland, A. J. 2000. The number extent and distribution of the vitreous materials workshops at Amarna. *Oxford Journal of Archaeology* 19, 115-134.

Spielmann, K. A. 2002. Feasting, craft specialisation and the ritual mode of production in small-scale societies. *American Anthropologist* 104, 195-207.

Week 6: Reading week

Study hard!

Week 7: Distribution and circulation

Maja Miše

There are many mechanisms for trade and exchange, which are often seen a motor for the spread of new ideas and techniques. How do archaeologists study distribution patterns and interpret past trade and exchange systems? What is the potential for identifying the source of raw materials, finished artefacts and techniques?

Essential Reading

Bevan, A. 2014. Mediterranean containerization. *Current Anthropology* 55 (4): 387-418. ONLINE

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Please also look through the *Oxford Roman Economy Project* databases <http://oxrep.classics.ox.ac.uk/databases/>

Further Reading

Bamforth, D. B., P. C. Woodman 2004. Tool hoards and Neolithic use of the landscape in North-Eastern Ireland. *Oxford Journal of Archaeology* 23/1, 21-44. INST ARCH PERS

Bauer, A. A., Agbe-Davies, A. S. (eds.), *Social archaeologies of trade and exchange: exploring relationships among people, places, and things*. Walnut Creek, Left Coast Press.

Bradley, R., M. Edmonds 1993. *Interpreting the axe trade*. Cambridge, Cambridge University Press. Especially chapter 1, Neolithic Britain and the study of exchange systems, pp. 1-58.) INST ARCH DAA 140 BRA

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Dietler, M. 2010. *Archaeologies of Colonialism: Consumption, Entanglement, and Violence in Ancient Mediterranean France*. Berkeley, University of California Press. INST ARCH DAC 100 DIE

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Frankenstein, S., Rowlands, M. 1978. The Internal Structure and regional Context of Early Iron Age Society in South-Western Germany. *Bulletin Institute of Archaeology* 15, 1978, 73-113. INST ARCH PERS

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- Hodder, I. 1974. Regression analysis of some trade and marketing patterns. *World Archaeology* 6/2, 172-189. INST ARCH Pers.
- Mauss, M. 1990. *The gift: the form and reason for exchange in archaic societies*. Routledge, London. [1950] INST ARCH BD MAU
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- Renfrew, C. 1975. Trade as action at a distance. Questions of integration and communication. In: J. A. Sabloff, C. C. Lamberg-Karlovsky (eds.), *Ancient civilisations and trade*. Albuquerque, University of New Mexico, 3-59. INST ARCH BC 100 SAB
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- Schwartz, M., Hollander, D., Stein, G. 1999. Reconstructing Mesopotamian exchange networks in the 4th millennium BC: Geochemical and archaeological analyses of bitumen artifacts from Hacinebi, Turkey. *Paléorient* 25, 67–82. Online
- Sindbæk, S. M., 2007. The small world of the Vikings: Networks in early medieval communication and exchange. *Norwegian Archaeological Review* 40, 59–74. <https://doi.org/10.1080/00293650701327619>
- Smith, M. L. 1999. The role of ordinary goods in premodern exchange. *Journal of Archaeological Method and Theory* 6/2, 109-135. INST ARCH Pers
- Tripković, B. Economy and exchange. In: Gardner, A. et al. (eds.), *The Oxford Handbook of Archaeological Theory*. Oxford, Oxford University press. Online.
- Waksman, Y. 2016 Provenance Studies: Productions and Compositional Groups. In: A. Hunt (ed.), *The Oxford Handbook of Archaeological Ceramic Analysis*. Oxford, Oxford University Press. DOI: 10.1093/oxfordhb/9780199681532.013.10
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- Wolf, G. 1999. World-systems analysis and the Roman Empire. *Journal of Roman Archaeology* 3, 44-58. INST ARCH Pers

Week 8: Raw materials selection and materials analysis

Miljana Radivojević

All artefacts are influenced by the physical properties of the organic and inorganic materials used as raw materials and tools. This in turn affects how the raw materials and the artefacts are

valued, their methods of acquisition, the management of the resource base, and the environmental impact of different procurement strategies. We need to be able to identify these materials and to understand the properties that make them useful under particular circumstances.

Essential reading

- Humphris, J., et al. 2018. Iron Smelting in Sudan: Experimental Archaeology at the Royal City of Meroe. *Journal of Field Archaeology* 43, 399–416. doi:10.1080/00934690.2018.1479085
- Martinón-Torres, M., Rehren, Th. 2009. Post-medieval crucible production and distribution: a study of materials and materialities. *Archaeometry* 51/1, 49-74. Online
- Archaeometallurgy: Guidelines for Best Practice*. Historic England, 2015. <https://historicengland.org.uk/images-books/publications/archaeometallurgy-guidelines-best-practice/>

Further reading

- Ashurst, J. A., Dimes, F. G. 1990. *Conservation of building and decorative stone. Volume 1*. London, Butterworth Heinemann. INST ARCH KP 1 ASH
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- Paynter, S., Dungworth, D. G. 2011. *Archaeological evidence for glassworking*. English Heritage: Centre for Archaeology Guidelines.
- Radivojević, M., Rehren, Th. 2016. Paint It Black: The Rise of Metallurgy in the Balkans. *Journal of Archaeological Method and Theory*, 23, 200-237. Online
- Thomson, R., Mould, Q. 2011. *Leather tanneries: the archaeological evidence*. London, Archetype. INST ARCH KI THO
- Thornton, Chr. P. 2009. Archaeometallurgy: Evidence of a paradigm shift? In: Kienlin, T. L.; Roberts, B. W. (eds), *Metals and societies. Studies in honour of Barbara S. Ottaway*. Universitätsforschungen zur prähistorischen Archäologie 169. Bonn, Habelt, 25-33. Inst Arch KEA QTO KIE
- Tomber, R., Dore, J. 1998. *The National Roman Fabric Reference Collection: A handbook*. London, MoLAS. INST ARCH DAA 170 Qto TOM

Week 9: Invention and Innovation

Miljana Radivojević

How does novelty enter technology and how do ideas spread? A consideration of the archaeological study of, and explanations for, changes in artefact form and assemblage composition over time. This will include a consideration of methods used to investigate the causes and effects of technological change (environmental, evolutionary, social, economic, ideological, etc.) and the degree to which these were directed by conscious choices in the past.

Essential reading

- Eerkens, J. W., Lipo, C. P. 2005. Cultural transmission, copying errors, and the generation of variation in material culture and the archaeological record. *Journal of Anthropological Archaeology* 24, 316–334. Online
- Hayden, B. 1998. Practical and prestige technologies: the evolution of material systems. *Journal of Archaeological Method and Theory* 5/1, 1-55. Online
- Radivojević, M. 2015. Inventing metallurgy in western Eurasia: a look through the microscope lens. *Cambridge Archaeological Journal* 25, 321-338. Online

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- Bailey, G. 1981. Concepts, time-scales and explanations in economic prehistory. In: A. Sheridan, G. Bailey (eds), *Economic archaeology*. British Archaeological Reports international series 96, Oxford: British Archaeological Reports, 97-117. INST ARCH AH SHE
- Barnett, W. K., Hoopes, J. W. 1995. *The emergence of pottery: Technology and innovation in ancient societies*. Washington: Smithsonian Institution Press. INST ARCH BC 100 BAR
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- Blackman, M. J. et al. 1993. The standardization hypothesis and ceramic mass production: Technological, compositional, and metric indices of craft specialization at Tell Leilan, Syria. *American Antiquity* 58/1, 60-80. Online
- Charlton, M. F. et al. 2010. Explaining the evolution of ironmaking recipes – An example from northwest Wales. *Journal of Anthropological Archaeology* 29, 352-367. INST ARCH Pers
- Costin, C. et al. 1989. The impact of the Inca conquest on local technology in the upper Mantaro Valley, Peru. In: S. E. Van der Leeuw, R. Torrence (eds.), *Whats new?* London: Unwin Hyman, 107-139. INST ARCH BC 100 LEE
- Crossley, D. W., 1998. The English glassmaker and his search for materials in the 16th and 17th centuries. In: McCray, P (ed) *The prehistory and history of glassmaking technology*, Westerville: Ohio, American Ceramic Society, 167-179.
- Fitzhugh, B. 2001. Risk and invention in human technological evolution. *Journal of Anthropological Archaeology* 20, 125-167. Online
- Harris, S. et al. 2016. Material choices for fibre in the Neolithic: an approach through the measurement of mechanical properties. *Archaeometry* 59/3, 574-591. doi:[10.1111/arcm.12267](https://doi.org/10.1111/arcm.12267)
- Henderson J. K. et al. 2005. Experiment and innovation: early Islamic industry at al-Raqqa, Syria. *Antiquity* 79, 130-145. INST ARCH Pers. Online
- Humphris J. et al. 2009. Variability in single smelting episodes – a pilot study using iron slag from Uganda. *Journal of Archaeological Science* 36, 359-369. Online

- Knecht, H. 1991. The role of innovation in changing Early Upper Paleolithic organic projectile technologies. *Techniques et Culture* 17–18, 115–144.
- Lechtman, H. 1984. Andean value systems and the development of prehistoric metallurgy. *Technology and Culture* 25, 1-36. INST ARCH PERS
- Lesick, K. et al. (eds) 2002. *Eureka: the archaeology of innovation and science*. Calgary: Archaeological Association of the University of Calgary. INST ARCH AH LES
- Loney, H. L. 2000. Society and technological control: a critical review of models of technological change in ceramic studies. *American Antiquity* 65/4, 646-668 and responses *American Antiquity* 66/4, 726-741. NET
- Martinón-Torres, M., Rehren, Th. 2009. Post-medieval crucible production and distribution: a study of materials and materialities. *Archaeometry* 51/1, 49-74. Online
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- Moorey, P. R. S. 2001. The mobility of artisans and opportunities for technology transfer between Western Asia and Egypt in the Late Bronze Age. In: Shortland, A. J. (ed.), *The social context of technological change: Egypt and the Near East, 1650-1550 B. C.* Oxford: Oxbow, 1-14. INST ARCH DBA 100 SHO
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- Raymond, R. 1986. *Out of the fiery furnace: the impact of metals on the history of mankind*. University Park/London: Pennsylvania State University Press. INST ARCH KEA Qto RAY
- Rehder, J. E. 1994. Blowpipes versus bellows in ancient metallurgy. *Journal of Field Archaeology* 21, 345-350. INST ARCH Pers. Online
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- Roberts, B. W., Radivojević, M. 2015. Invention as a process: pyrotechnologies in early societies. *Cambridge Archaeological Journal* 25/1, 299-306. Online
- Roux, V. 2010. Technological innovations and developmental trajectories: social factors as evolutionary forces. In: O'Brien, M. J., Shennan, S. J. (eds.), *Innovations in cultural systems: contributions from evolutionary anthropology*. Cambridge, MIT Press, 217-234.
- Schiffer, M. B. 2005. The Devil is in the Details: the Cascade Model of Invention Processes. *American Antiquity* 70/3, 485-502.
- Shennan, S. J., Wilkinson, J. R. 2001. Ceramic style change and neutral evolution: A case study from Neolithic Europe. *American Antiquity* 66/4, 577-593. Online
- Shortland, A. J. 2004. Hopeful monsters? Invention and innovation in the archaeological record. In J. Bourriau, J. Phillips (eds), *Invention and innovation: the social context of technological change 2: Egypt, the Aegean and the Near East 1650-1150 BC*. Oxford: Oxbow Books, 1-11. INST ARCH DBA 1000 BOU
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- Wengrow, D. 2001. The evolution of simplicity: Aesthetic labour and social change in the Neolithic Near East. *World Archaeology* 33/2, 168-188. INST ARCH Pers. Online

Week 10: Technology as an extended phenotype of human behaviour

Stephen Shennan

Technology, while not uniquely human, is a peculiar physical trait. Technology is not controlled genetically but its presence can have a profound effect on gene frequencies. Would we be correct in calling it part of an extended phenotype? Technology varies, is culturally transmitted, and changes through time. But it does it follow biological rules of evolution? In this session, we consider evolutionary models of artefact change and diversification and what insights they can tell us about past human behaviour.

Essential Reading

Buckley, C. D., & Boudot, E. (2017). The evolution of an ancient technology. *Royal Society Open Science*, 4(5). <https://doi.org/10.1098/rsos.170208>

Gjesfjeld, E., Chang, J., Silvestro, D. et al. Competition and extinction explain the evolution of diversity in American automobiles. *Palgrave Commun* 2, 16019 (2016). <https://doi.org/10.1057/palcomms.2016.19>

Harris, J. et al., 2021. The role of causal knowledge in the evolution of traditional technology *Current Biology* 31, 1798–1803. <https://www.sciencedirect.com/science/article/pii/S0960982221001615>

Shennan, S. J. (2013). Long-Term Trajectories of Technological Change. In P. J. Richerson & M. H. Christiansen (Eds.), *Cultural Evolution: Society, Technology, Language, and Religion* (pp. 143–155). MIT Press.

Further reading

Allen, M. S. (1996). Style and function in East Polynesian fish-hooks. *Antiquity*, 70(267), 97–116. <https://doi.org/10.1017/S0003598X00082922>

Charlton, M. F., Crew, P., Rehren, T., & Shennan, S. J. (2010). Explaining the evolution of ironmaking recipes – An example from northwest Wales. *Journal of Anthropological Archaeology*, 29(3), 352–367. <https://doi.org/10.1016/j.jaa.2010.05.001>

COLLARD, M., KEMERY, M., & BANKS, S. (2005). Causes of toolkit variation among hunter-gatherers : A test of four competing hypotheses. *Canadian Journal of Archaeology*, 29(1), 1–19.

Feathers, J. K. (2006). Explaining shell-tempered pottery in prehistoric Eastern North America. *Journal of Archaeological Method and Theory*, 13(2), 89–133. <https://doi.org/10.1007/s10816-006-9003-3>

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Lambert, B., Kontonatsios, G., Mauch, M., Kokkoris, T., Jockers, M., Ananiadou, S., & Leroi, A. M. (2020). The pace of modern culture. *Nature Human Behaviour*, 4(4), 352–360. <https://doi.org/10.1038/s41562-019-0802-4>

- Lyman, R., VanPool, T. L., & O'Brien, M. J. (2009). The diversity of North American projectile-point types, before and after the bow and arrow. *Journal of Anthropological Archaeology*, 28(1), 1–13. <https://doi.org/10.1016/j.jaa.2008.12.002>
- O'Brien, M J and T D Holland, 1995a. Behavioral Archaeology and the Extended Phenotype, in J M Skibo, W H Walker, and A E Nielson (eds), *Expanding Archaeology*, 143-161. Salt Lake City: University of Utah Press.
- O'Brien, M. J., & Lyman, R. L. (2000). *Applying Evolutionary Archaeology: A Systematic Approach*. New York: Kluwer Academic/Plenum Publishers.

Week 11: Research project feedback and discussion

Miljana Radivojević and Mike Charlton

Our final session will be devoted to discussion of your research projects. Each team should be prepared to introduce their topic and field questions from others in attendance. We will build on these conversations to summarize all the content explored throughout the term. We will also dedicate time to comment on student feedback, experience, and criticisms from the module so that we can continue to improve it for later years.

ASSESSMENT

Assessment deadlines

24 November; Research Proposal (1000 words, 20%)

1 December: Feedback on the Research Proposal of fellow students (10%)

19 December: Integrated Research Proposal (1000 words, 20%)

9 January 2024: Essay (2000 words, 50%)

Each assignment and possible approaches to it will be discussed in class, in advance of the submission deadline. If students are unclear about the nature of an assignment, they should discuss this with the module co-ordinator in advance (via office hours or class Moodle forum). You will receive feedback on your written coursework via Moodle, and have the opportunity to discuss your marks and feedback with the co-ordinator in their office hours.

For more details see the 'Assessment' section on Moodle. The [IoA marking criteria](#) can be found in the IoA Student Handbook (Section 12: Information on assessment). The [IoA Study Skills Guide](#) provides useful guidance on writing different types of assignment. For **penalties for late submission** see [UCL guidance on penalties \(Academic Manual Chapter 4 Section 3.12\)](#).

Additional marking criteria will be used for assessment 1 (see below):

Assessment 1 (Research Proposal) 1000-word proposal

For this assessment, you will form one or several groups, depending on the number of the students in the module, and develop a general research proposal to analyse various

technological aspects of an assigned site or landscape. We do not expect you to study the sites in great detail, but you need to know the general cultural context, the site layout and the types of artefacts produced here.

You will need to meet as a group and develop a General Research Proposal that could be submitted to a major funding body. While we do not expect you to do the costing, you should be realistic in terms of what would normally be supported: do not expect to get a new synchrotron built for you! Small test excavations would be acceptable, five years of large-scale research excavations not. Be realistic about destructive testing and access to collections as well.

Assume a three-year research project, with a funded position for each specialist (you). If necessary, you can add imaginary specialists for necessary investigations your expertise does not cover, but again, be realistic.

The General Research Proposal should be based on previous work, but address a research question of general interest, that has not been looked at in detail before for this site. In the introduction, which you will write together, you should outline why this is a relevant question, why this site is particularly suited to answer it, and how you are going to address it. Although there is not a mark for this collaboratively written introduction, your individual proposals will largely be assessed by how well they contribute towards addressing the agreed research question, and if this question is relevant and interesting.

This is then followed by the individual research proposals, where each of you normally looks at a specific class of material – pottery, metals, lithics, or specific contexts. You could also concentrate on creating a database, outreach or research on comparative sites.

Each 1000-word proposal should include a brief introduction to the material you are studying, propose appropriate methods for analysing your chosen material and show how this this will contribute to the group research question and project goals.

In real life, individual parts of a big research project can be declined funding if they are not considered well-conceived or irrelevant/marginal. Therefore, be sure to present a well-integrated project. Projects that are excellent but irrelevant to the central research question will be marked down.

You should provide a table of contents, so the reviewers know in which order to read the proposals. Attach the general introduction to the first proposal (disregard the wordcount, in this case). Number individual "chapters" in the title, so reviewers can download them from the Moodle in the correct order.

The wordcount is done in the same way as for a dissertation, it does not include bibliography, tables or legends (or the introduction and table of contents, obviously). Each contribution should include a bibliography.

Illustrations and plans should be provided, they need to be properly referenced as well.

Criteria for marking (i.e. things you should consider in writing your proposal)

- 1 Development of an interesting and relevant general research theme that all the group can contribute to in the general introduction. This criterium will influence every individual mark in the group
- 2 Demonstrating how your proposal contributes to the general research topic

- 3 Structure of the argument (relevance, analysis, logic and coherence)
- 4 Use of evidence (identification of relevant evidence to address the research question)
- 5 Identification of relevant analytical techniques and recording methods to investigate the evidence
- 6 Use of appropriate comparative studies to show how you would apply analytical techniques/research methods
- 7 Consideration of sampling methods
- 8 Writing quality (spelling, grammar, punctuation, paragraphing and general fluency; use of appropriate vocabulary; detail, accuracy and completeness of citations)
- 9 Use of tables, charts, illustrations (where relevant) to help clarify how evidence will be collected, analysed, presented and interpreted
- 10 Originality and independent thinking (critical reflection; critical approach to assumptions of others; ability to recognize and evaluate own assumptions)
- 11 Integration of theory, methods and data (ability to relate argument to core concepts in general archaeological method and/or theory).

Students will be given feedback on their 1000-word proposal from module coordinator as well as peer-review comments from two other students on the module. In the second half of term, the whole group will work together to create an integrated document of all your contributions, to be handed in by the end of the penultimate week for discussion during the last week of term. This is intended to help students think about how to develop a research project (thus relevant to dissertations). As you will be submitting your project components just after Reading Week, this will be in advance of the discussion of some potential research topics in class. We hope that your early engagement with these topics will contribute to debate in class. The final project proposal will have benefited from peer review by both the lecturer and fellow students. You use this feedback to help develop your research and presentation skills. You may not feel that every point of criticism is relevant or fair. However, if the reviewer misunderstood your submission, it points to problems of presentation and lack of clarity. By working together as a team you should also gain a better understanding of how archaeological research always involves collaboration. It can be annoying at times, so divide up the work and different responsibilities clearly and draw up exact internal deadlines in advance.

Note that each group will also choose a leader who will be responsible for the organisation of the group and submission of the introduction. As such they will be awarded a 5 point bonus on their final submission for the extra work. However, leadership leading to poor integration of team research proposals will lead to a loss of 1 point for each case. Team members who demonstrate superb integration with their group's proposal will receive 2 additional points for their final submission as incentive to be a valuable teammate.

Assessment 2: (Essay)

Word Limit 2000 words

Select one of the topics below – if you wish to write on another topic you must consult the module coordinator to agree on the wording of an alternative question. All essays should include references to relevant theoretical debate and case studies; this should not be restricted to papers discussed in class. Illustrations help to get your points across more clearly, maps and tables are often essential.

Topics

1. Discuss the advantages and disadvantages of using the *Chaîne Opératoire* as a basis for archaeological analysis.
2. Can archaeological evidence be used to identify how the organisation of production was controlled or manipulated by elites? Illustrate your discussion with reference to at least one case study discussing how the artefactual evidence has been related to the socio-political organization of a given society.
3. Are "quality" and ease of access the only factors influencing the choice of specific sources of raw materials?
4. Given that the earliest examples of an innovation are normally rare and hence archaeologically invisible, how can archaeologists understand the reasons for the introduction of technological innovations?
5. How can the different types of exchange described by anthropologists be detected archaeologically?
6. How does technology evolve? Does it follow Lamarkian or Darwinian patterns? Or do other processes better account for technological change?
7. Recent years have seen a radical improvement of analytical techniques that analyse the composition of artefacts and help to understand manufacturing processes. How have these enhanced our understanding of prehistoric social structure?