THE ROLE OF THE MODEL IN PARISIAN FINE JEWELLERY KNOWLEDGE

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Abstract

This thesis investigates the use and role of models in contemporary Parisian fine jewellery production. It embeds the apprenticeship-as-field method within a network approach to build on the literature of knowing by making to investigate Parisian fine jewellery from within the jewellery houses of the Place Vendôme and the *Haute Ecole de Joaillerie* (HEJ) that trains its jewellers. This thesis focuses on four types of model, including: the training models used to teach jewellery skills in schools throughout France; the production 'models of intention' that lie at the heart of the production process between the initial drawing and the final jewel; the models in the archive of the jewellery house and the artisans; and finally digital models. The thesis examines how these four types of model come to manifest Parisian fine jewellery knowledge through their performative roles in knowledge transmission, creation, tradition and evolution.

Parisian fine jewellery refers to the jewellery made in and around the Place Vendôme in Central Paris. It has historic roots in the nineteenth century jewellery community of family firms that emerged to replace the pre-modern craft guilds that were dissolved in the French revolution. In 2019, this production network remains extremely small and personal, although the industry now supplies a global demand, which it satisfies by producing both unique one-of-a-kind and market oriented jewellery. Indeed this global demand and the ownership by luxury conglomerates have introduced a new need for the individual jewellery houses to reassert their authenticity and originality.

This thesis begins by looking at the use of standardised national examination models as training models at the *Haute Ecole de Joaillerie* (HEJ) to transmit technical and spatial expertise via imitative learning that enables students to become masters of both making and space, resulting in fine jewellery knowledge that is standardised, evaluated and differentiated on a national scale. The thesis goes on to look at model making within the jewellery houses of the Place Vendôme, focussing on the roles of experimentation and of the body of the artisan in the making process. It investigates the production model's position at the heart of the jewellery production process and looks at how this process is orchestrated by the jewellery house. The thesis expands on this relational role of the model in fine jewellery knowledge by looking at how jewellery houses and artisans use archives of models to narrate their own traditions. Finally, this thesis looks at the use of digital models, which have been introduced at both the *Haute Ecole de Joaillerie* (HEJ) and the workshops of the jewellery houses in a material evolution. Looking at the scope for increased experimentation and the potential of haptic digital technologies, it shows how the jewellery

community has harnessed the similarities between the traditional and digital models to assimilate and localise a global phenomenon.

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Abbreviations

Explanatory note: The full title of these organisations, in English or in French, are given on their first appearance in this thesis. On all further references only the acronym is employed, except when it is necessary to remind the reader more fully of the organisation.

ANT: Actor Network Theory
CAP: *Certificat d'Aptitude Professionnelle* (Certificate of Vocational Skill)
CAO: *Conception Assistée par Ordinateur* (Computer Aided Design)
CAD: Computer Aided Design
HEJ: *Haute Ecole de Joaillerie*
RCA: Royal College of Art

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Introduction

We do not obtain knowledge by standing outside the world; we know because we are of the world. We are part of the world in its differential becoming.[1]

This quote from Karen Barad implies that to understand the world around us, we have to study it from within, acknowledging the interaction between mind, body and environment in the world around us. This thesis investigates this idea in both subject and methodology through a study of the model in the world of contemporary Parisian fine jewellery. It employs the apprenticeship-as-field method to ask how four types of material model (used in training, production, the archive and digital creation) come to manifest Parisian fine jewellery knowledge through performative roles in knowledge transmission, creation, tradition and evolution. Throughout this thesis the term 'model' will be used to denote the totality of all four types of model unless specified otherwise.

This thesis revolves around two research questions. The first question is how the bodily knowledge of the artisan is made manifest in training and production models. The thesis investigates the role of the body of the teacher and student in making training models in the classroom and shows that these models are critical to the standardisation and transmission of Parisian jewellery knowledge. It also explores how the body of the professional model maker is key to the creation of traditional wax and metal production models as well as digital models. In this way, the thesis seeks to understand Parisian fine jewellery as embodied knowledge which is physically expressed through the production and training models. This thesis thus speaks to a wider body of literature on embodied knowledge, which according to Kristina Niederrer is a form of experiential knowledge.[2] Michael Polanyi used the example of aesthetic evaluation and judgement of a pianist's touch, which cannot be scientifically measured, to demonstrate how experiential knowledge is critical to our understanding of connoisseurship and expertise.[3] Building on Marcel Mauss' study of skill and the body, this thesis provides a concrete case study of such embodied knowledge and its standardisation and transmission through training and production models.[4]

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[1] Karen Barad, "Posthumanist Perfomativity: Toward an understanding of how matter comes to matter," in *Material Feminisms,* ed. Stacey Alaimo and Susan Hekman (Indiana: Indiana University Press, 2008), 147.
[2] Kristina Niederrer, "Mapping the Meaning of Knowledge in Design Research," *Design Research Quarterly* 2.2 (2007).
[3] Michael Polanyi, *Personal Knowledge: Towards a post-critical philosophy* (Chicago, IL: University of Chicago Press, 1962).
[4] See Nathan Schlanger, ed., *Techniques, Technology and Civilisation* (London: Berghahn Books, 2006).

The first research question of how embodied knowledge is standardised and transmitted sets up the premise for the second research question. The thesis recognises that these models and their making only exist within the context of the Parisian fine jewellery community. This leads us to the second research question which seeks to understand how Parisian fine jewellery knowledge can be thought of as relational knowledge which links the teachers and students at the jewellery school, and also the jewellery professionals and the jewellery houses at which they work. The thesis uses Actor Network Theory, first developed by Bruno Latour, to identify two knowledge networks within the Parisian fine jewellery community, namely the training network at the *Haute Ecole de Joaillerie* (HEJ) and the production network within the jewellery houses.[5] Using the network approach which emerged as a practical methodology to test Actor Network Theory in the Education literature, the thesis seeks to answer the second research question, which is how the four different types of model identified within these two knowledge networks of training and production also manifest relational knowledge that binds together the Parisian fine jewellery community.[6]

The rationale for the design historical exploration of material models in training, production, archives and technological and material innovation is its abstract and concrete role as a 'mediator' between artisanal creativity and cultural institutions. The question of how it is that knowledge can be studied via objects has long been a key concern shared by the disciplines of the humanities. This thesis speaks to this literature on the 'anthropology' of knowledge, developed across a wide range of fields from anthropology, history of design, neuroscience, philosophy and history of art. It follows in the line of thinkers like Trevor Marchand and Tim Ingold, who have applied ideas from across these diverse disciplines, to provide a case study of making in the context of Parisian fine jewellery, whose artisanal creativity is orchestrated by the cultural institutions of the jewellery houses and the school which trains their jewellers.[7] This unique setting allows for a critical introspection of Marchand and Ingold's theoretical proposition that knowledge in making is shaped by an interdependence of the mind, body and environment.[8] This reflection is based on a reappraisal of Bruno Latour's work *We Have Never Been Modern*, which encourages us to attend to the dichotomies of the natural/social, global/local that are revealed through the

[5] Bruno Latour, *Reassembling the Social: An introduction to actor-network theory* (Oxford: Oxford University Press, 2005).
[6] Tara Fenwick and Richard Edwards, "Networks of Knowledge, Matters of Learning and Criticality in Higher Education," *Higher Education* 1(2014), 40.
[7] Trevor Marchand, "Making Knowledge: Explorations of the indissoluble relation between minds, bodies and the environment," *Journal of the Royal Anthropological Institute* (2010).
[8] See Trevor Marchand, "Introduction: Knowledge in Practice," *Africa* 76(1) (2009); Tim Ingold, "Eight Themes in the Anthropology of Technology," *Social Analysis* 41.1 (1997).

study of the models and the model makers, and to reevaluate our linear understanding of time in a production context.[9]

The thesis therefore contributes to a concern with knowing by making, by investigating how and with what effect Parisian fine jewellery knowledge is made manifest in the training models used to teach jewellery skills in schools throughout France that are also used for examination purposes, as well as in the production models that lie at the heart of the production process, connecting the initial gouache painting with the final jewel. Furthermore, by investigating the archives of these production and training models, and by looking at how model making has assimilated new materials and technology, the thesis seeks to answer how these models are used to narrate traditions of Parisian fine jewellery that claim their origins in the past while continuing to evolve into the future.

Following Bruno Latour's Actor Network Theory (ANT), this thesis postulates that these models form the basis of a Parisian fine jewellery knowledge network. Analysing both the training and production models enables an investigation of this knowledge network from two points – the jewellery houses and the school which trains their jewellers – as well as the connection between them. An exploration of the model making process within the jewellery houses and the school, reveals the importance of spatial and technical knowledge. The thesis looks at how these two forms of knowledge are made manifest in the production and training models, as well as in their iterations as archived and digital models. The model's unique function as a link between and within these two knowledge networks of training and production, as well as its ability to manifest both spatial and technical knowledge, means that the model is inherently relational. The thesis explores the consequences of this relationality both within the making process at the school and jewellery houses, as well as beyond the making process, in the context of the archives and in face of the rise of digital technology. It concludes by looking at the wider implications of this for the analysis of the model as an object of design historical interest.

This introduction outlines the key design historical discussions on knowledge and technique to which this thesis speaks and investigates how model making and its role in Parisian fine jewellery relates to the wider literature on craft production. This introduction then introduces the apprenticeship-as-field method used in this thesis and the final section outlines each subsequent chapter.

[9] Bruno Latour, *We have never been modern,* trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993).

i.i Literature Review

i.i.i What is Parisian fine jewellery?

Parisian fine jewellery has been the subject of two historical studies by Henri Vever, a nineteenth century jeweller, and Lydwine Scordia, a twenty-first century Jewellery Historian, as well as numerous coffee table books, which focus on particular jewellery houses.[10] This thesis aims to fill a gap in academic studies of Parisian fine jewellery, by approaching it from within the knowledge network that underlies its production, hidden from the consumer, and consequently is absent from the aforementioned works as they focus on the final jewels.

Parisian fine jewellery refers to the jewellery made in and around the Place Vendôme, which lies at the heart of the first *arrondissement* in Paris. The square itself dates back to the seventeenth century and throughout its history has been associated with a succession of monuments from the life-size equestrian statue of Louis XIV to the 1875 column of Napoleon, that still stands at its centre today.[11] As explained by Kevin Smith in a paper on Victor Hugo's famous *Ode to the Place Vendôme*, rapid changes in the construction, erasure and reconstruction of the monument throughout the nineteenth century reflected the dramatic shifts between the Revolution and the Third Republic, making it 'the most contested and politicized monument in all of Paris.'[12] Towards the end of the nineteenth century, the square and the adjoining Rue de la Paix became a showcase for luxury goods rather than political power and today it is synonymous with the height of Parisian luxury, in particular fine jewellery.[13]

According to the Jewellery Historian Lydwine Scordia, fine jewellery production in the Place Vendôme area has historic roots in the goldsmith community that emerged during the reign of François I.[14] In this thesis I highlight some of the links between this era, defined by pre-modern craft guilds, and the contemporary jewellery industry. It could be argued that

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[10] Henri Vever, *French Jewelry of the Nineteenth Century* (London: Thames and Hudson, 2001 [1906-8]); Lydwine Scordia, *Le Gout des Bijoux* (Paris: Perrin, 2013); See for example books on Van Cleef & Arpels, including: Vincent Meylan, *Van Cleef & Arpels: Treasures and Legends* (London: Antique Collectors' Club, 2015); Sylvie Raulft, *Van Cleef & Arpels* (Paris: Editions du Regard, 1986); Alvin Pang, *Van Cleef & Arpels: The Art and Science of Gems* (London: Distributed Art Publishers, 2016); Franco Cologni, *In Praise of Hands: The Art of Fine Jewelry at Van Cleef & Arpels* (New York: Marsilio, 2013); Sarah Coffin, *Set in Style: The Jewelry of Van Cleef & Arpels* (New York: Thames and Hudson, 2011).
[11] Kevin Smith, "Victor Hugo and the Vendôme Column," *French Forum* 21.2 (1996): 149-164.
[12] Smith, "Victor Hugo and the Vendôme Column," 163.
[13] "Place Vendôme," Paris Tourist Office, accessed 1 June 2019, https://en.parisinfo.com/transport/90844/Place-Vendome.
[14] Scordia, *Le Gout des Bijoux*.

Parisian fine jewellery of the 21st century has its roots in the nineteenth century, when the grand exhibitions of industrial products held in 1834, 1839, 1844 and 1849 allowed jewellers to exhibit their creations and rise to fame. This took on a whole new level with the first universal exhibition in Paris in 1855, which brought jewellers such as Marret, Baugrand, Chaise, Falize, Lemoine, Dafrique, Froment-Meurice, Morel, Duponchel and Wièse to the world's attention. These jewellers formed a tight-knit community and through intermarriage and inheritance, they gave rise to the pattern of family firms still associated with the Place Vendôme today.[15] Less well known is that this community of nineteenth century jewellers also left a legacy of small *ateliers*, tool suppliers, metal merchants and foundries that are spread across the area between the Place Vendôme in the first *arrondissement* and the building that houses the Union of French Jewellers and the *Haute Ecole de Joaillerie* (HEJ) on the Rue du Louvre in the second *arrondissement*.

In 2019 this historic production network remains extremely small and personal. To put it into perspective, there are only ten highly skilled jewellers working in the workshop at Chaumet[16] and twenty at Van Cleef & Arpels.[17] At the *Haute Ecole de Joaillerie* (HEJ), which trains the jewellers for the Place Vendôme, there are 600 students.[18] The school and the smaller jewellery workshops in the area are served by one precious metal supplier, one foundry, two tools suppliers, and three gemstone merchants, all of which are located around the Rue du Temple. This is a world in which, as this thesis will show, personal connections are extremely important. In the parlance of social networking sites, everyone is at most one connection away from someone else. In this thesis I investigate this Parisian fine jewellery world from the two focal points mentioned above, namely the jewellery houses of the Place Vendôme and the *Haute Ecole de Joaillerie* (HEJ) that trains its jewellers. I will introduce the historical context of each before following Karan Barad's lead to study them from within, using my own experience training as a jeweller at the *Haute Ecole de Joaillerie* (HEJ) and the field observations I conducted at Chaumet and X jewellery house.

The small size of the production network belies the fact that, since the late twentieth century, the Parisian fine jewellery industry has become a global industry. In 2019 there are over one hundred luxury jewellery and watch firms that form part of the Comité Vendôme.[19] All of these are owned by a few luxury conglomerates, including Kering, LVMH and

[15] Scordia, *Le Gout des Bijoux*.
[16] Franco Cerulli, Meeting with the author, 17 October 2013.
[17] X, Meeting with the author, 1 December 2016.
[18] "Haute Ecole de Joaillerie," FEDE.education, accessed 1 July 2019, https://www.fede.education/wp-content/uploads/2018/09/FICHEECOLE_HAUTE-ECOLE-DE-LA-JOAILLERIE_EN.pdf.
[19] See "Joaillerie, Horlogerie, Orfèvrerie," Comité Vendôme, accessed 1 July 2019, http://comite-vendome.fr/joaillerie-horlogerie-orfevrerie/.

Richemont. Indeed Mellerio dits Meller is the only jewellery house that remains in family hands.[20] Ownership of the jewellery houses by luxury conglomerates has driven global sales of Parisian fine jewellery. According to an internal document by the Union of French Jewellers, French jewellery sales are currently estimated at 148 million and, growing at 6% a year, are forecast to rise to 250 million by 2020.[21] Thus the small community of Parisian jewellers is now inextricably tied to a global marketplace.

Now that it is part of a global luxury industry, it is important to begin this thesis by looking at what this means, particularly for production in the workshops of the Place Vendôme. Prior to 1970, firms such as Chaumet concentrated on hand made bespoke production.[22] However, since then the firm has sought to capitalize on growing global demand by producing market oriented readymade jewellery. Today, all of the jewellery houses on the Place Vendôme produce jewellery collections, which can be bought in their stores throughout the world. At Chaumet, you could walk into the London shop on Bond Street and purchase the same *Joséphine aube printanière* ring that is discussed in chapters three and four, as you could from any shop from the United Arab Emirates to Australia. The Economic Historian Giorgio Riello has constructed a typology of forms of craft production, which enables us to dissect this evolution in contemporary Parisian fine jewellery production.[23] Table 1 constructed by Riello shows that Parisian fine jewellery houses in 2019 combine 'luxury craft production' (unique one-of-a-kind pieces) and 'fashionable populuxe production' (market oriented pieces).

[20] The family firm Mellerio dits Meller became the official jewelers for the French crown by Royal decree issued by Marie de Medici in 1613. 14 generations later, Laure Isabelle Mellerio is the president and artistic director of what is considered to be the 'last independent, family run, French high jewellery firm.' See "Mellerio Today," Mellerio, accessed 1 July 2019, https://mellerio.fr/en/mellerio-aujourdhui/.
[21] Bernadette Pinet, *De la Joaillerie Française* (Paris: UFBJOP, 2017).
[22] Beatrice de Plinval, Meeting with the author, 3 June 2013.
[23] Giorgio Riello, "Strategies and Boundaries: Subcontracting and the London trades in the Long Eighteenth Century," *Enterprise and Society* 9 (2008): 243-280.

Table 1: Types of products and related systems of production.

Product	Attributes	Production	Technologies	Main Competitive Advantage	Relation with Customers
Unique	Luxury	Craft	High skills/high or low technological investment	Quality (highest)	Bespoke
Small quantities with variations	Fashionable	Populuxe	Medium skills/some technological investment	Appeal/innovation	Some bespoke and increasingly (market-oriented) ready-made
Large quantities with (some) variations	Undifferentiated	Serial	Low skills/low technological investment	Convenience	Totally (production oriented) ready-made
Standardized	Mass	Industrial	Low skills/high technological investment	Price (lowest)	Mass products

According to Franco Cerulli, the head of production at Chaumet, this trend towards market oriented ready-made jewellery has accelerated since the introduction of digital technology in 2000. For this reason, this thesis focussing on contemporary production uses 2000 as the start point, although the research took place between June 2013, when I was first introduced to Beatrice de Plinval, the President of the Place Vendôme, and March 2019, when I left Paris.

The common link between the unique one-of-a-kind pieces of 'luxury craft production' and the market oriented pieces of 'fashionable populuxe production' is the model that is used in production. Both 'luxury craft production' and 'fashionable populuxe production' are characterised by division of labour that breaks down into a series of specialized stages, at the centre of which lies the production model. The jewellery production process always proceeds as follows. First, a gouache painting of the final jewel is painted by an artist, who takes his direction from the creative director of the jewellery house. These paintings reveal the volume and size of the jewel, although crucially they are not technical drawings and therefore do not state the exact dimensions of the jewel. These gouache paintings are passed onto the model maker, who then proceeds to make a model in green wax or inexpensive metals. This is known as a 'model of intention.' The jeweller in the atelier receives this model (and ONLY the model) and replicates it using precious metals. The model and the jewel are then both transferred to the stone setter who sets the precious gemstones before the final jewel is polished by the polisher.

i.i.ii The model

This thesis contributes to the existing literature on the model by revealing the multiplicity of its roles beyond the production process. As well as being used in the production process as a link between the gouache painting and the final jewel, this thesis identifies three further contexts in which models are used in Parisian fine jewellery production, namely the archive, the classroom and the digital world. Following the production process, the model is kept by the jewellery house in carefully curated archives. This thesis will explore how these archived models are used to narrate the tradition of Parisian fine jewellery. In addition to the models used in production, this thesis looks at the standardised metal and wax models that are used to teach and also examine jewellers throughout France as part of the vocational *Certificat d'Aptitude Professionnelle* (henceforth referred to as CAP) examination. Recent years have seen the rise of digital technology and the emergence of models in the form of computer renderings, which can be three dimensionally digitally printed. These models are now widely used in both production on the Place Vendôme and in teaching.

The distinction between these models is evident in the language used by Parisian jewellers: The models used in training are referred to as *maquette cire* (wax model) or *maquette CAP*; The models used in production are *maquette d'intention* (model of intention); The models in the archive are referred to as *maillechort* (the name of the cheap silver-nickel compound used to make the model); Finally, the digital models are called *maquette conçue par ordinateur* (computer generated model).

This thesis speaks to the existing literature on models. Margaret Morrison and Mary Morgan published a collection of essays looking at the use of models in modern science, specifically in the fields of Economics and Physics, in the development, exploration and application of theories, and in measurement methods.[24] The focus on Mathematics and Economics means that their edited collection does not explore three dimensional material models, which are the focus of this thesis. More relevant to the three dimensional jewellery models studied in this thesis is the work of Soraya de Chadarevian and Nick Hopwood, who explore solid models including wooden ships, plastic molecules, wax bodies, with particular emphasis on the eighteenth century onwards.[25] These models were used as teaching instruments or demonstration objects to mediate between teachers and students, scientists and the public, artisans and patrons. The models in this thesis play a similar rhetorical role. This thesis therefore adds a concrete case study to this body of literature, by exploring how models are used to transmit knowledge about technique and space from teacher to pupil; how they mediate between the artisans involved in the production process and the jewellery house; and how through the archive they mediate between a select VIP public and the jewellery house.

Yet the models in this thesis are more than rhetorical devices. In fact, this thesis explores how they embody existing knowledge and techniques and even - as the last chapter on digital technology reveals - become instruments for the production of new knowledge by merging different kinds of knowledge and techniques.

In their threefold relationship to knowledge (as rhetorical devices, embodying and creating new knowledge), the models investigated in this thesis in fact bear a striking similarity to the three dimensional architectural models studied by architectural historians. The Design Historian Simona Valeriani has looked beyond the much studied architectural presentation models to investigate the use of architectural models to develop solutions to technical and stylistic problems in production; to calculate the quantity of materials needed in construction; as part of contractual stipulations to document the details of the build; and to plan, monitor and measure actual work.[26] Valeriani argues that these three dimensional architectural models epitomize the 'in-between objects' that became important in the

[24] Margaret Morgan and Mary Morrison, *Models as Mediators: Perspectives on natural and social sciences* (Cambridge: University of Cambridge Press, 1999).
[25] Soraya de Chadarevian and Nick Hopwood, *Models, The Third Dimension of Science* (Stanford: Stanford University Press, 2004).
[26] Simona Valeriani, "Three-dimensional Models as 'in-between-objects' - The creation of in-between knowledge in early modern architectural practice," in *History of Technology: Conceptualising the production and diffusion of useful and reliable knowledge in Early Modern Europe*, ed. Ian Inkster (Bloomsbury, 2012), 5.

coming together of theoretical and experiential knowledge during the scientific revolution of early modern Europe. She explains that 'the sharing of both working locations and practices by people with conceptual and applied skill sets allowed for the exchange of their factual and methodological expertise and their knowledge creation practices, facilitating the development of new ways of investigating nature and creating knowledge about natural phenomena.' [27] Following Valeriani's lead, this thesis will seek to understand the consequences of the model's multiple roles for our understanding of the nature of knowledge transmission, creation, tradition and evolution.

i.i.iii Technical knowledge

In looking at the performative role of models in knowledge transmission, creation, tradition and evolution, this thesis aims to bring the French literature on technical knowledge to the Anglophone literature on History of Design. The concept of technical knowledge is particularly relevant to a study of French jewellery, as there is a vast literature in French on the subject of technology, which has only recently been translated into English. Indeed in a critique of Bryan Pfaffenberger's seminal paper in the English language, 'Towards an Anthropology of Technology,' the French Anthropologist Pierre Lemonnier has criticized the omission of French thinkers in the Anglophone world.[28] He argues that 'one cannot ignore either André Leroi-Gourhan[29] who, years ago, set the pace for both theoretical and methodological aspects of the study of homo technicus, André-Georges Haudricourt[30], whose ethnoscientific insights promoted the study of social representations of technology, or Gille[31] who devoted hundreds of pages to demonstrate the implications of the systemic side of technology throughout history.'[32] It is arguably this neglect of French texts that has led to confusion in the definition of technology in the English language. As Nathan Schlanger explains in his introduction to a recent translation of seminal texts by Marcel Mauss on *Techniques, Technology and Civilisation,* 'in its prevalent Anglo-Saxon usage, techniques applies ordinarily to phenomena that are primitive, traditional or small scale or else skilled and tacit while technology refers to those phenomena deemed modern, complex,

[27] Valeriani, "Three-dimensional Models as 'in-between-objects," 1.
[28] Pierre Lemonnier and Bryan Pffaffenberger, "Towards an Anthropology of Technology," *Man* 24.3 (1980): 526-527.
[29] See André Leroi-Gourhan, *Evolution et Techniques: L'homme et la matière* (Paris: A. Michel, 1943); André Leroi-Gourhan, *Evolution et Techniques: Milieu et techniques* (Paris: A. Michel, 1945); André Leroi-Gourhan, *La Geste et La Parole: Technique et langage* (Paris: A. Michel, 1964).
[30] See André-Georges Haudricourt, "Domestication des Animaux, Culture des Plantes et Traitement D'autrui," *L'Homme* 2 (1963): 40-50; André-Georges Haudricourt, "Nature et Culture Dans La civilization de L'igname: L'origine des clones et des clans," *L'Homme* 4 (1964): 93-104; André-Georges Haudricourt, *La Technologie, Science Humaine: Recherches d'histoire et d'ethnologie des techniques* (Paris: Editions de la Maison des Sciences de l'Homme).
[31] Bertrand Gille, *Histoire des Techniques* (Paris: Gallimard, 1978).
[32] Lemonnier and Pffaffenberger, "Towards an Anthropology of Technology," 526.

sophisticated, knowledge-based, objective.'[33] By contrast, the French research tradition, dating from the treatise by Alfred Espinas on *Les Origines de la Technologie,* has defined techniques as the object, and technology as its disciplinary study.[34] This subtle difference between these cultural traditions underlines the importance of techniques in French cultural thought as objects worthy of their own science, dedicated to their study.

In his seminal text on the topic, '*Les Techniques et la Technologie*,' Mauss defined technique as follows: 'We call technique an ensemble of movements or actions, in general and for the most part manual, which are organised and traditional, and which work together towards the achievement of a goal known as to be physical, chemical or organic.'[35] Mauss recognised techniques as inherently social: 'A practical art has two roots - the invention of the moment or the implement and the tradition of its use, indeed the use itself - and in both respects it is essentially a social thing.'[36] In his conception of the 'homme total' as a 'physical, psychological and social nexus,'[37] Mauss went one step further than Henry Bergson and his idea of the *homo faber*, to argue that 'all of social life depends upon techniques.'[38]

i.i.iv Knowledge networks

Recent developments in the 'anthropology' of knowledge have advanced this understanding of the social nature of technical skill. Like Mauss, the Anthropologist Tim Ingold has argued that 'technical relations are embedded in social relations and can only be understood within this relational matrix, as one aspect of human sociality.'[39] However he makes the important claim that 'skills are not, as Mauss classically argued, techniques of the individual body considered, objectively and in isolation as the instrument of cultural reason.'[40] Instead, he says that skills 'are properties of the whole system of relations constituted by the presence of the agent in a richly structured environment.'[41] The Anthropologist Trevor Marchand has coined the term 'shared production' to recognize the importance of the bodily and environmental interaction in knowledge production, as identified by Ingold.[42] He too argues that 'making knowledge is an ongoing process shared *between* people and *with* the world.'[43] Marchand follows in a long line of scholars dating back to Malcom Crick who have

[33] Nathan Schlanger, ed., *Techniques, Technology and Civilisation* (London: Berghahn Books, 2006), 2.
[34] Alfred Espinas, *Les Origines de la Technologie* (Paris: Felix Alcan, 1897).
[35] Schlanger, *Techniques, Technology and Civilisation,* 149.
[36] Schlanger, *Techniques, Technology and Civilisation,* 51.
[37] Schlanger, *Techniques, Technology and Civilisation,* 20.
[38] Schlanger, *Techniques, Technology and Civilisation,* 51.
[39] Tim Ingold, "Eight Themes in the Anthropology of Technology," 107.
[40] Ingold, "Eight Themes in the Anthropology of Technology," 108.
[41] Ingold, "Eight Themes in the Anthropology of Technology," 111.
[42] Trevor Marchand, "Making Knowledge," 1.
[43] Marchand, "Making Knowledge," 1.

contributed to the 'anthropology' of knowledge using research from the neurobiological sciences. [44] His most recent work was influenced by Mauro Adenzato and Franceso Garberini who have drawn on Giaccomo Rizzolatti and Laila Craighero's research on the mirror-neuron system, Merleau-Ponty's phenomenology of perception, and Ingold's studies of skills, to explore relationship between an organism and its environment.[45] Adenzato and Gaberini's perspective of 'embodied cognition,' shared by a cross-disciplinary community of scholars, views the mind as a biological system rooted 'in body experience and interwoven with action and interaction with other individuals.' [46] The contemporary understanding of technical knowledge, summed up by the terms 'embodied cognition' within 'shared production,' therefore rests on a dynamic interplay between the mind, body and environment.

This thesis contributes to this discussion by exploring different iterations of this three way relationship and the consequences thereof through the distinctive models used at different points in the Parisian fine jewellery knowledge network. It hypothesises that the three way relationship between mind, body and environment, identified by Marchand and Ingold, is dynamic across the knowledge network. This hypothesis is investigated through an auto-ethnographic study of the cognitive processes involved in learning skills by mimesis and asks how the Parisian fine jewellery community controls knowledge transmission through didactic models. The thesis explores how the relationship between the mind, body and environment plays out in the production process by applying the concept of the 'meshwork of making,' introduced by Tim Ingold, to the model making process in a jewellery house. The thesis asks how this concept of relational knowledge can be used to narrate a tradition of Parisian fine jewellery. Finally, it investigates whether this understanding of the interplay between the mind, body and environment has been changed by digital technology.

Whilst this thesis builds on the ideas developed by Marchand and Ingold, it returns to Mauss to explore how knowledge extends and varies across the Parisian fine jewellery network both within and across generations. Rather than looking at the arbitrary isolated artisan, as in Ingold's work, or artisans of different generations, as in the work of Marchand, this thesis focuses on how the model and its technical nature frames the interaction between artisans

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[44] Malcom Crick, "Anthropology of Knowledge," *Annual Review of Anthropology* 11 (1982): 287-313.
[45] Giacomo Rizzolatti and Laila Craighero, "The Mirror-Neuron System," *Annual Review of Neuroscience* 27 (2004): 169-92; Maurice Merleau-Ponty, *Phenomenology of Perception,* trans. C. Smith (London: Routledge, 1962); Tim Ingold, "Evolving Skills," in *Alas poor Darwin: Arguments against evolutionary psychology*, ed. Hilary Rose and Stephen Rose (London: Jonathan Cape, 2000): 225-46.
[46] Mauro Adenzato and Francesca Garbarini, "The *as if* in Cognitive Science, Neuroscience and Anthropology: A journey among robots, blacksmiths and neurons," *Theory & Psychology* 16 (2006): 747-59, 748.

and the institutions to which they belong. Indeed the thesis looks at the model as a mediating tool between teachers and pupils, as well as between the artisans and the jewellery houses.

The idea of such a knowledge network between artisans and their institutions, framed by the model, can be explained using Bruno Latour's Actor Network Theory (ANT), which maps relations that are at once material and semiotic.[47] It emphasises that knowledge can come into being through enactment as effects within particular webs of relations, in this case through the model making process in a web of relations between the jewellery house, the artisans and the model. As John Law suggests, ANT is a 'disparate set of tools, sensibilities and methods that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located. It assumes that nothing has reality or form outside the enactment of those relations.'[48] The ontology of this theory is performative; practices are enacted through the relations in which they emerge. This captures the dynamic nature of knowledge, which this thesis takes from the work of Ingold and Marchand. This thesis therefore aims to expand their work by investigating how knowledge is an effect of connections and activity, performed into existence in a web of relationships that is framed by the model.

Critical to this exploration is that, according to ANT, human beings do not have privileged status in networks. As Educationalists Tara Fenwick and Richard Edwards point out:

> One objective with actor-network approaches is then to investigate how […] things come together - and manage to hold together however temporarily - to form associations that produce those effects that become most visible: knowledge that becomes considered powerful, particular identities, routines, policies and regulatory regimes.[49]

In this thesis each chapter explores a different 'coming together' of the jewellery house, artisan and model, making visible the network negotiations involved in generating and sustaining perceived categories and dichotomies (for example student/teacher, experimentation/certainty, evolution/revolution, material/immaterial), particular discourses (for example tacit learning, problem solving, tradition, digital technology) and practices (examinations, archiving for example). Each of these distinctions are network effects.

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[47] Bruno Latour, *Reassembling the Social: An introduction to actor-network theory* (Oxford: Oxford University Press, 2005).
[48] John Law, "Actor-network Theory and Material Semiotics," in *The New Blackwell Companion to Social Theory*, ed. Brian Turner (Oxford: Wiley-Blackwell, 2009), 41.
[49] Tara Fenwick and Richard Edwards, "Networks of Knowledge, Matters of Learning and Criticality in Higher Education," *Higher Education* 1(2014), 40.

ANT therefore presents a dynamic vision of networks. Fenwick and Edwards claim that 'an ANT approach makes visible the variety and extent of networks, as well as their heterogeneous composition' and that 'a network sensibility can show how such assemblages can be unmade as well as made, how attempts to assemble networks can fail, and how counter-networks or alternative forms and spaces can take shape and develop.'[50] This means that networks can be formed within networks and that the connections between them are also fluid.

This thesis focuses on two knowledge networks embedded within the jewellery knowledge network discussed above, namely the production knowledge network within the jewellery houses and the training knowledge network at the *Haute Ecole de Joaillerie* (HEJ). By investigating these knowledge networks from the perspective of the model, the emphasis in this thesis is on the link between these two knowledge networks. This thesis therefore speaks to a growing concern with the link between training and production. The methodology section of this introduction will introduce the apprenticeship-as-field method, which ties into a wider literature on apprenticeship by educationalists, economists and historians.[51] Marchand explores the differences between his experience training as a craftsman's apprentice in Mali and Yemen, and his studies in a vocational woodworking program at an East London college, to stress the contrast between apprenticeship and formal education.[52] By pointing to the similarities between the formal education institution of the *Haute Ecole de Joaillerie* (HEJ) and the apprenticeship system as studied by ethnologists such as Marchand, this thesis questions this perceived division between the two forms of learning. In fact, by revealing the involvement of the jewellery houses and the influence of the jewellery industry's technological and material innovations in the pedagogy of the *Haute Ecole de Joaillerie* (HEJ), the thesis provides an example of how industry can be involved in vocational education in ways other than apprenticeship.[53]

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[50] Fenwick and Edwards, "Networks of Knowledge, Matters of Learning and Criticality in Higher Education," 41.

[51] See Patrik Ainley and Helen Rainbird, eds., *Apprenticeship: Towards a new paradigm of learning* (London: Kogan Page, 1999); Howard Gospel, *The Revival of Apprenticeship Training in Britain* (London: LSE Centre for Economic Performance, 1997); Hilary Steedman, Howard Gospel and Paul Ryan, *Apprenticeship: A Strategy for Growth* (London: LSE Centre for Economic Performance, 1998); Anja Heikkinen and Ronald Sultana, *Vocational Education and Apprenticeship in Europe: Challenges for practice and research* (Tampere: University of Tampere, Department of Education Series B, no. 16, 1997); Liora Bresler, ed., *Knowing Bodies, Moving Minds: Towards embodied teaching and learning* (London: Kluwer Academic, 2004); Lorna Unwin and Jerry Wellington, *Young People's Perspectives on Education, Training and Employment: Realising their potential* (London: Kogan Page, 2001).

[52] Trevor Marchand, "Muscles, Morals and Mind: Craft apprenticeship and the formation of person," *British Journal of Educational Studies* 56.3 (2008).

[53] Vocational education and apprenticeship are not the primary objects of study in this thesis. Rather, the apprenticeship-as-field method and the HEJ institution are used as methodological tools to shed

i.i.v Knowing by making

Latour distinguishes between matters of fact and matters of concern.[54] Matters of fact are based on drawing distinctions, while according to Karen Barad matters of concern involve entangling with the other through apparatuses:

> *Practices of knowing are specific material engagements that participate in (re) configuring the world*. Which practices we enact matter - in both senses of the word. Making knowledge is not simply about making facts but about making worlds, or rather it is about making specific worldly configurations - not in the sense of making them ex nihilo, or out of language, beliefs or ideas, but in the sense of materially engaging as part of the world in giving it specific material form.[55]

Thus we can think of knowledge as 'active intervention in bringing forth particular objects, understandings and subjectivities.'[56] According to Barad, knowing is a performance in many worlds. Indeed each chapter can be considered a different world of knowledge performance from the classroom at the *Haute Ecole de Joaillerie* (HEJ) in chapter one, to the workshop at X jewellery house in chapter two, the archive at Chaumet in chapter three, and the digital production rooms at the *Haute Ecole de Joaillerie* (HEJ) and Chaumet in chapter four. All of these situations are about the same knowledge, yet, as this thesis will show, the specific forms of knowledge performance are different in these diverse worlds.

The idea that knowledge is dynamic and performative, and that it takes place in diverse worlds, has implications for how we choose to study knowledge. Concerns about methods and modes of understanding can be linked to practice theory, and specifically Pierre Bourdieu's *Outline of a Theory of Practice*.[57] Here he suggested that the distinction between subject and object should be overcome, and he called for an analytical interpretation of the making of social activity in practice. He particularly noted the role for the engagement and participation of the body in this process. Bourdieu's theory led to the emergence of what the Anthropologist Johannes Fabian calls 'performative ethnography' as opposed to

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light on the role of the model in knowledge transmission. It is hoped, nevertheless, that this study will be of interest to educationalists.

[54] Bruno Latour, "Why Has Critique Run Out of Steam? From matters of fact to matters of concern," *Critical Inquiry* 30.2(2004), 232.

[55] Karen Barad, *Meeting The Universe Halfway: Quantum physics and the entanglement of matter and meaning* (Durham, NC: Duke University Press, 2007), 91.

[56] Fenwick and Edwards, "Networks of Knowledge, Matters of Learning and Criticality in Higher Education," 43.

[57] Pierre Bourdieu, *Outline of a Theory of Practice,* trans. Richard Nice (Cambridge: Cambridge University Press, 1977 [1972]).

'informative ethnography.'[58] Performative ethnography starts from the assumption that knowledge is mediated through embodied action. Following Bourdieu, it dissolves distinctions between subject and object, observation and participation.[59] It therefore encapsulates the quotation at the beginning of this thesis from Barad, that 'we do not obtain knowledge by standing outside the world; we know because we are of the world. We are part of the world in its differential becoming.'[60]

The next section on methodology will explore in greater depth the emergence of the apprenticeship-as-field method for ethnographic studies, but it is worth noting here that the idea of knowing by making has made a significant mark on the history of design and art historical literature. The past decade has seen a growing trend towards 'making' as a form of understanding among the wider historical community. Pamela Smith was one of the first to argue in an article on 'The Workshop of History,' that reconstruction was particularly useful for scholars of early modern history seeking to understand the human experience at a time when learning and knowledge was experiential and acquired by observation.[61] She is the founder of the *Making and Knowing Project*, a research and pedagogical initiative at the Centre for Science and Society at Columbia University that explores the connections between artistic making and scientific knowing. Her own research work has involved reconstructing the past in a variety of media. For example, Smith herself worked with Tony Beentjes, a practicing silversmith and conservator in Amsterdam, to reconstruct the techniques of casting from life.[62] As Paula Findlen's edited work *Early Modern Things* reveals, historians of science now see objects as an important strand in the history of ideas and investigate their making to understand artisanal mentalities and practices.[63] At the Victoria and Albert Museum in London, the *Encounters on the Shop Floor Project* (a project of the Victoria and Albert Research Institute funded by the Andrew W Mellon Foundation) brings together curators, makers, performers, surgeons and historians to explore the notion of 'embodied' knowledge described above by breaking down the divide between 'mind' and 'hand' and 'intellectual' and 'manual' knowledge.

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[58] Johannes Fabian, *Power and Performance: Ethnographic explorations through proverbial wisdom and theatre in Shaba Zaire* (University of Wisconsin Press, 1990).
[59] Bambi Ceuppens, "Close Encounters of a Third Kind: The anthropologist as an actor," *Philosophica* 55.1 (1995): 117-175.
[60] Barad, "Posthumanist Perfomativity," 147.
[61] Pamela Smith, "In the Workshop of History: Making, writing and meaning," *West 86th* 19.1 (2012): 4-31.
[62] Pamela Smith, "Nature and Art, Making and Knowing: Reconstructing sixteenth century life-casting," *Renaissance Quarterly* 63.1 (2010): 128-79.
[63] Paula Findlen, *Early Modern Things: Objects and their histories 1500-1800* (London: Routledge, 2013).

The *Encounters* project engages directly with contemporary artisans and their work, which is similar to the study of the contemporary Parisian fine jewellery community in this thesis. This stands in contrast to the aforementioned design historical studies, which focus on reconstruction rather than contemporary creation. The emphasis in this thesis is also subtly different from the existing design historical literature in that it is interested in what model making can tell us about Parisian fine jewellery as opposed to model making per se. In this, the thesis is perhaps closer to the Anthropologists Jean Lave and Etienne Wenger, who reject making as something intrinsically interesting in and for itself and treat apprenticeship as the site of 'situated peripheral learning,' whereby a person learns as much about the social context of the craft as they do about the craft itself; By learning the craft, they learn to be members of their society.[64] They argue that apprenticeship is more to do with modelling the social values and attitudes within which a craft is practised rather than simply the transmission of craft techniques. Thus this thesis uses an auto-ethnographic account as well as ethnographic observations of a model maker and their work to shed light not just on model making, but also on its significance for the phenomenon of Parisian fine jewellery knowledge, including its transmission, creation, tradition and evolution.

i.i.vi Craft

By looking at the interplay between model making and jewellery production, this thesis speaks to the existing literature on craft. Both jewellery making in general and model making as a subcategory are officially recognized as a craft, or *métier* in France. The French are very definite about what constitutes a *métier d'art*. In fact, following the law 2014-626 of the 18 June 2014 it is defined as:

> *Une activité indépendante de production, de creation, de transformation ou de reconstitution, de reparation et de restauration du patrimoine, caractérisée par la maîtrise de gestes et de techniques en vue du travail de la matière et nécessitant un apport artistique* (An independent activity of production, creation, transformation or reconstruction, reparation and restoration of cultural heritage, characterised by mastery of hand and technical skills to work on a material, and requiring an artistic input).[65]

The French ministry for the economy and industry publishes the list of the 281 recognised crafts one of which is model making.[66]

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[64] Jean Lave and Etienne Wenger, *Situated Learning: Legitimate peripheral participation* (Cambridge: Cambridge University Press, 1991).
[65] "281 Métiers," Institut National Métiers, accessed 10 June 2019, https://www.institut-metiersdart.org/metiers-art/fiches-metiers.
[66] "281 Métiers," Institut National Métiers, accessed 10 June 2019, https://www.institut-metiersdart.org/metiers-art/fiches-metiers.

In contrast to the strict French definition of craft, which is signed into law, the English word craft (which derives from the Old English croeft meaning physical strength) is not at all fixed. As the curator Paul Greenhalgh observed, 'craft has always been a messy word.'[67] In his edited work, *Craftwork as Problem Solving,* the Anthropologist Trevor Marchand summarises the history of the debate surrounding craft in the English speaking world.[68] It is, in his words, 'a polysemous, ambiguous and often contested term' which has been variously described as:

> Skilled handwork; as a kind of secret knowledge; as being inextricably entangled with mastery of materials, tools, techniques; as a residual of art; as social resistance against modernity and its processes of alienation; as an exemplar for, and vehicle toward, good and ethical conduct; as process, and in motion; as directly related to the functional objects that it yields; and… as problem solving.[69]

Marchand explains how since the Renaissance, craft has been defined in opposition to art. Invoking the Ancient Greek distinction between intellectual and manual labour, the artists of the fifteenth century argued that their mathematical perspective of drawing and painting enabled them to separate themselves from the makers of things. As the Anthropologist Kay M'Closkey explains:

> Drawing became the hallmark of "artistic literacy," but it also provided the means to dictate to others what would be produced. The concept of the artist as a unique, outstanding individual developed in contrast to the view that the anonymous craft worker, using only technical ability, executed the designs of either a patron or an artist.[70]

According to Marchand, 'the meaning of craft and its status has fluctuated over the centuries in relation to the fine arts and in relation to changing social politics, economics, and public attitudes toward education and vocational training.' [71] Marchand argues that crude misconceptions that arose as a result of craft's perceived inferiority to art were 'tactically construed' to make it the engine of grassroots cross cultural movements. Even today, Bruce Metcalf argues that craft represents a social movement of opposition to mainstream culture

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[67] Paul Greenhalgh, "Introduction: Craft in a changing world," in *The Persistence of Craft: the applied arts today,* ed. Paul Greenhalgh (London: A & C Black, 2002), 1.
[68] Trevor Marchand, "Introduction," in *Craftwork as Problem Solving,* ed. Trevor Marchand (New York: Routledge, 2017).
[69] Marchand, "Introduction," in *Craftwork as Problem Solving,* 8.
[70] Kathy M'Closky, "Art or Craft: The paradox of the Pangnirtung weaveshop," in *Women of the First Nations: Power, wisdom and strength,* ed. Christine Miller and Patricia Chuchryk (Winnipeg: University of Manitoba Press, 1996), 115.
[71] Marchand, "Introduction," in *Craftwork as Problem Solving,* 4.

because it stands against 'mass production, ugliness, big-money capitalism, corporate labour and against disembodiment.'[72]

Interestingly, the Parisian fine jewellery production investigated in this thesis could not be further from the counter-cultural movement referred to by Metcalf. Its status as a craft signed into law demonstrates that it is very much a part of the institutions of the French establishment. Moreover, this thesis will demonstrate how the jewellery houses of the Place Vendôme open themselves only to a select group of individuals who have significant financial resources and connections. Chapter three will look at how they use the models in the archive to reinvent and narrate a particular history, which ties them to elite Parisian society.

Given its establishment status, Parisian fine jewellery epitomises what has become known as 'luxury craft.' Luxury crafts have received significant attention in recent years. At the beginning of this PhD research, I was able to attend the meetings of a Leverhulme funded network *Luxury and the Manipulation of Desire* (2013-2015) that brought together scholars from the Global History and Culture Centre at the University of Warwick, the Victoria and Albert Museum, the University of Bologna, the University of Stockholm, the University of Melbourne and the Museum of Art and Design in New York. The aim of this collaboration was to demonstrate that luxury is not just a phenomenon associated with affluent societies in the twentieth century and that it speaks to a large literature concerning amongst other things, the development of skills, materials and networks - key themes in this thesis. The network coincided with a 2015 exhibition at the Victoria and Albert Museum that was jointly organized with the Crafts Council, which challenged preconceived notions of value and looked at the production of exceptional objects, like the fine jewellery discussed in this thesis.

The craft theoretician Glenn Adamson, who was involved in both of these projects, has contributed significantly to developing an idea of craft that moves beyond the traditional debate summarized by Marchand. In his seminal work *Thinking through Craft,* Adamson presents a more inclusive definition of craft, which incorporates luxury craft production. He suggests that we should think of craft as:

> An approach, an attitude, or a habit of action. Craft exists only in motion. It is a way of doing things, not a classification of objects, institutions or people. It is also a

[72] Bruce Metcalf, "Contemporary Craft: A brief overview," in *Exploring Contemporary Craft: History, theory and critical writing,* ed. Jean Johnson (Toronto: Coach House Books, 2002), 16.

> multiple: an amalgamation of interrelated core principles, which are put into relation with one another through the overarching idea of "craft."[73]

Thus according to Adamson, craft is a relational concept embodied in skill. These ideas will be developed in this thesis, which explores how the model making *process* makes manifest the relational nature of Parisian fine jewellery knowledge.

In light of the controversy surrounding the English word 'craft,' there is now a tendency to avoid trying to define the word. Marchand proposes instead that it be acknowledged as 'open-ended, multi-stranded and polythetic in nature.'[74] His theorization is especially useful in the context of this thesis because it explains how craft touches on 'a wide inventory of things, properties and characteristics including: apprenticeship, autonomy, bespoke, the body, design and making, economic pecarity, expertise, focus, functionality, identity, innovation, locality, materials, problem solving, social politics, risk, the senses, skill, standards, tools and tradition.'[75] The term 'polythetic' is especially pertinent to the model making investigated in this thesis as it perfectly captures the idea of the model as an 'in-between object' that was introduced at the beginning of this literature review. In fact, although the terms mentioned by Marchand are discussed throughout this thesis, each chapter has a particular focus in order to shed light on the performative role of the model in knowledge transmission, creation, tradition and evolution: Chapter one is on apprenticeship and expertise, drawing on auto-ethnographic experience to explore how trainee jewellery students become expert jewellers by making models; Chapter two focuses on design and making, problem solving and the body in the model making process at a jewellery house; Chapter three looks at tradition and identity as it explores how the models in the archive are used to narrate a Parisian tradition of fine jewellery; Finally, chapter four focuses on material, innovation and locality, investigating how digital technology is a material innovation that has been assimilated into the existing Parisian fine jewellery production structure, thereby making the global local. In this way, this thesis contributes a concrete example of the contemporary theory of craft.

This work has been inspired by similar studies of craft in diverse European contexts. Glenn Adamson's notion of 'craft in motion' is central to Catherine Rossi's study of craft in post-war Italian design.[76] Rossi uses the case study approach to look at the role of craft in areas including product, furniture, fashion, glass and ceramics. She shows how craft was

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[73] Glenn Adamson, *Thinking Through Craft* (Oxford: Berg, 2007), 5.
[74] Marchand, "Introduction," in *Craftwork as Problem Solving,* 9.
[75] Marchand, "Introduction," in *Craftwork as Problem Solving,* 9.
[76] Catherine Rossi, *Crafting Modern Design in Italy, from Post-War to Postmodernism* (London: Royal College of Art, PhD 2011).

'designed, curated, negated and continually relied upon by Italy's architects not only for the realisation of their designs but for the definition of their practice.'[77] Focussing on the role of a single craft in the French context is Susan Terrio's work on the French chocolate industry.[78] Although her work looks at craft from the consumption perspective, this thesis will point to numerous similarities with the Parisian fine jewellery industry. Whereas Rossi explores the public negation of craft by Italian designers, Terrio demonstrates how chocolatiers consciously invoke the discourse surrounding craft to market their products. She writes that:

> In postindustrial societies like France, craft can serve as a metaphor for an alternative set of cultural values and work practices in contrast to the dominant norm. In these settings the persistence, reinvention, or creation of traditional craft cultural forms, work practices, and communities can be a means to reassert cultural distinctiveness and identity in response to rapidly changing circumstances. Master craftsmen can be celebrated as symbols of local and/or national cultural values. Craft commodities can be marketed on the basis of the nostalgia for an aestheticized, preindustrial work ethos. Here tradition serves as a model of the past that changes constantly because it is continually reinvented and reconstructed from the vantage point of the present.[79]

This thesis will explore how the Parisian jewellery houses use the models in the archive to construct a similar narrative around craft production, thereby creating a tradition of Parisian fine jewellery that is also continually reinvented from the vantage point of the present. Moreover, it will look at how individual artisans use their own personal archive of models to construct an artisan-led tradition that is independent of the institution of the jewellery houses in which they work.

i.i.vii The French context

Susan Terrio points out that craft is a 'potent, manipulable symbol of French culture.'[80] According to the Historian of French literature Angelica Goodden, 'the French concern with developing an artisan class may be traced back to the seventeenth century debates surrounding the creation of an *Academie des sciences*,' which for the first time led to the separation of fine arts from practical arts and the sciences.[81] Goodden reevaluates the life

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[77] Rossi, *Crafting Modern Design in Italy, from Post-War to Postmodernism*, 33.
[78] Susan Terrio, "Crafting Grand Cru Chocolates in Contemporary France," *American Anthropologist* 98.1 (1996): 67-79.
[79] Terrio, "Crafting Grand Cru Chocolates in Contemporary France," 74.
[80] Terrio, "Crafting Grand Cru Chocolates in Contemporary France," 77.
[81] Angelica Goodden, *Rousseau's Hand: The crafting of a writer* (Oxford: Oxford University Press, 2013), 27.

and work of the philosopher Jean Jacques Rousseau through a study of his relationship to craft. Born into a family of watchmakers, he was apprenticed to a *graveur pour l'horlogerie* (watch engraver), and Goodden argues that this intimate connection to craft shaped his entire life and work, which espoused the notion that 'craft and what we call the moral and intellectual life are mutually supportive, [and] cannot be experienced in full without each other.'[82]

This thesis speaks to a wider literature on the subject of creativity in French culture. Ann Jefferson has explored the concept of the 'genius' in French cultural history, pointing to the constant struggle between the individual versus the collective 'genius.'[83] This notion of the 'genius' and the tension between the individual and collective will be investigated in this thesis, by looking at the role of the model in the production process, as a mediator between the jewellery house, which commissions the jewel, and the artisans, who make it. By examining the difference between models in archives kept by the jewellery houses and by their artisans, it will ask how artisans are able to create their own tradition of fine jewellery that is independent of the jewellery house that employs them.

The individual versus the collective is also a dominant theme in the literature on fashion in France. In his seminal article 'Fashion,' Georg Simmel argued that the tension between the uniform and the individual (or what he termed the tendencies towards demarcation and imitation) lies at the heart of the fashion system.[84] For Simmel, 'fashion is the imitation of a given example and satisfies the demand for social adaptation. At the same time it satisfies in no less degree the need of differentiation, the tendency towards dissimilarity, the desire for change and contrast.'[85] In an early article, Roland Barthes used Saussure's categories to analyse the language of fashion.[86] Here he distinguished between *costume* (the social normative system of dress) and *habillement* (the individual's choice of dress). The two are brought together in the *vetement,* which reflects the harmonization of the opposing forces between the individual and the social, identified by Simmel. More recently, Daniel Roche has argued that 'fashion is an equilibrium point between the collective and the individual' and the Marxist scholar Giles Lipovetsky has explored how 'fashion combines individualism and conformity,' thus becoming, in Nancy Green's words, 'the very expression of the

[82] Goodden, *Rousseau's Hand*, 195.
[83] Ann Jefferson, *Genius in France: An idea and its uses* (Princeton: Princeton University Press, 2015).
[84] Georg Simmel, "Fashion," in *On Individuality and Social Forms,* ed. David Levine (London: University of Chicago Press, 1971 [1904]).
[85] Simmel, "Fashion," 543.
[86] See Roland Barthes, "Language and Clothing," *The Language of Fashion (Bloomsbury Revelations)* (London: Bloomsbury, 2013); Roland Barthes, "Towards a Sociology of Dress," *The Language of Fashion (Bloomsbury Revelations)* (London: Bloomsbury, 2013).

symbiosis of democracy and individualism.'[87] This thesis will explore this symbiosis between the individual and the collective, identified by the literature on French fashion, by looking at how the model bridges the divide between the knowledge needed to produce unique one-a-kind pieces, traditionally produced by the jewellery houses, and the knowledge behind market oriented jewels, produced using new technology.

There is, in fact, a profound similarity between the late nineteenth and early twentieth century fashion studied by the aforementioned thinkers and the fine jewellery under investigation in this thesis. The globalisation of Parisian fine jewellery described at the beginning of this literature review bears a striking similarity to the globalisation of French fashion towards the end of the nineteenth century. This is illustrated by the example of the celebrated couturier Charles Frederick Worth. According to his biographer, Diana de Marley, 'it was almost a rule that court dresses [in the Third Empire] had to be produced by Worth.'[88] Worth is today remembered for transforming the way in which dresses were produced, as he dressed not just the rich, but also produced inexpensive copies and off-the-rack garments. De Marly estimates that Worth produced at least a thousand gowns each season for the ladies at court, and also had a growing international clientele.[89] It would have been impossible to service this global demand using the techniques of the past. Most writers have focused on developments in sewing machinery, which meant that by 1870 Worth was able to employ 1200 seamstresses in his workshop.[90] More interesting in the context of this thesis is the actual construction process he used. In order to mass produce garments on such a large scale, Worth introduced standard patterns with standard sized measurements, initially taken from his wife Marie. According to de Marly, Worth's standard patterns won him 'a worldwide empire as no previous dressmaker had ever achieved or could have done. He was an artist but on an industrial scale.'[91] The patterns were multiplied and sold to foreign dressmakers. Dickens noted that 'milliners from every decent capital come to wait on Worth. They go away wearing a dress or pattern for which they pay fabulous prices.'[92] These dress patterns bear a striking similarity to the models investigated in this thesis, which similarly bridge the gap between the unique one of a kind pieces and the market orientated jewels, which are sold by the jewellery houses in 2019. By comparing traditional and digital models and their making, this thesis will explore how the jewellery community

[87] Daniel Roche, *The Culture of Clothing: Dress and fashion in the ancient regime,* trans. Jean Birrell (Cambridge: Cambridge University Press, 1994), 53; Gilles Lipovetsky, *The Empire of Fashion: Dressing modern democracy,* trans. Catherine Porter (Princeton: Princeton University Press, 1994), 173; Nancy Green, *Ready-to-wear Ready-to-work* (London: Duke University Press, 1997), 18.
[88] Diana de Marly, *Worth: Father of Haute Couture* (New York: Holmes & Meier, 1990), 48.
[89] de Marly, *Worth: Father of Haute Couture*,98.
[90] de Marly, *Worth: Father of Haute Couture*, 60.
[91] de Marly, *Worth: Father of Haute Couture*, 119.
[92] de Marly, *Worth: Father of Haute Couture*, 103.

has harnessed the similarities between traditional and digital models in order to assimilate the new technology required to meet this global demand. At the same time, it will investigate how they invoke this connection between the traditional and digital models to authenticate these new goods. This ties into the work of the Fashion Historian Nancy Troy whose work *Couture Culture* explores how authenticity became a key concern for the couturiers like Poiret and Paquin, who followed Worth into the global fashion market.[93] She argues that in this globalised environment, 'originality, authenticity and the aesthetic aura of the individual object' became key concerns of the early twentieth century couturiers.[94] Troy examines how couturiers such as Poiret responded to this changed market environment, by creating their own new culture of consumption, most obviously through carefully curated shops. The example of Worth shows how even in the early twentieth century the apparently new culture of consumption was actually led by a change within the production process. This thesis will provide a contemporary case study to this effect.

i.i.viii Production and its objects

This thesis focuses on model making, which is part of the jewellery production process. However, the emphasis in this thesis is not on production in relation to consumption, but instead it looks closely at the process of production in order to ascertain how production knowledge is transmitted, created and evolves. In fact, the model's significance lies beyond the simple distinction of production and consumption. The model is never 'consumed,' not only in the sense that it is not sold, but also critically in that it can be seen to live on in the archives of the jewellery houses and of the artisans. Indeed chapter three will explore how the model continues to inspire new models even after it has been used to produce the original jewel. My work will follow scholars such as Ben Fine and Ellen Leopold[95] and Leora Auslander[96] in moving beyond the crude opposition between production and consumption to investigate the overall interactions between agents in the production process, which in turn inform consumption.

Igor Kopytoff has argued that 'the production of commodities is also a cultural and cognitive process' and contributes to the biography of the 'thing' in question.[97] The notion of even the most mundane objects having biographies has been taken up in the design history literature by Leora Auslander who points out that:

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[93] Nancy Troy, *Couture Culture* (Cambridge, MA: MIT Press, 2003).
[94] Troy, *Couture Culture*, 9.
[95] Ben Fine and Ellen Leopold, *The World of Consumption* (London: Routledge, 1993).
[96] Leora Auslander, *Taste and Power* (California: University of California Press, 1998).
[97] Igor Kopytoff, "The Biography of Things," in *The Social Life of Things* ed. Arjun Appadurai (Cambridge: Cambridge University Press, 1986),

> Their makers and users understand them to have special attributes not only because of their contact with the human body but because they themselves mirror two crucial characteristics of human existence. They, like the people who use them, are embodied. That embodiedness means that objects occupy space and cannot be in two spaces at once, and they are mortal, although their life-spans may be longer or shorter than the people using them.[98]

The study of the model in this thesis will explore how Kopytoff and Auslander's theoretical contribution to the study of the biography of objects can be moved away from the simple tracing of an object's linear life (from its creation to its consumption) to the possibility of a cyclical life in which an object is continuously reinvented via the knowledge manifested in the model.

My thesis will go one step further and follows in the vein of Lothar Ledderose's work on the modular basis of mass production in Chinese cultural history, *Ten Thousand Things,* in which he reveals the object's ability to encapsulate and transmit social relations and values. [99] The focus of Ledderose's work is the module system, which underpins not just the Chinese script that combines twelve single strokes into 50000 characters, but also the production of historic Chinese bronzes found at Anyang, Henan Province, and, most notably, the famous terracotta army made under the Emporer Qin in 274 BC that was discovered in Lintong County, Shaanxi, in 1974. Lederrose explains that:

> Modules consist of several elements. They are interchangeable parts. They are combined into units according to rules and conventions. All units can be broken down into modules with no components left over. Modules also have different levels of complexity. Complicated modules may contain simple modules, and most modules can also be used as independent characters. Modules change their size and proportions according to their position in the units. And all modules are individually executed and hence display small differences in their shapes.[100]

This thesis will follow Ledderose's close introspection of the making process. It hypothesises that the jewellery production models and the models used in training jewellers can be conceptualised in the same way. The thesis will investigate how these models are made using combinations of techniques and it asks how this attention to the sequence of techniques and the combinatorial possibilities that arise from this are critical to the model's ability to transmit and create knowledge over time.

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[98] Leora Auslander, "Beyond Words," *The American Historical Review* 110 (4, 2005), 1016.
[99] Lothar Ledderose, *Ten Thousand Things* (Princeton: Princeton University Press, 2000).
[100] Ledderose, *Ten Thousand Things,* 18.

By investigating the division of labour that underpins this modular production process, Ledderose points to the ability of the resulting objects to manifest the production relations of their making. We can gain an idea of how objects can reflect the production environment of their making by turning to the work of Pierre Bourdieu. Bourdieu's lesser known work on the Berber house discusses how relations can be immanent to certain objects and be consciously reproduced through this externalization.[101] In this paper, Bourdieu describes the layout and architecture of the Berber house and explains how the oppositions that define the organisation of the house mirror those that define the social relations of the community:

> The house is organised according to a set of homologous oppositions: fire: water :: cooked: raw:: high: low:: light: shadow:: day: night:: male: female:: nif: horma:: fertilising: able to be fertilized:: culture: nature. But in fact the same oppositions exist between the house as a whole and the rest of the universe. Considered in its relationship with the external world, which is a specifically masculine world of public life and agricultural work, the house, which is the universe of women and the world of intimacy and privacy is haram, that is to say, at once sacred and illicit for every man who does not form a part of it.[102]

Bourdieu also recognises that the relations within the house extend to the relations between the houses and beyond:

> The house, and, by extension the village, which is the full country, the precincts peopled by men, are opposed in a certain respect to the fields empty of men which are called lakhla, the space that is empty and sterile.[103]

Thus the house can be used as a metaphor to describe the society from numerous vantage points, depending on the onlooker's perspective. This thesis uses this idea as a template to trace the relation between the technical logic of the model, as explicated in Ledderose's work, and the social logic of the Parisian fine jewellery knowledge network. By investigating the model making process from numerous vantage points within the Parisian fine jewellery knowledge network, namely the classroom, the workshop and the archive, this thesis looks at how, like the Berber house, the model can shed light on different facets of the production environment of Parisian fine jewellery and the connections between them.

The idea that the internal technical logic of the model mirrors the external social logic of its making can be understood with reference to the work of the Anthropologist Patrice Maniglier. Following Michel Foucault, Maniglier postulates that:

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[101] Pierre Bourdieu, "The Berber House or the World Reversed," *Social Science Information* 9.2 (1970): 151-170.
[102] Bourdieu, "The Berber House or the World Reversed," 157.
[103] Bourdieu, "The Berber House or the World Reversed," 161.

> Instead of having their identity defined by their relations to one another, things now *are* systems of relations; they are endowed with an interiority of their own, which is not entirely apparent in their relations to one another. As such, their external relations to one another depend on the *form* of their own internal relations (i.e. their "structure").[104]

The guiding hypothesis in this thesis is therefore that the model, as an abstract concept, is not defined by its own physical form, nor by its relation to other models, but rather by the technical and social relations manifest within it. According to Maniglier, 'they [(the models)] turn in upon themselves, posit their own volumes, and define for themselves an *internal* space which, to our representation, is on the *exterior.*'[105] Maniglier argues that the relations manifest in objects can be viewed as *systems of relations* through time. Following his lead, this thesis will look at the consequences of this inherent relationality of the model for its ability to regenerate these relations through time. In this way, this thesis will seek to help us to revise our understanding of the importance of the way objects are produced for design historical studies of production and consumption.

i.ii Methodology

This thesis relies on auto-ethnographic research carried out at the *Haute Ecole de Joaillerie* (HEJ) and the jewellery houses of the Place Vendôme. This research was based on the apprenticeship-as-field method as well as ethnographic observations in the workshop. This dual investigation from within the jewellery houses and the school, which trains its jewellers reflects a network based methodology, whereby the knowledge network of Parisian fine jewellery was examined from two points within this network. This methodology section of the introduction will explain the background to this research, introduce the apprenticeship-as-field method as well as the network approach, and explore the advantages and disadvantages of the methods used.

Throughout my PhD I have been aware of the strict ethical guidelines, which govern academic research. During my first year at the Royal College of Art I studied the Research Methods Course and later took the Epigeum 'Good Research Practice' course. During my meetings I tried to put the best practice skills I had learnt into action. Each contact was presented with a project information sheet and a consent form, which acquainted them with my research and provided an opportunity to ask questions themselves. The standard project information sheet and consent forms can be seen in appendices one and two. All of

[104] Patrice Maniglier, "The Order of Things," in *A Companion to Foucault*, eds. Christopher Falzon, Timothy O'Leary and Jana Sawicki (London: Blackwell Publishing, 2013), 110.
[105] Maniglier, "The Order of Things," 111.

these forms were signed by the jewellery houses and teachers referred to in this thesis and submitted to the RCA Ethics department, which gave its approval for this research.[106]

I began this PhD with a focus on production models across a range of luxury trades in Europe.[107] I decided that to understand these luxury production models, I needed to narrow my research to one city and to one industry. In November 2013 I moved to the fifth *arrondissement* in Paris to engage more closely with my topic. I knew from experience that gaining access to luxury workshops involved careful and persistent networking, but I quickly learnt that Parisian society is extremely hierarchical and difficult to penetrate, particularly as a foreigner. In June 2013 I first met Beatrice de Plinval, the President of the Place Vendôme Association and the head of the archives at Chaumet. Through this connection I was introduced to the head of the workshop and the head of digital production, who gave me unprecedented access to the production of fine jewellery at Chaumet. Throughout my PhD I have worked closely with these contacts and have conducted multiple visits during which I learnt about the production of both the unique one-of-a-kind pieces and the market oriented pieces produced by the jewellery house. One benefit of conducting regular visits between 2013 and 2019 was that I was also able to see how the production process changed through the introduction of digital technology, which is the subject of chapter four of this thesis.

My research trips to Chaumet were also an education in French high society etiquette. In contrast to my research trips to the tailors and shoemakers in London and Italy, where I presented myself as an enthusiastic PhD student, eager to ask as many questions as possible, I was aware that I had to play a different role during my visits to the jewellery house and later also to X jewellery house. This extended beyond my attire (as formal as possible) to the questions that I asked and how I asked them. When I first met Beatrice de Plinval she used the word *'doucement'* (slowly) to encourage me to take my time. This one word encapsulates my research experience at the jewellery houses. I learnt the art of patience, as it would take many meetings with people to gain their trust enough to be passed on to the relevant people or to be given permission to take photographs. I also learnt that it was best to ask a few questions only and then return with more. In the tailoring workshops of Savile Row I had felt awkward returning with more questions (why didn't I ask that the *first*

[106] For reasons of confidentiality I am not obliged to submit the individual signed forms within this thesis. They have been acknowledged by the RCA Ethics department.
[107] My early case studies included: the tailors Liverano (Florence), Meyer and Mortimer (Savile Row), Henry Poole (Savile Row), Dege and Skinner (Savile Row); the shoemakers John Lobb (St James Street), John Lobb (Hermes owned in Paris), Ferragamo (Florence); the hat makers Maison Michel (Paris); the embroiderers Lessages (Paris); the lingerie maker Poupie Cadolle (Paris); the jewellers Chaumet (Paris).

time?!) but at Chaumet, I noticed that people were very appreciative when they realized I had thought carefully about what they had told me.

During my visits to Chaumet I was given access to the workshop at the top of the Place Vendôme where I met the artisans. During these meetings I witnessed the physical practice of jewellery making and gained knowledge about the context of the making process that enabled me to enrich my interpretation of this process with cultural significance.

However, as Trevor Marchand has noted, 'by relying solely on participant observation, oral accounts, or ethnographic reasoning, we limit our insights into the cognitive and anatomical processes involved in learning and doing.'[108] I realized that key to understanding the role of the model, both in the workshop and in the archive, was to personally engage with the model making process.

I have been aware of the power of making as a research method from a young age. Throughout my childhood and teenage years I accompanied my mother on anthropological fieldwork to the South Pacific. I remember morphing into a little Polynesian as I would dance barefoot with the island children, proudly showing off my island dress and woven pandanus hat, handmade for me by the mama next door who had adopted me into her clan. I was also an important aid to my mother's research, as the mamas would sit me down with a cup of watery 'milo' hot chocolate and involve me in their quilting work. While teaching me to make the various types of Cook Islands tivaevae, they passed on stories that my mother would never have heard in the more formal setting of an interview.

In addition to the approaches to knowing through making in the History of Design literature that were discussed in the literature review, this thesis is inspired by anthropological studies that track the transformation of the apprenticing novice into qualified practitioner. Jean Lave's research on apprenticing tailors in Liberia laid the groundwork for a new body of work that included the psychological and embodied processes of situated learning, recognizing the role of the environment of social relations, tools and materials in structuring knowledge within communities of practice.[109] As Barbara Hoffman points out in her auto-ethnographic research in Mali, the apprenticeship-as-field method has been increasingly adopted by anthropologists striving for a 'closer approximation' of the local learner's point

[108] Trevor Marchand, "Making Knowledge: Explorations of the indissoluble relation between minds, bodies and the environment," *Journal of the Royal Anthropological Institute* (2010), 10.
[109] Jean Lave, "A Comparative Approach to Educational Forms and Learning Processes," *Anthropology and Education Quarterly* 13.2 (1982): 181-7.

of view.[110] This approach immerses researchers in the motor-cognitive experiences of practice and the socio-political arena of work. This thesis uses the apprenticeship-as-field method as a form of auto-ethnographic research.

My work has been particularly influenced by the Anthropologist Trevor Marchand, who apprenticed as a mason in Yemen and Djenné.[111] His most recent work with carpentry trainees at the Building Crafts College in East London is closest to my work as it concerns learning in a formal Western educational establishment similar to the *Haute Ecole de Joaillerie* (HEJ). In 2005 Marchand began two years fieldwork as a trainee in the woodwork program at the college, working towards the National Vocational Qualifications and City & Guilds Diploma.[112]

Following Trevor Marchand's lead, I also engaged in two years fieldwork as a craft student. In September 2016, with the support of my supervisors and the Royal College of Art, I enrolled full time in the *Haute Ecole de Joaillerie* (HEJ) to study for the CAP (Certificat d'Aptitude Professionelle) examination that forms the basis of all jewellery training in France. The school is the oldest jewellery school in France and, as will be discussed in chapter one, has close links to the Place Vendôme. All of the jewellers in the workshop at Chaumet trained at the school and Franco Cerulli, the head of production at Chaumet, is one of the directors. Learning at the heart of the Parisian fine jewellery community, as opposed to at a school in London or elsewhere in France, was crucial to my research. As Marchand points out, 'together, practitioners and interlocutors structure their places of learning through activity and dialogue in the spaces they define and organize; along their pathways of movement; and with the tools, implements, and artefacts they use, create, and destroy.'[113] Indeed the making environment is as important as the making itself in the apprenticeship-as-field method of research.

Contrasting his experience at a college in London with his earlier work in Djenné and Yemen, Marchand claims that training in a college setting is a very different experience to working as an apprentice as most anthropologists have done.[114] For one, school training is

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[110] Barbara Hoffman, "Power, Structure, and Mande Jeliw," in *Status and Identity in West Africa: nyamakalaw of Mande*, ed. David Conrad and Barbara Frank (Bloomington and Indianapolis IN: Indiana University Press, 1995).
[111] Trevor Marchand, *Minaret Building and Apprenticeship in Yemen* (Routledge, 2001); Trevor Marchand, *The Masons of Djenné* (Indiana University Press, 2009).
[112] Marchand, "Making Knowledge."
[113] Marchand, "Making Knowledge," 10.
[114] See Rob Dilley, "Secrets and skills: Apprenticeship among Tukolor weavers," in *Apprenticeship: From theory to method and back again,* ed. Michael Coy (Albany, N.Y.: SUNY Press, 1989): 181-98; Greg Downey, *Learning capoeira: lessons in cunning from an Afro-Brazilian art* (Oxford: University Press, 2005); Nicolette Makovicky, "Something to Talk About: Connotation and knowledge-making

segregated from the everyday operations and economies of a workshop. As a paying student, I attended to learn and my teachers were there primarily to teach. Thus categories of persons and their roles in a school setting are starkly delineated and differentiated. School projects were always individual and highly competitive, although in the context of Parisian fine jewellery this is typical even in the professional workshop environment, as will be described in chapter two. The curriculum was structured in accordance with the demands of the CAP examination with instruction in gouache painting, technical drawing, metal working, wax working, science of jewellery and French jewellery history. The similarities and differences between this school environment and the real world of Parisian fine jewellery will become apparent in the course of the first two chapters of this thesis which explore my experience at the *Haute Ecole de Joaillerie* (HEJ) (chapter one) and the professional world of the model maker at X jewellery house (chapter two).

I was a complete novice when I began my studies at the *Haute Ecole de Joaillerie* (HEJ) as I had no previous experience of making jewellery. Yet as Erin O'Connor points out in her study of glassblowing, even the first experience of the novice is informed by some experience: 'In fact, she arrives at her first day with already equipped dispositions and schemata for handling the forthcoming situations, experiences that must bear on her very first moments of [making] to greater or lesser degrees.'[115] In addition to my observations in the workshop at Chaumet, I had grown up painting with my father, a fine art graduate. Throughout my childhood he would spend hours trying to teach me how to hold a paintbrush to produce an effortless stroke. In his hands, the brush seemed to become an extension of his body and I would watch in awe as he would paint a near perfect representation of what was before him, concentrating on his subject rather than the page or the brush. Although my hands never became as proficient as my father's, through this childhood experience I had learnt about the relationship between a master and his tools and about what Michael Polanyi called the 'phenomenal structure of tacit knowing,' namely that 'in the exercise of a skill ... we are aware of that from are attending to another thing, in the appearance of that thing.'[116] In short, I knew what it meant, what it felt like, to be a skilled craftsman. I knew what I was aiming for.

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among Central Slovak lacemakers," *Journal of the Royal Anthropological Institute* 16 (2010): 80-99; Anna Portisch, "The Craft of Skilful Learning: Kazakh women's everyday craft practices in western Mongolia," *Journal of the Royal Anthropological Institute* 16 (2008): 62-79; Tom Rice, "Learning to Listen: Auscultation and the transmission of auditory knowledge," *Journal of the Royal Anthropological Institute* 16 (2008): 41-61; and Soumhya Venkatesan, "Learning to Weave: weaving to learn… what?" *Journal of the Royal Anthropological Institute* 16 (2008): 158-175.

[115] Erin O'Connor, "Embodied Knowledge: The experience of meaning and the struggle towards proficiency in glassblowing," *Ethnography* 6 (2005), 191.

[116] Michael Polanyi, *The Tacit Dimension* (New York: Anchor Books, 1967),11.

In total I spent three years at the *Haute Ecole de Joaillerie* (HEJ), completing the CAP examination as well as the advanced Mention Complémentaire en Joaillerie. I earned a solid skill base in jewellery and became a member of the community of Parisian jewellers. Throughout my time at the school I used the apprenticeship-as-field method to reflect on my learning and my evolution as a jeweller. In terms of my research, I was able to draw much more from the experience than simply jewellery skills, as will now be explained.

Through my studies at the *Haute Ecole de Joaillerie* (HEJ) I 'learnt about learning' through direct immersion in the day-to-day training of the jewellers on the Place Vendôme.[117] By working towards the French national vocational qualification, the *Certificat d'Aptitude Professionnelle* (CAP) I gained first hand experience of the pedagogical structure of French jewellery training. As a full-time student at the school, I was subject to the school's authority and subordinate to the expert status of my teachers. The way in which teachers and pupils communicated with each other verbally and corporeally enabled me to understand the hierarchies in the Parisian fine jewellery community, a theme of the first chapter of this thesis. By observing others' reactions to my progress and their reactions to my work I was able to understand the teacher-pupil relationship from a personal perspective. Through the examination experience I also gained an insight into the ways in which expertise is perceived, evaluated and acknowledged by the Parisian fine jewellery community.

In an article on informal aspects of apprenticeship in American occupations, the ethnologist Bennie Graves argues that understanding social norms and values is an important part of any apprenticeship.[118] I am fluent in French (as well as Italian, German and English), but I had never lived in France prior to 2013. Having been raised in London, Los Angeles and Berlin, before studying at Cambridge, my fieldwork was a steep socialization into French culture and conduct. Bennie Graves identifies three stages of occupational socialization beginning with the apprentice's decision to train, when they begin the work and finally when they have been accepted by their colleagues and mentors. Reflecting back on my experience at the *Haute Ecole de Joaillerie* (HEJ) I realize how I too passed through all three of these stages. Bennie Graves notes that the third stage is identified by a change in how the apprentice is addressed and by the fact they are allowed into the 'backstage,' which is hidden from outsiders. By the end of my time at the *Haute Ecole de Joaillerie* (HEJ) I noticed how I had gone from being referred to as 'the English red head' to the 'Mademoiselle that

[117] See Esther Goody, "Learning, Apprenticeship and the Division of Labour," in *Apprenticeship: From theory to method and back again*, ed. Michael Coy (Albany, NY: SUNY Press, 1989), 254-5.
[118] Bennie Graves, "Informal Aspects of Apprenticeship ," in *Apprenticeship: From theory to method and back again,* ed. Michael Coy (Albany: State University of New York, 1989).

does enamelling.' Teachers also greeted me with the typical French cheek kiss that signifies increased respect.

I cannot say that this process of apprenticeship was in any way easy. Throughout my studies at the *Haute Ecole de Joaillerie* (HEJ) I made a concerted effort to practice a hermeneutic phenomenology, simultaneously immersing myself in the work at school and reflecting on my experiences.[119] Alongside my workshop notebook, in which I tried to keep an account of the techniques I learnt, I kept a daily diary of my observations and emotions. My approach followed Psychologist Katherine Ewing's claim that one can use one's own reactions as an observational tool to understand a subject or a situation.[120] Particularly in the early days, my diary told a story of frustration, anxiety and a feeling of inadequacy as I struggled to adjust to working with my hands for the first time in my life. It was not until I had left Paris in the spring of 2019 that I finally came across an ethnographic account that resonated with my experience. In a paper looking back on his apprenticeship as a wood carver in China, the Anthropologist Eugene Cooper describes the physical pain and frustration of working with your hands and pushing through it until '[he] was an intellectual with worker's hands.'[121] My previously manicured hands were also covered in plasters for the first few months. Over time, my hands healed and as my skill grew, I stopped inflicting accidental injuries on myself. I now once again have perfectly manicured hands, but now the fact that they continue to look presentable after hours in the workshop reveals that they truly are 'worker's hands.' Interestingly though, Cooper goes on to write that:

> My anguish was less physical than mental as I struggled with carving out a niche for myself in the factory by gaining my fellow workers' respect. Rage, inferiority and paranoia filled the pages of my field notes throughout the period. A combination of mistrust of my motives together with a strong dose of my own thick-headedness made my apprenticeship an often harrowing experience. [122]

Learning to work with your hands is indeed a highly emotional experience. As the Neurologist Frank Wilson finds in his study of the hand, 'when personal desire prompts anyone to learn to do something with their hands, an extremely complicated process is

[119] Charles Taylor, "Hegel's Philosophy of the Mind," in *Human Agency and Language: Philosophical papers I* (Cambridge: Cambridge University Press, 1985), 77-96.
[120] Katherine Ewing, "Is Psychoanalysis Relevant for Anthropology?" In *New Directions in Psychological Anthropology*, ed. Theodore Schwartz, Geoffrey White and Catherine Lutz (Cambridge: Cambridge University Press, 1992), 264.
[121] Eugene Cooper, "Apprenticeship as Field Method," in *Apprenticeship: From theory to method and back again,* ed. Michael Coy (Albany: State University of New York, 1989), 140.
[122] Cooper, "Apprenticeship as Field Method," 140.

initiated that endows the work with a powerful emotional charge.'[123] The words 'personal desire' seem to be critical here. I did not anticipate when I embarked on my jewellery training, that my fieldwork would ignite the passion that it did so much so that on completion of my PhD I hope to establish my own jewellery studio. The fact that it did undoubtedly made it harder to maintain an objective distance from my field of study during my training, but with hindsight it actually enriched my fieldwork. When Eugene Cooper looked back on his fieldwork, he came to the conclusion that 'one does gain a depth of understanding unattainable otherwise.'[124] Looking back at my own experience I believe my hitherto undiscovered passion for jewellery had two main benefits for my academic endeavour.

First, I found it easier to build a connection with jewellers I met with and was given new contacts and trusted with more information. For example, I had previously approached X jewellery house as a PhD researcher and had been denied all access. By chance, my gouache teacher's wife turned out to be the chief model maker. He made the personal introduction and she then helped arrange a meeting through her boss and the executives above him. The chief model maker immediately expressed great respect for the fact that I had devoted the time and energy to mastering the practical skills myself and even said this was the reason she chose to give me unprecedented access to her time and work. By sharing my own experience as a trainee jeweller with her, I was able to engage in more meaningful conversations with her during which she revealed not only her working method, but also her emotional connection to the materials and her work. My course also provided me with the necessary jewellery terminology with which I could phrase more meaningful and less hostile questions that elicited more informative answers.

The greater depth of access afforded by one's status as an apprentice is indeed a common theme in the literature. In his reflection on apprenticeship-as-field method, the Anthropologist Michael Coy describes not so much 'going native' as 'being made native.'[125] He explains how he was accepted as a blacksmith apprentice with 'staggering speed' and that 'they [his subjects] were more comfortable having some role to which I could be assigned.'[126] I too experienced rapid acceptance as a jewellery trainee and I noticed that similar to Michael Coy's experience, other members of the jewellery community found it easier to accept me in this role, rather than as a PhD researcher. It became clear to me in the

[123] Frank Wilson, *The Hand: How its use shapes the brain, language and human culture* (New York: Vintage, 1999), 5.
[124] Cooper, "Apprenticeship as Field Method," 146.
[125] Michael Coy, "Being What We Pretend To Be," in *Apprenticeship: from theory to method and back again,* ed. Michael Coy (Albany: State University of New York, 1989), 131.
[126] Coy, "Being What We Pretend To Be," 133.

course of my research that many jewellers not only did not know what a PhD was, but that they considered academia to be totally irrelevant to their concerns. I noticed that they felt much more comfortable talking to a fellow jeweller than to someone from a university background.

The second advantage of 'being made native,' was that I gained a deeper understanding of the unique knowledge environment that is the world of Parisian fine jewellery. Michel Coy writes that:

> In many ways hands-on experience is precisely what is offered to the anthropologist who applies the apprenticeship method. But it is not "hands-on" only in the practical sense of manipulating the materials and methods of production in a craft context. Apprenticeship is also the hands-on application of the methods and materials produced by anthropological science itself. The anthropological description and analysis of thousands of cultural systems provides the anthropologist in the modern era with the tools needed to meld with the social systems that he/she seeks to understand. Indeed it is not enough to understand the dynamics of human behaviour, understanding must be applied.[127]

Specifically my practical skills enabled me to understand the mediating role of the model in the production process. As part of the CAP course I spent one day a week training as a gouache painter, two days on metal work and a day making models. Making such training models within a wider curriculum of all the jewellery trades, enabled me to understand the significance of the production model for the gouache painter, jeweller and model maker. This is explored in chapter two. Towards the end of my studies I had the opportunity to remake a model from my wax teacher's archive. This enabled me to understand how models in archives could be used to generate new models and therefore new jewellery within an existing tradition and is explored in chapter three.

In summary, my training at the *Haute Ecole de Joaillerie* (HEJ) provided me with new inroads and a deeper connection to the Parisian fine jewellery house Chaumet, which had originally been my case study, and opened the door to X jewellery house. This meant that my research now spanned the *Haute Ecole de Joaillerie* (HEJ), Chaumet, and X jewellery house. Studying all four types of model in the Parisian fine jewellery world from the two nodes of this knowledge network that I mentioned above - namely the jewellery houses of the Place Vendôme and the school, which trains its jewellers - enabled me to combine my apprenticeship-as-field methodology with a network based approach.

[127] Coy, "Being What We Pretend To Be," 134.

The network based approach, inspired by the ANT described above, has been used by scholars such as the Anthropologist Anne Marie Mol and Educationalist Tara Fenwick to 'trace the process through which diverse elements become combined into knowledge networks, and how some networks stabilise, extend, enrol others and circulate to exert power, while others dissolve, distort, mutate or become appropriated.'[128] Indeed through my apprentice-as-field method research at the two nodes of the Parisian jewellery community network, I discovered new knowledge networks within each node - i.e. within the jewellery houses and the school. At both the *Haute Ecole de Joaillerie* (HEJ) and at the jewellery houses, I studied the knowledge network that I found myself in: At the *Haute Ecole de Joaillerie* (HEJ) I looked at model making through the prism of the pupil/teacher relationship that I developed with my teachers; at X jewellery house I investigated the position of the model maker at the heart of the jewellery production process; at Chaumet I discovered how knowledge was circulated, constituted and extended through the models in the archive and in digital production. The final section of this thesis will now address in more detail how the subsequent chapters draw upon the research obtained by the apprenticeship-as-field method and network approach in order to explain the model, understood in the abstract, in relation to Parisian fine jewellery knowledge.

i.iii Chapter outline

Each chapter of this thesis introduces a different form of model and explores its use in the transmission (chapter one), creation (chapter two), tradition (chapter three) and evolution (chapter four) of Parisian fine jewellery knowledge.

Chapter one looks at the role of models in the training and the examination of fine jewellers in France in order to understand knowledge transmission. Following in the line of work by ethnologists such as Trevor Marchand who use the apprenticeship-as-field method to investigate craft production, this chapter provides an auto-ethnographic account of the student experience at the *Haute Ecole de Joaillerie* (HEJ).[129] It explores how trainee jewellers gain corporeal making knowledge by making models in the classroom. Drawing on neurobiological research, the chapter demonstrates how pupils imitate the bodily performance of their teachers and gradually achieve their own body memory, enabling a focal awareness of their work while maintaining a subsidiary awareness of their tools. It looks at how training models are used to teach students to master both technique and space: Metal models teach jewellers a series of techniques in such a combination that they not only

[128] Fenwick and Edwards, "Networks of Knowledge, Matters of Learning and Criticality in Higher Education," 48.
[129] Marchand, *Minaret Building and Apprenticeship in Yemen.*

gain practical skills, but also acquire an expert memory of these techniques; By contrast, wax models transmit a form of situated/spatial knowledge, which teaches students to work in three dimensions. It is argued that the fact that all jewellery trainees throughout France are taught using the same training models gives rise to a sense of collective national identity amongst jewellers throughout France. The chapter asks how the influence of the jewellery houses of the Place Vendôme on the training models made by the pupils at the *Haute Ecole de Joaillerie* (HEJ) enables the school to lay claim to a tradition of Parisian fine jewellery knowledge.

Chapter two looks at the role of the model in knowledge creation through an investigation of the production model making process at X jewellery house. The chapter uses evidence from the jewellery house's model maker to reveal the models' position at the heart of the jewellery production process. It describes the production model making process as a dimensional and material translation, in Walter Benjamin's sense, from the two dimensional paper gouache painting to the three dimensional metal model.[130] Building on the work of the Art Historian Henri Focillion and the Anthropologist Tim Ingold, the second chapter explores how the form of the production model emerges through the model maker's engagement with the material, using a problem solving method to overcome technical and stylistic difficulties.[131] It introduces the term 'embodied bricolage' to explain the importance of the body of the artisan in this process.[132] Tim Ingold's notion of the 'meshwork of making' is used to describe the way in which the body of the artisan, his tools and the material enter into a dialogue with each other.[133] The chapter goes on to situate the production model making process within the wider jewellery production knowledge network that includes the gouache painter, model maker, jeweller, stone setter, and the jewellery house. It argues that this collaborative production network is held together by the production model and this in turn draws our attention to the social nature of the body of the model maker. Through an investigation of the role of the jewellery house in commissioning the production model, this chapter introduces intentionality to Ingold's theory and investigates the consequences of this for our understanding of the nature of jewellery knowledge.

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[130] Walter Benjamin, "The Task of the Translator," in *Selected Writings Volume 1*, eds. Marcus Bullock and Michael Jennings (Cambridge, MA: Harvard University Press, 1996).
[131] Henri Focillon, *The Life of Forms in Art*, trans. Charles Hogan and George Kubler (London: Zone, 1989); Tim Ingold, *Making: Anthropology, Archaeology, Art and Architecture* (London: Routledge, 2013).
[132] Erin O'Connor and Suzanne Peck, "The Prototype: Problem work in the relationship between designer, artist and gaffer in glassblowing," in *Craftwork as Problem Solving,* ed. Trevor Marchand (New York: Routledge, 2017).
[133] Ingold, *Making.*

The third chapter looks at how the model in the archive is used to narrate the Parisian fine jewellery knowledge tradition. It identifies two archives: the one containing historic models belonging to the jewellery house; and the other consisting of a photographic album of models, belonging to the individual artisan. Evidence from the archive at Chaumet sheds light on how the jewellery house curates the models in its archive to create the illusion of a historic jewellery tradition rooted in the Napoleonic era, which is theorised using Alexander Nagel's and Christopher Wood's work on anachronism.[134] It is argued that the existence of the archive, and the creation of new collections using it, is an important marketing strategy for the jewellery house, enabling it to assert its authenticity, similar to the French chocolatiers researched by Susan Terrio.[135] Using Annette Weiner's work on inalienable possessions, the chapter seeks to understand how the secrecy of the archive, which is opened only to select VIPs, has become a part of this marketing strategy.[136] The chapter goes on to present the personal archive of photographs of models belonging to my own wax model making teacher, Monsieur Bertelot. It documents how he passed on his own jewellery knowledge by explaining how to recreate one of the models in a photograph, and analyses this with reference to Georges Didi-Huberman and Walter Benjamin.[137] These two examples – from Chaumet and Monsieur Bertelot - demonstrate how models in the archive are used to construct different narratives of the past, which inform creation in the present. The central idea to emerge from this chapter is that there is no single tradition of Parisian fine jewellery, but that each generation and agent in the production process continually adapts and retells their own story from the vantage point of the present.

Chapter four explores the concept of knowledge evolution through an investigation into how digital technology has changed the way knowledge is transmitted, created and retold in the digital world. It asks how digital technology is taught at the *Haute Ecole de Joaillerie* (HEJ), exploring the similarities and differences to the traditional teaching set out in chapter one. Turning to whether the digital has changed the concept of 'embodied bricolage,' which chapter two showed to define the role of the model in the production process, this chapter shifts its focus to the use of digital technology at Chaumet. Using evidence from the creation and production team at the jewellery house, with reference to the work of Mark Paterson,

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[134] Alexander Nagel and Christopher S. Wood, *The Anachronic Renaissance* (New York: Zone Books, 2010).
[135] Susan Terrio, "Crafting Grand Cru Chocolates in Contemporary France," *American Anthropologist* 98.1 (1996).
[136] Annette Weiner, "Inalienable Wealth," *American Ethnologist* 12.2 (1985).
[137] Georges Didi-Huberman, *The Eye of History: When images take positions,* trans. Shane B. Lillis (London: MIT Press, 2018 [2009]), 250; See D. Schötter, ed., *Schrift, Bilder, Denken: Walter Benjamin und die Künste* (Berlin: Hausam Waldsee/Surkamp, 2004); S. Weigel, "Die unbekannten Meisterwerke in Benjamin's Bildergalerie," *Trajeke: Zeitschrift des Zentrums für Literatur- und Kulturforschung* Berlin 7, no 13 (2006): 15-22.

it reveals how digital technology has enabled greater experimentation in the production process.[138] It explores the latest developments in haptic technology, thereby revealing how digital production relies ever more on the engagement of the body of the artisan and also incorporates the physical body of the consumer. Looking at the use of digital technology at the *Haute Ecole de Joaillerie* (HEJ) and Chaumet, the chapter concludes that it has been assimilated into the existing Parisian fine jewellery tradition and its various narratives. Using the work on materiality by Victor Buchli, Mario Carpo and others, it explains this 'evolution' (as opposed to 'revolution') by the fact that the digital is simply a new material whose introduction is similar to the green wax that was introduced to jewellery production in the 1980s.[139] The chapter uses this evidence of the recurrent assimilation of new materials into the production model as a basis for reflecting on Bruno Latour's theory *We Have Never Been Modern* and our understanding of knowledge evolution through time.[140]

[138] Mark Paterson, "Digital Craft and Digital Touch: Hands-on design with an 'Undo' button," in *The Culture of Digital Tools*, ed. Byron Hawk, David Rieder, Ollie Oviedo (Minnesota: University of Minnesota Press, 2008).
[139] Victor Buchli, *An Archaeology of the Immaterial* (London: Routledge, 2016); Mario Carpo, *The Alphabet and the Algorithm* (Cambridge, MA: MIT Press, 2011).
[140] Latour, *We have never been modern.*

Chapter One: The model in the classroom - knowledge transmission

1.1 Introduction

How do we know and how do we come to know? According to the Anthropologist Trevor Marchand, these are the defining questions of the 'anthropology' of knowledge.[141] In his paper *Making Knowledge*, Marchand calls on anthropologists to explore these questions by recognising the interdependence of nature and nurture. He claims that 'there is widening recognition that nature or nurture should not be studied in isolation, for their interdependence is not trivial, but vital; and the processes by which they operate, and the effects that they yield, are not bounded, but coalesce.'[142] Specifically, Marchand argues for the need to look at the interdependence of minds, bodies and the environment. In this chapter I aim to follow his lead by looking at the environment and context of knowledge transmission in the Parisian fine jewellery knowledge network and the role of the sentient, practising, tool-wielding body in the learning process.

Linking minds, bodies and environment in this knowledge network are the training models, which form the basis of the teaching and examination of trainee jewellers. Students must learn to accurately combine given techniques in order to produce precise copies of metal models set in previous years' exams. They also learn to make wax models in a separate wax modelling class. At the end of their course, they must make these metal and wax models under exam conditions in order to obtain the *Certificat d'Aptitude Professionnelle* (henceforth referred to as CAP) qualification.

The evidence in this chapter is auto-ethnographic and comes from two years full time study in the CAP for jewellery program at the *Haute Ecole de Joaillerie* (henceforth referred to as the HEJ). During my training at the school my colleagues and I learnt to make fine jewellery by making set metal models used to examine the CAP to the examination specifications and standards. I also learnt to make wax models in a separate model making class that focused on developing spatial awareness. I use the term 'spatial knowledge' in the context of the construction of these wax models to describe the dimensional materiality of these models. The term 'situated knowledge' is used to describe the pupils' understanding of their own body in relation to these material models which is developed by handling these training models. In this chapter I also focus on 'technical knowledge' as I reflect on how I learnt to make these training models, by copying the bodily gestures of my teacher, and on how these

[141] See Trevor Marchand, "Making Knowledge: Explorations of the indissoluble relation between minds, bodies and the environment," *Journal of the Royal Anthropological Institute* (2010): 1-21.
[142] Marchand, "Making Knowledge," 2.

models introduced me to a variety of techniques and enabled me to build up an expert practical memory of these techniques. Looking at how these same models are made not only at the HEJ School but also at jewellery schools throughout France, I seek to understand how the training models contribute to the creation of a distinctly French knowledge community.

In addition to my auto-ethnographic research, I refer to the meetings that I conducted at key moments during my studies with the director of the HEJ, Monsieur Baldocchi.[143] These meetings gave me an understanding of how the school views its own role in the transmission of Parisian fine jewellery knowledge and to the school's connection with the fine jewellery houses of the Place Vendôme. In fact, a key theme throughout this chapter is how the Parisian jewellery knowledge transmitted by the training model is shared between the students, teachers and jewellery houses of the Place Vendôme.

1.1.1 Context

Recognising the importance of the environment for shared knowledge transmission, this chapter begins by exploring the social and historical context in which knowledge is created, enacted and evaluated at the HEJ on 58 Rue du Louvre in the second *arronidissement*, where I was a student between September 2016 and January 2019.

The history of the school was recounted to me by the current director of the school, Michel Baldocchi.[144] He has worked in the school administration since he was a young man, taking over the role of director from his father and his father before him. Through stories recounted to him by his forefathers and the remaining records in the school's archives, Monsieur Baldocchi has the most intimate knowledge of the school's history. According to the director, the HEJ claims its origin in the Parisian guild of goldsmiths that was founded in 1330 and dissolved during the French revolution. In 1864 the association was refounded as the *Chambre Syndicale des Orfèvres* (Society of Goldsmiths) to 'provide structure' to the flourishing jewellery industry in Paris.[145] There were two main aims, namely to establish a new headquarters for the profession (the old building on the Quai des Orfèvres[146] had been turned into the police headquarters) and, most importantly, to build a school specialising in jewellery education. The building of the school was prioritised and less than three years later, in 1867, the school was founded as the 'Ecole du Metier' or the school of the jewellery industry. According to Monsieur Baldocchi, the fact the school was established so swiftly

[143] Two key Meetings on 7 November 2017 and 6 December 2018.
[144] Michel Baldocchi, Meeting with the author, 6 December 2018.
[145] Michel Baldocchi, Meeting with the author, 6 December 2018.
[146] Translated as 'Goldsmiths' Key'

demonstrates the importance that the school and its role in knowledge transmission have always held for the Parisian fine jewellery community. It was the first *école professionelle* (vocational school) in France and was critical to the transmission of historic jewellery techniques and their evolution at the end of the nineteenth century.

The establishment of the school as the main source of knowledge transmission reflects a move in nineteenth century France away from the apprenticeship system of training favoured by the guilds towards formal educational establishments. This was common to all crafts, not just the fine jewellery profession. The Economic Historian Stephan Epstein has shown that pre-modern craft guilds relied on apprenticeships or informal pupillages to transmit experiential knowledge, including implicit knowledge (knowledge that is acquired independently of conscious attempts to learn) necessary for the acquisition of skills.[147] As the Economist Carlo Belfanti explains:

> The guilds played a decisive role in accumulating, preserving and transmitting technical know-how in many European urban centres, by codifying knowledge related to various production processes and ensuring that this heritage was preserved and handed down from generation to generation through severe and rigidly organised apprentice systems.[148]

The notion of an 'Ecole du Métier' (school of craft) was first proposed by Jean-Antoine Chaptal (1756-1832), Napoléon's most innovative minister of the interior (from November 1800 to July 1804), who played a major role in the creation of the institutions that laid the foundation for a uniquely French approach to industrialization in the nineteenth century. Chaptal believed that educational reform was key to improving competitiveness. At the heart of his vision was the creation of technical schools that not only gave workers practical experience in the latest production techniques but also increased interaction among entrepreneurs and artisans.[149]

It is interesting that the main motivation was *not* to democratise the system of learning by making it available to all, essentially removing the control that Epstein claims the guilds were able to exert over human capital formation through their control of apprenticeships. Instead, the concern was to create a distinctly French style of fine jewellery. In her book on *Modernism and the Decorative Arts in France*, the Design Historian Nancy Troy explains how the national need to excel in the creation of distinctly French luxury goods emerged from a

[147] Stephan Epstein, "Craft Guilds in the Pre Modern Economy: a discussion," *Economic history review* 61,1 (2008), 155-174.
[148] Carlo Marco Belfanti, "Guilds, Patents and the Circulation of Technical Knowledge: Northern Italy during the Early Modern Age," *Technology and Culture* 45.3 (2004), 573.
[149] Joseph Bizup, *Manufacturing Culture* (London: University of Virginia Press, 2003), 180.

historic rivalry with Germany.[150] Germany had a well-established system of apprenticeships linked to formal training, which the French greatly admired. Since Germany specialised in the production of common place goods, the French saw the potential of applying the German tradition of combining practical experience with classroom teaching to their traditional strength in the luxury goods.[151] Thus formalising the education system through the establishment of a jewellery school was not a means of democratising knowledge, but rather a means of increasing the state and profession's control over it in order to suit a higher national aim, namely to establish France's position as the leading producer of luxury goods. This chapter will ask how this philosophy continues to underpin knowledge transmission to this day.

The building of the *Chambre Syndicale des Orfèvres* headquarters at 58 Rue du Louvre to house the HEJ and the Union of Jewellers began in 1914 and, delayed by World War One, was completed in 1919/20. It can be seen in figure 1.

Figure 1: Photograph of the HEJ building at 58 Rue du Louvre, 2019.

[150] Nancy Troy, *Modernism and the Decorative Arts in France: Art Nouveau to Le Corbusier* (New Haven: Yale University Press, 1991).
[151] Troy, *Modernism and the Decorative Arts in France*, 62.

The Union of Jewellers has always occupied the first floor with the remaining floors all dedicated to the school. In fact, many of the workbenches and machinery we use as students date back to this era. The photograph in figure 2 from the 1920s is instantly recognisable as the classroom on the fifth floor in which I spent two years of my studies. The workbenches are still arranged in rows out from the window, with a large hearth at the back for annealing larger pieces.

Figure 2: Photograph of the fifth floor teaching rooms at the HEJ in 1921.

Figure 3: Photograph of the third floor teaching rooms at the HEJ in 1968.

Figure 4: Picture of the fifth floor teaching room at the end of the school day in 2018.

Figure 5: Photograph of a student at his workbench at the HEJ in 1921.

Figure 6: Picture of the author at a workbench in 2018.

Monsieur Baldocchi describes how the school has accompanied the French jewellery industry through the nineteenth century, its growth in the twentieth century and even the globalisation of the twenty-first century. He remembers how a few decades ago he was still in regular touch with Alan Boucheron and Eric Arpels, the heads of the then family-run jewellery houses Boucheron and Van Cleef & Arpels, whereas he now liaises with the CEOs of Richemont, LVMH and Kerang, the three most famous luxury conglomerates that have

acquired the leading French jewellery houses. He has followed their lead by opening the school to world with regular visits from delegations of jewellers from China. Over the past year the school has been celebrating its 150th anniversary with celebrations hosting all of the executives of the Place Vendôme jewellery houses as well as the artisans who have passed through its doors. The highpoint of the celebrations took place on 7 December 2018 when the school hosted a cocktail evening to celebrate the anniversary.[152] The evening was attended by all of the directors of the Parisian jewellery houses as well as senior politicians, such as the Prime Minister Jean-Pierre Raffarin; a guest list that was evidence of the school's position as a link between the city of Paris and the Parisian jewellery industry.

In 2019 there are now jewellery schools throughout France and rival schools such as the Ecole Boulle in Paris. However, according to Monsieur Baldocchi, the director of the HEJ, the HEJ has retained its reputation as the key institution that trains the artisans of the Place Vendôme. Indeed the Ecole Boulle is known to be 'less technical' (perhaps a code word for easier?) and attracts students with a more creative flair who go on to work in other areas of Parisian jewellery, such as costume jewellery.[153] Similarly, other regions of France train jewellers according to the regional demands of the jewellery industry. For example, Lyon is the centre of mass produced jewellery production in France and the main arts school, the SEPR, has close ties to these more industrial jewellery producers. The HEJ is also unique in that it only trains jewellers, whilst the Ecole Boulle and the SEPR also teach over thirteen other arts including cabinet making and woodworking, the Ecole Boulle being named after Louis XIV's cabinetmaker André-Charles Boulle (1642-1732).

The HEJ not only took over the role of human capital formation from the pre-revolution guild, but also certain mythologies that underpinned the culture of pre-modern craft guilds throughout Europe. The Design Historian Jasmine Kilburn-Toppin has researched guild practices in Early Modern London and showed how guildsmen crafted their identity through a collective memory culture. She demonstrates that 'particular materials, tools and visual representations of accomplished artisanal labour were significant foundations in the construction of personal and collective memories within the political and social body which

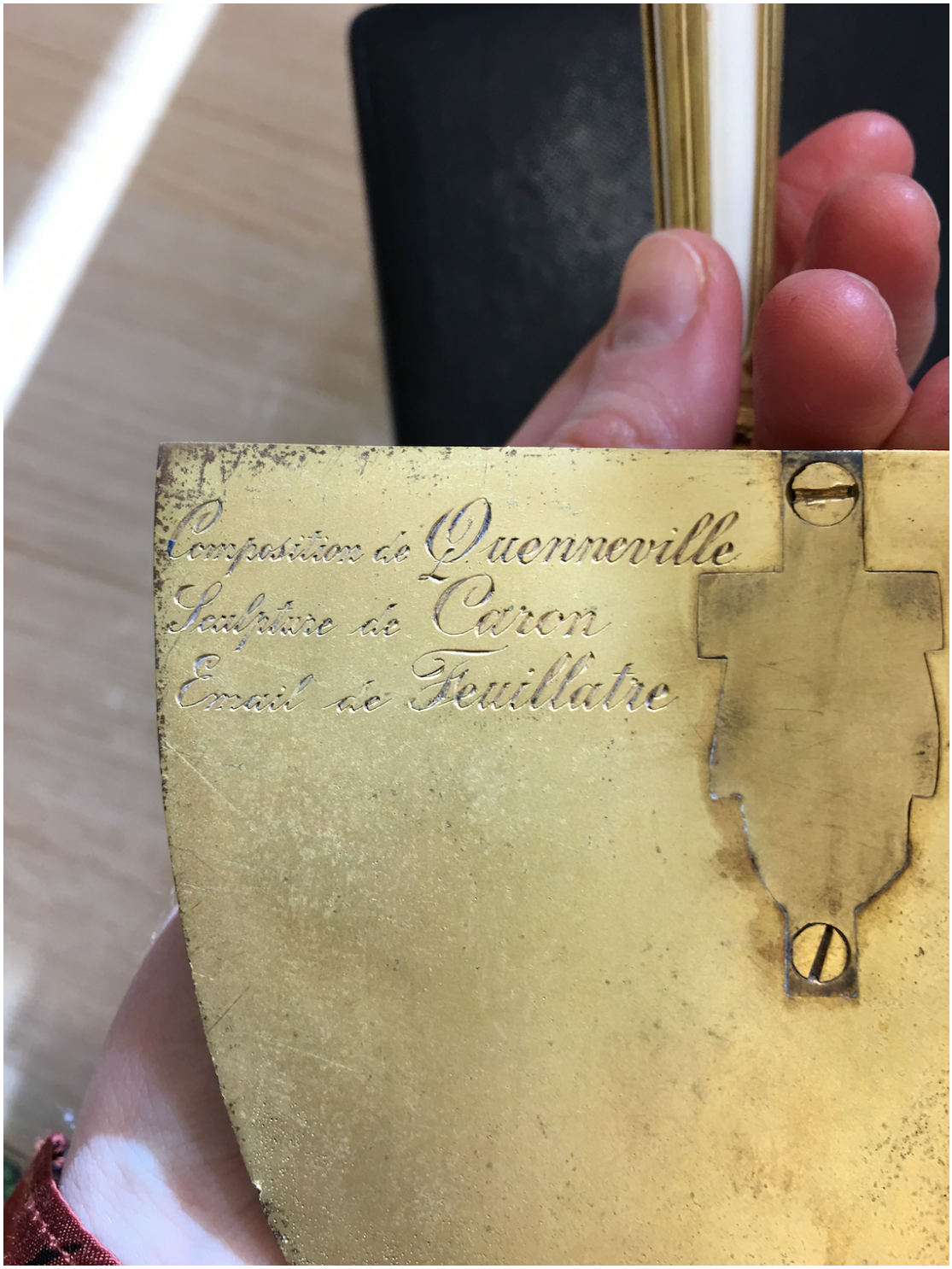
[152] Michel Baldocchi, Meeting with the author, 6 December 2018.
[153] The Ecole Boulle was created in 1886 to train professionals in the furniture industry (carpenters, carpet makers, cabinet makers, sculptors of wood) and later engravers and bronze workers. Since 1891 the school has been based on the rue Pierre Bourdan. After the Second World War, the school expanded its offering to include interior design and interior architecture. Today it prides itself on being one of the biggest schools of art and design in Europe. See "Histoire de l'école," Ecole Boulle, accessed 1 December 2018, www.ecole-boulle.org.

constituted a London livery company.'[154] The HEJ also has a collective memory culture dating back to the foundation of the school. In response to my questions about the school's history, Monsieur Baldocchi showed me the trowel that was used to lay the first stone of school's building on the Rue du Louvre. The original trowel was gold plated and enamelled by the finest nineteenth century enameller, Alexandre Feuillatre (seen in Figure 7). The venerated craftsmen who carried out the design and enamel work are recognised on the back of the trowel (seen in Figure 8). The trowel is normally kept in a safe as Monsieur Baldocchi considers it one of the school's most precious possessions, but it is always brought out at special occasions that celebrate the history of the school. He happened to have it on his desk during my meeting with him as he planned to show it to dignitaries at a function that same evening to celebrate the school's 150 year anniversary.

[154] Jasmine Kilburn-Toppin, "Material memories of the guildsmen crafting identities in early modern London," in *Memory before Modernity*, ed. Erika Kuijpers, Judith Pollmann, Johannes Müller, Jasper Van Der Steen (London: Brill, 2013), 167.

Figure 7: The guilded trowel used to construct the HEJ.

Figure 8: Reverse of the trowel used to construct the HEJ.



In her study of pre-modern craft guilds, Kilburn-Toppin also identifies a 'collective memory culture in which visual and material representations, signs or embodiments of the holy family and 'heavenly society' of saints acted as essential- if not entirely uncontroversial- intercessory tools.'[155] Just as the London Goldsmith guild revered the figure of Saint

[155] Kilburn-Toppin, "Material memories of the guildsmen crafting identities in early modern London," 168.

Dunstan, said to be a skilled tenth century metalworker, the Parisian goldsmiths have always revered Saint Eligius, a sixth century goldsmith.[156] This tradition continues to this day at the HEJ. As you enter the building on the Rue du Louvre, you are greeted by a large painting of the Saint and in the main reception hall there is a stone statue of the Saint seen in figure 9. Every year, on 1 November, the HEJ School organizes a party to celebrate Saint Eligius, which is attended by all staff, pupils, alumni and others from the jewellery community. It is a twenty-first century version of the pre revolutionary guild festivities centred around the same religious iconography.

[156] According to Catholic tradition, the saint was born in 590 near Limoges, where he was apprenticed to the famous goldsmith Abbo. While working under the royal treasurer of Neustria he made a gold throne for Clotaire II who appointed him master of the mint at Marseilles in gratitude. After the death of Clotaire in 629, Dagobert appointed him chief councillor. Eligius took advantage of his influence to found monasteries and help the poor. On the death of Dagobert in 639, Eligius entered the priesthood and became Bishop of Noyon Tournai in 640. In this role he undertook the conversion of the inhabitants of his diocese and endowed a monastery for Virgins. He erected a monastery to Saint Quentin and discovered the bodies of Saint Piatus and his companions. See Leon Van der Essen, "St. Eligius," in *The Catholic Encyclopedia. Vol. 5*. (New York: Robert Appleton Company, 1909), <http://www.newadvent.org/cathen/05386a.htm>.

Figure 9: Statue of Saint Eligius in the great hall at the HEJ.

Like the pre-modern craft guilds, the school does not keep itself secret. The school opens to the public once a year on a Saturday in March for the *journée des portes ouvertes* (open day). As well as being a day for prospective students, the open day is attended by Parisians, much as they would frequent an art exhibition. The best work of the students is displayed and the students demonstrate their skills in the workshops. My proudest moment was being given my own enamel display in the great hall. In 2018 the school also launched an Instagram

account, which shows pictures of various works in progress taking place in the workshops. Thus in the spirit of the pre-modern guilds, the school and profession closely guards its knowledge through the training at the school, but the products of this knowledge are proudly displayed for all to admire.

Figure 10: Open day at the HEJ.

Figure 11: Image of some of my enamel works on display at the HEJ open day 2018.

What does this similarity to the pre-revolutionary guilds tell us about the HEJ and the world of Parisian fine jewellery? The trowel and veneration of Saint Eligius suggest that Parisian fine jewellery knowledge continues to be seen as sacred. Indeed it could be argued that fine jewellery took on a quasi religious role in 1530 when François I created the crown jewels.[157] Until then, the kings of France had jewellery, but they were their personal property. Many of them were sold to pay for the king's ransom when he was imprisoned at Pavie in 1525 by the Emperor Charles V. On 15 June 1530, Francois I created a collection of 'rings of the crown of France'- a category which included all jewels, mounted or not.[158] From this point on, the jewels and stones of the crown became 'inalienable.' This meant that they were no longer the personal property of the king but belonged to the state and were passed from one generation of royals to the next. The personal jewellery of the monarch was kept separate from the crown jewels. Thus the division between the office of kingship and the person of the king was made manifest through jewellery.

In a key paper, *Interpreting Objects: Between the Visible and the Invisible*, the Historian Krzysztof Pomian explores objects which make manifest the distinction between the sacred

[157] Michel Baldocchi, Meeting with author, 7 November 2017.
[158] Lydwine Scordia, *Le Gout des Bijoux* (Paris: Perrin, 2013).

and profane.[159] Pomian defines the objects that lie between and thereby separate the sacred and profane as semiophores.[160] As semiophores, jewels make manifest the idea of a system of hierarchy that is independent of the mortal lives of the persons occupying offices of state. This chapter will look at the transmission of jewellery skills at the HEJ to reveal how the carefully orchestrated, ritual transmission of knowledge gives rise to such an idea of a timeless tradition of jewellery.

1.1.2 Studying at the Haute Ecole de Joaillerie

In September 2016 I enrolled as a student at the HEJ. Entrance to the school involves an examination that tests basic metal working skills as well as an interview with the director of the school, Monsieur Baldocchi, to ascertain the candidate's motivation. There are three different categories of students: younger students (18-26 years of age) who study at the school full time; younger students who study at the school two days a week and are apprenticed to a jewellery house for the remaining three days; and mature students (older than 26) who study at the school fulltime. The three groups of students are taught by the same teachers, but in separate classes, for logistical and disciplinary reasons; it is thought that the younger, less mature students require a firmer hand to enforce the silence and discipline of the workshop and that there are some teachers who are better suited to this task.[161]

At the HEJ all students pay fees, although I understand that the state pays for less well off students and also covers the fees of mature students who are either unemployed or wish to change their career. The students come from a range of backgrounds, but as the school is considered to be the best in Paris, many of the younger students have parents in the industry. It is not unusual for parents who work in the most senior positions of some of the large jewellery houses to send their children to train at the HEJ, rather than pursue a university education, which is a sign of the high esteem of the *métier* (craft) among top business people in France. I was the only foreign student in my class and the school (which tellingly doesn't gather statistics on diversity) is overwhelmingly white and French. I am lucky to have a French name, which made it easier to 'blend in', but even so for the entire first year, my friends informed me that I was referred to by teachers and students in other classes as 'the English red head' (I was the only red head in the entire school!). Over time I became known as the 'girl who does enamel,' a more flattering description that signified my acceptance into the jewellery community. Students from other parts of the world with

[159] Susan Pearce, *Interpreting Objects and Collections* (London: Routledge, 1994).
[160] Alain Schnapp, "Towards a Universal History of Antiquarians," *Complutum* 24 (2): 13-20.
[161] Monsieur Baldocchi, Meeting with the author, 7 November 2017.

'foreign' sounding names were often given French names, not unlike Trevor Marchand, who was called Abu Bakr by the masons in Djenné.[162] Thus my Argentinian friend Laila was called Celeste (this being the French version of her second name) and a Chinese girl became known as Anne Lise because the teacher liked the name.

The six hundred students are taught by a group of twenty full-time teachers.[163] All but two of these teachers were themselves once students at the school. One of my teachers, Mark Tournier, was over seventy years old and could recall the days when nothing was motorized and the propane/oxygen was controlled via a foot pump. The teachers are led by Monsieur Baldocchi, and it is interesting to note that many of the junior administrative positions are held by the extended family of Madame Pinet, the head of the Union of French Jewellers, which is housed in the same building. Every day at noon the teachers go out for lunch to a local restaurant together and the students do the same in social groupings that emerge over time. Lunchtime conversation revolves around school gossip for both the teachers and the pupils. I noticed that in contrast to my experience at English schools and universities, no one knew anything about anyone else's private life outside school. This reflects how relations both among teachers and pupils remain strictly professional; personal details are kept for intimate relationships, which are best kept out of the workplace.

School days run from 8am until 5pm with an hour lunch break at noon. There are two short breaks of ten minutes at 10am and 3pm, during which students and teachers go outside to smoke. School hours are rigidly adhered to and students who are not at their workbench working at 8am or who begin packing up their tools before 5pm are reprimanded by the teacher and also looked down on by the other students. The hours and routine mirror those of the Parisian fine jewellery workshops in which the students expect to find employment after their studies; Keeping to the schedule religiously is therefore seen as an indicator not just of ones motivation for school, but for one's future career as a jeweller.

The disciplined structure of the school day is similar to that observed by Trevor Marchand among the Yemeni stone masons.[164] It is the product of what Pierre Bourdieu calls the 'objective homogenizing of the group habitus,' resulting from the 'homogeneity of the conditions of existence which enables practices to be objectively harmonized without any intentional calculation or conscious reference to the norm.'[165] Thus, by keeping to the

[162] Trevor Marchand, *The Masons of Djenné* (Indiana University Press, 2009), 35.
[163] Monsieur Baldocchi, Meeting with the author, 7 November 2017.
[164] Trevor Marchand, *Minaret Building and Apprenticeship in Yemen* (Routledge, 2001), 109.
[165] Pierre Bourdieu, *Outline of a Theory of Practice,* trans. Richard Nice (Cambridge: Cambridge University Press, 1977 [1972]), 80.

schedule of the Parisian fine jewellery profession, the young trainee jewellers are absorbed into the habitus of the wider Parisian fine jewellery world. Trevor Marchand explains this with reference to Yemeni stone masons:

> Sedimenting discipline and obedience in the actions, behaviour and attitudes of the young builders serves to lay the 'foundations' for the their future as members of the trade, and thus determines the "principles of structure" for the formation of that future. Thus the labourer comes to embody the foundations and principles of the system. As in the case of the edifice, setting foundations and determining the principles of structure is the most crucial step in safeguarding the 'structural integrity' of the trade, in the present and over the long term.[166]

For those enrolled full time at the school in *bijouterie* (jewellery making with an emphasis on metal work as opposed to stone setting or polishing), there is one day a week of gouache painting, one day of technical drawing and jewellery history, one day of wax model making and two days of metal work. Stone setting and polishing are separate vocational examinations and are thus not included in the schedule. There are also classes on the science behind jewellery making, health and safety, as well as the economics of running a business. This is therefore an all-encompassing education of the craft of fine jewellery, enabling students to work in a professional workshop and eventually become self-employed.

Students at the school all study for the CAP (*Certificat d'Aptitude Professionnelle*) in jewellery making. This is a national vocational qualification that exists for every *metier d'art* (craft) and it is considered to be one level beneath the baccalaureate.[167] At the end of two years study, every student sits examinations in metal working, technical drawing, wax modelling, gouache painting, jewellery science and business management. The achievement of passing the CAP affirms that the individual has the basic skills and expertise that the profession deems necessary for jewellers. Although the examinations are set and conducted by the Paris-based *Maison des Examens*, which is in charge of the CAP for all industries in France, the individual examinations are signed off by teachers from every main jewellery school in France. These same teachers anonymously mark the final examination pieces. Thus the jewellery profession, as represented by these teacher representatives, retains a firm hold on the standards required in the industry. Furthermore, this harmonisation in the examination and appraisal of trainee jewellers ensures a certain quality standard in the students produced by the large range of jewellery schools across France described above;

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[166] Marchand, *Minaret Building and Apprenticeship in Yemen,* 120.

[167] Incidentally, the CAP exams for all *métiers d'art* include GCSE style examinations in Maths, French, History, Geography, a foreign language and Sport. I had to provide translated documents of my UK examination results in order to be exempt from these examinations.

everyone who has ever obtained a CAP has the same basic knowledge extending from metal and wax working skills to the science of metal working and the history of French jewellery. This chapter will explore in greater detail the implications of this harmonisation in jewellery knowledge and its control by the profession. It is impossible to be employed as a jeweller in a French jewellery workshop without the certificate. Moreover, the CAP examination has a more profound significance to one's identity as a jeweller. When I passed my exams in July 2018 I came to understand the importance of the CAP as a rite of passage in the jewellery industry, as I gained the respect of my teachers.

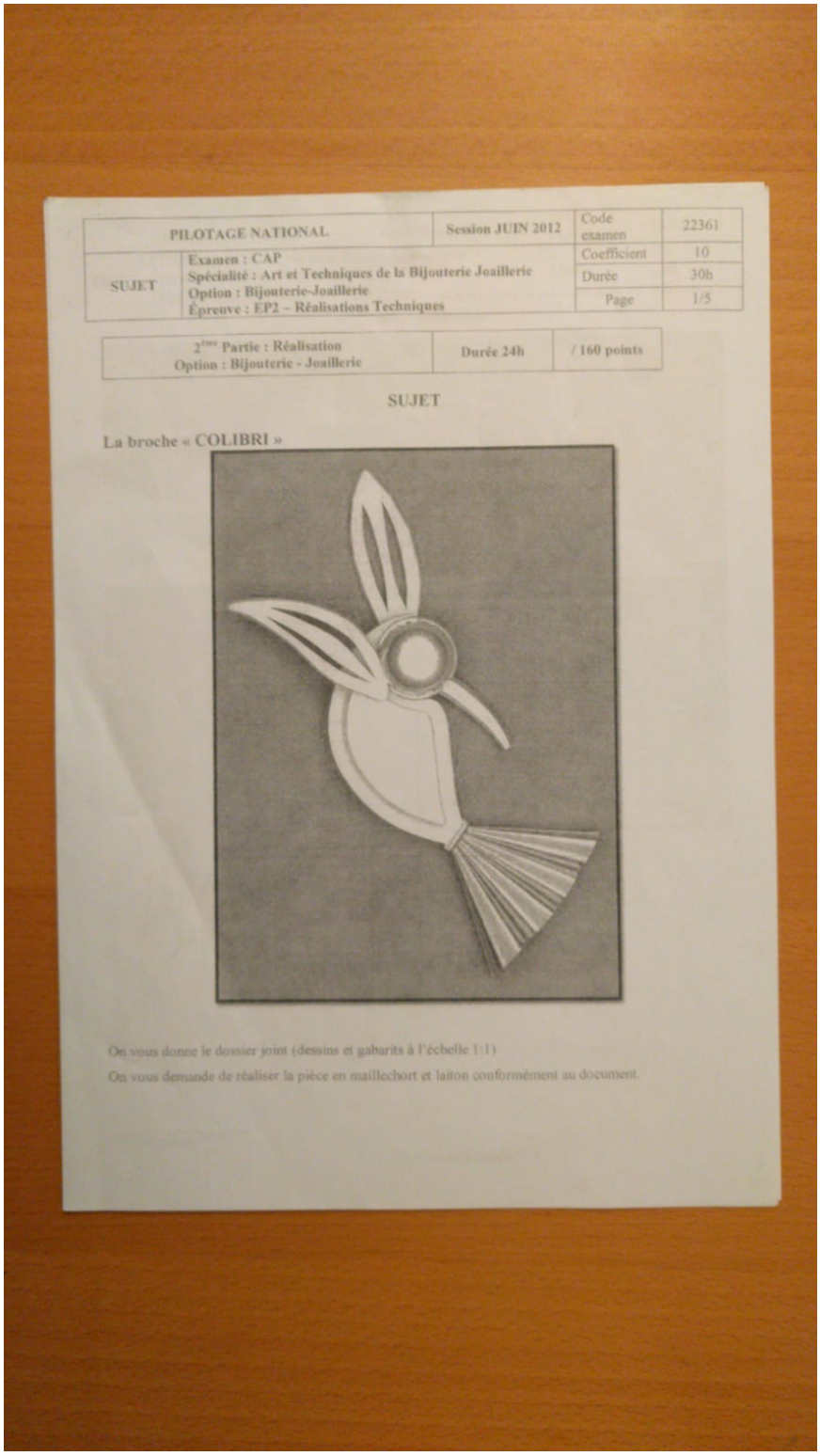
1.2 The use of training models in teaching

The key components of these examinations, which are weighted most heavily in the final mark, are the metal models, which the students must reproduce with precision to the degree of a tenth of a millimetre using set techniques that they have learnt over the past two years.

The hummingbird in figure 12 is an example of such an examination piece. Students are presented with the five sheets of paper seen in figures 13 through 17. The instructions give a scale technical drawing, which must be recreated exactly to the tenth of a millimetre in three dimensions. The student is provided with the exact amount of metal required by the task. The finished work is judged according to the following criteria: respect to the dimensions and the form of the technical drawing, the cut out of the body and the wings, the ribbed volume of the tail, the soldering, the harmony of the various components (for example, how well the dome of the head slots effortlessly into the main body piece and the position of the wings), and the quality of the finish.

Figure 12: Final hummingbird model.

Figure 13: June 2012 examination sheet page 1.



PILOTAGE NATIONAL		Session JUIN 2012	Code examen	22361
SUJET	Examen : CAP Spécialité : Art et Techniques de la Bijouterie Joaillerie Option : Bijouterie-Joaillerie Épreuve : EP2 – Réalisations Techniques		Coefficient	10
			Durée	30h
			Page	1/5

2ème Partie : Réalisation Option : Bijouterie - Joaillerie	Durée 24h	/ 160 points

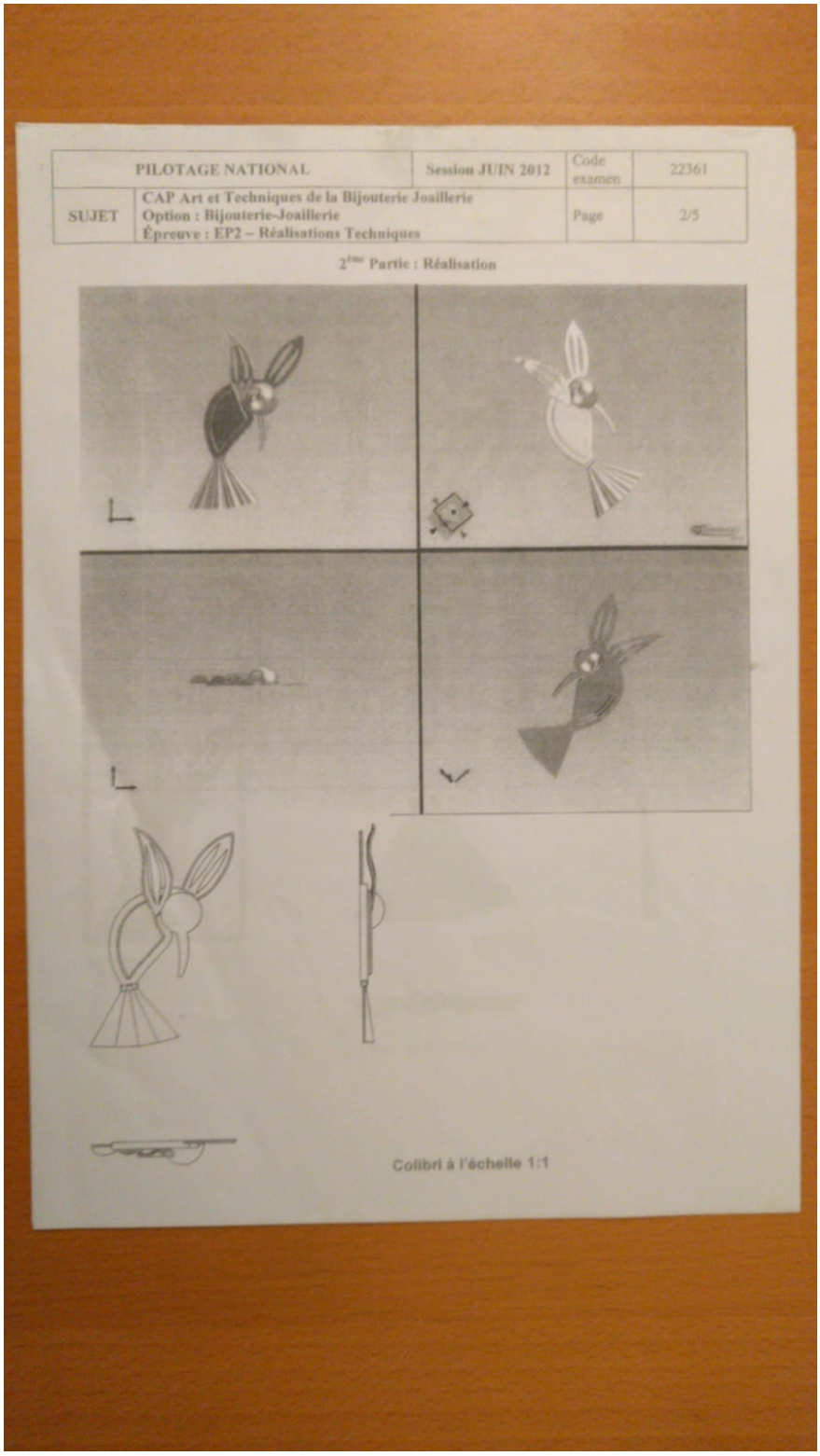
SUJET

La broche « COLIBRI »

On vous donne le dossier joint (dessins et gabarits à l'échelle 1:1)

On vous demande de réaliser la pièce en maillechort et laiton conformément au document.

Figure 14: June 2012 examination sheet page 2.

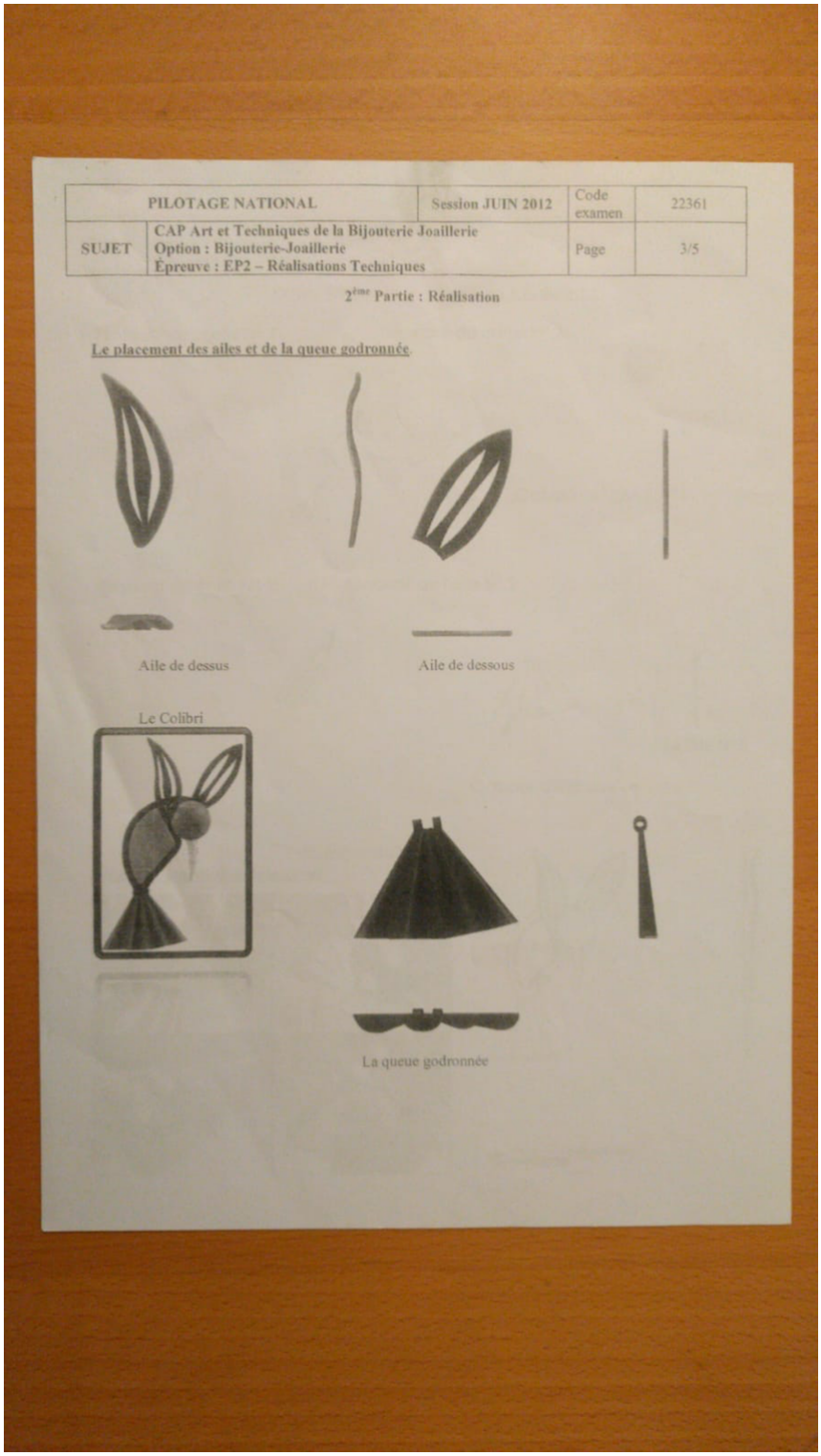


PILOTAGE NATIONAL	Session JUIN 2012	Code examen	22361
SUJET	CAP Art et Techniques de la Bijouterie Joaillerie Option : Bijouterie-Joaillerie Épreuve : EP2 – Réalisations Techniques	Page	2/5

2ème Partie : Réalisation

Colibri à l'échelle 1:1

Figure 15: June 2012 examination sheet page 3.



PILOTAGE NATIONAL		Session JUIN 2012	Code examen	22361
SUJET	CAP Art et Techniques de la Bijouterie Joaillerie Option : Bijouterie-Joaillerie Épreuve : EP2 – Réalisations Techniques		Page	3/5

2ème Partie : Réalisation

Le placement des ailes et de la queue godronnée.

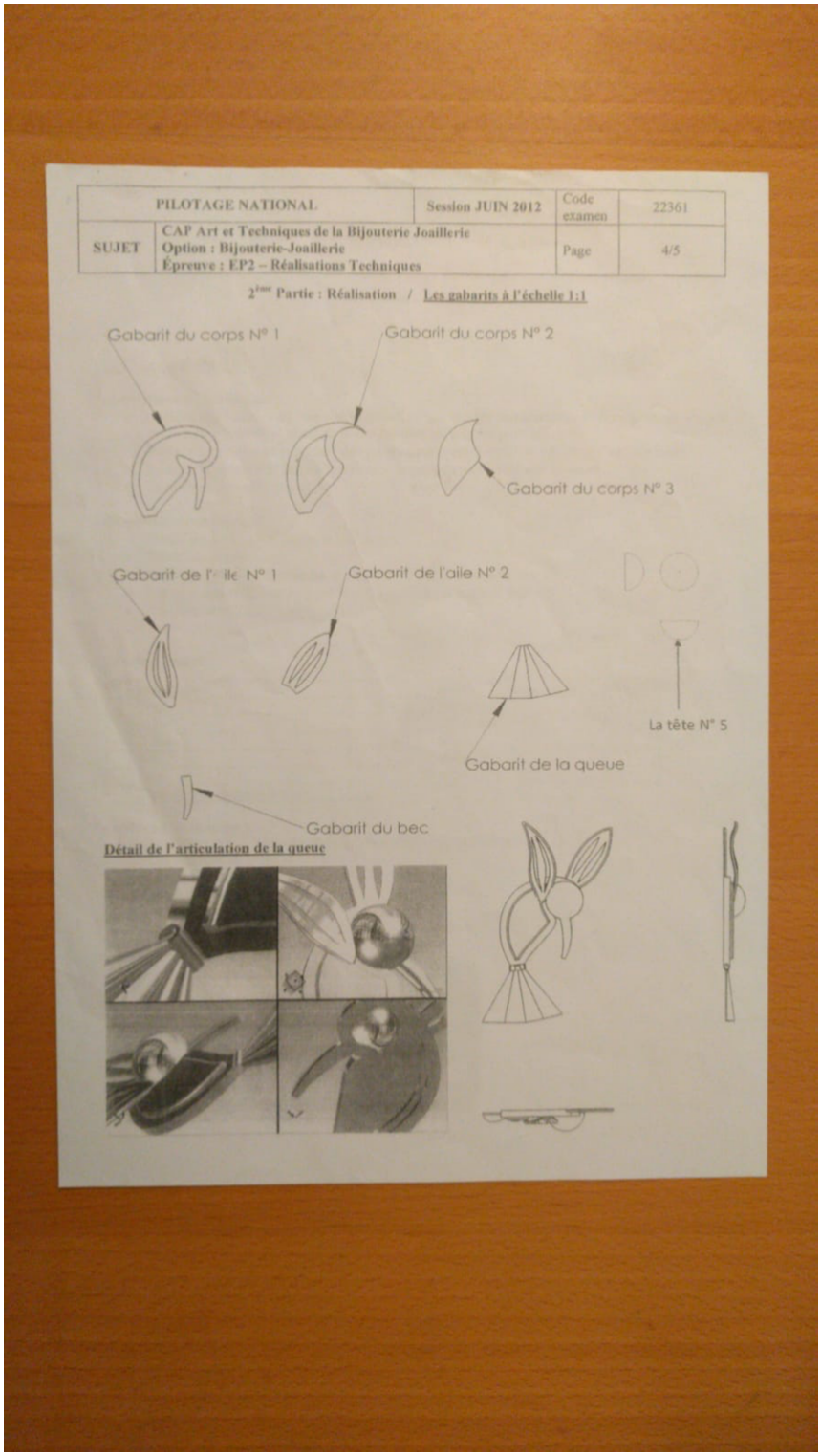
Aile de dessus

Aile de dessous

Le Colibri

La queue godronnée

Figure 16: June 2012 examination sheet page 4.



PILOTAGE NATIONAL		Session JUIN 2012	Code examen	22361
SUJET	CAP Art et Techniques de la Bijouterie Joaillerie Option : Bijouterie-Joaillerie Épreuve : EP2 – Réalisations Techniques		Page	4/5

2ème Partie : Réalisation / Les gabarits à l'échelle 1:1

Gabarit du corps N° 1

Gabarit du corps N° 2

Gabarit du corps N° 3

Gabarit de l'aile N° 1

Gabarit de l'aile N° 2

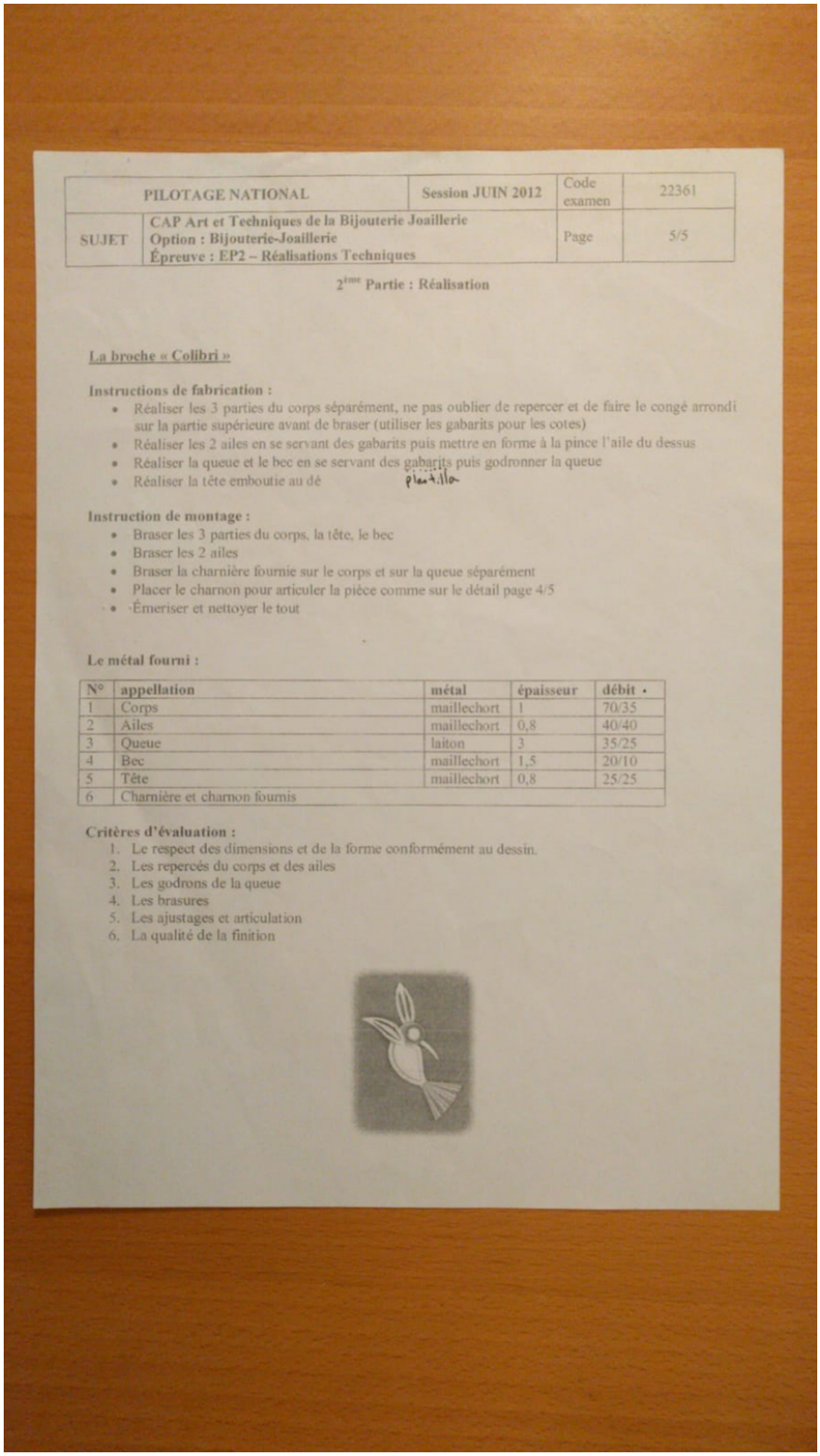
La tête N° 5

Gabarit de la queue

Gabarit du bec

Détail de l'articulation de la queue

Figure 17: June 2012 examination sheet page 5.



PILOTAGE NATIONAL		Session JUIN 2012	Code examen	22361
SUJET	CAP Art et Techniques de la Bijouterie Joaillerie Option : Bijouterie-Joaillerie Épreuve : EP2 – Réalisations Techniques		Page	5/5

2ème Partie : Réalisation

La broche « Colibri »

Instructions de fabrication :

- Réaliser les 3 parties du corps séparément, ne pas oublier de repercer et de faire le congé arrondi sur la partie supérieure avant de braser (utiliser les gabarits pour les cotes)
- Réaliser les 2 ailes en se servant des gabarits puis mettre en forme à la pince l'aile du dessus
- Réaliser la queue et le bec en se servant des gabarits puis godronner la queue
- Réaliser la tête emboutie au dé

Instruction de montage :

- Braser les 3 parties du corps, la tête, le bec
- Braser les 2 ailes
- Braser la charnière fournie sur le corps et sur la queue séparément
- Placer le charnon pour articuler la pièce comme sur le détail page 4/5
- Émeriser et nettoyer le tout

Le métal fourni :

N°	appellation	métal	épaisseur	débit
1	Corps	maillechort	1	70/35
2	Ailes	maillechort	0,8	40/40
3	Queue	laiton	3	35/25
4	Bec	maillechort	1,5	20/10
5	Tête	maillechort	0,8	25/25
6	Charnière et charnon fournis			

Critères d'évaluation :

1. Le respect des dimensions et de la forme conformément au dessin.
2. Les repercés du corps et des ailes
3. Les godrons de la queue
4. Les brasures
5. Les ajustages et articulation
6. La qualité de la finition

In addition to their use in examinations, these training models form the basis of the teaching at jewellery schools throughout France, as students learn the key skills necessary to pass the examination by making the training models of the previous years' examinations. This chapter will now look in detail at how the training models serve to transmit knowledge to

the individual students, by teaching skills involving technique and spatial thinking. It will also explore how they are used to create a collective body of knowledge enabling harmonization and differentiation in the Parisian fine jewellery world.

1.2.1 Learning by imitation: Bodily knowledge

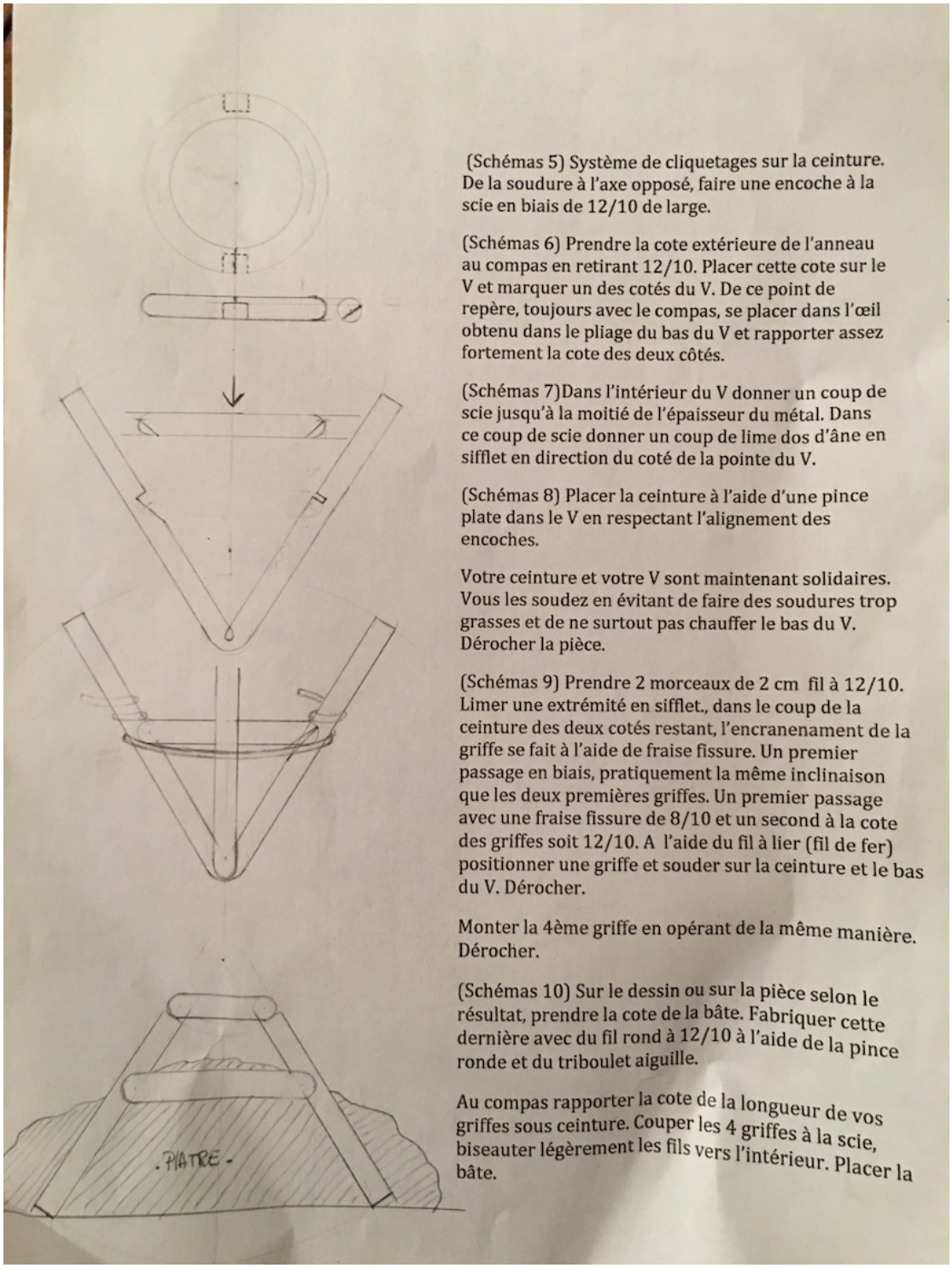
Teaching at the HEJ takes place in classes of no more than ten students, enabling one-on-one tuition from teacher to pupil. Typically, the teacher takes the place of the pupil at his/her workbench and the pupil observes before resuming his/her place to remake the step that the teacher has just demonstrated. The teacher uses few or no words to explain his actions. Such implicit knowledge transmission through the body, rather than through words has been a central concern in design history and anthropology since Michael Polanyi noted that 'we know more than we can tell.'[168] As Trevor Marchand explains in his paper on crafting knowledge:

> The function of language, whether spoken or written, is duly recognized as pivotal to any knowledge economy; but the acting body too is integral to the formation, acquisition, expression and continual transformation of knowledge.[169]

Initially I found this process of bodily learning very challenging. At the beginning of my training, with my trusty notebook in hand, I would stand next to the teacher, eagerly making notes of his every move. However, in writing down the process I soon discovered I that I had missed out the key details, which made the difference between success and failure in the technique he was demonstrating. Perhaps the best example of this was when I had to make my first four-pronged bezel setting. Figure 18 shows a series of instructions on how to make a four pronged bezel setting.

[168] Tim Ingold, *Making: Anthropology, Archaeology, Art and Architecture* (London: Routledge, 2013), 109.
[169] Trevor Marchand, "Crafting Knowledge: The role of "parsing and production" in the communication of skill- based knowledge among masons" in *Ways of Knowing,* ed. Michael Harris (Oxford: Berghahn, 2007).

Figure 18: Instructions to make bezel setting.



I confidently began to reproduce the steps, only to produce something more similar to a bird's nest than a bezel setting. It was only when I carefully observed my teacher and his actions that I noticed that I was inserting the file to make the incision at the right point and the correct angle, but moving in the wrong direction.

Figure 19: Close up of my teacher producing a bezel setting.

By imitating his most precise movement, I was finally able to create a flawless bezel setting seen in figure 20. By mimicking my teacher and continually adjusting my gesture until I achieved the desired result, my jewellery making habitus began to take shape and, in the words of Pierre Bourdieu, I got a 'feel for the game.'[170] This supports recent literature on craft learning, such as Jeanne Lave and Etienne Wenger's seminal study on *Situated Learning*, which laid the groundwork for the anthropology of knowledge to move beyond focus on top down accounts of teaching to include the psychological and embodied processes of situated learning.[171] In his introduction to their work, the Anthropologist William Hanks notes that:

[170] Pierre Bourdieu, *The Logic of Practice,* trans. Richard Nice (Cambridge: Polity Press, 1990 [1980]), 66.
[171] Jeanne Lave and Etienne Wenger, *Situated Learning: Legitimate peripheral participation* (Cambridge: University Press, 1991).

> The apprentice's ability to understand the master's performance depends not on their possessing the same representation of it, or of the object it entails, but rather on their being engaged in the performance in congruent ways.[172]

Figure 20: Completed bezel setting.

My experience of bodily imitation in the workshop can be analysed and explained by research from the neurobiological field. Research on the mirror neuron system (the network of brain areas in the pre-motor and parietal cortices that is activated by both producing and recognizing the same object-orientated movement performed by the self or others) has enabled us to conceptualise imitative learning more clearly. Indeed research by Vittorio Gallese first showed that far from being exclusively dependent upon mentalistic/linguistic abilities, the capacity for understanding others as intentional agents is deeply grounded in the relational nature of action.[173] He found that the same neural

[172] Lave and Wenger, *Situated Learning: Legitimate peripheral participation*, 21.
[173] Vittorio Gallese, "The Shared Manifold Hypothesis: From mirror neurons to empathy," *Journal of Consciousness Studies* 8 (2001): 33-50.

structures that are active during sensations and emotions are active also when the same sensations and emotions are to be detected in others. Thus when I observed the teacher, the same neurological pathways were activated as when I performed the action myself.

I noticed that some of my colleagues, who had more experience making jewellery, found it much easier to pick up what the teacher was showing them. This can be explained by neurobiological research on motor cognition and research into the relation between motor execution and simulation. In his study of the hand, the Neurologist Frank Wilson likens the body to a violin that has to be kept in tune. [174] He interviews a circus performer who describes the hours of practice and rehearsal that he must do before every show in order to maintain his skill. Wilson explains this with reference to the work of the Neurologist Marc Jeannerod who has looked at the specialization of function of brain cells and connections associated with visual control of movement. For example, some brain cells only respond to light moving within a specific velocity range or a particular orientation. Others, known as bimodal cells, link the coordindation of eye and arm movements. In his book *The Cognitive Neuroscience of Action,* Jeannerod explains how the dorsal visual system (whose main task is to process visual data to create movement shapes) evolved in humans to enable not just simple identification and tracking, but to guide the hand to perform anticipated tasks.[175] Simultaneously, the ventral system, which Jeannerod calls the 'semantic processing system' responsible for 'manipulating, identifying or transforming objects,' [176] facilitates in the advance planning of precision hand movements. [177] Frank Wilson explains that these complex systems must be kept 'in tune.' [178] It is therefore little wonder that my colleagues, who had been working with their hands much longer than I had, found it easier to perform manual tasks; my body had yet to be tuned whilst they were keeping theirs in tune.

My experience in the workshop reveals the critical role of the body in knowledge transmission. In the imitative knowledge transmission process described above, both the body of the teacher and the pupil play an integral role. This has also been described by Trevor Marchand in his study of Yemeni stone masons: 'Knowledge is sedimented in [the

[174] Frank Wilson, *The Hand: How its use shapes the brain, language and human culture* (New York: Vintage, 1999), 108.
[175] Marc Jeannerod, *The Cognitive Neuroscience of Action* (Cambridge, MA: Blackwell Publishers, 1997).
[176] Jeannerod, *The Cognitive Neuroscience of Action,* 21.
[177] Wilson sums up as follows: The dorsal system is known to assist in the approach phase of object-oriented movements, and it may also act as an information channel for manual performance related to familiar tasks. The ventral system, then, could be the preferred channel for visual and sensory motor information related to the use of unfamiliar objects, or objects about which there is interest in acquiring greater detail or more precise categorisation. See Wilson, *The Hand*, 108.
[178] Wilson, *The Hand,* 108.

master's] performance'[179] and 'since much of the learning process involves little or no verbal communication, the apprentice must rely on his/her eyes, ears, and sense of touch to incorporate their Master's skill into the reproduction of bodily representations of knowledge.'[180] In this way, through the teaching process using training models, the Parisian fine jewellery knowledge and the body of the artisan become uniquely intertwined. This idea has been explored by the neuroscientists Mauro Adenzato and Francesca Garabini in their work on 'embodied cognition':

> The embodied cognition perspective views the mind no longer as a set of logical/abstract functions, but as a biological system, which is rooted in body experience and interwoven with action and interaction with other individuals. Action and representation are no longer interpreted in terms of the classic physical–mental dichotomy, but have proven to be closely interlinked. Specifically, embodied cognition means that acting in the world, interacting with the objects and individuals in it, representing the world, perceiving it, categorizing it and understanding its meaning are merely different levels of the same relationship that exists between an organism and its environment.[181]

This suggests that, through bodily action in the transmission of jewellery knowledge, the very knowledge itself becomes inseparable from the physical body of the jewellers. The fact that the knowledge is held within the body of the artisan will play a critical role in the next chapter, which looks at how knowledge is created and controlled in the production of Parisian fine jewellery. The aforementioned research by neuroscientists corroborates Pierre Bourdieu's argument that 'the principles [knowledge] embodied in this way [via the making process] are placed beyond the grasp of consciousness, and hence cannot be touched, by voluntary, deliberate transformation, and cannot even be made explicit.'[182] This quote reveals how through a knowledge transmission process that relies on the bodies of the teacher and pupil and cannot be written down, the Parisian fine jewellery artisans gain a unique hold over fine jewellery knowledge.

1.2.2 The hierarchy of knowledge

The learning process described above relies on a unique teacher/pupil relationship, which deserves further investigation. The Anthropologist Marcel Mauss theorised that imitative

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[179] Marchand, *Minaret Building and Apprenticeship in Yemen,* 182.
[180] Marchand, *Minaret building and apprenticeship in Yemen,* 138.
[181] Mauro Adenzato and Francesca Garbarini, "The *as if* in Cognitive Science, Neuroscience and Anthropology: A journey among robots, blacksmiths and neurons," *Theory & Psychology* 16 (2006), 748.
[182] Bourdieu, *Outline of a Theory of Practice,* 114.

learning relied on social hierarchy. He described the learning process as an act of 'prestigious imitation':

> The child, the adult, imitates actions which have succeeded and which he has seen successfully performed by people in who, he has confidence and who have authority over him. The action is imposed from without, from above, even if it is an exclusively biological action, involving his body. The individual borrows the series of movements, which constitute it from the action executed in front of him or with him by others. It is precisely this notion of the prestige of the person who performs the ordered, authorized, tested action vis-à-vis the imitating individual that contains the entire social element. The imitative action, which follows, contains the psychological element and the biological element. But the whole, the ensemble, is conditioned by the three elements indissolubly mixed together.[183]

This quotation describes the learning process outlined in the previous section, where the teacher is the adult and the student takes the role of the child. As Mauss explained, the authority of the teacher is critical to the knowledge transfer through bodily imitation, which I experienced first hand during my lessons at the HEJ.

In the classroom, I noticed how the position of the teacher was reinforced through the language used by both the teachers and students. Students use the formal 'vous' when addressing the teachers and the younger students call the teacher Monsieur or Madame. Many teachers also habitually humiliate and tease their students to reinforce their superior position. My foreign status and my headstrong character meant that I was particularly susceptible to this behaviour as I initially had no allies in class to defend me and many teachers and peers were eager to show me that my academic qualifications meant nothing in the workshop environment. My mistakes were the object of public humiliation and ridicule by the teachers and fellow students, who were more experienced than I was. Aggressive teasing and provocation is not uncommon in apprenticeship situations. In his study of Greek apprentices, Michael Herzfeld explains that 'the oppression of apprentices by their masters… reproduces large inequalities… [which] can be reduced and eventually negated by acts of "theft," or the appropriation of expert knowledge.'[184] In this way, derogatory remarks from teacher to pupil reinforce the hierarchy in the classroom. Over time, I rose to the top of my class and, as predicted by Herzfeld, the teasing gradually stopped. I also noticed that as my skill developed, the relationship with my teachers

[183] Nathan Schlanger, ed., *Techniques, Technology and Civilisation* (London: Berghahn Books, 2006), 80.

[184] Michael Herzfeld, "It Takes One to Know One: Collective resentment and mutual recognition among Greeks in local and global contexts," in *Counterworks,* ed. Richard Fardon (London: Routledge, 1995), 239-240.

matured. Once I had passed my examinations and also proven myself to be a proficient enameller (a skill which no one else in the school has), my teachers began to greet me with the French hug and kiss routine, a sign of mutual respect.

Interestingly, my experience at the HEJ contrasts with Trevor Marchand's description and analysis of the formal training of Quebec builders and at the Building Crafts College in East London, where he observes friendly banter between the teachers and pupils.[185] Marchand argues that the process of objectifying knowledge in an institutional setting undermines the 'resolute attitude of superiority of the Master builder' that he witnesses during his apprenticeship in Yemen. My lessons at the HEJ show how the traditional hierarchies of the apprenticeship system survive in the formal education of Parisian jewellers. One reason for this might be the school's historic link to the pre-modern craft guild apprenticeship system described at the beginning of this chapter.

1.2.3 Corporeal knowledge: From novice to amateur

Over time, I found that my own body, rather than that of my teacher, began to guide me in my jewellery making. As I built up experience, I was able to draw on my own bodily memory. As Maurice Merleau Ponty has proposed, the body is able to assimilate new significances and with experience, 'significance is to a lesser degree grasped by an intellectualized constituting consciousness, but becomes a motor grasping of a motor significance.'[186] In a later task, I had to construct what is known as a *bâté picôt* (seen in figures 21 and 22). This also involved creating tiny notches on a large round circle of wire into which small pieces of round wire could be placed and soldered before soldering on a domed top. My experience making the bezel setting meant that I knew how to angle my file to create the correct size and shape of groove to discretely hold the wires.

[185] Marchand, "Making Knowledge," 9.
[186] Maurice Merleau-Ponty, *Phenomenology of Perception,* trans. C. Smith. (London: Routledge, 1962), 143.

Figure 21: Bâté picot.

Figure 22: Bâté picot.

As I developed my own bodily knowledge I moved from having to adapt to problems, to being able to anticipate them. For example, when soldering in the small round wire pieces into the circular base, I partially soldered all of them before then soldering each one in turn to ensure that they maintained the required position and direction. As a novice I would simply have applied the flame to the piece and the wire pieces would have moved around in various directions. I could have adapted to the situation by going back and reheating each piece to melt the solder and reposition them, but this would have taken time. As Bourdieu points out, proficiency is that 'almost miraculous encounter between the habitus and a field, between incorporated history and an objectified history, which makes possible the near-perfect anticipation of the future inscribed in all the concrete configurations.'[187] Indeed, '[the body] is inclined and able to anticipate [regularities] practically in behaviours which engage a corporeal knowledge that provides a practical comprehension of the world.'[188] This suggests that anticipation relies on an awareness of one's body within the environment - it carries the action beyond the moment.

The emergence of my own bodily knowledge through the making of training models also changed my relationship with my tools. At the start of the course, all pupils were given a toolbox with all the items one would need for the CAP examination. Figure 23 show the contents of a typical student's toolbox at the HEJ.

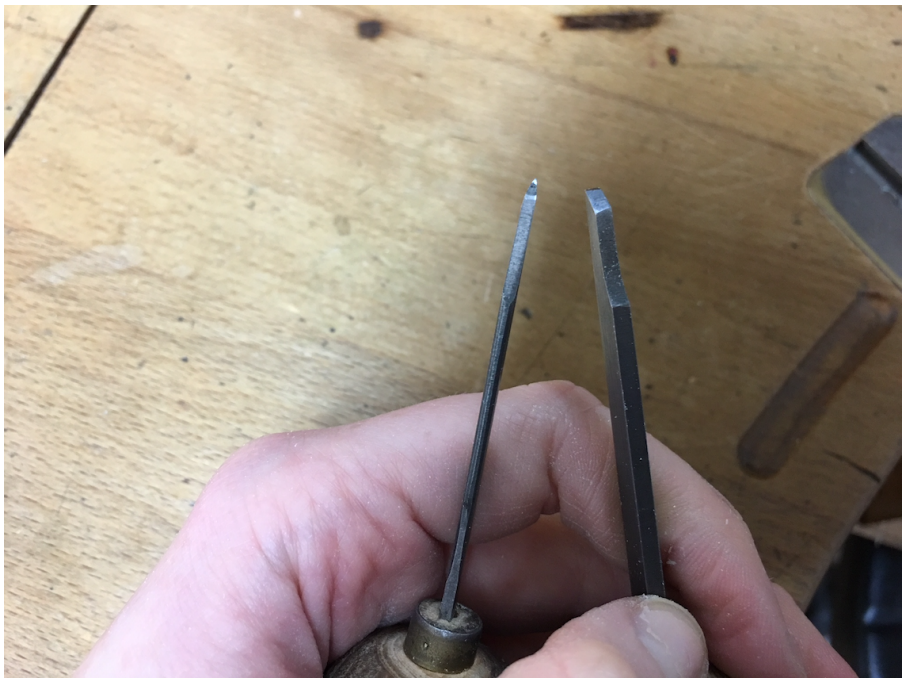
[187] Bourdieu, *The Logic of Practice,* 66.
[188] Bourdieu, *The Logic of Practice,* 67.

Figure 23: Toolbox with typical tools.

It contains tools common to all jewellers as well as ones specific to working with wax. These include: a very coarse large file used for creating basic forms from three-dimensional blocks, smaller files with curved edges useful for creating curves and crevasses in the wax (known as *rifloirs*), and tools known as *échoppes* or *onglets*, which come in a variety of thicknesses depending on how intense the engraving should be, as seen in figures 24 and 25.

Figure 24: Echoppes used for wax work.

Figure 25: Echoppes used for wax work.



During the first few weeks of the course, all my attention was focused on the saw or the file as I used the tools for the first time. It was only a month into my studies that I began to gain what Michael Polanyi has called 'subsidiary awareness' of the tools, by which I mean that I no longer focused on the tools, but instead watched the effect of the tools on the metal as I

worked, while keeping an awareness of them.[189] Working on the training models, I developed a 'focal awareness,' which incorporated my subsidiary awareness of the tool. The tool's significance became inextricably tied to how it served the model making process. In *Personal Knowledge*, Michael Polanyi describes how tools recede from consciousness to become extensions of the body:

> Tools ... can never lie in the field of ... operations; they remain necessarily on our side of it, forming part of ourselves, the operating person ourselves. We pour ourselves out into them and assimilate them as parts of our own existence. We accept them existentially by dwelling in them.[190]

In her ethnographic account of glass blowing, Erin O'Connor points out that 'as our awareness of a practice shifts into focal awareness, so too does that practice take on a lived character, a graceful extended movement, an arc of embodied techniques.'[191] This 'lived character' of practice that develops through model making, in which the body of the student no longer simply imitates the teacher, but actually embodies the making knowledge itself, is critical to the training models' ability to transmit the technical and spatial knowledge that makes a Parisian jeweller.

1.3 What knowledge do the training models transmit?

Having looked at how knowledge is transmitted from teacher to pupil, this chapter now focuses in more detail on the training models themselves to explore how they enable the transmission of technical knowledge and also spatial knowledge.

In his work on Yemeni stone masons, the Anthropologist Trevor Marchand compares and contrasts his own training as an architect with that of the stone masons to whom he is apprenticed in Yemen. He concludes that:

> The traditional builder, through the process of making, reliant on his sensorimotor domain which both produces his skilled performance and his knowledge about building, begins by mastering the basic unit of the brick. Each stage of his development is about the mastery of increasing scales of spatial relations and the consequent formation of the object-as-entity. In other words, the builder's knowledge moves from the micro to the macro scale, or from the brick to the

[189] Michael Polanyi, *Personal Knowledge: Towards a post-critical philosophy* (Chicago, IL: University of Chicago Press, 1962), 55.
[190] Polanyi, *Personal Knowledge*, 59.
[191] Erin O'Connor, "Embodied Knowledge: The experience of meaning and the struggle towards proficiency in glassblowing," *Ethnography* 6 (2005), 189.

> building, mastering his understanding of spatial relations by transforming them into objects of knowledge through the physical process of making concrete objects that can be known. Conversely, the training of an architect… first inculcates a knowledge of spatial relations at the scale of the building plan and moves the architect's knowledge, predominantly through the process of drawing reliant upon imagery-based conceptualization (and the skill of drawing itself upon the sensorimotor domain), towards an understanding of the 'particular'' in terms of drawn details of the building's component parts. In other words, as opposed to the micro to macro direction of the builder's training in making, the architect's knowledge about a building, and more particularly about abstract spatial relations, evolved inversely from the macro to the micro scale. Subsequently, through their respective training, the builder becomes a master of making and the architect a master of space.[192]

In this section I demonstrate how the use of training models to teach jewellery skills creates jewellers who are both masters of making as well as masters of space. On the one hand, the models teach jewellers like builders, from the micro to the macro, as jewellers learn to combine various techniques to create a finished complex model. On the other hand, the models also teach jewellers to be like architects, working from the macro to the micro, as they are a key tool in the development of spatial relations. In this way, by recreating training models in a classroom setting, jewellers learn to master both technique and space.

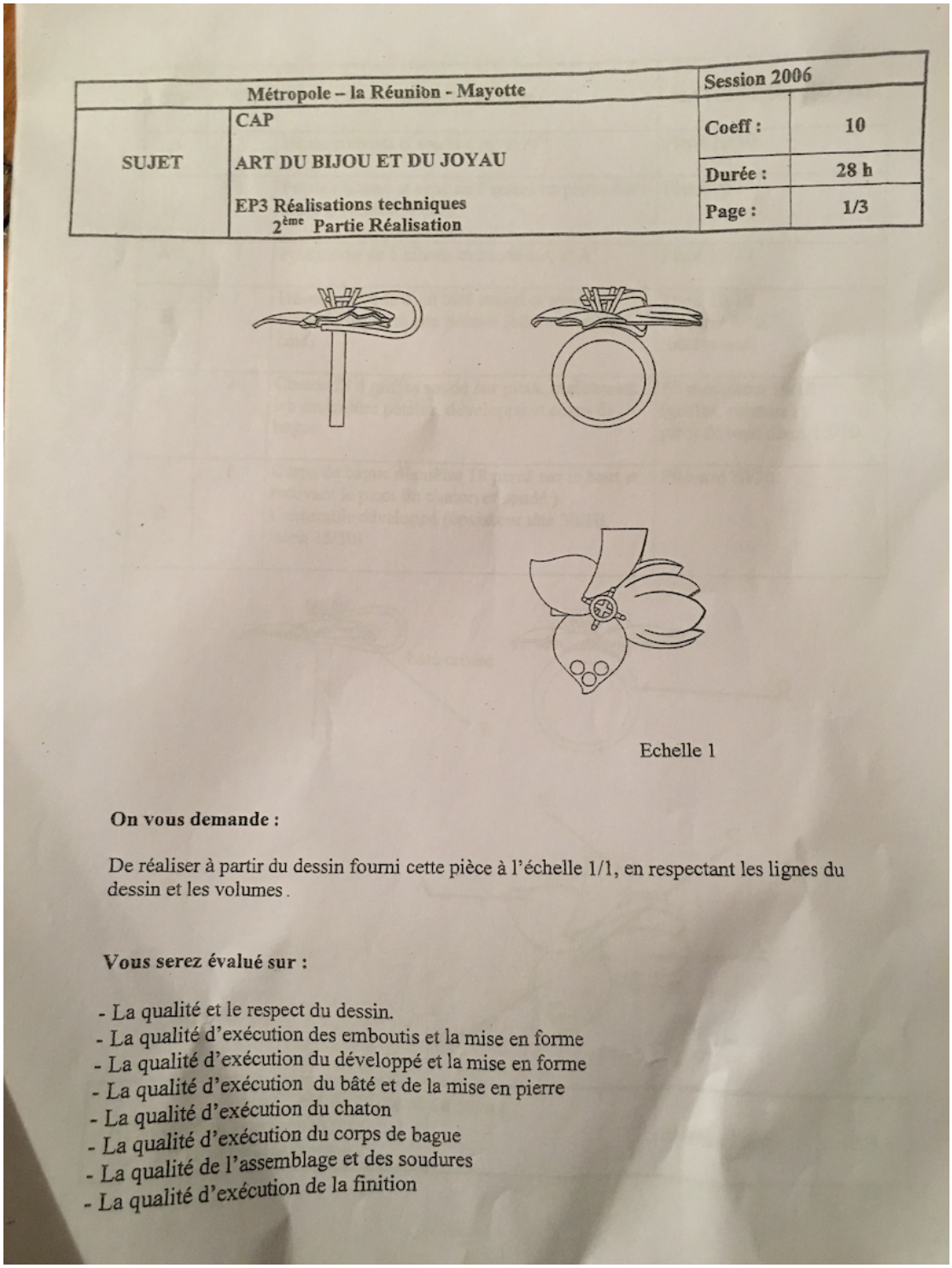
1.3.1 Knowledge transmission: Mastering Technique

The primary function of the metal training models in the classroom is to teach key jewellery skills. Psychological research shows that individual differences, even among elite performers, are closely related to assessed amounts of 'deliberate practice,' which can be defined as: 'a highly structured activity, the explicit goal of which is to improve performance. Specific tasks are invented to overcome weaknesses, and performance is carefully monitored to provide cues for ways to improve it further.'[193] Psychologists recognise that deliberate practice 'requires effort and is not inherently enjoyable' (!).[194] Making training models in a classroom setting is a prime example of 'deliberate practice.' The intended result of the activity is not creative or pleasurable, but to improve performance. Each training model is graded by the teacher on a scale of one to twenty, with twenty being the best. At

[192] Marchand, *Minaret Building and Apprenticeship in Yemen,* 183.
[193] Anders Ericsson, Ralphe Krampe, and Clemens Tesch-Römer, "The Role of Deliberate Performance in the Acquisition of Expert Performance," *Psychological Review* 100 (1993), 368.
[194] Ericsson, Krampe and Tesch-Römer, "The Role of Deliberate Performance in the Acquisition of Expert Performance," 368.

the HEJ the teachers grade the models much more harshly than in the final exam. Over the two years study the highest mark I achieved was a fourteen out of twenty and this was the highest mark in the class. Key to the definition of 'deliberate practice' is the idea of a 'structured activity.' The CAP examination models (subsequently used as training models) are structured in the sense that they always require a variety of techniques to be used in an appropriate sequence to create a finished model. The flower ring model from the 2006 CAP examination is an example of one such model (see figures 26 to 28).

Figure 26: 2006 examination page 1.



Métropole – la Réunion - Mayotte		Session 2006	
SUJET	CAP ART DU BIJOU ET DU JOYAU EP3 Réalisations techniques 2ème Partie Réalisation	Coeff :	10
		Durée :	28 h
		Page :	1/3

Echelle 1

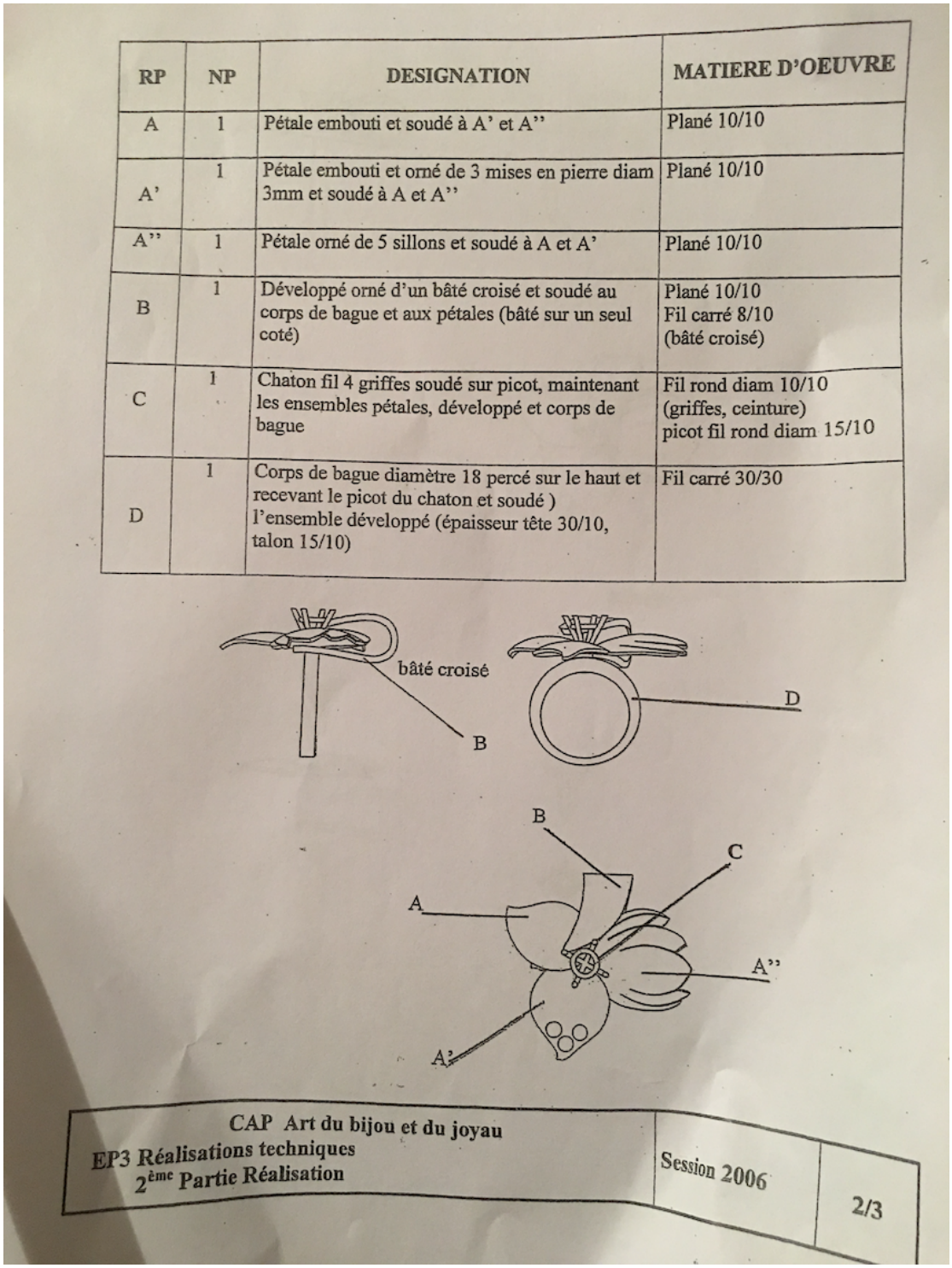
On vous demande :

De réaliser à partir du dessin fourni cette pièce à l'échelle 1/1, en respectant les lignes du dessin et les volumes.

Vous serez évalué sur :

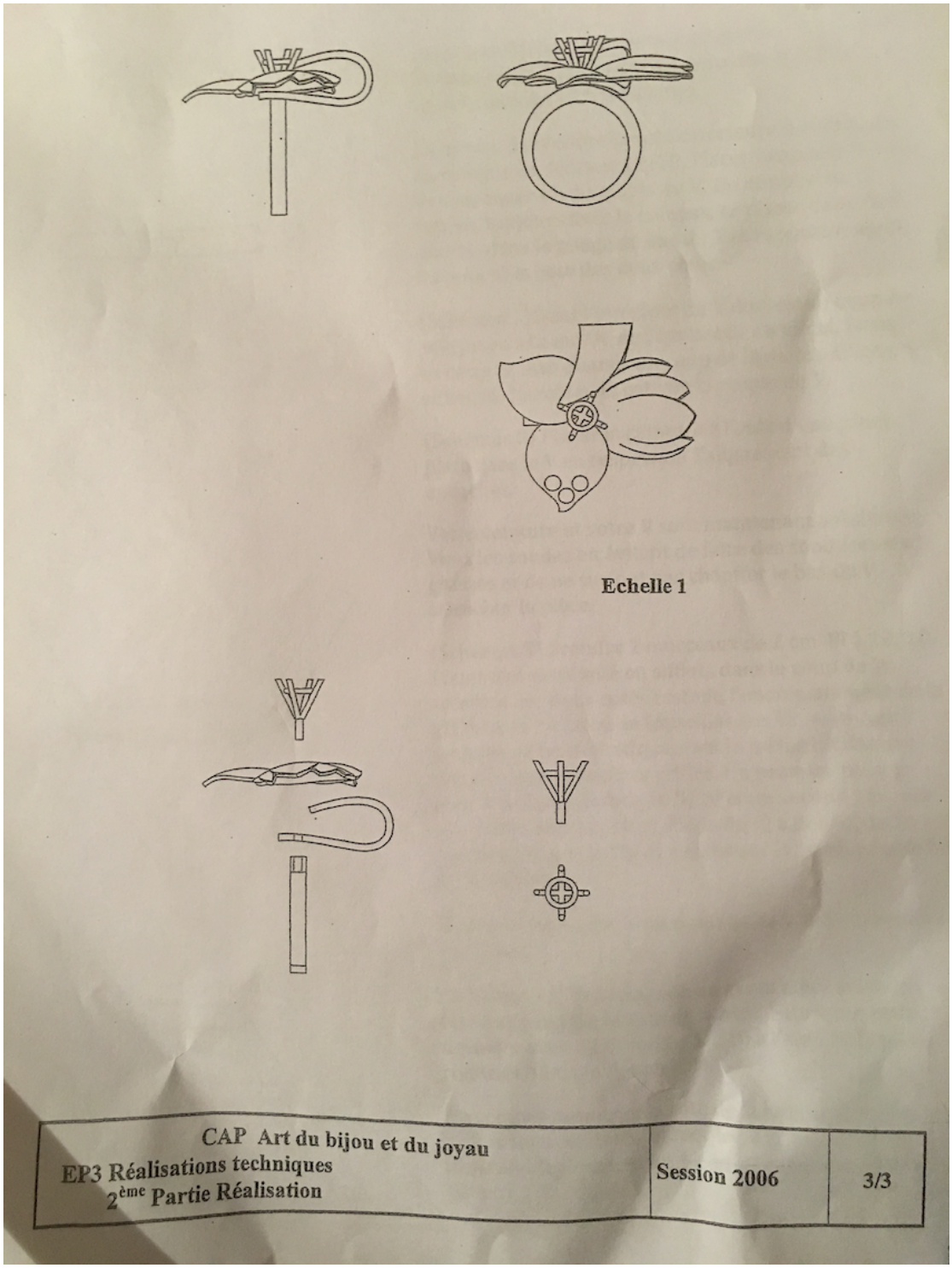
- La qualité et le respect du dessin.
- La qualité d'exécution des emboutis et la mise en forme
- La qualité d'exécution du développé et la mise en forme
- La qualité d'exécution du bâté et de la mise en pierre
- La qualité d'exécution du chaton
- La qualité d'exécution du corps de bague
- La qualité de l'assemblage et des soudures
- La qualité d'exécution de la finition

Figure 27: 2006 examination page 2.



RP	NP	DESIGNATION	MATIERE D'OEUVRE
A	1	Pétale embouti et soudé à A' et A''	Plané 10/10
A'	1	Pétale embouti et orné de 3 mises en pierre diam 3mm et soudé à A et A''	Plané 10/10
A''	1	Pétale orné de 5 sillons et soudé à A et A'	Plané 10/10
B	1	Développé orné d'un bâté croisé et soudé au corps de bague et aux pétales (bâté sur un seul coté)	Plané 10/10 Fil carré 8/10 (bâté croisé)
C	1	Chaton fil 4 griffes soudé sur picot, maintenant les ensembles pétales, développé et corps de bague	Fil rond diam 10/10 (griffes, ceinture) picot fil rond diam 15/10
D	1	Corps de bague diamètre 18 percé sur le haut et recevant le picot du chaton et soudé) l'ensemble développé (épaisseur tête 30/10, talon 15/10)	Fil carré 30/30

Figure 28: 2006 examination page 3.



By working on these training models in class, students can learn and practice the individual skills. An example of such a technique is the *batté orné* seen in figure 29. This involves soldering a metal wire above and below the edge of a curved piece of metal to give the appearance that the metal is thicker than it actually is. The difficulty lies in recreating the bend of the leaf shape exactly in two pieces of square metal wire so that they fit seamlessly

around the bottom of one side of the upper and lower parts of the leaf. Figures 29 to 31 show the resulting views from above, below and the side respectively.

Figure 29: Batté orné viewed from above.

Figure 30: Batté orné viewed from below.

Figure 31: Batté orné viewed from the side.

The result of the technique is that the ring has a leaf which appears to have the full thickness, but does not carry the weight of a thicker piece of metal, as seen in figures 32 and 33.

Figure 32: Finished model from 2006 examination.

Figure 33: Finished model from 2006 examination.

Although the training models are independent of each other, learning is cumulative in the sense that each model teaches the student to overcome certain technical obstacles, informing how they tackle the next. The Anthropologist Maurice Bloch postulates that an expert does not simply 'remember many instances,' but has a 'dedicated cognitive mechanism for dealing with instances of a particular kind,' which enables them to engage in an activity quickly and efficiently.[195] By engaging with similar, yet different challenges across a spectrum of distinct training models, trainee jewellers develop such a 'purpose oriented domain' and come to embody the habitus of Parisian fine jewellery. [196] I now present a brief summary of the other training models I made throughout my studies and the challenges that each presented.

[195] Maurice Bloch, *How We Think They Think: Anthropological approaches to cognition, memory and literacy* (Oxford: Westview Press, 1998), 9.
[196] Bloch, *How We Think They Think,* 14.

Figure 34: Model of a cyclist.

The model of the cyclist was the first model I ever made. The key challenge was to recreate every piece exactly with the utmost precision because any deviation in the angles within the geometric structure meant that the piece would not slot together as one (a prerequisite for the clean solder points demanded by the task).

Figure 35: Model of a cockerel.

The cockerel demanded even greater precision than the cyclist. The most challenging aspect of this model was transposing the diamond motif onto the rounded metal body piece and achieving the correct incline of the tail and finishing it with the *baté orné* described above.

Figure 36: Model of a hummingbird.

The new skill introduced in the hummingbird was the hinge on the tail.

Figure 37: Model of a bee.

The most challenging aspect in the bee model was achieving the correct three dimensional forms for the body, tail and head. This was a more complex task than creating the simple domed shapes seen in the previous models. Students use a wooden block in which they remove inverse pieces of the required form. The metal is then beaten into these areas in the block to create the desired three dimensional shape. The order in which the pieces were

soldered together was also critical because of the large difference in size between the thin legs and antennae and the large main body and head.

The defining feature of all of the training models described above is the fact that they all combine multiple techniques. The ability to successfully order and combine these techniques is key to a successful model. I learnt this the hard way. At the beginning of my studies, I would diligently make detailed notes on the exact operations to be performed at each stage. I was extremely proud of my precise notebook complete with pictures of each individual making stage. However, I soon discovered that the neatness of my notebook was not translated into a good model (technically precise with a high quality solder and finish). My teacher, more used to dealing with proficient skilled jewellers of the calibre of my classmates, quickly became exasperated and would bellow across the atelier: 'I tell you one thing and you end up with another?! You never listen!' At this point I would produce my notebook to prove that I had in fact been paying attention and that, contrary to his assertion, I knew exactly what to do. It took me half a year, during which I had every derogatory word in the French dictionary thrown at me, to realise that the notebook was the source of my desperation rather than the solution to my problems.

There were two problems with my notebook of techniques. First, as Peter Dormer has suggested, rules reside in the craft activity itself as the 'internal logic' of a craft is incorporated into 'the fabric of the body and the texture of the mind.'[197] This echoes the philosopher Gilbert Ryle's assertion that 'knowing a rule is knowing how. It is realised in performances which conform to the rule, not in theoretical citations of it.'[198] Understanding the theory behind something does not therefore mean that one is actually able to successfully complete a practical task.

Second, my notebook broke down the model making process into discrete technical actions. Yet this focus on the individual operations had blinded me to the links between these actions that only in sequence resulted in the desired training model. As Michael Polanyi has pointed out, 'all particulars become meaningless if we lose sight of the pattern they jointly constitute.'[199] The need to attend to the links between seemingly distinct sequences of actions was a cornerstone of the theory of the rhizome developed by Gilles Deleuze and

[197] Peter Dormer, *The Art of the Maker* (London: Thames and Hudson, 1994), 60.
[198] Gilbert Ryle, "Knowing How and Knowing That," in *Gilbert Ryle: Collected papers, vol. 2: Collected essays 1929-68* (Bristol: Thoemmes Antiquarian Books, 1990), 217.
[199] Polanyi, *Personal Knowledge*, 57.

Philippe Guattari.[200] In their seminal work *A Thousand Plateaus,* they argue that thresholds (here, the links between actions) are the key to understanding the emergence of form from matter via actions that are inherently relational. To give perhaps the most basic example, when soldering silver it is necessary for the two parts to be soldered, to be heated to the same temperature. A smaller piece heats much faster than a larger piece and is liable to melt if too much heat is applied to the juncture, while the larger piece attains the required heat. This means that the order in which the pieces are assembled is crucial to the viability of the final piece. Similarly, a piece of metal must be heated and beaten into shape before the handsaw is used to cut out the intricate pattern because it weakens the metal. This idea is also fundamental to Tim Ingold's theorisation of making as 'not so much an assembly as a procession, not a building up from discrete parts into a hierarchically organised totality but a carrying on.'[201]

By producing complex training models involving many techniques, trainee jewellers learn to conceptualise discrete technical steps as an interrelated series of actions. This is important for how they retain the technical knowledge taught by the models and subsequently for their ability to retrieve this knowledge from memory. To return to the matter of expertise raised at the beginning of this section, it has been argued that 'the memory of experts is organized in complex hierarchical systems in contrast to less skilled individuals whose retrieval of their limited knowledge is more difficult and unreliable.'[202] The complex structure of the training model as a series of interrelated techniques is mirrored in the organisation of the student's memory, facilitating knowledge retrieval. Thus the internal logic of the training model directly means that model making is 'deliberate practice' to develop jewellery making expertise.

The key to developing expertise with each training model made is the fact that the models contain similar techniques, albeit in different combinations. In the words of the Russian neurophysiologist Nikolai Bernstein:

> Practice ... does not consist in repeating the means of solution of a motor problem time after time, but in the process of solving this problem again and again by techniques which we change ... and perfect ... from repetition to repetition.[203]

[200] The rhizome is a philosophical concept developed by Gilles Deleuze and Félix Guattari as a way of modelling connections in multiple non-hierarchical ways that are continuously evolving without changing the underlying connectivity.
[201] Ingold, *Making,* 45.
[202] Epstein, "Craft Guilds in the Pre-Modern Economy," 166.
[203] Nikolai Bernstein, *The Co-ordination and Regulation of Movement* (Oxford: Pergamon, 1967), 134.

Thus 'practice is a particular type of repetition without repetition.'[204] Over time, Bernstein argues that the maker's field of attention becomes more encompassing.[205] Thus in my first models, I focused on soldering the pieces together in the right order and often spent hours polishing away excess solder. In my later models I made sure that the solder joint was invisible on both the front and back of the model by using the tiniest piece of solder I could cut and positioning it carefully so that it would not be seen. As Anna Portisch points out, in her study of Kazak weaving: 'It is perhaps not so much a question of certain "mastered" abilities "receding from consciousness," but rather a question of becoming better at simultaneously keeping several aspects of an execution in one's awareness, and continually weighing different aspects against each other.'[206] Thus I did not forget the easier techniques in later models, I simply became better at harmonizing them and focusing on several aspects at once, for example the solder joint and the finish. In this way the learning process across the training models is dynamic and responsive as the student gains an increasingly complex understanding with each model.

1.3.2 Knowledge transmission: Mastering Space

In addition to two days metal working a week, students at the HEJ spend one day a week making wax models. The principle here is the same, namely to make a three dimensional wax model from a two dimensional technical drawing. However unlike the metal training models described above, whose prime focus is to unify various challenging jewellery techniques in one piece, the sole purpose of the wax models is to teach and then examine a student's ability to think three dimensionally. Chapter two will show how wax models are used by professional jewellers to cast metal pieces in the lost wax process.[207] The wax models made in the classroom are never cast into silver, as their purpose is purely didactic. The reason wax is used to teach spatial skills is that it is faster and easier to achieve form and shape in wax than in metal, enabling students to work faster to realise a variety of geometric forms.

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[204] Bernstein, *The Co-ordination and Regulation of Movement*, 134.
[205] Nikolai Bernstein, "On Dexterity and its Development," in *Dexterity and its Development,* ed. Mark Latash and Michael Turvey (New Jersey: Laurence Erlbaum Associates, 1996), 188.
[206] Anna Portisch, "The Craft of Skillful Learning: Kazakh women's everyday craft practices in western Mongolia," *Journal of the Royal Anthropological Institute* 16 (2008), 76.
[207] The process by which this is achieved is known as *fonte a cire perdue* (lost wax casting). First, the wax model is attached to a wax 'tree' structure, which is placed in a cylinder that is dipped into a slurry of silica then into sand-like stucco until a thick layer is formed. The coated piece is then heated in a kiln so that the wax pours out, leaving a cavity that can be filled with molten metal. Upon cooling, the shell is hammered away and the metal form can be removed from the 'tree structure' and worked to remove the signs of the casting process.

The wax models prescribed are highly geometric forms with a variety of levels and inclines. Figures 38 to 46 show some of the models I made during my first term at the HEJ. The photos reveal the importance of symmetry and proportion in these models. They all contain a series of levels that are repeated across the piece.

Figure 38: Wax model made by the author, 2017.

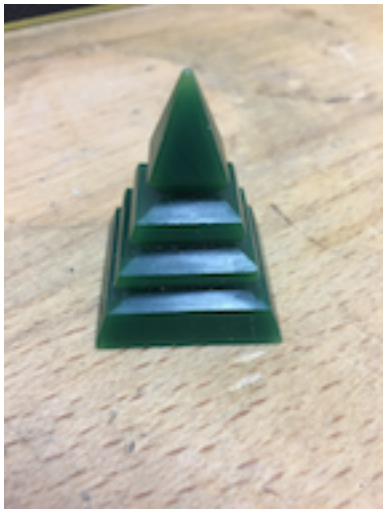


Figure 39: Wax model made by the author, 2017.

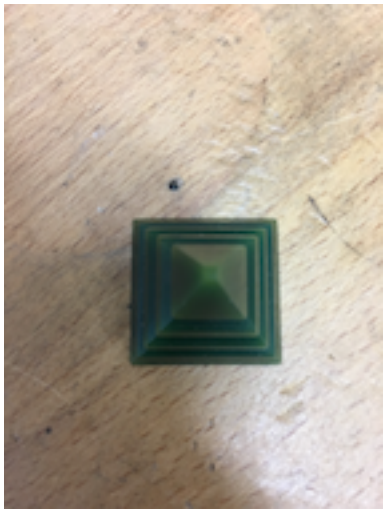


Figure 40: Wax model made by the author, 2017.

Figure 41: Wax model made by the author, 2017.

Figure 42: Wax model made by the author, 2017.

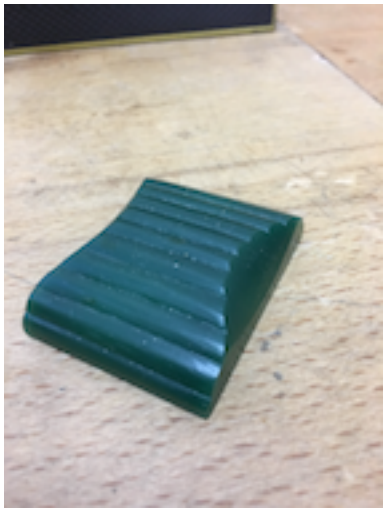


Figure 43: Wax model made by the author, 2017.

Figure 44: Wax model made by the author, 2017.

Figure 45: Wax model made by the author, 2017.

Figure 46: Wax model made by the author, 2017.

By making these wax models, students learn to move effortlessly between two and three dimensions. The trick to successfully reproducing the two dimensional technical drawing in three dimensional wax is to focus on the individual lines and the links between them, rather than the drawing/model as a whole. The first book I ever owned was a storybook called Harold and his purple crayon. In the story, Harold uses his purple crayon to draw the world around him. The two dimensional lines he draws became the three-dimensional world he inhabits. In the wax model making class I often felt like Harold, retracing two dimensional lines in order to construct a three dimensional reality. Linear accuracy is key to the wax models. When making the wax model, the focus is always on the line. The line of the technical drawing becomes a line in the three-dimensional model in the form of a facet junction. The key to creating a model that is true to the technical drawing is to adhere exactly to the lines in the two-dimensional drawing.

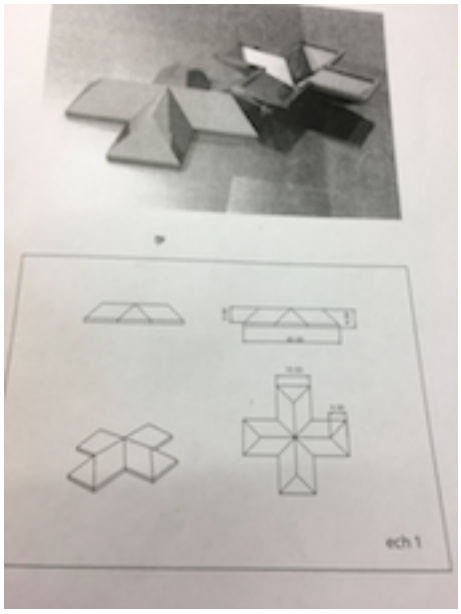
The importance of the line resonates with Tim Ingold's study of making and his work on lines.[208] Ingold's analysis draws attention to the importance of the dynamic quality of lines that narrate the making process. He builds on the distinction recognised by the artist Patricia Cain between non-gestural lines (statements about what is to be) and gestural lines (which issue from things) to contrast the technical drawing, which is 'devoid of feeling', and drawings that 'tell.'[209] The latter, he argues, are a form of 'correspondence, of kinaesthetic awareness and line of flight.'[210] I would argue that the lines in the model transform the senseless non-gestural lines of the technical drawing, which expresses what is to be made, into gestural lines in a wax model. I would qualify the definition of gestural lines to highlight

[208] Ingold, *Making*; Tim Ingold, *The Life of Lines* (London: Routledge, 2015).
[209] Ingold, *Making*, 128.
[210] Ingold, *Making*, 128.

the importance of the interrelation of the lines. In mathematics, the direction of a line i.e. its movement in a three dimensional plane is described by its vector. The vector roots the line firmly within a three dimensional framework and effectively means that each line is always described in relation to the other lines around it. Thus the movement of lines in a three dimensional space is inherently relational. Indeed rather than a focus on the individual line, it is by studying the relations between the lines seen in the technical drawing and brought to life in the facet junctions of the wax model, that the model maker succeeds in producing an accurate model. In this way, the gestural lines of the model do not just 'tell,' but rather they engage in a dialogue with each other.

The images in figures 47 to 49 show the construction of a wax model cross. Each stage, from the technical drawing, to the tracing of the shape, to the final model, reveals the importance of maintaining this relationship between length, width and depth. Figure 48 shows the grid like structure drawn within the form of the model. The aim is to work around this grid as the model is created. Each square is treated as its own XYZ three dimensional axis with the file used to create a new surface spanning the three dimensions. Thus the non-gestural lines that can be seen in figure 47 are transformed into gestural lines that together create the three dimensional volume in figure 49. By making such a model, students learn to translate simple lines into gestural lines and thereby gain the spatial awareness that the Neurologist Frank Wilson has called 'situational knowledge.'[211] They can then apply this knowledge to the production of different types of jewellery.

Figure 47: Wax model construction sheet.



[211] Wilson, *The Hand*, 59.

Figure 48: Wax model construction.

Figure 49: Wax model construction.

The idea that spatial awareness can be developed by making has been explored by Trevor Marchand in his study of Yemeni stone masons. He cites the work of Ray Jackendoff and Barbara Landau who look at a correlation between the split in expressive power of language - between the ability to describe the what of an object and the where of an object - and the anatomical bifurcation for spatial representation in thought.[212] Marchand expands this

[212] Ray Jackendoff and Barbara Landau, "Spatial Language and Spatial Cognition," in *Languages of the Mind,* ed. Ray Jackendoff (Cambridge, MA: MIT Press, 1992).

window of human spatial cognition from one which was primarily language based to include the processes of making. He describes how stone mason apprentices 'inhabit the processes of making.'[213] As the Art Historian Henri Focillon described, 'the artist beholds his work with other eyes than we do for his vision is within the forms so to speak and from within himself.'[214]

The training model's use in understanding the spatial relations within a form also explains its use in the technical drawing class. Here, large models are made to enable the students to understand the different views and dissections seen in the technical drawings. The students are encouraged to *handle* the models and manipulate them in order to see the object from various positions and to critically engage with the three dimensional volume before them, as seen in figure 50 where the teacher moves the three dimensional foam model to show the gestural lines that emerge from the two dimensional technical drawing on the board behind him. Thus when students are presented with a technical drawing they are conditioned to see within it the gestural lines which will emerge in the three dimensional model.

Figure 50: Photograph taken in technical drawing class, 2017.

[213] Marchand, *Minaret Building and Apprenticeships in Yemen,* 243.
[214] Henri Focillon, *The Life of Forms in Art*, trans. Charles Hogan and George Kubler (London: Zone, 1989), 127.

Handling the training models is key to the didactic success of this experience. At the beginning of the twentieth century the Psychologist Geza Revesz was influential in acknowledging the importance of touch within spatial measure arguing that the haptic sense is inherently a geometric sense. He argued that 'through our tactile sense we comprehend the constant, the approximate, the invariable, the general, or in other words, the sensory and perceptible content of geometry.'[215] This is supported by neurobiological research. The Neurologist Frank Wilson has explained the process by which we gain information when handling objects like the foam models used in the technical drawing classes: 'The information returned to the brain [is] written in the tactile and kinetic language of manipulation and [is] compared with information coming from the visual system as part of a process through which the brain creates visuospatial images.'[216] Thus it is not just in its making, but also in its handling that the training model is able to transmit spatial knowledge, making the students 'masters of space.'

1.3.3 Social knowledge

In a paper on the process of apprenticeship, the ethnologist Jack Haas looks at the ritual ordeals involved in the process of learning new skills.[217] One might argue that the training models are such a form of ritual ordeal. Each new model produces the same feeling of uncertainty and ambiguity for the learner student. It is notable that although students work on the model alone, the fact that everyone is making the same piece means that the experience of making the training model is in fact a collective one. Haas stresses how the shared ordeal is critical to producing a sense of belonging among apprentices: 'Having survived a shared ordeal, members of the occupation perceive themselves as a select minority with a set of distinctive and shared attributes and qualities.'[218] Indeed the sense of comradery between pupils even in different classes can be heard through the intense discussions of the individual training models and how to make them that reverberate around the HEJ corridors.

The HEJ is not alone in using the CAP examination models as training models to teach technical skills and spatial knowledge. According to Monsieur Baldocchi, who knows the directors of the other jewellery schools throughout France, every school in France uses the

[215] Geza Revesz, "The Problem of Space with Particular Emphasis on Specific Sensory Spaces," *American Journal of Psychology* 50 (1937), 432.
[216] Wilson, *The Hand*, 276.
[217] Jack Haas, "The Process of Apprenticeship," in *Apprenticeship: From theory to method and back again,* ed. Michael Coy (Albany: State University of New York Press, 1989).
[218] Haas, "The Process of Apprenticeship," 104.

same models to teach their trainees.[219] The fact that these training models are made throughout France, teaching pupils how to use the same skills in the same sequence to produce the exact same object, reinforces Marcel Mauss' idea that techniques are fundamentally social and 'are particular to a single society, or at least to a single civilization, to the point of characterizing it, indeed of standing for it, so to say, as a sign.'[220] Mauss famously referred to the example of the different shovels used by the French and the English in the Trenches during World War One and the difference in the technique between the two nations. Indeed the use of the same training models to train every jeweller in France, means that just like the men in the Trenches using French shovels, all French jewellers will make basic jewels using the same techniques and crucially the same sequence of techniques.

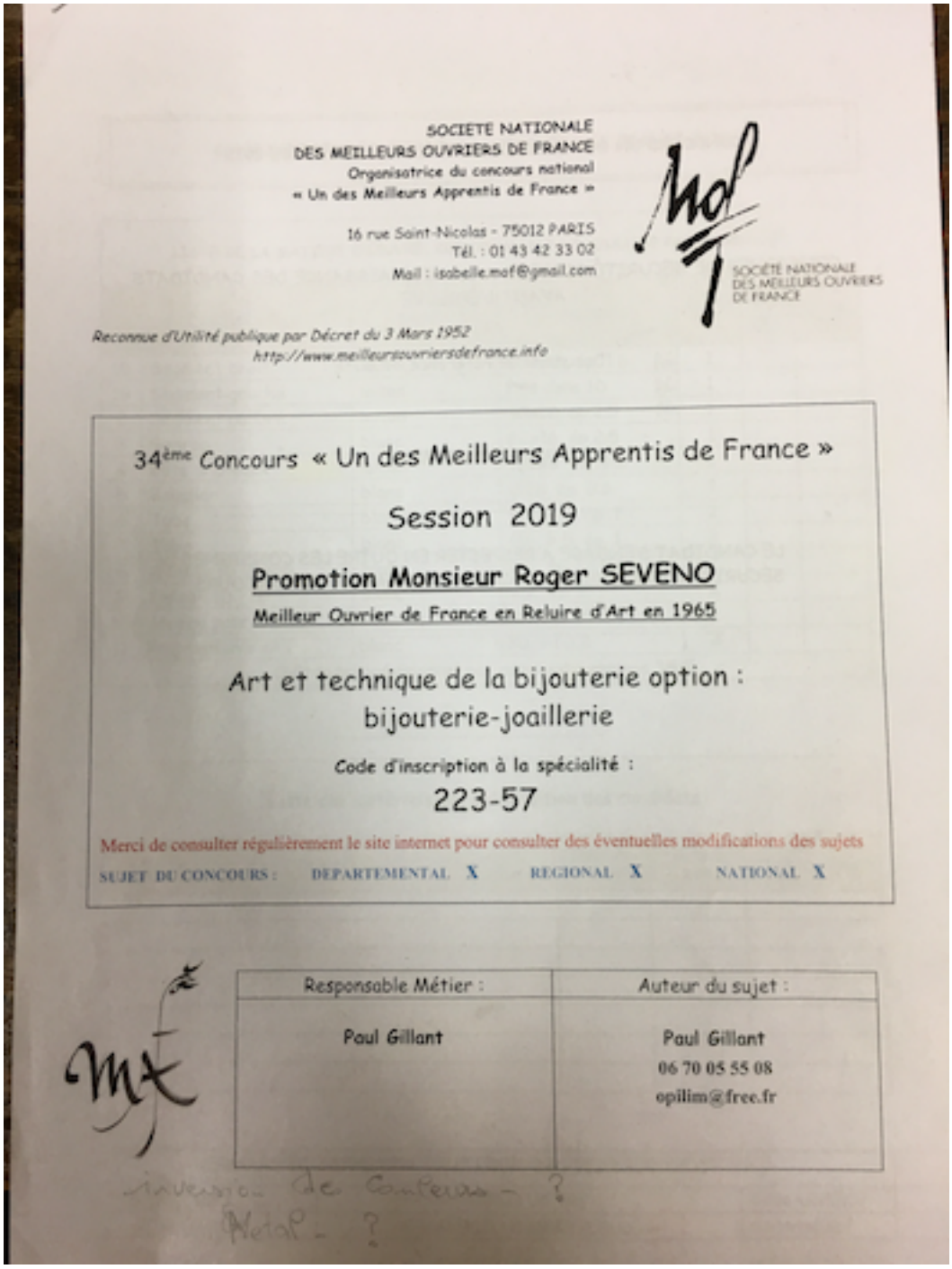
Mauss' contemporary, the sociologist André Leroi-Gourhan, theorized this around the notions of *tendance* (tendency) and that of *degree du fait* (levels of fact).[221] By tendency, he referred to the propensity of all human groups to perform the same technical action, in this case making jewellery. This, he argued, results from basic human needs and from the individual constraints of matter. Against this common background, each culture develops its own tools according to technical traditions (*milieu technique*). This chapter has already revealed model making to be a key technical tradition of the French jewellery sector. Leroi-Gourhan argued that the observable techniques that illustrate a given tendency (called facts) more or less resemble each other. He termed the features they have in common 'first levels of the fact' and the features in which they differ the 'last features of fact.' Through the use of standardized training models in jewellery education throughout France ('first features of fact'), the state effectively safeguards the persistence of these 'last features of fact,' which depend on the tradition of model making. Thus the use of French training models to transmit jewellery knowledge creates a peculiarly French technique of jewellery making.[222] In this way, the training model ties technique to geography enabling the creation of identifiably French jewellery.

At the same time, the training models used throughout France enable difference to be created within the French jewellery sector. The CAP examination models used as training

[219] Michel Baldocchi, Meeting with the author, 7 December 2018.
[220] Schlanger, *Techniques, Technology and Civilisation,* 52.
[221] André Leroi-Gourhan, *Evolution et Techniques: L'homme et la matière* (Paris: A. Michel, 1943).
[222] This thesis makes no claims about knowledge transmission in other cultures, although from personal acquaintance with leading figures in European craftsmanship through the European wide Michelangelo Foundation for Creativity and Craftsmanship the author is not aware of the existence of any nation-wide examination models in any craft like the French ones described here. In any case, the argument made here is about the French examination models contributing to a French style of jewellery. Evidently even if other nations were to use models, they would be their own national models and not the French ones described in this thesis, and they would thus contribute to their own distinct national style of jewellery.

models set the jewellers on a career path that is full of making similar, ever more challenging models to demonstrate their own career progression and compare their skills to others'. In the first week of December each year, the students who progress from the CAP to the next two year course known as the *Brévet de Metier d'Art* (BMA) begin work on the model set for that year's *Meilleur Apprentis de France* (Best Apprentice in France) competition. This is the first time that students make training models in silver and the theme is much more challenging than the CAP. Students throughout France enter the competition, all making the same model, which is evaluated by the competition coordinators at the Union of French Jewellers (which is located on the ground floor of the same building as the HEJ). Figure 57 shows the teacher distributing the silver and the exercise for 2018. The competition sheets in figures 51 to 56 are instantly recognisable as having the same format as the CAP examinations above. The examination criteria are also the same except that 'stone setting' is also a new category, reflecting the increased complexity of the piece.

Figure 51: Meilleur apprentis de France 2018 competition page 1.



SOCIETE NATIONALE
DES MEILLEURS OUVRIERS DE FRANCE
Organisatrice du concours national
« Un des Meilleurs Apprentis de France »

16 rue Saint-Nicolas - 75012 PARIS
Tél. : 01 43 42 33 02
Mail : isabelle.maf@gmail.com

SOCIÉTÉ NATIONALE DES MEILLEURS OUVRIERS DE FRANCE

Reconnue d'Utilité publique par Décret du 3 Mars 1952
http://www.meilleursouvriersdefrance.info

34ème Concours « Un des Meilleurs Apprentis de France »

Session 2019

Promotion Monsieur Roger SEVENO

Meilleur Ouvrier de France en Reliure d'Art en 1965

Art et technique de la bijouterie option :
bijouterie-joaillerie

Code d'inscription à la spécialité :

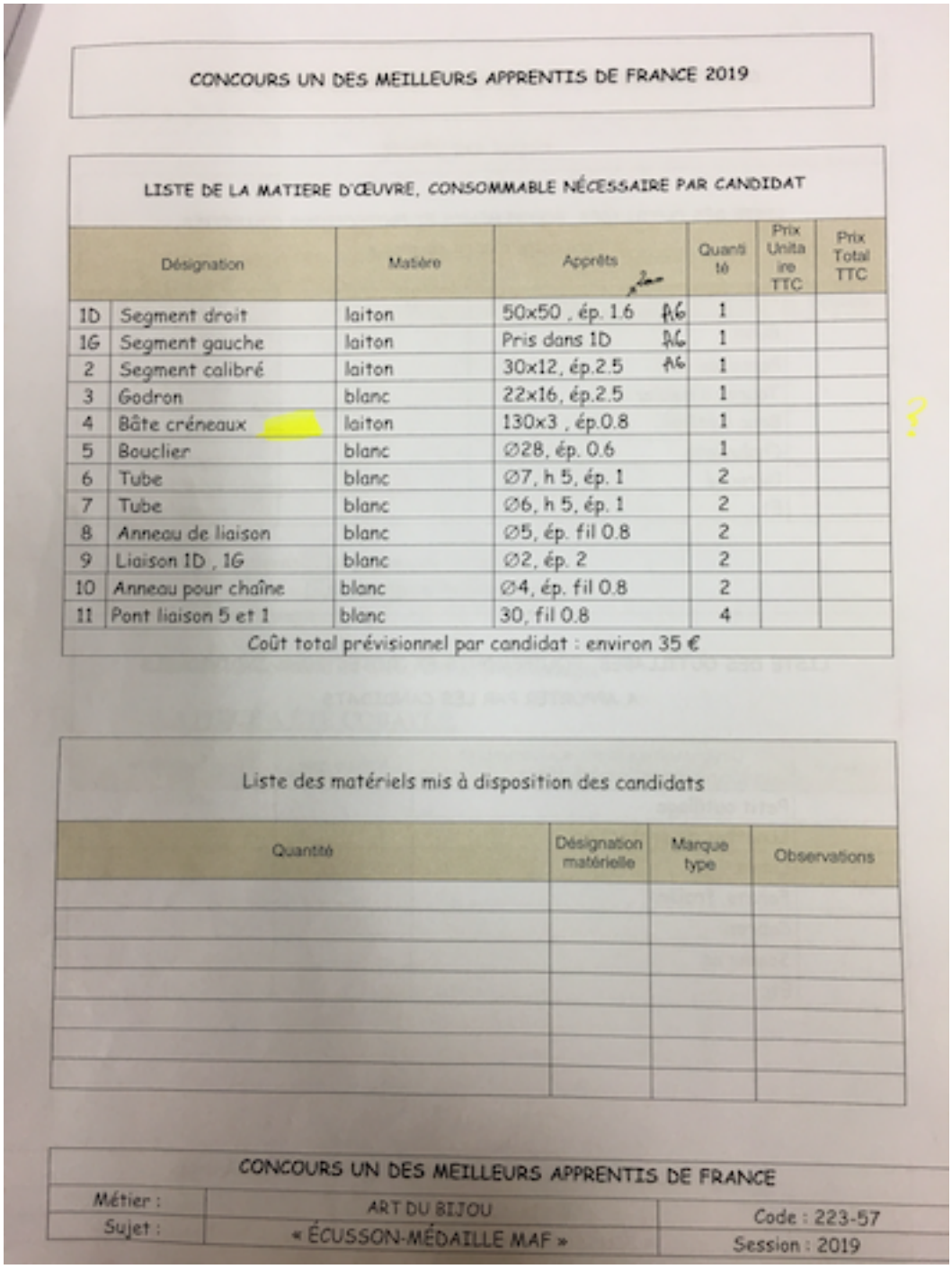
223-57

Merci de consulter régulièrement le site internet pour consulter des éventuelles modifications des sujets

SUJET DU CONCOURS : DEPARTEMENTAL X REGIONAL X NATIONAL X

Responsable Métier :	Auteur du sujet :
Paul Gillant	Paul Gillant 06 70 05 55 08 opilim@free.fr

Figure 52: Meilleur apprentis de France 2018 competition page 2.



CONCOURS UN DES MEILLEURS APPRENTIS DE FRANCE 2019

LISTE DE LA MATIERE D'ŒUVRE, CONSOMMABLE NÉCESSAIRE PAR CANDIDAT

	Désignation	Matière	Apprêts	Quantité	Prix Unitaire TTC	Prix Total TTC
1D	Segment droit	laiton	50x50 , ép. 1.6 Ag	1		
1G	Segment gauche	laiton	Pris dans 1D Ag	1		
2	Segment calibré	laiton	30x12, ép.2.5 Ag	1		
3	Godron	blanc	22x16, ép.2.5	1		
4	Bâte créneaux	laiton	130x3 , ép.0.8	1		
5	Bouclier	blanc	Ø28, ép. 0.6	1		
6	Tube	blanc	Ø7, h 5, ép. 1	2		
7	Tube	blanc	Ø6, h 5, ép. 1	2		
8	Anneau de liaison	blanc	Ø5, ép. fil 0.8	2		
9	Liaison 1D , 1G	blanc	Ø2, ép. 2	2		
10	Anneau pour chaîne	blanc	Ø4, ép. fil 0.8	2		
11	Pont liaison 5 et 1	blanc	30, fil 0.8	4		
	Coût total prévisionnel par candidat : environ 35 €					

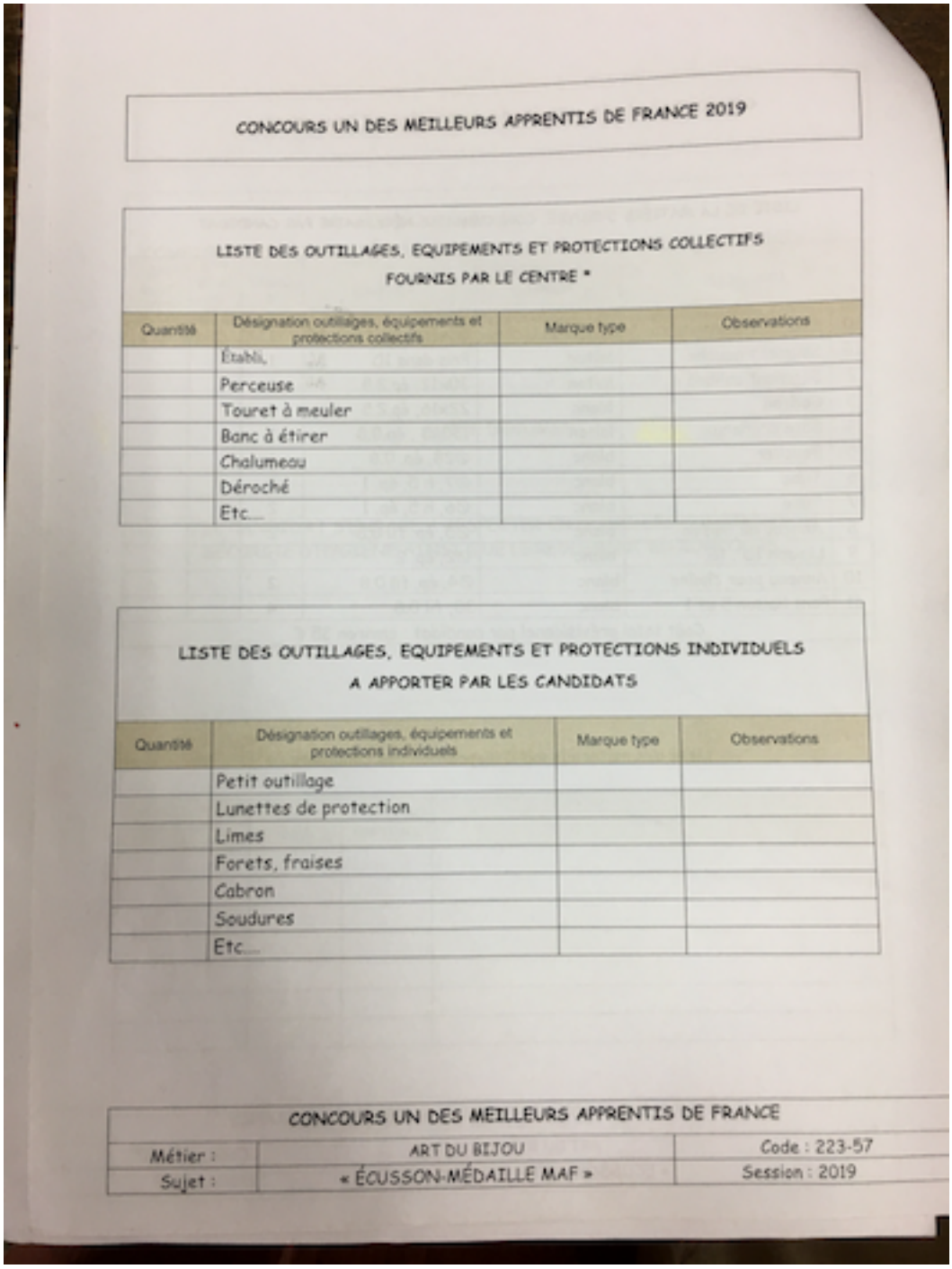
Liste des matériels mis à disposition des candidats

Quantité	Désignation matérielle	Marque type	Observations

CONCOURS UN DES MEILLEURS APPRENTIS DE FRANCE

Métier :	ART DU BIJOU	Code : 223-57
Sujet :	« ÉCUSSON-MÉDAILLE MAF »	Session : 2019

Figure 53: Meilleur apprentis de France 2018 competition page 3.



CONCOURS UN DES MEILLEURS APPRENTIS DE FRANCE 2019

LISTE DES OUTILLAGES, EQUIPEMENTS ET PROTECTIONS COLLECTIFS FOURNIS PAR LE CENTRE *

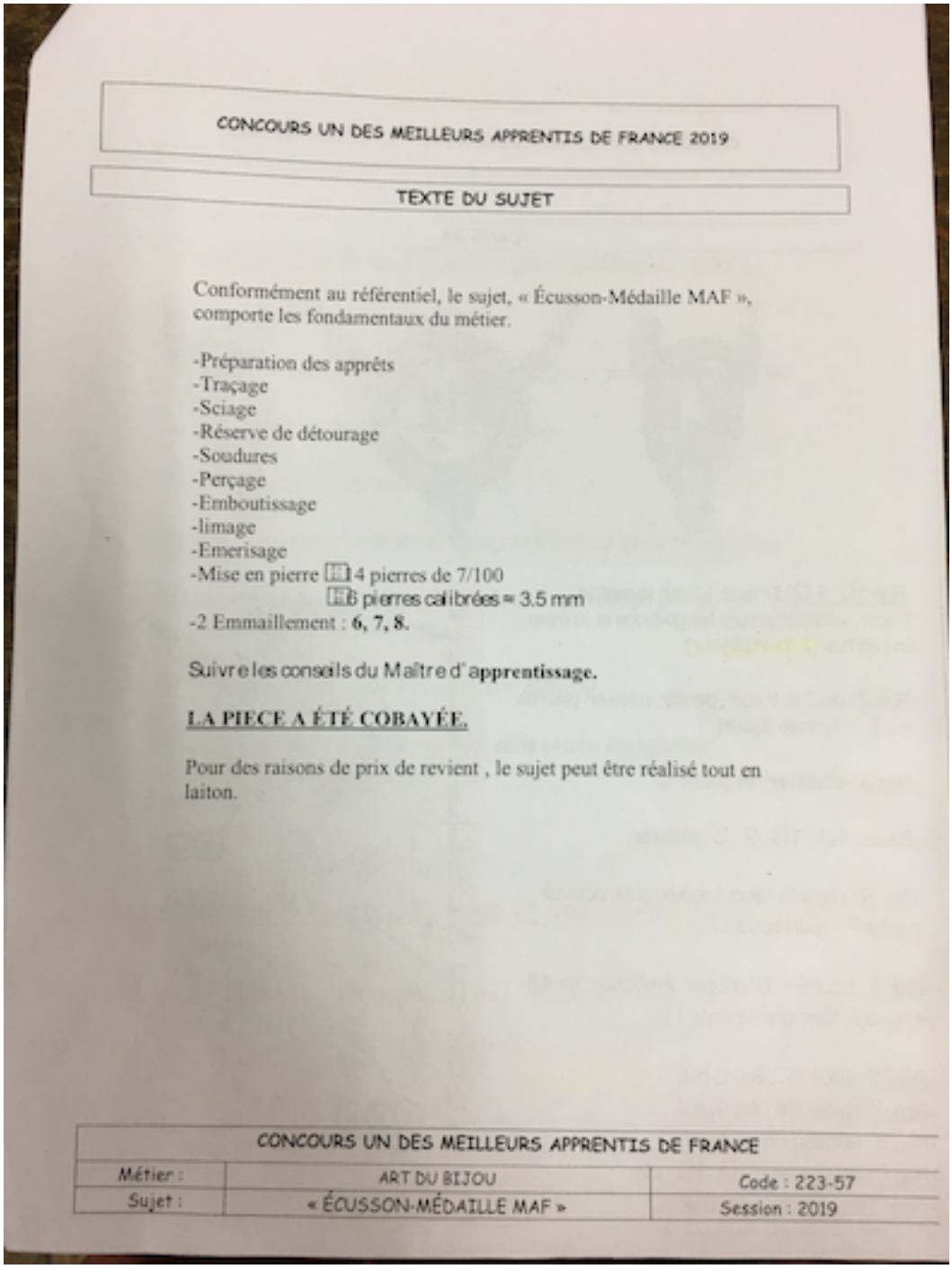
Quantité	Désignation outillages, équipements et protections collectifs	Marque type	Observations
	Établi		
	Perceuse		
	Touret à meuler		
	Banc à étirer		
	Chalumeau		
	Déroché		
	Etc....		

LISTE DES OUTILLAGES, EQUIPEMENTS ET PROTECTIONS INDIVIDUELS A APPORTER PAR LES CANDIDATS

Quantité	Désignation outillages, équipements et protections individuels	Marque type	Observations
	Petit outillage		
	Lunettes de protection		
	Limes		
	Forets, fraises		
	Cabron		
	Soudures		
	Etc....		

CONCOURS UN DES MEILLEURS APPRENTIS DE FRANCE		
Métier :	ART DU BIJOU	Code : 223-57
Sujet :	« ÉCUSSON-MÉDAILLE MAF »	Session : 2019

Figure 54: Meilleur apprentis de France 2018 competition page 4.



CONCOURS UN DES MEILLEURS APPRENTIS DE FRANCE 2019

TEXTE DU SUJET

Conformément au référentiel, le sujet, « Écusson-Médaille MAF », comporte les fondamentaux du métier.

-Préparation des apprêts
-Traçage
-Sciage
-Réserve de détourage
-Soudures
-Perçage
-Emboutissage
-limage
-Emerisage
-Mise en pierre ☐ 4 pierres de 7/100
☐ 6 pierres calibrées ≈ 3.5 mm
-2 Emmaillement : **6, 7, 8.**

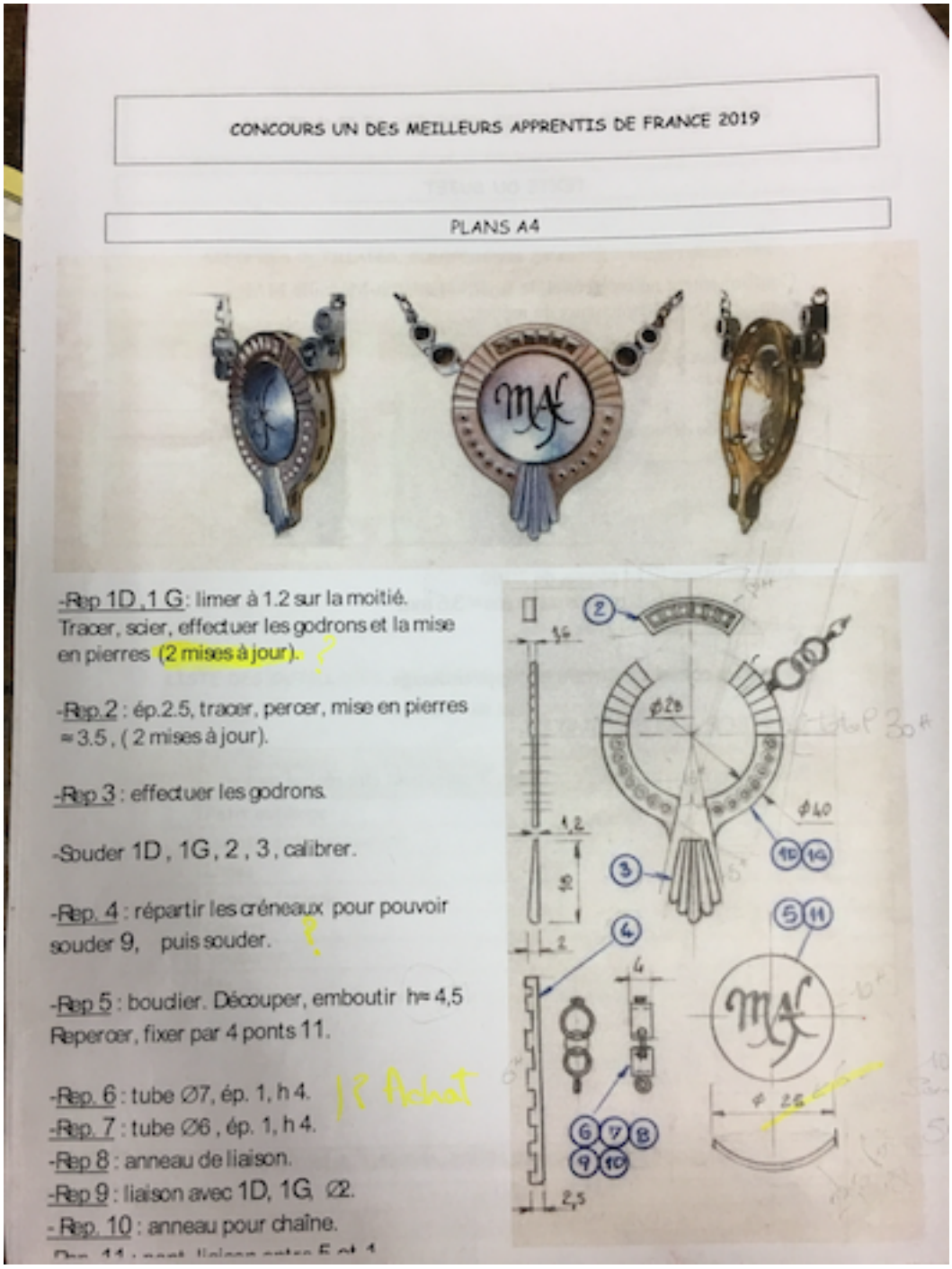
Suivre les conseils du Maître d'**apprentissage.**

LA PIECE A ÉTÉ COBAYÉE.

Pour des raisons de prix de revient , le sujet peut être réalisé tout en laiton.

CONCOURS UN DES MEILLEURS APPRENTIS DE FRANCE		
Métier :	ART DU BIJOU	Code : 223-57
Sujet :	« ÉCUSSON-MÉDAILLE MAF »	Session : 2019

Figure 55: Meilleur apprentis de France 2018 competition page 5.



CONCOURS UN DES MEILLEURS APPRENTIS DE FRANCE 2019

PLANS A4

-Rep 1D, 1 G : limer à 1.2 sur la moitié.
Tracer, scier, effectuer les godrons et la mise en pierres (2 mises à jour).

-Rep 2 : ép.2.5, tracer, percer, mise en pierres ≈ 3.5, (2 mises à jour).

-Rep 3 : effectuer les godrons.

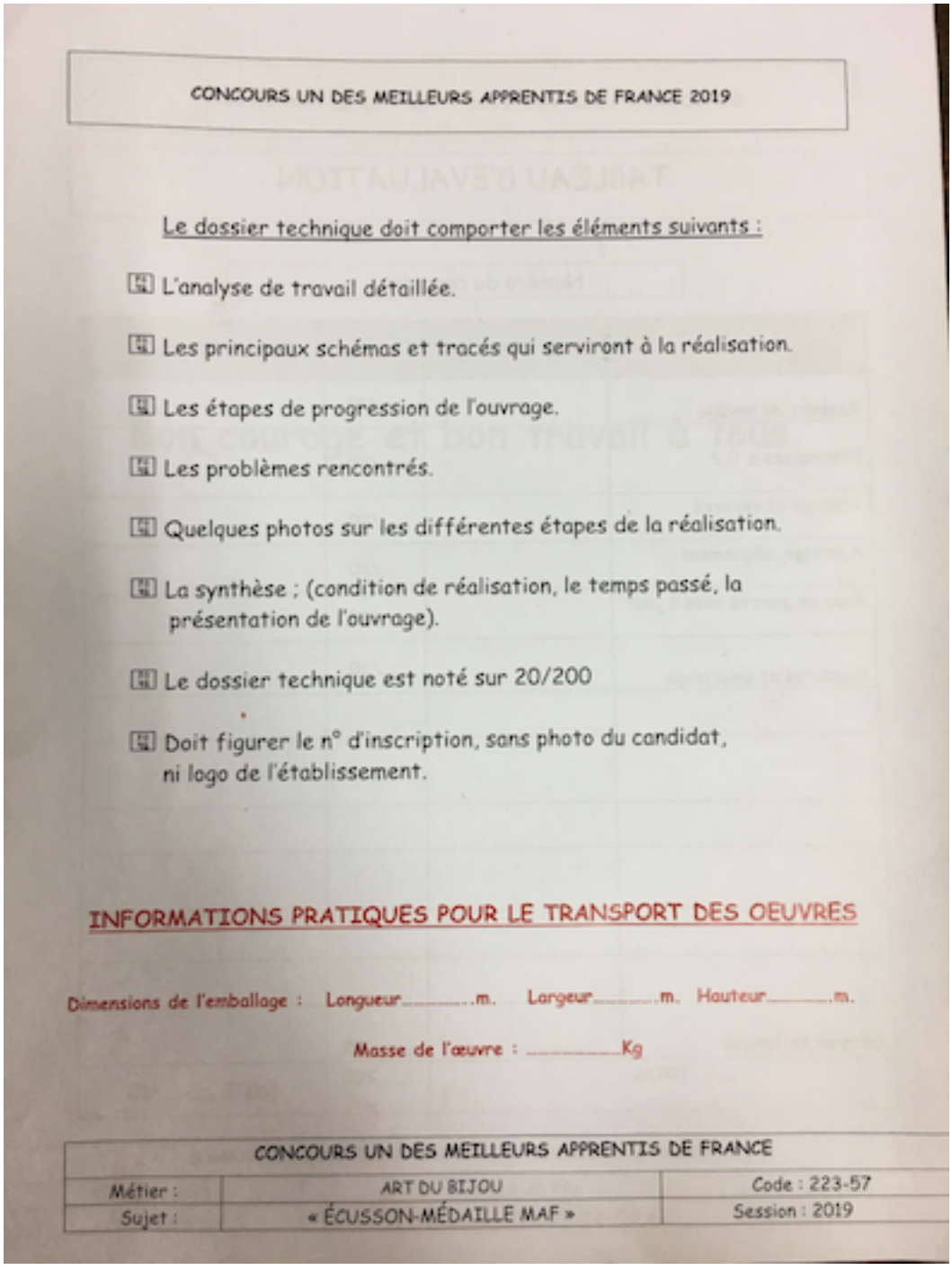
-Souder 1D, 1G, 2, 3, calibrer.

-Rep. 4 : répartir les créneaux pour pouvoir souder 9, puis souder.

-Rep 5 : bouclier. Découper, emboutir h= 4,5
Repercer, fixer par 4 ponts 11.

-Rep. 6 : tube Ø7, ép. 1, h 4.
-Rep. 7 : tube Ø6, ép. 1, h 4.
-Rep 8 : anneau de liaison.
-Rep 9 : liaison avec 1D, 1G, ∅2.
- Rep. 10 : anneau pour chaîne.

Figure 56: Meilleur apprentis de France 2018 competition page 6.



CONCOURS UN DES MEILLEURS APPRENTIS DE FRANCE 2019

Le dossier technique doit comporter les éléments suivants :

- L'analyse de travail détaillée.
- Les principaux schémas et tracés qui serviront à la réalisation.
- Les étapes de progression de l'ouvrage.
- Les problèmes rencontrés.
- Quelques photos sur les différentes étapes de la réalisation.
- La synthèse ; (condition de réalisation, le temps passé, la présentation de l'ouvrage).
- Le dossier technique est noté sur 20/200
- Doit figurer le n° d'inscription, sans photo du candidat, ni logo de l'établissement.

INFORMATIONS PRATIQUES POUR LE TRANSPORT DES OEUVRES

Dimensions de l'emballage : Longueur.....m. Largeur.....m. Hauteur.....m.

Masse de l'œuvre : .....Kg

CONCOURS UN DES MEILLEURS APPRENTIS DE FRANCE		
Métier :	ART DU BIJOU	Code : 223-57
Sujet :	« ÉCUSSON-MÉDAILLE MAF »	Session : 2019

Figure 57: Teacher distributing the metal for the Meilleur Apprentis de France competition, 2018.

The use of models in the examinations like the CAP and competitions such as the *Meilleur Apprentis de France* (Best Apprentice in France) means that the models provide a common channel and a focus point for the debate and expression of differences. This is similar to the beauty pageants researched by the Anthropologist Richard Wilk in Belize in which the human body of the competitor is the object of attention comparable to the jewellery models discussed here. The training and examination models 'narrow our gaze towards a particular kind of difference,' in this case technical aptitude, and they 'standardise a vocabulary for describing difference and provide a syntax for expression, to produce a common frame of organised distinction, in the process making wildly disparate groups of people intelligible to each other.'[223] Thus these models enable jewellers to discern and crucially to describe the distinctions within the field of French jewellery. Just as the training/examination models provide the basis for a collective sense of belonging, they also provide the language to express difference and variation within the group.

[223] Richard Wilk, "Learning to be Local in Belize: Global systems of common difference", *Worlds Apart: Modernity through the prism of the local*, ed. Danny Miller (London: Routledge, 1995), 130.

1.4 Understanding the model as a 'technique'

This social function of the training model, in creating harmony and difference within French jewellery society, can be best understood with reference to Marcel Mauss' work on 'technique,' which was mentioned in the introduction to this thesis. Mauss recognised techniques as inherently social: 'A practical art has two roots - the invention of the moment or the implement and the tradition of its use, indeed the use itself - and in both respects it is essentially a social thing.'[224] In his conception of the '*homme total*' as a 'physical, psychological and social nexus,'[225] Mauss went one step further than Bergson and his idea of the *homo faber*, to argue that 'all of social life depends upon techniques.'[226]

In explaining how techniques create and mediate social traditions, Mauss invoked the concept of 'tradition.' In his essay *Fragment of a Plan of General Descriptive Sociology* he distinguished between two kinds of tradition- the oral tradition and a form of symbolic repetition which is frequently mistaken for imitation:

> Any traditional practice, endowed with a form and transmitted through the form, can in some measure be regarded as symbolic. When one generation hands down to the next the technical knowledge of its manual and bodily actions, as much authority and social tradition is involved as when transmission occurs through language.[227]

The use of the training models in teaching students exemplifies the model's critical role in transmitting the tradition of fine jewellery across and between generations.

In fact, use of training models in education means that the French jewellery industry can precisely control how and to whom the tradition of jewellery is passed on to. This is best seen through the use of specially designed models that connect the jewellery houses with the students at the HEJ. Each year group at the HEJ is linked to one particular jewellery house. This system, known as *parrainage,* reaffirms the link between the jewellery houses of the Place Vendôme and the students. Throughout the course of their studies the year group is known by the name of their jewellery house (this is embroidered on their work coat) and the students are invited to attend special events, such as the private view of the latest fine jewellery collection. The photos in figures 58 to 60 show the last three year groups with the chief executives and creative directors of their jewellery houses: Chanel (2015-2019), Van Cleef & Arpels (2016-2020), Boucheron (2018-2021). These photographs

[224] Schlanger, *Techniques, Technology and Civilisation,* 51.
[225] Schlanger, *Techniques, Technology and Civilisation,* 20.
[226] Schlanger, *Techniques, Technology and Civilisation,* 51.
[227] Schlanger, *Techniques, Technology and Civilisation,* 76.

are hung in the classroom used by the students and are widely publicised on the school's and the jewellery houses' social media platforms. The way in which they are so proudly displayed reveals the importance of this link between the jewellery house and the school to both of their reputations.

Figure 58: Promotion Chanel (2015-2019).

Figure 59: Promotion Van Cleef & Arpels (2016-2020).

Figure 60: Promotion Boucheron (2018-2021).

The relationship is reaffirmed in the second year when the jewellery house issues a model that, like the exam pieces, must be replicated precisely by the students. The model is either inspired by a historic piece made by the jewellery house or by the current theme of this

year's collection. It is telling that it has been impossible to gain permission to replicate an image of one of these models in this thesis.[228] The reason for this is that unlike the CAP examination pieces, which are in the public domain, these models remain the intellectual property of the jewellery house. The secrecy with which these models are guarded, being distributed only to the students of a particular cohort in a particular year and locked away in Monsieur Baldocchi's office, enables the jewellery house to carefully control who has access to their tradition. As well as setting the model, the artisans of the jewellery house also evaluate the students' pieces. The exercise serves two purposes. It builds a creative connection between the students and the jewellery house and transmits the technical knowledge and style of the jewellery house to the next generation. Of course one training model is not enough to transmit the entire *oeuvre* of the jewellery house and the pupils are unlikely to all find employment in the atelier of that particular jewellery house. Rather, this exercise teaches the students how to take the history and ethos of a jewellery house and the drawing of a jewel from its creative team and transform it into a three dimensional model. This process will be discussed in chapter three. This is exactly the daily job of the professional model maker, as will be revealed in the next chapter. In this way, the training models set by the jewellery house are preparing the students to move into the professional relationship setting of the Parisian fine world.

1.5 Static knowledge: the foundation of a fine jewellery tradition

The discussions in this chapter describe a very rigid, immovable form of knowledge and method of knowledge transmission. I explained the rigid hierarchy of the classroom, where pupils work in silence to produce training models precisely, using prescribed techniques in a particular order. The learning experience at the HEJ is astonishingly unforgiving. The latest neurobiological research, for example, points to the importance of making mistakes. In his study of the hand, the Neurologist Frank Wilson recounts the experience of a circus performer who says that the hundreds of mistakes he made were crucial to honing his skill because the mistakes 'increase the repertoire of things that you do when something goes wrong.'[229] As a novice, I made many mistakes, but I quickly learnt that this philosophy of learning through mistakes was not one endorsed by my teachers. My mistakes were the subject of ridicule among my teachers and fellow students and I was forced to redo each step until it was perfect.

[228] Monsieur Baldocchi has shown me the file of the pages detailing the models that are issued to students. All of the sheets have 'confidential' marked across them. Since the images are the intellectual property of the jewellery houses, the director of the school does not have permission to pass them onto anyone but the students concerned.
[229] Wilson, *The Hand,* 110.

This rigid method of knowledge transmission contrasts with the experience of other ethnologists who have engaged in learning a craft at educational institutions like the HEJ. In 2005 the Anthropologist Trevor Marchand enrolled at the Building Crafts College in East London to gain a National Vocational Qualifications (NVQ) and a City and Guilds Diploma in carpentry.[230] He describes a noisy classroom and the frequent use of the 'shared utterance,' in which the speaker and listener fluidly swap roles. He concludes that knowledge is realized in communication and in interaction:

> The dynamic nature of interaction presents constant opportunity for new and possibly divergent ways of thinking and speaking about things. Thus dialogue is not an articulation of fixed things already known, but rather it is a kind of "knowing in progress." The state of "knowing" is one of constant flux, update, and transformation.[231]

The obvious contrast between my experience at the HEJ and Trevor Marchand's experience at the carpentry college in London raises the question: why is there such a seeming lack of free expression in Parisian fine jewellery education? Seeking an answer to this question, I approached Monsieur Baldocchi, the director of the HEJ. He explained that the purpose of the school was to provide a firm foundation of technical knowledge.[232] The knowledge passed on by the training models is, in his opinion, not open for debate and has stood the test of time, since the same techniques are present in all of the models, year after year. Once they have acquired this basis, students can go on to experiment and innovate in their careers. The idea that training should provide an unchanging timeless foundation for craftsmen is not unique to the Parisian jewellery community. In his work on Yemeni builders, Trevor Marchand observes that 'to become a master of the trade meant *mastering making*, and before being allowed to *make*, one had to discipline the hand, and thus the mind, that would do the making.'[233] This chapter has indeed shown how the strict precise making of models in wax and metal enables trainee jewellers to master making. By looking at the role of the body through imitative learning, as well as the cognitive processes that underpin this learning, I have revealed how the training model engages the hand and also the mind of the trainee jeweller. I have also demonstrated how this learning process via the training model takes place within and is dependent on the specific context of the HEJ school environment. The similarity in teaching philosophy between the HEJ and the Yemeni stone masons, with the emphasis in both being the discipline of the hand and mind, is a further

[230] Marchand, "Making Knowledge."
[231] Marchand, "Making Knowledge," 12.
[232] Monsieur Baldocchi, Meeting with the author, 6 December 2018.
[233] Marchand, *Minaret building and apprenticeship in Yemen,* 120.

sign of the strong similarities between the HEJ and the apprenticeship system of the pre-modern craft guilds introduced at the beginning of this chapter.

1.6 Conclusion

Through an auto-ethnographic study of the role of the training model in the transmission of Parisian fine jewellery knowledge in the classroom, this chapter has answered Marchand's call for broader research into knowledge transmission that attends to the importance of the environment, the body and the mind. Drawing on research from the fields of cognitive studies, psychology and neuroscience, as well as ethnographic studies of knowledge transmission, reflections on the experience as a student at the HEJ have revealed the importance of the body in imitative learning, as students make training models by mimicking their teachers' gestures. Furthermore, this chapter has shown how the structure of these training models, composed of numerous jewellery techniques that must be performed in sequence, enables students to develop a hierarchically organised structured memory of techniques that facilitates easy retrieval. In addition to the transmission of this technical knowledge via metal models, this chapter has shown how wax model making is pivotal to the acquisition of spatial knowledge. This spatial knowledge is critical to the material and dimensional translation that lies at the heart of the production model, which is explored in the next chapter.

The analysis in this chapter of how training models are used in the classroom has demonstrated that the learning process at the HEJ is more a training in mental and bodily discipline than in creativity. This supports Jean Lave and Etienne Wenger's argument, central also to Michael Herzfeld's study of Greek artisans, that apprenticeship is 'less concerned with the transmission of craft techniques than with modelling the social values and attitudes within which a craft is practised.'[234] Indeed the standardisation of teaching and examination via the use of the same training models throughout jewellery schools in France, means that training at the HEJ not only provides students with a solid set of jewellery skills, but crucially becomes an entry point into the close-knit community of Parisian jewellers. In the following chapter, I follow this lead into the world of professional jewellers and look at how models are used in the creation of fine jewellery pieces on the Place Vendôme.

[234] Michael Herzfeld, *The Body Impolitic: Artisans and artifice in the global hierarchy of value* (Chicago: University of Chicago Press, 2004), 51.

Chapter Two: The model in production - knowledge creation

This chapter has been rdacted for confidentiality reasons. The subject of this chapter is the creation of production models at a particular Parisian jewellery house. For information relating to this chapter please contact josephinedestael@me.com. Thank you for your understanding.

Chapter Three: The model in the archive – knowledge tradition

3.1 Introduction

The Anthropologist Keith Barber famously observed that humans introduce improvisation while simultaneously striving to 'make things stick.'[235] This quote will become pertinent in this chapter, as it looks at how the knowledge training and production networks identified in the previous chapters extend over time through the traditions narrated by the jewellery houses and by the artisans using the physical models kept in their archives. It begins by investigating the production models in the archive of the jewellery house Chaumet. These production models enter the archive when the model maker who made them leaves the employment of the jewellery house. Using the work of Alexander Nagel and Christopher Wood, the chapter explores how the complex temporality of the archived models enables the jewellery house to claim its roots in the Napoleonic era.[236] Inspired by Susan Terrio's work on French chocolatiers, the chapter looks at how the jewellery house uses the archive to narrate a historic Parisian tradition of fine jewellery that authenticates its current collections.[237] In spite of the prominent role of the archived model in marketing its contemporary collections, the archive is known as the jewellery house's most famous secret and the models within it can be understood using Annette Weiner's theory of inalienable possessions.[238] The chapter goes on to identify another even more covert archive of models belonging to an individual artisan. Drawing on Georges Didi-Huberman's theory of the image and the work of Walter Benjamin, it investigates how this personal archive is used to pass on fine jewellery knowledge, exposing the existence of a less self-conscious artisan-led tradition of Parisian fine jewellery that is independent of the jewellery houses of the Place Vendôme.[239] In this way, this chapter reveals the role of the model beyond the production process in creating diverse ways of narrating the tradition of Parisian fine jewellery that underpin the knowledge networks of training and production described in the first two chapters.

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[235] Keith Barber, "Improvisation and the Art of Making Things Stick," in *Creativity and Cultural Improvisation,* ed. Elizabeth Hallam and Tim Ingold (Oxford: Berg, 2007), 38.
[236] Alexander Nagel and Christopher S. Wood, *The Anachronic Renaissance* (New York: Zone Books, 2010).
[237] Susan Terrio, "Crafting Grand Cru Chocolates in Contemporary France," *American Anthropologist* 98.1 (1996).
[238] Annette Weiner, "Inalienable Wealth," *American Ethnologist* 12.2 (1985).
[239] Georges Didi-Huberman, *The Eye of History: When images take positions,* trans. Shane B. Lillis (London: MIT Press, 2018 [2009]).

What do we mean by archive? Jacques Derrida famously wrote that 'nothing is less clear today than the word archive.'[240] This chapter takes its definition from the Historian Caroline Steedman, who criticizes Derrida's metaphorical definition of archives, by arguing that the archive is a physical space where scholars engage with material objects.[241] The focus in this chapter is on the archives of models, which are kept by the jewellery houses, and the photographic archives of models, which belong to the artisans who made them. Derrida's work, *Archive Fever,* is however also influential in this chapter. Here Derrida proposed a psychoanalytic reading of the archive, premised on the conflict between the death drive and the conservation drive based on pleasure.[242] As summarised by Marlene Manoff, 'in this formulation, the archive affirms the past, present, and future; it preserves the records of the past and it embodies the promise of the present to the future.'[243] This chapter will explore the archive's ability to reach back and forth across time in order to understand how the models in the archives are used by the jewellery houses to construct a narrative of the past that authenticates contemporary works and to create new models for future collections. Furthermore, Derrida argued that the structure of the archive determines what can be archived and pointed to the importance of the technical methods of what he called 'archivization' in the shaping of history and memory.[244] Indeed this chapter begins from the premise that the model not only constitutes the archives, but is in fact the 'technical method' that is critical to the construction of history and memory in the traditions of the jewellery houses and the artisans.

The term 'tradition' deserves equal explanation. Since the time of Edmund Burke, Western social thought has been dominated by a naturalistic view of tradition, which likens it to a natural object, occupying space, enduring in time, and having a molecular structure.[245] This chapter follows the work of Richard Handler and Jocelyn Linnekin to argue that 'tradition is [in fact] a symbolic process.'[246] Using evidence from the archives of models, this chapter will demonstrate how on-going cultural representations refer to or take account of prior representations, thus creating continuity with the past. But crucially it will show that this continuity of reference is constructed in the present and also includes an element of discontinuity. Thus it presents tradition as 'a symbolic process that both presupposes past

[240] Jacques Derrida, *Archive Fever: A Freudian impression,* trans. Eric Prenowitz (Chicago: University of Chicago Press, 1995), 4.
[241] Carolyn Steedman, "Something she Called a Fever: Michelet, Derrida and Dust," *American Historical Review* 106,4 (2001), 1176.
[242] Marlene Manoff, "Theories of the Archive from Across Disciplines," in *Libraries and the Academy Volume 4* (Baltimore: Johns Hopkins University Press, 2004), 10.
[243] Manoff, "Theories of the Archive from Across Disciplines," 11.
[244] Derrida, *Archive Fever,* 17.
[245] Edmund Burke, *Reflections on the Revolution in France* (New York: Penguin Books, 1968).
[246] Richard Handler and Jocelyn Linnekin, "Tradition, Genuine or Spurious," *Journal of American Folklore* 97 (1984), 286.

symbolisms and creatively reinterprets them.'[247] Handler and Linnekin provide a case study of modern Hawaii to show how the fact that tradition is continually reinvented from the vantage point of the present means that multiple traditions can coexist. This chapter will investigate this hypothesis in the context of Parisian fine jewellery, beginning with a case study of the tradition told by the jewellery house Chaumet.

3.2 The model archive at Chaumet- Reconstructing the past

The first half of this chapter takes its evidence from the jewellery house Chaumet, which, like Van Cleef & Arpels, is one of the better known jewellery houses on the Place Vendôme. Chaumet was founded by Etienne Nitot and his son François Regnault Nitot in 1780.[248] They supplied the court jeweller Aubert prior to the Revolution and rose to fame as the preferred jewellers of Napoleon Bonaparte and his consort Joséphine de Beauharnais. In 1815 Jean-Baptiste Fossin succeeded François Regnault and won an international reputation for his jewels together with his son Jules. In 1862, Fossin was succeeded by Prosper Morel, who produced jewellery for Napoleon III and the Empress Eugenie. In 1885 Joseph Chaumet married Morel's daughter and took control of the house, overseeing the move to the residence at 12 Place Vendôme in 1907. Marcel Chaumet succeeded his father in 1928. The business remained in family hands until 1987 when financial mismanagement led to bankruptcy and criminal proceedings. The firm was bought by Investcorp and then acquired by the luxury group LVMH in October 1999.[249] It is clear from this concise history of the firm that it has survived through the greatest political changes from the French Revolution to late twentieth century globalisation. These political changes have been reflected in changing fashions. This chapter aims to explore how the jewellery house tells its own story through these turbulent times by analysing one type of jewel, namely the tiara.

Tiaras are what Chaumet is best known for on the Place Vendôme. In fact, the firm has made a concerted effort to identify itself with the tiara, by employing the Jewellery Historian Diana Scarisbrick to write a book on the subject, which tells the story of the house through the tiaras and is lavishly illustrated with photographs of famous icons of the nineteenth and twentieth centuries wearing their Chaumet tiaras.[250] Scarisbrick has written numerous books on French and English jewellery history, but she appears to have been chosen to write all of the books on Chaumet because of her friendship with Beatrice de Plinval, the head of the archive at the firm. In my first meeting with de Plinval she mentioned Scarisbrick as

[247] Handler and Linnekin, "Tradition, Genuine or Spurious," 288.
[248] Diana Scarisbrick, *Chaumet Joaillier Depuis 1780* (Paris: Alain de Gourcuff, 1995).
[249] Scarisbrick, *Chaumet Joaillier Depuis 1780*.
[250] Diana Scarisbrick, *Timeless Tiaras: Chaumet from 1804 to the Present* (New York: Assouline: 2002).

someone who could be 'trusted,' trusted perhaps to tell the story of the jewellery house as it is meant to be told.[251] Indeed the book is used like a piece of marketing material by the firm, as copies lie open in the visitors' reception at the headquarters on the Place Vendôme and can be found in the luxury sections of high end Parisian bookstores. The book is evidence of how the jewellery house has taken control of the narrative of its past in order to construct its identity in the present.

Diana Scarisbrick's work is based on encounters with the archive at Chaumet. All of the main jewellery houses now have a special department known as '*patrimoine*' or 'heritage,' charged with maintaining the archival collection. The most famous of these belong to the oldest jewellery houses, including Chaumet (1780), Cartier (1847) and Boucheron (1858), whose archives have in recent years become increasingly important marketing tools for these now global firms. Cartier's archives, for example, contain ledgers with a near complete record of sales since 1898, along with photographs, plaster casts and gouache paintings of the pieces made in the workshop since the early twentieth century.[252] At Boucheron, they have gone one step further to turn their entire headquarters into a form of living archive. In 2010, the luxury conglomerate Kering that owns Boucheron acquired the site at 26 Place Vendôme, which was the historic family home of the Boucheron family. The site was reopened in December 2018 following extensive renovations. The Boucheron chief executive Hélène Poulit-Duquesne has said of the renovations: 'In this family home visitors will discover a new jewellery experience, since they will be welcome as friends more than as clients.'[253] Unfortunately I was unable to gain access to either of these two archives,[254] but I was welcomed to Chaumet during the first months of this PhD research in the spring of 2013. This chapter uses evidence from the visits I made to the archive between 2013 and 2019.[255]

At Chaumet, all requests to access the archives involve a personal meeting with Beatrice de Plinval, the head of the *Patrimoine* department, who is also President of the Place Vendôme

[251] Before signing off on the permission forms for this thesis Chaumet asked to read this thesis. When I sent them the chapters, they asked that I redact the information about financial mismanagement at the end of the 1980s because it didn't 'sound nice.'
[252] "Archives," Cartier, accessed 1 July 2019, https://www.cartier.co.uk/en-gb/maison/living-heritage/archives-and-expertise/archives-and-expertise.html.
[253] "Boucheron celebrates its glorious past with a new boutique in a revived Paris landmark," News-Artnet, accessed 1 July 2019, https://news.artnet.com/art-world/maison-boucheron-hotel-1415848.
[254] As will be discussed in this chapter the archives of the jewellery houses are all kept extremely secret. The 'visitors' and 'friends' referred to by the CEO of Boucheron are in fact limited to High Net Worth individuals. Moreover, during the time that this research was conducted, both archives were locked away in storage whilst building work was being undertaken at the headquarters.
[255] Visits to the archives conducted on 3 June 2013, 17 October 2013, 14 October 2014, 10 January 2019.

association of luxury firms with boutiques on the famous Place Vendôme. Her office is located in the imposing reception rooms of the Chaumet headquarters on the Place Vendôme. Lavishly decorated in the Napoleonic style, the 'office' has a view of the entire circular Place Vendôme. At each meeting, she appeared elegantly styled in perfectly tailored suits with colour coordinated Chaumet fine jewellery (such as an orange enamelled wrist watch that perfectly matches the coral of her earrings and necklace) and a large black onyx ring that was a family heirloom. Her address book is as impressive as her outfits. Over the course of our meetings she revealed a close connection to a wide range of members of European high society. She passed on the contact details for, amongst others: Evelyne de Possémé, the head of collections at the Musée des Arts Decoratifs; the Jewellery Historian Diana Scarisbrick; and one of the owners/restorers of Heligan gardens in Cornwall (she is a keen botanist and was interested by the fact that I am part Cornish). Each time the connection was passed on through a handwritten note with the person's telephone number and home address - not an email address in sight - with the advice to contact them 'when the time is right.' It is clear that Beatrice de Plinval connects not just the archive with the jewellers and Chaumet employees but that her personal connections extend the archive and its history to the wider Parisian jewellery network and beyond. Chapter two revealed how the production model makes manifest the relations inherent in the production of Parisian fine jewellery. The models in the archive continue this role and become a connecting force beyond the production process. The delicacy with which Beatrice de Plinval passes on her contacts reveals the subtlety of the social relations that lie at the heart of the Place Vendôme and how they are curated and cared for as fastidiously as the archives.

At Chaumet, the archive includes seven hundred silver-nickel compound tiaras dating back to Joseph Chaumet who took control of the house in 1885. The models were an invention of Chaumet and date to the Belle Époque period of 1900 to 1915.[256] The model tiaras are hand painted with gouache paint to mimic the gemstones in the final jewels. They also contain the mechanisms of the final jewel, such as hinges and clasps. Examples of the model tiaras can be seen in figures 93 to 97.

[256] The collection was established in 1907 when the jewellery house moved to its current premises at 12 Place Vendôme.

Figure 93: Model tiara, Chaumet.

Figure 94: Model tiara, Chaumet.

Figure 95: Model tiara, Chaumet.

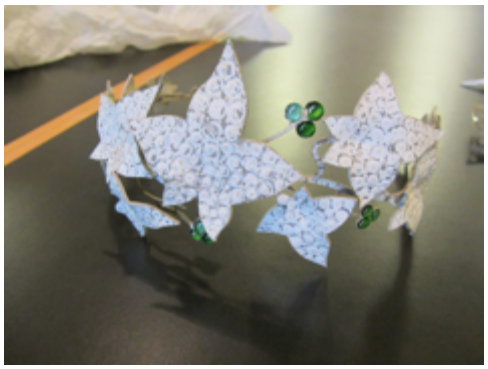
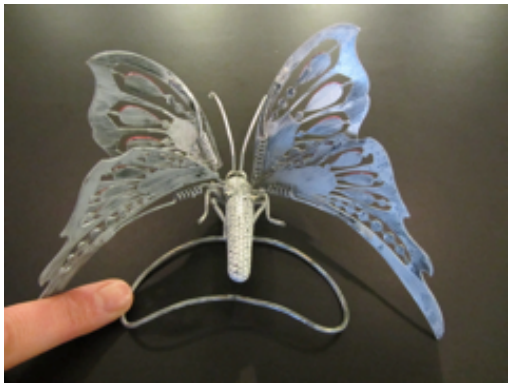


Figure 96: Model tiara, Chaumet.

Figure 97: Model tiara, Chaumet.



At Chaumet, these archived models are displayed on the walls of the first floor reception rooms of the headquarters on the Place Vendôme. The rooms are empty except for the hundreds of tiaras that hang on barely visible pin hooks on the otherwise empty walls. The absence of glass means that unlike in a museum collection of jewels, the models can be taken down and handled by the visitor. In my hands the models feel as fragile and delicate as a real platinum diamond set tiara and I imagine how it would sit on my head. This does not feel like a 'museum' experience. None of the tiaras are numbered and the information I gather about them comes from Beatrice de Plinval, who acts as the gatekeeper to the collection. She began working for the firm as a young girl thanks to a family connection and has no historical training. It is clear to me that her main priority is to show me the most visually appealing models in order that I might tell a similar narrative to that of Diana Scarisbrick, showing the jewellery house's history in the best possible light. In the following sections I explore how and why the archived models are used to construct such a narrative around the firm's history.

3.3 The anachronic tiara models

Part of my CAP course involved one afternoon a week of jewellery history. During this class we were taught the history of French jewellery and expected to write short essays about pieces we were presented with, identifying the age, gemstones, techniques, and symbols. The models pictured in figures 93 to 97 can be analysed as though they were examination pieces. This gives an indication as to how they would be interpreted by French jewellers.

The tiaras in figures 93 and 94 depict a classical motif. This is most commonly associated with the Napoleonic era, when Chaumet was led by Marie-Etienne Nitot and his son, François Regnault Nitot. Their designs followed the style devised for the Empire by the architects Charles Percier and Pierre Fontaine and centred on strictly classical motifs: the lyre, Greek key, leaves of olive or laurel, acanthus and vine scrolls, palmettes and honeysuckle.

The tiara in figure 95 features a vine motif. This tiara is typical of the era following the restoration of the Bourbon monarchy, when the gemstones and pearls were reset in new jewels, designed especially for the court ceremonies of Louis XVIII and Charles X, who reigned from 1815 to 1830, followed by Louis Philippe and Queen Marie-Amélie until 1848. [257] In 1815 Jean-Baptiste Fossin succeeded François Regnault and won an international reputation for his jewels together with his son Jules. The Fossins continued to produce tiaras, reviving themes from the Ancien Regime of garlands, flowers, bouquets and bowknots and leaves of ivy, volubilis, olive and chestnut, flowers of eglantine, hawthorn, jasmine, geranium and cactus, as well as fruits such as grapes, cherries and red currants.

The tiara in figures 96 and 97 is known as an aigrette and is generally associated with the demise of the Empire at the end of the nineteenth century. An aigrette is the name for a hair piece which typically had feathers in front of the chignon.

Each of these styles is representative of a particular period from the nineteenth century, but the tiaras themselves all date to around 1900.[258] When the HEJ trained eye sees the various styles, it does not recognise jewels from the turn of the century but rather sees a timeline of stylistic evolution dating back to Joséphine de Beauharnais and Napoléon Bonaparte. Thus the model tiaras set up a series of creative origins that tie the jewellery house firmly to the political history of France since the revolution. This illusion is reinforced by the language

[257] Scarisbrick, *Timeless Tiaras*, 208.
[258] The archive itself dates to 1907, which is when the workshops and boutique were set up at 12 Place Vendôme.

used to describe the rooms. In the reception of the Chaumet headquarters there is a small publication describing the jewellery house. It mentions the model tiara collection, referring to them as '*maquettes des plus extraordinaires diadems crées depuis 1780*' ('models of the most extraordinary tiaras created since 1780'). The reference to 1780 as opposed to the early twentieth century tricks the reader into thinking the models also date to the Napoleonic era.

This same historical mirage is created by the interior design of the tiara rooms, the name given to the room in which the archive is displayed. The tiara rooms were constructed and decorated in 1907 when the jewellery house first moved to 12 Place Vendôme.[259] As a result, the architecture and tiaras date to the same period. Furthermore, on the Chaumet website, they claim that the jewellery is even inspired by the 'classical architecture.' The key point is that the rooms are not decorated in the style of the early twentieth century, but rather diagram the neoclassical décor of Napoleon's architects Charles Percier and Pierre Fontaine. This can be seen in figure 98. The Chaumet website and publicity material even includes a section on the architecture and decoration of Joséphine's country retreat, Malmaison, as seen in figure 99.

Figure 98: Interior of the tiara rooms at Chaumet as shown on Chaumet website.

REDACTED

Figure 99: Interior of Malmaison as shown on Chaumet website.

REDACTED

The architecture of the tiara rooms and the interior décor is important as it sets the conditions for viewing the tiaras. By hanging the tiaras on the walls of the neoclassical rooms at the Place Vendôme, and thereby drawing them into the architecture, Chaumet extends the virtual link between the rooms on the Place Vendôme and Joséphine de Beauharnais to the tiaras.

Through the stylistic references in the forms of the tiaras and the rooms in which they are displayed, the tiaras thus gain a new mythical origin in the Napoleonic era; they are 'anachronic.' The word 'anchronic' has been used by Christopher Wood and Alexander Nagel in their work *The Anachronic Renaissance* as an alternative to 'anachronistic, a judgemental term that carries with it the historicist assumption that every event and every

[259] Beatrice de Plinval, Meeting with the author, 3 June 2013.

object has its proper location within objective and linear time.'[260] The model tiaras are anachronic because they not only repeat, hesitate, remember the Napoleonic era, but crucially were made by Joseph Chaumet in the Belle Époque.

The link between the tiaras and the Napoleonic era is reinforced by the life-size portrait of Josephine de Beauharnais that hangs at the entrance to the tiara collection, seen in figure 100. In this portrait, the Empress wears a tiara made by Marie Etienne Nitot, who founded the jewellery house that would become Chaumet in 1780. Together with his son François Regnault, Nitot became famous for creating the jewellery for Joséphine de Beauharnais and Marie-Louise, Napoleon's second wife. The life-size painting is a copy of an original painted by Robert Lefevre in 1805. Placed in the entrance to the tiara room, it carries an enormous validating power. Visitors to the model tiara collection look past the locality of the Place Vendôme outside, which was only built in the late nineteenth century, and instead concentrate on the referential target of Joséphine. Moreover, the jewellery created by Nitot for the Empress, which was the prototype for the tiaras made by Chaumet in the Belle Époque, is 'retro activated' by the painting. In the presence of Joséphine wearing a tiara that resembles the tiara models that hang on the walls, the link between the jewellery house Chaumet and the Napoleonic era gains compelling concreteness. The painting next to the tiaras sets up a proposition: the idea that the model tiaras on the walls are historically rooted in the original tiara made for Joséphine. There is no need to ask whether anyone actual believes in this physical chain. The painting and the tiaras stand in for the idea of this chain; they create a fiction, not an illusion. Through the use of the tiaras in the archive the jewellery house transforms this fiction into reality. It is to this continued use of the tiaras that I now turn.

Figure 100: Joséphine de Beauharnais painted by Robert Lefevre.

REDACTED

Having established the anachronic nature of the model tiaras and how this enables the jewellery house to construct a particular narrative trail of its history right back to Napoleon Bonaparte, it is useful to explore how the models perform this role in practice. The following section looks at how the models function not just as mythical points of origin linking the house to the past, but it will use Nagel and Wood's theory to explain how the models are used by current artisans as points of origin for future collections, thereby ensuring that the

[260] Nagel and Wood, *The Anachronic Renaissance,* 13.

stylistic chain linking all the way back to Napoleon is preserved in the twenty-first century creations.

3.4 The use of models to create new collections- Constructing the future

According to Beatrice de Plinval, the primary role of the model tiaras and other pieces in the archive is to inspire new work.[261] Georg Simmel points out in his work on Rembrandt that 'humans, precisely because they do not merely repeat but create something new, cannot start anew each time. Rather, they need a given material, a given antecedence on which, or on the basis of which, they accomplish their achievements as a reshaping of the material.'[262] It is precisely through their capacity to generate iterations of a design, either directly or indirectly, that archived models are key to the creative process within the jewellery houses and Parisian jewellery as a whole.

Beatrice de Plinval explains how artisans are actively encouraged to leave the atelier and handle the archived models in the tiara room. The archived models in the room are meant to serve as inspiration for future designs. In 2013, I met with artisans from the workshop at Chaumet who confirmed that they did in fact frequently visit the tiara rooms (more than once a month) and revealed a detailed knowledge of many of the models.[263] For example, Pascal Boudariat (the twelfth head of the workshop at Chaumet) told me that his favourite piece was the butterfly aigrette seen in figure 94. All of his team are acquainted not just with the model tiaras, but also understand the historical context of the forms of the models as described in the previous section. Indeed Randal Johnson points out the important role of the *French* education system 'which tends to cultivate a certain familiarity with legitimate culture and [inculcates] a certain attitude towards works of art.'[264] This was seen in evidence in chapter one, which explained how the jewellery houses set models inspired by their own collections for the students of the HEJ to make. Here I pointed out that the jewellery education system in France includes a whole module on French jewellery history - one afternoon each week of my studies at the HEJ was devoted to this subject. The archive collection in the jewellery houses enables the artisans to increase their knowledge of the jewellery produced by the jewellery house in which they work and increases familiarity with the forms. Furnished with the code necessary to understand the jewellery archive, the artisans are able to decode the archived models as they are meant to be decoded and make

[261] Beatrice de Plinval, Meeting with the author, 17 October 2013.
[262] Georg Simmel, *Rembrandt,* trans. Alan Scott and Helmut Staubman (New York: Routledge, 2005), 155.
[263] Meeting with Pascal Boudariat and two artisans from the Chaumet workshop, 17 October 2013.
[264] Randal Johnson, "Introduction," *The Field of Cultural Production,* essays by Pierre Bourdieu, ed. Randal Johnson (London: Polity Press, 2007), 23.

use of the archive as a source of inspiration for new production models. Thus we conclude that the French jewellery education system introduced in chapter one lays the foundation for a particular French mode of engaging with history of design that enables artisans to decode the archived models in a particular way, and make use of the archive to produce new production models that will remain understandable within this particular cultural field.

This story of the 'living archive' also plays an important role in the marketing of Chaumet fine jewellery and most obviously in the *Joséphine* collection. Figures 101 to 105 show some of the key items from the *Joséphine* collection.[265]

Figure 101: Joséphine aube printanière ring, Chaumet 2019.

REDACTED

Figure 102: Joséphine éclat floral ring, Chaumet 2019.

REDACTED

Figure 103: Joséphine aigrette ring, Chaumet 2019.

REDACTED

Figure 104: Joséphine aigrette earring, Chaumet 2019.

REDACTED

Figure 105: Joséphine aigrette impériale pendant, Chaumet 2019.

REDACTED

All of the pieces in the collection have the name of different types of tiaras associated with Joséphine de Beauharnais, namely the *aube printannière, éclat floral* and the *aigrette*. The form of each piece references the form of the tiara, which it is named after.[266] The influence of the tiaras is also continually referenced in the marketing campaigns surrounding the collection as seen in figure 106.

[265] "Joséphine Collection," Chaumet Website, accessed 1 January 2019, https://www.chaumet.com/jewellery/josephine-collection
[266] Franco Cerulli, Meeting with the author, 26 March 2018.

Figure 106: Marketing message for the Joséphine collection of rings.

REDACTED

In figure 106, taken from the website, the house boasts of 'two hundred and thirty years of expert tradition' (the use of production models inspired by the models in the archive whose mythical point of origin are the tiaras made by Nitot for Joséphine) and 'contemporary creativity.' The words 'contemporary creativity' capture the fact that there are notable differences between the original tiaras and the current Joséphine collection.

First, the tiaras have been used to inspire rings, bracelets and necklaces, rather than tiaras, because according to Franco Cerulli, there is now a trend for expensive engagement or celebration rings with coloured gemstones. The jewellery house has taken inspiration from jewellery designed to adorn the head and applied the form to jewellery for the ears, wrist and neck. This suggests that the actual body of the wearer is not important to the jewellery creation process. It reinforces the idea that emerged in chapter two, which showed how the creative process is entirely divorced from the final jewel and consumer - the only link between the gouache painting and the final jewel is through the model and this is kept hidden from the consumer.

Second, the modern Joséphine collection is no longer a series of unique one of-a-kind-pieces like the historic Chaumet tiaras. The images in figures 101 to 105 have been taken from the Chaumet website and are available for purchase in unlimited numbers by anyone. The headquarters typically have one or more (depending on the popularity) of the most popular designs in stock, but particular combinations, such as a gold ring with a pink sapphire, have to be specially ordered. In order to produce larger quantities of the rings, the jewellery house uses rapid prototyping to digitally print resin models of the basic forms that are then cast into precious metals, as will be discussed in chapter 4. This can be seen in figure 107 which is a resin printed model of the *aube printinère* ring in figure 108 that I saw in production when I visited the workshop in October 2013.

Figure 107: Resin printed aube printinière ring.

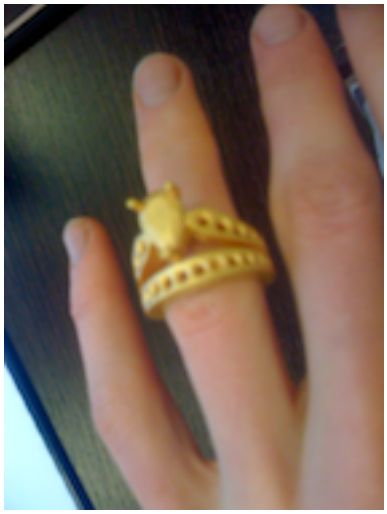


Figure 108: Joséphine aube printanière ring in white gold with pink sapphire, Chaumet 2019.

REDACTED

The production of new collections referencing the tiara models can be theorised using the theory of origins proposed by Nagel and Wood. The models in the archive inspire new production models not in a 'substitutional' (direct) sense, but rather in a 'citational' (indirect) transmission of form.[267] The creation of the new jewel, in this case the ring, using the latest rendering and printing technology, exemplifies the 'authorial' or performative nature of creativity. According to Nagel and Wood, 'substitution and performance are not phases succeeding one another, but rather are two competitive models of creation that are always in play.'[268] In the case of the models in the archive, the new production models referencing them, and the new jewels produced as a result, the citational nature of creativity is embedded within the authorial theory of creation. In this way, through its role in uniting two modes of creation - the citational to reference the archived model and the authorial to produce a final jewel from the new production model - the archived model enables the jewellery house to create a collection of rings, using new technology for the twenty-first century market, that claim their origin in the jewellery made for Joséphine.

3.5 The didactic role of the archived model

The visual illusion of a physical link to Joséphine de Beauharnais is particularly useful when the fine jewellery collection is presented to visiting VIPs. Since 2015 I have been invited to

[267] Nagel and Wood, *The Anachronic Renaissance*, 359.
[268] Nagel and Wood, *The Anachronic Renaissance*, 13.

the private viewings of the Chaumet fine jewellery collection at the beginning of every January.[269] The fine jewellery is displayed in rooms that are elaborately decorated according to the theme of the collection. Most memorably, in January 2018, the *Promenades Impériales* collection was exhibited in a Siberian forest setting, complete with real birch trees and fake snow. One room was entirely clad in the finest white leather with pull out draws (operated via magnetic touch by the staff) to give the illusion of being inside a Russian aristocrat's jewellery box. To enter the viewing, all visitors had to pass through the tiara rooms. Thus, even for modern day collections inspired by far flung places like Imperial Russia, the link to Joséphine is ever present through the tiaras. By including the tiara rooms in the experience of the new jewellery collections, Chaumet situates all of its creations firmly in the context of Parisian jewellery history. The head of production Franco Cerulli explained to me that he also leads people through the tiara rooms prior to business meetings with company investors at which he reveals the plans for the latest collection, in order to 'teach' them how to view the current collection.

The role played by the tiara rooms in 'setting the scene' for contemporary collections can be understood using the work of the sociologist Pierre Bourdieu. In his paper 'Outline of a Sociological Theory of Art Perception,' Bourdieu points out that comprehension of an artwork involves a decoding operation and that the ability to decode the works of art as they are meant to be decoded is a form of knowledge that permits a viewer to situate the work of art in relation to the universe of artistic possibilities of which it is part:

> The perception of a work of art in a truly aesthetic manner, that is, as a signifier which signifies nothing other than itself, does not consist of considering it "without connecting it with anything other than itself either emotionally or intellectually "…, but rather of noting its *distinctive style* by relating it to the ensemble of works forming the class to which it belongs, and to these works only.[270]

Thus by introducing visitors to the tiara collection before the contemporary collection, the jewellery house ensures that visitors view the contemporary collection in the 'right' way, namely as fine jewellery rooted in Parisian tradition.

The above analysis suggests a correlation between how people view the Chaumet jewellery collection and how artwork in general is viewed. In order to consider this in more detail, it is useful to turn to theories of semiotics and works of art theorists, like Gregg Bordowitz's recent work on Glenn Ligon's artwork *Untitled (I am a man).* Bordowitz uses the work of the

[269] Note that Chaumet is unusual in this regard as the other jewellery houses launch their collections during the week of the day of Saint Eligius on 10 December.
[270] Pierre Bourdieu, "Outline of a Sociological Theory of Art Perception," in *The Field of Cultural Production,* ed. Randal Johnson (London: Polity Press, 2007), 23.

late nineteenth century American philosopher Charles Sanders Peirce and the late French psychoanalyst André Green to construct a theory for understanding how works of art stand in relation to each other and how they are distinguished for viewers. He quotes Peirce's theory of Firstness, Secondness and Thirdness from a letter he wrote in 1904:

> Firstness is the mode of being of that which is such as it is, positively and without reference to anything else.
>
> Secondness is the mode of being of that which is such as it is, with respect to a second but regardless of any third.
>
> Thirdness is the mode of being of that which is such as it is, in bringing a second and a third into relation to each other.[271]

According to Bordowitz, thirdness is 'the field of generalisation and continuity' in which a viewer dwells when standing in front of the painting.[272] He goes on to describe it as 'the admixture of uncertainty, sensation, external force, preconception, fantasy and observation- and ultimately a matter of belief.'[273] Thirdness could be seen to describe the encounter between the viewer and the new jewellery collection, mediated by the archived model. When the VIPs see the new collection after having seen the model tiaras, they 'see' not just the influence of the model tiaras in the current work, but crucially the mythical substitution chain that the archived model collection sets off back to the time of Joséphine. Indeed Bordowitz explains that:

> The operation of Thirdness is a potential chain of substitutions initiated by the artwork. Each canvas of the series produces a rift in space and time, a place that is nowhere and everywhere for viewers to occupy. The area in front of a work is not a location as much as an operative claim on the person of the viewer - the viewers capacity for imaginary association.[274]

By guiding visitors through the archived models before introducing them to the new collection, Franco Cerulli and his team control their experience of thirdness and make sure that their 'imaginary association' is precisely the desired association with Joséphine and Napoléon.

3.6 The inalienable archived model

However, this experience of Thirdness is not available to everyone. The visitors to the launch of the Chaumet fine jewellery collections are specially invited guests. There is a press day and two events for select members of the Parisian fine jewellery world, including the

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[271] Gregg Bordowitz, *Untitled (I Am a Man)* (London: Afterall Books, 2018), 17.
[272] Bordowitz, *Untitled (I Am a Man),* 20.
[273] Bordowitz, *Untitled (I Am a Man),* 24.
[274] Bordowitz, *Untitled (I Am a Man),* 25.

heads of production and CEOs of the other jewellery houses on the Place Vendôme. At other times throughout the year the model tiaras are only shown to visitors following a meeting with Beatrice de Plinval. From our conversations, I surmise that access to the rooms requires an important connection to the Parisian fine jewellery scene and an understanding of the history of Chaumet. I know this because prior to being shown the rooms, I was quizzed most thoroughly on my knowledge of the jewellery house, bringing back memories of public school entrance exams.

The tiara rooms could be described as the jewellery house's most famous secret. Its existence is public knowledge, but there is very little in the public domain either about its collection or use. The Chaumet website now mentions the collection: 'Chaumet conserves around 700 nickel silver tiara models in its museum, all of which bear witness to the history of the jewellery house's creative expertise.'[275] However, the website does not show actual photographs of these archived models, instead using an artists impression to show the museum walls, as seen in figure 109. The painted image captures the essence of the model tiaras: the visible construction lines mirror the models' 'work in progress' status; the light brush strokes reflects their distinctly handmade, experimental feel; the shadows so boldly cast beneath them reinforce that they are three dimensional; the black and white emphasises their age.

Figure 109: Artist's impression of the tiara rooms on the Chaumet website.

REDACTED

The Jewellery Historian Diana Scarisbrick's book about the tradition of tiaras at Chaumet, discussed at the beginning of this chapter, mentions the model tiaras, but wrongly calls them 'replicas,' which they emphatically are not. And most tellingly, the book contains photographs of the actual tiaras, famous women wearing the tiaras and even the gouache paintings, but there is not a single photograph or further mention of the silver nickel model tiaras.

The way in which the archived models are closely guarded within the private tiara rooms can be understood using Annette Weiner's theory of inalienable objects. These are things that are 'taken out of circulation on a permanent basis [that] take on heightened qualities of sacredness.'[276] Inalienable possessions 'mark out who a person is in relation to the past' and

[275] "Craftsmanship," Chaumet, accessed 1 July 2018, https://www.chaumet.com/our-maison/craftsmanship/the-art-of-creating-a-tiara.
[276] Annette Weiner, "Inalienable Wealth," *American Ethnologist* 12.2 (1985), 211.

indeed this chapter has shown that the models establish a link between the contemporary jewellery collections and the past which is both real (through their historic character) and imagined (through the fictitious link to the Napoleonic era). According to Annette Weiner, the owner 'becomes more than she or he is because the self is enlarged and enhanced by the power of the past'[277] which suggests that the inalienable models increase the allure of the fine jewellery house by linking it to the glorified era of Joséphine and Napoléon. Weiner argues that these objects are 'politically salient, because keeping a highly prized object against all the demands for exchange enshrines and even entrenches the owner's difference.'[278] Crucially, Weiner points out that 'even if the possession is not displayed by the owner, the fact of its presence confirms the establishment of hierarchical difference in social and political identities.'[279] This suggests that by keeping the models secret and showing them only to artisans and select members of the fine jewellery community and VIPs, the jewellery house positions itself at the top of Parisian high society.

3.7 Establishing authenticity

It is worth reiterating the archived models' unique ability to create a narrative linking the modern day collection back to Joséphine de Beauharnais, thus providing a physical link between the modern day and the (imagined) past. The tiaras worn by Joséphine have either been destroyed (it was common practice for the gemstones to be removed and recycled in more 'modern' jewels) or are held in private or museum collections. The jewellery house itself does not own any of Joséphine's actual original tiaras.[280] The archived models, which set up a mythical link back to the Napoleonic era, effectively substitute for the original tiaras. In her work *Wild Things*, the Design Historian Judy Attfield uses furniture as a case study to explore concepts of tradition, modernism and design, concluding that original antiques are more valuable than reproductions because they objectify the notion of authenticity.[281] Indeed unlike replicas, which are modern day reproductions, the tiara models have the patina of time, which means that the viewer is fooled by their anachronic nature into thinking that they are viewing an actual physical object from the time of Joséphine.

Establishing this link between contemporary production and the Napoleonic era is an important tool in authenticating the current collection. The introduction to this thesis introduced the idea that faced with the globalisation of the fine jewellery market, the

[277] Weiner, "Inalienable Wealth," 212.
[278] Annette Weiner, "Cultural Difference and the Density of Objects," *American Ethnologist* 21.2 (1994), 395.
[279] Weiner, "Cultural Difference and the Density of Objects," 395.
[280] Beatrice de Plinval, Meeting with the author, 10 January 2019.
[281] Judy Attfield, *Wild Things: The material culture of everyday life* (Oxford: Berg, 2000).

jewellery houses on the Place Vendôme had to find new ways of claiming originality and cultural authenticity. This is particularly important for collections like the Joséphine jewellery described above which departs from the tradition of unique bespoke pieces described in chapter two, and uses new digital technology to produce larger quantities of set designs.

Having established the archived models' role in creating an authentic and mythical link to the past, the question we must ask is: Why Joséphine? At the beginning of this chapter I explained how Nitot, the first jeweller at Chaumet, was famous for making the jewellery for Joséphine and Napoléon. The link therefore is very real. However, the reason why the jewellery house goes to such lengths to emphasise the connection, using the archived models to reconstruct a tangible link with this past, is much more complex.

A recently published biography by the Art Historian and *Conservateur Général Honoraire du Patrimoine* (the most important position in French national heritage) Bernard Chevallier reveals how Joséphine continues to be the object of fascination among the French.[282] However, it is important to remember that Joséphine was a much more complicated character than the title of *Joséphine Impératrice* suggests and that she in fact originated from humble origins in Martinique. I would argue that these 'exotic' origins are critical in explaining the importance of Joséphine to the narrative constructed by Chaumet. The way in which Chaumet markets its jewellery by emphasising the association with Joséphine de Beauharnais is strikingly similar to the methods used by the French chocolate industry, which has been researched by the Anthropologist Susan Terrio. In her seminal paper on artisan chocolatiers, Terrio shows how French chocolatiers use the past and play on an enduring fascination with the exoticism of the inhabitants, customs, and cuisines of the New World in order to market their chocolates.[283] It is interesting that Terrio argues that by highlighting the exotic roots of chocolate, the chocolatiers construct a specifically French history of chocolate and celebrate its transformation from a primitive foreign foodstuff to a refined French one. Similarly, Joséphine de Beauharnais represents the same transformation from the exotic into the refined French, as seen through the first sentence of Chevallier's biography: *'Rien ne prédestinait cette petite Créole de la Martinique à occupier le plus beau trône de l'univers'* ('Nothing could have predestined this little Creole from Martinique to occupy the most beautiful throne in the universe').[284] This transformation was of course marked, amongst other things, by the fact that Joséphine began to receive and wear expensive jewels made by Nitot and paid for by Napoléon. Thus by linking the

[282] Bernard Chevallier, *Joséphine Impératrice* (Paris: Editions du Chêne, 2014).
[283] Terrio, "Crafting Grand Cru Chocolates in Contemporary France."
[284] Chevallier, *Joséphine,* 11.

contemporary creations to Joséphine de Beauharnais, Chaumet uses the same strategy as the chocolatiers. It not only plays into the French fascination with the exotic, but it lays claim to the creation of a peculiarly French style of elegance as it claims to have transformed the wild exotic Creole into the embodiment of French power and style.

Terrio also looks at how, 'through their window displays and boutique interiors, French chocolatiers actively capitalise on the enduring association between contemporary artisanal production and the idealised, aestheticized image of a "traditional" pre-modern France.'[285] For example she looks at how the master chocolatier Chaudun links his work to the past of guild traditions as his elaborate work recalls the masterpieces that were a rite of passage in French craft guilds. She points out that this is at odds with the reality of his production methods as, like all contemporary artisanal producers, Chaudun buys industrially manufactured chocolate, rather than producing his own from cacao beans as the guildsmen would have done. The tiara models play a similar role at Chaumet. I have already described in this chapter how the tiaras, made of inexpensive metal and hand painted to show gemstones, have a definite 'hand made' quality. They might share the fragility of the final jewels, but unlike the final tiaras, they bear the traces of the hand that made them through small imperfections. The tiara models enable Chaumet to capitalise on this handmade tradition of jewellery production on the Place Vendôme even if, as was shown in the previous section, this is increasingly divorced from the reality of most of its contemporary collection, which is produced using digital technology. Few VIP consumers and even press people know this and the tiara models give the impression that the handmade production methods persist throughout the collection to this day.[286]

Finally, through their fictitious link to Napoléon and Joséphine the archived models represent an overt attempt to claim a uniquely Parisian tradition of fine jewellery. Here again, there are similarities with the French chocolatiers. Susan Terrio demonstrates how the chocolatiers 'use France's colonial history to construct a French history of chocolate in

[285] Terrio, "Crafting Grand Cru Chocolates in France," 4.
[286] This is a common strategy throughout the luxury industry. When I worked at the head office at Hermès, I would train shop staff to tell anyone who asked how something was made and how long it took, the information for one of the most expensive handmade items like the Birkin, rather than mention that the piece they might be referring to was industrially made. Like the model tiaras, the existence of a few handmade pieces largely kept out of circulation (the Birkin bags) gives the impression that the brand invests heavily in hand production. I was surprised at how customers were prepared to accept this myth without further questioning. It seems that when buying a luxury good, people buy a brand and the point about the association with the handmade that is created via the Birkin and indeed the tiara models is that it extends to the entire brand. In most cases, I also realized that when someone asks how something is made (or in this case a VIP visits the tiara model rooms) they have already made the decision to purchase and just want to be made to feel as good as possible about the purchase, which is of course in the brand's interest as it likely leads to repeat custom.

which they root their current production.'[287] In a similar way, the construction of a historical narrative back to Joséphine de Beauharnais ties the evolution of Chaumet fine jewellery to the course of French history. Through their link to this past via the archived models, the contemporary jewels claim their place as part of the nation's historic patrimony and emerge as 'genuine, living, cultural forms.'[288]

The use of models in the archive to narrate a story of contemporary jewellery rooted in the Napoleonic era demonstrates that the jewellery houses' versions of Parisian fine jewellery tradition are selective and consciously shaped in order to market their contemporary jewellery collections. The question we now ask is whether there is a more genuine, unselfconscious tradition to be found in Parisian fine jewellery?

3.8 The artisan's archive

The first part of this chapter has described one tradition of Parisian fine jewellery that emerges from the production model. It is one that is central to the marketing of Chaumet and the other jewellery houses on the Place Vendôme. As the models in the archive actually belong to the jewellery house (rather than the artisan), the tradition outlined above can be said to belong to the jewellery houses in concrete as well as abstract terms.

The previous section showed how artisans, who use the Chaumet archive to create new jewellery collections, are critical in the jewellery houses' narrative of a tradition of handcrafted jewellery rooted in Parisian history and it is to the artisans that we now turn in the search of a less self conscious, artisan-led tradition. Although the artisans do not own the physical models they produce, they are not left empty handed. In fact, the production models are also kept as photographs by the artisans who made them. At X jewellery house, the chief model maker told me that she does not own the production models she makes but has photographs of them stored digitally. When my gouache teacher at the HEJ first told me about his wife and her work he phoned her and she sent him an image of one of her models, which he showed to me in the strictest confidence away from the rest of the class. My own wax teacher, Monsieur Bertelot, also keeps a small album of his work, which ostensibly resembles a family photo album from the pre-digital age. From my experience with model makers on the Place Vendôme, I always suspected that this album existed, but it was only two years into my studies with him that he showed it to me and, most touchingly, allowed me to replicate one of the models, a lily of the valley ring seen in figure 113.

[287] Terrio, "Crafting Chocolates in France," 77.
[288] Terrio, "Crafting Chocolates in France," 77.

The difference between the actual physical model and the photograph of the model became clear to me through two wax projects I made in my lessons with Monsieur Bertelot: one a replication of a physical model, the other a replication from a photograph. Indeed several months prior to the photo of the lily of the valley (seen in figure 113), he gave me a small wax orchid he had made to replicate (seen in figures 110 to 112).

Figure 110: Wax model orchid.

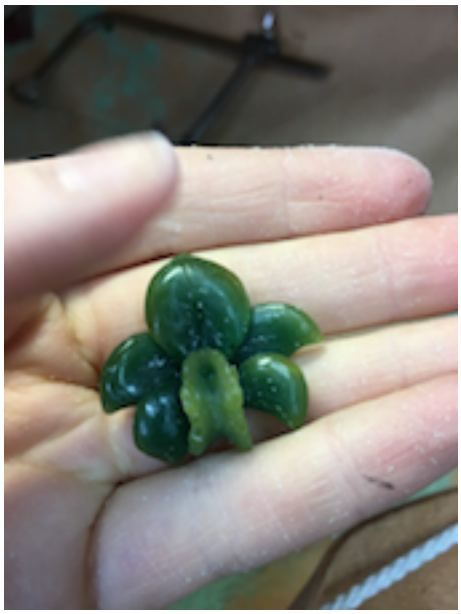


Figure 111: Wax model orchid.

Figure 112: My reproduction of the wax model orchid prior to assembly.

Making the wax orchid was the first time that I had created a more artistic sculptural piece in wax. Rather than using a technical drawing for the measurements of the piece, I had to measure the wax model myself before sculpting the petals in wax. I found it hugely beneficial to work from an existing model to create my first sculptural piece. Holding the model in my hand and running my finger over it, I gained a greater sense of the three dimensional volume than I would have done with a two dimensional technical drawing as I could experience all three dimensions at once. This spatial awareness is especially important for sculptural pieces, which are created using a sequential process by focusing on one view at a time. Thus I began by forming the petals from above, before working from the side view. As I held the model for the first time I was able to imagine the direction my file would have to take in order to produce the required curve. I also understood how the parts interlocked. Having the physical model to hand was particularly useful when creating the lip of the orchid. It was a form, which mystified me when it was still in its box, but as soon as I held the model, I knew how I would be able to carve it myself.

When an artisan or student like myself looks and handles the model, they intuitively understand how it was made. This understanding of the model advances Victorio Gallese's mirror neurone theory whereby the model manifests the relational nature of action, enabling recognition, intuitive understanding and intersubjective empathy.[289] In chapter two I explained the collaborative nature of the production model, which provided a unique link between the jewellery house and the various artisans involved in the production

[289] Vittorio Gallese, "The Shared Manifold Hypothesis: From mirror neurons to empathy," *Journal of Consciousness Studies* 8 (2001): 33-50.

process. In this the models are very much like the Rembrandt paintings discussed by Simmel, who claims that 'with Rembrandt the depicted moment appears to contain the whole living impulse directed toward it; it tells the story of this life course.'[290] He writes that:

> In the physiognomies of Rembrandt's portraits we feel very clearly that the course of a life, heaping fate on fate, creates this present image. It elevates us, as it were, to a certain height from which we can view the ascending path toward that point, even though none of the content of its past could be naturalistically stated in the way portraits with a psychological slant might seek to suggest.[291]

In the same way as Rembrandt portraits manifest the life and relations within it of the sitter, the physical model manifests the relations within the production process- both between the artisans and the sequential nature of production. Like someone viewing a Rembrandt portrait, the artisan handling the model recognises the relations inherent within it. This intuitive empathetic understanding enables an artisan like myself to replicate a physical model.

Figure 113: Photograph of lily of the valley ring in Monsieur Bertelot's album of models.

This experience of recreating a physical wax model was very different to that of recreating the lily of the valley ring from the photograph in figure 113. As I looked more closely at the photograph of the ring in order to figure out how to reproduce it, I realized that I had no idea of its size, heft or even how the model produced by Monsieur Bertelot was intended to

[290] Georg Simmel, *Rembrandt,* trans. Alan Scott and Helmut Staubman (New York: Routledge, 2005), 6.
[291] Simmel, *Rembrandt,* 9.

sit on the hand. The difference between the two-dimensional photograph and how my experience would have been with a physical three-dimensional model went beyond the difference in dimension. Because I could not handle the model or put it on my hand I had no sense of the flow of the original piece and the movements, which were used to construct it.

At first, I believed that my experience revealed the inferiority of the photograph vis-à-vis the actual physical model and by extension the subservience of the artisan in relation to the jewellery house. Yet as Monsieur Bertelot described the ring in the photograph and explained to me how I was to go about making it - sequentially by listing the steps - I realised that he saw more in the photograph than just a simple photograph of the model. As Simmel explains, the photograph 'reminds' the artisan of the original, 'eliminating itself so that [they] subjectively believe that [they] are seeing the model.'[292] The photograph of the model thus awakens the memory of the model. By keeping an album of photographs of production models, the artisan is able to recreate his own archive of models in his mind.

The relationship between the photograph and the artisan who made the production model depicted in it can be further understood through Walter Benjamin's writing on the imagination as a form of knowledge.[293] In his writings, Benjamin described how images could reveal 'a scansion at work, the rhythm of an emerging apparition or "manifestation" and a "deformation."'[294] According to Benjamin, the imagination 'disassembles only to reform and reassemble in a montage everything in its own clairvoyance.'[295] Didi Huberman explains this understanding with reference to Benjamin's later definition of aura in *The work of Art in the Age of its Technological Reproducibility* where he describes the aura as 'the unique apparition of a distance however near it may be.'[296] Huberman picks up on the word 'unique' (einmalig) and argues that 'this is what must be renounced: the notion that the image is "one" or even that it is "whole".'[297] Huberman argues that 'we should recognise the potential of the image as that which determines that it will never be the "one image" or the "all-image"- what destines it to multiplicities, to intervals, to differences to connections, to relations, to bifurcations, to alterations, to constellations and to transformations.'[298] This explains why and how the artisan who looks at the photograph sees more than the single

[292] Simmel, *Rembrandt,* 21.
[293] Georges Didi-Huberman, *The Eye of History: When images take positions,* trans. Shane B. Lillis (London: MIT Press, 2018 [2009]), 250; See D. Schötter, ed., *Schrift, Bilder, Denken: Walter Benjamin und die Künste* (Berlin: Hausam Waldsee/Surkamp, 2004); S. Weigel, "Die unbekannten Meisterwerke in Benjamin's Bildergalerie," *Trajeke: Zeitschrift des Zentrums für Literatur- und Kulturforschung* Berlin 7, no 13 (2006): 15-22.
[294] Didi-Huberman, *The Eye of History*, 251.
[295] See Walter Benjamin, "Imagination," trans. R. Livingstone, in *Selected Writing*s, vol 1, 280.
[296] Didi-Huberman, *The Eye of History*, 251.
[297] Didi-Huberman, *The Eye of History,* 251.
[298] Didi-Huberman, *The Eye of History*, 251.

image of the production model. Rather, he sees the relations within it and between it and the other production models he has made and through this he understands the constellations between them. The archive of photographs is like the 'montage' theorised by Benjamin, 'capable of punctuating for us the apparitions and deformations and that are capable of showing us in images *how the world appears* and *how it is deformed'.* Huberman takes this idea one step further:

> It is in this way, by taking position in a given montage, that the different images that make it up - by composing its chronology - can teach us something about our own history - by which I mean something else.[299]

Thus the photographs in the archive contain the knowledge the artisan needs to recognise the underlying sequence such that he is able to transform the image before him into a new model that adheres to the same underlying form. In this way the photographic archive is more than just the imagination of the models; it is in fact the manifestation of the knowledge of their making. The use of the photographed production models is evidence of the unselfconscious creation of a tradition of fine jewellery that belongs to the artisans themselves.

This explains the secrecy with which Monsieur Bertelot guards his personal photographic album. Unlike the secrecy in the jewellery houses, this is no marketing strategy. Rather, the way in which Monsieur Bertelot gave me the honour of reproducing one of his models two years into my studies demonstrated that the photo album enabled him not just to control the transmission of his knowledge, but crucially allowed him to develop his own tradition of fine jewellery. Without his guidance, the photograph was meaningless to me. Yet when he described the model in the photograph and explained to me how it was made, I quickly understood the relation between the dimensions and the sequence of steps needed to construct it. I began making the leaf of the model and then proceeded to create the stems and the individual flowers using the same sequential procedure as I had employed for the wax orchid. In this way, Monsieur Bertelot passed his memory onto me and by enabling me to reproduce one of his models from the photograph, passed on his experience and creative genius. This reinforces the point made in chapter one, which is that through the transmission of the model, the artisans maintain control over the knowledge of Parisian fine jewellery technology. This chapter takes the idea one step further as it is through the transmission of the model that artisans are able to develop and control their own unique tradition of Parisian fine jewellery, which is completely distinct from that of the jewellery houses.

[299] Didi-Huberman, *The Eye of History*, 251.

3.9 Conclusion

In their essay on tradition, Handler and Linnekin conclude that:

> Traditions are neither genuine nor spurious, for if genuine tradition refers to the pristine and immutable heritage of the past, then all genuine traditions are spurious. But if, as we have argued, tradition is always defined in the present, then all spurious traditions are genuine.[300]

This reinforces the point that both the narratives told by the jewellery house and by the artisan are equally valid. By showing how different agents (from the jewellery house employees like Beatrice de Plinval to the artisans like Monsieur Bertelot) in different environments (from the archive of the headquarters to the classroom) use the models in their archives, I have shown that the production model's role as an in-between object comes into its own once the actual making has ceased. For the common denominator between all of these various but equally 'genuine' narratives surrounding Parisian fine jewellery production will always be the model.

The fact that models in the archive of the jewellery houses and the artisans can be used to create different histories of Parisian fine jewellery, reinforces the idea developed in the previous two chapters, namely that, to quote Marchand, 'knowledge-making is a dynamic process arising directly from the indissoluble relations that exist between minds, bodies, and environment.'[301] In the previous chapters I showed how technical and spatial/situated knowledge was manifest in the model and that the interaction of bodies, environment and minds in the model making process facilitated the transmission of this knowledge (chapter one) and unleashed its creative potential (chapter two). In this chapter I have shown that the model continues to manifest 'knowledge in action' even after the production process has ended. In fact, the archived model is central to the ever-changing reconstruction of the past. In the following chapter, I take this idea one step further to demonstrate how the model, specifically the digital model, is also central to the future evolution of Parisian fine jewellery knowledge.

[300] Handler and Linnekin, "Tradition, Genuine or Spurious," 288.
[301] Trevor Marchand, "Making Knowledge: Explorations of the indissoluble relation between minds, bodies and the environment," *Journal of the Royal Anthropological Institute* (2010), 2.

Chapter Four: The digital model – knowledge evolution

4.1 Introduction

The first three chapters of this thesis have looked at the role of what might be termed 'traditional' models made in either wax or inexpensive metals in a variety of contexts and roles: Chapter one looked at the role of metal and wax models used throughout France to teach and examination jewellery skills; Chapter two investigated how production 'models of intention' are made in the setting of a fine jewellery house through a process of 'embodied bricolage'; Chapter three looked at how models in archives are used by artisans and the jewellery houses to construct traditions of Parisian fine jewellery training and production knowledge. Throughout these discussions I have followed in the footsteps of Glenn Adamson and his work on craft and Trevor Marchand's work on knowledge to explain the model making process as craft in action and have shown how this results in training and production knowledge networks that extend over time.[302] The previous chapters have looked at this dynamism from a present perspective - investigating how the training and production models are used in the present and also used to construct narratives of the past. This chapter takes these ideas one step further to explore the role of the digital model in the future evolution of Parisian fine jewellery knowledge.

During my time researching this thesis (from 2013 to 2019) I have been witness to the increased use of digital technologies such as Computer Aided Drawing (CAD), visualization, 3D modelling and processing applications, as well as industrial technologies such as 3D printing in the jewellery houses of the Place Vendôme. In 2019 these technologies are now used in both the classroom and the jewellery house settings explored in the first and second chapters of this thesis. The aim of this chapter is to understand how digital technologies have changed the process of knowledge transmission explored in chapter one and whether they have changed the nature of knowledge in the production process described in chapter two. Finally it will ask whether, in face of the global spread of digital technology, we can still speak of a 'Parisian' tradition of fine jewellery.

In her book *Digital Crafts*, the jeweller Ann Marie Shillito explains the range of digital technology available to contemporary jewellers. She distinguishes between '3D CAD developed to design products and mechanical parts for industrial manufacture, and buildings and molecules, and 3D modelling software, which has fewer constraints' though she notes that 'the difference between these programs is blurring as 3D modelling tools

[302] Adamson, *Thinking Through Craft;* Marchand, "Making Knowledge."

merge with more prescriptive engineering based CAD tools.'[303] These software packages use different modelling architecture such as wireframe modelling (consisting of lines, points and curves), surface modelling (a polygon mesh) and solid modelling (the object can be rotated, manipulates, exploded, sliced etc.).[304] 3D scanners can also be used to capture models of odd, natural or highly detailed forms.[305] The renderings created by these software packages can then be 3D printed, the principle of which is based on the concept of 'bacon-slicing' a virtual 3D model. These 'slices' are sent as x,y data to the 3D printer which 'prints' out these slices precisely layer by layer by layer, one on top of the previous one so the original sliced virtual object is replicated, constructed vertically (z axis) as a tangible model. Different systems use different materials and different methods of constructing in layers, providing different degrees of finish and size of build.'[306] There are five basic types of 3D printing: deposition/extruding molten or fluid materials; sintering granular materials; binding granular materials; photopolymerisation (setting light sensitive resin or gell); and layering cut sheet.[307] In this chapter I will point out the software and 3D printers used at both the HEJ and at Chaumet.

The evidence in this chapter is based on my research at both the HEJ and at Chaumet. At the HEJ I discussed the use of digital technology with the director Monsieur Baldocchi[308] and spent an afternoon in a digital technology class, speaking to both the teacher Madame Bercy and the pupils[309]. At Chaumet I spoke to Franco Cerulli[310], the head of production, as well as Claire Devé[311], the creative director, and Philippe Boudariat[312], the head of digital production. In order to learn more about digital technology and its use in jewellery design and production I also spoke to Karleung Wai, the specialist technician in additive manufacturing at the Royal College of Art rapid prototyping department in London.[313] This is the 'central knowledge hub and go to facility for all 3D printing and scanning requirements within the college.'[314] The team working in the department have an overview of the technology currently available as well as technological developments. This chapter

[303] Ann Marie Shillito, *Digital Crafts: Industrial technologies for applied artists and digital makers* (London: Bloomsbury, 2013), 86.
[304] Shillito, *Digital Crafts*, 91.
[305] Shillito, *Digital Crafts*, 94.
[306] Shillito, *Digital Crafts,* 105.
[307] See Shillito, *Digital Crafts,* 110 for detailed information on each process.
[308] Michel Baldocchi, Meeting with the author, 7 November 2017 and 6 December 2018.
[309] Madame Bercy, Meeting with the author, 8 November 2018.
[310] Franco Cerulli, Meeting with the author, 3 June 2013, 17 October 2013, 14 October 2014, 6 January 2017, 7 January 2018, 26 march 2018, 10 January 2019.
[311] Claire Devé, Meeting with the author, 14 October 2014.
[312] Philippe Boudariat, Meeting with the author, 3 June 2013, 17 October 2013, 14 October 2014, 10 January 2019.
[313] Karleung Wai, Meeting with the author, 12 December 2018.
[314] RapidformRCA, accessed 16 June 2019, https://www.rca.ac.uk/studying-at-the-rca/facilities/college-wide-facilities/rapidformrca/.

will also draw on research from a range of disciplines including architecture (Mario Carpo), technology (Mark Paterson, Kenneth Knoespe and Jichen Zhu) and anthropology (Victor Buchli) and connect this to the wider literature on technological and material innovation developed by theorists such as Bruno Latour and Pierre Lemonnier.

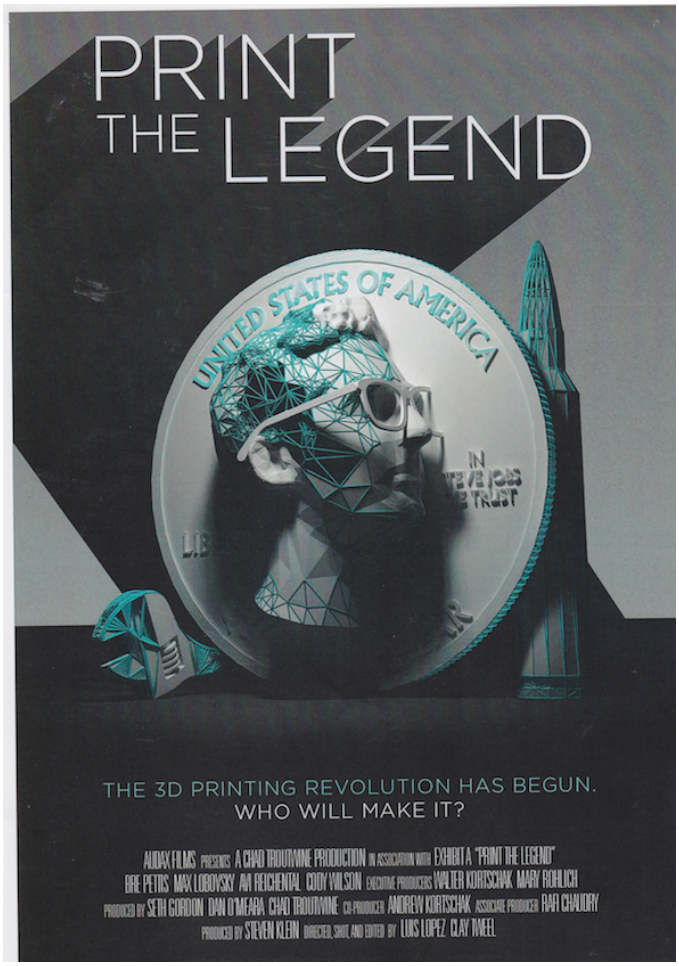
4.2 The potential for a revolution

Chapter three looked how the jewellery houses and the artisans constructed their own Parisian fine jewellery traditions using the model archive and the photographic archive of models respectively. When I first began my research on the Place Vendôme in 2013, digital technology seemed to threaten the very concept of a 'Parisian' tradition of jewellery because the technology itself is was global phenomenon and was therefore available to anyone in the world.

Indeed when I first met Philippe Boudariat, the head of digital production at Chaumet, in 2013 I noticed a large print on his wall, which he had bought at a digital design conference in the United States, seen in figure 114.[315] The poster shows a United States coin with the words 'in Steve Jobs we trust,' which implies that the technology is rooted in the Silicon Valley digital boom at the end of the twentieth century. It also asks the question: 'Who will make it?', suggesting that anyone can engage in this 'digital revolution.'

[315] Philippe Boudariat, Meeting with the author, 3 June 2013.

Figure 114: Print in the office of Philippe Boudariat.



The democratisation of technology implied by this poster seemed to threaten both the Parisian fine jewellery houses and the artisans, who are central to the Parisian fine jewellery tradition discussed in this thesis. The Architectural Historian Mario Carpo has argued that because anyone can learn to use digital software, digital technology enables us to move back to an 'ideal state of original, autographical, artisan hand-making, except that in a digitized production chain the primary object of design is now an informational model.'[316] By this logic, digital technology had the potential to break down the strict division of labour in the jewellery production process described in chapters one and two. Historical studies such as Dagmar Schäfer's work on the Chinese Scholar Yan Song, have found evidence to support a strong correlation between division of labour in artisanal production and the power of the master.[317] This would seem to suggest that digital technology, by breaking down the division of labour in the fine jewellery production process, should significantly increase the power of the individual model maker artisan. Could this threaten the harmonious balance

[316] Mario Carpo, *The Alphabet and the Algorithm* (Cambridge, MA: MIT Press, 2011), 33.
[317] Dagmar Schäfer, *Crafting of the 10,000 Things* (London: University of Chicago Books, 2011).

between the intentionality of the artisan and the jewellery house, which came about through the production model in chapter two?

Digital technology's apparent threat to the jewellery houses did not end here. In fact, the rise of digital technology could be seen to threaten the power of the entire institutional structure of the Parisian fine jewellery world that forms the background to chapters one and two. Whilst restoring the power of making to the artisan, the digital also had the potential to open up the design process to consumers in novel ways. As Carpo explains, 'digital fabrication does not rely on mechanical matrixes, casts, stamps, moulds or dies, hence it does not need to reuse them to amortize their cost.'[318] As a result, each digitally fabricated item could theoretically be different at no additional cost. This opens up the possibility of digital mass customisation in which the consumer plays a key role in the design of the final piece. To this end, Carpo refers specifically to the development of three dimensional Building Information Modelling (BIM) platforms used to create and maintain digital models throughout their lifecycle:

> For centuries traditional scale models have provided a venue for information exchange and discussion on various aspects of buildings or any other technical object under development; realistic 3D models in particular have often been used to consult non-technical agencies - in particular patrons, customers, councils or even the general public. Given their unequalled potential for visualisation, immersive simulation and interactive feedback, digital technologies could greatly enrich these traditional tools for publicity and participation in design.[319]

Consumers of high-end Parisian design have long been acquainted with this process of customisation. In May and June 2005, the designer Bernard Cache's tables were exhibited in central Paris at the Galerie Natalie Seroussi (see figure 115). Customers in the exhibit could choose from a set of variables to design a table of their choice. A three-dimensional virtual model was emailed to the customer for further verification before it was sent to the factory to be produced and shipped.[320]

Figure 115: Objectile-table non standard.

REDACTED

[318] Mario Carpo, *The Second Digital Turn* (Cambridge, MA: MIT Press, 2017), 4.

[319] Carpo, *The Alphabet and the Algorithm*, 115.

[320] See review of the exhibition in *Architecture d'Aujourd'hui* 358 (May-June 2005), 38; "Objectile-table non standard," Galerie Natalie Seroussi, accessed 1 July 2019, http://www.natalieseroussi.com/en/expositions/presentationarchive/54/objectile-table-non-standard#oeuv-1.

The consequences of this potential for revolution in terms of design authorship and the consumer/ producer relationship cannot be overstated. The Anthropologist Victor Buchli goes so far as to say that 'normal flows of globalisation and state sovereignty are disrupted… since objects can be created at point of need at any time in any place rather than being produced somewhere else with traditional tooling and materials and transported to the point of use.'[321] Thus in 2013 digital technology seemed to have the potential to threaten the very notion of a 'Parisian' tradition of fine jewellery.

It is now six years on from my first meeting with Philippe Boudariat, and enough time has passed to enable me to reflect on whether these threats to the 'Parisian' nature of Parisian fine jewellery have actually been realised. It is striking that in 2019, fourteen years on from Cache's table exhibition, we have still to see the jewellery houses follow the designer's lead. In fact, in his most recent 2017 study of digital technology, the architect Mario Carpo has gone from hailing the 'nonstandard paradigm' as the next tectonic shift in design in his 2011 work *The Alphabet and the Algorithm*, to describing the 'participatory turn that never was' in his most recent work *The Second Digital Turn*.[322] His analysis of architecture is equally true for Parisian jewellery. Far from opening up the production process to allow an increasingly global clientele to participate in creating a new international style for the jewellery houses, the influx of digital technology has led to moves to reaffirm the 'Parisian' nature of production and the styles of the individual jewellery houses. Interestingly however, this has not been achieved by a luddite rejection of the new technology. Rather, this chapter will show how digital technology has been incorporated into existing notions of knowledge transmission and 'embodied bricolage' discussed in chapters one and two.

4.3 Knowledge transmission

Chapter one explored how training models in metal and wax are used to transmit Parisian fine jewellery knowledge through imitative learning. By looking at the role of these models in teaching and examinations throughout France, the chapter demonstrated how the model creates harmony and exposes differentiation throughout the French jewellery community. The question is how digital technology has changed the teaching method and whether digital model production in schools still manifests the same uniquely French jewellery knowledge.

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[321] Victor Buchli, *An Archaeology of the Immaterial* (London: Routledge, 2016), 152.
[322] Carpo, *The Second Digital Turn,* 40.

Digital technology was first introduced at the HEJ school in 1998 using a platform known as AMAP.[323] In 2000, the first computer room was created and students began to work with the software Rhinoceros, which in 2018 was updated to Rhinoceros Gold, a specialist plug-in for jewellery design. The advantages of this tool, according to the website are: the extensive libraries of gems, all with shaped cutting tools to create mounts with custom back-holing; advanced pavé tools to create continuous swathes of gems and prongs both automatically and with custom placement; the ring and setting creation tools, which include cross section profiles of many common wires to create rings, head and bezel settings; and custom tools for creating signet rings, hollow rings and twisting channel settings.[324] Specialists at the RCA rapid prototyping department confirm that is the most widely used software in schools and the jewellery industry.[325] The digital renderings created by students at the HEJ are printed using Solidscape, which is a printer that squirts out a microjet of liquid wax layer by layer. It uses Midas 3D printer wax specially designed with the jewellery industry in mind as it can be used in the same lost wax process as the traditionally hand made wax models explored in earlier chapters, enabling casting in all precious metals.[326]

There are now two full-time teachers at the HEJ who teach the subject, known as *Conception Assistée par Ordinateur (CAO)* (CAD). Both teachers themselves trained as jewellers at the HEJ school.[327] Interestingly, the head of *CAO* at the HEJ has the same career background as the model maker at X jewellery house, as both began by making models for advertisements. This points to a similarity between the 'traditional' models used for knowledge transmission discussed in chapter one and the new digital technology, which will now be examined in greater depth.

As part of my research I spent an afternoon observing the digital design class, led by Madame Bercy and talked to both the teacher and students about their experiences.[328] This experience enabled me to compare the teaching methods described in chapter one with those in the digital technology classes.

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[323] Monsieur Baldocchi, Meeting with the author, 6 December 2018.
[324] "Rhino Gold," Simply Rhino, accessed 15 June 2019, https://simplyrhino.co.uk/products/rhino-plug-ins/rhinogold.
[325] Karleung Wai, Meeting with the author, 12 December 2018. There are many different types of software available for Computer Aided Design (CAD), each of which has a different skill or industry focus. The advantage of Rhino Gold is that it is the only software available designed specifically for jewellers.
[326] "Solidscape," Solidscape, accessed 12 December 2018, https://www.solidscape.com/.
[327] Monsieur Baldocchi, Meeting with the author, 6 December 2018.
[328] 8 November 2018.

The teaching of computer design is led by tools and techniques, similar to the traditional teaching discussed in chapter one. Students are shown a tool and then told to create something with it. By looking at each other's work they learn about the possibilities and limitations of the tool. The teacher then gives the pupils specific projects, which must be replicated with the same precision demanded by the traditional models described in chapter one. As with the metal work, the first stage of any project task is to write down the making process in a series of steps, much like a recipe. Towards the end of their studies, students begin making their own creations. This process can be seen in figure 116 where the individual steps to introduce a surface texture seen on the left are translated into an actual project on the right.

Figure 116: Student exercise introducing a surface texture (left) and its application in a personal project (right), student X 2018.

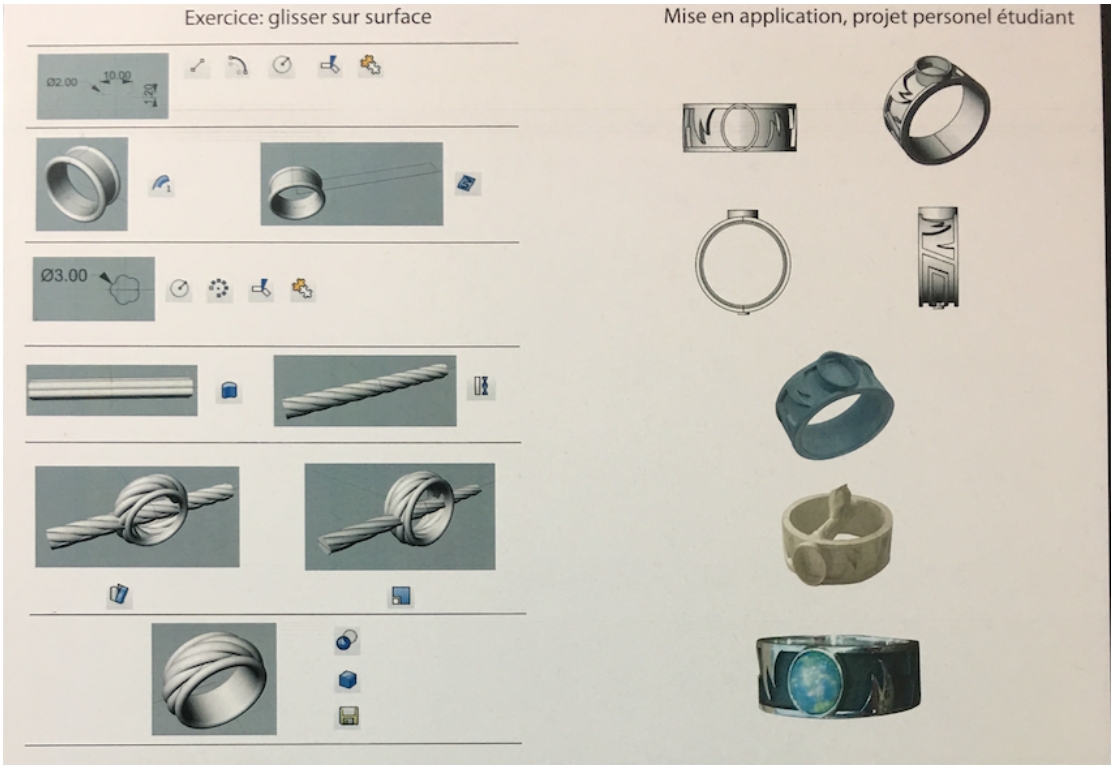

Figure 117 shows the evolution of a personal project. Figures 117 and 118 shows how the ring was designed and rendered in RhinoJewel and then printed in wax using Solidscape.[329] The wax model was then cast into silver using the lost wax method, resulting in a final jewel that can be seen in figure 119.

[329] Work reproduced with the permission of the student X.

Figure 117: Technical drawing and rendering of a ring using RhinoJewel, student X 2018.

Figure 118: Technical drawing and rendering of a ring using RhinoJewel, student X 2018.

Figure 119: Final ring without cover, student X 2018.

Figure 120: Final ring with cover, student X 2018.

Observing Madame Bercy's class in action, there seemed to be a clear distinction between the traditional method of learning described in chapter one, which was based on bodily imitation, and the method of learning digital skills, which was based on verbal

communication and written instructions. There also appeared to be more freedom in these classes, not just to produce individual work, as seen above, but also to make mistakes and learn from them. According to Madame Bercy, this is because digital mistakes can always be rectified much faster than in the workshop where errors can only be covered up and waste valuable workshop time. Mark Paterson has referred to this as the power of the 'undo' button.[330] I also observed a wide range of abilities in the class, in contrast to the metal working classes where everyone was of a very high level.

The apparent discrepancy between learning in the traditional way and digital learning is echoed in much of the literature. In her book on digital crafts Ann Marie Shillito writes about the difficulty of learning to use digital tools and implies that it does not come naturally to artisan makers:

> Designers like Michael, balanced between 'right brain' and 'left brain' thinking, more easily incorporate CAD's engineer-focused structure into their practice. Their learning curve is less steep and when they pick up CAD again, they do so swiftly and effectively. For many of us CAD's prescriptiveness can produce continual cognitive disruptions destroying 'flow', an immersive condition and deeply qualitative experience that designer makers cherish and work so hard to achieve with CAD's complexity, leading to frustration and a sense of exclusion.[331]

This would seem to suggest that digital techniques require different skills and that their learning engages different parts of the brain compared to the traditional techniques explored in the previous chapters.

Madame Bercy disputes the idea that digital learning requires a different way of thinking to the traditional way of learning described in chapter one. She argues that digital learning actually uses the same cognitive methods as learning in the workshop. In chapter one I looked at the importance of sequencing jewellery techniques in training models. I explained how the combination of techniques within individual models enabled trainee jewellers to develop a memory of the techniques organized in complex hierarchical structures that optimized retrieval at a later date. Madame Bercy explained that sequencing steps was just as important a part of learning to make digital models. In fact, at the beginning of every project she asks students to write down the order of steps required to make the digital model. She told me that students need to learn to visualize the computer modelling process before they begin work. In this way, the digital model tasks set by Madame Bercy, composed

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[330] Mark Paterson, "Digital Craft and Digital Touch: Hands-on design with an 'Undo' button," in *The Culture of Digital Tools*, ed. Byron Hawk, David Rieder, Ollie Oviedo (Minnesota: University of Minnesota Press, 2008).
[331] Shillito, *Digital Crafts,* 55.

of numerous techniques to produce a single digital model, perform the same role as the physical models do in the classroom.

Interestingly, Madame Bercy's experience resonates with the more scientific literature on digital technology. The interaction design specialist Malcom McCullough has argued that 'mental modelling is key to effective computing.'[332] He explains that:

> Effective mental models of computer system states are able to predict outcomes of untried procedures, whereas rote knowledge of procedures does not necessarily include an understanding of system states. Such models are essential for learning how to combine elements of the digital repertoire. You must know the elements and be able to visualize their combinations.[333]

In short, in both the workshop and the computer room it is not enough simply to 'know' individual techniques, one must be able to practice them in sequence. It is interesting that McCullough emphasizes the importance of being able to 'visualize' the making of the digital model. This suggests that the same mental processes are at play as in the imitative learning described in chapter one. Here I referred to the work of the neuroscientist Vittorio Gallese whose mirror neurone theory explains the purpose of mimesis by showing that the same neural structures are active when observing others and when performing the action oneself. [334] The same theory can be used to explain the visualization referred to by McCullough. When visualizing oneself doing something the same neural structures are activated as when someone else performs the action in front of one, which are again the very same structures as when one performs the action oneself.

McCullough argues that the ability to envision structure varies among people. The fact that similar mental processes are at work in the memorization of workshop and computer skills might explain why, according to Madame Bercy, there is a strong correlation between a student's ability in the metal/wax workshops and their ability in the computer room.

During my time at the school in the academic years 2016-17 and 2017-18, the subject *CAO* was not part of the CAP qualification and therefore did not form part of the curriculum for the older (26 years and older) students. In 2018/19 the first cohort of students were taught under a new CSJ (Certificat Supérieur de Joaillerie) program that includes a minimum of ten hours computer studies a week for all students.[335] This comes at the expense of gouache

[332] Malcom McCullough, *Abstracting Craft: The practiced digital hand* (London: MIT Press, 1998), 144.
[333] McCullough, *Abstracting Craft*, 144.
[334] Vittorio Gallese, "The Shared Manifold Hypothesis: From mirror neurons to empathy," *Journal of Consciousness Studies* 8 (2001): 33-50.
[335] Monsieur Baldocchi, Meeting with the author, 6 December 2018.

painting and hand technical drawing, rather than taking any time away from wax model making. There is also an advanced qualification known as the CQP in digital technology. This enables people with working experience using digital technology in other fields to retrain and learn to design jewellery at the heart of the Parisian jewellery ecosystem. The incorporation of computer skills into the traditional jewellery examination system introduced in chapter one is a sign of acceptance of the place of digital technology in the training of jewellers. Chapter one revealed how teachers examined and graded the final examinations, giving the profession control over the transmission of skills. By incorporating digital technology into the national examinations and maintaining the role of teachers in marking examinations, the jewellery profession has assimilated the new technology and reinforced its control over both traditional and digital knowledge transmission.

It is interesting that digital skills have been worked into the national examinations, but that they have not taken the place of metal working and wax working in the student timetables. According to Monsieur Baldocchi, the school's main focus will always be on providing the traditional skills training described in chapter one.[336] He claims that the skills taught in the metal working and wax working classes are important for all students, even those that go on to work with digital technology. Chapter one explained how students learnt to engage with materials and tools by working in metal and wax. In 'The Castration of Skill?' Clive Edwards writes that:

> Understanding or knowing of a process or material cannot simply be discovered by reading, or even doing. Techniques can be learned by 'sitting next to Nelly' but the distinction between 'knowing' and 'knowing how' remains…[337]

This 'knowing how' can only be achieved through direct experience of materials with tools.

Furthermore, digital technology cannot teach spatial awareness like the wax modelling described in chapter one. In *The Craftsman,* Richard Sennett recounts how the architect Renzo Piano uses on-site sketching, drawing and model making because the process of simultaneous thinking and doing helps him understand the relation of the building to the site's topography. The computer algorithms in CAD software shortcut this process, creating a closed system divorced from reality. [338] Madame Bercy herself confirmed this shortcoming, emphasising the importance of the wax modelling class as a prerequisite for developing the spatial awareness and 'situated knowledge' required to be successful in

[336] Michel Baldocchi, Meeting with the author, 7 November 2017.
[337] Clive Edwards, "The Castration of Skill?" In *Obscure Objects of Desire,* ed. Tanya Harrod (London: Craft Council, 1997).
[338] Richard Sennett, *The Craftsman* (London: Allen Lane, 2008), 40.

digital creation. She explained that she would stress this link between the traditional and the digital to her students to make them aware of the need to bring the spatial skills they mastered in the wax modelling class into the computer room.

Indeed Monsieur Baldocchi is not alone in his assessment of the importance of traditional training in wax and metal in spite of the growing use of digital technology in the jewellery community. Ann Marie Shillito quotes Gilbert Riedelbauch, a silversmith and Head of Foundation Studies and the Design Arts Coordinator at The Australian National University's School of Art who believes that:

> It is particularly useful to be a competent maker in a "traditional" medium before one takes on digital technologies. The concern of those involved in undergraduate teaching of craft skills and of those in practice-based research, is that the drive to get students into using computers for concept development and core design work is initiated too early in their course. Eroding the essential space and time required to build up tacit and explicit knowledge through direct experience of real materials can leave many design and applied arts students with superficial and lightweight comprehension of real world constraints and affordances of materials and processes, that is to say their properties and qualities that allow a person to perform an action.[339]

Nevertheless, there are exciting developments in digital technology, which might make it an increasingly useful tool in the transmission of jewellery knowledge. In October 2002, the first 'virtual handshake' took place between researchers at the Massachusetts Institute of Technology (MIT) Touchlabs and University College London.[340] Mark Paterson has explored recent research directed at communicating the feel of objects over a distributed network, creating a 'mutual touch'[341] and sense of 'copresence.'[342] As Mark Paterson points out, this will be particularly useful for training purposes as haptic experiences could be recorded and played back, enabling a 'new master-apprentice relationship that includes the feel of the materials and the feel of the teacher's hand.'[343] According to Ivan Amato, this would enable 'in-the-hands knowledge of artists and artisans to become digitised and preserved for

[339] Shillito, *Digital Crafts,* 27.
[340] Mark Paterson, "Feel the Presence: Technologies of touch and distance," *Environment and Planning D: Society and Space* 24.5 (2006): 691.
[341] Paterson, "Digital Craft and Digital Touch," 231.
[342]Jung Kim, Hyun Kim, Boon Tay and Manivannan Muniyandi, "Transatlantic Touch: A study of haptic collaboration over long distance," *Presence: Teleoperators and Virtual Environ*ments 13 (2004): 328-337.
[343] Paterson, "Digital Craft and Digital Touch," 231.

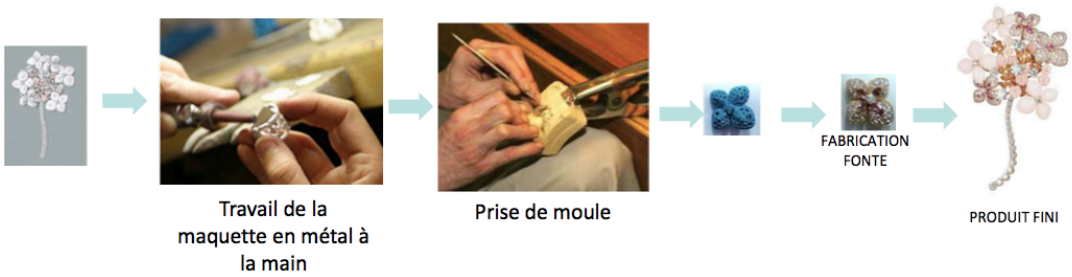
future students.'[344] These developments in haptic technology are already being harnessed in jewellery production on the Place Vendôme. This will be explored in the next section on the use of digital technology at Chaumet.

4.4 Embodied bricolage

Computer design was first introduced at Chaumet as recently as 2011.[345] Prior to this, the jewellery house experimented on a few projects using external subcontractors.[346] It was through these early experiments that the head of creation understood the potential of computer design and three-dimensional scanning and printing. Today the computer design team consists of two full time employees, who both initially trained as jewellers and even worked in the Chaumet atelier.

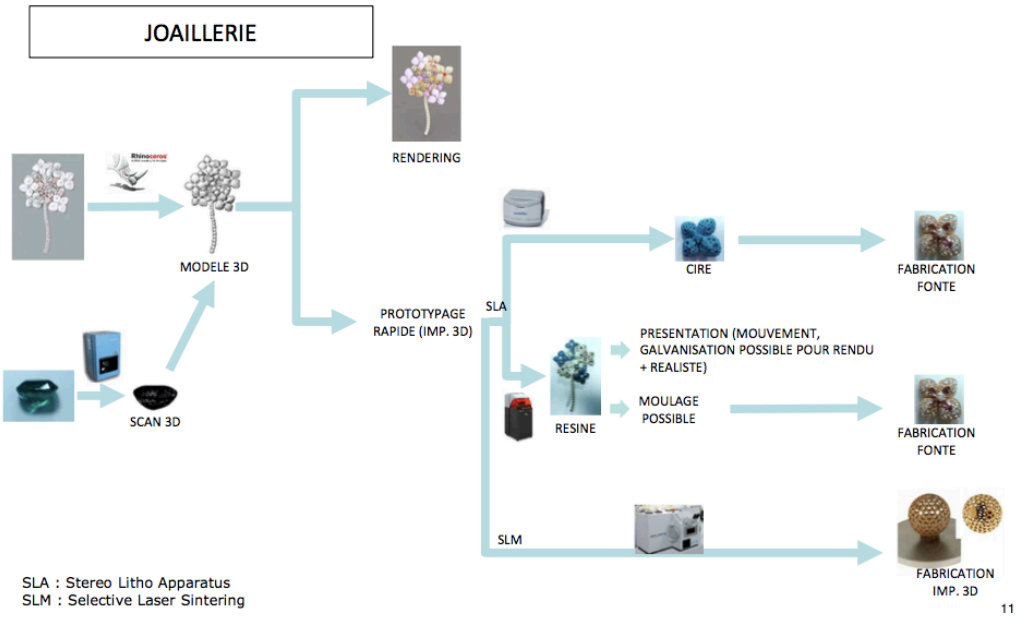
The flow charts in figures 121 and 122 were created by Franco Cerulli to explain the difference between the traditional and the digital production methods to investors at Chaumet, who finance the technological developments introduced by his team. Figure 122 shows that external items, such as body parts or precious stones can be scanned into the computer system. These can be used to create bespoke digital models. These computer models may be digital renderings or they may be physically printed as rapid form prototypes. Currently these prototypes are either in wax or resin and they, like the traditional wax and metal models described earlier, are used to create digital models, which can be used to fabricate the final jewel by way of the foundry. Experiments are currently taking place internally on the Place Vendôme to actually print in precious metals. This is the novel technology shown on the last arrow of the flow chart of figure 122.

Figure 121: Traditional production method at Chaumet.



[344] Ivan Amato, "Touchy Subjects: From Digital Clay to the 'nanoManipulator,'" *Technology Review* (2001), 71.
[345] Franco Cerulli, Meeting with the author, 3 June 2013.
[346] According to the current head of production, Franco Cerulli, these were conducted in top secret and I am told there are no records available.

Figure 122: Digital production method at Chaumet.



The digital technology at Chaumet is used in a variety of ways.[347] First, renderings are created using the Rhino Jewel software. These renderings can be used to experiment with colours and the fragility of the digital model. For example, the rendering of the Hortensia broche seen in figure 123 simulates the shaking of the broche when it is touched. This is known as the *fleur tremblante* technique (trembling flower) that was first developed by the jewellery house Mellerio Meller in the nineteenth century and is now a common feature of Parisian fine jewellery. These digital models might be presented to investors and managers prior to a collection being launched.

[347] Franco Cerulli, Meeting with the author, 17 October 2013.

Figure 123: Digital rendering of the Hortensia broche, Chaumet 2014.

The digital renderings can also be printed in wax to produce physical three-dimensional models like the traditional models described in chapters one and two. Figure 124 shows a tray of such printed resin rings lying in the production room at Chaumet. At Chaumet, they use the Objet 350 Connex3 printer, which uses photo-sensitive materials. It works by jetting photopolymer materials in the slice profile as a thin layer onto a build tray, immediately sets it, and bonds it to previous layers by exposure to UV light.[348] This was the first 3D printer in the world to simultaneously print multiple colours and materials, each with different properties (as seen in figure 124). [349] The potential of this printer was demonstrated in 2012 in a collaboration with Neri Oxman, director of the Mediated Matter research group and Assistant Professor of Media Arts and sciences at MIT Media Lab. She designed eighteen 'Imaginary Beings: Mythologies of the Not Yet'- a series of works inspired by the development and shape of living organisms referencing the work of Jorge Luis Borges - which were printed in a mix of transparent, opaque and coloured materials. These were exhibited in the Mulitversités Créatives exhibition at the Pompidou Centre in Paris in 2012, devoted to forward looking work in the fields of architecture, design, new technologies and

[348] Shillito, *Digital Crafts,* 112.
[349] See https://www.stratasys.com/3d-printers/objet-350-500-connex3.

social innovation.[350] Philippe Boudariat mentioned this exhibition to me when we first met in 2013 to highlight what he perceived to be exciting advances in digital technology.

Figure 124: Printed resin rings at Chaumet.

The series of photos in figures 125 to 127 shows the model lifecycle of the now familiar Joséphine ring that was first developed in 2013 and that was introduced in chapter three. The ring was digitally rendered in figure 125 to experiment with the layout of the stones and then printed in resin to check for the fit on the finger. The speed of the computer creation and printing meant that the ring could move rapidly from conception to the first stages of production, namely the printed resin ring seen in figure 126.

Figure 125: Rendering of Joséphine aube printanière ring, Chaumet 2013.

[350] "Imaginary Beings: Mythologies of the Not Yet," MIT School of Architecture and Planning, accessed 14 June 2019, https://sap.mit.edu/article/standard/imaginary-beings-mythologies-not-yet

Figure 126: Resin printed Josépgine aube printanière ring, Chaumet 2013.

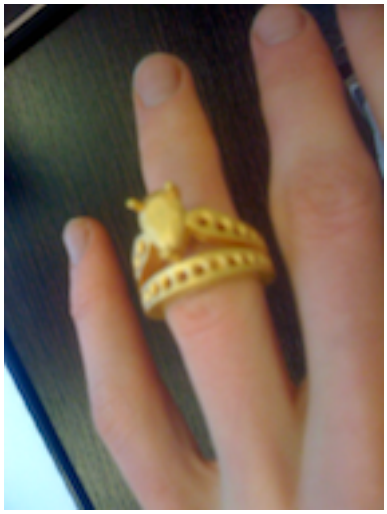


Figure 127: Joséphine aube printanière ring, Chaumet 2019.

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Using the evidence from the digital production team at Chaumet, I now consider how this has changed the notion of 'embodied bricolage' that described the traditional model making process on the Place Vendôme explored in chapter two.

Digital technology builds on the idea of 'bricolage' and experimentation explored in chapter two. In her book on digital crafts, the jeweller Ann Marie Shillito asks what motivates makers to adopt digital crafts:

> Digital technologies enable us to push boundaries, particularly to work through ideas, factors and issues by assisting design, mockups and physically making pieces that would be difficult or impossible to envisage otherwise. Moreover, digital technologies enable us to produce new work that was previously impossible, extremely difficult or physically and financially unviable to make by hand with conventional tools and processes.[351]

This suggests that part of what attracts craftspeople like Shillito to digital technology is the promise of greater experimentation, crucially at a lower cost in terms of both time and physical materials.

Shillito's claims are supported by evidence from Chaumet.[352] In October 2014 I met with the creative director of Chaumet, Claire Devé, who described how she would meet with Philippe

[351] Shillito, *Digital Crafts,* 14.
[352] Claire Devé, Meeting with the author, 14 October 2014.

Boudariat, the head of digital production, and discuss her ideas for new jewellery projects. He would then return to his studio and experiment with the ideas she had proposed and by the next morning he would be able to present her with three dimensional models. The speed of the process meant that she could provide immediate feedback and the digital models could be changed accordingly without much time or effort. This production process is a complete contrast to the process outlined in chapter two where the creative team would present the model maker with a gouache painting, which she would have to create before handing it to the jeweller. The model making process in chapter two was described as bricolage because the model maker had to find solutions to create a three dimensional object from the two dimensional gouache painting. The digital production process at Chaumet enables even greater experimentation from the beginning of the creative process as the designer and the digital model maker have the ability work together to produce the most innovative jewellery possible. Furthermore, because changes can be made to existing digital models relatively easily (Philippe can modify an existing model on screen and reprint it whereas the hand model maker has to start from scratch each time), more time can be spent on experimenting.

The ability to change and rework an existing model deserves further attention. Key to the increased experimentation enabled by the digital model is the fact that the digital is a comparatively risk free environment. This has been explored at length by the sociologist Mark Paterson. He points out that standard computer functions of 'delete', 'undo/redo', 'save', 'copy' and 'paste' support this idea of a 'risk free' zone, 'the most underrated probably being 'undo' and 'redo', which allow designer makers the opportunity to explore and push ideas 'over the edge'. 'Save as' removes the fear of losing track of interesting and promising ideas.'[353]

The digital production method also reduces risk further down the production chain as virtual rendered images of potential products can be tested before production, and designs can subsequently be modified or withdrawn. Franco Cerulli explained that the rendering of the Hortensia broche seen in figure 123 was produced for financial investors and that the colours of the stones were subsequently changed to produce the two digital models that are available in 2019 seen in figures 128 and 129.

Figure 128: Broche Jardins Hortensia "Aube Rosée", Chaumet 2019.

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[353] Shillito, *Digital Crafts*, 48.

Figure 129: Broche Jardins Hortensia "Voie Lactée", Chaumet 2019.

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Having established that the digital production process can still be described as bricolage, albeit risk-free, I now turn to whether knowledge is still 'embodied' in the sense of the traditional model making process described in chapter two.

In order to understand how the digital production process might be thought of as 'embodied,' it is necessary to explore the latest developments in haptic technology. The history of haptic technology can be dated back to the early twentieth century Links Corporations flight simulators that aimed to recreate the sensation of being in flight through wooden crates on mechanical stilts.[354] Twenty years ago, Martin McCullough wrote a book on the digital hand in which he predicted that 'increasingly computing shows promise of becoming the medium that could reunite visual thinking with manual dexterity and practiced knowledge.'[355] Since then Mark Paterson has shown that 'haptic technology has become a rapidly developing area where such manual dexterity and practiced knowledge, so necessary for the kinds of direct contact and manipulation of materials that characterize craft and hands-on design, can enter the digital realm.'[356] Haptic technology not only creates a sense of touch, but importantly enables the direct manipulation of objects, giving the user the feeling of being immersed in the task.

In a paper on haptic technology, Mark Paterson investigated the use of the haptic device PHANTOM, developed by Thomas Massie and Kenneth Salisbury in 1993 at Massachusetts Institute of Technology (MIT). This consisted of a stylus attached to a moveable arm. At Chaumet in 2019 they use the latest version of haptic arm 'Geomagic touch' that is produced by 3D Systems.[357] Figures 130 and 131 are images of the device from the company's website.

Figure 130: The Geomagic touch.

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Figure 131: The Geomagic touch in action.

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[354] Ken Hillis, *Digital Sensations: Space, identity and embodiment in virtual reality* (Minneapolis: University of Minnesota Press, 1999).
[355] McCullough, *Abstracting Craft.*
[356] Paterson, "Digital Craft and Digital Touch," 223.
[357] "The Touch," 3D systems, accessed 1 January 2019, https://www.3dsystems.com/haptics-devices/touch.

According to the company website the tool is described as a 'motorised device that applies force feedback on the user's hand, allowing them to feel virtual objects and producing true-to-life sensations as the user manipulates on-screen three dimensional objects.' [358] 'Forcefeedback' is a key concept in haptic technology. Mark Paterson explains that: 'Force feedback occurs through a combination of cutaneous mechanoreceptor sensation and kinaesthesia: in other words, pressure and movement in space over a certain duration. In space and duration its presentment to us is a feeling of solidity, which haptic devices emulate through the use of force feedback.'[359] In this way the digital artisan is able to feel the force and resistance of tools and materials, which re-establishes the 'dialogue' between the hand and the material (in this case digital) that was described in chapter two. According to Philippe Boudariat at Chaumet, learning to use the haptic arm is as challenging as learning to use a saw or a file. In fact, the artisan must find a rhythm with the digital tools just as he had to find a rhythm with the traditional materials described in chapter two. Indeed walking into the digital design room at Chaumet, I was struck by the similarity to the traditional workshop; the posture of sitting at a desk and manipulating a haptic display of the virtual object while looking at a visual display of the virtual object is indeed a good approximation of the traditional posture of a model maker. This would seem to support the idea raised by Carpo that 'acting almost like prosthetic extensions of the hands of the artisan, digital design and fabrication tools are creating the high-tech analogue of pre-industrial artisanal practices.'[360]

However, there are obvious limitations to the multisensory environment created by haptic technology. McCullough suggests that the sense of bending or morphing materials with the free-form gestures of sculpture requires that feeling of "palpable mass.'[361] Indeed chapter two pointed to the importance of holding the production model in one's hand to get a sense of the flow of the piece and its heft; this is not yet possible using existing digital technology.

At the beginning of this chapter I explained how Monsieur Baldocchi and other educators consider traditional jewellery skills to be relevant even to jewellers working with digital jewellery technology. The importance of traditional techniques for understanding materials and volume is supported by evidence from Chaumet. Franco Cerulli prides himself on

[358] "The Touch," 3D systems, accessed 1 January 2019, https://www.3dsystems.com/haptics-devices/touch.
[359] Paterson, "Feel the Presence," 695.
[360] Carpo, *The Alphabet and the Algorithm*, 40.
[361] McCullough, *Abstracting Craft,* 102.

having a team of computer designers who are all skilled jewellers. Philippe Boudariat even began his career in the Chaumet workshop. There is also a workbench with hand tools in the same room as the three-dimensional scanner and printer. During our first meeting Philippe Boudariat proudly showed me one of the jewels he had created prior to his career in computer design, seen in figure 132.[362]

Figure 132: Tiara made by Philippe Boudariat at Chaumet.

The latest technological developments mean that digital technology also takes the meaning of embodied one step further to include the body of the consumer. During my last visit to Chaumet in January 2019, I was shown the virtual scan of a Chinese client's head that had been sent to the Place Vendôme headquarters where Philippe Boudariat was able to make a bespoke tiara.[363] Unfortunately due to client confidentiality, I did not have permission to take photographs or record the exact details of this commission. The most common form of digital scanning used in creative (as opposed to engineering industries which require contact scanning to achieve the highest level of precision) industries is non-contact scanning.[364] One method of non-contact scanning is photogrammetry. This involves up to 48 cameras set up within a rig, which take photographs of the object from many different angles, enabling a replica to be digitally rendered. This can be seen in figure 133 which is taken from the website of the company specialising in this technology in London called Sample and Hold. This firm has even developed a software called Alice to capture moving bodies.[365] All commercial 3D scanners and rigs are now portable, meaning they can be easily shipped around the world. This means that Philippe Boudariat and the digital designers at the Chaumet headquarters in Paris can create bespoke jewellery without ever having to physically engage with the client or the stone. Chapter two discussed how the model maker adjusted the model to a mannequin's neck, head or wrist by hand. Here we observe how digital technology takes over this haptic role with far greater precision. Moreover, it was

[362] Philippe Boudariat, Meeting with the author, 14 October 2014.
[363] Philippe Boudariat, Meeting with the author, 8 January 2019.
[364] Evidence from team at RCA rapid prototyping department, March 2019.
[365] "Alice," Sample and Hold, accessed 1 January 2019, http://www.sampleandhold.co.uk/alice/.

noted in the previous chapters that the body of the individual consumer plays no role in the traditional creative and model making process as evidenced by the fact that the model is kept out of the public domain and crucially that tiaras once made to adorn the head are used, via the model in the archive, as inspiration for contemporary rings and earrings. The introduction of body scanning means that for the first time, the individual body of the consumer, as opposed to a mannequin, is assuming a central role in the production process.

Figure 133: Digital scanning by Sample and Hold.

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4.5 A Parisian digital tradition

We have seen how digital technology has been appropriated by the Parisian fine jewellery community. Perhaps the best sign of the integration of digital technology into Parisian fine jewellery is a new breed of model makers and models that seamlessly combine the digital and the traditional. Indeed the main idea to emerge from my research at both the HEJ and Chaumet is the sense that just as the traditional model maker had to learn to use both wax and a variety of metals, the next generation of model makers must be able to move effortlessly between these media and CAD. As the Professors of Digital Media Jichen Zhu and Kenneth Knoespe point out in their widely cited article on computational codes, 'it is increasingly the objective of education to build settings where students may develop agility for code switching.'[366] Indeed this is already in evidence at the HEJ where pupils combine atelier work with their CAD projects.

This is also in evidence in practice at Chaumet, where projects are increasingly made through a combination of CAD and 3D printing technology and physical models. The images in figures 134 to 137 show the production of the main piece of the *Lumières d'Eau* collection unveiled at the *Biennale des Antiquitaires* in September 2014. The central piece holding the stone was digitally rendered and printed to create a mould that was used to make the final piece. The resulting casting was further worked on in the atelier where the artisans pieced together the various elements and prepared the stone settings. With such an elaborate piece, Franco Cerulli, the head of production, explains that digital technology was used to ensure a perfect fit for the sapphire stones and to speed up the simplest part of the basic metal work in order to leave more time for the stone setting and hand detail.

[366] Kenneth Knoespe and Jichen Zhu, "Continuous Materiality through a Hierarchy of Computational Code," *Fibre Culture* 11 (2008)*, 9*.

Figure 134: Gouache painting of Lumières d'Eau necklace, Chaumet 2014.

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Figure 135: 3D printed and cast centre piece of the Lumières d'Eau necklace, Chaumet 2014.

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Figure 136: Stone setting of the Lumières d'Eau necklace, Chaumet 2014.

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Figure 137: Final Lumières d'Eau necklace, Chaumet 2014.

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As a result of these hybrid jewels, created using both traditional and digital model making techniques, the next generation of jewellery used to construct the narratives of the Parisian fine jewellery tradition will lead to the emergence of a Parisian digital tradition of fine jewellery. This will be supported by further technological development.

In 2019, digital technology teams are being developed and internally fostered by the jewellery houses and the groups to which they belong. Thus at Chaumet, the head of production, Franco Cerulli, was recruited from within the LVMH group. Over the past five years I have observed how they have built a small team of computer designers recruited from the Place Vendôme workshop of the firm and other LVMH group firms. In this way the digital platforms they are developing and working on remain firmly within the knowledge boundaries of the LVMH group. The way in which the digital platforms are being created and developed within the luxury conglomerates is a fascinating point. It mirrors the close interconnection between science and technology that Ursula Klein has recently shown to have existed as far back as the eighteenth century. In a classic paper '*Technoscience avant la lettre*', she showed that eighteenth century chemical science and technology were linked at the communal and institutional level, 'entrenched in a shared material culture that extended from the laboratory to the chemical workshop.'[367] Similarly, modern developments in computer science are taking place within the workshops of the Place Vendôme. As during the scientific revolution that followed, the security and secrecy around the activities of the computer designers on the Place Vendôme has also increased significantly. In 2016, for example, I was able to take photographs freely in the computer rooms at the Chaumet

[367] Ursula Klein, "Technoscience Avant la Lettre," *Perspectives on Science* 13(2) (2005): 226-266.

headquarters. In 2019, I had to apply for permission from LVMH, which was denied. The growing secrecy, which shrouds the use of computing on the Place Vendôme reveals that material secrecy has moved from traditional to digital materials.

Chapter three showed how archives were used by both the jewellery houses and artisans to create their own traditions of Parisian fine jewellery. The manipulation of these archives will also be affected by advances in digital technology. Interestingly, the digital archive at Chaumet has yet to incorporate new three dimensional digital technology. The usual two dimensional representation of data as folders in the cloud is fast becoming inadequate. According to Franco Cerulli, the sheer volume of data means that no one has yet organised the system. Instead, there are thousands of files of digital models that sit somewhere in the cloud. Mark Paterson points out that Stephen Spielberg showed gloves being used to manipulate the dataflow onscreen in his 2002 science fiction film Minority Report which was based on research at the MIT Media Lab.[368] In chapter three I revealed how the archive of model tiaras at Chaumet was displayed in such a way that tiaras could be picked off the wall and handled by visitors. Further developments in Tangible User Interfaces, as predicted by Stephen Spielberg, raise the possibility that future generations might be able to explore the digital archive in a similar way.

The idea that the digital can be as local as it is global is not unique to Paris. Buchli points to a speech by President Obama from the 2013 State of the Union Address, which captures how global developments in digital production were used to reimagine local manufacturing in a national production strategy:

> A once shuttered warehouse is now a state-of-the-art lab where new workers are mastering the 3D printing that has the potential to revolutionise the way we make almost everything. There's no reason this can't happen in other towns. So tonight, I'm announcing the launch of three more manufacturing hubs, where businesses will partner with the Departments for Defence and Energy to turn regions left behind by globalisation into global centres of high-tech jobs. And I ask this Congress to create a network of fifteen of these hubs and guarantee that the next revolution in manufacturing is Made in America.[369]

There is, therefore, an inherent contradiction in the idea of a global digital technology. Buchli begins to discuss this towards the end of his recent work on materiality:

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[368] Paterson, "Digital Craft and Digital Touch," 230.
[369] "Remarks by the President in the State of the Union Address 2013", White House Press Office, accessed 12 February 2013, www.whitehouse.gove/the-press-office/3013/02/12/remarks-president-state-union-address.

> The material register advanced by 3D printing seems to express in the most perfect terms the materiality of neo-liberalism with its ability to produce extreme forms of individuation. But as many observers have noted…such neo-liberal technologies of self are profoundly locally inflected. Similarly, the rise of 3D printing, as fluid and universalising as it might appear, emerges within specific settings and assumes new and unexpected dimensions precisely because of its specific material register and its local inflections- the specific agendas of governance and national development as suggested by president Obama is a case in point.[370]

Buchli looks at the consequences of this by exploring the case of a three-dimensional printed gun, which was displayed at the Victoria and Albert Museum. His work demonstrates how many scholars and lawmakers are focussed on the legal and regulatory implications of the finished digitally produced objects and thereby overlook the consequences of digital technology for the designers and the making process.

How are we to understand the fact that seemingly global digital technology can be as much a local phenomenon as it is global? In his work *We have never been modern,* Bruno Latour explains technological networks with the analogy of the railway network which is 'local at all points, since you can always find sleepers and railway workers, and you have stations and automatic ticket machines scattered along the way. Yet it is global since it takes you from Madrid to Berlin or from Brest to Vladivostok.'[371] However, Latour points out that it cannot take you everywhere: 'there are continuous paths that lead from the local to the global, from the circumstantial to the universal, from the contingent to the necessary, only so long as the branch lines are paid for.'[372] Knowledge and skills differ from the railroad in that they have no such physical constraints. The same has been shown to be true of the digital technology investigated in this chapter. Latour describes 'an Ariadne's thread that allows us to pass with continuity from the local to the global, from the human to the non human. It is the thread of networks and practices and instruments, of documents and translations.'[373] I would argue that the digital model in this chapter is just such a thread. The fact that the attributes of the digital models mimic those of the traditional models, particularly in their ability to engage the mind, body and environment in training and production, has facilitated the assimilation of what was a global digital technology into the existing structure of Parisian fine jewellery.

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[370] Buchli, *An Archaeology of the Immaterial*, 153.
[371] Bruno Latour, *We Have Never Been Modern,* trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993), 117.
[372] Latour, *We Have Never Been Modern,* 117.
[373] Latour, *We Have Never Been Modern,*121

4.6 An evolution rather than a revolution

To return to the poster I encountered in Philippe Boudariat's office in 2013, this chapter has shown that far from being a revolution, digital technology has in fact been appropriated by the Parisian fine jewellery community in an evolution that has preserved existing ideas of knowledge transmission and embodied bricolage manifested by traditional models and contributed to a new chapter of the Parisian fine jewellery tradition.

The notion of an evolution rather than a revolution can be explained by revising our understanding of the digital. Digital technology is often dismissed as an 'immaterial' phenomenon. In a recent book on immateriality, the Anthropologist Victor Buchli speaks of 'illusory immateriality that girds the productive dualisms underpinning our digitized societies.'[374] In his seminal paper on *Bits*, Jean François Blanchette traces the history of this immaterial trope back to the telegraph: 'The promise of telegraphy is metaphysical: by annihilating space and time, it allows humankind to escape physical limitations. The power and ubiquity of electricity are metaphorically attached to a newly disembodied consciousness.'[375] Throughout the 1990s theoreticians and professionals reiterated this promise. Thus Barlow's *Declaration of the Independence of Cyberspace*[376] and Negroponte's *Being Digital* [377] emphasized the digital 'revolution's' independence from matter. As Blanchette points out, 'a direct consequence of the prevalence of the trope of immateriality is the dearth of research on the topic, and it is only recently that researchers have self-identified as exploring the materiality of digital information.'[378]

It is telling that none of the theorists cited by Blanchette were actively engaged in making things digitally. When I began my research into digital design I was struck by the fact that computer designers actually understand the digital very differently from these theorists. From my first meeting with the head of computer design at both Chaumet and at the HEJ, the professionals I spoke to were unequivocal on one point: the digital is a material.

Among the first scholars to have attempted to understand the material digital world were Kenneth Knoespe and Jichen Zhu.[379] They argued that the material/immaterial dualism

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[374] Buchli, *An Archaeology of the Immaterial*, 146.
[375] Shawn Rosenheim, *The Cryptographic Imagination : Secret writing from Edgar Poe to the internet* (Baltimore, Md.: Johns Hopkins University Press, 1997).
[376] Jean Perry Barlow, "A Declaration of the Independence of Cyberspace," Electronic Frontier Foundation, accessed 10 June 2019. https://www.eff.org/cyberspace-independence.
[377] Nicholas Negroponte, *Being Digital* (New York: Knopf, 1995).
[378] Jean François Blanchette, "A Material History of Bits," *Journal of the American society for Information Science and Technology* 62(6) (2011), 6.
[379] Knoespe and Zhu, "Continuous Materiality through a Hierarchy of Computational Code."

conforms to a long tradition of Cartesian dualism that can be traced from Plato to the populist fiction of William Gibson's cyberpunk fiction where computer codes transcend the physical world. Knoespe and Zhu argue persuasively that computer code fundamentally challenges this Cartesian view of the material world:

> On the one hand, computer code, relying on a complex network of the imperceptible electro-magnetic shifts is generally regarded as immaterial. On the other hand, researchers in tangible computing demonstrate that digital media exist at the very boundary between the physical and the digital.[380]

Instead these authors suggest that code should be understood as a 'dynamic system intertwined with the material world.'[381] They theorise this as:

> A wide spectrum of materiality activated by a hierarchy of codes that move from 'lower' machine code to 'higher' readable computer language and to codes in general (structural, legislative, social, cultural etc.). Each level of code engages natural language and the physical world in different ways, varying from the shifting voltage of computer circuits to our everyday activity. Altogether, the hierarchy of codes constructs a field of diverse materiality that is continuous and interconnected.[382]

This is not, in fact, the first time that Parisian fine jewellery has seen the introduction of a new material. Green wax was introduced to France in the 1970s, when my teacher at the HEJ, Monsieur Bertelot, was one of the first artisans to use the new material. Green wax was brought to France from the United States in 1978. Marcel Mauss already stressed the importance of borrowing and the spread of techniques: 'we cannot overstate the importance of technical borrowings and the human benefits that ensue. The history of human industries is properly the history of civilization and vice versa.'[383]

Prior to the arrival of green wax, Monsieur Bertelot and other model makers worked with cheap metals. The disadvantage was that inexpensive metals such as brass and zinc are much harder than silver and take longer to work with. It was also common for model makers to use a form of red wax, which is much softer and thus cannot be worked on using standard jewellery tools such as files and does not last. This is seen in some of the older models I discovered in a box in the model maker's studio. It is clear from figure 138 that red wax models were much cruder than the models we see today, as explained in chapter two.

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[380] Knoespe and Zhu, "Continuous Materiality through a Hierarchy of Computational Code," 1.
[381] Knoespe and Zhu, "Continuous Materiality through a Hierarchy of Computational Code," 1.
[382] Knoespe and Zhu, "Continuous Materiality through a Hierarchy of Computational Code," 4.
[383] Nathan Schlanger, ed., *Techniques, Technology and Civilisation* (London: Berghahn Books, 2006), 47.

Figure 138: Red wax model, X jewellery house 1950.

The green wax did not change the nature of the training and production models or their use. As with red wax, the green wax can either be sent to the foundry to be smelted into a metal base model that is then refined, or it can be kept in its wax material form. This suggests that the adoption of green wax occurred in a favourable technical milieu, proving Pierre Lemonnier's point that 'to be assimilated, a technological feature has to fit physically into existing practices.'[384] In fact, green wax enabled jewellers to fully exploit and build on existing practices much more effectively than red wax as it could be worked on using standard jeweller's tools such as files.

The adoption of green wax brought about a fundamental change in the making of the model and the art of the model maker. The ease and speed with which green wax can be worked using standard jewellery tools means that the model maker can work faster and also express himself more easily. The material and the model maker are brought closer together. Monsieur Bertelot recalls that although there was some reluctance from practitioners to adopt the new material, once they became aware of the ease of use, it quickly spread throughout France. By 1980, it was in use at the HEJ. In fact, so widespread was the use of the green wax that it soon received its own module in the French national CAP jewellery exams in 1984 with classes at the HEJ school devoted to learning to handle the material.

[384] Pierre Lemonnier, *Technological Choices: Transformation in material cultures since the Neolithic* (London: Routledge, 2002),13.

There are clear parallels between the adoption of green wax and the digital technology introduced in this chapter. However, there is a fundamental difference in that whilst red wax became obsolete following the introduction of green wax, this chapter has shown that there is no sign of digital technology completely replacing green wax. This chapter has shown that there is still a place for green wax in transmitting material and situated spatial knowledge. In a paper on the use of agricultural techniques in Les Corbières, the Anthropologist Guille Escuret showed how despite the systematic use of weed killers, people carried on with the ploughing of vineyards. He argued that the technically non required ploughing revealed 'proper' skilled wine growers and therefore had a meaning in local social organisation.[385] Like ploughing, making wax modelling has, through the teaching in schools and its evaluation in the CAP exams, become a defining characteristic of the professional Parisian jeweller.

In summary, this chapter has now shown not only that the promised 'revolution' of digital technology did not materialize, but also that Parisian fine jewellery production has a history of adopting new materials, which are used together with old materials and in new combinations thereof. In his seminal work *We have never been modern,* Bruno Latour explores the myth of the 'revolution', asking 'why does the modern Constitution oblige us to experience time as a revolution that always has to start over and over again?'[386] He argues that 'modernization consists in continually exiting from an obscure age, that mingled the needs of society with scientific truth, in order to exit into a new age that will finally distinguish clearly what belongs to a temporal nature and what comes from humans, what depends on things and what depends on signs.'[387] He explains that this idea of human progress is thinkable 'only on the condition that all elements that are contemporary according to the calendar belong to the same time' so that 'time forms a continuous and progressive flow, of which the moderns declare themselves the avantguard and the antimoderns the rearguard while the premoderns are left on the sideline of complete stagnation.'[388] Fortunately, Latour argues that we can dispose of this 'modern temporality with its succession of radical revolutions.'[389] In its place, Latour encourages us to think of time like a spiral rather than a line:

> We do have a future and a past, but the future takes the form of a circle expanding in all directions, and the past is not surpassed but revisited, repeated, surrounded, protected, recombined, reinterpreted and reshuffled. Elements that may appear

[385] Gilles Escuret, "Les Corbières," in *Technological Choices: Transformation in material cultures since the Neolithic,* ed. Pierre Lemonnier (London: Routledge, 2002).
[386] Latour, *We Have Never Been Modern,* 70.
[387] Latour, *We Have Never Been Modern,* 71.
[388] Latour, *We Have Never Been Modern,* 73.
[389] Latour, *We Have Never Been Modern,* 74.

> remote if we follow the spiral may turn out to be quite nearby if we compare loops. Conversely, elements that are quite contemporary, if we judge by the line, become quite remote if we traverse a spoke. Such a temporality does not oblige us to use the labels 'archaic' and 'advanced', since every cohort of contemporary elements may bring together elements from all times. In such a framework, our actions may be recognized at last as being polytemporal.[390]

This chapter has shown the 'polytemporal' nature of model making and of the model. Latour says that 'phenomena are nothing but the encounter of already present elements.'[391] Digital models are exactly such a phenomenon, as I have shown that they are simply a material evolution of traditional models, manifesting the same connections between the body, mind and environment. The wider implications of this for our understanding of the model will be discussed in the conclusion to this thesis.

4.7 Conclusion

As the Anthropologist Trevor Marchand points out, 'the success for a creative improvisation or innovation is often reliant on the practitioner's ability to frame change within a discourse of continuity and tradition.'[392] This chapter has argued that digital models are a material evolution of the traditional models studied in the first three chapters of this thesis. It has revealed how digital models continue to manifest jewellery production knowledge, and, like the traditional model making studied in the first chapters, this knowledge is unleashed through the interaction between the body, mind and environment in the model making. Specifically, the chapter has shown that learning via digital models involves the same cognitive processes as in the traditional classroom setting. Furthermore, looking at the use of digital models at Chaumet, this chapter has revealed how digital model making continues to engage the body of the artisan. Finally, this chapter has argued that by harnessing the similarities between the digital and the traditional, and by incorporating digital technology as a new material into the existing network structure of Parisian fine jewellery production, the Parisian fine jewellery community has turned what had the potential to be a 'global revolution' into a uniquely Parisian evolution of fine jewellery knowledge. Peter Dormer once said that 'it is not craft as 'handicraft' that defines contemporary craftsmanship: it is craft as knowledge that empowers a maker to take charge of technology.'[393] Indeed this chapter has shown that the use of models to manifest Parisian fine jewellery production knowledge has empowered the Parisian jewellery community to take charge of digital

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[390] Latour, *We Have Never Been Modern,* 75.
[391] Latour, *We Have Never Been Modern,* 81.
[392] Trevor Marchand, "Introduction: Knowledge in Practice," *Africa* 76(1) (2009), 6.
[393] Quoted in Shillito, *Digital Crafts*, 8.

technology and with it, claim its future just as the previous chapter showed it could claim its past.

Conclusion

This is a thesis about four types of models and how they manifest Parisian fine jewellery knowledge. Each chapter has focussed on a different type of model (the training and production models and their iterations as archived and digital models) to explain its role in knowledge transmission, production, tradition and evolution. Using the apprentice-as-field method to investigate the model and model making in the classroom, the jewellery house, the archive, and the digital world, the thesis has revealed the importance of spatial and technical knowledge in the training and production networks that define Parisian fine jewellery. The thesis has shown how the model (henceforth understood as a totality including all four types) comes to manifest these two forms of knowledge and explored the consequences of this, by revealing how the model connects the artisans and institutions of the fine jewellery knowledge networks of training and production. The resulting inherent relationality of the model was used as the basis of a study of the model in the archives of jewellery houses and artisans, as well as digital models incorporating new technology. This capacity of the model to open the knowledge network up and connect it across time, confirms its importance as an object of design historical study.

This thesis follows in the vein of body of research inspired by the relational concept of knowledge first theorised by Bruno Latour through his Actor Network Theory (ANT), also using Tim Ingold's concept of the meshwork of making, an iteration of the ANT focusing on a dynamic web rather than a network of relations. This thesis has also built on Trevor Marchand's concept of the shared production of knowledge to explain how knowledge is performed into being in such a web of relations. It has shown how their work can be used to understand how the model manifests knowledge in different contexts within the Parisian fine jewellery community.

Anthropologist of the Body, Anne Marie Mol has applied the same method of looking at one practice in different contexts. [394] She investigated how knowledge of the disease atherosclerosis materialises as very different things in four different communities, namely doctors' discussions with the patient; radiology's comparison of images; laboratory examinations of artery fragments; and surgical procedures.[395] In analysing her work, the philosopher David Law, who pioneered ANT together with Latour, explained the importance of the overlap between these different contexts:

[394] Anne Marie Mol, *The Body Multiple: Ontology in medical practice* (Durham: Duke University Press, 2002).
[395] Mol, *The Body Multiple*.

> We are not dealing with different and possibly flawed perspectives on the same object. Rather we are dealing with different objects produced in different method assemblages. Those objects overlap, yes. Indeed, that is what all the trouble is about: trying to make sure they overlap in productive ways.[396]

The question of overlap - in the case of this thesis between the classroom, the workshop, the archive and the digital world - is particularly important as we turn to the question of what we can learn from this thesis about the role of the model in Parisian fine jewellery knowledge. In fact, this thesis has shown how this overlap between different contexts has been a defining feature of Parisian fine jewellery since its origins in the nineteenth century. Chapter one explored the history of the HEJ and showed how it was established by the jewellery community and continues to retain strong links with the jewellery houses. Chapter two showed how the bodily intentionality of the artisan and the intentionality of the commissioning jewellery house interact in the model making process. The third chapter revealed how the archives are used by the artisans to inspire new collections. Finally, chapter four demonstrated how new technology is being simultaneously introduced in the classroom and in the production workshop of the jewellery houses.

Looking at the overlap between the chapters presented in this thesis, what do we learn? First, we see that knowledge, as manifested in the model, is dynamic. It is above all dynamic in a temporal sense as models can be used to tell different narratives about the past, inspire new collections, transmit knowledge to the next generation, and facilitate the introduction of new technology. The Parisian fine jewellery knowledge contained in the model is therefore timeless, not in the sense that it does not change, but rather in the way in which it moves effortlessly between the past, present and future. Knowledge is clearly also dynamic in that it is subject to constant renegotiation and evolution, through the introduction of new model makers, who emerge through the teaching methods described in chapter one, and the introduction of new technology and materials as seen in chapter four. Moreover, as chapter three showed, it can be interpreted and reinterpreted, giving rise to diverse narratives of the Parisian fine jewellery tradition. Thus the model surpasses the distinction between the past and the present and supports Bruno Latour's non-linear, spiral conception of time in which 'the past is not surpassed but revisited, repeated, surrounded, protected, recombined, reinterpreted and reshuffled.'[397]

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[396] David Law, "Making a Mess with Method," in *The Sage Handbook of Sociology,* ed. William Outhwaite and Stephen Turner (Oxford: Wiley-Blackwell, 2004), 55.
[397] Bruno Latour, *We Have Never Been Modern,* trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993), 75.

Second, the knowledge in the model results from the interaction between the mind, body and environment in the model making process. Chapter one demonstrated how neurobiological research on cognition could be used to explain the body's role in learning by making models. Chapter two took this idea further to show how the body's role in making models introduced the necessary bodily intentionality needed to produce the model according to the specification. It also introduced the idea of 'bricolage' to show how model making involves a dialogue between the maker, the material and the artisan, as theorized in Ingold's theory of the 'meshwork of making'. Chapter four demonstrated how the interaction between the mind, body and the environment in the traditional model making process was now being mimicked using digital technology, thereby facilitating the uptake of digital methods of production.

This thesis has also questioned the divide between the natural and the social that has influenced much of the art historical and anthropological literature since Bourdieu. Chapter two revealed the inextricable link between the bodily intentionality of the artisan and the intentionality of the jewellery house in the model making process. It was argued that this implied that the model, and the mind, body and environment that are critical to the knowledge manifested in it, is at once natural and social.

Third, and following on from the previous point, Parisian fine jewellery knowledge is simultaneously local and individual. Its local identity is established through the dominance of the HEJ school and the jewellery houses introduced in chapters one and two, and it is reinforced by the use of models in the archive to tell particular narratives about the Parisian fine jewellery tradition which root it firmly in Parisian history and high society. Chapter four demonstrated how new technology was being absorbed into the existing network so that even the apparently global digital revolution has been recast as a Parisian evolution. But this thesis has also shown how Parisian fine jewellery knowledge is above all individual, in the sense that it is very specific to the individual maker and artisan. Chapter one showed how students at the HEJ learn to make models by copying the bodily gestures of the teacher and thereby build up their own individual memory of the techniques. Indeed it revealed how even the tools they use, which at the beginning of their studies belong to a standard set of tools given to all pupils, become individual to the student. Chapter two described the role of the only model maker at X jewellery house, and chapter three demonstrated how artisans have their own individual photographic archives that enable them to construct their own personal tradition of Parisian fine jewellery independent of the jewellery houses.

In summary, this thesis has shown how the model surpasses the perceived division between the past/future, natural/social and even the local/global. This has important implications for our understanding of models in general. The literature review in the introduction to this thesis summarised the existing literature which explored models as 'in-between objects'[398]. In his seminal work *We have never been modern,* Bruno Latour argues that such 'intermediaries' were invented by 'the modern' in order to construct a unity between these apparent oppositions. He explains that typical 'modern' analyses, like those discussed in the introduction, takes the form of 'a preliminary purification, a divided separation, and a progressive reblending.'[399] The critical explanation in such 'modern' studies begins from the poles and heads toward the middle, with the 'in-between' model being the interlocutor between two people or times, or the hybrid of two opposing ideas. Thus, for example, Simona Valeriani's essay on 'in-between objects' looks at the role of such intermediaries 'in the coming together of such categories as theory/praxis, intellectuals/artisans, speculative knowledge/skill which had been seen as distinct in the Middle Ages.'[400]

This thesis has followed Latour to begin instead from the 'middle position' that is the model. Following this method, I have shown how the model is at once historic and of the future, both natural and social, and global and local. In fact, the distinctions present in the existing literature lose their significance. Rather than being an intermediary or in-between object, the model has revealed itself to be what Latour calls a mediator: 'A mediator is an original event and creates what it translates as well as the entities between which it plays a mediating role.'[401] Latour takes this idea one step further to claim that 'as soon as we start form the middle, as soon as we invert the arrows of explanation, as soon as we take the essence accumulated at the two extremes and redistribute it to the whole set of intermediaries, as soon as we elevate the latter to the status of fully-fledged mediators, then history in fact becomes possible.'[402] Crucially this is no longer a history of people, but a history of natural things as well. In this way understanding the model as a mediator rather than as an in-between object, brings to the forefront its ability to manifest the connection between mind, body and environment that lies at the heart of our understanding of knowledge.

Latour's definition of a mediator builds on Louis Dumont's concept of holism within his

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[398] Simona Valeriani, "Three-dimensional Models as 'in-between-objects' - The creation of in-between knowledge in early modern architectural practice," in *History of Technology: Conceptualising the Production and Diffusion of Useful and Reliable Knowledge in Early Modern Europe*, ed. Ian Inkster (Bloomsbury, 2012).
[399] Latour, *We Have Never Been Modern,* 76.
[400] Valeriani, "Three-dimensional Models as 'in-between-objects'," 1.
[401] Latour, *We Have Never Been Modern,* 78.
[402] Latour, *We Have Never Been Modern,* 81.

theory of hierarchy. This is the notion that 'the understanding of particular human social phenomena should be grasped in relation to the larger totality or whole in terms of which they are defined.'[403] In his discussion of Dumont's conception of holism, the Anthropologist Bruce Kapferer emphasizes that Dumont's holism is 'avowedly anti-dualistic and is engaged to conceive of the parts as being defined and produced out of the principles that govern the whole as an encompassment of its parts.'[404] Dumont's holism refers to the relational value that encompasses all others that can be conceived of as part of the whole. As a 'mediator' in Latour's sense, the model is at once a product of the social relations, which it also simultaneously manifests, and which it regenerates through time thanks to its role in the archive. It has a value that encompasses all others but remains an integral part of the Parisian jewellery production process. It is at once a part and the whole.

The holism of Dumont, based on the hierarchy of value, specifies a system, which is open rather than closed, fixed, or static, thus defining a space of multiple potentialities. Indeed this thesis supports the conclusion of a growing body of work that demonstrates that knowledge is 'not a body or an authority, but an effect of connections performed into existence in a web of relations that are worked at, around and against constantly.'[405] It has also contributed to the methodology of studying knowledge through networks. Scholars such as the Anthropologist Anne Marie Mol and Educationalist Tara Fenwick have looked at knowledge using a network approach to 'trace the process through which diverse elements become combined into knowledge networks, and how some networks stabilise, extend, enrol others and circulate to exert power, while others dissolve, distort, mutate or become appropriated.'[406] This thesis has shown how the network approach can be used as the basis for the apprenticeship-as-field method developed by Trevor Marchand. The introduction outlined the topography of the Parisian fine jewellery world and explained that it is located between the jewellery houses of the Place Vendôme and the HEJ school that trains its jewellers. By training as a jeweller, I was able to study these two main nodes of the Parisian fine jewellery network - the HEJ school and the jewellery houses - from within. In each case, I studied the knowledge network that I found myself in; At the HEJ school I looked at model making through the prism of the pupil/teacher relationship that I developed with my teachers and at X jewellery house I discussed the position of the model maker at the heart of the jewellery production process. In chapters three and four I also looked at how knowledge was circulated, constituted and extended through the models in the archive and

[403] Bruce Kapferer, "Louis Dumont and Holist Anthropology," in *Experiments in Holism,* eds. Tom Otto and Nils Bubandt (London: Blackwell Publishing, 2010), 187.
[404] Kapferer, "Louis Dumont and Holist Anthropology," 192.
[405] Tara Fenwick and Richard Edwards, "Networks of Knowledge, Matters of Learning and Criticality in Higher Education," *Higher Education* 1(2014), 48.
[406] Fenwick and Edwards, "Networks of Knowledge, Matters of Learning and Criticality in Higher Education," 48.

in digital production. Thus by applying a network way of thinking to the apprenticeship method, I was able to investigate the relational property of knowledge in multiple contexts.

The auto-ethnographic account of my experience as a student at the HEJ has revealed the power of individual experience in design historical research. By engaging in the making process myself, I was able to experience at first hand how the mind, body and environment interact in the model making process. My work also demonstrates the point first made by Lave and Wenger that through the apprenticeship method, one learns as much about the social context of the craft as the craft itself.[407] In chapters one and two I described the history and social environments of the HEJ school and X jewellery house. Armed with this increased cultural awareness, my student experience also enabled me to forge a closer connection to the professional world of Parisian fine jewellery as I was introduced to the model maker at X jewellery house and I was given increased access to the digital production team at Chaumet. Thus the concept of 'making by knowing' has research benefits beyond the actual making process itself.

Through its investigation of how training and production models manifest the embodied and relational qualities of Parisian fine jewellery knowledge, this thesis has contributed to our understanding of these two forms of knowledge. It has shed light on how embodied knowledge is both technical and spatial in nature as it has shown how through their dimensional as well as technical nature, the models manifest the bodily experience of the working student and artisan. By looking at the role of models in transmission, creation, tradition and evolution in the training and production networks of Parisian fine jewellery, the thesis has shown that these knowledge networks exist within a cyclical conception of time that like the Actor Network Theory that spawned this idea of networked knowledge, was also central to the theory of Bruno Latour.[408] In this way, 'relational knowledge,' the object of the second research question, must be understood outside of the traditional constraints imposed by a linear conception of time.

It is hoped that this case study of the model in Parisian fine jewellery training and production networks will inspire comparable studies of luxury crafts that also involve the use of models. The use of patterns by tailors and wooden lasts by shoemakers, mentioned in the introduction, are just two examples of a similar use of models, which can be observed in luxury workshops. The analysis of the model in the Parisian fine jewellery knowledge network, undertaken in this thesis, inspires us to ask whether these patterns and lasts play

[407] Jean Lave, and Etienne Wenger, *Situated Learning: Legitimate peripheral participation* (Cambridge: Cambridge University Press, 1991).
[408] See Latour, *We Have Never Been Modern.*

a similar critical role in the knowledge networks that underpin these luxury industries. In this way, this thesis could potentially allow us to move from a study of model making as a craft to a theoretical reappraisal of luxury craft and its significance for our understanding of objects and their making in the design historical literature.

Appendix 1: Model Project Information Sheet

Project Information Sheet

The model as jewellery technology in 21st century Paris

For further information

Supervisor: *Dr. Sarah Cheang- email: soah@rca.ac.uk*

Date:

My name is Joséphine de Staël and I am a PhD research student at the Royal College of Art. My work explores jewellery production in 21st century Paris. You are invited to take part in this research project which explores the role of the model, its material and its making in the production of Parisian fine jewellery and in the training of Parisian jewellers.

If you consent to participate, this will involve:

- An interview with me (between one and two hours)
- The possibility of providing images which can support the ideas discussed in our meeting.

Please note that written consent will be sought for your personal information (name, occupation etc), ideas and images to be used in the final thesis.

Participation is entirely voluntary. You can withdraw at any time. All information collected will be confidential and securely stored. You will only be identified with your permission. Your thoughts and images (where applicable) will only be published with your consent.

If you have any concerns or would like to know the outcome of this project, please contact my supervisor at the below address.

Thank you for your interest,

Joséphine de Staël

Complaints Clause:This project follows the guidelines laid out by the Royal College of Art Research Ethics Policy.

For further information Supervisor:

Dr. Sarah Cheang- email: soah@rca.ac.uk

If you have any questions, please speak with the researcher. If you have any concerns or a complaint about the manner in which this research is conducted, please the address the RCA Research Ethics Committee by emailing ethics@rca.ac.uk or by sending a letter addressed to: The Research Ethics Committee

Royal College of Art Kensington Gore London SW7 2EU

Appendix 2: Model Consent Form

Consent Form

The model as jewellery technology in 21st century Paris

For further information

Supervisor: *Dr. Sarah Cheang- email: soah@rca.ac.uk*

Date:

I *(please print)*.....have read the information on the research project *The Model as Jewellery Technology in 21st Century Paris* which is to be conducted by Josephine de Stael from the Royal College of Art, and all queries have been answered to my satisfaction.

I agree to voluntarily participate in this research and give my consent freely. I understand that the project will be conducted in accordance with the Information Sheet, a copy of which I have retained.

I understand that I can withdraw my participation from the project at any time, without penalty, and do not have to give any reason for withdrawing.

I consent to:

- An interview with the research student.
- The information elicited in this interview being discussed in the thesis.
- My name being used in reference to specific information given in the interview substantiated by a specific quote.
- The images agreed with the research student being used in the thesis.

I understand that all information gathered will be stored securely, and my opinions will be accurately represented. Any images in which I can be clearly identified will be used in the public domain only with my consent.

Print Name:.....
Signature.....

Date: .....

Complaints Clause:This project follows the guidelines laid out by the Royal College

of Art Research Ethics Policy.

If you have any questions, please speak with the researcher. If you have any concerns or a complaint about the manner in which this research is conducted, please the address the RCA Research Ethics Committee by emailing ethics@rca.ac.uk or by sending a letter addressed to: The Research Ethics Committee

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