

HIST G8906
Craft and Science: Making Objects in the Early Modern World
Spring 206
Monday 9am-12:50pm
Chandler 260

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This course will study the materials, techniques, settings, and meanings of skilled craft and artistic practices in the early modern period (1350-1750), in order to reflect upon a series of issues, including craft knowledge and artisanal epistemology; the intersections between craft and science; and questions of historical methodology and evidence in the reconstruction of historical experience. The course will be run as a “Laboratory Seminar,” with discussions of primary and secondary materials, as well as hands-on work in a laboratory. This course is one component of the Making and Knowing Project of the [Center for Science and Society](#) and more information on the Project can be found [here](#). Thus, in its first years, this course contributes to the collective production of a transcription, English translation, and critical edition of a late sixteenth-century manuscript in French, Ms. Fr. 640.

Students are encouraged to take this course both semesters (or more), but will receive full credit only once. Different laboratory work and readings will be carried out each semester.

A PRE-REQUISITE OF THIS COURSE is to complete laboratory safety training. The safety training schedule for the Morningside campus is linked [here](#):

<http://www.ehs.columbia.edu/TrainingSchedule.html>. No registration is required for safety training; you may simply show up and attend. Your attendance will be recorded and stored electronically in the RASCAL system, where you will be able to print a training certificate as proof of training. Training sessions are scheduled for February 5 (Medical Campus, Hammer LL-110, 2-3.30 pm) and February 20 (Havemeyer 309, 10-11.30 am), 2015.

Course Organization

This course will be conducted by discussion of readings and hands-on work in the laboratory. Readings will include primary sources and literature drawn from material culture studies, anthropology, history of science and technology, and art history, as well as an introduction to historical reconstruction and to BnF Ms. Fr. 640. Students will contribute to the research on Ms. Fr. 640 by finding and comparing contemporaneous primary sources and discussing their value for a better understanding of the recipes and methods described in the Ms. Fr. 640. At the same time, a series of introductory lab sessions on making and materials will be conducted. The course will then turn to the reconstruction of the techniques in Ms. Fr. 640. Using a transcription and English translation, the laboratory portion of the course will focus each year on a single set of related techniques described in the manuscript. In 2014-15, the focus will be mold-making and metalworking, including sand and plaster casting.

Work in the laboratory each semester will include a two-week residency by an expert maker, who will participate in the seminar and lead demonstrations and experiments in the lab. This expert will come from conservation, studio art, or craft, and will have expertise in historical techniques in areas relevant to the manuscript. This semester's expert practitioner is Andrew Lacey, sculptor and independent scholar, <http://www.andrewlacey.com/andrewlacey.com/home.html>. He will be in residence March 2-13. Participants are expected to schedule extra time for lab work during this period.

On May 27-30, 2015, an international meeting of experts in metalworking and casting (Working Group Meeting) will be held at Columbia in order to review the progress made on the project. Students from both semesters will be expected to attend this meeting. On June 1-19, a Renaissance French Paleography seminar will be offered at Columbia in order to "crowdsource" the pigment and painting recipes in the manuscript. A Call for Applications has gone out, and applications are due February 2.

Assignments and Evaluation

Discussion

Students will assist in leading a discussion session. **Discussion participation accounts for about 10% of the total grade.**

Hands-on Assignments

Students will keep field notes (in written, visual, or podcast form) on their experiences and experiments in the Class Wiki (<https://making-and-knowing.wikischolars.columbia.edu/>), documenting their experiments in reconstruction, as well as their methodological reflections on the uses of hands-on work and reconstruction as historical sources. They will upload their photos to the photo repository at:

<https://www.flickr.com/photos/128418753@N06>

Login Credentials: makingknowing@yahoo.com Artisanal1

Making and Knowing Online

You can follow the project on Twitter @makingknowing and tweet any photos from the laboratory (which we can then re-tweet).

The project's public website is makingandknowing.org

Each group will be assigned laboratory tasks:

Data organization: ensures tagging of photos and wikientries by all groups. Sorting of photos into albums.

Lab organization: ensures that all lab members have labeled their materials and put away all tools.

Safety monitoring: ensures that students have read the Materials Data Safety Sheets (MSDS) and are working safely (lab coat, safety glasses, gloves, and dust mask, when necessary)

Open lab times will be announced throughout the semester, but will generally be held Monday afternoons, Wednesdays, and Fridays.

The laboratory component of the course will be worth 30% of the grade.

Written assignments

Students will contribute to the decipherment of the text of Ms. Fr. 640, and they will contribute annotations to the translation and critical edition of the manuscript. They will assist in maintaining and contributing to the course Wiki and Field Notes, and they will take part in the final Working Group Meeting to be held in May.

Working in groups, students will contribute three short annotation essays (750-3000 words) to the critical edition, similar to a catalog entry for an exhibition. These essays will make use of a whole range of visual and textual sources, and will integrate their laboratory experiences into a written or visual presentation that makes an argument about what research (both textual and material) into the recipe revealed about process, materials, sixteenth-century culture and society, or the identity of the author. One of the most important components of this assignment is the research that students will undertake on

the relationship of recipes in Ms. Fr. 640 to other earlier and contemporaneous recipe collections.

The annotation assignment comprises 60% of the grade.

Reading

The following **required** course books are available at Book Culture (112th between Broadway and Amsterdam) and on 2-day reserve at Butler Library.

Cennino Cennini, *Il libro dell'Arte (The Craftsman's Handbook)*, trans. Daniel V. Thompson, Jr. (New York: Dover, 1960).

Vannoccio Biringuccio, *Pirotechnia* (1540), trans. Cyril Stanley Smith and Martha Teach Gnudi (repr., Cambridge, MA, 1966).

Theophilus, *The Various Arts: De Diversis Artibus*, ed. and trans. C. R. Dodwell (Oxford: Clarendon Press, 1986).

Benvenuto Cellini, *Two Treatises*, trans. C. R. Ashbee (repr. 2006).

Pamela O. Long, *Artisan Practitioners and the Rise of the New Sciences, 1400-1600* (Oregon State UP, 2011).

Pamela H. Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago and London: The University of Chicago Press, 2004).

Recommended:

Tim Ingold, *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill* (London and New York: Routledge, 2000).

Tim Ingold, *Making: Anthropology, archaeology, art, and architecture* (Abingdon, Oxon: Routledge, 2013).

Robert Tarule, *The Artisan of Ipswich: Craftsmanship and Community in Colonial New England* (Johns Hopkins University Press, 2004).

Pamela H. Smith, Amy R. W. Meyers, and Harold J. Cook (eds.), *The Ways of Making and Knowing* (University of Michigan Press, 2014)

All other readings on the syllabus (and much else) are in the Course Dropbox which you will be invited to join.

Class Schedule

Below you will find what to prepare for class in **the week before** the class meeting, and what to expect on the day of class. Please be sure to ask in advance if anything is not clear! For an abridged version of the schedule, see the [Google Doc here](#).

Week 1: ART AND SCIENCE

In preparation for January 26:

Background reading and watching:

Watch "Lions, Dragons, and other Beasts" here

<http://www.bgc.bard.edu/gallery/gallery-at-bgc/past-exhibitions/past-exhibitions-aquamania.html>

Watch the introduction to the manuscript and the project here:

<http://www.youtube.com/watch?v=NhRXVKDIYjo&feature=youtu.be>

Read the 2014 NSF grant description about the Making and Knowing Project, and the shorter 2014 Making and Knowing Project Description. (Both in Dropbox)

Background on Ms. Fr. 640:

Pamela H. Smith and Tonny Beentjes, "Nature and Art, Making and Knowing: Reconstructing Sixteenth-Century Life Casting Techniques," *Renaissance Quarterly*, 63 (2010): 28-179.

Pamela H. Smith, "In the Workshop of History: Making, Writing, and Meaning," *West 86th: A Journal of Decorative Arts, Design History, and Material Culture*, vol. 19 (2012): 431.

Browse the manuscript here:

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g.r=.langEN>

Explore the manuscript on Google Drive (AND, **MOST IMPORTANTLY, MAKE SURE YOU CAN GET INTO GOOGLE DRIVE**). All participants will receive an invitation to GD with instructions when registration to this course is confirmed.

Explore the general compilation of online sources for researching the manuscript:

https://docs.google.com/document/d/1HHWZ2vTrlK0Q4xN6Ih6Ia5Arjlv9_g4L0Rf03vghrYk/edit

Join the Wiki: <https://making-and-knowing.wikischolars.columbia.edu/>

What to expect in class on Monday, January 26:

- **BRING YOUR LAPTOP OR TABLET TO CLASS**
- To get to Chandler 260, go into the main entrance of Havemeyer Hall. Turn left and proceed down the hallway. Turn right when you see signs for Chandler Hall. 4) Follow the signs past the Chemistry Office on your left and go through the door to Chandler Hall. Turn right to go down the staircase and go down one floor and then walk down the hallway until you arrive at 260.
- Introductions all around, and introduction to the project
- The course in brief, expectations, skills, and your contribution to the project. Come with questions!
- Navigating the manuscript: **YOU MUST HAVE YOUR LAPTOP OR TABLET**
- Discussion of Home Culinary Reconstruction (HCR) Assignment handed out in class (division into groups). **Due Monday, February 2 in class**
- Introduction to databases for research on contemporaneous sources (Meredith Levin)
- **Safety training** (Greg Kwolek, Kathy Heinemann)

- Move to Fayerweather 513 for Erma Hermens, Technical Art History Lecture (Video conference in class), 12-2pm. (Class officially ends at 1pm, but students are welcome and encouraged to stay for the whole lecture, if they have time. Bring your lunch, if you wish.)

Wednesday, January 28, 10am: Video meeting with students in the V&A/RCA History of Design course V&A (these students will be working on researching objects related to Ms. Fr. 640, e.g., imitation coral, imitation gems, and backing for gems).

Week 2: HOME CULINARY RECONSTRUCTION AND CONSUMPTION

In Preparation for Monday, February 2:

You will want to start on the HCR right away, by reading the assignment carefully, exploring and using the websites listed on the HCR assignment sheet to search for comparable recipes in contemporaneous sources, and doing the following reading **BEFORE** starting your reconstruction:

Required Reading:

- Ken Albala, "Cooking as Research Methodology: Experiments in Renaissance Cuisine," *Renaissance Food from Rabelais to Shakespeare: Culinary Readings and Culinary Histories*, ed. Joan Fitzpatrick (Aldershot, UK: Ashgate, 2010), pp. 73–88.
 - See also Ken Albala's blog on: <http://kenalbala.blogspot.nl/>
- Ad Stijnman, "Style and technique are inseparable: art technological sources and reconstructions," *Art of the Past. Sources and Reconstructions. The proceedings of the First Symposium of the Art Technological Source Research Study Group*, ed. by Mark Clarke, Joyce H. Townsend, and Ad Stijnman (Amsterdam: Archetype, 2005): 1-8.
- Maartje Stols-Witlox, "Sizing layers for oil paintings...", *Proceedings of the Second ATSR Symposium* (2008), pp. 148-163.
- <http://youtu.be/pdEbMBe0aa8>
 - which includes this recipe:
 - <http://www.folger.edu/template.cfm?cid=3689&showpreview=1>
 - <http://shakespeare.folger.edu/cgi-bin/Pwebrecon.cgi?BBID=233795>
- Explore the reference guide by Meredith Levin, European and History of Science Subject Specialist, Butler Library: <http://columbia.libguides.com/HIST-G8906>

February 2, in class:

- We will meet in The Studio at Butler (Butler 208b), where the groups will present on their HCR (prepare presentations and practice them).
- Bring your tablet or laptop. Bring the material results of your HCR. We will consume them, if safe!
- Discussion of required readings.

- Introduction to field notes with Prof. Brian Boyd, Dept. of Anthropology
- Hand out Bread Molding Recipe (BMR) Instructions, sourdough starter and/or barm. **Bread molds are due February 9 in class.**
- Wiki practice and profiles with Jonah Bossewitch.

WEEK 3: BREAD MOLDING RECONSTRUCTION

In preparation for February 9:

Required Reading and Watching:

Adelheid Voskuhl, "Recreating Herschel's Actinometry: An Essay in the Historiography of Experimental Practice," *British Journal for the History of Science*, 30.3 (1997): 337-355.

Francisco Alonso-Almeida, "Genre conventions in English recipes, 1600-1800," *Reading and Writing Recipe Books, 1550-1800*, Michelle DiMeo and Sara Pennell (Manchester: Manchester University Press, 2013), pp. 68-90.

Doris Oltrogge, "The Cologne database for painting materials and reconstructions," *Art of the Past. Sources and Reconstructions. The proceedings of the First Symposium of the Art Technological Source Research Study Group*, ed. by Mark Clarke, Joyce H. Townsend, and Ad Stijnman (Amsterdam: Archetype, 2005): 9-15.

Reconstruction of alchemical experiments (Chymistry of Isaac Newton),

<http://webapp1.dlib.indiana.edu/newton/>

Watch [the lecture that Bill Newman recently gave](#) in which he does two of the experiments from the website (both demonstrating the vegetability of metals). Start the video at about 27 mins for one of the experiments.

Search for bread molding recipes in BnF Ms. Fr. 640 and in other sources, for example:

Alessio Piemontese, *Book of Secrets* (1555); various English versions on EEBO; French versions on Gallica; Italian versions—you find them!—different groups use different editions BEFORE 1600.

(For English: Search for Ruscelli, Girolamo, *The secretes of the reuerende Maister Alexis of Piemount Containyng excellent remedies against diuers diseases, woundes, and other accidents, with the manner to make distillations, parfumes, confitures, diynges, colours, fusions and meltynges. ... Translated out of Frenche into Englishe, by Wyllyam Warde* (1558).

Hugh Platt, *The Jewell House of Art and Nature: Containing diuers rare and profitable Inventions, together with sundry new experimentes in the Art of Husbandry, Distillation, and Molding* (London, 1594).

Check the following for bread molding, and note other materials of which molds can be made:

Cennino Cennini, *Il libro dell'Arte (The Craftsman's Handbook)*, trans. Daniel V. Thompson, Jr. (New York: Dover, 1960).

Vannoccio Biringuccio, *Pirotechnia* (1540), trans. Cyril Stanley Smith and Martha Teach Gnudi (repr., Cambridge, MA, 1966).

Theophilus, *The Various Arts: De Diversis Artibus*, ed. and trans. C. R. Dodwell (Oxford: Clarendon Press, 1986).

Benvenuto Cellini, *Two Treatises*, trans. C. R. Ashbee (repr. 2006).

Hans Sachs, *The Book of Trades*,

<http://www.vam.ac.uk/content/articles/t/the-book-of-trades-das-standebuch/>

Check any other relevant sources from the BMR assignment sheet.

February 9, in class:

- Bring your bread molds to class and be ready to discuss your experiences of making and manipulating bread.
- Pouring of wax, tallow, sulfur into the bread molds
- Material Safety Data Sheet (MSDS) exercise and fire extinguisher practice
- hand out wax roundels (for carving into a template for a medal)

Week 4: SANDCASTING

Preparation for February 16:

Required Reading and Watching:

Ann-Sophie Lehmann, "Wedging, Throwing, Dipping and Dragging – How Motions, Tools and Materials Make Art," *Folded Stones*, eds. Barbara Baert and Trees de Mits (Institute for Practice-based Research in the Arts: Ghent 2009), pp. 41-60.

Michael W. Cole, "Cellini's Blood," *The Art Bulletin* 81.2 (1999): 215–35.

Pamela H. Smith, "Making as Knowing: Craft as Natural Philosophy," *Ways of Making and Knowing: The Material Culture of Empirical Knowledge*, co-edited with Amy Meyers and Harold J. Cook (Bard Graduate Center/University of Michigan Press, 2014), pp. 17-47.

February 16, in class:

- Discussion of readings: from your own textual and hands on research, consider how an early modern person understood materials. How does this compare to our own perspectives informed by the natural sciences?
- Introduction to annotation research and writing; start browsing recipes from Ms. Fr. 640 to select topic and recipes of your final annotation essay assignment (make sure that you choose from recipes that have been transcribed and translated by the paleography workshop!). Annotation handout.
- Portrait medal sandcasting; carving of wax models (completed at home)
- **Your wax and plaster models for sandcasting must be finished by February 23. This will necessitate coming in during open lab hours on Feb. 16 or 18 to impress your wax model in clay, then pour it in plaster.**
- **February 19, 6pm:** Larry Principe, Departments of Chemistry and History of Science, Johns Hopkins University, "Secret Materials and Chymical Exotica, or, How

to Make the Luminescent Bologna Stone" (Fayerweather 411, 1180 Amsterdam Avenue, Columbia University)

- Friday, Feb. 20, 12-2pm: Larry Principe carries out alchemical reconstruction in the lab, meets class.

WEEK 5: SANDCASTING

Preparation for February 23:

Note: Your wax -> clay-> plaster models for sandcasting must be finished, and ideally completely dry, by February 23.

Required Reading and Watching:

Watch as many of the videos collected on the Wiki on lost wax and sandcasting as possible.

Cennino Cennini, *Il libro dell'Arte (The Craftsman's Handbook)*, trans. Daniel V. Thompson, Jr. (New York: Dover, 1960), on casting.

Theophilus, "On bell-casting," *De diversis artibus*, pp. 77-103; 167-176.

Biringuccio, "On casting," *Pirotechnia*, pp. 213-34, and elsewhere.

Francesca G. Bewer, "The Sculpture of Adriaen de Vries: A Technical Study," *Small Bronzes in the Renaissance*, ed. Debra Pincus (Washington, D. C.: Center for Advanced Study in the Visual Arts, 2001), pp. 159-193.

Richard E Stone, "Antico and the Development of Bronze Casting in Italy at the End of the Quattrocento," *Metropolitan Museum Journal* 16 (1982): 87-116.

February 23, in class:

- Discussion of Readings.
- Discussion of students' proposed annotations (these should be finalized by the end of Andrew Lacey's visit)
- Sandcasting (with commercial clay?)

Week 6 & 7: EXPERT MAKER VISIT: CASTING DELICATE PATTERNS (March 2-19) **(Be prepared to spend more time in the lab during these two weeks; you will have individual group time with Andrew Lacey)**

Preparation for March 2: Firm up annotation plans

Required Reading:

In order to familiarize yourself with plaster casting recipes, find and read through all the recipes that relate to plaster casting, flies, plants, spiders, and other small patterns in BnF Ms. Fr. 640.

Search relevant source materials for more information on plaster casting recipes and experiments (Piemontese, Biringuccio, etc). **All students must bring in to class**

(or upload to Wiki) on March 2 a full list of all the plaster casting recipes they have found in Ms. Fr. 640 and in other sources.

March 2, in class:

Introductions

Casting in cuttlefish

plaster mold making of small creatures and plants.

Week 7: PLASTER MOLD MAKING CONTINUES

March 9: molding and casting

**Wednesday, March 11, 9:15am: Visit to Met Museum to examine cast metal objects.
ASSEMBLE IN FRONT OF MAIN ENTRANCE BY 9:15am.**

At the end of the week, we will:

- discuss recipes to be annotated; groups will begin to think about the historical question their annotation will answer
- compile a materials list for experiments
- develop a protocol for experimentation on your recipe

Week 8: ANNOTATIONS AND THE DIGITAL EDITION

In preparation for March 23:

Over the break, you should make sure that your materials lists are finalized and sourced, and that your protocol is written. Be completely ready to implement your experiments on March 23.

Required Reading:

John A. Walsh and Wallace Edd Hooper, "The Library of Invention: Alchemical discourse and information technology standardization," *Journal of the Alliance of Digital Humanities Organizations* vol.27, no.1 (April 2012): 55-79.

Susan Schriebman, Ray Siemens, and John Unsworth, "The Digital Humanities and Humanities Computing: An Introduction," *A Companion to Digital Humanities*, eds. Schriebman, Siemens and Unsworth (Oxford: Blackwell Publishing, 2004), xxiii-xxvii.

Daniel V. Pitti, "Designing Sustainable Projects and Publications," *A Companion to Digital Humanities* (2004), pp. 471-487.

Sue Breakell, "For One and All: Participation and Exchange in the Archive," *Revisualizing Visual Culture*, eds. Chris Bailey and Hazel Gardiner (Burlington, VT: Ashgate, 2010), pp. 97-108.

Willard McCarty, "Introduction," *Text and Genre in Reconstruction: Effects of Digitalization on Ideas, Behaviours, Products and Institutions*, ed. Willard McCarty (Cambridge: Open Book Publishers, 2010), pp.1-12

Alan Galey, "The Human Presence in Digital Artefacts," *Text and Genre in Reconstruction: Effects of Digitalization on Ideas, Behaviours, Products and Institutions* (2010), pp. 93-117.

In class, March 23:

- discussion of readings
- intro to writing your annotation in Google docs
- short discussion of finalized annotation plans
- start your experiments

Week 9: EXPERIMENTING

March 30: Work on annotation experiments

Meet with UvA students in conservation course by skype
RBML meeting on texts relevant to course.

Week 10: EMBODIED KNOWLEDGE

Preparation for April 6:

Hasok Chang, "How Historical Experiments Can Improve Scientific Knowledge and Science Education: The Cases of Boiling Water and Electrochemistry" (2011)

Raymond Tallis, *The Hand: A Philosophical Inquiry into Human Being*, (Edinburgh: Edinburgh University Press, 2003), Ch. 1.

Erin O'Connor, "Embodied knowledge in glassblowing: the experience of meaning and the struggle towards proficiency," *Sociological Review* (2007): 126-141.

[Tim Ingold, *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill*, (London and New York: Routledge, 2000), Ch. 18-19 (pp. 339-361).

Julian Thomas, "Phenomenology and Material Culture," in *Handbook of Material Culture*, ed. Christopher Tilley et al. (Sage 2006), 43-59.]

In class, April 6:

- discussion of readings
- work on annotation experiments

April 6, 3:30pm: Prof. Hasok Chang, History and Philosophy of Science Department, University of Cambridge The Case for Pluralism in Science.

Week 11: REVISITING ARTISANAL EPISTEMOLOGY

April 13, in preparation, think about artisanal epistemology again in the light of your practical experience:

Required Reading:

Andrea Bernardoni, "Artisanal Processes and Epistemological Debate in the Works of Leonardo Da Vinci and Vannoccio Biringuccio;"

Henrike Haug, "Artificial Interventions in the Natural Form of Things: Shared Metallogenetical Concepts of Goldsmiths and Alchemists;"
Lawrence M. Principe, "Goldsmiths and Chymists: The Activity of Artisans Within Alchemical Circles,"
all in Sven Dupré (ed.), *Laboratories of Art: Alchemy and Art Technology from Antiquity to the Eighteenth Century* (Springer, 2014).

In class, April 13:

- Brief Discussion of readings.
- Work on annotation experiments. Your first draft of annotations is due on April. 23

*** Apr. 13, 6 PM, Fayerweather 411 – Prof. William Newman (Indiana University), "Liberating the Green Lion: Unsolved Mysteries of Isaac Newton's Alchemical Practice"**

Week 12

April 20: Work on annotation experiments and writing. (**Instructions for depositing your annotation and images in GD**)

Fire extinguisher training at 12:30-1pm

April 23: Annotation first drafts due today by midnight. All class members read all annotations.

Week 13:

April 27: Annotation workshop.

Week 14:

May 4: Lecture. Further lab and writing work on annotations. 12:20: Fire extinguisher practice

May 7: Annotation second drafts due today. All class members read all annotations.

Week 15:

Monday, May 11: Final Annotation workshop. Exit interviews.

FINAL ANNOTATIONS DUE ON MAY 18

May 27-30 - Working Group Meeting, attendance required.

June 1-19 - Paleography Workshop

Four questions to consider in working with objects and materials:

1. Materials

What material(s) make up your object? What are that material's properties? Where was it sourced? What determined its quality? How is the material described today (scientific analysis, material safety description (MSDS sheet))? How was the material described in written sources of the time (e.g., "unctuous," composed of water and earth, etc)? In addition to "workability," properties might also include the availability of materials in certain locales (by virtue of natural morphology or of trading patterns). How was knowledge of materials transmitted and disseminated (orally, by group working conditions, in writing, by templates)?

2. Technology

What tools, instruments and techniques were used for the transformation of your material in different places at different moments? How did that technology move and change over time? What were the consequences of these changes?

3. Performance

How did a specific conjunction of materials and technologies give rise to certain practices of making? In what ways did they constrain makers or require know-how? How did makers work against these limits (for example by manipulating the materials to vary their properties)? What were the circumstances for the display of skill: did makers change their practices when working in different places or when being watched by particular audiences? What were regarded as the signs of virtuosity, and how did these vary at different places at different moments? What was the role of the individual maker as opposed to the collaborative team? How does an object generate a "personality" or "sensitivity" for the person or workshop that produced it?

How did new technologies change bodily experiences and gave rise to specific forms of practical expertise? How do embodied practices vary through time? Under which conditions might our bodily experience when reconstructing a pre-modern experiment be comparable to what practitioners have experienced in the past?

4. The system of the arts

What were the social structures that supported certain forms of production and consumption (e.g., associations such as guilds, workshops, manufactories)? How were practices of making limited by the law? Reshaped by ambition? What practices of making were interdependent? Which were siblings ("sister arts")? What was the relationship between making and status? How was the meaning of an object made manifest by its use, which could occur in rituals, through written treatises, or through daily use of the object?"

Two further issues to consider throughout:

Evidence

How do we know what a thing was made of and how it was made? What do texts tell us, what can we learn directly from objects or from present-day practices? How does one kind of evidence affect the way we understand another?

Historiography

How have historians treated these materials and their transformation? What kinds of narratives have historians constructed around and about materials and processes that give them meaning (whether bound up with professional and national narratives, with issues of identity or of rationality, or something else)? How have historians of science reflected on experimental reconstructions as a tool to recreate historical experience?