Visual Grounded Analysis:
Developing and testing a method for Preliminary Visual Research

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ABSTRACT

Approaching a new design project by performing preliminary visual research is a common practice in educational and studio settings, particularly in Jewellery and Fashion Design. Collecting images around a given subject or theme — for better understanding its visual traits, or for future reference — could be seen as the counterpart, in visual terms, of a literature search.

However, 'visual research' is an expression often used rather vaguely for indicating a spectrum of unstructured methodological approaches, whose procedures and underlying assumptions tend to remain unexplained, undisclosed or unquestioned in everyday studio practice. When creative practice becomes an integral part of academic research, though, there is an increased need for rigor and explicitness regarding every aspect about it, including all the work preliminary to it.

This research aims to develop and test a systematic method for conducting and documenting visual research in the preliminary stages of the design process, contributing to new knowledge in the form of a new visual method, also applicable as a design tool.

A reflection on the vagueness and implicitness of the Intuitive Approach (IA) to visual research adopted in the initial stage of this PhD motivated the search for an alternative method that could make transparent and rigorous the taken-for-granted, subjective assumptions behind the research initially conducted. The iterative and data-driven nature of the IA oriented the methodological quest towards established qualitative approaches in the Social Sciences, focusing on Emergent Methods and Grounded Theory.

By translating and adapting some of their procedures to suit a visual context, a new method, Grounded Visual Analysis (GVA), has been developed

and tested, revealing its suitability for achieving a higher degree of explicitness and systematicity in the process of data collection and analysis, and increasing the richness of the visual patterns elicited from the data, thus their potential for stimulating reflective practice.

The development of GVA is offered as the major contribution to knowledge of this research, together with its application on a practical case as the demonstration of its double functioning, either as a reflective method for conducting visual research in the preparatory phase of the design process, and as a design tool for stimulating the generation of new ideas and design briefs.

ACKNOWLEDGEMENTS

A PhD can be a very intense experience and mine is no exception. It has been a tough ride and a test of resilience and determination, despite personal difficulties and an unsettled working environment. Nevertheless, I have been blessed by the presence of a few people of invaluable worth, without whose support and encouragement this research would never be accomplished.

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ABBREVIATIONS

IA – Intuitive Approach

CAQDAS – Computer Assisted Qualitative Data Software Analysis

CJ – Contemporary Jewellery

EL – Electro-Luminescence

GT – Grounded Theory

GVA – Grounded Visual Analysis

JD – Jewellery Design

LED – Light Emitting Diode

PBR – Practice-Based Research

PLR – Practice-Led Research

PVR – Preliminary Visual Research

DEFINITIONS

Aesthetic

The Merriam-Webster Dictionary proposes a few definitions for this adjective, such as "relating to, or dealing with aesthetics or the beautiful", "pleasing in appearance, attractive" and also "responsive or appreciative of what is pleasurable to the senses"(2016). In this thesis, the adjective 'aesthetic' is intended as an attribute related to what is pleasurable, or appealing to the visual sense, in the subjective terms, and it does not hint at Aesthetics or philosophical discourse on art, beauty or taste.

Archive

The Merriam-Webster dictionary defines Archive "a repository or collection, especially of information" (2017). In this thesis, the noun, used for the nomenclature 'Visual Archive', is intended as a synonym of 'repository', 'library' or 'collection', meaning a physical, or virtual space where data are stored, independently from their internal organisation.

Artefacts/Objects/Products – Images/Photographs/Pictures

This research concerns the process of preliminary visual analysis within the fields of Arts, Craft and Design where, in order to get an overall grasp of a given visual theme, style or phenomenon, a number of two or three dimensional 'objects' (or units of analysis) such as products, artefacts, artworks, structures, buildings, decorative motifs, details or 'styles' (depending on the field in which the researcher operates) are purposively, or opportunistically, observed and assessed. When these 'units' cannot be readily gathered or reached in their real form, it is common practice to perform a similar assessment through their photographs or images, working as substitutes, or proxies.

In this thesis terms such as 'artefact', 'object' and 'product' will be often used interchangeably, as well as the terms 'image', 'picture', or 'photograph', since the latter are intended as depictions, substituting the formers during the analysis.

Artist/Designer/Craftsperson/Practitioner/Researcher

These terms are often used interchangeably within the thesis for indicating that the subjects that might be undertaking professional or academic research could be, at the same time, practitioners within the allied fields of Arts, Crafts or Design. The two methods that the thesis will discussing (the IA, and GVA), are used for conducting preliminary visual research, so the subject using then is a researcher (either in an academic, or in a professional setting), but. since they can be used as well as tools for the preliminary phases of the creative process, the subject using them might also be an Artist, Craftsperson, Practitioner or Designer.

Design Brief

 A written document, generally used as a communication tool between the client and designer, where the aims, objectives, direction, rules, issues and milestones around which a design project will be developed are clarified before the designer starts to work on it (Cleardesign.uk, 2016) . The Cambridge English Dictionary defines it as:

> a written description of what a new project or product should do, what is needed to produce it, how long it will take, etc.(2016) **.**

The operational definition within this thesis refers strictly to the phase of *experimentation* and *practice*, and considers in this case 'design brief' a form of preliminary and subjective clarification, in written form, of the objectives and visual criteria that a designer (in this case, myself) is establishing for setting boundaries and developing new practice. It is intended as a set of 'visual ingredients', around which the experimentation will take place, for the elaboration of new 'design recipes' and the consequent production of new artefacts.

Inferential cycle – Induction/Deduction/Abduction

Inference, according to the Oxford dictionary is "a conclusion reached on the basis of evidence and reasoning". Inference is a logical process where

> […] our mind travels through a path: it starts from a *known object*, it transits through an *intermediate passage*, it comes to know an *object previously unknown*. Depending on the nature of the starting object, and in particular of the ending, we have three kinds of inference: Induction, Deduction and Abduction[1](Zingale, 2009, p. 1).

The analysis of the inferential cycle is studied in Logic, Epistemology, Cognitive Psychology and Semiotics and can be traced back in the history of human thought until Aristotle (384-322 BC).

Deduction is a *necessary* inference, in that, if the premises from which the inference is made are true, *necessarily* the conclusion will be true. Deductive inferences start from a known rule and move towards a conclusion that is an application, a result or an effect of that rule, called a *thesis*. Inductive inferences, start from the observation of applications, results or effects of a rule, and move towards the delineation of it, so that the conclusion of inductive reasoning is called *synthesis*. Syntheses are *non-necessary* inferences since even if the premises are true, the conclusions are only probable, or true until disproven. *Abductive* inferences, a term coined by Charles Saunders Peirce (1839-1914) are *non-necessary* inferences standing conceptually before or laterally to inductive reasoning, in that they search for the existence of a rule that would explain the observation of effects or results of such rule. In fact, the conclusion of an abductive inference is an *hypothesis*, that is a thesis yet to be discovered, a possibility. If inductive enquiry prepares the development of a theory, abductive reasoning precedes it and anticipates it.

Abductive reasoning applies to this research as it is central to the contemporary approach to Grounded Theory and Design Thinking and underlies

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[1] Translated from Italian by the researcher.

the logic of creativity. "Abduction is the inference that opens the space to invention"(Zingale, 2009, p. 8)[2] .

Light / Lighting

References to 'light' or 'lighting' in this thesis are intended with regard to the visual effect generated, emitted or obtained by means of artificial sources. Light is therefore intended as 'artificial light', as opposed to natural daylight.

The vast majority of artefacts explored in this research present lighting generated electrically by Light Emitting Diodes (LEDs), but there are also examples where lighting effects are obtained by different sources such as electroluminescent (EL) materials, phosphorescent or fluorescent pigments, or by direct or indirect interaction between emitted light and other materials, through phenomena such as reflection, refraction, absorption, etc.

Practice-based research / Practice-led research

In this research, terms such as practice-based research and practice-led research (often used interchangeably as synonyms) are used for indicating two distinct and different approaches to academic research involving practical or creative work. This distinction concerns not only the research **design**, but also the final outcome of the research and the form of submission with regard to doctoral degrees.

Such distinction is clearly outlined in the practice-based research guide provided by Creativity and Cognition Studios:

Practice-based Research is an original investigation undertaken in order to gain new knowledge partly by means of practice and the outcomes of that practice. In a doctoral thesis, claims of originality and contribution to knowledge may be demonstrated through creative outcomes in the form of designs, music, digital media, performances and exhibitions. Whilst the significance and context of the claims are described in words, a full understanding can only be obtained with direct reference to the outcomes.

Practice-led Research is concerned with the nature of practice and leads to new knowledge that has operational significance for that practice. In a doctoral thesis, the

[2] For more on the inferential cycle and abduction, see (Hartshorne & Weiss, 1960; Houser & Kloesel, 1992; Minnameier, 2010; Misak, 2004; The Peirce Edition Project, 1998; Vickers, 2016; Zingale, 2014)

results of practice-led research may be fully described in text form without the inclusion of a creative work. The primary focus of the research is to advance knowledge about practice, or to advance knowledge within practice. Such research includes practice as an integral part of its method and often falls within the general area of action research (Candy, 2006, p. 1).

Theory

The Oxford English Dictionary defines theory as: "A supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained."(2015a); the Merriam-Webster dictionary as: "an idea or set of ideas that is intended to explain facts or events"(2015b) and Birks and Mills as "an explanatory scheme comprising a set of concepts related to each other through logical patterns of connectivity" (2011, p. 113).

When referring to theory in this study, I mean an explanatory model of which the visual data are a representation; a general principle, or a set of principles, of which the data are an illustration.

CHAPTER 1 - INTRODUCTION: FROM PRACTICE TO METHOD

Introduction

Conducting visual research during the preliminary stages of the design process is a common practice in Art, Craft and Design, consisting of the collection of visual information around a design problem or theme in order to facilitate the development of new design ideas, or new practice.

However, the expression 'visual research' is often used rather vaguely for alluding to a series of unstructured approaches that might range from the assembly of simple moodboards[1] to the collection of complete archives of images thematically sorted. This practice tends to be known through its results, the visual data gathered, but the processes underlying their collection, analysis and evaluation often remain unquestioned and confined behind the metaphorical 'closed doors' of artists' and designers' studios, and sometimes could be unknown by the designers themselves. When developing new practice becomes central in academic research, it is necessary to question and to disclose all aspects around it, including the practices and processes preliminary to it.

This thesis presents the development and testing of GVA, a systematic method for visual research in the preliminary stage of the design process that can be used in academic and studio practice for evaluating visual data and explicitly disclosing some of the assumptions and processes underlying their analysis. This method is the response to a methodological problem arisen in the initial stage of this research, where preliminary visual research was tackled with an unstructured and implicit method (the Intuitive Approach) progressively leading to the uncovering of issues and inconsistencies that raised a new awareness regarding methodological rigor and the necessity to make explicit the subjective assumptions behind the development of visual analysis.

This chapter will introduce some fundamental aspects of this thesis and, for this purpose, it has been divided in three sections.

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[1] A moodboard can be defined as "a collection of visually stimulating images and related materials" that are used in design practice as idea development tools (Lucero, 2012, p. 438)

Section 1.1 will provide an overview of the gradually unfolding PhD journey, as it shifted from practice-based to practice-led research[2], leading to a transformation of key questions and methods. It started as a practice-based investigation (Stage 1), aiming to explore the use of light as an innovative material for designing Contemporary Jewellery, and it progressively transformed into a practice-led enquiry (Stage 2) on visual methodologies for the preparation phase of the design process.

The section will also introduce the Intuitive Approach (IA), the method for preliminary visual research adopted in Stage 1, from which the main dilemmas and reflections leading to the next phase (Stage 2) of this research have arisen. The reasons for this evolution will be as well outlined in regard to the changes that this has implied for the structure and focus of the PhD. These changes have also affected the aims and research questions that have shifted from 'subjects' to 'objects' of the enquiry, eventually taking the role of case-studies for the development and testing of a new visual method (GVA) offered as the final contribution to knowledge of this PhD.

Section 1.2, will make a digression and a series of reflections on the role of creative practice in academic research as opposed to its role for researching in a professional setting, in order to underline the importance of the reasons behind the transformation occurred to this PhD, from a practice-based research in the crafts, to an interdisciplinary practice-led enquiry on methods for visual analysis.

Section 1.3, will briefly summarise the entire thesis, introducing the content of the various chapters in their progression and reciprocal relationship.

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[2] An operational definition and distinction between practice-based and practice-led research, can be found on the 'Definitions' section, on page XV and XVI, and also in Candy (2006) and on Creativity and Cognition Studios' website (2016)

1.1 - From Stage 1 to Stage 2 – The evolution of a PhD

The research for this PhD can be described as a developmental journey, started along a model of practice-based research in the crafts[3], aiming to explore the potential of emitted light as an innovative 'material' within the field of jewellery design, and subsequently evolved into an interdisciplinary practice-led enquiry, focused on developing and testing a method of visual research for the preliminary stage of the design process.

Sometimes in research it may be that a topic, that at the outset was expected to be of minor importance, acquires a greater significance in the course of a project (Darke, 1984). This is precisely the story of this PhD. The methodological aspect, that in the initial research remit appeared to be instrumental for the development of a practice-based enquiry, became over time the real protagonist and also the main contribution to knowledge of the investigation.

This thesis will present the research following its true narrative, as a journey unfolding from one idea of doctoral research to a different one. This shift, that will be referred as the passage from <u>Stage 1</u> (the practice-based project, aiming at exploring light as a new material for Contemporary Jewellery design) to <u>Stage 2</u> (the practice-led enquiry on the development and testing of a method for visual research), does not represent an abrupt diversion from one PhD into a diametrically opposed one; it is rather the uncovering of a more significant problem (Stage 2) *within* the problem of the initial research (Stage 1).

For clarity, this is illustrated in Figure 2, where this PhD is depicted as a set, in an onion-like juxtaposition of areas: the outer red circle represents the research proposed in Stage 1, enclosing its key areas of research development—

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[3] For examples of doctoral practice-based research in crafts and particularly in jewellery design and related subjects, see for instance (Astfalck, 2007; De Ruysser, 2009; Kettley, 2007; Kim, 2015; Lucero, 2009; Niedderer, 2004; Oberlack, 2011; Wallace, 2007; Williams, 2009)

Problem, Context and Method (Candy, 2006)—and the inner small red circle represents Stage 2 (the method-based research), positioned as an area of interest grown inside the methodological aspect of Stage 1 (IA – Intuitive Approach) and focused on the development and testing of the Grounded Visual Analysis (GVA) method.
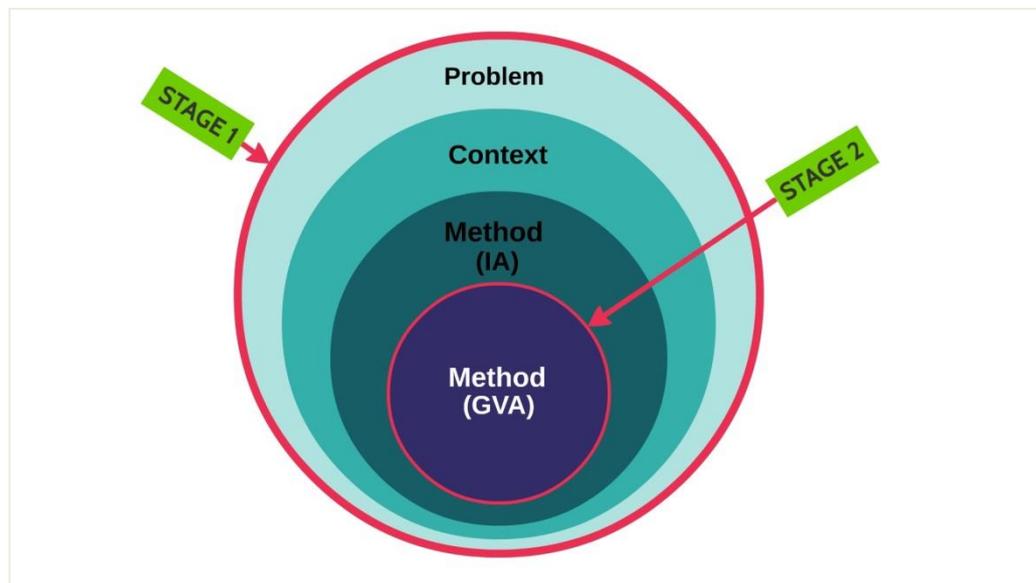
Figure 2 - The relationship between Stage 1 and Stage 2

Figure 2 needs to be imagined as a three-dimensional illustration, where by zooming in and 'entering' the blue area of Stage 2, we will find a new, circumscribed research project, where Stage 1 will assume the role of the contextual landscape, surrounding and sharing with the new project part of its Problems and Context areas. In this sense, it is possible to say that Stage 2 is a *derivation* of Stage 1 that, whilst sharing many aspects with it, has evolved into a new research project in its own respect.

Focusing on a problematic aspect of a project and uncovering the existence of embedded 'sub-projects' worthy of deeper investigation or even precedence, is a rather common occurrence in Art, Crafts and Design studio practice. In my professional career as a fine artist, for instance, I have encountered several situations where certain constructive, structural or aesthetic results could not be achieved easily—if at all—with the tools or equipment available to me at that moment.

When the tools at hand are unsuitable, the possible options are either to proceed with the work and to adapt one's expectations to the results attainable with unfit tools, or to consider a diversion from the main project in order to find, or to devise better tools for obtaining the desired result. It is not uncommon for artists or craftspeople to personalise or even to design and make new tools to suit the needs of very peculiar situations.

In light of the initial project, this toolmaking process could mean an absolute diversion, as it might lead to a rather complex or time-consuming detour. The level of complexity and time necessary for completing this detour could, indeed, transform it into a secondary and independent project on its own. It is up to individual choice to evaluate whether this diversion is necessary, desirable or avoidable, and this subjective evaluation is, in turn, influential upon the results obtainable with the main, initial project, together with its potential development.

This analogy serves to illustrate one fundamental concept underpinning the apparently drastic change in focus and direction of this research: one main project can include secondary aspects that, at some point, might become unconvincing or unsatisfactory, causing a temporary diversion. This diversion can grow into an independent project on its own, and even though it might appear to lead astray from the initial direction, it has been undertaken for improving the same results that the initial project aimed to obtain in the first place.

Thus, if we consider Stage 1 of this PhD as the initial project with its specific aims (understanding how to use light as a new material for designing Contemporary Jewellery), and the method used for achieving them (the Intuitive Approach, or IA) as the unconvincing or unsatisfactory tool, then Stage 2 represents the 'toolmaking process': a secondary, derivative project born and grown within and from the initial project, out of the necessity of devising a custom-made and better tool.

Once the objective of the secondary project is achieved (the custom-made tool designed, built and tested), it is likely that that the initial project is resumed and the original objectives are pursued using the newly designed tool,

with the expectation of achieving the better results. In the case of this research, the 'detour' of Stage 2 for the development of a tailor-made method for preliminary visual research, was indeed initially conceived as a temporary diversion, that would eventually flow back into the resuming of the practice-based objectives of Stage 1.

However, it has been during the evolution of this diversion that the complexity and depth of this methodological investigation have progressively unfolded, revealing a greater scope and potential to become a more significant and far-reaching contribution to knowledge than the initial practice-based exploration on an innovative material for designing jewellery.

The enquiry of Stage 2, has over time grown in scope and importance, becoming eventually the real core and definitive outcome of this research. This has caused me to question and to reconsider several times the pertinence and utility of returning, in the research design of this PhD, to the initial practice-based objectives of Stage 1 after having completed the methodological detour of Stage 2, and to use the new GVA method as a design tool for producing more jewellery.

As it will become clearer along the discussion of the thesis, the new research scenario developed in Stage 2 has indeed shifted not only the context, but also the fundamental questions that this research has attempted to answer: if in Stage 1, the research question, (and related outcome) was of creative and practical nature ('*how can light be used as a new material for designing Contemporary Jewellery?*'), in Stage 2 the question has become purely methodological ('*how can images be systematically analysed in the preparation phase of the design process?*'), so even the outcome had to be reconsidered and realigned with this structural shift.

This is why this PhD is concluding with the achievement of the objectives of Stage 2, offering as its main contribution to knowledge the development and practical testing of a new method for preliminary visual research together with the procedural and reflective aspects that are connected to it. The fact of resuming, after this, the initial practice-based objectives of Stage 1, and applying

the newly developed method for designing and producing more jewellery artefacts, has to be framed as a subsequent project that could be pursued afterwards as further research, but is outside of the remit of the present PhD.

In the same way, the questions underlying Stage 1 and Stage 2, if compared, might seem very distant and reciprocally unrelated, but on the contrary, they are very closely linked, since the methodological problem at the core of Stage 2 was also present in Stage 1, even though so implicitly that it ended up not being perceived and dismissed as something 'outside' of the research remit.

The dualisms and contrasts between Stage 1 and Stage 2, practice-based and practice-led research, crafts-based or methods-based enquiry that will accompany the discussion throughout the entire thesis, represent, as a matter of fact, the constant questioning and intimate and personal dialogue underpinning the evolution of this research, that has not to be seen as a hybrid project caught between two stages and two PhD researches, but as an organic continuum.

It is therefore necessary to start the thesis' narrative by presenting the practice-based project of Stage 1, in its genuine and original formulation (and not in hindsight). This, not only for respecting the true chronological progression and development of the research—and to give some recognition to the copious work produced in that Stage—but mostly for clarifying the real context from which the dilemmas and issues motivating the methodological quest of Stage 2 have arisen. Hence, the continuous references and parallelisms recurring in the thesis between the two Stages and the two methods (IA in Stage 1 and GVA in Stage 2) will be clearly framed as the inevitable and intimate comparative conversation occurring in the background during the development of the new method in Stage 2.

For the practical development and testing of GVA (Chapters 4 and 5), the same visual theme (Lighting Wearables) analysed in Stage 1 with the IA has been deliberately chosen a second time. The reason for this is for further evidencing the conversational and relational aspects of the two Stages and two visual methods. Stage 2 and GVA have originated *within* and *because of* Stage 1 and the

flaws of the IA, and it has been by constantly reflecting and referring back to the methodological issues of Stage 1 that the direction for Stage 2 has been checked and constantly adjusted along the way.

The choice of working within the same visual theme of Lighting Wearables in Stage 2 has also implied that new roles had to be reassigned to similar elements in a new equation: the aim of Stage 1 (investigating how light could be used as a new material in Contemporary Jewellery) has shifted in Stage 2 to the role of case-study, from subject to object, for the scope of testing the effective applicability of the GVA method on a concrete design situation.

The results of the unstructured and implicit visual analysis performed in Stage 1 with the IA were important in the light of the practice-based nature of the project, as they represented the design criteria for formulating a design brief[4] and to produce new jewellery artefacts. However, in Stage 2 they have become less important, except for demonstrating that GVA, as a method, allows to reach a higher level of richness and detail in this respect (Chapter 5). Central requirements in Stage 2 were to reflect and to make explicit the origin of these design criteria, to investigate the processes behind the elicitation of underlying patterns from the visual analysis of artefacts, and to highlight the background functioning of the entire analytical process.

The real focus (and intended contribution to knowledge) of GVA is rather to be found in the potential of the method to expose, and disclose—not only to the research community, but mostly to the artists-designers performing the visual analysis—the underlying assumptions, very often tacit, intuitive or inconspicuous, standing at the root of the visual analysis itself. The implications of this higher level of explicitness and awareness will be discussed in Chapters 4, 5 and 6 and are to be considered as the most interesting aspects and contributions to knowledge brought by this research, along with the development of the GVA method itself.

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[4] An operational definition for 'Design Brief' as used and intended within this thesis, is provided at page XIII in the 'Definitions' section.

Despite GVA being more structured and systematic than its 'ancestor' IA, it strongly depends upon the same level of subjective apprehension of visual data (artefacts or their photographs). It still applies to the realm of the intimate and reflective monologue happening behind the metaphorical 'closed doors' of many artists' or designers' practices, where at the origin of inspirations, creative choices or design styles there are implicit and subjective assumptions that, too often, remain undisclosed to the world, and might as well be unknown to the artists/designers themselves.

The crucial point is that GVA allows the emergence of some of the analytical aspects that in the IA were submerged or taken for granted, therefore not fully functioning at a conscious level. In Stage 1 these aspects were *passive* influential factors, while in Stage 2, GVA stimulates them to become *active* factors of influence, determining a further level of depth in the analytical process.

It is the explicitness required by the process of GVA itself that stimulates the researcher to become aware of possible incongruences, inconsistencies or gaps in the data analysed and to question personal biases in the elicitation of the patterns emerging from the analysis, so as to intervene upon them, in order to further refining the analytical process. The constant, iterative dialogue between data, researcher and emerging visual patterns allows to modulate in real time the quality of the collection of data and their analysis, obtaining a more controlled and articulated set of results. The analytical process, as a whole, is conducted with a higher level of alertness, leaving a minor space for evaluative processes happening below the radar of the researcher's awareness.

Reflective practice (Schön, 1983) is an integral part of the creative *modus operandi* of many artists and designers and deeper levels of reflection and analysis into one's own apprehension and insights on a given theme or subject can introduce additional layers for further reflection *in action* and *on action*, in a spiral-like progression that can enrich and fine-tune the subsequent phases of the creative process. 'Explicit subjectivity' is, in a nutshell, the core characteristic of the GVA approach and its main innovation over the IA, adopted in Stage 1.

INTRODUCTION: FROM PRACTICE TO METHOD

1.2 - Practice as/in *Academic* Research vs Practice as/in *Studio* Research

The shift from Stage 1 to Stage 2, from practice-based to practice-led research, from crafts to methodological enquiry, and the consequent evolution of the final outcome and contribution to knowledge of this PhD, has to be framed, at the same time, within the general context of academic research in the creative disciplines, where practice is often presented as part of the research outcome, together with a written thesis.

The debate on the role of practice in academic research is ongoing and lively, counting on a number of authoritative voices for different perspectives[5]. Feast and Melles (2010) report that "there is considerable variation, disagreement and misunderstanding across universities internationally regarding the nature of practice-based research and in particular how it relates to doctoral education in design" (p.1), after conducting an in-depth review of the literature underpinning the main epistemological positions with regard to the nature of research in design (and ultimately regarding how practice is considered *in* or *as* academic research. Biggs and Büchler (2008b), with regard to the nature of practice-based research have pointed out that "the debate that has lasted for fifteen years in the United Kingdom may indicate that the question itself is unanswerable", and that this could be because the question is "a poorly constructed one"(p.7), as practice-based research should be *Situated* in relationship to other forms of academic research in other disciplines, avoiding an *Isolationist* position, that is, to consider it "an independent subject in which we can define for ourselves what research means and we will do so without reference to anything else. (p.6).

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[5] More on different positions with regard to the role practice in academic research can be found in (Archer, 1984; Barrett & Bolt, 2007; Biggs, 2004a; Biggs & Büchler, 2008a; Cross, 2001; Durling, 2002; Durling & Niedderer, 2007; Frayling, 1993; Friedman, 2003, 2008; Langrish, 2000; Niedderer & Roworth-Stokes, 2007; Scrivener, 2000, 2002; Chris Smith, 2004; H. Smith & Dean, 2009; Sullivan, 2009, 2010) and also very recent discussion threads of PhD-Design Jiscm@il Email Discussion list, retrievable from the archives, for instance these (Friedman, 2017a, 2017b)

The discourse around the role and importance—in terms of research structure and outcomes—that practice should or might have in doctoral research is at the basis of the issues and dilemmas underlying the shift of this research between Stage 1 to Stage 2. Can practice *alone* speak enough be accepted as the outcome of academic research? Is practice *in itself* research, is it just *a part of* it, or is it complementary but separate from it? To what extent must writing accompany practical work in order for it to qualify as research at academic level?

Reflecting on my position with regard to this issue has been an important part of the research journey, because these questions have determined the developmental nature of this PhD, especially in terms of the different roles and 'weight', in thesis' terms, of the practice developed in Stage 1 (a series of jewellery artefacts), and the practice developed in Stage 2 (the development and systematic application of GVA on a case-study).

My position and awareness has greatly changed during the evolution of the research and in order to present it, it is necessary to postulate an initial distinction between 'practice as/in *studio* research' and 'practice as/in *academic* research'[6]. This is important and pertinent to my research because not only does it reflect the dualistic nature of my experience as a professional practitioner and as an apprentice researcher, but also because it explains why the necessity of providing a more transparent account of the processes underlying the methods of visual analysis at the root of my practice has progressively become so crucial to justify a shift in the focus of the PhD, and the consequent passage from Stage 1 to Stage 2.

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[6] The *as/in* alternative deliberately juxtaposes two different readings of the same phrase, synthesising two positions at the opposite extremes in the debate on the role of practice within a research context: 'practice *as* research' and 'practice *in* research' (academic or studio). The difference is not so slight because 'practice *as* research' implies that the practice *is* the research, or at least it constitutes a good part of it, whilst 'practice in research' refers to the role, or position that practice could have *with regard* to research, thus implying that research is fundamentally something else, and practice occupies a corollary position. As it will become clearer during the discussion of the thesis, my position has diametrically changed along the shift occurring in the PhD itself, starting from a strong practitioner's perspective where I centralised my creative practice as 'the research', and ending at the opposite extreme, with my creative practice being almost accessory to 'the research', consisting of a written thesis about a new visual method and its practical application.

My personal experience is very similar to that of other artists and practitioners, who first have familiarised themselves with one idea of research from their professional perspective and only later have approached the academic world, where research presents different and more complex nuances. At the end of my doctoral journey, I do not believe (as I did at the outset) that research within an academic context is, can, and should overlap to research within the space of a professional artistic or design studio. In my current view, even if, or when, the general aspects, the content or the outcomes of these two instances of research could hypothetically coincide or intersect, the presuppositions and purposes would remain very different and distinct.

There are aspects, such as communication, transferability, dissemination, criticism and transparency, together with rigor and systematicity, that I see as necessary in academic research, while not so necessary in research conducted for professional practice, so in this sense they can be seen as discriminating factors between researching for academia or researching for professional practice.

I believe that, in the creative disciplines, practice is *a form* of research (as it can lead to new discoveries, apprehension, insights and knowledge), however, for it to be considered a form, or a part of *academic* research, it has to be made thoroughly transparent, communicated and made available for the wider community of peers to critically appraise it, validate it, understand it, share it and even possibly replicate it. In this sense, my position is fluctuating and liminal: I concur with what Biggs and Büchler (Biggs & Büchler, 2008b) call the Situational position, as I believe that academic research in the creative disciplines should adapt and share equal standards with research in other disciplines (position that is sustained by objectivist epistemologies and less rigidly by constructionists), but

in terms of research in professional practice I maintain that an Isolationist position (subjectivist) might be accepted.[7]

As an apprentice academic researcher with 30 years of artistic professional experience, I came eventually to the conclusion that, more than in the development of the practice itself, it might be in the degree of explicitness, rigor and depth of communication *about* and *around* that practice that the key factors distinguishing 'practice as/in *academic* research' from 'practice as/in *studio* research' are to be searched. While in a professional context it is the practice, the creative outcome, that tends to lead and to centralise the attention of the artist-designer-maker and of its public, in an academic context all the processes about and around the practice are equally, if not even more important than the practice itself.

It is, in fact, the recipient towards which the research and the practice are directed that, in a sense, justifies and explains the difference in the levels of rigor and transparency that are required around that practice: in the case of academic research, it is the entire academic community of peers that represents the ideal recipient of the new knowledge generated through the practice, so every aspect of it must not be kept private and exclusive to the researcher/practitioner alone; in the case of practice as/in studio research, it is the practice itself, instead, that is the protagonist, so the levels of disclosure of corollary aspects around or about it can become of secondary importance and are not necessarily to be communicated or shared with the general public.

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[7] Crotty (1998) makes a clear distinction between objectivist, constructionist and subjectivist epistemologies (p. 4-5) and positions them at the basis of a four-layers scheme that grounds the choice of research methods in a coherent continuum founded on the epistemology, which determines the theoretical perspective, which determines the methodology, which determines the methods. At the same time, he affirms that these positions are to be seen along a spectrum and not as watertight compartments (p.9). Objectivism affirms that reality has an intrinsic meaning independently of the mind observing it. Research is a form of discovery of meanings that are objectified and only wait to be uncovered. Constructionism holds that there is no objective truth to be discovered, but it is the mind that constructs meanings, and it does so by interacting with the world, therefore different people in different social situations will construct different meanings. Subjectivism moves this discourse even further, maintaining that meaning is imposed by the mind to the world without any form of interplay. Biggs and Büchler (2008b) have used Crotty's model and framed according to it the epistemological positions of design researchers and theorists in terms of the role of practice in academic research, concluding that a subjectivist perspective (Frayling, 1993) separating design research from established models of research aligns with an Isolationist position, while constructivist models such as Cross' (2001) or objectivist as Friedman's (2003, 2008) are in line with a Situated approach.

This consideration is very important because it represents the trap I could not see in Stage 1 of this research where, given my predominant experience as an artist and my inexperience as an academic researcher, I approached the PhD like a practitioner would do, and not like a researcher would. I centralised all my efforts with the objective to get to an outstanding practical result, and I indeed ended with a series of 29 lighting jewellery models (see Appendix A), representing a wide range of visual responses to my question regarding the use of light as an innovative material for designing contemporary jewellery. Considering the practice-based model of doctoral research in jewellery I referred to earlier, I evaluated this result as extremely fruitful, so I thought that all that was left in order to frame this result as academic research was to complement it with a written commentary. I slowly realised, though, that (what I thought it was) my successful practice was standing instead on very weak grounds since I failed to notice that there were fundamental aspects at its very root that I completely overlooked and that I could not even explain to myself, let alone to others.

In particular, the preliminary visual research process (IA - Chapter 2) leading me to the development of that practice was based on evident assumptions that I could not justify or trace back at all. I could not clearly explain how the 'visual research' itself was performed: it started with a 'given' set of criteria for image collection, but I could not tell explicitly where these criteria came from; I could not explain what, how many or how the images had been actually analysed; I even derived a series of visual patterns, and design criteria that started the design development of the final 29 jewellery artefacts, but again, I could not explain how these criteria were generated. In other words, not only could I not get to the very root of my own visual and creative process, I was not even aware of my unawareness.

In a professional context I would have never realised the existence of an unknown world at the root of my own practice, as I would never need to question the 'whys' or the 'hows' so deeply behind all my visual choices, as long as my visual methods would help me to develop practical work that would remain convincing for myself and my public. At the same time, I would never

INTRODUCTION: FROM PRACTICE TO METHOD

provide myself with what turned out to be, in Stage 2, an invaluable source of insight and creative inspiration that, otherwise, would have remained completely unavailable to me.

At this point, this reasoning seems to present a very simple and straightforward condition as the requirement for practice to be evaluated as part of academic research, rather than as part of studio research: that of being treated as a means and not an end for sharing new knowledge with a community of peers, through explicit communication and disclosure of all aspects about that practice. This, however, is actually far from a simple and straightforward condition to realise, *in practice*. In fact, it is difficult to define, measure and establish what is meant by 'explicitness' and even by 'practice' in the first place, as both concepts, on closer inspection, turn out to be extremely elusive.

On the one side, there is the issue of clarifying what is intended by 'explicitness', in an absolute sense, and also how it could be measured or evaluated, and what the correct level, extent, or the degree of explicitness necessary or sufficient for discriminating between academic and non-academic practice-as-research should be. How explicit is explicit? Where does one start and where does one end in the quest for transparency?

On the other side, there is the issue of clarifying what is intended by 'practice', and even in this case, aiming for an absolute definition can become problematic, as it is difficult to establish clearly what this practice is supposed to be, where it should start and where it should end. For instance, when an artist or designer develops a series of artefacts as part of a practice-based project, is 'the practice' circumscribed to these objects alone? Does this practice include only the three-dimensional matter, its processes of manipulation and refinement and does it end with the final version of the completed artefacts? Does it instead start within a sketchbook and does it end in the glass case of an exhibition, including the public's apprehension of the finished artefact? Or does it even start earlier, within the realm of the intimate thoughts crowding the designer's mind, long before the first line on paper was drawn?

It is even more difficult to attempt to combine these two undefined and elusive concepts and to assume that, in order for practical work to gain the status of academic research, it would be necessary to just be 'explicit' (in a non-better defined sense) about 'practice' (in a non-better defined sense). This would turn out to be in an extremely weak and troubling starting position.

For this reason, I will propose a form of relative definition, or interpretation, of these two concepts that should help to guide the discussion and the evaluation of the level of explicitness with regard to the practical work first performed in Stage 1 and then evolved in Stage 2, in terms of what, in this research, has been considered 'practice as academic research'.

The proposed interpretation of the concept of explicitness will be limited to the *awareness and intentionality* with regard to the necessity of disclosing, commenting and communicating corollary aspects of 'the practice' (see further for the proposed definition of practice). This intention, or awareness, is here considered in simple binary terms, so either as present or non-present, independently from its higher or lower degree of actuation. In other words, any aspect about or around the practice where it is possible to recognise an *awareness* and *intentionality* regarding the necessity of its communication and disclosure will be considered 'explicit', while any aspect of the practice where, on the contrary, this necessity has been overlooked (intentionally or unintentionally), will be considered 'implicit'.

Regarding the reach and definition of the term 'practice', this will be limited and referred to the different connotations that this term has assumed in the two Stages of the research.

In Stage 1, the aspects defining the practice can be ideally expressed in a four phases process, as illustrated in Figure 3:

A - **Preliminary Visual Research** ('Lighting Wearables' and 'CJD' themes)

B - Elicitation of **Visual Patterns/Criteria** (from the Visual Review)

C - Development of a **Design Brief** (from the Visual Patterns/Criteria)

D - **Design/Production** of a range of jewellery (from the Design Brief)

Figure 3 shows these four phases from top to bottom, on the left side as they were developed and expressed in Stage 1 and, on the right side, in Stage 2. They are represented in the figure as a linear scheme for comparative reasons and for evidencing the 'weight' and role that each phase has assumed in Stage 1, in contrast to Stage 2 (in truth, the process *per se*, starting from A, and moving towards D, is circular and recursive, rather than linear, but this will be better explained in the next chapters of the thesis).
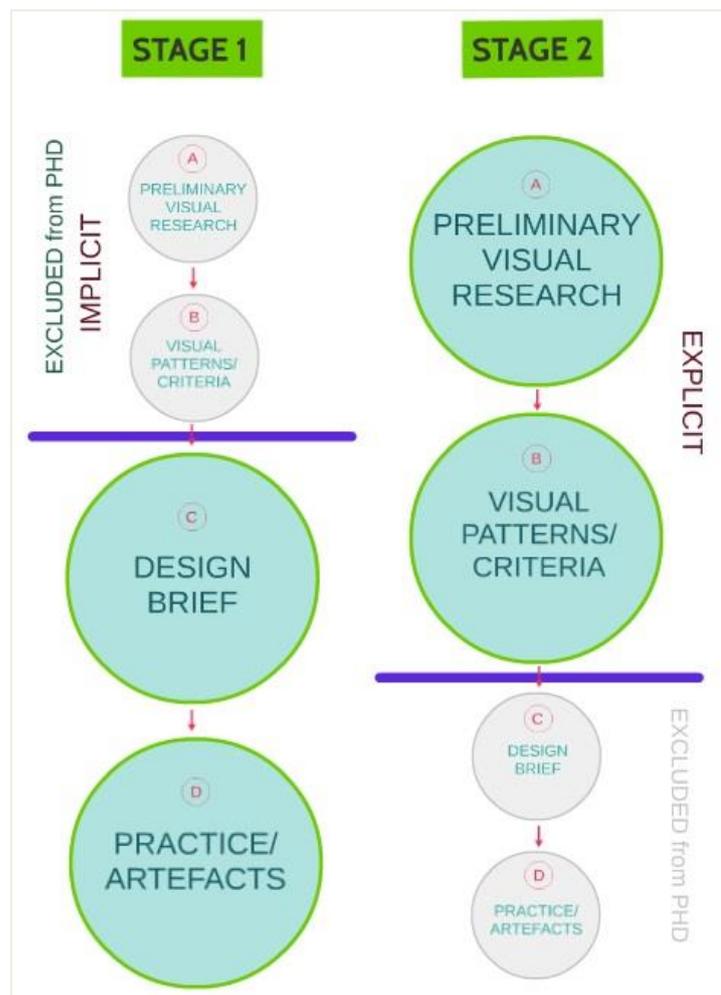
Figure 3 - Positioning and meaning of Practice in Stage 1 and Stage 2

It is possible to notice that in Stage 1, the first two phases (A and B) are represented by two small grey circles separated by a horizontal line from the other two phases (C and D) in bigger colourful circles. The horizontal line works as an ideal 'watershed' separating the first two phases that were overlooked as if excluded from the PhD remit.

In Stage 1, only the two last phases were actually developed and considered to be part of 'the practice' to be shared and documented for the research, while phases A and B remained implicit and underdeveloped because of a lack of *awareness* about their role in terms of contribution to knowledge, and about the importance of their disclosure. In fact, they were overlooked as they were perceived to be somehow 'outside' the remit of the research. Although they represented the bases upon which the design brief (C) and the consequent practical production of jewellery artefacts (D) were developed, they were taken for granted as something 'given' and dismissed without further questioning.

In Stage 2, as Figure 3 shows, the situation is reversed: phases A and B are represented by the big coloured circles (meaning that they have been explored and documented as part of the PhD remit), while the 'watershed' line signals the 'end' of the PhD research, and phases C and D are represented by the small grey circles, as they are considered to be 'outside and after' the PhD remit.

In Stage 2, 'the practice' assumes a different meaning, as it does not concern the production of physical artefacts, but it is focused on the quest for a rigorous method for Preliminary Visual Review (A), and on its systematic application on a case-study, in order to explicitly elicit Visual Patterns and Criteria (B) for the subsequent phases of the design process, as it happened in Stage 1.

The practice in Stage 2, therefore, can be seen as a more 'theoretical practice', that has been purposely developed for documenting and investigating the very aspects that in Stage 1 were missing and overlooked in terms of explicit communication about the 'practical practice'. This is why the entire Stage 2 has been focused on the integration of phases A and B, and it has stopped at the completion of this purpose. Stage 1 and Stage 2 are therefore complementary, rather than opposite, and they are to be seen as the two sides of the same coin, or two aspects of the same research continuum developed in two subsequent stages.

This has inevitably shifted the nature of the research as well, because the focus of Stage 2 has moved from creative practice to visual methods, and this has also modified the kind of contribution to knowledge being pursued, from new knowledge "by means of practice and the outcomes of that practice" to new knowledge having "operational significance for that practice" (Candy, 2006, p. 1), thus decontextualising the significance of including and developing a second time the phases C and D (the most design and practice-centred ones) as integral parts of the research. Even though they indeed represent the logical continuation of phases A and B in the same A-to-D developmental structure that sees Stage 1 and 2 as the first and last aspects of the same continuum, they could represent the ideal starting points for a new, further research project (an ideal Stage 3, closing the A→B→C→D→ circle and returning iteratively to the initial purpose of Stage 1, but on a higher level, as in a spiral-like process), resuming the initial practice-based project (as in the toolmaking analogy), with preliminary presuppositions derived by using the newly developed GVA tool (the outcome of Stage 2).

1.3 - Thesis structure and content

This thesis has been structured according to its true narrative, by presenting the evolution between the two Stages as a continuum (see Visual Synopsis on page V for a quick glance at the chapters' content).

Chapter 2 will present the practice-based research of Stage 1 in its original formulation, introducing the rationale, aims, problems, questions and contextualising it within the field of Contemporary Jewellery design in relation to the innovative use of materials, with a focus on light and its contextual use in other body related fields such as Fashion, Product design and Wearable technologies. It will present the Intuitive Approach (IA) as it was actually applied in Stage 1, through the formulation of the image collection criteria, the elicitation of patterns and design criteria, the development of a design brief and the production of the 29 working models of lighting jewellery responding to the original research question.

Chapter 3 signals the shift towards Stage 2 and will concentrate on the methodological recontextualisation of the research, reflecting on the flaws and merits of the IA and starting a new quest for finding a more rigorous and explicit method for performing preliminary visual analysis. Here, visual research will be positioned within the design process and some methodologies will be discussed, in particular data-driven methods from the Social Sciences, eventually focusing on Grounded Theory as the most structured method to be adapted for developing a new, custom-made approach to 'visual research'.

Chapter 4 and 5 work conjointly in presenting in detail the core of this research, Grounded Visual Analysis (GVA), the method developed and offered as major contribution to knowledge. Some aspects have been presented more in depth in Chapter 4 and others in Chapter 5, depending on the nature of the aspect being more theoretical (Chapter 4) or practical (Chapter 5). For this reason both chapters have been developed along a sequence of sections and sub-sections that follow an ideal continuum, starting from pure theoretical reasoning and ending with pure practical application of the method.

Chapter 4 will introduce the genesis of the method, analysing all the aspects and procedural steps of the IA and developing their counterpart in GVA, so that it will become clear how GVA represents an evolution, a more advanced version of the IA, in structured and rigorous terms. Then, the main procedural traits of Grounded Theory will be considered individually as they were presented in Chapter 3, and 'translated' in visual terms, developing the definitive GVA procedure, so that the points of similarity and difference between Grounded Theory and GVA will be highlighted, and it will become clearer which GVA aspects are directly influenced by Grounded Theory and which are original and unique to the new method. Moreover, this theoretical discussion will serve as an introduction and necessary companion for the further discussion of Chapter 5.

Chapter 5, will take the theory and put it into practice, by demonstrating how GVA can be used on a concrete design case for performing preliminary visual analysis. As anticipated, for comparative reasons the theme chosen for performing this practical test of the method is indeed the same visual theme that

was central in Stage 1, Lighting Wearables. Chapter 5 will demonstrate each step of the analytical process, starting from the collection of data, their organisation from image archives into databases, to the use and adaptation in a visual context of qualitative analysis software (QSR NVivo®), to the actual step-by-step analysis of the Lighting Wearables database, with the emerging patterns and categories. Reflections and comments will accompany this practical testing, especially with regard to the richness and depth of the results progressively emerging from the analysis, and on the influence that these results may imply in terms of creative and reflective practice.

Chapter 6 will draw the conclusion of this complex but fruitful journey, resuming the original contributions to the disciplinary or interdisciplinary knowledge offered by this research and suggesting more avenues for further research.

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CHAPTER 2 - STAGE 1 - IA - A PRACTICE-BASED APPROACH

Introduction

This chapter will concentrate on the practice-based research conducted in Stage 1. Other than presenting the rationale, the problem, question and the context from which this research originated, the chapter serves to set the scene for the shift towards Stage 2 that will be discussed from Chapter 3 onwards. Particularly significant is the method of preliminary visual analysis adopted in Stage 1 (the Intuitive Approach, or IA), from which the dilemmas leading to the shift to Stage 2, have arisen.

The journey of a PhD spans over years of academic, professional and personal life and the stage of thesis writing occurs at the very end of a developmental continuum. For this reason, this thesis intends to follow chronologically the true narrative of the research, so that its evolution will be presented as it unfolded, evidencing also its initial naiveties and grey areas. Therefore I have resisted the temptation to present the work conducted in Stage 1 in hindsight, avoiding reinterpretations in a retrospective view. Whenever some reflection with regard to today's perspective have been deemed necessary, a footnote has been added, with the specification of it being a 'retrospective note', in order to distinguish the reasoning made with today's perspective, from the discourse contained in this Chapter, that directly referred to the initial Stage of this PhD (2010 to 2012, approximately).

In this chapter I have also refrained from anticipating aspects of the research that in Stage 1 were not yet perceived as significant, or even noted as being part of the research remit. This is the reason why some procedures presented here can appear as coming 'out of the blue', since this is precisely where they came from, at the time this research began. All the reflections and evaluations *a posteriori* about Stage 1's work will be presented from Chapter 3 onwards, following the real emergence of a deeper level of awareness about the most implicit and problematic passages of this enquiry. They will represent an ideal bridge connecting the implicit approach of Stage 1 with the explicit development of Stage 2.

Since the passage from Stage 1 to Stage 2 implied a rather radical change in the very foundation and perspective of the entire PhD, I had to re-evaluate several times, in the process of writing the thesis, the relevance and the relative space to be allocated to the work performed in Stage 1, in the light of the ultimate importance of Stage 2. For instance, the contextual review conducted in Stage 1, has been abundantly reduced here (section 2.3 and sub-sections) since it was relevant for the development of new jewellery practice, but it was not significant for the methodological shift of Stage 2.   Similarly, a detailed presentation about the practice produced as the outcome of Stage 1 has been entirely removed from the thesis and moved to Appendix A, since the creative production of jewellery artefacts was consistent with the aims and practice-based model of Stage 1, but no longer with the practice-led methodological development of Stage 2.

It can be said that, if the apparent U-turn occurred to the foundations of this research appeared initially to imply a painful loss in terms of thesis' space and recognition to be given to all the work and the time spent on Stage 1, over time I came to the realisation that this time and work was not lost at all. It had instead provided the new context, the breeding ground, from which a more mature research problem emerged, leading me to Stage 2 and GVA. This evolution mirrored as well a parallel process of personal growth, moving me from the perspective of an art and design practitioner approaching academic research (Stage 1) to the position of an academic researcher, retracing and reflecting on the methods at the basis of my art and design practice (Stage 2).

2.1 - Stage 1- Rationale

This research derived from my lifetime interest in lighting design, developed professionally in the early 90s through sculptural work, and evolved over time through several collaborations in architectural and interior design

projects in my native country, Italy[10]. Aside from an innate fascination for the ethereal and magical qualities of light and its emotional and atmospheric effects, a further evolution of my work moved me to design and produce objects of increasingly smaller dimensions, with the ultimate step in scale reduction—in the form of jewellery artefacts—occurred around the early 2000s.

At the time, I used to create mock-up models for my sculptures, in order to preliminarily assess their possible effects and results, and by pure chance I envisioned the potential for these small-scale versions of bigger objects to be reinterpreted and worn on the body as pieces of jewellery. I had no specialist knowledge in jewellery design, but, given the unexpected success of my 'recontextualised' jewellery, I thought about seriously studying jewellery design, after receiving an offer for a place at Central Saint Martins College of Art and Design in London.

Central Saint Martins is renowned worldwide for having brought out some of the most cutting-edge artists and designers of our time[11], especially in the fashion industry, and for promoting an 'outside the box' approach to design ('Pushing the boundaries' used to be the University's motto, and constant mantra, during my studies). Unsurprisingly, this atmosphere shaped my creative philosophy as well, making the quest for unexplored or under-explored areas of visual research in Jewellery my personal mission.

By progressively familiarising with the wider landscape of jewellery design from an historical, geographical and economic point of view, it became clear that, in order to find a space for developing innovative work, I had to start from exploring the artistic movement of Contemporary Jewellery, an internal current

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[10] More on my artistic background and some of my work can be found online on my website (2017).

[11] More on CSM graduates and alumni can be found the University of the Arts London website (2017) and, for instance, in (McClatchey & Murray, 2011) and (Lightfoot, 2015)

born around the end of World War II in the wake of the artistic revolution set off by Modern and Contemporary Art within the wider landscape of the Fine Arts[12].

Contemporary Jewellery originated as a movement questioning and challenging the traditional notion of Jewellery, pushing the boundaries of the discipline and exploring new forms of artistic expression through the jewellery form. Between the numerous sub-avenues developed within this movement, I focused my attention on a particular strand, the exploration of new materials[13] and technologies. Over my artistic career, I had developed a substantial body of knowledge on the use of several materials and their technologies and I was particularly interested in combining this knowledge with the discipline-specific approach on materials of jewellery design.

On closer inspection[14], it became clear that almost any non-traditional jewellery material had been considered or explored by Contemporary jewellers, even though there was not a uniform distribution of practice and experimentation across the various materials. In fact, some appeared to have attracted more interest, while others seemed to appeal to an extremely exiguous number of designers, light being one of the least explored of all.

It seemed almost impossible to me that an element such as light, that I perceived to be unequivocally fascinating, had been substantially ignored by the community of jewellery designers who, at the same time, had engaged over the decades in an almost obsessive quest for 'claiming new land' and exploring new

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[12] A more detailed account on Contemporary Jewellery will be presented in sub-section 2.3.1 and on New Materials in sub-section 2.3.2.

[13] New materials in a relative sense, if compared to materials traditionally associated with the mainstream notion of jewellery, such as precious metals and gemstones.

[14] At this initial stage, 'closer inspection' meant a general review and a 'quick glance' at hundreds of photographs of Contemporary jewellery I had collected over time in my Visual Archives (see sub-section 2.4.1) in order to find confirmation of an instinctive 'sense' about the scarcity of lighting jewellery examples. This 'sense' derived from a form of tacit knowledge accumulated over time by implicitly observing a number of Contemporary Jewellery artefacts through books, catalogues, exhibitions, museums and galleries.

materials, to the point of producing jewellery with the most unimaginable, improbable and even extreme substances or materials[15].

Considering at the same time the public acclaim that artworks, installations and light displays were gaining in many other creative fields[16], I became increasingly intrigued by the strange neglect of light within the jewellery field. I instinctively concluded that light had not been identified as a virgin avenue for innovative work, still, the jewellery artists dedicated to using light as their elective material were so few worldwide (including myself) that they could be literally counted with the fingers of one hand. Moreover, the extreme and contradictory feedback that my early lighting jewellery work[17] had provided me—exalted as 'magical' on the one side and belittled as 'clubbing jewellery' on the other—strengthened even further my conviction that there was something worthy to explore in this direction.

The first observation I made from the initial 'intuitive review' of my Contemporary Jewellery Visual Archive (see sub-section 2.4.1) was that the vast majority of the examples of luminous jewellery I could retrieve and observe were, in reality, *jewellery-like* objects, rather than *jewellery* artefacts in the strict sense[18]. These artefacts came mainly from other markets—such as Fashion, Product Design, clubbing merchandising or novelty items— and even when they were actual jewellery, I could perceive a 'primitiveness' in the use of light and in their overall design, very far from the high level of refinement, complexity, and

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[15] Many 'new' materials, have been nowadays integrated and are considered almost as traditional in jewellery as the iconic precious metals and gemstones (e.g.: wood, glass, plastics, fabric, alternate metals or non-precious stones). Other innovative and unusual materials that have been explored by Contemporary jewellers include, for instance, sugar, salt, chocolate and a range of other foods, soap, ice, snow, foam, fire, plants and flowers, insects or animals, hair, skin, blood, sperm, fat, teeth and ashes. Examples of such work is partially illustrated in anthologies on Contemporary Jewellery design (Astfalck, Broadhead, & Derrez, 2005; Cheung, Clarke, & Clarke, 2006; Cohn & Sudjic, 2012; Den Besten, 2011; Gilhooley & Costin, 1997) or blogs and websites such as Klimt 02 (2017) or The Carrotbox (2017)

[16] First and foremost within the Fine Arts, but also in Fashion, Textile, Product, Interaction, Architectural and even medical design (Kettley, 2007; Oberlack, 2011; Wallace, 2007)

[17] *Galaxy* (2006) series, visible on my website (2017).

[18] A discussion on the definitional issues related to the specific field of jewellery is offered later, in section 2.3 'Stage1-Context' in particular within sub-sections 2.3.1 'Contemporary Jewellery Design'.

materials' articulation typical of the field of Jewellery. In the majority of cases, their overall design and lighting arrangement consisted of a mere juxtaposition of a lighting source above or below a jewellery object, without any evident design strategy for the integration of these two elements, or for the articulation of the lighting effects in the object itself.

Wallace (2007), when talking about digital jewellery (of which 'lighting jewellery' can be considered a sub-category) confirms both of my impressions, stating that

[...] these developments are emerging from outside the field of contemporary jewellery. Consequently digital jewellery is significantly under-explored within contemporary jewellery practice and the emerging developments from other fields present a narrow interpretation of both jewellery and digital technologies. In terms of aesthetics there is a distinct naivety regarding the form, material, connection with the body and scope of interaction of a digital jewellery object (Wallace, 2007, p. 11).

Technological advancements in electronics have allowed a progressive miniaturisation of components (including light sources such as LEDs), facilitating the delineation of a rapidly growing field of new products and research, particularly significant from the design standpoint, known as Wearable Technologies (or simply called 'Wearables'[19]). Being Wearable Technologies an umbrella of design and technology disciplines, they comprehend several design strands, focusing on various technological or functional aspects of wearable devices.

Interactive and electronic technologies open new possibilities for the designing of wearable objects (Buechley & Eisenberg, 2009; A. Dunne, 2006; L. E. Dunne, Ashdown, & Smyth, 2005; Kettley, 2007; Oberlack, 2011; Seymour, 2010; Silina & Haddadi, 2015; Wallace, Dearden, & Fisher, 2007) but not enough focus

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[19] Wearable technologies are also known as wearable devices. wearable computers (one avenue stemmed from Pervasive and Ubiquitous Computing) or fashion technology. They will be discussed the Context section (sub-section 2.3 4).

is given to the merely aesthetic aspects that these technologies can offer on the use of lighting effects, obtainable through a creative use of electrically powered materials and components. Wearable lighting is nevertheless applied and explored in various body-related disciplines, and it stands at the forefront of innovative practice and research in Fashion, Accessories Design, Product and Industrial Design, Interaction Design and even Medical Design. However, there is a lack of specific research on the aesthetic potential of lighting as a visual effect and as an 'immaterial material' in relation to jewellery objects, and in particular within the field of Jewellery.

Wearable devices can assume several aspects and be placed in different positions on the body, still, there is a strong tendency to mimic the forms and body-positioning generally associated with Jewellery (Kettley, 2007; Wallace, 2007). The advent of Wearables has indeed hybridised, from the jewellery-object standpoint, two previously separated fields of practice and theoretical knowledge: on the one side the field of electronic engineering, and on the other side the field of jewellery design and body-related objects. This has created a new category of products that are (or aspire to be) simultaneously jewellery *and* technological devices, while before they tended to be *either* one *or* the other.

This fact alone gives a double layer of reading to the lighting/jewellery relationship: on the one side, light can be seen as an aesthetic and decorative element in an artistic, or ornamental object (Jewellery), and on the other, light can be used as a functional element in a technological device (Wearables). This dichotomy has reinforced the scope of Stage 1's investigation on the use of light in Jewellery since it allows the inclusion of Wearables as an additional category of artefacts interpretable, and visually analysable as part of the 'Lighting Jewellery' theme. This has given me the advantage of collecting more images of artefacts to be analysed during preliminary visual research, given the scarcity of work coming strictly from Jewellery.

This adds a significance to the practice-based results of Stage 1, as the existence of an allied design field parallel to Jewellery, extends and expands the scope of exploring light in this direction. In fact, if it is not so evident that

jewellery designers have succeeded in dealing extensively with lighting and its technology, it is equally not evident that technologists have succeeded in designing jewellery with electronics.

This comes back to the observation on the primitiveness or "naivety" (Wallace, 2007) in the digital technology/jewellery design relationship. As pointed out in an industrial report on the rise and distribution of Wearable technologies, conducted by Beecham Research (2014a, 2014b), the field of Wearables has grown exponentially over the most recent years, but one of its main issues remains the aesthetic factor. Despite the impressive expansion in terms of technological advancement and market distribution, Wearables still encounter resistance in a good portion of the general public, as they aesthetically reflect a stereotypical geeky-looking and futuristic style, traditionally associated with cyber/technological gadgets, thus failing to appeal to a wider public of potential customers, not particularly moved by the idea of tech gear *per se*. Moreover, the general public still fail to recognise such objects as jewellery, even when they are skilfully 'camouflaged' via the heavy use of traditional jewellery materials such as precious metals or gemstones.

It is not surprising that Wallace (2007), talking years earlier from a Jewellery perspective, pointed out this aspect long before Fashion and Marketing analysts came to the same observation:

> Digital jewellery proposals from non-jewellers generally originate from a desire to enable ubiquitous mobile technology use. In such cases the body is predominantly seen as a convenient location on which to place digital devices, and jewellery is conceived as a conventional form of adornment.[…] Similarly, industrial design proposals for wearable technology emphasise a conventional futuristic aesthetic at the expense of a wider conception of the nature of digital jewellery.(Wallace, 2007, p. 22).

This justifies the aim of this research to focus on the use of lighting in ways *congruent* with the level of refinement and articulation that can be seen in the use of other materials in the field of jewellery design. Duke-Woolley and Romeo (2014) advocate and predict the necessity of a closer interaction and collaboration between technologists and jewellery designers in order to develop, in the future, products that will effectively embody a sense of true hybridity

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between jewellery and technological devices, appealing also to a public outside the merely technology-driven market.

Figure 4 provides a visual illustration and summary of the five main aspects of the rationale of the practice-based research of Stage 1.
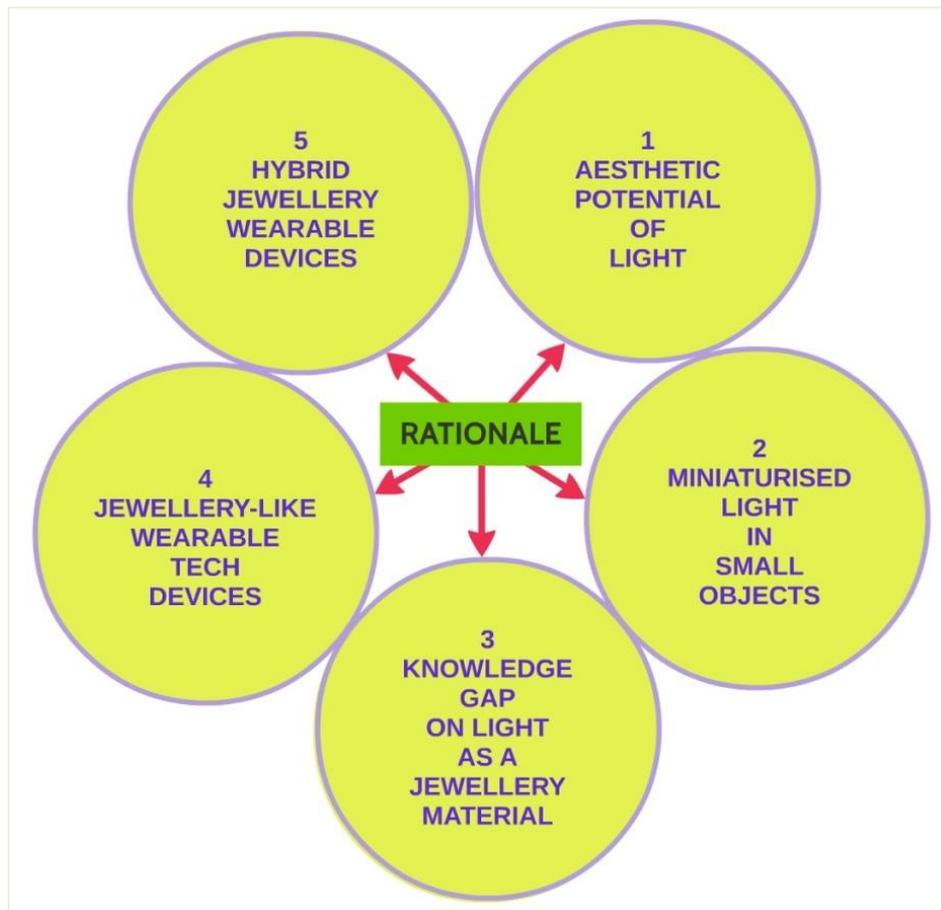
Figure 4 - Five aspects of the research rationale in Stage 1

The rationale of Stage 1 can be summarised as: *1)* light is a visual element compatible with the design of jewellery design thanks to its aesthetic potential, corroborated by the growing interest and exploratory work conducted in other, allied Art and Design disciplines; *2)* the miniaturisation of the available electronic technologies enables the inclusion of lighting in small, jewellery-like objects and devices; 3*)* the gap in knowledge on how to use light for designing jewellery is big enough to justify specific research and experimentation; *4)* the exponential growth of the design field of Wearables has introduced a very contemporary motive for this research, and *5)* there is the necessity to further investigate how light and jewellery can be effectively combined and integrated in order to

originate a new, hybrid category of artefacts, since this has been approached so far only from an electronic engineering standpoint and not from a jewellery design one.

2.2 - Stage 1 – Problem and Question

The main problem of Stage 1 was summarised in the initial thesis title: '*Drawing with light: a practice-based enquiry on emitted light as an innovative material for designing Contemporary Jewellery*'. The title contracts four partially overlapping sub-themes that need to be contextually addressed, in order to get to an understanding of how emitted light can be articulated as a new material for designing Contemporary Jewellery.

The research problem revolves around two main areas of interest: *Jewellery,* on the one side, and *Light,* on the other.

The *Jewellery* area of interest, encompassing two of the four sub-themes: *Contemporary Jewellery*, implying the understanding and definition of CJ in order to contextualise the practice that will be produced as the outcome of Stage 1, and the use of *New Materials in Jewellery*, implying the understanding of the discipline-specific approach on materials, so that light will be treated for designing new jewellery in ways consistent with this approach within the field.

The *Light* area of interest, subtending the remaining two sub-themes: the interpretation of *Light as a Material*, and the understanding of the use of *Wearable Light* in Jewellery and in Wearables.

Figure 5 visually schematises and disentangles the thesis title: the big aqua circle represents the research problem (designing Contemporary Jewellery using light as a new material) that can be reformulated into a question: '*How can light be used and articulated for designing Contemporary Jewellery?'.*
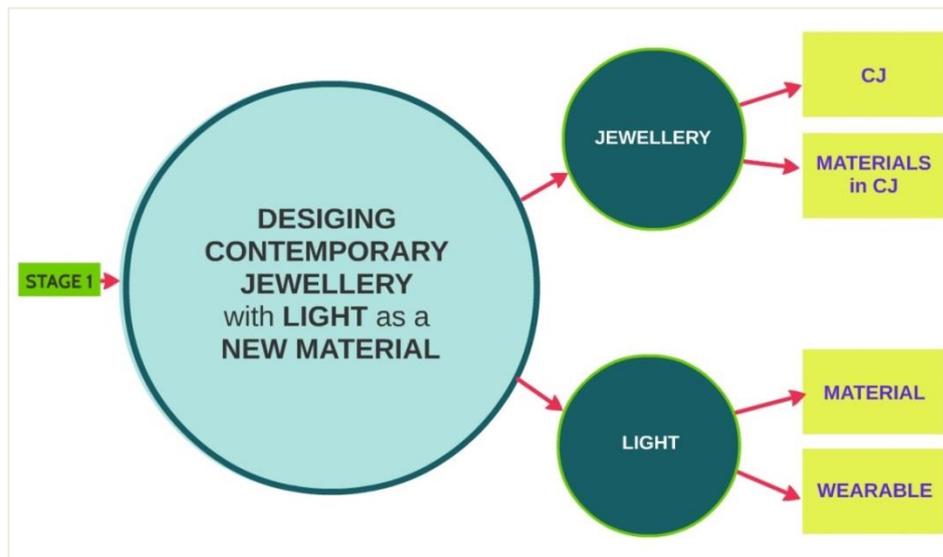
Figure 5 - Research problem, areas of interest and sub-themes in Stage 1

 Observing Figure 5, the two main areas of interest *Jewellery* and *Light* are represented by the dark green circles, while the four sub-themes are illustrated with the light green rectangles and derive in pairs from the two areas of interest The four sub-themes together outline the contextual landscape of Stage 1.

In the next section (2.3 and sub-sections), they will be introduced individually and later they will be re-connected in thematic pairs, on the basis of their visual congruence, work as criteria for the image collection within the IA (section 2.4 and sub-sections on Method) for the development of a design brief, leading to the final development of jewellery practice (section 2.5 on Outcome, and Appendix A).

2.3 - Stage 1 – Context

This section will give a brief account on the contextual landscape of Stage 1, represented by the four sub-themes derived from the two main areas of interest *Jewellery* and *Light*.

Figure 6, below, moves one step further and represents the ideal continuation of the concept-map previously shown in Figure 5 (p.32): the two main areas of interest *Jewellery* and *Light* (dark green circles) are here presented on the left-hand side, in connection with their respective two sub-themes (light

green rectangles). Each pair of sub-themes, after being individually explored, reflected upon, and clarified, is recombined, generating the two Visual Themes central to the preliminary visual analysis performed with the IA (Section 2.4): *New Materials Jewellery* and *Lighting Wearables* that in Figure 6 are shown in the light green circles, outlined in red. These two themes are the cornerstones for developing the design brief that will lead to the final practical experimentation (Sub-section 2.4.4). In Figure 6, the final outcome—new Contemporary jewellery using light as a material—is represented as the big aqua circle inscribing the two visual themes.
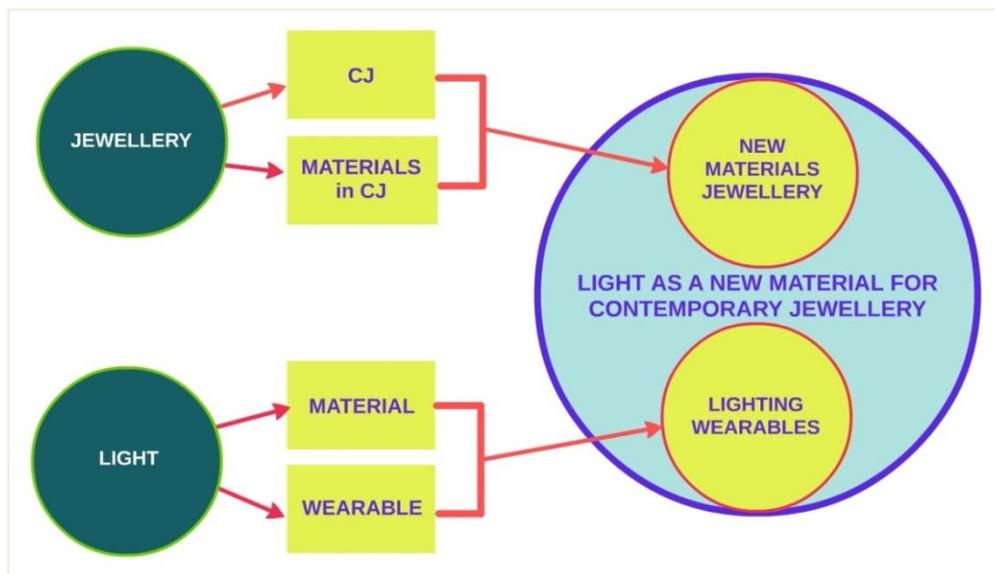
Figure 6 - Sub-themes regrouped in two Visual Themes leading to the IA

The following sub-sections will provide a contextual overview of each of the four sub-themes.

2.3.1 - Sub-theme 1: Contemporary Jewellery (CJ)

The first of the four sub-themes concerns the use of light within the context of Contemporary Jewellery. This means to exclude other forms of jewellery belonging to the wider global Jewellery market of today (comprising other internal avenues, such as Fine Jewellery, Costume Jewellery, Fashion Jewellery, etc.). For this purpose, a brief digression has to be made on the ambiguous use of the term 'contemporary', that for the sake of this discussion will be distinguished by using upper-case or lower-case initials.

On the one side there is Contemporary Jewellery (upper-case), that is an artistic movement, an internal avenue, grown within the wider historical, geographical and social context of Jewellery, similarly to how Contemporary Art is an artistic movement, or an internal avenue, has grown within the wider historical, geographical and social landscape of the Fine Arts.

On the other side, there is contemporary jewellery (lower-case), that is, simply, the jewellery 'of today'. In this sense it can be said that all and any jewellery can be seen as contemporary, when the adjective relates to the same contextual time referred by the discussion. For clarity, even Victorian jewellery was contemporary, in Victorian times.

This distinction is important because, as it will become clearer further in the discussion, there is a certain degree of confusion nowadays on the use (and the meaning) of the Contemporary/contemporary adjective, to the point that any given piece of jewellery might be labelled as 'contemporary' (or 'Contemporary'), not necessarily making a clear and informed reference to a specific artistic agenda, or to an historical period of production of the artefact.

Other nomenclatures have been proposed for the Contemporary Jewellery movement by various authors over the years, creating possibly even more confusion[20]. Still, 'Contemporary Jewellery' remains probably the most widely known and used name, but, as it will be shown, the ambiguities about it do not stop with the choice of name.

The movement of Contemporary Jewellery can be traced back in history until an approximate time of beginning—the end of World War II, according to most authors spanning the whole second half of the twentieth-century until the

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[20] Various nomenclatures have been used to label the 'New Jewelry' (Dormer & Turner, 1985; Drutt English & Dormer, 1995) all intending similar nuances of this form of research and practice between art, design and craft. Den Besten (2011, pp. 9-10) lists six adjectives for identifying this form of jewellery, *Contemporary*, *Art*, *Research, Studio, Design and Author*, even though the 'Design' and 'Studio' labels tend to indicate jewellery at the crossroads between Crafts and Design, rather than between Fine Arts and Crafts, as it is generally the case with Contemporary Jewellery. It has to be noted that, as the discussion argues, there is anyway great ambiguity and a lack of universal recognition on these nomenclatures as none of these is more or less definitive or official than others..

present times, when it is still officially active. It developed at the core of the discipline of Jewellery, moving the first steps across Western Europe, and progressively spreading worldwide.

Embracing the modernist ideals of rejection of mainstream values and radical reformism proper of the artistic vanguards of the end of 19th century and beginnings of 20th century[21], this revolutionary movement promoted a critical revision of the jewellery landscape as a whole, reconsidering and questioning every aspect or value traditionally linked to it in the previous centuries.

The underlying aim of Contemporary Jewellery was to challenge and to question every aspect associated to jewellery design until then, and on this premise the jewellery object was to be re-analysed, dissected, and possibly reinterpreted in every constituent aspect or detail, be it formal, functional or conceptual. This caused the delineation of a series of further sub-avenues developed within the movement itself, each focusing on specific experimentation and research in several directions, yet all commonly aimed at pushing the boundaries of the jewellery discipline.

The pioneers of Contemporary Jewellery initiated divergent paths of practice, each proposing alternative views of the most disparate aspects of jewellery such as: function of the jewellery object; social, political or symbolic meaning; 'Crafts vs Design vs Fine Art' standing of jewellery; positioning and relationship to the body; wearability or un-wearability; personal or interpersonal significance; emotional impact; design and aesthetic exploration; relationship with the viewer or the wearer; technological and materials' research. (Broadhead, 1985; Den Besten, 2011; Dormer & Turner, 1985; Drutt English & Dormer, 1995; Watkins, 1993; West, 1998).

This long list alone (not exhaustive) should raise some questions about the cohesion, the communality of intents between the artists populating this

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[21] For an overview on Modernism and Avant-Garde in Fine Art and design history, see: (Rainey, 2005) (Cahoone, 2003), (Murphy, 1999).and (Wilk, 2006)

movement and their work, and about which factors, especially nowadays, might determine whether new jewellery work can be labelled Contemporary or contemporary jewellery. Is it something intrinsic to the work? Does it depend on the context where the work is presented? Is it something related to the author's philosophy or declared mission? Is it something that a layperson would clearly grasp by the mere observation of a range of Contemporary Jewellery artefacts, or does it require some form of connoisseurship or expertise[22]? What is the 'essence' of Contemporary Jewellery?

If one considers how diverse and dissimilar between them are the hundreds of thousands exemplars of Contemporary jewellery artefacts designed and produced from such an heterogeneous range of sub-strands of artistic exploration, over the decades and across the continents, one might start to despair about the idea of coming up with a definition. Attempting to find a common denominator linking such a diversity of work, all labelled under the same name of Contemporary Jewellery, would seem to be an impossible task. After all, one of the meanings of the verb '*to define*', according to the Oxford Dictionary is to "mark out the boundary or limits" (2015) [23] and the mere idea of attempting to fix boundaries to something intrinsically born for breaking them seems to be a logical contradiction.

Still, some form of clarity is necessary, if new jewellery work is to be designed and developed according to an idea of Contemporary Jewellery. The aim of this reasoning is to highlight the existence of a definitional issue around Contemporary Jewellery preventing an easy access to this idea (if there is one to be found) and the risk is that, if not investigated, it might get lost behind the taken-for-granted assumptions crowding the implicit processes occurring in the

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[22] The relationship between Experiential Knowledge, Expertise, Connoisseurship and practice is explored in depth in (Nimkulrat, Niedderer, & Evans, 2015). Also, knowledge in design and creative practice is a topic that has been widely explored in design research. For an overview of different forms of knowledge, (in particular tacit or implicit knowledge), see (EKSIG, 2016) (Biggs, 2004b; Niedderer, 2007; Niedderer & Imani, 2008; Niedderer & Reilly, 2007; Polanyi, 1966) (Barrett, 2007; Lawson, 2004; Stokerson, 2009).

[23] *To define* comes etymologically from the Latin verb *definire*, which is composed by *de-*("completely")+ *finire* ("to end, to limit") (To define, 2015)

background, when approaching new jewellery work. Getting to this idea, and finding a focus for it is the aim of the visual analysis that will be performed in section 2.4 with the IA in order to investigate whether some underlying patterns, or visual criteria could be inferred directly from the observation and analysis of Contemporary Jewellery artefacts.

The Contemporary Jewellery phenomenon is not ultimately theorised in the literature[24] and is generally apprehended, understood and intuitively 'absorbed' by gradually building experiential knowledge. The accounts given by jewellery authors, historians, curators or gallerists tend to be similarly structured in placing the jewellery artefacts at the end of an ideal spectrum, where the narrative follows a descriptive commentary of Contemporary Jewellery—as a whole, or fractioned within sections focusing on some aspects of it—from an historical, artistic or conceptual perspective, and ends with the presentation of the jewellery artefacts as examples, instances, or illustrations of this general (and often quite abstract) discourse.

The issue of the indefinability of Contemporary Jewellery becomes even clearer when this perspective is turned upside down, and instead of apprehending jewellery artefacts as illustrations of an abstract discourse, or of a series of categorisations that authors, historians or curators have already outlined in advance, we try to invert the process by attempting to grasp these discourses or categories from the observation of artefacts themselves. In other words, if we attempt to move the jewellery work away from its institutional

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[24] It has to be recognised that a contemporary generation of researchers, curators, and historians (Astfalck, 2005, 2007; Cohn, 2009; Cohn & Sudjic, 2012; Den Besten, 2011; Unger, 2010) is advancing critique and academic research in the field of jewellery, in light of the decades of historical contribution of the movement of Contemporary Jewellery, and is contributing a more theoretical and critical discourse in analysing the Jewellery phenomenon through literature, while the communication of the earlier authors used to be more anthological than critical.

setting, to decontextualize it from the 'Jewelleryworld'[25], observing the artefacts inductively as diverse instances of an hypothetical 'essence' to be found, we would start to search for underlying patterns, or principles, that could eventually provide the working definition of CJ for this research, guiding the development of new jewellery practice accordingly.

It could be argued that there are so many accounts illustrating the phenomenon of Contemporary Jewellery—by means of images and examples of jewellery artefacts already produced—that an inductive and more explicit understanding of the essence of Contemporary Jewellery could be derived from browsing and reading through them. Yet, if we are to question whether new work or unknown work, might be fitting (or not) within the context of Contemporary Jewellery, it would be necessary to refer to an ideal set of principles, or to a formal theory, working as a guideline for our discernment in this direction. Otherwise, it would be impossible to know for sure. On the contrary, this kind of discernment, seems to happen in retrospect, that is, after the 'Jewelleryworld' has already apprehended, evaluated, and categorised the jewellery work, and consequently expressed its tacit approval for it to be part of Contemporary Jewellery.

At present, there is no such thing as a systematic study proposing, or providing a theory, or a set of rules or criteria defining Contemporary Jewellery that could constitute an explanatory model against which to interpret, to classify, to understand or even to design a new Contemporary Jewellery artefact. In all truth, it can even become problematic, in some cases, to establish with certainty whether certain artefacts *are* jewellery at all (Astfalck, 2007).

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[25] This is a neologism coined in reference to the discourse on the 'Artworld' presented by Arthur Danto in the homonymous work (Danto, 1964), that led to the development of an Institutional Theory of Art, brought forward as well by several theorists of art such as (Becker, 1982; Bourdieu, 1986; Danto, 1964; Dickie, 1974, 1997; Wollheim, 1980) The 'Jewelleryworld' is represented by the whole Contemporary Jewellery system, made of artists, authors, curators, gallerists, historians, bloggers, professional associations, institutions and academies, working as the interpretive community that tacitly establishes the set of rules for the 'canonisation' of jewellery artefacts within or outside of its realm.

This leads to a further step in the reasoning: the discipline of Jewellery itself is posing definitional issues. At a deeper thought, the Jewellery design boundaries are substantially blurred by an hybrid disciplinary positioning that places Jewellery at a crossroads, overlapping a range of other creative fields such as Fashion, Costume Design, Product and Industrial design, the Crafts, the Decorative and the Fine Arts.
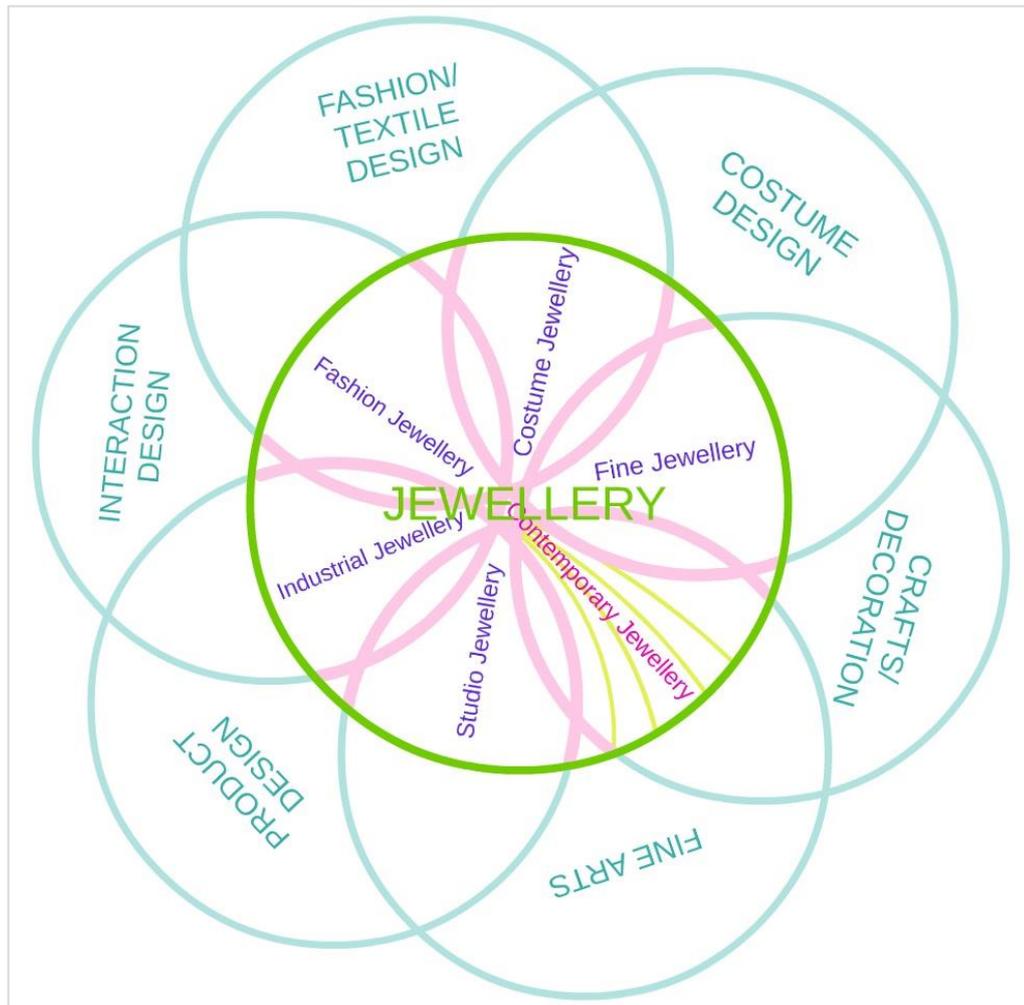
Figure 7 - Positioning of CJD in relation to Jewellery and allied disciplines

Figure 7 visually represents Jewellery, in the central circle as a liminal discipline, intersecting and overlapping other disciplines that are, in their turn, intersecting each other. It encloses various sub-strands, corresponding roughly to the various disciplinary and market ambits that conceptually or aesthetically are in proximity to each other (Fine, Contemporary, Costume jewellery etc.)(Derrez, 2005; Unger, 2012).

As previously mentioned, in absence of an established theory defining what is Jewellery and what is not, it might become even more difficult for a layperson to grasp the essence of an internal sub-strand as complex and hard to define as Contemporary Jewellery. Approaching this issue with the attitude and the new eyes of a layperson might paradoxically help to put aside the taken-for-granted assumptions that might be seen as the downside of an ingrained form of expertise, preventing a fresh look on a phenomenon that is instinctively 'known', but still escapes definitions. A layperson needs to build expertise, and this is generally achieved by repeatedly coming *across* several examples of Contemporary Jewellery, positioned as final exemplifications of more general accounts made by various authors, historians, curators or gallerist in books, catalogues, exhibitions, museums or galleries. In other words, the understanding of Contemporary Jewellery, at present, seems to rely on a form of experiential knowledge and it generally occurs by a process of ostensive definition[26].

In the literature, for instance, one can find countless accounts on Contemporary Jewellery in the form of visual anthologies, where diverse aspects of the artistic phenomenon are highlighted, often through thematic grouping of artefacts (Astfalck, 2007; Cheung et al., 2006; Cohn & Sudjic, 2012; Drutt English & Dormer, 1995; Game & Goring, 1998; Watkins, 1993). These groups are elicited and created quite liberally by the authors of each account, evidencing even more the lack of a precise and universally recognised model of reference for the classification or the thematic referencing of Contemporary Jewellery.

Whenever Contemporary Jewellery is thematically organised, and a series of artefacts are grouped, the viewer is typically presented with a very heterogeneous gallery of photographs of artefacts that are either

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[26] An ostensive definition conveys the meaning of a term by pointing out examples. Ostensive definitions rely on analogical or case-based reasoning by the subject they are referred to. Ostensive definition assumes the questioner has sufficient understanding to recognize the type of information being given. As Wittgenstein writes ; "So one might say: the ostensive definition explains the use—the meaning—of the word when the overall role of the word in language is clear. Thus if I know that someone means to explain a colour-word to me the ostensive definition "That is called 'sepia' " will help me to understand the word.... One has already to know (or be able to do) something in order to be capable of asking a thing's name." (Wittgenstein, 1967)

'bibliographically' described (author, title, date, materials, dimensions, making techniques etc.), or more rarely, presented with commentary about the author, or the object itself. What is generally missing is an explicit analytical discourse, aiming at comparing and contrasting different Contemporary Jewellery artefacts, discussing their differences or similarities from various points of view, in order to elicit common visual or conceptual themes or patterns, through which to sketch a possible explanatory model. This form of inductive reasoning is eventually left to the intuition and sensitivity of the reader/viewer.

Similarly, an explanation of why—under which criteria—a specific group of artefacts has been selected and clustered around a given theme is hardly, if ever, provided, and it is not always so immediate to intuitively grasp it, by simply looking at the exemplars contained in the thematic group. The reader/viewer has to trust the creators of these thematic clusters about the fact that extremely diverse artefacts might have something in common, so that there might be an unspoken set of rules linking them all together.

Still, what the elements characterising this commonality are, where they could they be identified in the artefacts and to which extent they might be visible in each work, is not otherwise explained. The reader/viewer is left with the task of guessing, absorbing, and possibly formulating a personal and intuitive theory connecting these hypothetical and unspoken criteria, and to search for more information, or for a confirmation, in further anthologies of Contemporary work, where more thematic groups will be provided, very likely in a very different way. The constant repetition of this process of intuitively extracting general patterns from a multitude of individual jewellery examples, builds up over time, and forms the basis for a new form of experiential knowledge and connoisseurship that will help, in the majority of cases, to relate, and recognise intuitively the unspoken and hypothetical underlying rules of the Contemporary Jewellery phenomenon.

My challenge, when I started to reflect on how to practically transfer on the practice to be produced at the end of this research the Contemporary Jewellery imprint, was the realisation that I owned a form of experiential

knowledge about the CJ phenomenon that I could hardly explain, let alone extract a set of rules below my 'personal theory' of Contemporary Jewellery. However, this was necessary in order to come up with a set of visual criteria to be followed when designing new jewellery artefacts using light so that they could be congruent with this theoretical set of rules, and be recognisable as Contemporary jewellery.

My intention was focused on eliciting a set of visual patterns, or criteria, that could explain in clear terms what distinguished Contemporary Jewellery from the rest of Jewellery, in order to replicate them in my practice and produce work that could be recognised as CJ and not as any other form of jewellery.

I pursued the idea of making these assumptions more clear and explicit to myself by means of reflection, journaling and through an intentional re-observation and re-assessment of the images (photographs) of Contemporary Jewellery that were stored in my Visual Archives.[27] I re-examined thousands of images of exemplars of Contemporary Jewellery and I eventually concluded that, if one leitmotif could be found, or hypothesised, linking the most diverse Contemporary Jewellery artefacts, it had to be searched in the idea of challenging the tradition. That seemed to me the only possible underlying, constant theme that could connect all the exemplars of Contemporary Jewellery work that I re-analysed for this purpose. Independently from the particular aspect of jewellery that each exemplar seemed to challenge, I could trace an apparent and constant intention to innovate by breaking Jewellery stereotypes, reformulating assumptions, thinking from a different perspective or dissociating from the mainstream. In a few words, to be *different* from the norm. So, what is the norm today?

Answering this question implied a new analytical and reflective voyage searching for definitions, in order to get to a clear notion of 'tradition', from which to detach. This brought me back a second time to the main source,

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[27] See following section 2.4.1 on Visual Archives for a detailed illustration of this design tool, part of the IA.

Jewellery, the quintessential representation of tradition that Contemporary Jewellers had been artistically fought against for decades, in the attempt to detach and produce *different* work.

The Oxford Dictionary, defines Jewellery as: "Personal ornaments, such as necklaces, rings or bracelets, that are typically made from or contain jewels and precious metal" (Jewellery, 2015b), and the Merriam-Webster Dictionary as: "Objects of precious metal often set with gems and worn for personal adornment" (Jewellery, 2015a). In reality, *thanks* and *because* of the critical contribution and impact of Contemporary Jewellery, it is impossible nowadays to provide a precise and univocal definition of 'jewellery' satisfying and encompassing all the variety, complexity and apparent contradictions that can be found in the present panorama of Jewellery design. This makes the above clear-cut definitions obsolete, to say the least.

In the wider context of the global market of Jewellery, the phenomenon of Contemporary Jewellery has occupied, and still occupies, an extremely small niche, to the point that its existence is generally ignored by the layperson (Unger, 2012). Nevertheless, its impact has been extremely influential considering how, even the most traditional branches of Jewellery (such as Fine Jewellery) are progressively adopting and legitimising small forms of transgression—such as the use of non-precious materials, for instance, even if toned-down by the predominance of precious metals and gemstones— that few decades ago would be considered unacceptable. The progressive loss of boundaries and increased contamination with other disciplines of Jewellery (as previously illustrated in Figure 7, p.40) can be easily traced back and attributed to the influence of Contemporary Jewellery that, by attempting to break away from all forms of tradition, has demonstrated that even in the most unorthodox experiments there is a creative germ that can, in the long run, infect anything.

It is clear though, that with the passage of time, even the impact of Contemporary Jewellery has to be re-evaluated in its turn, because the role and the relevance that such a movement might have in the present days is very different from the role and relevance it had at the outset, when the notion of

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Jewellery tradition was a sharply outlined. The global Jewellery context of today is so heterogeneous and liminal and the disciplinary boundaries are so blurred and contaminated that it is hard, if not impossible, to rely on a universally accepted *norm* from which to evaluate what might be transgressive or truly innovative.

This has obvious consequences on the significance of designing Contemporary Jewellery today. Firstly, when Contemporary Jewellery took its first steps, the tradition of Western European Jewellery rotated substantially around two ideas (as previously seen in the dictionaries definitions): *preciousness* and *adornment,* therefore the space for artistic challenge was virtually infinite. Today, for the principle of diminishing returns, this space has been drastically reduced by of all the work already produced by all the CJ predecessors. Secondly, Contemporary Jewellery has fought so many battles for pushing and breaking all the boundaries between Jewellery and other art and design disciplines, that it has lost over time its proprietary well-defined space, falling paradoxically victim of its own success.

In fact, in the post-war period, the non-conformist elements representing breaking points from the tradition could be clearly recognised within the majority of the CJ artefacts (therefore the 'essence' of Contemporary Jewellery transpired, independently from the institutional context connected to the setting or origin of the work). Today, it is extremely difficult to label as Contemporary Jewellery an artefact 'blindly', outside a specific context, without at least knowing or recognising the author, or the gallery or museum featuring it, or the institution or artistic affiliation it might come from. All this information has become necessary today because, as Jewellery has lost almost all its disciplinary boundaries, the recognition and positioning of the artefacts tends to happen contextually and not substantially.

This brings us to the inevitable conclusion that, if it is postulated that the essence of Contemporary Jewellery stands in the pursuit of true innovation through the exploration of unconventional avenues, detaching and being *different* from the mainstream Jewellery norm, it has to be taken into account

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that this norm has evolved and changed over time, thus very few contemporary jewellery artefacts would intrinsically qualify to be labelled as Contemporary Jewellery today, if it were not for their contextual recognition.

The aim of this research of exploring an unconventional element such as light—almost entirely neglected in terms of research and experimentation within the Jewellery field—and to use it similarly to how other innovative materials have been approached by Contemporary jewellers for developing new practice, represents enough evidence of innovation and detachment from the mainstream Jewellery norm to qualify as Contemporary Jewellery. Moreover, the ascertainment of the existence of an evident research gap within the perennial quest for the exploration of non-traditional materials pursued by Contemporary Jewellers gives enough reason for positioning Stage 1 of this research along the same line of enquiry.

2.3.2 - Sub-Theme 2: New Materials in Jewellery

This second sub-theme (see Figure 5, p.34) refers to the general understanding of the use of materials in jewellery design, and in particular of the use of 'innovative' materials. As it was mentioned in footnote 15 (p.28), there are materials that have been traditionally associated with jewellery, and more unconventional materials that have been introduced within the field only relatively recently.

The use of these materials, predominantly non-precious and often 'borrowed' from other industrial fields, is less diffused in comparison to the use of precious and semi-precious materials, in the tradition of Western jewellery design. It is, again, by observing and intuitively analysing numerous artefacts made with these innovative materials within the ambit of Contemporary Jewellery that I hypothesised the possibility to elicit and gather some recurrent pattern underlying the 'typical' Jewellery approach to materials, in order to apply them in the experimentation phase and using light as a new material when designing jewellery.

As discussed in the previous section, if a leitmotif linking different artefacts within Contemporary Jewellery can be hypothesised, it might be found in the intention to challenge every aspect traditionally associated with jewellery design. On this basis, even Contemporary Jewellery, could be ideally subdivided into internal avenues, all united by a similar quest for unconventionality, with a distinction between them based on the individual 'traditional' Jewellery aspects respectively challenged.

Figure 8 is a zoomed view of one portion of the previously discussed Figure 7 (p.41), where some of the most common avenues of practice and critique internal to Contemporary Jewellery are evidenced, as examples.

Figure 8 - Internal sub-strands of Contemporary Jewellery

It is important to clarify that these avenues and their nomenclatures are only indicative and that they still respond to the same principle of liminality pervading the entire discipline, so that there are no clear-cut boundaries between them.

Moreover, there is hardly a Contemporary Jewellery artefact that is entirely focused on only one kind of 'challenge', without involving at the same time other aspects that in a sense have become clichés (paradoxically) in Contemporary Jewellery. So, for instance, a Contemporary piece challenging the relationship of jewellery with the body, or with the wearer, might be at the same time socially engaged; or a conceptual piece developed as a political critique of

our Western consumerist society might have, at the same time, innovative and unconventional aspects with regard to the choice and use of materials.

What is of interest for this research, however, between all the possible identifiable sub-avenues of Contemporary Jewellery, is the fertile strand of practice and experimentation concerning the exploration of new materials and technologies, whilst not detaching particularly from a mainstream 'sense' associated to most traditional jewellery. This is to signify that in this case of these jewellery artefacts, the focus has been intentionally laser-sharp on only one jewellery aspect to be challenged: the use of traditional materials, without having to re-define what the function, the positioning on the body or the main reference to traditional jewellery forms could be or should be.

The experimentation conducted by Contemporary Jewellers with non-traditional materials, has allowed a progressive redefinition of the notion of preciousness and aesthetics in body adornment, in a way that has increasingly searched to affirm the idea that the value of a piece of jewellery, similarly to what happens with artworks in the Fine Arts, should go way beyond the market price of the materials composing it combined with and the cost of labour, but on the contrary, it should stand in the artistic value of the work itself.

Relatively inexpensive materials, imported from the industrial world and non-jewellery contexts, have been transformed into extraordinary elements of beauty by a skilful reinterpretation of their aesthetic potential, expanding the relatively limited visual palette previously available to jewellers into a whole new range of textures, colours and design combinations. The concept of 'skilful reinterpretation' in the use of materials is key in this context, because there is a way of approaching materials within jewellery, and in particular Contemporary Jewellery that is uncommon in other disciplines.

To make this point I will use only two examples, above all, as illustrations of this concept: two bracelets from two artists, seeming apparently at odds, if one considers the materials of choice—gold and platinum on the one side and plastics on the other—but extraordinarily close, if one considers instead the attitude with which materials have been approached and treated in both cases.

On the precious side, we find Italian artist Giovanni Corvaja, who managed—through the development of making techniques and tools—to exploit the tensile properties of gold and platinum, reducing them to threads as thin as one fifth of a human hair (Rubtsova, 2008), building with them jewellery pieces entirely covered in precious fur. Figure 9 and 10 show an image and a detail of the 'Commitment' bracelet—part of a five-piece collection called *The Golden Fleece*—, a hollow toroidal shape covered with gold fur made out of 1,241,856 single wires, springing from 12,672 holes, featuring internally an hexagonal grid of 4000 platinum granules.

Figure 9 - Giovanni Corvaja (2008) - *Commitment* - bracelet
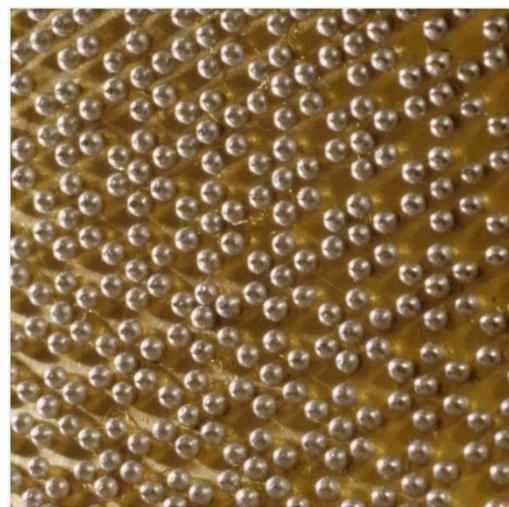
Figure 10 - Giovanni Corvaja (2008) - Detail of internal granulation - *Commitment* bracelet

The bracelet is an accomplishment that took over ten years of preliminary research, and 1250 hours of labour to make. It is a unique piece of art and exquisite craftsmanship, whose value transcends entirely the mere idea of it being made out of gold and platinum. In this case, the idea of 'skilful reinterpretation' is expressed at its maximum level: Corvaja not only treats materials with religious respect, but considers work as a transformative form of meditation, through which, as the collection's name hints, he eventually managed to perform an alchemical transmutation, transforming precious materials into something even more precious.

On the opposite side we find Scottish designer Peter Chang (Figure 11) abundantly anticipating with his visionary work most contemporary practice on sustainability and the reuse of indestructible materials like plastics. Chang chose

plastics as his elective material, developing a combination of personalised working methods, tools and procedures, managing to confer to this most despised and common material, "like the ultimate alchemist" (Pollard, 2007), the same flawless beauty and refinement that a master goldsmith would confer to the most precious fine jewellery.

Figure 11 - Peter Chang - Untitled - bracelet

Chang, similarly to Corvaja, dedicates months in designing, developing and finishing each of his works. The brooch depicted in Figure 11 took around 246 hours of work excluding the time spent thinking and designing it. Each of his works represents a unique, one of a kind universe of patterns, colours and combinations of making techniques, all perfectly blended to a point of perfection[28].

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[28] From a correspondence between Peter Chang and Louise Mitchell, curator of the Powerhouse Museum, (Sydney, Australia) commissioning the bracelet, the complexity of the work is revealed by the same author: "The Powerhouse bracelet core was made of carved polyurethane foam (bought), the surface was made of mainly pigmented polyester (bought) with inlays of red acrylic (bought) dots turned on a lathe with green polyester (cracked-ice patterned) mosaic shapes, fluorescent green acrylic sheet (bought) was laminated and also turned on a lathe and hand finished. The inner band was made of strips of purple and red acrylic (bought) heat formed and periodically interrupted with discs of green. The 4 tentacles were fabricated from alternative laminations of polyester and acrylic sheet, yellow, orange and 2 reds that were bought, 2 reds that were re-cycled, topped by a silver ball (bought). The 4 finials-1- hand-carved in green and pink fluorescent acrylic, 2- thermoformed hemisphere in acrylic (bought) with lathe turned acrylic appendages topped with shaped silver wire (bought), 3- thermoformed, laminated and carved acrylic (re-cycled from the centre of a discarded "o" from a sign-maker) red shape, surrounded by alternating green acrylic (supplied in an early sponsorship commission) shapes topped by silver wire, 4- base in thermoformed acrylic (bought) surmounted by a single bead (bought as part of a cheap, new necklace) further surrounded by dress-maker pin-heads (bought)"(Museum of Applied Arts & Sciences, 2005)

Chang's works re-combine into new life-forms recycled plastics, foams, resins, pigments, acrylics, lacquers, and found objects—all very inexpensive materials—with such an exquisite skill, fluidity and complexity to transform them into mesmerising technical riddles, especially for somebody passionate about materials and their technology like me. The passages between the layering of materials, the various combination of making techniques and the meticulous attention to even the most tiny of details render these pieces unique exemplars of the concept of 'skilful reinterpretation'

Peter Chang's works are 'pieces of plastics' as much as Giovanni Corvaja's are 'pieces of gold', but their intrinsic value is unquantifiable, as they go far beyond the traditional notion of body adornment or jewellery. They embody the idea of preciousness in its pure form, not only because these artists came up with the originality of the ideas behind their works, but because their actual realisation required a level of experimentation, skill and mastery that are absolutely unique.

These two examples represent, possibly, the highest points I could imagine for illustrating the idea of 'skilful reinterpretation' as a key concept in the treatment of materials, typical of jewellery design, particularly of Contemporary Jewellery, and quite uncommon outside of the jewellery field. I am not implying that every jeweller is treating materials with the same devotion and refinement as Corvaja and Chang do, but I am claiming, on the basis of my experiential knowledge that there is a *tendency* towards this direction. There is a generalised intention in treating even the materials that are not commercially considered as precious, *as if* they were as such, and to make them become precious, through the reinterpretation of their aesthetic potential, the development of personalised making techniques and working procedures and the development of specific visual patterns that might enhance their perceived value.

One has to keep in mind that, behind most of the challenges pursued over the decades by Contemporary Jewellers there has been the intention to demonstrate and to claim that Jewellery can be a field for genuine artistic

expression, as much as the Fine Arts. Jewellery, however, in relation to the global market of precious or semiprecious goods, tends to remain a field where the artistic value in the design of a piece is considered to be of minimal importance in the overall evaluation of the 'value' of a piece of jewellery. There are cases where this 'intangible' additional value, is brought in by means of 'branding', but in the majority of the cases where the fame of a brand cannot justify an increase in market value, the 'value' of Jewellery remains linked on a strictly materialistic discourse of 'cost per gram/karat' and therefore 'value per gram/karat'.

In terms of Contemporary Jewellery, however, a gram of plastics might be as valuable as a gram of gold, as what matters the most is the artistic value, the research, the skill and the originality and uniqueness that is infused within the artefact, the level to which the artist is able to push a specific material to its limits, and the mastery with which it is approached and treated. Peter Chang himself talks about this approach to materials:

> Diamonds, marble, gold, canvas and paint, as materials, are nothing in themselves until their creative potential is explored, exposed and fused through vision, intellect, instinct and the hands of artists, sculptors and craftsmen. The same is true of plastic. It is the joy of exploring their qualities of malleability, creating colour and sensuality, teasing the materials to obey, exploiting all to the maximum, which gives it value to me. (Museum of Applied Arts & Sciences, 2005)

Almost every imaginable material or element has been tested over the years in order to produce jewellery, sometimes as an isolated exercise in creativity and skill, and other times as an elective choice to be pushed to its extreme potential. Plastics, silicones, resins, woods, fabrics, glass, concrete, all kinds of recycled materials and found objects, down to the most unusual or shocking elements such as fire, ice, soap, food, bodily fluids or dead animals have been shaped and reinterpreted, not only on the basis of their possible implications at a conceptual level, but also in reason of their aesthetic potential. Within this sub-strand of jewellery concerned with innovative materials it is possible to outline, again, two internal avenues, two sub-categories of work, at least on the basis of the apparent role that new materials appear to represent within various works.

On the one side it is possible to define a use of materials aimed at better expressing some material aspects of the object in function of the focus of the work that remains the conceptual communication of a message through jewellery, or about jewellery. In these kinds of work, each aesthetic and formal choice concerning the construction of the piece, or the use of materials within the piece, tend to be functional to the communication of the symbolic and conceptual meaning of the object. One example offered, above all, is the iconic bangle *Gold Makes you Blind* by Swiss artist Otto Künzli (Figure 12).

Figure 12 - Otto Künzli . (1980) - *Gold Makes you Blind* - bangle

In this historical piece of jewellery, Künzli uses a black rubber tube (a poor material, definitely less common in Jewellery in the 80's than today) for 'hiding' a 18kt gold ball, that is distorting the silhouette of the piece. The piece is a witty conceptual game about wealth display, perception of value, and trust: one has to trust the maker of the piece about the presence of the 'real value' in gold trapped inside the rubber bangle, and at the same time, one has to accept to give up the pleasure of displaying the 'real worth' of the piece to the world, by wearing instead an 'ugly and poor' piece of black rubber. This is a perfect example for illustrating how the use of materials has been a means for sustaining the critique brought forward by Contemporary Jewellers in various directions, and in the case of this Künzli iconic piece, a critique aiming at the heart of the Jewellery tradition, challenging the public to question what is really valuable about Jewellery itself. The same title of the artwork hints to the idea of a

subversion of values, where the 'blindness' is constituted by the pre-conceived notions of social status, class and value that are to be reconsidered, and where the materials used within the piece work directly as symbols, as metaphors for this idea of hidden or explicit value.

This kind of jewellery, for the predominance of the conceptual, social or political critiques that the artefact aims to stimulate can be referred back to the sub-strand of Contemporary Jewellery that is known as Conceptual Jewellery, where materials and design elements are used mainly as means, and do not represent the real end and focus of the research behind the artwork.

On the other side, where the formal and aesthetic aspects of the jewellery artefact are the main objectives of the work, and the exploration of new materials, their decorative potential and their technologies are the focus of the artistic research, the jewellery object does not attempt to challenge its ornamental function, but through a skilful use of materials and design elements it aims to intensify its aesthetic appeal, playing with new layers of visual possibilities.

Far from taking away the existence of philosophical references or inspirations behind the work of the two jewellery masters previously mentioned for the sake of this discussion they represent the peak of excellence in the use and command of materials and their technologies. There are several examples of Contemporary Jewellery were the use and research on materials is central for its aesthetic in the research for its visual and decorative potential. This kind of jewellery might have secondary conceptual implications, but it is mainly design-focused and it is precisely on this kind of jewellery that this research will concentrate, as it is on the aesthetic and materials-based aspects of lighting that the practical experimentation and application on jewellery artefacts will focus.

One example of this kind of research on materials, taken from the very contemporary scene can be seen, for instance, in the work of Korean jeweller Seulgi Kwon (Figure 13) who has developed an extremely original and 'skilful reinterpretation' of the use of silicone in combination with other simple materials such as threads, feathers, pigments and plastics, creating very

articulated pieces of jewellery that, even though inspired by rather common references to 'nature', present a use of materials pushed to their maximum potential.

Figure 13 - Seulgi Kwon - (2016) - *Swing of the Night* . brooch

The objective of this research is to concentrate on this sub-strand of Contemporary Jewellery focused on materials, through the accumulation of images of jewellery artefacts in a dedicated Visual Archive, in order to gather an understanding on how different materials have been used in Contemporary Jewellery in relation to their visual properties, and the decorative qualities they can bring. The aim is to elicit possible recurring patterns in the use of these materials, and to search for common denominators that might be similarly applied to the use of light, as an alternative material that could similarly contribute to the articulation of colour, texture and constructive volumes, in the design of unconventional pieces of body adornment.

2.3.3 - Sub-Theme 3: Light as a Material

The third sub-theme to be understood for contextualising this research concerns the use of light as a decorative element for designing new jewellery. The term 'light' is intended as the 'Immaterial Material' that emanates from artificial light sources, so the research is not concerned with the merits or demerits of the light sources themselves. References to light are hence attributed to its purely visual, decorative, and aesthetic[29] aspects, as an element that might be used, or included, in the designing and making of wearable artefacts. Light, in terms of design will be considered as the emission of the light source, and the development of new jewellery practice will focus is on how this ephemeral element can be articulated to produce visual effects, similarly to how other elements or materials have been articulated in the designing, texturing or making of jewellery and wearable artefacts.

Light is termed a 'material' with respect to its potential to add colour, texture or volumes to an artefact so it will be considered in combination and in relation to other materials that might enhance its effects, or, in turn, be enhanced by it. Defining light 'a material' is far from making a claim about its physical properties; it is an intentional terminological choice for assimilating the visual, textural and ornamental properties of lighting to those of other materials that can complement and enrich the 'visual palette' available to jewellery designers for exploring new aesthetic avenues within the field. This also implies the exclusion from this research of all discourses about light that could refer to its meanings or affects, or to its symbolic, metaphorical or emotional value.

'Drawing with light', the incipit of the original Stage 1 thesis title, is the contraction of two concepts: '*drawing*' (as a tool for designing, and at the same time, a language of artistic imagination, reflection and creation and '*with light'* (in mind)*.* These concepts refer to the stage of the 'ideation' of a jewellery

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[29] Please refer to the operational definition of 'aesthetic' and 'aesthetics' in regard to this research, offered in the Definitions section on p. XII.

object, while keeping in mind the nature of light, that is, the essence of this 'immaterial material', as if Light were a special kind of ink or paint.

This awareness comes from my experience in working with light in developing objects for interior design and body adornment. Having accumulated a solid basis of experiential knowledge, and devised a series of strategies for tackling the preliminary stages of the design process with an element as light, I will present here a few aspects that deserve some reflection so that they can be considered during the development of the practical phase.

The first point to consider is that the ideation of a new piece of jewellery, 'with light in mind' is very different from the ideation of new jewellery with other materials in mind. This is because the intangible (even invisible, unless interfaced with other materials) nature of light forces the jewellery practitioner outside of his/her habitual comfort zone, preventing a *design by crafting* (Jones, 1981) approach—a very common design method in jewellery—and it renders almost impossible to perform the preliminary testing and evaluation of new design ideas using traditional approaches, such as model-making.

Materials can be manipulated, tested, and many creative ideas can spring directly from the act of directly 'playing' with them, without a precise idea of where this spontaneous creative game will lead (the equivalent of the process of 'freewriting', in literary terms). This might even be the elective method for developing new practice for some designers, and it is often adopted within the Crafts, where not all creative activity is strictly planned following a rigorous and systematic procedure of sketching, finalising a drawing, and building a three-dimensional piece of jewellery as a mechanical act of 'execution' of a plan already established on paper.

Moreover, in this form of spontaneous creation, there could be situations or passages, where ideas might be tested in three-dimensional form, by crafting mock-ups or models and using substitute materials or 'quick' making processes (e.g., gluing instead of soldering or using mock-up materials such as paper, clay, plastics, foam, base metals or wood in order to get an immediate three-dimensional idea of the artefact for preliminary assessment).

STAGE 1 - IA - A PRACTICE-BASED APPROACH

Lighting effects, instead, occur through the combination of the light emitted by a source and its interactions with specific surfaces or materials and, in order to evaluate and test these specific effects, no material or element can be really substituted to light itself and the actual materials, surfaces, shapes or finishes that will eventually constitute the final piece. Creating test pieces and models of lighting jewellery with quick model-making techniques or materials, can become in this sense almost impossible since, unless these materials are going to be the actual ones that will be included in the final version of the artefact, every specific light interaction or aesthetic effect obtained will be strongly dissimilar from the desired or imagined result. Any substitution in this sense would make the testing unrealistic and useless.

This fact alone complicates matters in the practice of designing and making jewellery with light to a point where, in order to test preliminarily a new artefact with desired lighting effects on/in it, there will be almost no difference between a mock-up model and an operational final piece, except very few details in the refinement of some making, or finishing passages. Especially when the testing is necessary for preliminarily evaluating different versions of a possible idea, the model-making process might become as challenging, costly and time-consuming as the development of an entire jewellery collection, and not much time can be saved by cutting passages in the process.

The only alternative to it is to develop the ability to imagine and to predict the behaviour of light, with a certain degree of certainty, in given conditions and in correspondence with certain materials or surfaces. This is achieved with time, and by accumulating experience, and still, there is a reasonable risk of obtaining ill-imagined or disappointing results, when working exclusively on the basis of educated guesses on lighting effects during the ideation phase, without testing them in practice, and jumping directly to the making of a final artefact.

A second point to be considered is that, as much as in this thesis light is considered to be a visual effect, it is important to remember that lighting is also a technology. Emitted light, in fact, is a very peculiar material because it is not

readily available to be bought in grams or meters and be directly transformed or manipulated by the skilled hands of a craftsman, like the vast majority of materials commonly used in Jewellery. Light has to be generated first, and afterwards it has to be indirectly channelled, or interfaced with or through other materials and elements in the design of a jewellery piece. The technology and design necessary for doing so add extra-layers of complexity to the design process, and need to be taken into account very carefully when developing a piece of lighting jewellery.

Not only is it necessary to design and build an electronic circuit for supporting the emission of light, but this has to be customised differently on the basis of the selected light source, the performance that the light must have, and the specific design and light positioning required by each new artefact. Moreover, the circuit and all its electronic components have to be integrated within the design of the artefact, and this certainly adds more design problems to be solved, since these component represent an additional encumbrance that, most of the times, heavily influences the direction that the final appearance of the artefact will assume, to the extreme of completely preventing a whole range of aesthetic possibilities, if technically unfeasible. Still, the technological side of light represents an inescapable chapter in the designing of lighting jewellery, and all the preliminary phases of planning and designing of technical, electronic and mechanical solutions for this aspect of light are an additional burden in terms of time and money spent on a project that cannot be avoided, but have to be effectively sorted, even before the 'aesthetic' aspect of light can be tackled, for playing the 'artistic game' of jewellery design.

Moreover, since the final aim of this practice-based investigation is to find ways to use light 'as a material' congruent with how other materials have been articulated within the Jewellery field, there are more factors that need to be considered in terms of light as a technology, besides the mere 'light generation' problem, such as the behaviour of light, its intensity, its colouring, together with all the possible effects that light can produce in combination with the design elements and materials composing the artefact. As it will be shown, at

the moment of writing the majority of lighting jewellery artefacts observed so far, either within the Jewellery field, and outside of it, tend not to go far away from a mere 'light generation' approach, and are designed as a juxtaposition of two elements, a jewellery artefact on the one side, and a light source on the other. In terms of 'lighting design' this does not go further than a very crude use of LEDs or few other light sources, as if the mere fact of combining a LED on top or below a piece of Jewellery would, in itself, be enough to 'create the magic' of lighting design, and transforming it into a piece of lighting jewellery[30].

This is indeed the main argument of which my quest for a different use of light is based, because, this literal and straightforward use of lighting, that so far has coincided with the use of the source of light itself positioned on top, or below, *any* jewellery artefact—with no real integration, and no articulation of the lighting effects—does correspond, in terms of articulation in the use of materials typical of Jewellery, to wearing a piece of string knotted at its extremities and claiming it to be a ground-breaking necklace. If we exclude a 'conceptual' game about the provocation, or the critique, made through and by the jewellery artefact and the material composing it (as Conceptual Jewellers do, but it falls outside the interest of this research)this could be the most literal, unrefined and inarticulate use of a piece of string that one might imagine.

The same discourse applies for all jewellery or jewellery-like artefacts that present a light source merely juxtaposed to a jewellery artefact, where the only aspect about light that has been considered in the design of this artefact is the 'light generation' issue, when it is not even entirely missing (e.g. electronic

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[30] Retrospective note (2017): Here I am referring to the moment of the contextual review of Stage 1, between 2010 and 2012. The field of Wearable technologies was on the rise, but not yet 'exploded' as a mass phenomenon like today, therefore even the available examples of lighting jewellery that could be found (and the technology deployed) were far more rudimentary, in comparison to what can be seen today, in the full flourishing of the revolution of Wearable devices. Notwithstanding their industrial production, that has implied a significant advancement in perfecting their making and finishing, they remain quite inarticulate in terms of 'lighting design', despite the possibilities made available by the incessant technological advancements in electronics.

components, batteries or circuits in plain sight or hidden behind the object for lack of design development, or other forms of bad design).

In terms of the technical solutions for powering and controlling the behaviour of multiple LEDs in small objects such as jewellery from a non-engineer perspective[31], I performed separate research during my previous years of academic and professional practice, so I approached this PhD research having already encountered and solved all the different stages preliminary to the point of development of a personalised system for tackling in a definitive way the technical lighting aspect[32]. This has allowed me to concentrate almost entirely on the visual articulation of light as a new material, and not to worry about how to solve its technological obstacles, especially in the ideation phase of the design process.

A designer experimenting with light cannot count on a body of previous practice handed down and established over time through the work of other colleagues, and often finds him/herself in the position of pioneering this research, literally establishing the first steps ever documented. Jewellery

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[31] Retrospective note (2017) – When the practice-based project of Stage 1 was conceived and developed, (2010-2012), many of the electronic technologies that are popular today were not much diffused outside of the niche of 'tech geeks' and electronic engineers that tinkered with toys and electronic components, yet still assembled their circuits and prototypes by hand. Most of the electronic 'kits' that are available today for designing and experimenting with wearable or interactive objects (such as all the Adafruit (2017) pre-assembled kits, for instance) were developed as prototypes in the same way, and only years later were globally diffused as industrial products. Especially within disciplines traditionally unrelated to electronics, such as Jewellery and the Crafts, the standard of electronics for lighting jewellery was a watch battery and a single LED, or, In the most 'advanced' cases, more LEDs were used, and bigger disposable batteries deployed. I was one of the first Jewellery designers to switch to a rechargeable system in 2007, when I started to experimented with microcontrollers (wearable computer boards) developing an interactive jewellery artefact where light intensity, emission, behaviour and colouring were managed through the programming of an Arduino board. Nevertheless, I had to source each of the electronic components individually, most of which were not even distributed in Europe at the time, and all the circuitry was designed and assembled entirely by hand. Nowadays all this work has become practically obsolete, and designers wanting to experiment with electronic technologies can buy ready-made kits, for instance 'light sequins' (where SMD LEDs are pre-assembled and ready to be used, without even need of soldering let alone sourcing for resistors, cables and the LEDs themselves). This has made the whole process extremely easy, and it has allowed to bridge a seemingly insurmountable gap between Crafts and electronic engineering. Still, this does not seem to have solved the problem of 'designing' with light, which remains quite inarticulate, even in the most technologically advanced industrial Wearable devices.

[32] Retrospective note (2017) - The development of a customised 'standard' system for testing the lighting effects during the ideation phase of the design process (solving the issues previously presented about the difficulty of working with a pure '*desiging by crafting*' approach) has been tackled at the outset of the practical experimentation in Stage 1, and some details about it can be found in Appendix A-2.

designers, because of the lack of literature and previous experimentation within the field on the use of lighting as a material, do not own a field-specific knowledge of the technological or design issues that the introduction of this technology might raise in the designing of jewellery objects, nor of the aesthetic potential of lighting as a material. The achievement of my solutions to these problems took several years of preparation, research, experimentation and practice, and it cannot be separated from the body of tacit knowledge about this particular aspect accumulated over the years of practice within the discipline of Jewellery. Neither it can be fully communicated or transferred in writing. This form of knowledge can be illustrated and shared to some extent, and this research aims to do so through the illustration of the theoretical and practical passages leading to the development of new practice using light as a material. However, there is a form of experience that cannot be discounted, or spared to any designer that might choose to experiment for the first time with light and start to build his/her own body of practice and knowledge about how to treat this peculiar material.

It should be intuitively clear, that the preparation and setting in place of all the technical and visual elements necessary for the construction of lighting jewellery could be very time-consuming and qualitatively expensive. Light is a very 'indirect' material to work with, it has to be always considered in combination with other materials and design elements within a jewellery piece; it has to be generated by designing and building a customised electrical circuit, that represent an additional encumbrance to be included in the overall design of the piece; the small dimensions of Jewellery objects might make this even more problematic; the visual effects depending on the light interaction with surfaces, textures and materials have to be realistically assessed through the reconstruction of realistic light conditions and realistic materials; even the finishing process cannot be overlooked as different texturing or polishing effects can determine different aesthetic and constructive results; the impact of failed or inconclusive testing is extremely high, when shortcuts to realistic testing are applied since the imagined lighting effects or outcomes might not correspond to the actual outcomes obtained in practice.

This, in my experience, makes the simple fact of choosing Light as the elective material for designing Contemporary Jewellery, extremely complex, and also quite unprofitable, since there is still a strong preconception about this form of jewellery in relation to the cheap merchandise associated to the Clubbing scene or the market of Novelty gadgets[33]. All these aspects might provide a clue regarding one of the aspects of the research problem, the under-exploration of light as a new material in jewellery design, and in general, they certainly justify the fact that '*drawing with light* (in mind)' is in itself a problem to be considered from many points of view

2.3.4 - Sub-Theme 4: Wearable Light

The last and fourth sub-theme refers to the understanding of how light has been introduced and approached within the field of Jewellery. As previously discussed with regard to the understanding of the Contemporary Jewellery theme (Section 2.3.1), in absence of a theory or an explanatory model at the root of a visual phenomenon, it can be hypothesised that, by observing and visually analysing a multitude of examples where such phenomenon is expressed, a form of overall grasp, or general understanding of it might be achieved.

Even in the case of wearable light, the idea was to explore existing lighting jewellery artefacts (made by different authors) in the attempt to elicit recurrent visual patterns in the use of light within the discipline of Jewellery that could help in developing a new design brief for exploring the ornamental use of light through the production of new jewellery artefacts. This meant to consider light as any other material with regard to its property to bring colour, texture and volume to the design of jewellery objects, and to explore the ways in which this had been previously done, in order to articulate a range of new possibilities. The

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[33] <u>Retrospective note</u> (2017) – Even this consideration has to be framed in the context of the years when Stage 1 developed (2010/2012) which, in terms of the exponential growth of the global market of Wearable Technologies, correspond to aeons ago. Today, the 'democratisation' of smart devices (from Bluetooth earpieces, to sport trackers, to smart watches etc.) has certainly shaped the mainstream taste with regard to the very idea of wearing electronics and technology on the body, so that these artefacts—that used to be perceived as a 'novelty' because of their 'futuristic' style (traditionally associated with the Clubbing scene, or the youngsters' world)—have been legitimised as 'normal' fashion accessories today, accessible and adaptable to any age, fashion or gender.

aim was not to develop a comprehensive and definitive vocabulary for the use of light in jewellery design, but to contribute with a series of interpretations to open the way for further research within the field.

Analysing how light had been used and introduced in Contemporary Jewellery through the visual analysis of artefacts, though, presented a first problem: the effective difficulty in sourcing a significant number of examples belonging strictly to the discipline of Jewellery, that could represent a relatively robust and reliable sample for extracting general criteria, or common denominators and illustrating 'how' light had been used so far within the discipline. In the case of Jewellery, the number of artefacts available for analysis was so exiguous that it would have been extremely arbitrary to consider it as a sufficient and reliable sample for extracting any pattern, visual criterion or significant result. It would be fairer to claim that light within the field of Jewellery *had not* been explored, as much as other materials had, and this consideration provided a further reinforcement for the points discussed in the rationale for this research.

The examples of lighting jewellery that could be sourced, not only within the sub-strand of Contemporary Jewellery, but in the general discipline of Jewellery were a minimum, if compared to the overpowering quantity of jewellery developed with any other imaginable material. Moreover, it is very common for Contemporary Jewellers to focus their work on forms of consistent research and focused practice: for some artists it can be a recurrent stylistic trait, for others, the exploration and mastering of a particular material, a technique, or a conceptual enquiry. Each designer tends to establish a personal 'signature' or ambit of research and to build expertise and reputation in that direction, creating a personal niche of practice and research that, over time, tends to become distinctive and recognisable within the wider community of practitioners.

However, this form of consistent research with Light could be observed only for a handful of designers (including myself) while in the majority of other cases, the few exemplars of lighting jewellery retrievable represented

extemporary detours, or forms of isolated experimentation, that could not really say much in terms of true insight into the problematic approach to light from the artists who attempted such one-off experiments, as they remained somehow visually and technically unripe, merely brushing the surface of the complexity of using light as a new medium for designing jewellery.

This situation was instead overturned when searching for lighting jewellery in other disciplines dealing with *jewellery-like* objects, or more generally with body-adornment. The quantity of examples of artefacts including light in jewellery-like artefacts was impressively higher, especially when considering the markets of novelty items, clubbing merchandise, toys and gadgets, and the fields of Fashion, Textiles, Product, Industrial, interaction design and Wearable Technologies. It seemed convenient to include, therefore, within the category of 'lighting jewellery' also the artefacts belonging to these allied disciplines, or as long as they included a lighting element and they consisted in body-adornment, in order to increase the number of images in the Visual Archive on Lighting Wearables to be analysed, and to possibly highlight the differences in lighting application.

For this reason, a preliminary series of considerations on the apparent differences between the approach to lighting design between the various disciplines and markets has been outlined, separating the work produced by Jewellery designers, from the work developed by Product and Industrial designers, and ending with the artefacts belonging to the markets of Clubbing merchandise and Novelty items.

2.3.4.1 - Light by Jewellery Designers

By analysing the use of light and making a quick overview of the artefacts designed by jewellers, it is possible to draw some observation with regard to a minor conformation in terms to references to iconic jewellery forms or to the category of objects produced (necklaces, brooches, etc.) and a heightened attention to the relationship between light, the artefact and the body. The use of light has been tackled mainly from an ornamental point of view, and it has been treated as an integral part of the overall design of the artefact, contributing

together with the other materials involved, to the final, aesthetic outcome of the artwork. Light has also be used either as a means to extend the visual reach of the jewellery *beyond* the boundaries of the artefact itself, including the space surrounding the jewellery artefact as part of the artwork, or, in other cases, light has been used as a decorative and striking visual addition to add visual accents to the object itself.
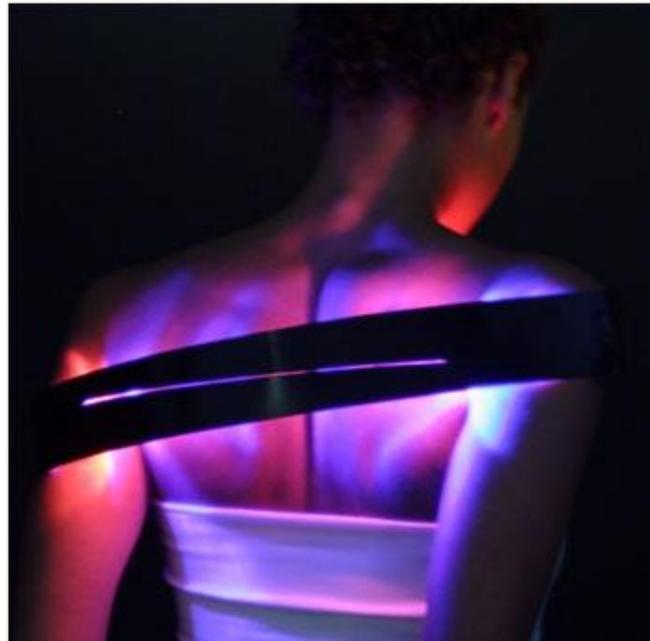
Figure 14 - Ulrike Oberlack - (2007) - *Body Light Wrap*

Ulrike Oberlack (Figure 14), one of the very few designers having based an entire career on the development of research on wearable light, for instance, brings the focus of her work on lights outside the boundaries of the jewellery object. In her work the artefact generating the light is not as central as the light that is emanated from it: the object is a means , but the light, together with the body of the wearer and the surrounding environment are the real focus of her doctoral research on light as body adornment. She showcases her artwork on the bodies of performers and contemporary dancers, filming her pieces in movement while they leave trails of light as imprints on the surrounding spaces, interacting and blending between the contrasting coloured lights worn by the dancers performing together. The light is used in its most symbolic and evocative sense, as a metaphor for interaction and for the influence that each human being has around and beyond the individual's limited space. The use of light in Oberlack's

work has a strong conceptual element that is so fundamental to render the pieces almost empty, if worn without the lights operating. In fact, the lights are not designed to be complementary to the jewellery objects themselves: the objects are carried on the body, so that light can emanate from them, and the body can work as a projection surface. In this respect they do not represent examples on how to *integrate* the light within the jewellery artefact, but of how light can integrate with the human body. As Oberlack states herself

> 'Sculpting the Body' refers to ways in which wearable light can shape the visual perception of the body as a site of light. The light emitted by the *Body Light Wrap* […] rakes the surface of the body, accentuates the relief of the skin and highlights the shape of the body in the projected areas.[…] Body Light Wrap exploits the juxtaposition of red and blue light emission on the shoulders to model the muscle and bone structure of the upper body in a *chiaroscuro* effect. Indeed one could speak of the body being sculpted by light. (Oberlack, 2011, p. 126)

A similar observation can be applied to the work of Kyeok Kim (Figure 15) who has developed some collections of work using light as a decorative element within her pieces.
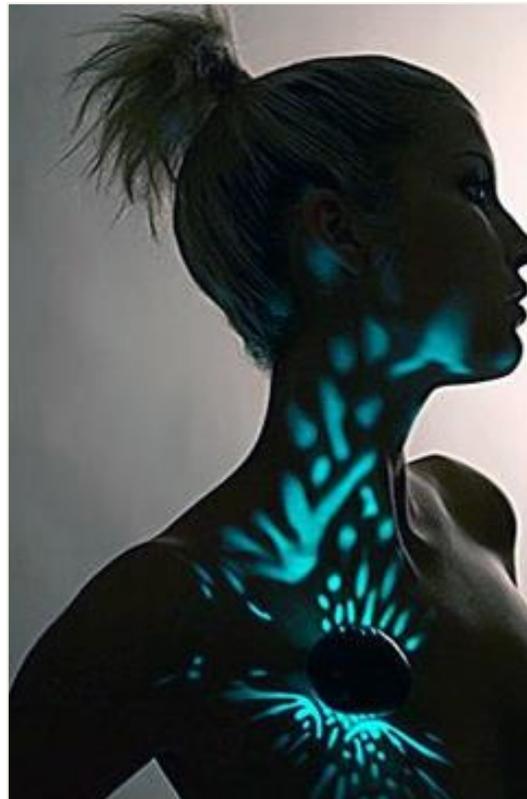
Figure 15 - Kyeok Kim - (2006) - *Aurora* - brooch

In her work, as it can be observed in the *Aurora* brooch, light emitted by the jewellery object draws and projects motifs through cut-outs directly on the body of the wearer. Even in this case, the lighting object plays its most important role on the body of the wearer, outside and around the artefact, and it is not a central feature in the design on the jewellery artefact itself, unless the artefact is 'switched on'. Silver, for instance, the structural material chosen for constructing Kim's *Aurora* brooch does not have a specific relationship with the light emitted by the piece, except for the fact that it provides a solid (non-transparent, or translucent) surface, allowing the light to neatly escape from the cut-outs, and to project sharp luminous silhouettes on the wearer's body.

This is a property that could be obtained from a quantity of other solid materials such as ceramics, certain plastics, wood, or a quantity of other metals etc. Silver, in itself, when polished, could work, for instance, as a mirror surface for producing reflective effects, but in the case of the *Aurora* brooch, this feature has not been exploited, and the use of polished silver relates more to the 'silver colour' attribute for the finishing of the object, and it also contributes to confer an increased sense of preciousness of the Jewellery object.

These pieces, when unlit, look like beautiful metallic pebbles decorated with cut-out motifs. Even though the presence of the cut-outs may be revealing of a specific design strategy in terms of the desired behaviour of the lighting element once the artefact will be switched on, the integration of the light as a component of the artefact, as intended for this research, remains very basic. In fact, even in this case, the light plays its main role *beyond* the jewellery object, and it is not a decorative element of the object itself, that certainly gains a boost in attractiveness when lit up, but that has been conceived to be almost equally appealing when unlit.

My previous work with jewellery and lights, has always focused on the integration of light in the aesthetics of the jewellery artefact, and on its modulation, even though the idea of using light exactly like other 'materials' for designing of a piece of jewellery was not so explicit and clear-cut to me as it is today. I can recognise anyway this implicit intention, by analysing some of my

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early works, and it is very evident by considering the way in which these pieces were structured and conceived. The concept behind the two rings (Figures 16 and 17) illustrated below is an intentional intensification of the idea of 'light' as traditionally expressed in Jewellery through the use of gemstones, or shiny, translucent or polished surfaces. I attempted, in a collection of rings, to play with this idea.

Figure 16 - Lisa Cerutti - (2006) - *Skyflame* - ring   Figure 17 - Lisa Cerutti (2006) - *Firequeen* - ring

Skyflame (Figure 16) is a ring where in the upper part, instead of a gemstone, a hand-carved piece of clear acrylic is set. The light source (a white LED) is hidden from sight inside the metallic structure of the ring, and only the light emanation is allowed to travel along the outline of the transparent Perspex®, designing a 'virtual gemstone' apparently made out of pure light.

Firequeen (Figure 17), pushes this idea to a further level. On the upper part is set a clear borosilicate glass dome, partially filled with real loose gemstones (synthetic rubies). The light source (a red LED) is, again, hidden within the metal structure, and while the light emanation draws a luminous outline along the glass profile, the real gemstones sparkle, reflect, refract and

progressively diffuse the emanation of light as if they were pervaded by a metaphorical form of 'inner light'.

These rings are part of the *Galaxy* series, a collection I developed in 2006 where I deliberately worked on rings in order to reduce the available space for the insertion of circuits and components, challenging myself to adapt the design of the pieces to include and integrate everything necessary for generating the light. At the time, I had already noticed that this form of integration was not present in the few examples I could observe, which, either were extremely bulky, being built around the idea of an 'electrical box' with the jewellery stuck on top of it, or, even worse, they had a nice 'front' and a very ugly back, with battery holders and switches in plain sight on the rear of the object. In the *Galaxy* series, all the pieces use the conductive properties of the gold and silver structures as negative poles in the electrical circuit, and none has evident or accessible electronic parts disrupting the overall design.
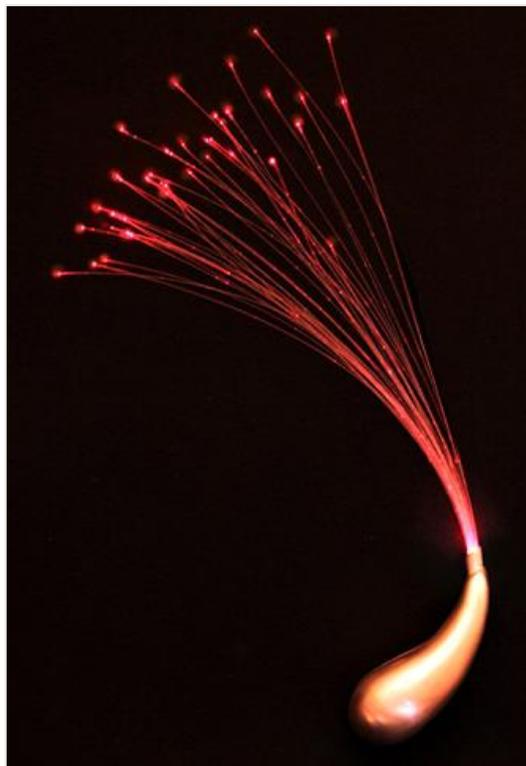
Figure 18 - Lisa Cerutti - (2006) - *Shooting Star* - brooch

In *Shooting Star* (Figure 18), the intention of using light as a structural and aesthetic element within the design of the jewellery object itself, is very evident.

The brooch, similarly to the 'lighting gemstones' shown in the previous examples, hides the light source and all electrical parts within the gold body and is designed for allowing the fibre optics to diffuse the light through their entire length (the fibres have been treated so that the light is not only transferred to the end bits but it glows along their entire length creating a solid linear motif made (apparently) of light only.

This again, makes of the light emanation not only an additional element within the artefact, but a necessary feature of its design and structure, as without light the entire 'tail' of the shooting star would be a rather meaningless and unattractive bunch of semi-transparent threads.

Another element that seems to be common and that can be traced in the work of jewellery designers that have developed significant research in the use of light in their jewellery is an increased level of sensitivity and subtlety in the way of treating light. In all the cases previously shown as examples, the lighting source is always hidden, no LEDs are crudely displayed directly on top or below the artefacts, and there is a tendency of smoothing, and blending the harshness of a crude light emanation through either an indirect use of light (light is instinctively considered as the 'emanation', and not the light source itself) or through a progressive 'fading' or 'dimming' of it, through the wearer's body in Oberlack's and Kim's cases, through the interaction with other materials, in my own.

Many other examples of work with lights traceable from jewellery designers can be generally considered as detours, one-off experiments, undertaken possibly as a form of challenge, or a *divertissement*, because the scant examples available tend to be isolated exemplars within bodies of work based on totally different forms of conceptual or material research. In this sense they show a very basic use of light, that is not generally included as a significant element in the design of the jewellery object, or as a proper structural or decorative material. This is perceivable also by the substantially minor degree of engagement and complexity in the conceptual or material approach to lights.

Figures 19 and 20 (p.73 and p.74) are examples of works of jewellery artists who do not base their entire artwork on lights and they have been selected for showing two characteristics in the use of light that can be found most commonly outside of the Jewellery design field.

In the case of Leah Heiss (Figure 19), *Drift* is a 'handheld object'' that is not supposed to work as body adornment, but as an interactive object that, by softly pulsing light should engage the curiosity of the onlooker and stimulate the desire to hold it on the hands and interact with it.
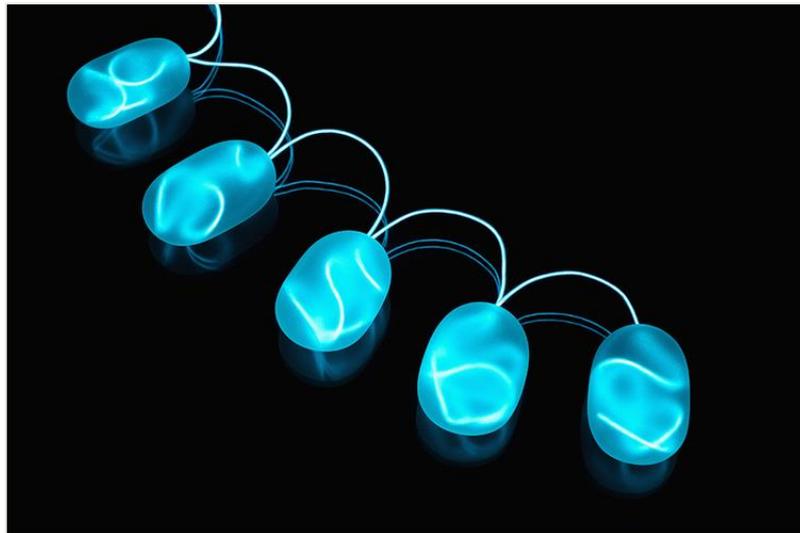
Figure 19 - Leah Heiss - (2009) - *Drift* - handheld interactive element

The luminescence of the object is provided by nano-engineered Electroluminescent cable and the interactivity is activated by sensors. Heiss designs jewellery that crosses the boundaries with interaction and medical design, and the lighting element in her work is used similarly to how interaction designers do. The light source is clearly in sight (as we can see the EL cable is directly embedded in the resin pods, connecting them) and its main function is to 'indicate' the status, or the behaviour of the interactive device, rather than being focused on representing an aesthetic element. It has to be said that the focus of *Drift* is on the emotional engagement between the objects and the onlooker, hence the lights are used as stimuli and indicators in a piece that is in reality based on sensorial interaction.

When curiosity overcomes and we pick the pods up they react to the holder in playful, confronting and unexpected ways. Drift questions how through imbuing our artefacts with interactivity we may actually be giving them personality traits – the capacity to behave in erratic, complex and unforeseen ways.(Heiss, 2009)

There is an aesthetic aspect to it, as the EL cable is a central feature in the piece, but even this aspect is turned functionally: to generate the 'wow effect' that the luminosity of the object induces in the onlooker, and when it is overcome, light will continue to work as a means to indicate the different modalities, and the functioning of the interaction.

In the case of *Adamantina* (Figure 20), a string of Christmas lights has been woven to form a choker. Silvia Beccaria creates jewellery with a wide range of materials and her work rotates around the idea of 'weaving' and progressively making her jewellery grow, as fabric is built by weaving of single threads. This piece, in her collections, is a unique exemplar where light is concerned, and considering that the main focus of her work is to further the notion of 'fiber' by entwining all materials that can be woven, this choker with lights can be framed as a further chapter in an series of exploratory work focused on concepts other than how to deal with light in Jewellery.

Figure 20 - Silvia Beccaria - (2010) - *Adamantina* - choker

It has been chosen, however, to exemplify quite literally the use of and approach to light that is generally visible in the majority of lighting jewellery artefacts created by authors whose main interest is not focused on lighting design. Light, in these works, is in fact just an additional feature, added to work that is developed around completely different kinds of research. Lights tend to be used aesthetically, like in the *Adamantina* it might represent a more glittering version of sequins, but there is not any form of integration in terms of design between these lights and the actual jewellery object. Moreover, they tend to be used directly as the light sources themselves (LEDs in plain sight) and there is no attempt to modulate their emission, or to work directly *on* it and *through* it.

2.3.4.2 - Light by Product designers

In the case of Product, Industrial, Fashion or Interaction design, it is very common to associate the use of lights with visual references hinting at futuristic, alien or cyborg-like, or to iconic inspirations such as the work of Hans Ruedi Giger (2014), or movies such as Metropolis (1927),Tron (1982), The Matrix (1999) etc.

In general, contemporary jewellers have not embraced opportunities afforded by digital technologies to extend the scope, and subsequently the subject, of contemporary jewellery. Where the notion of digital jewellery has been broached by industrial designers the conceptions have not progressed beyond a clichéd futuristic aesthetic.(Wallace, 2007, p. 78).

Figure 21 - Dominic Elvin - (2017) - *Technician White Head System*

Figure 22 - Lumigram - (2010) - *Lumitop Karina*

In Dominic Elvin's headpiece, (Figure 21) LEDs are used as enhancements to add an extra-feature to the robot-like design of the face-adornment. The reference to the futuristic aesthetics is clear, and also the destination of this piece for the Clubbing scene or for cosplayers. The use of light is literal, LEDs are in plain sight and they simply add an accent to a piece that, substantially, is not built around the design of light or complemented by light to a significant extent.

In the case of Lumigram's top (Figure 22) the entire accent is on the fabric created by woven fibre optics, a textile entirely seemingly made out of pure light. In this case the light source is not visible, as the light that is seen on the body piece is simply transferred and diffused through the fibres, but this is only one of a multitude of products featuring this patented fibre-optics textile in various forms, from interior design to Fashion accessories, and there is not a strategic relationship between how the product is designed and the lights that are used in it.

In the cases of Figures 23 and 24, the pieces are examples of Wearable Computing and Interaction Design, similar to the case of Leah Heiss, illustrated in Figure 19. In both cases the LEDs work as visible indicators of the changes made through the interaction between the objects, the wearer or the environment.

Figure 23 - Leah Buechley - (2008) - *Beaded LED bracelet*

Figure 24 - Moritz Waledemeyer - (2009) - *Hearbeat* for Campeggi - brooch

Leah Buechley's *Beaded LED bracelet* (Figure 23) is sensitive to movements in 3D space. The bracelet is made with an array of LEDs that switch between different lighting displays depending to the movements of the wearer.

Each light display is connected to a pre-set position of the bracelet in spatial X, Y, Z axes, and sends a digital coded signal to a computer that is programmed to transform it into a sound. The result is that the body movements (a sort of pre-established dance sequence) performed while wearing the bracelet, can be associated through a computer, to produce a series of related sounds. Light in this case is a visual representation, an indicator for the changes in the spatial position (and in pre-set signal) of the bracelet, whose scope is to demonstrate some of the potentialities of Interaction Design, and to represent it via the relationship between dance and music.

> In this case, we were prompted to use the LED sequins just as one might traditional beads, weaving the bracelet from glass beads, LED sequins, standard thread, and conductive thread on a bead loom.[…] the bracelet can also be used to display scrolling text, cellular automata and other low-resolution animations (Buechley & Eisenberg, 2009 p.138).

In the case of *Hearbeat*, Moritz Waldemeyer (Figure 24) developed what he defines a "new invisible jewellery concept" (Waldemeyer, 2009), realised with an array of LEDs connected to a sensor recording the heartbeat of the wearer and displaying the rhythmic animation of a growing luminous heart. The piece is hidden under the wearer's clothes, working as a projection and diffusive surface for the light emission to pass through and allowing the object to remain hidden, eliminating the visual impact of the complex electronic circuitry. Even though the LED display this case hints at the basic form of a heart, which could be read as an attempt at creating a purely aesthetic object of body-adornment, it can either be seen as the literal translation of the functionality of tracking visually the actual heart-rate of the wearer. The LEDs use is extremely basic, even if they are in this case technically hidden from sight and the lighting emission is filtered through the fabric of the wearer's clothes. Still, the 'sense' of the lighting element is justified by its functionality as 'indicator' of an interaction occurring, rather than being in place for a purely ornamental scope.

In all the above examples, it seems that the focus of product, industrial or interaction designers is not really on the lighting features of the object, that remain secondary to the 'performance' that the device is operating, and

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somehow justified through the 'wow', or 'novelty' effect that a lighting feature can provoke into the onlooker, possibly even enhancing the futuristic appeal of a 'smart' and technologically advanced device.

2.3.4.3 - Light as a Novelty

One of the strongest associations between the use of lighting and Jewellery is, however, the market for novelty items, clubbing merchandise gadgets and children's toys.

Figure 25 - Blinkee.com (2012) - *Fibre Optics LED Mohawk*

Figure 26 - Windycitynovelties.com (2012) - *Pink LED bunny ears with Marabou*

The fact that the vast majority of examples of body adornment with lights belongs and originates from the category of festive gadgets, clubbing merchandise or children's toys, plays a fundamental role in shaping the general public evaluation of the use of light in jewellery design. These objects (a couple of random examples are shown in Figures 25 and 26) are industrially produced, and are generally of very cheap manufacture, materials and finishing, and they embody an overall taste that is eccentric at best, or extremely ugly at worst.

In my experience, the constant association between LEDs and novelty items, is one of the most difficult preconceptions to fight against, for a designer who wants to practice and research the potential of lighting within the discipline of Jewellery. In fact, it is almost inevitable that the mainstream idea of lighting jewellery, unless appropriately contextualised, is already shaped and influenced by references to the above mentioned markets, and the risk of new work being

quickly dismissed as 'clubbing jewellery' is very high. In a sense, one should work and design with a double mission: one, to create new work and innovation in the use of lights within the discipline of Jewellery, and second, to move against the mainstream prejudice, identifying the factors determining a 'clubbing' product, and designing with strong references in an opposite direction, in order to develop a contrasting idea through new research and practice.

In my professional experience, when exhibiting my collections internationally I noticed that the 'distortion' in the prejudice about lighting jewellery being 'clubbing gear' was twofold: on the one side it could be apprehended as something funny, theatrical, or so peculiar that it had to be worn only on very special occasions, and on the other side it could be perceived as a synonym of tacky gaudiness and bad taste, in opposition to the idea of stylish refinement that is typically associated with Contemporary Jewellery.

The exponential growth of the market of Wearable Technologies, is gradually 'popularising' wearable lights though the diffusion of smart accessories that include some lit elements into them, with the advantage that the mainstream taste is getting accustomed to the idea of wearing technology (lights included) on the body. This was previously associated only to the market of Watches, traditionally moving alongside Jewellery, but today the space between functional devices and body adornment has hybridised them and this is slowly legitimising and normalising the use of lights as a decorative element for body adornment in everyday life.

2.4 - Stage 1 – Method: The Intuitive Approach (IA)

This section will illustrate the method adopted in Stage 1 for conducting the preliminary visual analysis setting the direction for the final stage of design development, experimentation and practice. It has been named the Intuitive Approach (IA) as it is characterised by intuitive procedures for collecting and evaluating images (or artefacts). It reflects a *modus operandi* relatively common

within creative disciplines, particularly Jewellery and Fashion design. The IA consist of an ensemble of unstructured procedures and techniques applied in the preparation phase of the design process[34] for the analysis of visual material.

The IA is an iterative process of image collection and analysis developed in progressive stages of refinement, on the basis of intuitive categorisations, until an understanding of the recurrent traits (or visual criteria) underlying a given visual theme emerges. This does not necessarily entail the formulation of a final explanatory model of that theme, because the recursive elicitation of the visual patterns underlying a number of instances of that theme can represent for the designer sufficient clues for grasping its essence and for stimulating the development of new design ideas.[35]

The IA is the method that I have applied in my professional practice when I had to develop new creative work around one or more specific visual themes or brief requirements, or as a tool to draw inspiration for informing new design ideas.

The IA consists of attempting to reach an intuitive understanding of a visual theme through a preliminary 'review' (the visual parallel of the 'literature review') where artefacts, images, decorative details, illustrations or designs on that theme are gathered and evaluated, in search of common patterns or key elements perceived to express 'the essence' of that theme. These elements can then be translated into distinctive references for the development of new design briefs and projects. The entire process is subjective as it is based on the individual apprehension of any given theme, so there is not a 'right' or 'wrong'

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[34] See Chapter 3, section 3.3.2 for more on the preliminary stage of the design process.

[35] Retrospective note (2017)- It is important to remember that, In Stage 1, the stage of design development and practical experimentation was considered the principal research and design method for the exploration of new, suitable ways for using light as a new material in Jewellery. In this perspective, the methodological approach to the elicitation of visual patterns underlying the two Visual Themes of Lighting Wearables and New Materials Jewellery was barely perceived to be an integral part of the research: it was a tacit working tool in the background every time new artefacts related to the chosen themes were found or observed.

approach for the image selection, the elicitation of patterns, or the possible outcomes that their re-elaboration might produce.

The collection of visual material can be performed by browsing books or catalogues, by surfing the internet, or by assessing real three-dimensional objects or decorative details. The material retrieved can be simultaneously assessed while moving to new and more focused samples, or it can be archived for future reference in sketchbooks, albums or digital repositories to be analysed and reflected upon in more depth by means of textual commentary, drawing, or preliminary design development.

The fundamental aspects of the IA are the accumulative, comparative and repetitive aspects of the process. The IA is an unstructured method based on analogical reasoning for *ostensively* defining and understanding visual themes, through the analysis of a multiplicity of examples, in an attempt to reach a form of prototypical generalisation, by means of anecdotal evidence.

In the following sub-section the IA will be presented in its four fundamental elements; 1 – Visual Archives (sub-section 2.4.1) – Image Collection (sub-section 2.4.2); Image Analysis (sub-section 2.4.3); and 4- Design brief (sub-section 2.4.4).

2.4.1 - IA - Visual Archives

Building and maintaining a 'Visual Archive'[36] of images around themes of interest is a practice adopted by a number of artists and designers to produce a reference library that might function as a visual stimulus for inspiration and concentration during design projects, informing the generation of new design ideas. It can be seen as the visual equivalent of a thematic collection of books, journals, articles or magazine cuttings on subjects that researchers or professionals build for present or future reference.

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[36] Please see the Definitions section on p. XII for an operational definition of the term Archive in this thesis.

Collecting images on themes of interest and approaching the design development through a combination of visual analysis, sketching, drawing and written commentary is a procedure commonly implemented by a number of art and design professionals, and taught as a design method in art and design institutions. I have developed the habit of saving, storing and using images as a reference and inspiration for my projects, and I have also been taught to do so while studying art on multiple occasions. Interestingly enough, I could not retrace specific methods, or procedures for building and managing these form of Archives, except for tangential literature about the creation and use of Moodboards (Ashby & Johnson, 2004; Lucero, 2009, 2012; Lucero, Aliakseyeu, & Martens, 2008), which can be roughly brought back to a similar concept, from which some ideas can be drawn[37].

In my experience, and through the examination of students' and colleagues' work, I have seen these Visual Archives take several forms: from simple collections of magazine cuttings, photocopies or actual pictures amassed in photo albums, sketchbooks, folders or boxes (with variable degrees of thematic or temporal organisation and coherence); to more elaborated versions, such as 'visual journals' or 'project journals', where images are used for reflection and re-elaboration through sketching, drawing, textual notes or in combination with collage, materials' swatches or textural samples, to outline initial ideas and planning future designs; to the most contemporary versions, on computer folders, digital albums, and online repositories, with images either scanned from the original printed sources or directly taken from the web.

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[37] Moodboards, as idea development tools, have a role that can be compared to that of a Visual Archive in the IA. They can be seen as minimalistic versions of Visual Archives, with the difference that in the Archives images are accumulated and intuitively analysed in order to derive a set of concrete visual patterns representing peculiar traits of the theme, with the scope to use and to reinterpret them for the development of new design briefs. In the case of mood boards, images are selected and used on the basis of their emblematic or evocative strength, for synthesising and conveying, as an ensemble, the mood or 'the feel' of the theme, in a way that is even more preverbal, implicit and, consequently, even more susceptible to dubious understanding.

In my earlier consultancy projects for the architectural conservation and restoration of paintings, frescoes and decorations on historical buildings, I had to understand preliminarily the key elements of various architectural styles, in order to grasp the most characteristic traits and be able to appropriately translate them to integrate, reconstruct or to even recreate them, according to the original style.

This led me to keep track of the visual references I consulted, and over the years to develop the habit of keeping repositories of images in several areas of art and design. At present I actively maintain several Visual Archives, for different thematic areas such as 'Architectural Decoration' (divided by style and period), 'Interior Design', 'Product and Industrial Design', 'Costume Design', 'Textures and Patterns', 'Lighting' and 'Contemporary Jewellery', just to name a few. Part of my creative activity is to dedicate periodically some time for sessions of 'image hunting', and whenever I come across images I find interesting or inspiring, I store them in the appropriate Archive for future reference. Sometimes, Archives can be initiated on the basis of the requirements of a very specific project, and later retained as reference collections.

Visual Archives can be built without specific forms of internal organisation or cataloguing, except for a general sense of thematic sorting (different themes in different Archives). For instance, I have been keeping a Visual Archive on Italian Fine Jewellery since 2002 now comprising several thousand images, in the form of magazine cuttings, advertisements and editorial pages. These images are contained in folders assigned to the same 'Fine Jewellery' theme, organised on no other criterion than the rough temporal progression, based on the order with which the various images were accumulated.

This very basic and chaotic Archive has nonetheless served its role as informative, reflective and inspirational tool over the years. It has constituted my library of visual information where I could access and review almost anything produced, marketed or advertised in Italy over the past 15 years and analyse, at

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a glance, the trends, recurrent patterns, or technical elements that I deemed significant for informing my work.

The description of the detailed process I use for keeping my Visual Archives is representative of my experience, even though I hypothesise other artists and designers might use a similar approach in principle, when dealing with preliminary visual research in their projects and work.

2.4.2 - IA - Image Collection

The preliminary phase of contextualisation was instrumental for highlighting the areas where it was necessary to get a deeper understanding of the phenomenon of the use of light in Contemporary Jewellery. In absence of existing theories about a univocal definition of Jewellery, or Contemporary Jewellery and about how to use lights or even innovative materials within these fields, this understanding could be inductively drawn by evaluating and analysing a series of examples of existing lighting Jewellery artefacts in terms of how light had already been deployed. The recurring design patterns elicited would then be used as starting points for the subsequent phase of experimentation, design development and jewellery making.

After reflecting on the four sub-themes previously discussed in the Context section (2.3 and sub-sections), I believed I could pair them into two main themes, *New Materials Jewellery* (from the pairing of the two first sub-themes Contemporary Jewellery and New Materials) and *Lighting Wearables* (from pairing the last two sub-themes Light as a Material and Wearable Light). I had been accumulating hundreds of images of artefacts in two of my pre-extant Visual Archives, one dedicated to Contemporary Jewellery and another focused on Lighting (from a range of markets, from Interior Design to Fashion, Clubbing, industrial design, interiors etc.). These Archives consisted partially in physical folders containing photocopies and magazine cuttings and partially in digital format in image folders on my PC.

Because of my previous experience in Jewellery and lighting design, I could not start this process as a *tabula rasa*, disregarding my experiential

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knowledge on the subject. I had to skim through the images contained in these pre-existing Archives in order to select only the images that would be relevant for the development of new practice on the use of light as a new material for designing jewellery. Together with the images that I had already amassed in these Archives, I performed searches online on the principal forums, blogs and websites specialised in Contemporary Jewellery[38], concentrating only on the artefacts where I could clearly recognise the use of non-traditional jewellery materials and — in the case of the images on Lighting Wearables — on various forms of body-adornment websites dealing with Ubiquitous Computing, Wearable Technologies,   Product Design, novelty items and clubbing merchandise.

In order to select which artefacts could be considered relevant and meaningful for this research, I had to establish a series of characteristics, or criteria that would identify the correct examples to be sourced and analysed. Through a few sessions of 'personal brainstorming' I listed a series of keywords and concepts that I thought were fundamental criteria defining the idea of using emitted light in Contemporary Jewellery and I elaborated a concept map where I started to create connections through and between them. Figure 27 shows the map of the initial key concepts related to Contemporary Jewellery and lighting design and Figure 28 is a visual representation of the criteria selected for the subsequent analysis of the examples, drawn from several disciplines.

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[38] Online searcher were performed regularly on websites such as: Klimt 02 (2017), The Carrotbox, (2017), Galerie Marzee (2017), Collect (2017), Art Jewelry Forum (2017), Galerie RA (2017), Munich Jewellery Week (2017) , Pinterest (2017), SOFA (2017).
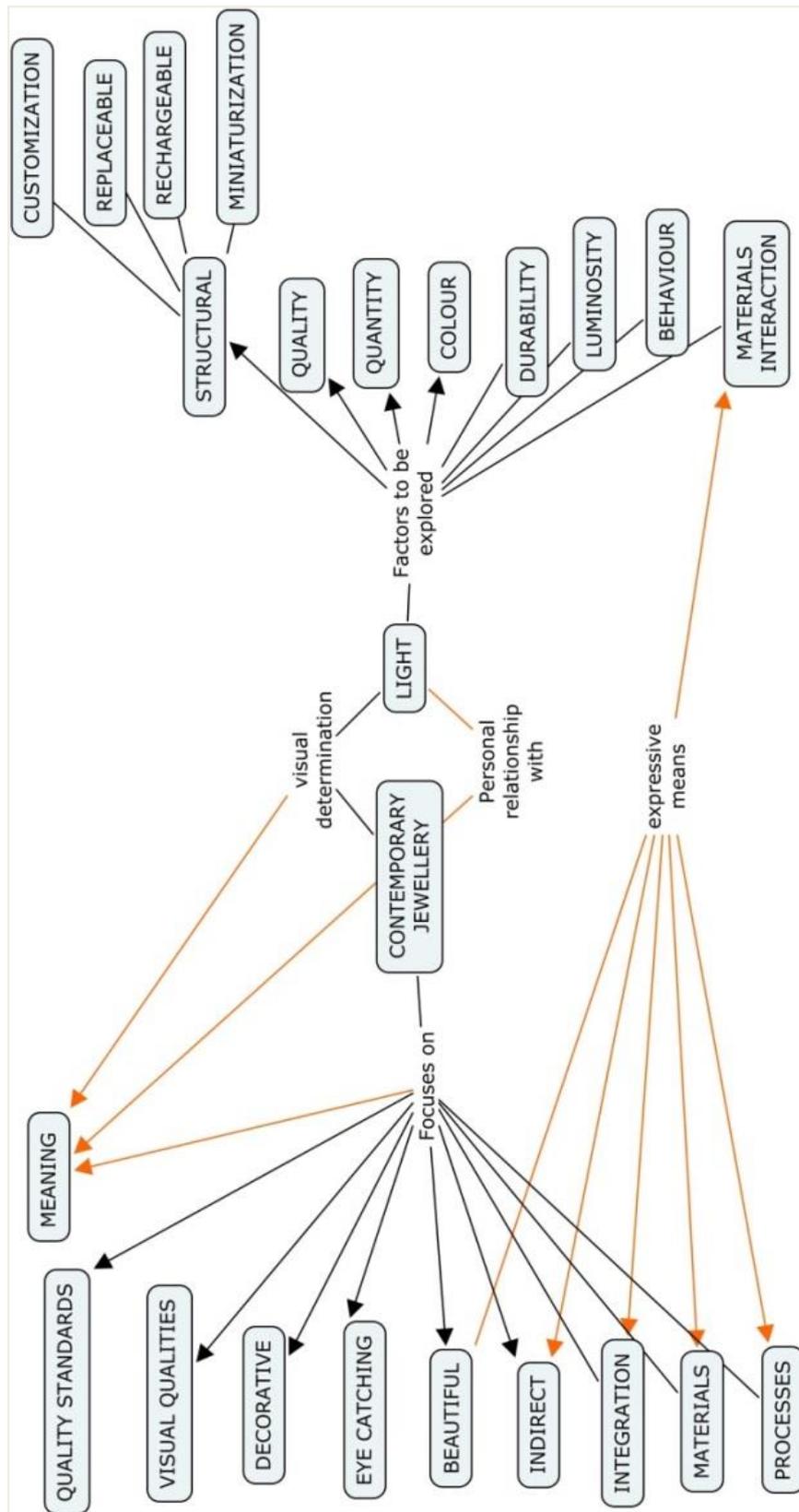
Figure 27 - Concept Map of key aspects of Contemporary Jewellery and Lighting Wearables
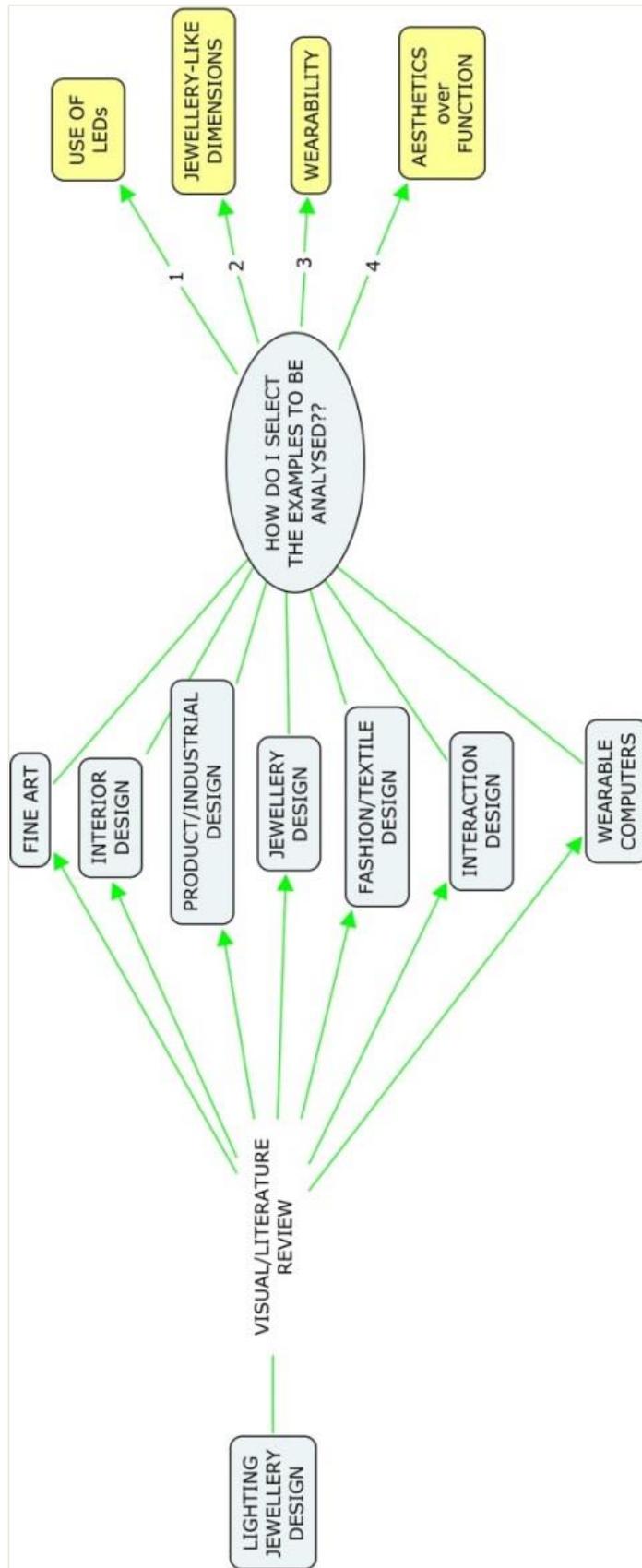
Figure 28 - Concept Map defining the four criteria for image selection

The selection of the images for conducting preliminary visual research on the two Visual Themes 'New Materials Jewellery' and 'Lighting Wearables' was conducted according to the following four principles and criteria (as they can be seen in Figure 28):

1- <u>Use of emitted lights</u> - All the images of artefacts considered for analysis, had to be selected on the basis of the main requirement that they presented a simple or extensive use of emitted lights in the design. The fact that the majority of the artefacts displayed the use of LEDs, was explained on the basis of the practicality of using these small light sources for designing small objects like Jewellery or Wearables, and it justified their extremely popular use. LEDs, in fact, other than being extremely small, can be easily powered with small batteries, require a low voltage and have a low current absorption. LEDs allow to design objects that are highly portable, do not require a cable connection to a mains for power and can be easily incorporated into the design of small scale objects without being excessively cumbersome.

2- <u>Jewellery-like dimensions</u> - This criterion was contingent and not based on a range of specific dimensions in terms of areas, volumes or weights, since there is not such an established rule in jewellery design. The notion of jewellery-like dimensions is strictly related to experiential knowledge, and in particular to the practice and experience in terms of jewellery culture. For this project this criterion was considered to stand within a dimensional range going from very small objects (as in the dimensional range Fine or high street jewellery) to the theatrical volumes of catwalk and costume jewellery. The limit to this criterion stood in a reasonable purpose of wearability of the artefact.

3- <u>Wearable on the body</u> - If the previous criterion referred to the notion of wearability in terms of *suitability* for being worn, this criterion focused on the *purpose* of wearability as the ideal destination of the lit[39] objects analysed. For

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[39] <u>Retrospective note</u> (2017) – It is possible to notice how, slowly, the theme of 'New Materials Jewellery' is disappearing from the reasoning, and how it gets tacitly and progressively incorporated into the 'Lighting Wearables' theme, as the only focus of the investigation. This will be discussed in Chapter 3, (Section 3.1.2) where the flaws and naiveties of the IA and its conduction in Stage 1 will be highlighted.

instance, a mobile phone could have jewellery-like dimensions, it might include LEDs in the design, but independently from its potential wearability, its purpose is not to be worn on the body, even if it could be carried in a pocket or supplemented by accessories allowing it to hang on the neck, or strapped onto an arm. Therefore, objects not specifically designed for being positioned on the body have been excluded from the data analysis.

4- Aesthetics over Functionality - Objects that could be in the right range of dimensions, use of lights, and wearability, were deemed to be unsuitable for the analysis if they had a main utility exceeding the purpose of being ornamental.

MP3 or MPEG players, for instance, are examples of this kind of objects, as they have the 'right' dimensional range, they are designed specifically to be worn on the body and they have luminous parts. However, their LED displays are mainly functional, and this utilitarian aspect is predominant over the ornamental and decorative factor. This criterion in reality excluded many artefacts playing with lights and function, especially in the discipline of Wearables and Interaction design. In all these cases, the use of lights had to be evaluated in terms of effective influence over the final aesthetic aspect of the object, so unless the implementation of interactivity or functionality had been devised specifically to modify the lighting and aesthetic properties of the object itself, the objects had to be excluded from the analysis.

Summarising, the images collected and selected for preliminary visual analysis responded to the four principles described above, therefore they were all objects lit (mainly with LEDs), specifically designed to be comfortably worn on the body for weight, dimensions, and purpose, and whose lights had a main visual or ornamental function.

2.4.3 - IA - Image Analysis

The images selected were cumulatively assessed by browsing through them and performing more rounds of observation and intuitive analysis in an attempt to elicit some common features underlying the use of lights, at the same time hypothesising how these features could be implemented, modified,

improved or developed in the practice that I would be performing at the end of this analysis[40].

This iterative, unstructured process led to the formulation of a set of basic criteria common to these artefacts, some of which were 'felt' to be shared by the majority of the images collected and analysed, while others were accepted because they were perceived as relevant in terms of a sufficient quantitative distribution.

The 'common denominators' in the use of lighting in wearable artefacts observed during preliminary visual analysis with the IA were substantially three:

1-Plain light emission, crude LED colours - The first observation from the analysis of the images was that, either in the clubbing/gadgets/novelty items examples, and in the more sophisticate exemplars developed by product, interaction or jewellery designers, the main scope behind the use of lights seemed to be the 'wow effect' of the plain use of LEDs. In the majority of cases, monochromatic LEDs were placed in plain sight on top or below the artefacts, without modulation or intervention on their light intensity or colour output and without any strategy for implementing lighting effects through them.

The palette of colours emitted by monochromatic LEDs is extremely limited, and the colours available are extremely harsh and strong. Tri-chromatic (RGB) LEDs instead, emit any hue and shade in the light spectrum, by modulating and blending the outputs of the three red, green and blue channels. In absolute terms, RGB LEDs represent the best solution for the control of light intensity and colour emission. However, they require additional components in the electronic circuit in order to manage the blending of the three light sources and to obtain the desired output. This can easily become an obstacle either in terms of encumbrance of the components within the design of the artefact, and with

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[40] Retrospective note (2017) – It can be noted that the process of image collection and image analysis are entirely taken for granted and treated implicitly as coincidental and enmeshed in the process of idea generation and design development for the subsequent phase of practice. See next Chapter (Section 3.1 and sub-sections) for a more detailed discussion on the issues in the process and application of the IA.

regard to the complexity of the circuitry, especially if more than one LED is involved[41].

Moreover, the majority of the artefacts including LEDs analysed came from the clubbing/disco/gadget industry, and none of these products relied on sophisticated or particularly elegant design solutions, therefore lights had been used in their most basic and crude form.

All these considerations brought me to the conclusion that for the practical development of this research it would be meaningful to conduct more experimentation around the use of monochromatic LEDs in order to devise alternative solutions for modulating the light and colour emission via an indirect use of light sources and filters, and through the interaction with surrounding design elements, surfaces and materials.

2-Non-specific design – The second common denominator elicited from the visual analysis was that there was not a specific design strategy 'around' the lighting element in the objects examined. The design of the objects, with very few exceptions, seemed to be developed independently from the possible presence of a light source. The lighting element was generally an addition to the artefacts, as it seemed evident that these objects were not designed with the clear intention to facilitate, or to enhance the integration of a lighting element through their design.

This observation, in combination with the previously listed problem of a plain and crude use of light sources made me conclude that for the practical experimentation, I would have to focus the new designs on the light emission as the main element around which the entire artefact would be conceived and built. The experimentation would then treat the light element in its pure form (the emission and not the light source) that would be filtered, channelled and

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[41] Retrospective note (2017) – Please refer to footnote n. 31 p. 62 for a more detailed comment about the current availability of 'Kits' for the immediate use of electronic parts, and how the situation was at its embryonic stage when Stage 1 was developed.

conveyed through or in combination with materials that could modify and modulate its effects and colours in the final form.

3-Invisibility in daylight - For a piece of jewellery to be considered a piece of lighting jewellery, the light sources need to be in operation. Any lighting jewellery piece was deemed to be significant for this research only when the emitted light was clearly showing. With the light turned off, the piece would be not any different from any other piece of jewellery, thus it would be of no interest for the purpose of this PhD.

A common issue in the examples analysed in the visual review stood in the use of disposable batteries (very often watch batteries) as power supply. They tended to be used because of their limited dimensions and immediacy of operation, not requiring any expertise in terms of electronics. Still, for several reasons they are far from desirable for the purpose of designing lighting jewellery and they are arguably the main reason why very few jewellery designers continue to work with lights in their jewellery after some initial, playful experiments.

The first reason is that the forward voltage of these batteries is not optimal for LEDs to reach their maximum light intensity. LEDs powered in this way emit light that is not strong enough to produce a discrete effect in daylight and it is also bound to gradually fade while the battery discharges. The quality of light produced with these batteries is not constant, and is best suited for being appreciated in dark or semi-dark environments, hence the predominant use in clubbing merchandise. This is the opposite setting of where traditionally jewellery is exhibited or showcased. Jewellery tends to be displayed in galleries, shops, fairs or exhibitions where dazzling halogen lights are strategically positioned in order to enhance the glistening of un-lit jewellery, and lighting jewellery powered with these batteries are bound to literally disappear, showing barely any sign of light shining through.

Moreover, the constant necessity of replacing the exhausted batteries with new ones, other than having sustainability implications, impacts on the costs of maintaining the constant operation of these artefacts and to showcase

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them side by side with other Jewellery that does not have such complications. It is evident that pieces of jewellery designed in this way need to be constantly supervised and supplied with new batteries and it is unimaginable that a gallerist or a shop owner will ever supervise on the constant replacement of batteries for maintaining the continuous operation the jewellery displayed. It is more likely that the batteries will be left to discharge, and the lighting jewellery shown as normal pieces of un-lit jewellery, losing all their special appeal and 'reason to exist'. This is one of the factors that appears to be most discouraging in pursuing research and practice in lighting jewellery design.

The issue of disposable batteries is also linked to a design problem: the battery needs a holder for it to be easily replaced and in order not to influence the design of the artefact, it needs to be concealed within the piece (unless deliberately left in the open as visible design element). This creates the additional problem of designing and making the opening and closing mechanism in the object, to allow an easy access to the battery. Keeping in mind that Contemporary Jewellery artefacts are generally handmade and that these additional mechanisms for encasing the electronics might differ for each new piece of jewellery with a different design, this element alone might represent an additional limit in terms of time and effective freedom for developing new ideas.

If disposable batteries can be regarded as the 'starter kit' allowing anybody to experiment the thrill of working with light in jewellery, they are also the main obstacle preventing significant development in the practice. Therefore, in the experimentation I chose to refrain from using these batteries and to develop new jewellery entirely based on a rechargeable system[42].

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[42] Technically this passage has been resolved during my Master's practice-based research with the development of the *Arduino* (2008) series, available on my website (2017).

2.4.4 - IA - Design Brief

Once the main problematic features common to the vast majority of the examples of lighting jewellery analysed were established, it was possible to derive, as a matter of contrast, a series of criteria for guiding the delineation of a new design brief.

Through further sessions of brainstorming and the generation of a new concept map (Figure 29) I linked in reciprocal relationships various keywords, ending with a series of finalised criteria for designing new jewellery artefacts and for the behaviour and treatment of the lighting element in them. These criteria formed the basis for guiding the practical choices in terms of materials, effects, and techniques to be used in the new practice.

The final criteria for the practical experimentation, derived from the issues previously illustrated, can be divided in two main groups: criteria defining the direction for designing the jewellery objects (in yellow in Figure 29) and criteria for the lighting effects to be explored (in light blue in Figure 29).
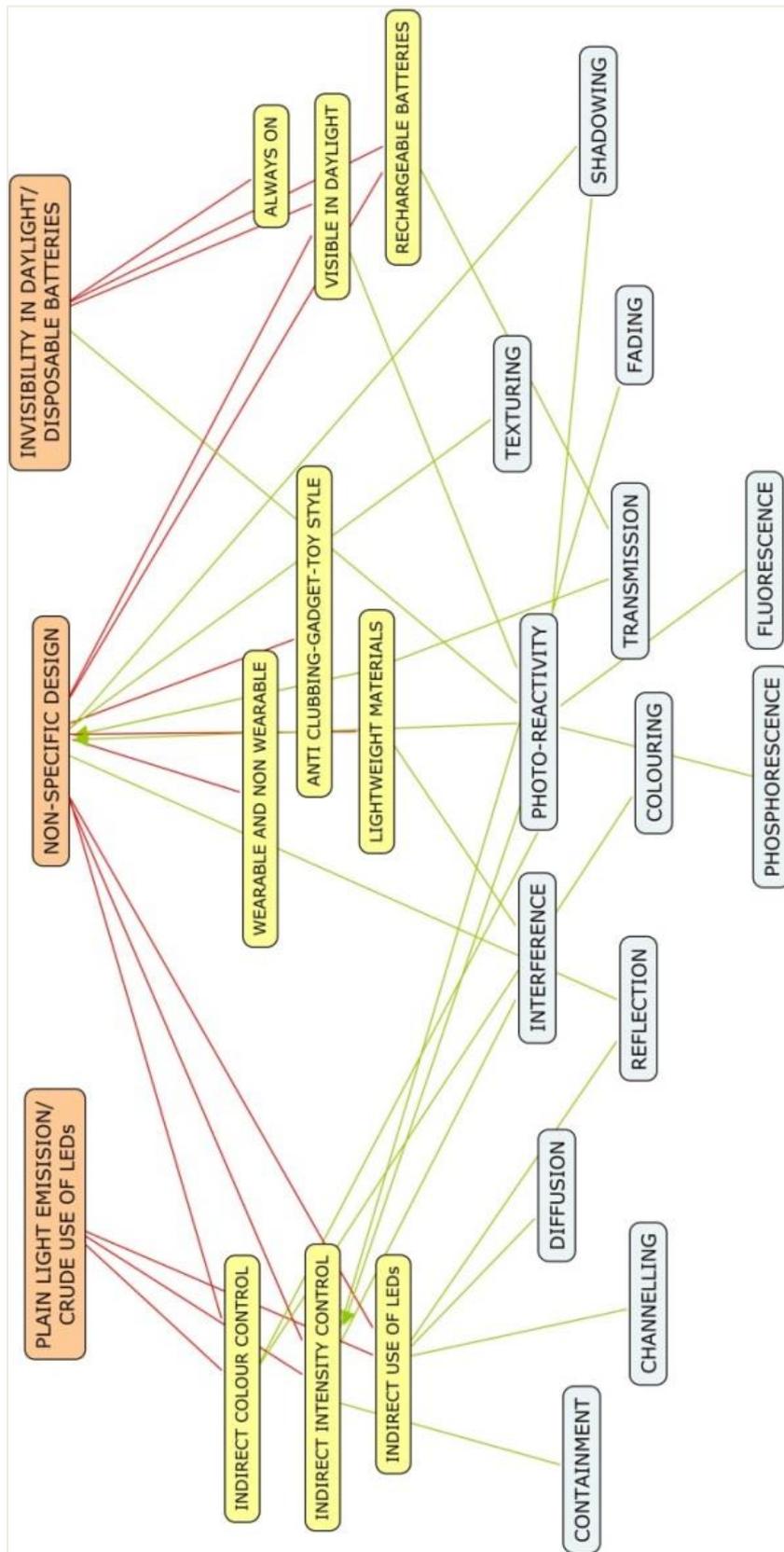
Figure 29 - Concept Map for the formulation of the visual criteria for the design brief

A brief description of each criterion will help to identify their use, how they could apply to the practical development of new Jewellery with lights and the context in which they had to be framed.

Object-Related Criteria:

1- Always ON **:** The objects to be designed should be intended and conceived considering the lights as constantly operating. The aspect, or effects on the object when the lights are not visible or in operation are not going to be considered for the design development.

2- Visible in Daylight**:** The luminosity and intensity of light emission of the object should be considered for being perceivable even in luminous environment. Possible differences in lighting effects in darkness and daylight might be further explored.

3- Rechargeable : Each object should be provided with a rechargeable system hidden within the piece, not reachable by the wearer. The On and Off statuses should be regulated by a switch or a potentiometer and the charge be possible via USB port.

4- Lightweight **:** The use of lightweight materials should always be preferred where possible, over materials with a higher specific gravity, in order to allow more freedom and complexity in the use of light sources, increasing where necessary the amounts of electronic components or material layers, without concerns regarding the overall weight of the final object.

5- 6- 7 Indirect use of LEDs, Colour, Intensity : As a matter of contrast with the plain and crude use of LEDs observed in the examples analysed, the practical experimentation should develop from an intentionally indirect use of LEDs (always hidden, never directly showing or surfacing in the design). Any colouring effect on the emitted light should never come directly from the native colour of the LEDs. The lighting colour should be the resultant of the interaction between the LEDs (white or coloured) and the surfaces or materials through which the light will be filtered. The intensity of the light emission should be regulated downstream of the light source, so instead of being modulated directly on the

LED via resistors or microcontrollers, it should be managed through effects and interactions between light source, surfaces and layering of materials.

8- Wearable – Unwearable : The objects produced should be designed to be worn on the body but at the same time to be perceived as *objets d'art* when not worn. This might lead to a further development of the project, where additional considerations and solutions could be developed on the use and destination of these luminous objects when used as adornment for the environment, instead of the body of a person.

9- Anti-Clubbing Style : This visual criterion defines the specific requirement for the objects to intentionally set some distance in terms of visual references, details, sophistication and use of lights from the jewellery-like products belonging to the clubbing/cyber/novelty markets. This criterion is used in order to establish a visual identity for lighting jewellery artefacts, in order to be clearly distinguishable from the counterpart that has no specific study or design regarding light, materials, technology or their reciprocal integration.

Lighting Effects Criteria:

1- Diffusion**:** Light will be filtered through one or more surfaces and spread through a material's surface that might blend colours or cause the light intensity to progressively fade.

2- Transmission**:** Light will be transferred from one point to another, with or without intensity loss. Fibre optics for example or specific plastics will be used for transferring light from the direct source (that will remain hidden) to other parts of the object. A form of indirect multiplication of the light sources.

3- Reflection**:** Glossy, polished surfaces will be intentionally used in order to reflect lights or shadows, creating textures, patterns and visual effects.

4- Channelling**:** Light will be forced to pass through tunnel-like structures, creating a distance between the source points and the final destination, in order to divide the light emission into ordered beams.

5- Containment : Similar to the Channelling effect, but stronger, linear and without transference: The light will be confined in designed areas and will not disperse because of light-blocking surfaces acting like walls.

6- Fading: The gradual reduction in intensity of light emission, obtained indirectly via the interaction of light and specific materials.

7- Texturing: reciprocal influence of light and materials that will create a texturised effect either on the material, or on the lighting effect itself.

8- Shadowing: Deliberate use of shadows as visual effects resulting from the positioning of elements working as obstacles in the path of light for the generation of visual contrasting effects.

9- Interferencing : Similar to the effect of 'Shadowing' but less sharp and extreme. It might refer to the placement of non-translucent elements over or embedded in translucent surfaces. The passage of light through the translucent surface will find the 'interfering' material, creating light and shadow patterns or textures.

10- Colouring: Light itself will be used to contribute to the general colouring of the artefact. This will be done indirectly through direct light filtering or through material's diffusion.

11- 12 Fluorescence-Phosphorescence: The on/off status of the objects might be used as an additional lighting effect in combination with UV light. Phosphorescent pigments release light in darkness after charging themselves in daylight, while fluorescent pigment react to Ultraviolet light.

Table 1 summarises the nine criteria for the design of the object and the twelve criteria for the lighting effects:

Table 1 - Summative list of the design brief criteria for the development of new practice

Criteria for the Object	Criteria for the Lighting Design
Always ON	Diffusion
Visible in Daylight	Transmission
Rechargeable	Reflection
Lightweight	Channelling
Indirect use of LEDs	Containment
Indirect use of Colour	Fading
Indirect intensity control	Texturing
Wearable - Unwearable	Shadowing
Anti-Clubbing style	Interferencing
	Colouring
	Fluorecence
	Phosphorescence

These criteria were established to work together in setting the direction for the experimentation and development of new practice. They constituted the rules, the milestones around which the exploration of new lighting jewellery would unfold. They synthesised the main points of a design brief I set for myself, clarifying the objectives, boundaries and visual references framing the new practice. Not all the criteria had to be included in every artefact, but they should work together in order to inform the design development, with the aim to produce new artefacts appearing substantially different and distinguishable from all the lighting jewellery-light products coming from other disciplines and markets, and bearing the main character of a sophisticated use of light and design, congruent with how other innovative materials have been traditionally used in discipline of Jewellery.

2.5 - Stage 1 – Outcome

This section was originally devoted to the description and discussion of how the elicited criteria translated into the practical application of the design brief, through the elaboration of the first tests and experiments with materials, the progression of the exploration via the making of samples and models, until the final production of a series of lighting jewellery artefacts, answering the practice-based research problem on how to use light as an innovative material for designing jewellery in ways consistent with the use of other materials within the field. This process of design development and practice, led to the final production of 29 working jewellery objects/brooches, responding to the requirements of the design brief, demonstrating progressive levels of refinement and complexity in the integration between lighting elements and the jewellery artefacts.

Given the shift of the entire research into a methodological enquiry (Stage 2), this section, as anticipated in the Introduction to this chapter, has been moved outside of the thesis and can now be found in Appendix A. This is why this Chapter stops abruptly here, with the delineation of the design criteria elicited from the visual analysis performed with the IA, as it is precisely thanks to the methodological unfolding of the IA that all the issues, inconsistencies and obscure passages have slowly transformed into the rationale for diverting the research into the methodological enquiry of Stage 2, with the aim to fix them.

The realisation about the necessity of delving deeper into the obscure passages of Stage 1 was not clearly perceived at one precise moment before or after the development of practice but, on the contrary, it grew contextually while the experimentation proceeded. The jewellery artefacts were designed and produced, but an increasing sense of unease became apparent as soon as I started to document in writing the process I went through.

This is the point where a rough demarcation line between Stage 1 and Stage 2 can be drawn, even though the passage has been extremely gradual, hidden and implicit, to the point that continuous second thoughts or decisions

about the role, the weight and the relevance of each passage of Stage 1 have kept on appearing until the very moment of the final formulation of the thesis.

2.6 - Stage 1 – Conclusion

In this chapter I have presented the development of the practice-based research conducted at the outset of this PhD, subsequently reconfigured as a preliminary Stage (Stage 1) — in the context of the research continuum — providing a new rationale and context for the shift of the research into a practice-led enquiry on methods for preliminary visual research (Stage 2).

The chapter has presented the aim, rationale, problem and question concerning research in the field of Jewellery for the development of new practice using light as an innovative material. It has provided a practical illustration of how preliminary visual research has been conducted using the Intuitive Approach (IA), an unstructured and implicit method ingrained in professional practice that led to the development of a design brief and an extensive range of jewellery practice, and also to the progressive unfolding of a series of issues, inconsistencies and dilemmas whose resolution became the central focus of a new research problem driving the continuation of this PhD.

The transition from Stage 1 to Stage 2 will be discussed in next chapter, where the dilemmas, inconsistencies, flaws and obscurities or Stage 1 that brought to the radical shift of this research into Stage 2 will be evaluated in more detail. They will be recontextualised in a new rationale, justifying a new research problem, and a new model of practice-led research, leading to the development of a new method (GVA) for conducting preliminary visual research.

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CHAPTER 3 - STAGE 2- SEARCHING FOR A NEW METHOD

Introduction

This chapter signals the transition between Stage 1 and Stage 2, and it will give an account of a new methodological enquiry developed from delving deeper into the problematic and unconvincing aspects of the practice-based research presented in Chapter 2. In the case of this PhD, it has been the process of preliminary visual research conducted in Stage 1 (IA) that, with the progression of the enquiry, has revealed the presence of implicit passages, unexplained (and unexplainable) logical shortcuts, and taken-for-granted assumptions that deserved a deeper investigation.

The growth of a sense of unease regarding these 'conceptual hiccups' brought me to a gradual quest for their discovery and unravelling, and with it, the research problem, question, rationale, context, and envisaged outcome of the entire research started to shift. It is thanks to the grey areas surfaced in Stage 1 that the awareness about the necessity to approach preliminary visual research with more rigor and systematicity became clearer and stronger.

With the deepening of the investigation on the inconsistencies and flaws of the IA and my way of conducting it (section 3.1), I had the opportunity to contextualise the process of preliminary visual research and to position it along the initial stages of the design process (section 3.2) and to explore emergent methods of qualitative analysis, (section 3.3) ending with the selection of Grounded Theory as the method conceptually and procedurally most resonant with the IA, finally anticipating the possibility of integrating the two methods into a new approach specifically devised for preliminary visual research, crafts and design projects (Chapters 4 and 5).

Figure 30 schematises the differences and parallelisms between Stage 1 and Stage 2 by illustrating their fundamental stages side by side in comparison. The following sections will provide a more detailed discussion on the genesis of Stage 2 as the result of the evolution of Stage 1.
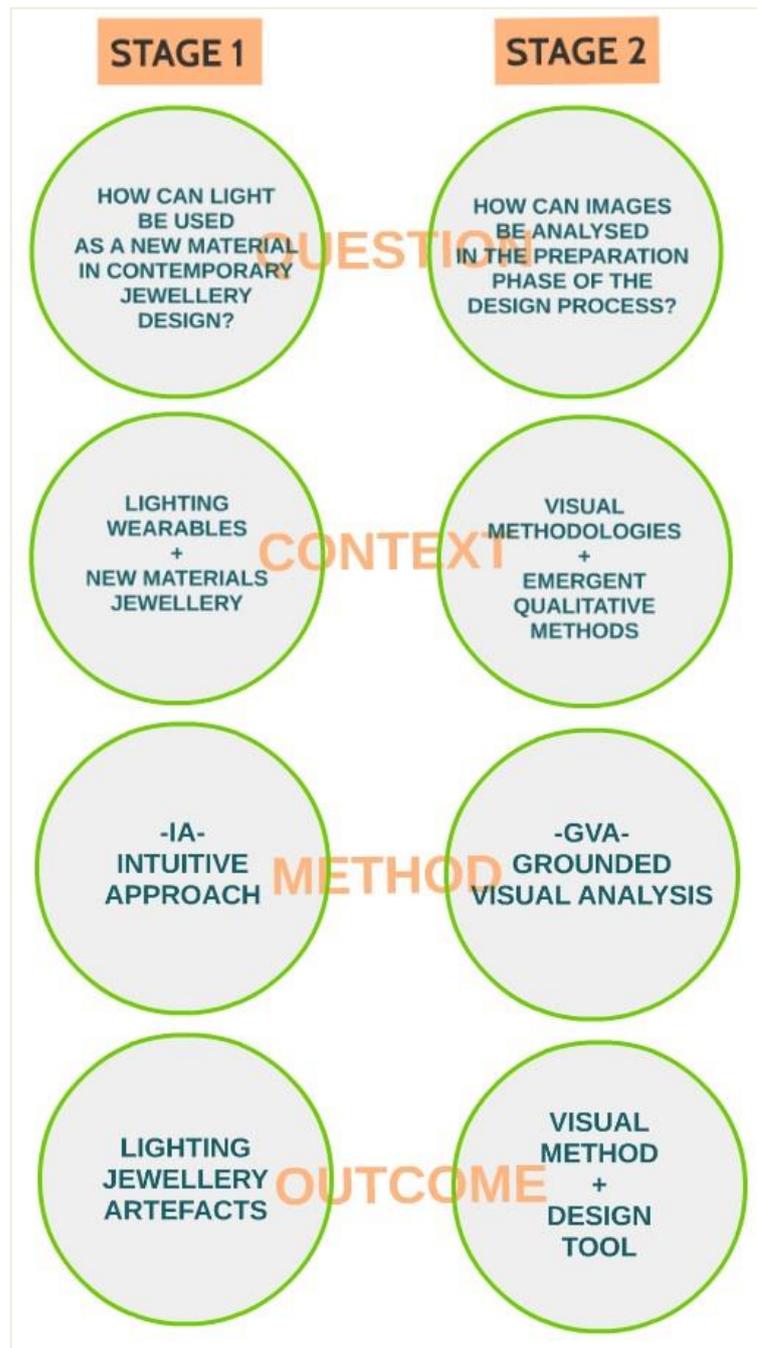
Figure 30 - Stage 1 and Stage 2 compared

3.1 - Problem and Question

In the new frame of Stage 2, it is possible to recontextualise the quest for resolving the inconsistencies, flaws and unexplained shortcuts in the application of the IA as a new research problem, concerning the conduction of preliminary visual research (PVR) with an increased level of rigor and systematicity. The process of visual research tackled with the IA in Stage 1, was conducted at a very

intuitive and implicit level, thus preventing a clear insight into its functioning, structure and application, and also a systematic communication of these aspects.

The shift of the research problem from the development of new Jewellery practice (Stage 1) to the method of preliminary visual research (Stage 2) brought me to the formulation of a new research question ('*How can images be analysed in the preparation phase of the design process?*') and, similarly, all the elements composing the rationale, context and method in Stage 2 had to be reconsidered during this transition.

This section will explore the problematic or unconvincing aspects of the IA that were taken for granted (or completely neglected) at the time of their application in Stage 1. These issues will be discussed, even though there will be a constant reference to them also in the following chapters of the thesis.

The delineation of a new research problem signals the beginning of a developmental process that occurred as well at a personal level as a designer and a novel researcher, thanks to the discovery of qualitative emergent methods of data analysis and the progressive reflection on my own practice and on the processes underpinning it.

3.1.1 - Rigor and Implicitness

If the pivotal point of Stage 1 was to gather a clear understanding about how innovative materials had been used in Contemporary Jewellery and how the use of light had been approached in body adornment, this was postulated to depend, in absence of an existing theory, on the results of the preliminary visual research process conducted with the IA. This should have alerted me to the fact that the method of visual collection and analysis was the keystone of the entire research, thus not only was it supposed to be extremely solid, but also approached with rigor and systematicity. On the contrary, the entire process was conducted almost 'magically' in the background, and overlooked as a preparatory phase to the 'real' research, that I had perceived to be entirely based on the experimentation and development of new practice and the anticipation of it.

I attempted to retrace the passages I followed in the application of the IA and to reconstruct its procedure, with the intention to fill the conceptual and procedural gaps I could not clearly outline or communicate in Stage 1. What I knew was that my strategy had been to preliminarily 'analyse' images of Lighting Wearables, in order to understand how light as a visual element had been used, and to elicit recurrent patterns (or criteria) about its use, in order to generate a new design brief for the development of new experimentation and practice.

The first problem I recognised in this approach was my lack of awareness and recollection about how I managed to elicit those criteria from the visual analysis. The concept maps resulting from the brainstorming sessions in reality presented the criteria in reciprocal relationships, but they did not help to explain where those criteria came from. They apparently derived from the observation of a sample of images of Lighting jewellery and wearable artefacts I amassed for this purpose, but the exact process leading to their elicitation remained unquestioned and unknown to me.

By reflecting on this issue I began to comprehend that the elicitation of the criteria was coming from a totally different route. An ineffable 'sense' of these criteria, was most likely present even before the IA analysis started, as it derived from a capillary and implicit process of evaluation and assessment performed on countless occasions in years of studio research and practice, from the extemporary observation of countless exemplars of Lighting Wearables and jewellery artefacts which, over time, had crystallised into a form of tacit knowledge about the 'Lighting Wearables', or 'New Materials Jewellery' themes. Because of this knowledge, it was possible for me in Stage 1 to intuitively select a small sample of images of artefacts from my Visual Archives (whose selection criteria were as much implicit and unknown), and to derive from them a series of specific criteria to be developed into new jewellery practice. These criteria were coming from all the implicit evaluations performed on a bigger number of artefacts seen over the years, and not directly from the analysis of that specific sample of images, so it is more correct to say that they were defined, rather than elicited.

The lack of insight and reflection on this implicit form of knowledge and on its implications over the evaluative processes happening in the back of my mind when assessing any given image, was something I did not perceive as an issue or a missing passage in the transparent conduction of my visual research in Stage 1, so it remained an aspect confined outside of the research, as a given pre-condition to it.

By progressing into the PhD and thanks to the input of my supervisors, I realised that the issues about my method in Stage 1 were more than one: not only could I not explain how the criteria were generated, but also how I analysed the images, how I sampled them, what exact visual aspects I elicited from each of them, how and if they related or influenced each other, and how the method I used was structured or organised. In other words, I progressively realised that the research conducted in Stage 1 was not very different from how I would have conducted any other project in my studio. In other words, I had developed new *practice as studio research*, instead of new *practice as academic research*.

I also realised how common and frequent this issue was in everyday situations: in my academic experience, I could see how very often students, artists, and designers are not fully aware of how implicitly 'visual research' is approached and conducted in their practices, how many underlying assumptions and decisions are taking place in the background that remain unquestioned and overlooked, and how problematic a practitioner/researchers' position could become, if it were always necessary for good academic practice, to respond to the same questions I was struggling to find an answer for myself.

These considerations gave me even more motivation for reconsidering the visual research conducted in Stage 1 and to move it towards the methods-centred enquiry of Stage 2, as it became increasingly clear that the delineation of a systematic approach for this preliminary phase of the design process — being 'visual research' a practice diffused in all sorts of design disciplines — could also assist other designers, even outside of the niche of Contemporary Jewellery. This would reinforce the scope and reach of the contribution of this research. It was also clear that the IA adopted in Stage 1 was the pivotal point to be reassessed

and reconstructed in order to develop a more systematic and rigorous method to preliminary visual research since many passages of the process were not documented or recorded at all.

My application of the IA relied entirely on my extant, implicit knowledge so that I also took for granted (without questioning it) the accuracy of my insight on the Visual Themes of interest. Moreover, I had no awareness about the extent to which the implicit assumptions underlying the analytical process might be influential or, if made explicit, contribute to the expansion and development of new understanding and insight about my practice (as it will be shown in Chapters 4 and 5).

In Stage 1, even the design process was developed non-systematically, without a system of documentation carefully devised that could faithfully testify and communicate not only the practical development of the practice, but also how the succession of the various rounds of experimentation, and the gradual increase of the complexity of the artefacts, reflected an internal progression of thought inside my mind.

Even though I kept a photographic record of the experimentation and practical development of Stage 1 and I reflected on it by journaling during each session, these reflections were unstructured, chaotic and mainly focused on the practice itself, or on possible directions for additional practice, while other deeper processes underlying the progression of this practice were completely missed.

There was the constant reasoning the metaphorical 'closed doors', the chattering in the mind operating choices, discarding solutions, plotting strategies, and relying on implicit assumptions that were completely unbeknownst to me, notwithstanding they were the real backbone of that practice; and behind the implicit assumptions there was the tacit knowledge and the visual analysis occurred extemporarily over the years before I started this research, without ever being questioned, tracked or recorded; and finally, there was the specific visual research conducted with the IA on the Visual Archives that

occurred without my recollection of how it functioned, how I performed it and how I came up with solutions.

Biggs and Büchler (2007) affirm that "rigor is one of the cornerstones of high-quality academic research" (p.62) and the total lack of rigor was one of the clearest issues in the conduction of Stage 1 that needed to be addressed in the new direction of this research.

3.1.2 - The disappearance of visual data

One evident mistake I surprisingly did not detect at all at the time of Stage 1, was the slow and progressive disappearance of the Visual Theme of New Materials Jewellery and its automatic and tacit 'incorporation' into the Lighting Wearables theme. During the brainstorming sessions for developing the Concept Maps preceding the elicitation of the four criteria for the collection of the images to be analysed (Figures 27 and 28, Section 2.4.3 p.86), I missed the fact that these criteria were exclusively referring (and referable) to the images coming from one single archive (on Lighting Wearables) and that, in the process, the Archive on New Materials Jewellery had disappeared from my reasoning, and was not analysed at all, with no images being sourced from it.

Even though both Visual Archives were populated in parallel for this research on the same opportunistic basis, the archive on New Materials Jewellery contained almost 5 times the number of images than that of Lighting Wearables, still, it vanished from the analysis even before the analytical process began, without me noticing that this happened. So big is the blinding effect of tacit assumptions.

I can hypothesise that this occurred because, being aware of the research problem of Stage 1, I instinctively focused more on the element 'light' (which was the real 'stranger' to be explored) than on the element 'new materials in jewellery', being a theme that I perceived as secondary and of which I already had a clear grasp through the observation of countless exemplars. In the case of lighting wearables, the exemplars retrievable were really scant, so the phenomenon was more mysterious and relatively 'new' to the exploration in

Jewellery terms, despite my longer experience in lighting design compared to the one in jewellery design.

Moreover, it is likely that, in the light of my alertness on the research problem, an intuitive process of evaluation and analysis had already occurred on every single occasion where new images were found and inserted in the Visual Archives, so that, by the time I began the reflection and brainstorming on the criteria for image collection for the two specific Archives to be processed with the IA, these criteria were already subconsciously emerged so that, in reality I uncovered them, rather than discovered them. At which point, I probably 'made disappear' the Visual Theme that I implicitly felt was less important to explore, and I concentrated my evaluations on the Archive of Lighting Wearables only.

It is true that the same form of implicit knowledge was likely present and available to me also with regard to the Lighting Wearables theme, given my previous experience and interest in it, but it is also true that my aim was to design new jewellery articulating light and that, in this respect, the theme of Lighting Wearables was a relatively newer phenomenon, so the necessity to question and challenge any form of preconception[43] about it was even stronger.

However, this observation is not only important because of the lack of analysis performed on the Visual Theme of New Materials Jewellery *per se*, but because it demonstrates a further, possible consequence of conducting visual research without a systematic method: data may be lost in the process and a clear realisation about this loss might occur only much later, or it might never occur.

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[43] Tacit knowledge is here considered to be a form of preconception that, if not brought to the surface of explicit knowledge, can cause bias in the analysis of visual data, or, as it will be named further in the thesis' discussion 'self-bias', which is intended as a form of internal influence that one's own tacit and extant assumption might exert on present and future evaluations.

3.2 - Context

The outcome of Stage 1, in the form of a series of jewellery artefacts responding to the criteria elicited, or defined through preliminary visual research, however, demonstrated that the IA was a method that produced results and that it could lead to generating new design ideas. There was also one level of awareness of the fact that the categories derived from the IA were not randomly generated, but directly derived from a form of comparative analysis of the images of the two archives used as a starting point. Even though these criteria could have been drawn from a basis of tacit knowledge, I had to deliberately go through a preliminary analytical process of image review, in order to define them and in order to transform them in the milestones for the practical experimentation that followed.

The IA, other than being ingrained and tested in years of experience and practice, was indeed very far from rigorous. Although it worked and it allowed the elicitation of categories for the development of a design brief and the production of a body of work successfully responding to the required criteria, it was a practitioner's method, not a researcher's one.

So it was necessary to adjust the method, to retrace its passages and make it more rigorous, or to find a different method of similar nature, that could be re-applied in order to give the necessary rigor to the phase of preliminary visual research that, as discussed, was the cornerstone of the entire strategic approach of the practice-based investigation.

3.2.1 - Visiographies – contextual review of visual material

The process of collecting and working with images will often be compared in this thesis to the collection and work with literature and text-based data, as there are many points of similarity, not only in the way that both can be organised, archived and retrieved, but also in consideration to the fact that visual images speak a language very familiar to artists and designers, so that they can be seen as the counterpart, in terms of artistic and design research, of the written word in other ambits of research exclusively based on written text.

As with the literature, pictures can be 'bibliographically' classified and archived. This form of record can be considered in two ways: with regard to the picture, seen as the photograph (with reference to the photographer, subject, content and possible meaning), and with regard to the object depicted within the picture (the artefact in the case of this research) with its own author, title, year and a series of formal details concerning its content (materials, themes, etc.).

As stated in the Definitions section (p. XII), images in this research belong to the second category, as they are used as mere substitutes for the actual objects depicted in them. Knowing the 'bibliographic' details of the artefact portrayed in the image adds further elements relevant to the understanding of that artefact: they contextualise it in time, they open up the possibility to retrieve more visual material from the same author and to access more information about the artistic approach or formal and technological aspects of the work.

It has to be considered, though, that not all the images collected correspond to artefacts that have been encountered and observed in real-life situations. When this occurs, one is forced to rely on the picture alone for getting an idea of the artefact, that, potentially, could not even exist at all (being perhaps a digital fabrication) or that could be misinterpreted in its formal characteristics, since images could be intrinsically misleading.[44]

In consideration of this possibility, it is important to establish *a priori* a strategy, or a position to be maintained in terms of how to deal with these kind of images. Similarly to how academic literature can be distinguished in peer-reviewed and non-peer-reviewed, even images representing artefacts can be ideally divided between images of which we know the source (because we have observed the real artefacts or seen enough depictions of them to have gathered a supposedly 'realistic' idea) and images depicting artefacts we do not know and have never observed (so that the image is the only representation we have of an

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[44] On the ambiguity of images and interpretation of photographic depiction see (Barthes, 2010; Berger, Blomberg, Fox, Dibb, & Hollis, 1972; Gombrich, 1980; Siegesmund, 2008).

artefact and our idea about it relies on the image only). The first category of images would ideally correspond to peer-reviewed publications (in that they are somehow 'verified' by our experience of the real artefact) and the second might correspond to the ones that are non-peer-reviewed (in that they have not been verified, and we might decide to include them or not in our visual research).

One can intuitively understand that, where images are not verified or verifiable by our empirical experience of the actual artefacts depicted in them, they become representations of our 'idea' of an imagined artefact (or our 'fantasy' about it) and the fact of including them in visual analysis might correspond to the choice of conducting research relying on non-peer-reviewed publications: the higher the quantity of this kind of data, the higher the risk of basing our reasoning and findings on unreliable foundations. The same might be applicable for images: the more we rely on images that correspond to 'imagined' artefacts (barring philosophical digressions on this point or on the actual reliability and 'objectivity' of our empirical experience of real artefacts), the more our overall grasp or understanding of a given visual phenomenon could be mistaken.

However, it needs to be considered that there is a strong discrepancy between theory and practice when it comes to what occurs behind the literal or metaphorical 'closed doors' of an artist's or designer's studio. The practice of conducting preliminary image collection and analysis occurs almost exclusively in a dimension of private, informal and unstructured preliminary exploration, and it cannot aspire to achieve the status of academic rigor, or 'objectivity', as this is a 'background' practice that will hardly appear in any form of academic documentation on practice or about practice.

Moreover, there is a fundamental aspect that has to be taken into account that, on the contrary, distinguishes images as data from written text: a source of literature can be discarded even before being read, and it is possible to 'isolate' its potentially detrimental effect, when deemed as unreliable or unsuitable for academic standards. An image has instead an immediate,

instantaneous influence. Once it is found, it is also seen, and once it is seen, it cannot be 'unseen', independently from how 'reliable' the image might be.

In everyday studio practice, art, crafts and design practitioners work constantly with visual material and come across, observe, copy or store a quantity of images without really reflecting about 'reliability' matters, or without spending the time for appropriately checking the sources or systematically archiving with academic rigor all the necessary information about the images progressively encountered. It might happen that an interesting picture is found in a magazine, or on the web, then the page is ripped out and kept in a sketchbook, or the image is copied and pasted into a PC folder with the intention to be re-elaborated later on, or for being kept as a source of inspiration for future reference. This might occur simply because the image, or the 'imagined' object depicted in it, is inspiring or interesting *per se*, and this can be sufficient for evaluating such image as 'valid' and worthy to be collected into a personal form of archive.

This reasoning serves to highlight the fact that the methodological quest of Stage 2—as much as rigor and systematicity could be desirable features for elevating the academic standing of preliminary visual research—brought me to face the dilemma of which strategy to adopt in case of the realistic possibility of running into images depicting artefacts of 'non-ascertained' provenance. I had to consider whether to discard all the images that could not be backed-up with rigorous proof of their correspondence to real artefacts, or to adopt a 'behind closed doors/real-studio-life' attitude and collect any image deemed as interesting, significant or relevant in the Archives for preliminary visual research, regardless of the rigor and 'scientific proof' about their true correspondence to the objects depicted.

I am not suggesting an answer to this question, but with my approach I want to show an openness to both solutions and situations: in Stage 1 I demonstrated a chaotic and unstructured way of conducting this process (effective in terms of results, problematic in terms of communication, academic rigor and recollection of the actual process); in Stage 2, I attempted to approach

the same process more rigorously, not only by developing and applying purposely a new systematic method, but by being rigorous in the recording and tracking of all the appropriate information about all the images, at the same time being more careful and alert about every passage concerning their selection and analysis (as it will be shown in Chapter 4 and 5).

This does not mean that a structured, systematic and rigorous approach to preliminary visual analysis (like GVA) cannot be applied to analysing a set of visual data amassed without a rigorous system, or careful consideration about their 'reliability', as it tends to happen in everyday studio practice. In a sense, with the two Stages of this research I have demonstrated two opposite attitudes to visual research at the extremes of an ideal spectrum: loose image collection and loose visual method (IA) in Stage 1 and rigorous image collection and rigorous visual method (GVA) in Stage 2. This opens up and gives space for a range of intermediate solutions in between, with the recommendation of preferring rigor in the methodological approach, as it might bring about successful results, even in the case of a less accurate or careful process of image collection and selection (as the real 'success' of a systematic method such as GVA can be seen in the deeper levels of introspection that stimulates the researcher, other than on the increased accuracy and quality of the results produced). As it will be repeatedly pointed out in the thesis, 'explicit subjectivity' is the key factor of GVA and the entire discussion around visual methods refers to the private space of a practitioner's ability to dig deeper into his/her own apprehension on and about practice.

3.2.2 - The IA within the Design Process

It was clear that the review of the IA, and the quest for a more rigorous method for conducting preliminary visual research (visiography) had to start from considering its positioning in the context of design methods and the design process.

Jones states that design methods "are attempts to make public the hitherto private thinking of designers; to *externalize* the design process" (Jones,

1981, p. 45). He categorises various methods by grouping them on the basis of three factors: creativity, rationality and control over the design process.

"From the creative viewpoint the designer is like a *black box* out of which comes the mysterious creative leap; from the rational viewpoint the designer is a *glass box* inside which can be discerned a completely explicable rational process; from the control viewpoint the designer is a *self-organising system* capable of finding short cuts across unknown territory." (Jones, 1981, p. 46).

Methods like Brainstorming (adopted in Stage 1 and developed through Concept Maps) are *black box* methods in that a designer is confidently producing outputs in an implicit and instinctual way "which often succeed, without his being able to say how these outputs were obtained."(Jones, 1981, p. 46).

This summarises the nature of the results obtained with the IA, in which I had confidence to the point of not questioning them, and that were undoubtedly successful in responding to the design brief and to the main research question, but that on closer inspection had mysteriously sprung from an equally mysterious process of preliminary visual research.

The passage to Stage 2 represents the attempt to move from a black box (implicit), to a glass box (explicit) approach. Jones continues to explain that new systematic design methods (as opposed to traditional ones, such as design by Crafting, used in Stage 1 for the development of practice and part of the IA) have as a common trait the attempt to externalise the thought processes that designers keep traditionally to themselves.

The design process is assumed to be entirely explicable, even though practising designers may be unable to give convincing reasons for all the decisions that they take. The inventors of the systematic design methods described here seem to imply that a human designer has a full knowledge of what he is doing and why he is doing it. " (Jones, 1981, pp. 49-50).

The preoccupation with Jones about systematic glass-box approaches to design is that of the impossibility for a *human* designer (he stresses this concept, implying that designers cannot behave and perform rationally and systematically like computers) to externalise the design process to a point where all its aspects are completely known, rationalised and made explicit.

I agree with this view, even though the point for the development of a systematic method, in the case of this research, is not that of pretending to rationalise and externalise the totality of the processes underlying visual analysis, but at least to *strive* to do so, making this effort for very intimate reasons, though, as a form of self-discovery and self-enquiry that will inevitably be reflected in further iterations of the design process, rather than a mere exercise in externalisation to 'objectify' the implicitness of subjective creative processes.

The aim of the development of GVA is to bridge this gap and be positioned half-way between an implicit black box approach (represented by its 'ancestor', the IA) and a totally explicit glass box approach (in my view unattainable in practice, but only in theory).

The new GVA method aims to be systematic in the *exposition* and *explication* of the processes underlying the subjective evaluation of images but not in terms of the subsequent stages of the design process, where the results of this evaluation will be elaborated, interpreted, combined and used for developing new design solutions.

In terms of the design process, various authors have proposed different models and given various nomenclatures for the different stages, even though, despite these differences, some common traits can be outlined.

Jones, for instance, schematises the design process in three stages: *Analysis*, *Synthesis* and *Evaluation*, where in the analysis stage the design problem is broken into pieces, in the synthesis stage these pieces are recombined in new ways and in the evaluation stage the new combinations are tested and the consequences of these new arrangements are evaluated. He adds that the process is iterative.

> Most design theorists agree that it is usual to cycle many times through this sequence and some, (Asimov, 1962; Watts, 1966) suggest that each cycle is progressively less general and more detailed than the one before it. " (Jones, 1981, pp. 63-64).

In Jones' model, preliminary visual research (PVR or 'Visiography') would be positioned in the *Analysis* stage, where the research problem (in the case of

Stage 1, designing with light in CJ) is investigated through the analysis of several instances of it, in order to synthesise a possible explanatory scheme.

Baxter (1995) proposes a design process model called "Stairway to Creativity" consisting of five stages: *First Insight – Preparation – Incubation – Illumination – Verification*. The stages that seem more relevant for framing preliminary visual research, according to this model are the first two, *First Insight* and *Preparation*, and Baxter gives some clarification about them

> First insight and preparation are the logical and rational parts of creativity. It makes sense that a creative breakthrough needs some first insight to frame the problem and establish a goal. It then makes sense that an understanding of current knowledge is required in order to advance beyond that knowledge. (Baxter, 1995, p. 65).

First Insight would correspond to the framing of the research problem in the light of its rationale, and the *Preparation* stage would correspond to Jones' *Analysis* stage, between which stages it seems to be correct to position PVR, as it works as a tool either to further frame the problem (by familiarising with it), and to review the state of the art regarding that problem, through the analysis of several instances of it.

Archer's model of the design process (Archer, 1984) consist of 6 stages, *Programming – Data Collection – Analysis – Synthesis – Development – Communication*, that can be compared, as in the case of Baxter's as a further explicitation of the three-stages model proposed by Jones. *Programming* and *Data Collection* would correspond to Jones' Analysis stage and to Baxter's *First Insight* and *Preparation Stages*, with the addition that Archer's *Analysis* stage can be seen as a further step corresponding to the phase of image analysis in visual research.

Osborn (Osborn, 2006) returns to a three-stages model that he describes as *Fact-finding*, *Idea-finding* and *Solution-finding*. It is possible to recognise, again, a different nomenclature for the same principles that have been differently termed and subdivided by the previous authors. The *Fact-finding* stage is easily comparable to Jones' *Analysis* stage, and is consequently of interest for the positioning of PVR as it is described as a stage that serves for defining the problem, gathering and analysing the relevant data.

With regard to the fact that Osborn's *Fact-finding* stage comprehends the phases of *problem definition*, and *preparation*, which consists of gathering and analysing the relevant data, and in which it is possible to recognise either Archer's two stages of *Programming* and *Data Collection*, and Baxter's *First Insight* and *Preparation* stages, Osborn states that

> No sharp distinction would be made between problem-definition and preparation. We often shift back and forth from one phase into the other. In fact, scientific fact-finding may sometimes result in the optimum form of problem-definition. (Osborn, 2006, p. 100).

Cross (2008) formulates another model of the design process in four stages: *Exploration*, *Generation*, *Evaluation*, *Communication*. In this case, it is the *Exploration* stage, where the designer would examine the "ill-defined problem space" (p.29) that would coincide with the positioning of PVR in the IA.
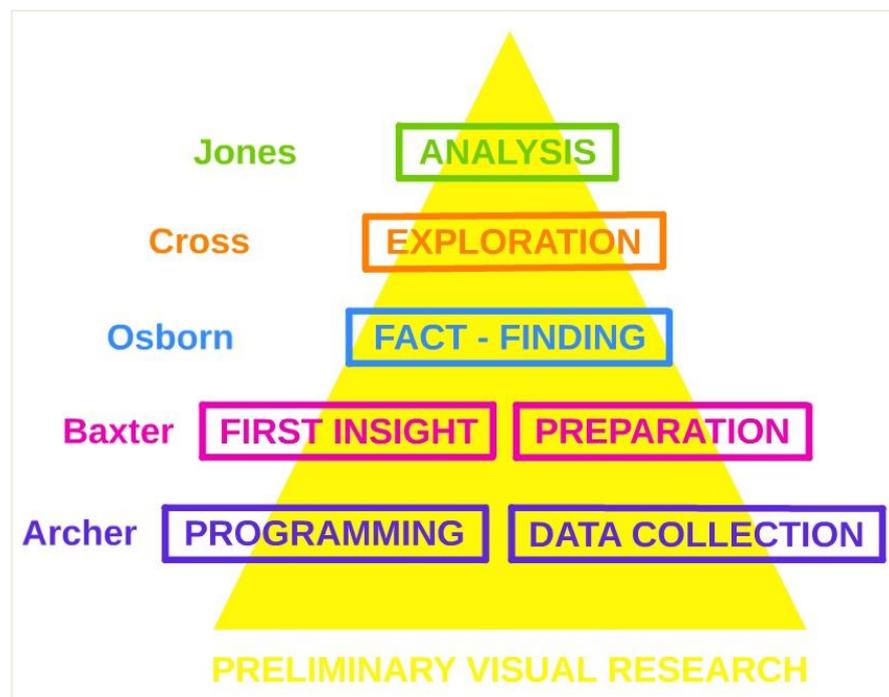
Figure 31- Preliminary Visual Research in relation to models of the design process

Figure 31 offers a visual representation of different nomenclatures proposed by the various authors for this initial stage of the design process. This coincides with what in the IA had been generically called 'preliminary visual research'. It is a preliminary stage were the design problem needs to be understood as much as possible, so the designer gathers as much visual information as possible in order to get a broader knowledge of the 'state of the

art' of the problem, so that it can be tackled it in the subsequent stages of design development.

The British Design Council conducted a comparative study in 2007 where the design process adopted by eleven leading global companies was investigated, resulting in an in-depth report where "striking similarities and shared approaches" were found (Design Council, 2007, p. 6). Prior to this study, the Design Council developed a model for illustrating the design process known as the *Double-Diamond* model, in the attempt to summarise and simplify the common denominators of different models of the design process that, despite the use of different nomenclatures, share a similar approach.

> While the companies we spoke to had very different ways of managing their design process, and though the terminology they use may differ from that of the double diamond model, there are some core stages within a design process that are common across the participating companies.(Design Council, 2007).
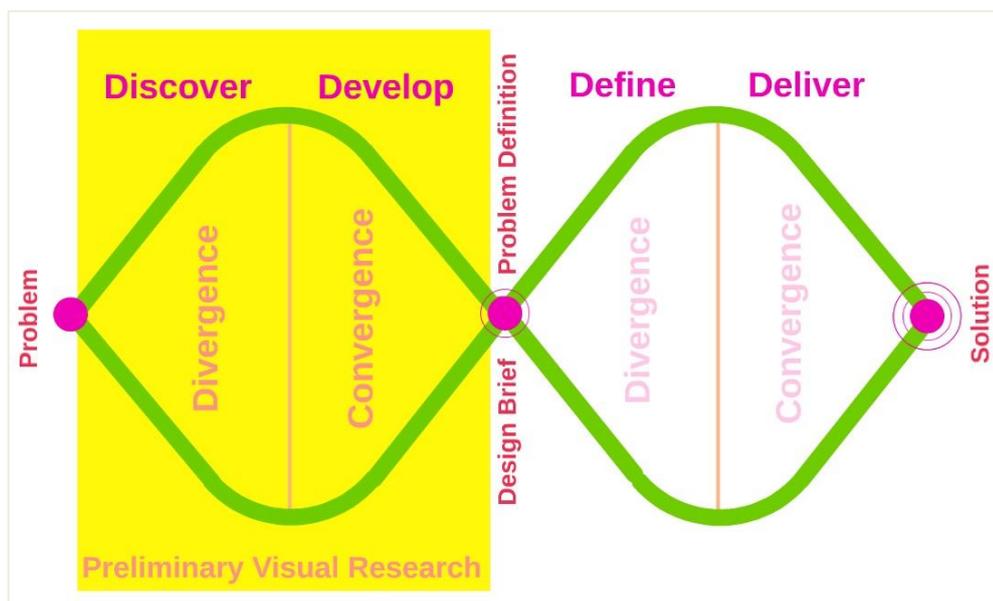
Figure 32 - Preliminary Visual Research positioning in the Double Diamond model

The *Double Diamond* model of the design process consists of four stages, *Discover*, *Define*, *Develop* and *Deliver*, as is shown in Figure 32, where I have elaborated the original graphic representation offered by the Design Council (Design Council, 2015). I have positioned PVR in the first two phases of divergence and convergence, since it consists of a process initially expanding the range of data available on the given theme of interest. It is then converged, by eliciting patterns from the visual data, preparing the subsequent stages,

represented by the definition of a design brief, its development and the final production of practice.

> In all creative processes a number of possible ideas are created ('divergent thinking') before refining and narrowing down to the best idea ('convergent thinking'), and this can be represented by a diamond shape. But the Double Diamond indicates that this happens twice – once to confirm the problem definition and once to create the solution. (Design Council, 2015, p. 2)

The *Discover* stage is a phase of *divergent thought*, where the outlook on a design problem is kept broad in order for influences and ideas to expand. The subsequent *Define* stage is a phase of *convergent thought*, where the ideas freely expanded in the *Discover* stage are reviewed, filtered, analysed, selected and discarded, "then they converge upon a single problem statement" (Norman, 2013, p. 220). The *Develop* stage is again a phase of divergent thought, where "solutions or concepts are created, prototyped, tested and iterated" (Design Council, 2015, p. 3). The last stage, *Delivery*, is again based on convergent thought, so that one solution among the many developed during the *Develop* phase is selected, finalised and produced. This double pattern of expansion and contraction can be repeated iteratively in order to progressively refine ideas.

The result of the review of various models schematising the stages of the design process, made me clarify the notion that: 1) PVR is a divergent process aimed at expanding the visual data available and familiarising with them at the outset of a design/creative endeavour; 2) PVR is positioned at the outset of the design process and it spans over the initial phases otherwise called *Preparation*, *Exploration*, *Fact-finding*, *Analysis*, *First Insight*, *Programming*, *Data Collection*, and Discovery; 3) PVR aims at eliciting, from a large quantity of data, recurrent patterns, common visual denominators, in order to prepare a stage of convergence that will be translated into the formulation of a design brief, based on the criteria elicited; 4) PVR is abductive in nature as it hypothesises the existence of an explanatory model at the root of individual instances of a given visual theme, and attempts to draw a possible illustration of it.

3.2.3 - Deconstructing the IA

The search and comparison of different models of the design process, and the clarification of the concepts of *divergence* and *convergence* underpinning the cyclical progression of design through the different stages, led me to reach a further realisation: the IA was, in fact, spanning the entire design process and did not consist only of PVR, which was just a part of it. However, it was the part that needed to be clarified and structured the most, as it was precisely from the issues and dilemmas on how I conducted this phase of visual research that the shift of this research into a methodological quest occurred.

In other words, I realised that I had been identifying the whole for its parts, so that I associated the IA (the entire design process, from problem to solution) with a specific phase of it, PVR, where the problems and inconsistencies were located. In light of my intention to respect the true narrative of the research and to present facts and events as they actually unfolded, I am discussing this 'discovery' here, and not in the 'Problems' Section (3.1) —where it should logically belong— because I realised this distinction *after* the reflection and comparison between other design process models. I understood that the IA could be framed along these models, so I juxtaposed it to them in order to start to retrace its structural passages and to retrospectively assign a schematic structure to it.
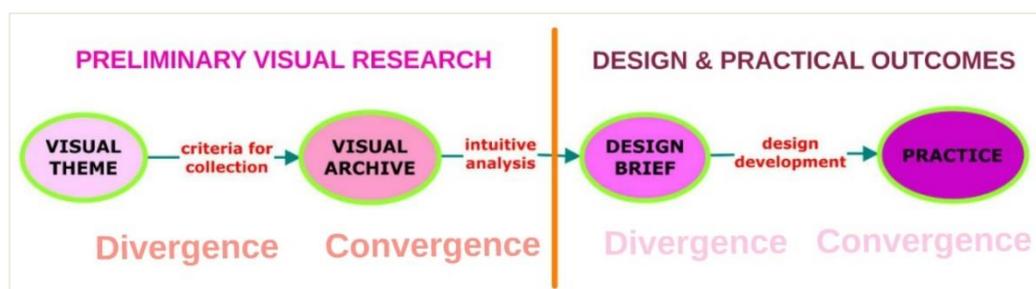
Figure 33 - The IA structured in its developmental stages

Figure 33 illustrates my attempt to schematise the IA. I could recognise in the IA a similar sequential and cyclical progression and the IA could also be divided into four main stages, where it was possible to see an alternation

between divergent and convergent thinking, even though they were spaced out by a series of intermediate passages.

As shown in the Figure, the initial problem, in my case the understanding of a <u>Visual Theme</u> (Lighting Wearables), brought me to define a set of four *criteria for collection* (see Concept Map in Figure 28, p.86), that determined the choice of images for populating a specific <u>Visual Archive</u>, upon which I performed an *intuitive analysis* in search for visual patterns, leading to the formulation of a <u>Design Brief</u> (see Table 1 p.96), that, through *design development,* brought me to the final production of new Jewellery <u>Practice</u>.

It became clear then, that in light of the Double Diamond model (which I saw as the most generalised scheme comprehending the essence of all the models previously proposed by other authors), PVR corresponded to the first two alternations of divergence and convergence, within the whole IA process. The process of PVR started right after the definition of the design problem (in my case 'understanding a specific visual theme'), it expanded through the collection of visual data, gathering a multitude of images of artefacts where the problem was embodied in different ways, then it contracted through the analysis of these images in search for recurrent visual patterns, until the moment of definition of a design brief, which represented the beginning of a new cycle of divergence, through experimentation and exploration of various ideas, until the final point of convergence, represented by the definition specific ideas to be concretised through practice.

Figure 34 shows a juxtaposition between the IA and the Double Diamond model, where it is possible to see the positioning of PVR, in its two phases of divergence, represented by image collection and the population of the Visual Archive, and convergence, represented by image analysis in search for visual patterns, ending right before the formulation of a design brief, which has to be seen as one of the possible ways to interpret and combine the patterns resulting from the analysis of data.
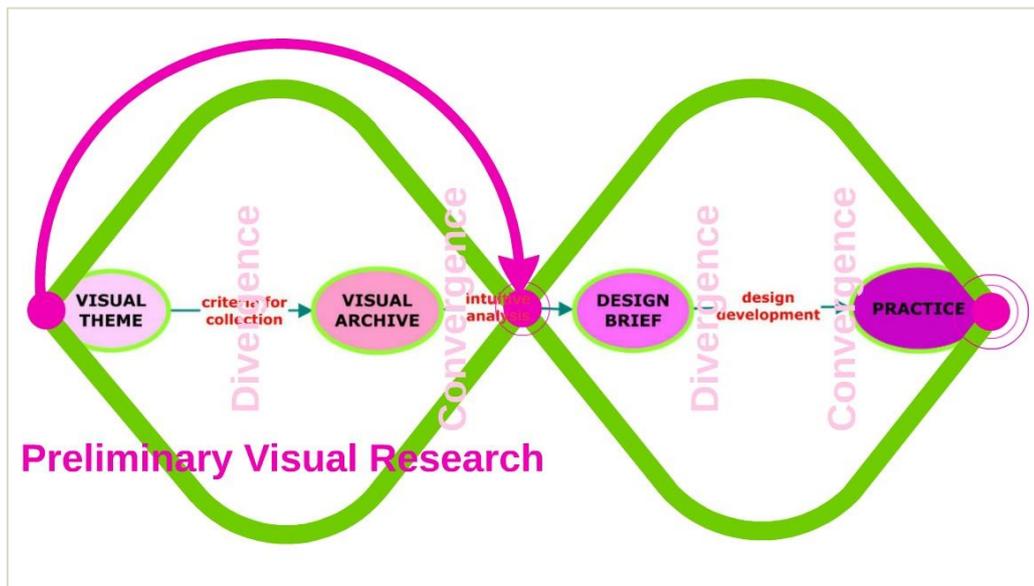
Figure 34 - PVR in relation to the IA and the Double Diamond model of the design process

This finally frames the space where the research of Stage 2 unfolds exactly, by concentrating on Preliminary Visual Research and on the search for an alternative method for conducting this specific phase of the design process in a more rigorous ad systematic way.

3.3 - Searching for a Method

The quest for a method that could function as a reference, either to be directly applicable, instead of the IA, for re-conducting PVR and retracing the lost passages of Stage 1, or to serve as a model in order to develop a brand new one, started from a search on extant visual methodologies. However, I could not make reference to methods where images were treated, or intended, as I did with the IA, since in all cases images tended to be interpreted as signifiers for social phenomena, rather than as raw data to be formally analysed in order to gather visual categories about the visual themes they were instances of.

Either images were counted in quantitative research, such as studies using content analysis applied to visual images (Bell, 2001), or as qualitative data in studies in fields such as visual anthropology (Collier, 2001), Cultural Studies (Lister & Wells, 2001) Semiotics and Iconography (Barthes, 2010; Jewitt &

Oyama, 2001; Panofsky, 1970; van Leeuwen, 2001), psychoanalysis (Diem-Wille, 2001) anthropology, or ethnomethodology (Goodwin, 2001).

The main issue was the difficulty to mediate, or to imagine a correspondence, between these methods and their framing of the images, and the procedure and role of images in the IA, in order to develop a suitable solution. I also noticed that these visual methods were, in all cases, adaptations of methods borrowed from the Social Sciences (and the studies themselves, for the most part of cases, were Social Sciences' studies, with the peculiarity of using visual material). I found very few similarities with the IA in Rose's concept of "compositional interpretation" with regard to the role and description of images (Rose, 2012, pp. 51-52); in the use of Content Analysis applied to visual data for the quantitative aspect of keeping score of the recurrent patterns elicited from visual images (Bell, 2001; Rose, 2012), in order to formulate a basic form of charting of the statistical relevance of the various patterns; and in particular in the coding procedures of Grounded Theory applied to photo-documentation (Rose, 2012; Suchar, 1997). However, in all these examples, images were never, approached from a design, crafts or artistic perspective, or as data useful for developing the preliminary phase of the design process.

The real turning point occurred while taking a closer look at the original methodologies within the context of the Social Sciences, from which these visual methods were taken, where I discovered the approach to data-driven methods and I immediately recognised a close conceptual correspondence between the inductive-abductive[45] nature of such methods, and the fundamental traits of the IA. Being aware of the inductive/abductive nature of my enquiry, drew me closer to methods of data collection and analysis that were already designed for working with this 'backwards' approach. These methods were not designed, or generally applied to work within the arts and design disciplines, but I saw interesting similarities in principles and procedures with the IA. In particular, I

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[45] Please refer to the 'Definitions' section at the beginning of this thesis (pp. XIV-XV) for a basic presentation of the inferential cycle and for definitions of the concepts of Induction, Deduction and Abduction.

found great similarity with Grounded Theory, since it possessed a similar iterative structure, dealt with raw data without a known theoretical framework to start with, and allowed explanatory models to be generated directly from the data through the inductive elicitation of patterns, in a cyclical recursive process of data collection and analysis. Moreover, Grounded Theory had an extremely rigorous and systematic set of procedures (unlikely the IA), so it was the perfect reference from which to start to evolve my new method.

Paradoxically, I found it much easier to envisage a correspondence with the IA — and to imagine a possible 'translation' in visual terms — in studies conducted within with methodologies entirely based on textual data, rather than understanding how to adapt and position my kind of preliminary visual research to visual methodologies that, in reality, did not really have a creative purpose at their core.

3.3.1 - Theory-Driven vs Data-Driven

The traditional structure of research adopting methods referred to as hypothesis-testing or theory-driven research (Burck, 2005)*,* unfolds through an initial survey and critical analysis of the literature, in order to inform the research question and the theoretical framework that will guide the subsequent data collection and analysis (Elliott & Higgins, 2012). The general presupposition of such qualitative methods is that there must be *"precise and clear cut theories or hypotheses before the data collection takes place"* (Kelle, 2005, pp. 1-2).

Where extant theories or hypotheses are not clearly outlined, because either the area of enquiry is under-theorised or because (as often it is the case within crafts research) the nature of knowledge may be experiential, non-explicit, or embodied in practice, the adoption of a traditional theory-driven approach may produce an unsuitable result.

Research methods that try to elicit explanatory models from raw data are more adaptable to make explicit assumptions regarding the underlying hypotheses or theories that these data might represent. In particular, qualitative research methodologies addressing open-ended and exploratory questions,

aiming at generating hypotheses or theories rather than testing them, seem particularly suitable for capturing the richness and variability of visual data (Burck, 2005) .

These qualitative methods, referred as hypothesis/theory-generating (Burck, 2005), data-driven or emergent research (Charmaz, 2006; Dick, 2003; Glaser & Strauss, 1967; Hesse-Bieber & Leavy, 2008b), are somehow placed at the opposite end of the research process spectrum in respect to theory testing methods. In emergent or theory-generating research, hypotheses or theories are not known before data collection and will emerge from the data. The process is in a sense inverted, the data come first, then the hypotheses are drawn and the theory will follow (Hesse-Bieber & Leavy, 2008a).

An emergent method is defined by Charmaz as

inductive, indeterminate, and open-ended. An emergent method begins with the empirical world and builds an inductive understanding of it as events unfold and knowledge accrues.[…] Emergent methods are particularly well suited for studying uncharted, contingent, or dynamic phenomena. […] By adopting emergent methods, researchers can account for processes discovered in the empirical world and direct their methodological strategies accordingly.(2008, p. 155)

This opposition between theory-testing research and emergent research is mirrored by the differences between deductive and inductive enquiry. Traditional, theory-testing research is deductive as it requires the researcher to identify the research problem from the literature and to prove or disprove existing theory with the data, while emergent research is inductive and requires the researcher to identify the research problem from the data and then to generate new theory and understanding (Elliott & Higgins, 2012).

3.3.2 - Grounded Theory

Grounded Theory, defined as by Charmaz as "the most widely used and popular qualitative research method across a wide range of disciplines and subject areas" (2007, p. 1), is a theory-generating, emergent qualitative method presented by Barney Glaser and Anselm Strauss (1967) as a challenge to the traditional hypothetic-deductive approach, and further developed by Glaser himself (Glaser, 1992, 1994), Strauss and Corbin (1990; 1997), Charmaz (2000,

2006) and by an increasing number of authors, that appears particularly appropriate for investigating under-theorised areas of enquiry (Burck, 2005).

In 1967, Barney G. Glaser and Anselm Strauss published 'The Discovery of Grounded Theory: Strategies for Qualitative Research' (Glaser & Strauss, 1967), "the first systematic statement about how to construct emergent analyses" (Charmaz, 2008, p. 156). Before the publication of Glaser and Strauss' work, the literature on qualitative research was limited to theories on social construction with a lack of empirical grounds, and the discussion was centred on methods of data collection and issues of validity, without systematic indications or focus on the analytic phase of the research process. Glaser and Strauss contributed to the detachment of qualitative research from the parameters of quantitative enquiry and argued that, by force of these differences, qualitative researchers could engage in the systematic analysis of empirical data and inductive theory generation (Charmaz, 2008) .

Grounded Theory, developed as a qualitative method for analysing social phenomena, originates philosophically from the sociological perspective of symbolic interactionism, Strauss being particularly influenced by the writings of Herbert Blumer, G.H. Mead, John Dewey, Robert E. Park and W.I.Thomas (Hammerseley, 1990). Glaser, on the other hand, was influenced by the innovative work on quantitative research of Paul Lazarsfeld, envisaging the need of introducing a higher level of systematicity in qualitative research methods (Eaves, 2001) .

The initial approach to Grounded Theory was subsequently revised by the same authors who took separate stances on several aspects of the method, with Glaser maintaining his position closer to the original formulation of the method (often referred as 'Classic Grounded Theory' or 'Glaserian approach') and Strauss, in collaboration with Juliet Corbin, focusing more on the development of systematic techniques and procedures for data analysis, with the scope of assisting novice researchers, receiving also critiques from Glaser about this approach being no longer Grounded Theory.

This critique raised debates about the authenticity of the methodological approach adopted by numerous authors over the years as various adaptations or alterations of the original method have been attempted, often taking partially, if any, of the Strauss and Glaser original methodological strategies. Charmaz states that "Grounded Theory has evolved into a constellation of methods rather than an orthodox unitary approach" (Charmaz, 2008, p. 161) and indicates four fundamental positions: Glaser and Strauss' initial formulation, Glaser development or it, Strauss and Corbin's version, and a most recent Constructivist Grounded Theory (Bryant, 2002; Charmaz, 2000, 2005, 2006; Clarke, 2003; Mills, Bonner, & Francis, 2006). Glaser, who argued about his position being the only Grounded Theory, has recently admitted the coexistence of other interpretations and versions of Grounded Theory (Bryant & Charmaz, 2007) .

3.3.2.1 - Grounded Theory as an applicable method

The purpose of Grounded Theory is to develop theories grounded in the data, fitting the data, working in practice and relevant to the research situation (Dick, 2005; Glaser, 1992) . The emergent, generative nature of these methods allows "new properties of the studied phenomenon to appear that, in turn, shape new conditions and consequences to be studied"(Charmaz, 2008, p. 155).

This introduces one of the fundamental aspects of Grounded Theory, that is the iterative, spiral-like nature of the process and its particular double inductive-deductive nature, where induction is prevalent, but deduction marginally coexists and follows the scope of inductive enquiry. In fact, the inductive aspect of Grounded Theory remains its predominant trait, as the data come first and the theory is built gradually as the data are systematically analysed, but there is also an iterative and cyclical aspect of the process (Theoretical Sampling) that has deductive aspects. When an initial sample of data is coded, conceptualised and the initial hypotheses about the relationships between concepts are advanced, the researcher deductively adjusts and selects the next sample of data, understanding where more data can be added and found for proceeding with the comparative process, 'with deduction primarily in the service of induction' (Elliott & Higgins, 2012, p. 8).

The Grounded Theory approach is structured around a number of steps whose rigorous execution will produce a working theory as the final outcome. Grounded theory uses a sequence of data collection and analysis procedures to develop a theory inductively derived from the data (Dick, 2005; Strauss & Corbin, 1990, 1997).

Attempting a mediation between various approaches, there are several aspects of the Grounded Theory process that appear to be applicable in an Art and Design scenario, by reason of their resonance with the IA and their translatability for visual analysis. The following sections will briefly illustrate them.

3.3.2.2 - Theoretical sensitivity – the role of the literature

Even if Grounded Theory moves from data to theory and presupposes no prior theoretical underpinning to start with, this does not imply that in reality it can be completely isolated from any theory or previous knowledge (Elliott & Higgins, 2012). Glaser and Strauss admit that "the researcher does not approach reality as a *tabula rasa*" (1967, p. 3) and therefore cannot be exempt from some form of theoretical understanding before starting the enquiry.

In order to 'discover' variables, concepts and relationships within the data (codes, categories, properties) the researcher needs to develop a 'theoretical sensitivity' that is the ability to spot the diversity and nuances that the data are communicating. One's prior knowledge of the problem and the level of interaction with the literature can be influencing factors of theoretical sensitivity (Borgatti, 1996).

In relation to the influence and position of the literature in a Grounded Theory study, Glaser (1978) affirms that one's knowledge and approach to the literature, should be kept at a very general and broad level in order to open a wider range of interpretative possibilities, as 'learning not to know' is fundamental in order to maintain closeness and sensitivity to the data (Heath & Cowley, 2004). A literature review, as traditionally performed in hypothesis-testing research, is inimical to Grounded Theory (Elliott & Higgins, 2012) because

it constitutes a potential contamination for the emerging theory. The researcher should try to avoid *"the 'rich' derailments provided by the related literature in the form of conscious or unrecognised assumptions of what ought to be found in the data"* (Glaser, 1992, p. 31) .

Focused reading can occur later, when the theory is sufficiently developed and the risk of contamination is averted. The literature itself, at this point, can add more structure and work as additional data (Heath, 2006).

> The researcher should not worry about covering the literature in the same field before his research begins, since it will always be there. It does not go away! And there will be plenty of time during the grounded theory process to integrate this literature with the emergent theory during saturation, densifying and sorting. (Glaser, 1992, pp. 32-33)

Strauss (1987) takes a slightly different position, stating that one's prior knowledge and the use of the literature, if based on a wide and general level of understanding, can contribute to the development of theoretical sensitivity, while when focused and specific could be useful for stimulating and influencing (*forcing*, as Glaser (1992) would object), the generation of hypotheses.

3.3.2.3 - Data collection and Sampling

Characteristic of Grounded Theory is the simultaneous process of data collection and analysis. Data are analysed and coded as soon as they are gathered. The majority of the examples of studies using Grounded Theory in the literature (as it is generally the case in the Social Sciences) refer to analysis and coding of textual data (interviews, focus groups' records, etc.), with the coding style following a line by line or word by word approach for the necessity of staying close to the data, comparing incidents and interrogating the data for actions and theoretical potential (Charmaz, 2008).

General qualitative coding (Thematic and Content Analysis, for example) is different from Grounded Theory coding as the first focuses on highlighting themes or topics for grouping and synthesising the material, while Grounded Theory codes for actions and processes for attempting at explicating the data, suggesting possibilities for emergent links in the underlying processes.

3.3.2.4 - Data Coding

Coding, as Charmaz defines it, "means categorizing segments of data with a short name that simultaneously summarizes and accounts for each piece of data" (Charmaz, 2006, p. 43), while Birks and Mills add that they "are a form of shorthand that researchers repeatedly use to identify conceptual reoccurrences and similarities in the patterns of participant's experiences" (Birks & Mills, 2011, p. 93).

After the initial phase of open coding, when it becomes evident which codes are most frequent or significant, a second phase of focused or selective coding will follow, where codes are sorted and synthesized, allowing the management of larger quantities of data. The new focused codes are constantly compared against the data, in order to understand which give a better interpretation or understanding of the phenomena scrutinized. This selection is performed on the basis of which codes are carrying the major weight in terms of the analysis and comparison against further batches of data, and this second level of codes, now more abstract, becomes the basis for the outlining or the initial theoretical categories. When categories start to emerge, their diverse properties are searched and compared with the data and more data are then sourced in order to increase diversity (Corbin & Strauss, 1990; Dick, 2005).

As the categories develop, interconnections and relationship will emerge, revealing hierarchical levels of significance and distribution. A core category, that is a category with a frequent match in the data and with significant relationships with the other categories, will be identified and other categories will result somehow linked and dependent on this main category.

3.3.2.5 - Theoretical Sampling

A sample is a set, or batch of data that is chosen to start the enquiry. The initial sampling is generally considered as a starting point for drafting the initial coding and allowing the first concepts and categories to emerge. When this occurs, new, more focused data are then selected and examined and this process

is always guided by the continuous comparison between data and the theoretical categories.

As categories emerge, new data are searched, added and coded in order to increase the diversity of the sample and to add different properties. The sampling is guided by the emergence of the categories and their properties and the purpose is to reinforce and articulate the emerging theory. When the categories and their properties will saturate, and no more additional data or coding will add information to the properties already discovered, the sampling and coding for these categories or properties will cease (Charmaz, 2008; Dick, 2005).

3.3.2.6 - Memos and Note taking

Memos are notes that the researcher constantly collects about the data and the coding, capturing his/her intuitions and reflections on possible connections or relationship between the categories, or the concepts emerging from the analysis. The assumption is that an explanatory model is concealed within the data, so memos and note-taking are tools that help the researcher in adding insights into this direction (Corbin & Strauss, 1990; Dick, 2005; Glaser & Strauss, 1967). Memos can refer directly to codes or categories, their properties, or to the emergent theory, they can be interpretations of the in-vivo material, references to literature, metaphors, hypotheses, examinations of the relationships between categories, considerations about methodological issues, or draft notes about the emergent theory. The final formulation of a theory generally emerges from sorting, organising and integrating the theoretical memos (Borgatti, 1996; Charmaz, 1983; Eaves, 2001).

3.3.2.7 - Constant comparative method

Constantly comparing data, then data with emerging categories, data with properties and data with the emerging theory is the essence of Grounded Theory (Charmaz, 1983; Corbin & Strauss, 1990; Dick, 2005; Glaser & Strauss, 1967). The initial data are analysed and coded, the first tentative categories will emerge, then further samples of data will be coded and analysed with

comparison to the categories and their properties in mind, and eventually data will be compared also to the theory emerging. This ensures that the theory will always be adequate to the data as it will fit the situation and will make sense of it, in other words, it will work. (Glaser, 1992, 1994; Glaser & Strauss, 1967) .

3.3.2.8 - Saturation

The process of coding, comparing, sampling for new data and recursively repeating the process with the progressive definition of categories and their properties can lead to a point of diminishing returns (Dick, 2005). When the addition of new data does not add new aspects, qualities or understandings for that specific category, or to a category's properties, the sampling for that property or category will cease.

When all the categories and properties are saturated, the researcher will move to the phase of sorting and organising the categories and relative memos in the form of a coherent storyline that will make the theory clearer and explicit (Burck, 2005; Corbin & Strauss, 1990; Dick, 2005).

Glaser argues that theorizing is the role of the researcher and that in order to do so, one should be able to conceptualise, while if the researcher is "admittedly low on conceptual ability, then he or she should not try grounded theory" (1992, p. 12).

Once codes are translated into categories with all the relevant properties, all connected to a core category, and these are saturated to the point that no more coding or data can be added to enrich and articulate the understanding of the area of enquiry, the researcher owns all the material for the conclusive formulation of a theory, or an explanatory model for the data.

In the case of Grounded Theory, the cornerstone of this process are the theoretical memos, which have accompanied in the form of written notes all the analytical process and can become the building blocks for the formulation of the theory. Memos are sorted, grouped thematically and sequenced in order to give to the theory the clearest possible exposition. Sorting is the process of

structuring and integrating the notes and written memos deciding how to communicate the findings in a coherent report (Charmaz, 2006; Dick, 2005)

3.4 - Conclusion

In this chapter I have presented the issues and inconsistencies that appeared at the end of Stage 1, where I realised the difficulty in explicitly retracing the origin and the processes behind the elicitation of the visual criteria underpinning the design brief that led to the development of a range of 29 lighting jewellery artefacts.

The reflection on these problems and their clarification signals the passage between Stage 1 and Stage 2, from a practice-based research to a practice-led enquiry on methods for visual analysis. Through a contextual review and reflection on established models of the design process, I clarified the structure of the IA and I identified in preliminary visual research (PVR) the precise Stage that needed more clarification and structure and where the quest for a more rigorous and systematic method would be directed.

By exploring extant visual methodologies that led me to the 'discovery' of emergent qualitative methods in the Social Sciences, I identified in Grounded Theory the method that mostly resonated with the iterative nature of PVR in the IA, and whose adaptation would likely to be more effective in dealing with visual data.

In the next Chapter I will illustrate how the procedures of Grounded Theory and of the IA have been compared and elaborated, in order to generate Grounded Visual Analysis (GVA), the method that I am proposing as the principal contribution to knowledge of this research.

CHAPTER 4 - STAGE 2 – GVA DEVELOPMENT

Introduction

This chapter will introduce Grounded Visual Analysis (GVA), the method developed in Stage 2—and main contribution of this research—derived by the necessity to overcome the procedural and structural flaws of the IA, the visual method adopted in Stage 1. The relationship between GVA and the IA will be highlighted along the discussion, in particular in constant reference to Grounded Theory, the qualitative method from which GVA draws inspiration, adapting some of its aspects to a visual context for interpretive and creative purposes.

This chapter and the next (Chapter 5) will go hand in hand in illustrating GVA. Here, the discussion will be focused on the methodological aspects of GVA in relationship to the IA and Grounded Theory, while in Chapter 5, the procedure of GVA will be illustrated in practice by applying the method to the analysis of a series of images as a case-study, using the same Visual Archive of Lighting Wearables that was used in Stage 1 with the IA as a case-study. This, in addition to demonstrating the method in all its procedural steps, will give useful points of comparison and contrast between the two approaches (IA and GVA), in the different stages of this research, and it will enable reflections and conclusions on the merits of GVA as a new method for visual analysis.

Both Chapter 4 and 5 will present the main points that will lead to the final discussion (Chapter 6) on how the development of GVA represents the main original contribution to knowledge of this research to jewellery design and also, more extensively, to the wider field of Design and visual methodologies for Art, Crafts and Design.

4.1 - GVA as a Qualitative Emergent Method

GVA is a method for analysing visual data such as images, photographs or artefacts, in the attempt to elicit recurring visual patterns and at the same time disclosing some of the reflective processes, implicit assumptions underlying the visual research conducted in the preparation phase of the design process.

GVA is an acronym standing for Grounded Visual Analysis. This name has been chosen because it is a method of visual analysis (V and A) and because it is grounded in the data (G). The choice of the term 'grounded', not only expresses the closeness of the analytical process to the data but also makes a reference to the method that mostly inspired its development, Grounded Theory (Glaser & Strauss, 1967).

GVA, though, is not to be confused with Grounded Theory, as it is not a visual version of it, or a literal application of Grounded Theory to visual data. It is a similarly data-driven and emergent method that has been developed by translating and adapting *some* of the aspects and procedures of Grounded Theory, even though it does not claim, or aspire, to be considered as Grounded Theory applied in a visual context.

The points of similarity with Grounded Theory are many, as well with other data-driven qualitative methods (Thematic Analysis, Qualitative Content Analysis, Visual Content Analysis), such as the iterative nature of the process, the progressive refinement in the collection of data, the use of coding for eliciting patterns or categories, the constant comparative approach, but the points of difference are also particularly neat.

First of all, the data analysed and the context in which GVA and Grounded Theory move are totally different: Grounded Theory searches for *conceptual patterns* emerging from textual data gathered from people, mainly by observation, interviews or focus groups, while GVA deals with the formal analysis of artefacts, or the photographs depicting them, and searches for *visual patterns*.

Secondly, the disciplinary contexts in which the two methods are framed are also very different: Grounded Theory in the Social Sciences aims at investigating and eventually theorising aspects of human activity and interactions: in psychology concentrating on the behaviours of individuals, and in sociology on groups of people and their characteristics (Black, 2002). GVA's final aim is to facilitate the development of creative practice in Art, Crafts or Design and to stimulate a higher level of personal awareness on the reflective processes underlying the generation of new ideas, artworks or products.

Grounded Theory also arranges the emerging conceptual patterns in an explanatory scheme of reciprocal relationships of logical connectivity (Birks & Mills, 2011) and aims, at the end of the analytical process, to formulate a Theory, that is Grounded in the data. GVA also elicits visual patterns from the analysis of images and artefacts, but the final aim of GVA, as a *reflective method*, is to make these patterns explicit, transparent and therefore sharable, and as a *design tool*, to use these patterns for the generation of new ideas and the development of the design process.

In a sense, the visual patterns deriving from the iterative process of GVA could be seen as the building blocks of a possible explanatory model, so, broadly speaking, a visual theory[46]. Still, the main interest in eliciting and using these patterns, at least for this research, is not to generate an interconnected scheme that might bring to explaining, or to formulating predictions, with regard to a visual phenomenon *per se*, but to use them for generating design ideas and a deeper understanding, to new practice.

The patterns emerging from GVA could be compared to the volume sliders in an audio mixer. Each slider (visual pattern) corresponds to a different audio channel and it can bring to the background or to the foreground the corresponding sound or musical instrument, by varying its volume. By altering the combinations in the arrangement of various sliders, the musical output could drastically change. By conducting GVA and discovering the visual patterns emerging from the analysis, we could certainly concentrate on understanding, or explaining, the existing balance between them *as they already are*, with regard to the visual phenomenon analysed; but we could also use them to 'play', altering their balance with new combinations and relationships, in order to get to different visual results.

This should help to illustrate the two main aspects of GVA: the *reflective method*, for making explicit and understandable the visual patterns already

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[46] See the Definitions section introductory to this thesis (p. XVI) for a proposed definition of Theory in this research.

existent in the artefacts analysed (e.g. the already established positions of the volume sliders in a specific piece of music), and the *design tool*, using visual patterns as building blocks for generating new design outcomes, (e.g. moving the sliders and changing their combinations, generating different musical outputs).

4.2 - GVA as an evolution of the IA

GVA derives from developing the IA into a more systematic method for visual analysis, taking inspiration from the general methodological principles of Qualitative Emergent Methods and following in particular the rigorous structure of Grounded Theory as a guideline for developing a tailor-made approach for a visual context.

Given that the superficial form of preliminary visual research performed with the IA led to a form of understanding of the Lighting Wearable phenomenon that—however vague and implicit—brought to the generation of new practice, I approached the development of GVA from the perspective of improving a method that already worked, rather than setting up a completely different one. The IA needed fundamentally to be re-structured and clarified, so it was necessary to retrace its passages, for solidifying its valid aspects, modifying the weaker ones, and integrating them with new ones, where necessary.

Therefore, the process of evolving the IA into GVA went through a preliminary phase where the methodological aspects of the IA were retraced and reviewed, using Grounded Theory as a structured guideline. The results of this preliminary review formed the basis for the subsequent structuring of the skeleton of GVA and they will be illustrated in the next sub-section.

4.2.1 - The IA under the lens of Grounded Theory

The *data-driven* nature of Qualitative Emergent Methods, and in particular of Grounded Theory, matches the exploratory, visually-driven nature of the preparation phase of a design situation: in the case of Stage 1, it was necessary to preliminarily explore a number of images (or artefacts) to get to a

basic understanding of the visual phenomenon of Lighting Wearables, in order to apply it for developing alternative design solutions in the field of jewellery.

This process could not count on an established visual theory covering the Lighting Wearables theme that could frame, or explain, the various instances (artefacts) as empirical articulations of it. As in the case of the Social Sciences, in absence of an extant theory, the textual data represent the instances where the studied social phenomenon (and its embodied theory) are expressed in various aspects. In my case, the images and the artefacts represented the instances where the Lighting Wearables phenomenon (as a theme, a style, and a trend) was expressed in its various aspects.

Grounded Theory is generally considered to be based on *inductive* reasoning: starting from the data, a theory is progressively built, but, there is also a secondary *deductive* aspect to it, that is represented by the growth of Theoretical Sensitivity in the researcher that, after coding the initial sample of data, and formulating the first conceptualisations and hypotheses, allows him/her to search deductively for new, more focused data, in a process that frames deduction in the service of induction (Birks & Mills, 2011). Equally, the IA could not start from deduction, since an extant theory on the visual phenomenon was not available. Given the subjective, heterogeneous and non-necessary[47] inferences that can be made from the analysis of visual data, it is more appropriate to talk about *abductive*[48] reasoning (Reichertz, 2007), that is a form of "inference to the Best Explanation"(Lipton, 2000).

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[47] The distinction between *necessary* and *non-necessary* inferences constitutes the basis for separating deduction on the one side and induction and abduction on the other. In deductive reasoning, if the premises are true, then the conclusions are *necessarily* true. In induction and abduction, instead, things are not so clear-cut as the premise is not *guaranteed* to be true, but it might *likely* to be, for example, even in the case of it being true, the conclusion is not *necessarily* true, but it might have *compatibility* or be *statistically probable* to be true. For a more detailed explanation and examples of deductive, inductive and abductive inferences see (Douven, 2011) and (Vickers, 2016) and refer to more authors mentioned in the Definitions section (pp. XIV-XV)

[48] For a basic definition of Abduction, please refer to the 'Definitions' section introductory to this thesis (p. XIV-XV). For a deepening on abductive reasoning see the work of Charles Sanders Peirce (1839-1914) on the logic of Science, in (Hartshorne & Weiss, 1960), (Houser & Kloesel, 1992) (The Peirce Edition Project, 1998) and (Misak, 2004)

In the Social Sciences, moreover, from the analysis of individual instances, it is possible to gather, group and structure various key concepts while they emerge, until a more abstract and generalised view of the social phenomenon can be obtained, to the point that a theoretical model of it can be formulated, as in the case of Grounded Theory. On the same principle of starting from the *specific* and moving towards the *general*, by gathering and grouping the main key visual aspects emerging from the analysis of various instances (images, artefacts), a more generalised understanding of the visual theme could be equally obtained, and it would be characterised by a close link to each individual instance, being grounded on them.

The process of *coding*—that consists in systematically reducing to essential text (or codes) the main concepts found within the textual data, while a hierarchical system of categories of increasing abstraction is progressively taking shape—is very similar to the process happening in the IA, when collecting images. By reflecting on how this had occurred, I realised that I had instinctively reduced each artefact, or image, to a series of *mental keywords* referring to its properties against a series of formal categories: from constitutive materials, colours, styles, markets, use or quality of lighting etc., and that I implicitly kept a mental score of these mental keywords, forming over time a generalised sense of distribution and 'statistical' relevance.

The process of mental keywording formed over time the basis for the tacit knowledge about Lighting Jewellery that, even though it could not be clearly qualified or quantified in Stage 1, was at the core of the design criteria listed in Table 1 (Chapter 2, sub-section 2.4.4), and in the background when developing the 29 final Lighting Jewellery models. In hindsight, it is clear that those design criteria were not coming directly from the analysis of the small sample of images illustrated in the discussion and chosen to exemplify the Lighting Wearables theme in Stage 1, but they came from a longer process of intuitive analysis and assessment of a much larger set of images of artefacts, observed and tacitly analysed over years of practice and interest on the Lighting Wearables theme.

This brought me to move from the confused and implicit process of mental keywording towards a written recording system, inspired by the analytical trail kept in Grounded Theory, where the coding is systematically tracked in writing, and is kept as a reference for the analysis of further data, so that the progressive accumulation of codes and recurrence, hierarchical value and relationship with other codes and data, can be transparently examined, compared and shared.

Another point of similarity between Grounded Theory and the IA is in the *iterative* nature of the process. In Grounded Theory, every aspect of the analytical process is performed on a recurrent and spiral-like basis, by repeating several rounds of data collection and analysis until a higher level of abstraction is progressively reached, and the theoretical model emerging will eventually frame and explain a wide range of empirical instances (Charmaz, 2006). Even if very unstructured, I recognised the same iterative nature in the IA, while I was sourcing for images in increasingly specific terms, as if the mental trail of the visual themes emerging from the images previously collected would slowly build a form of categorical abstraction, leading to new searches for images bearing visual aspects that were not yet covered, or fully saturated, by my mental categories.

The IA, though, did not have a logical organisation in stages, in the iterative process, as opposed to the systematic procedures prescribed by Grounded Theory. In the IA, the rounds of iteration were not distinctly ordered or even documented, reflective logs or *memos* were not kept in writing and the processes forming the tacit knowledge were happening at a mental level and most of the time unconsciously.

There is also a tradition of collaborative work in the Social Sciences, where studies are often performed by teams of researchers, so the need for clarity, consistency and transparency in disclosing every aspect of the analytical process is necessary for allowing the homogeneous integration of coding and interpretations of different researchers. The IA was framed instead on an individual perspective, as the subjective work of a single designer, so the need

for explicitness, at least initially, was only motivated by a perceived issue in communication to the research community about the processes underlying my preliminary visual research. Nevertheless, as it will be shown later in the discussion, forcing a higher level of transparency around these processes can have a significance and usefulness also for the individual designer, as it can lead to the discovery of further visual aspects in the analysis that, with an implicit and intuitive approach, would remain otherwise submerged.

A review of the literature on the substantive area of interest at the outset of an investigation (in other words, the position a researcher must take in terms of on having, or building, a form of preliminary knowledge around a given phenomenon), according to Glaser should be avoided, and left to a later stage of the research

> […] to not contaminate, be constrained by, inhibit, stifle or otherwise impede the researcher's effort to generate categories, their properties, and theoretical codes from the data that truly fit, are relevant and work with received or preconceived concepts that may really not fit, work or be relevant, but appear to do so momentarily. (Glaser, 1992, p. 31).

because, he continues,

> It is hard enough to generate one's own concepts, without the added burden of contending with the "rich" derailments provided by the related literature in the form of conscious or unrecognized assumptions of what ought to be found in the data. (Glaser, 1992, p. 31).

This is at complete odds in the case of the IA, where preliminary visual analysis is considered as the counterpart, in visual terms, of a literature review. It is almost unescapable for an artist, or designer, to be constantly exposed to visual content, even though one might intentionally attempt to avoid to delve into a focused search on a specific theme. A latent form of knowledge around visual phenomena or themes, especially when they relate to the interests or specialisations of an artist or designer is unavoidable, and this aspect has to be taken into account.

Glaser (1992) recognises a difference in the forms of literature, that he subdivides in: 1) non-professional, popular and descriptive, 2) professional literature related to the area researched and 3) professional literature unrelated

to the area researched. He emphasises then that the form of literature to be avoided is the second, the most specific to the area of interest (pp.31-37).

In reality, visual data that are seen, assessed or collected during the normal routine of studio practice with methodological approaches similar to the IA, could more likely be associated to the other two categories of literature, because either they are unrelated to the substantive area of research (case 3) or, even when related, they resemble more to the first form of literature (non-professional, popular and descriptive). In fact, unless they are framed in in-depth studies offering a form of explanatory model of patterns and relationships (that could create bias, as case 2, in the professional literature), they remain data that add to the authentic and personal apprehension of the area of interest, and, as Glaser observes, they are

> […] pure descriptions of various sorts with virtually no or minimal conceptualizations, such as are found in ethnographies, biographies, diaries, comments, manuscripts, records, reports, catalogs, etc, etc. These materials should be related to the substantive area being studied and therefore are to be considered just more data to be constantly compared for generating categories and properties. They may be read at any stage of the research as data.(Glaser, 1992, pp. 36-37).

Therefore, if a form of preliminary knowledge on Lighting Wearables was present long before starting this PhD — and it could be considered as a natural form of experiential knowledge, unbiased by external sources of influence, (as in the literature case 1) — the increased focus given to this theme in Stage 1 by archiving and analysing images with the IA, could represent a form of substantive research (case 2, to be avoided, according to Glaser) that could constitute a form of bias in the light of a new analysis using GVA.

In other words, it has to be taken into account that the design criteria formulated in Stage 1 (Table 1), could represent the condensed expression of a set of pre-existing assumptions on the theme of Lighting Wearables that could influence the same study when re-performed with GVA, since this would not start from a 'clean slate' perspective, as prescribed by Grounded Theory. For this reason, in developing and testing GVA, I had to consider that, whatever adaptation or translation of Grounded Theory I would envisage, I would have to

start by accepting this first, significant pre-conditional difference in preliminary knowledge.

One further point of comparison between Grounded Theory and the IA is the constant comparative method that in Grounded Theory is a milestone accompanying the various iterations in the different phases of the coding process. Every time a researcher codes, he/she needs to be open and to constantly compare the data and their codes. As Charmaz explains:

> At first, you compare data with data to find similarities and differences. For example, compare interview statements and incidents within the same interview and compare statements and incidents in different interviews. Making sequential comparisons helps. Compare data in earlier and later interviews of the same individual(s) or compare observations of events at different times and places. When you conduct observations of a routine activity, compare what happens on one day with the same activity on subsequent days. (Charmaz, 2006, p. 54).

This promotes a repeated exploration and questioning of the assumptions about the phenomena researched, and it leads to new discoveries, also stimulating theoretical sensitivity (Strauss & Corbin, 1990).

This can also be translated in visual terms: the data are the images, or the artefacts, and they can be compared for similarities or differences and these comparisons can be performed at various levels: from image to image, from code to code, from category to category, from coding session to coding session, from groups of images to other groups of images, and this will, exactly as prescribed by Strauss and Corbin, push further the exploration, question our assumptions and increasing our sensitivity, opening the way to new insights.

In the IA, this form of systematic and recurrent comparison was present to some extent, but it remained unstructured and performed at intuitive level, so that it could not be considered as a deliberate process working actively in the critical and exploratory sense prescribed by Strauss and Corbin, or as a method for stimulating and developing theoretical sensitivity (*visual s*ensitivity, in this case).

As for the final aspects of Grounded Theory as presented in Chapter 3 (sub-section 3.3.2.8) *saturation*, *sorting* and *theory generation*, there was no counterpart in the IA, as a real point of saturation was never reached or felt,

since the process of categorisation was extremely confused. With regard to sorting—which is a form of conclusive reflection on the results of the analysis and reorganisation of the memos for the generation of a final theoretical model—this could be seen as coincident to the mental reorganisation of the visual categories and the clarification of the tacit 'sense' of the visual phenomenon, without a communicable structure.

The generation of a conclusive theory, that is structurally intrinsic in the method of Grounded Theory, and its final aim, did not apply for the IA, whose results, in the form of the design criteria intuitively generated, served the purpose of forming the basis for developing a design brief for the practical production of Lighting Jewellery artefacts.

The following Table 2 draws the conclusions to the review of the IA in relation to the structure and methodological aspects of Grounded Theory, and the points of difference and similarity are summarised in a comparative scheme, where they are displayed side-by-side. In the left purple column are listed the main aspects or principles of Grounded Theory, following the same order as they are presented in Chapter 3, flanked by the corresponding existing or missing aspects of the IA, in the blue column.

Table 2 - Comparison between Grounded Theory and the Intuitive Approach

Grounded Theory (GT)	Intuitive Approach (IA)
Data-Driven	Data-Driven
Inductive→Deductive→Inductive	Abductive
From particular to general	From particular to general
Systematic Coding	Mental Keywording
Iterative (systematic)	Iterative (unsystematic)
Written analytical trail	Mental, untracked
Explicit, teamwork	Implicit, infivdual work
Memos and annotations	No documentation
Theoretical sensitivity	Tacit knowledge
Systematic Comparison	Inconsistent comparison
Theory generation	Design bref generation

In the following section I will discuss how, starting from the results of the comparison between the IA and Grounded Theory, the basic structure of GVA has been gradually developed.

4.3 - Methodological structure of GVA

Following the review of the IA in the light of Grounded Theory, a phase of integration and adaptation between the two methods has allowed the outlining of the basic structure of GVA. The main procedural passages of Grounded Theory, as introduced in Chapter 3, have been individually considered against the procedures of the IA, and then adapted to suit GVA on the basis of their applicability to visual data.

The GVA method has been subsequently clarified and refined by testing it on a practical case (Chapter 5) and by applying it on a series of images from the same theme and Visual Archive of Lighting Wearables, utilised in Stage 1. This has been done with the double purpose of testing the method, and at the same time drawing useful comparisons and critical reflections on the merits of GVA in comparison to the IA.

Before describing in detail each aspect of the basic methodological structure of GVA, Table 3 offers a visual mapping of the three methods side-by-side, so that it should be easier to see the correspondence between similar aspects of the methods: starting from Grounded Theory, moving to its related aspect in the IA and ending with the final reformulation of GVA. The three coloured columns represent vertically the three methods, where the key methodological aspects of Grounded Theory are listed, for consistency, from top to bottom in the same order as they have been presented in Chapter 3 (section 3.3.2 and sub-sections). Each line, read horizontally, presents the corresponding aspects of the three methods displayed side-by-side. The cells that are left blank and colourless, are the procedural aspects not present or not developed by the corresponding method. The reading order of the table goes horizontally, line- by-line, from top to bottom.

Table 3 - Methodological passage from GT, to IA, to GVA

Grounded Theory (GT)	Intuitive Approach (IA)	Grounded Visual Analysis (GVA)
Data-driven	Data-driven	Data-driven
Inductive-(Deductive)	Abductive	Abductive
Iterative - Spiral	Iterative- Circular	Iterative - Spiral
Theoretical Sensitivity	Tacit Knowledge	Visual Sesitivity
Data Collection and Sampling	Visual Archives	Image Sampling and Database
Data Coding	Mental Keywording	Data coding
Categories and Properties	Intuitive Categories	Categories and sub-categories
Theoretical Sampling		Visual Sampling
Memoing and note-taking		Memos and annotations
Constant Comparison		Constant Comparison
Saturation		Saturation

The individual aspects of GVA, as listed in the green column of Table 3, will be illustrated and discussed between the next sub sections and Chapter 5, in relation to how they derived from the GT→ IA→ GVA methodological passages. They will be presented in a sequence that will introduce first the most theoretical aspects, moving through an ideal line that will end with the very practical aspects illustrated at the end of Chapter 5. The intermediate sub-sections will introduce aspects that are both theoretical and practical.

4.3.1 - Visual Sensitivity

The passage from an implicit to an explicit level of analysis is not only allowed, but facilitated and enhanced by the application of GVA, this representing one of the main merits that can be associated with the use of this method. GVA, by making the analytical process more clear and transparent, helps in building an increased level of insight into the analysis itself and in the richness of the results obtained from it. This is precisely caused by the increased level of *Visual Sensitivity* that the GVA process manages to stimulate.

Visual Sensitivity is the counterpart of the concept of Theoretical sensitivity in Grounded Theory and, even though it does not represent a practical technique or procedure for conducting GVA, it still deserves some specific discourse because it is intrinsically linked to all the phases of the process, and it deals with the fundamental problem of the IA, that is the lack of explicitness

(possibly even of awareness), in the elaboration and communication of the pre-extant knowledge underlying the analytical process.

Theoretical sensitivity in Grounded Theory is defined by Strauss and Corbin as

[…] an awareness of the subtleties of meaning of data. One can come to the research situation with varying degrees of sensitivity depending upon previous reading and experience with or relevant to an area. It can also be developed further during the research process. Theoretical sensitivity refers to the attribute of having insight, the ability to give meaning to data, the capacity to understand, and capability to separate the pertinent from that which isn't. (Strauss & Corbin, 1990, pp. 41-42)

In a visual context, it is very close to the concept of *experiential knowledge* (Biggs, 2004b; EKSIG, 2016; Niedderer, 2007; Niedderer & Reilly, 2007; Nimkulrat et al., 2015) that is gained through professional practice, and it refers to the resulting impact that this form of knowledge can have on the analytical (and creative) process. Visual Sensitivity represents a level of experience, and of tacit knowledge determining a level of sensitivity and perception that accompanies the researcher throughout all the phases of the enquiry, so, on the one hand it is a possible precondition to it, but on the other hand it is a factor that might expand, and be reinforced by it.

In fact, Strauss and Corbin (1990) proceed in analysing this concept and affirm that theoretical sensitivity comes from a combination of sources, such as the literature, professional experience, personal experience and also from the same analytical process around the area of interest. Similarly, Visual Sensitivity is acquired and expanded through the combination of various factors: professional and personal experience, as well as the literature, and also the visual research previously performed around the desired area of enquiry; it can also be enhanced by the analytical and systematic process of GVA itself, as it will be demonstrated in Chapter 5, during the testing of the method.

It is important to be aware of the existence of this level of sensitivity, especially at the outset of visual analysis, in order to distance oneself as much as possible from pre-extant assumptions that might cause bias, but also for distinguishing between the initial level of sensitivity and the final level, obtained and stimulated by the analytical process itself.

In fact, as the authors suggest, this represents an important creative aspect of the method:

> This sensitivity represents an ability not only to use personal and professional experience imaginatively, but also literature. It enables the analyst to see the research situation and its associated data in new ways, and to explore the data's potential for developing theory. (Strauss & Corbin, 1990, p. 44)

As it will be illustrated in Chapter 5, where the application of GVA will be described in detail using images from the Lighting Wearables theme, the level of Visual Sensitivity that I carried forward on that theme because of my experiential knowledge (certainly increased by the focused work already conducted in Stage 1 with the IA), could represent a critical issue of *self-bias*[49] that could virtually invalidate all efforts at effectively re-evaluating with a different method the same visual theme.

It was the awareness about this potential problem that brought me to remain constantly alert, trying as much as possible to be aware of the extant design criteria derived in Stage 1 and their potential to prevent a 'fresh look' on the visual data. I made a conscious effort to treat each image analysed *as if* I was seeing it for the first time—questioning all coding that could not be clearly recognised as truly emerging directly from each image—while mediating this process by constantly reflecting on each step of the analysis. I kept the process extremely close to the individual data, deliberately avoiding to gather an 'overall sense' of the images 'as an ensemble' (as it did happen with the IA), but treating them on an individual basis and letting the process to gain momentum while building upon itself, until the codes emerging started to coincide, then to exceed and eventually surpass the quantity and quality of the criteria from Stage 1, so that the risk of the 'self-bias' influence was finally warded off.

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[49] See footnote n.43 p.107 for a clarification of 'self-bias'.

Indeed, Strauss and Corbin themselves admit that:

[...] it is not easy to make creative use of one's knowledge and experience while at the same time holding on to the reality of a phenomenon rather than just thinking imaginatively about it.(Strauss & Corbin, 1990, p. 44).

and they suggest, in order to keep the analysis free from the conditioning caused by this form of pre-extant sensitivity, to regularly step back and ask oneself whether the analysis really fits the reality of the data and to keep an attitude of scepticism, maintaining all explanations, categorisations or hypotheses regarding the data as provisional and "never accepted as a fact" (1990, p. 45), and to repeatedly check these against the actual data.

Most of all, they prescribe to follow closely the research procedures, because

The data collection and analytic procedures are designed to give rigor to a study. At the same time they help you to break through biases, and lead you to examine some of your assumptions that might otherwise affect an unrealistic reading of the data (1990, pp. 45-46).

As it will be confirmed by the practical testing in Chapter 5, the fact of keeping a questioning attitude towards the sample of images, maintaining alertness about the existence of pre-existent knowledge and bias about them, and following almost pedantically the GVA procedure, helped to develop the analysis and coding with a spontaneous progression, accompanied by the contextual growth of my Visual Sensitivity, deriving from the richness of the analysis of the raw data instead of relying on the preconceived assumptions I brought forward from my tacit knowledge and the analysis performed in Stage 1.

4.3.2 - Image collection and sampling

By image collection is intended 'the process of collecting images', while in reference to 'a collection of images', other terms are used in the thesis, such as 'Visual Archive', or 'repository'.

Analysis conducted with GVA is based on the precondition of having amassed a number of images around a given theme (e.g. a Visual Archive as illustrated in the case of the IA), that will work as a 'reference library' in order for

the GVA image sampling process to begin. The constitution and amassment of a Visual Archive is not considered part of GVA, as it represents merely a starting point, a thematic image repository from which the images that will go through GVA will be selected and analysed. It is not, therefore, necessary to establish a rigid set of criteria ruling the quality or quantity of the images that are to be included into a Visual Archive, except for a generic principle of thematic coherence. This serves to allow the amassment of as many images pertinent to the chosen theme as possible without limitations of sorts.

This form of free-collection allows to reduce the possible interferences with the subsequent process of GVA that an established set of criteria for preliminary collection would imply (because these criteria would inevitably represent an *a priori* form of 'categorisation', impacting on Visual Sensitivity and 'self-bias', from which, as previously explained, it is advisable to maintain a careful distance).

Also, the freedom of accumulating images in a visual repository, without worrying about possible repetitions, or slight departures from the thematic focus of the Archive, will allow the researcher to quickly expand it, counting on the fact that, as soon as the GVA process will start, the images will be reassessed and appropriately selected or discarded for GVA, this time with a clearer set of criteria, that will be driven by the analysis itself. This will also allow the Visual Archive to remain an external source of visual information around a theme, equally available for selecting different samples of images concerning alternative projects, because it will contain images thematically coherent but not specifically filtered for a single project.

Populating a preliminary Visual Archive, in the light of the visual/textual parallelism that has been brought forward so far, can be associated to the processes of freewriting, whose main utility is to temporarily suspend judgment and to prevent writer's blocks, and to produce text in quantity, trusting that a further process of editing and refinement will follow.
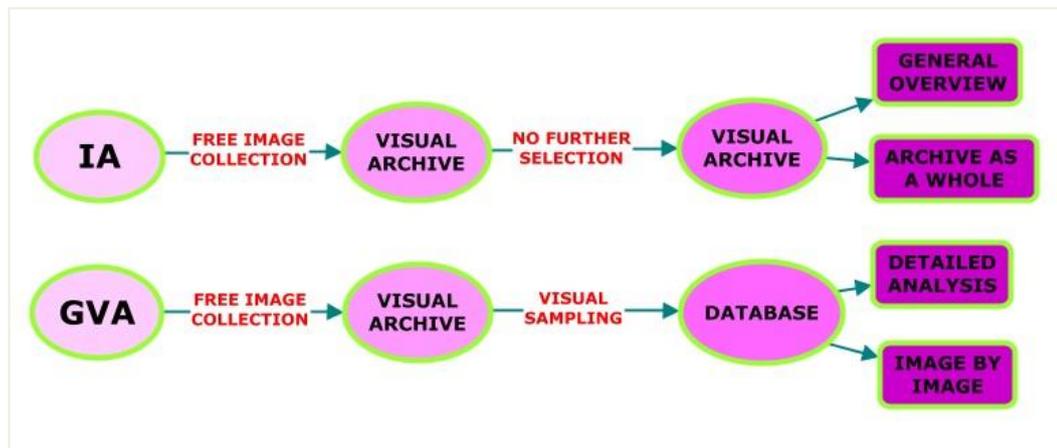
Figure 35 - The role of the Visual Archive in the IA and in GVA

Figure 35 illustrates the role and position of the Visual Archive in the methodological structure of the IA and GVA. In the case of the IA, the Archive constituted not only a reference library on the chosen theme, but it was also evaluated in its entirety, in the attempt to grasp a 'general sense' of the visual theme of interest. After this was intuitively acquired, a small sample of key images had been sourced from the Archive, as an illustration, or a confirmation *a posteriori*, of the criteria implicitly derived from the evaluation of the Archive as a whole.

In GVA, the Visual Archive is not analysed as a whole, but images are selected from it and evaluated on a one-to-one basis, starting from one initial sample chosen on the basis of few, general criteria that will be progressively refined and focused through subsequent rounds of image selection and analysis, driven by the emergence and refinement of the criteria themselves, until a point of saturation in the distribution and depth of the coding and the emerging categories.

Image selection, in GVA (i.e. the process of choosing images *from* the Visual Archive) has therefore to be framed in relation to the concept of *sampling* of the images, especially in the light of the parallelism between GVA and Grounded Theory.

A basic definition of *sample* is offered by the Merriam-Webster dictionary (2016) as: "a small amount of something that gives you information about the thing it was taken from" and also as "a group of people or things that are taken

from a larger group and studied, tested or questioned to get information". In other words, a sample is a sub-set of manageable size, representative of a wider population, that can be analysed, producing accurate results about that population. Selecting a sample for analysis or evaluation is necessary because the researcher "cannot observe or record everything that occurs" (Ritchie, Lewis, & Elam, 2003, p. 77).

The approaches to *sampling* (the selection of the units composing a sample) can be distinguished between *probability sampling*, and *non-probability sampling*. Probability sampling is considered to be the most rigorous approach for statistical research (Ritchie et al., 2003), and the units of the sample are chosen randomly from a given population and they have a known probability of selection for being statistically representative of it (Kumar Roy, Ackarya, & Kumar Roy, 2016, p. 115). In non-probability sampling, the elements of the sample are instead chosen deliberately for representing particular groups, or features of the population, and they do not have known probabilities of being selected as they are not meant to be statistically representative. Non-probability sampling, is considered to be more appropriate for qualitative research because it is best suited for allowing in-depth studies around particular features of a phenomenon (Ritchie et al., 2003).

Purposive Sampling, is a non-probability approach to sampling where the units of the sample are chosen because

> They have particular features or characteristics which will enable detailed exploration and understanding of the central themes and puzzles which the researcher wishes to study.(Ritchie et al., 2003, p. 78)

The units of the purposive sample are selected to represent various characteristics of key criteria so that all of them could be covered, and that within each of these criteria there could be some diversity in the distribution of their characteristics, so that their impact could be explored. (Ritchie et al., 2003, p. 79).

There are various approaches to purposive sampling, such as *Theoretical Sampling*, that is part of Grounded Theory (Glaser & Strauss, 1967), and a similar

approach has been adopted in GVA, where it has been named *Visual Sampling*. In this form of sampling, the units are chosen on the basis of their potential to contribute to the emergence of a wide range of characteristics and related properties, in order to build and test theoretical models around given phenomena. In Visual Sampling, the units (images) are selected on the basis of their contribution to the development of diversity in the categories, codes and properties that can emerge from the analysis.

Visual Sampling is an iterative process, because the sample is not entirely gathered at the outset of the analysis, but it is gradually built over various rounds of increasingly focused image collection and analysis. After an initial set of images has been selected and analysed, more images are chosen, and the further cycles of image selection are driven by the emergence of codes and categories, until a point of saturation is reached.

However, in order for the analysis of the sample to be meaningful in relationship to the wider population to which it refers, (so that inferences about that population can be made) it would be necessary to have a known correspondence between how the sample is formed and how the wider population of reference is composed and distributed.

The understanding of the relationship between the 'wider population' and the 'sample' is, in its turn, linked to the concept of *Sampling Frame*, that serves to circumscribe the wider population into a finite entity. A sampling frame is "any material or device used to obtain informational access to the finite population of interest"(Särndal, Swensson, & Wretan, 1992, p. 9) and, ideally, it should consist "of all elements occurring only once and it should exclude any other element that is irrelevant for the study"(Kumar Roy et al., 2016, p. 115).

In the case of the Visual Archive on Lighting Wearables chosen for illustrating GVA, the wider population, for example, would ideally correspond to all the Lighting Wearables artefacts (or their images) ever produced, in any place, and at any time. It would be possible to talk about a sampling frame of that wider population if a finite and discrete list of all these artefacts would exist, so

that a sample could be selected from it, on the basis of specific criteria, in order to represent it or to be linked in a known relationship to it.

In the case of visual research as it has been presented so far in this thesis, it is difficult to imagine a scenario where a sampling frame of such a visual phenomenon would be available, similarly to a comprehensive list of all the artworks related to a given visual theme ever produced, like a form of census, as in the case of some research performed in the Social Sciences. This could happen only in particular events.

For example, one could trace a comprehensive list of all the artworks produced by a particular artist; or of all the artworks produced in a specific time frame, *and* in a specific place *and* by a specific group of artists. In similar cases there could be a discrete list (a sampling frame) to refer to, because there would be the possibility to circumscribe a finite entity of reference, of which a sample could be representative in a known set of relationships.

When, instead, a sampling frame is not available, as in the majority of cases of visual research where the understanding of a 'theme' or a 'style' is searched through the review of a variable number of images (or artefacts), that are mostly sourced on an opportunistic basis, it is important to be aware that the codes, categories or visual criteria resulting from their analysis will not allow universal claims to be made with regard to the wider visual phenomenon they might illustrate, because this visual phenomenon was not known from the outset as a finite entity of established dimensions or proportions, and therefore the sample could hardly be representative of it.

In the case of the Lighting Wearables analysed with the IA (and later in Chapter 5 with GVA), the hundreds of images contained in the Visual Archive cannot be seen to be truly representative of the Lighting Wearables phenomenon in absolute terms, as they do not possess a known relationship of distribution and diversity in regards to it, and even the Lighting Wearables phenomenon in itself is not a known and finite entity.

It could be hypothesised that one Visual Archive comprehending thousands of images could be a closer depiction of the wider reality of a given visual theme, if compared to an Archive consisting of only a few images. Still, unless that visual theme is precisely known and framed, no matter how big or small the Visual Archive is, no inferences can be trusted as true or extended to an ideal universal reality, since any form of correspondence and relationship between the Archive and that reality is unknown.

The sample of images chosen from the Visual Archive of Lighting Wearables for GVA, therefore, has to be seen as a *sample* of a *sample*. It is a sample *purposively* chosen, from a bigger sample (the Visual Archive) of unknown proportions and relationship with regard to the visual theme of Lighting Wearables. By analysing with GVA this 'sample of a sample', it is only possible to make inferences regarding the partial representation that is expressed *within* the Visual Archive, and not going beyond it.

This discussion serves to highlight the importance of being very careful and aware of the limited and relative dimension in which preliminary visual analysis is generally conducted. However, since the rationale for the development of GVA has been to bring to the surface, and to make clear and explicit the submerged processes that might have led to the formulation of the design criteria in Stage 1, it is within this subjective and relative space that the sample from the Visual Archive analysed with GVA has to be interpreted.

These images, even though they *do not* possess a known relationship with 'all the Lighting Wearables ever produced', still *do* possess a relationship with my subjective apprehension of the Lighting Wearables phenomenon. This apprehension has brought me to select the specific images that I perceived to be interesting or significant for representing the Lighting Wearables visual theme, and to include them into the Archive, while other images have been evaluated as irrelevant and dismissed. In this perspective, from the analysis of the Visual Archive, it is likely that there will emerge a picture of my personal interpretation of that phenomenon, in a sort of auto-ethnographic perspective.

If the images in the Archive, and the sample selected from it for GVA, cannot tell a reliable story about the absolute reality of Lighting Wearables, they can nevertheless reveal a story about my subjective take on it. From this point of view, the Visual Archive from which the GVA sample is selected, becomes a discreet population, since it does contain a finite set of images representing my visual preferences and choices. It is with this awareness that the sample of images analysed with GVA in Chapter 5 has been considered.

It is important to be aware of this aspect, because it is more likely that when preliminary visual analysis is performed in order to obtain a general understanding of a theme, unless a sampling frame is available, it is more likely that the patterns emerging from it will reveal a very personal reading of that theme. If on the one side the relativity of this perspective can be seen as a limitation, on the other, it can be used to one's own advantage, by deliberately performing GVA for gaining insight into the subjective and implicit aspects of an intimate visual world, questioning and exposing underlying assumptions and evaluations that otherwise might never become explicit enough to be further elaborated through reflective practice.

4.3.3 - Image organisation

Populating a Visual Archive around a theme is an ongoing process of free collection that, as previously said, does not have to be necessarily linked to the development of a specific project, and it can happen on an opportunistic basis, every time new images that are pertinent to the theme of interest are found. Images within the Archive are not otherwise organised, except for their order of insertion into the repository.

In both practical examples of analysis performed with the IA (Chapter 2) and GVA (Chapter 5), the same Visual Archive on Lighting Wearables has been used as a starting point, even though it contained less images In Stage 1 with the

IA, than years later In Stage 2, when GVA was developed and tested[50]. As explained before, though, it is not in the quantity of images contained in the Archive that the reach and validity of the analysis has to be understood, but in the way that the images involved in the analysis are sampled, treated and organised.

In terms of the practical organisation and management of the Visual Archive for GVA, the progressive availability of digital media over the span of this PhD has inevitably influenced not only my way of conducting research, but also my practice of storing images into an archive. What were for decades only physical collections of photographs, photocopies and magazine cuttings, have transformed, in particular in Stage 2, into digital repositories stored in the Cloud[51] and shared potentially with millions of people worldwide.

The use of analytical software, digital image repositories and online platforms of image sharing have optimised certain aspects of the preliminary visual research process, where these technologies can be advantageous over 'ink and paper' methods. The digitalisation of the working tools applied in GVA does not represent though a conceptual turning point in approaching visual research, but an evolution in the use of certain tools, driven by practical necessity. Possibly because I am a Digital Immigrant[52] (Prensky, 2001), I have adopted a hybrid approach between digital and old-school methods in the application of GVA, for improving efficiency and results. Examples of this mixed approach will be

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[50] The analysis with the IA was performed during the Spring of 2011, while the development and testing of GVA started in October 2013 and ended in December 2014.

[51] Cloud Computing, often known as 'the Cloud' refers to a system of networked remote servers hosted online for storing, accessing and managing data on the Internet instead of on the local hard-drive of a computer. For detailed information on how the Cloud works, see (Cloud Computing, 2016).

[52] Prensky (2001) defines 'Digital Immigrants' the generation of today's technology users who were not born into the technological world of computers, video games, the internet etc., but have familiarised to varying degrees with these technologies. He distinguishes them from 'Digital Natives', who are the users born with these technologies already available. He compares Digital Immigrants with Immigrants in linguistic terms, as people who had to adapt to a non-native environment and therefore retain an 'accent', or as he defines it, 'a foot in the past' (p.2). He argues that Digital Natives differ from Immigrants for generational aspects , but also for cognitive structure and ways of processing information. For more on this topic see (Prensky, 2001) and (Helsper & Eynon, 2009)

commented in the further description on the case-study of GVA of Lighting Wearables.

The diffusion of online platforms for photo sharing (such as Flickr, Pinterest, Instagram etc.), has made me to notice that the quantity of images I collected over time in digital format was outnumbering their printed counterparts. This has been particularly evident with regard to the Visual Archive on Lighting Wearables, where the majority of examples have been sourced from the growing market of Wearable Technologies, and are almost exclusively available in digital format online.

In order to avoid the inconvenience of having part of the Archive stored in photo albums, part in online platforms and part in PC folders, I opted in Stage 2 for the digitalisation of its entire content, and I substituted the images already present in the Archive in printed form with their digital versions (searching online or scanning them), for increased uniformity and cohesion. Digital images have the advantage of not using physical space so that a digital repository, compared to a physical one, is virtually limitless. Moreover, digital images can be shared, copied, and made available anytime and anywhere. This is particularly important because the diffusion of online social platforms has exponentially increased the mobility and availability of images that can be found on the web.

4.3.3.1 - Visual Archives 2.0 (Pinterest boards)

Pinterest (2017), a free online social platform for image and link sharing, has gained increasing popularity over the recent years and has become the principal tool I have used in Stage 2 for centralizing my Visual Archives.

Pinterest allows the saving, sharing and management of photographs, videos and other media content in online collections called 'Pinterest boards' that work as the digital counterparts of physical pin boards. The user can browse, save, sort and manage the images (called 'Pins') found either within Pinterest or in any other website (by capturing them with a browser plugin called 'Pin it' button, and transforming them into Pins) and automatically share them with the community of other Pinterest users sharing similar interests, so that the

relevance of the images circulating on each user's home feed is progressively customised on the basis of thematic interests.

Images can be tagged and searched by keywords, but they can also be found with the help of sophisticated algorithms of image recognition that search for visual similarities with other images, and by the progressive growth of a personalised network of followers sharing common interests. At the moment of writing (2016) Pinterest stores more than 50 billion images, and has reached over 100 million active users worldwide (176 million registered) (Griffith, 2015; Craig Smith, 2016).

In 2009, before starting this PhD, I created my first Pinterest account and I started using it parallelly to my old Visual Archives, visiting it on a weekly basis for 'image hunting' sessions, until the overwhelming availability of digital content brought me to the decision of using exclusively Pinterest as the platform for my Visual Archives, much later, in Stage 2. This account currently hosts 23 thematic boards, follows 743 users and is followed by 535, and stores a total of 12976 images. In 2013 I created a second Pinterest account (Cerutti, 2013-2016) dedicated specifically to this PhD and the development of GVA, and I moved the Visual Archive on Lighting Wearables I used for testing the method to it.
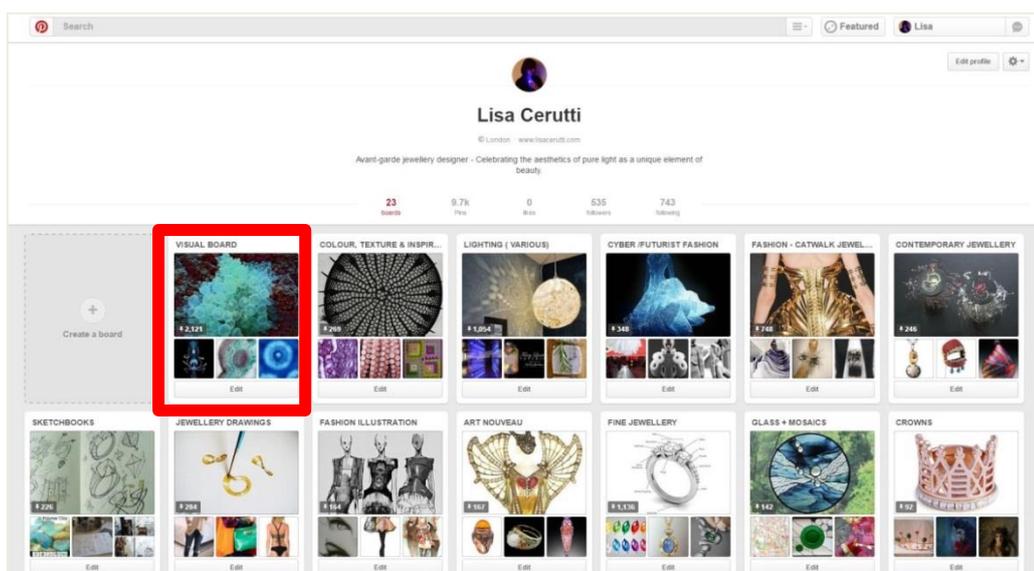
Figure 36 - Some of the Visual Archives in my main Pinterest account

Figure 36 shows a screenshot of how the thematic boards are presented on Pinterest. Each board is represented by a square (one example of a board is evidenced with a red rectangular outline) similar to a 'folder' on a computer. There is a limit of 500 boards and 200000 Pins to be stored for a single account, so it is up to individual choice to establish how generic or focused on a theme each board might be.

A board, once created, can be populated with images that are saved specifically to it so that they are kept in chronological order of insertion and can be browsed at any time by scrolling on the page. Figure 37 shows how the pins are displayed on a board once it is opened, using as example the same board outlined in red in the previous figure.
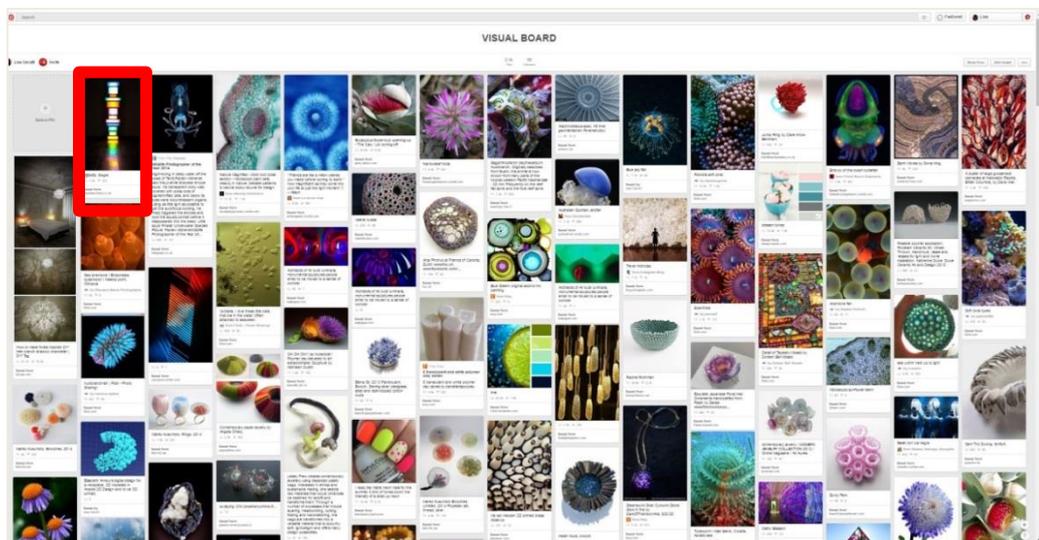
Figure 37 – Content visualisation in a single Pinterest Archive

The images are displayed side by side in a grid view and appear as 'previews'. In the example, the screenshot has been captured with a 50% zoom on the page so that more previews could be visualised at the same time. On a 100% zoom, obviously only half of them will be shown at any time, increasing the need of scrolling to the bottom of the page for visualising more content. This aspect can become problematic, as it will be discussed in section 4.3.3.2 about familiarising with the data.

By selecting any individual Pin, a detailed window with a full-size picture and specific information about it appears. Figure 38 shows the detailed view of

the same Pin outlined in red as an example in Figure 37, with some areas of particular interest highlighted in red.
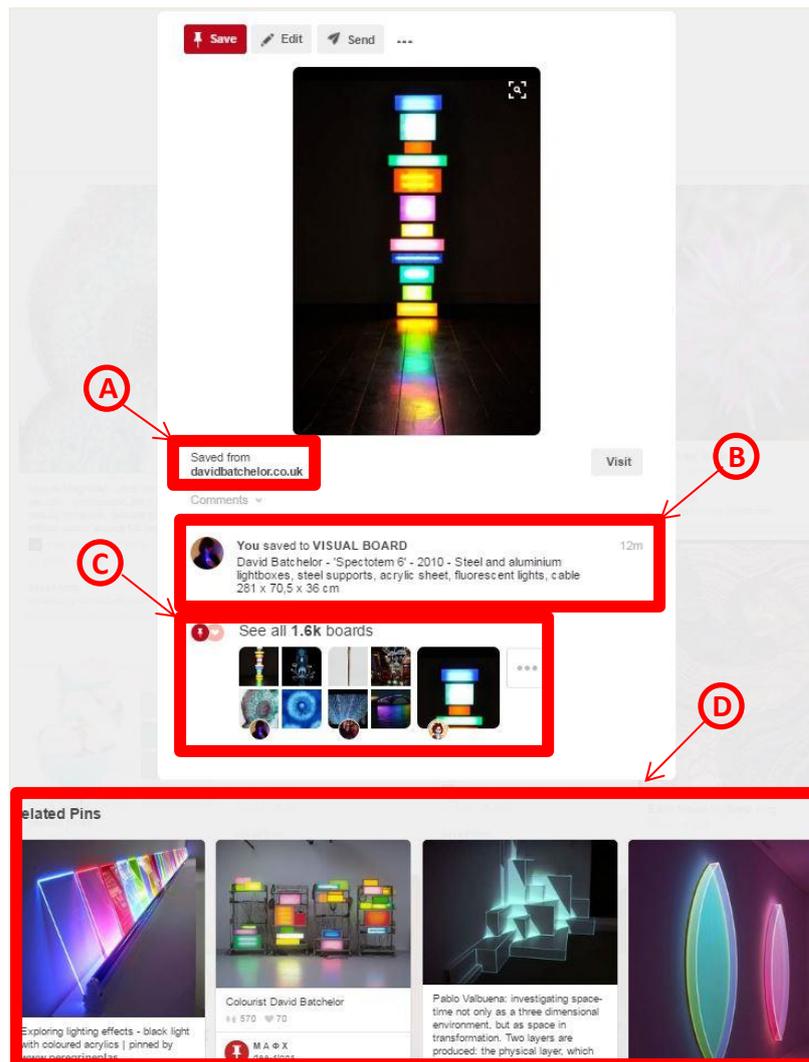
Figure 38 - Detail of a single pin – (David Batchelor (2010) - *Specototem 6*)

This detailed view offers information about the original website from which the image has been captured (rectangle A), and a direct link to it, so that by clicking on the picture a new window will be directed to the original URL. This is useful, provided that the original page remains active and its content the same, for keeping an immediate form of 'bibliographic' reference of the image, that in the case of physical printouts or magazine clippings is often lost or overlooked (in fact, I have hardly recorded such information in the case of the Visual Archives in printed or local-PC format in Stage 1).

A text box is also available for the user's comments and annotations (rectangle B) and I have used it for copying in text form the basic information for

the acknowledgement of the artefact, in order to minimise the loss of this information later, in the case that broken links or change of content would occur on the page. Unfortunately this practice of copying information about the image into the comments box was adopted only at later stage of GVA testing, when I realised that a large quantity of the images saved years before into my Pinterest boards could not be referred back to the origin because links had been removed, the website terminated or the content of the page replaced, such that in many cases it was impossible to recover such information. In next sub-section 4.3.3.2, I will discuss this problem in relation to the choice I had to face regarding information loss or how to treat images of unknown source.

More interestingly, the detailed window of the pin offers direct links to all the Pinterest boards of other users where the same image has been pinned (Rectangle C) and also suggests new images similar or visually related (rectangle D). These last two aspects constitute the real core of using Pinterest for populating image archives, as they are key for increasing the progressive customisation of the images that are offered on the user's main home feed on a daily basis.

In fact, one of Pinterest's strengths stands in its social structure, that is not primarily focused on connecting people, as other social media work, but on connecting the thematic interests that people share. It is very easy to build a personalised network of connections with other 'Pinners' worldwide simply on the basis of common interests. Pinterest users can be 'followed' as it is common in other social networks (so that all updates within the personalised network can be shared by followers), but more interestingly, even single thematic boards can be followed, so that each update on a specific board will be automatically shared with all the people following it.

By increasing the number of boards followed on the same theme, for instance, it will be possible to receive a constant stream of related images, on the basis of the continuous updates on the boards that are followed. In this sense Pinterest can be used as a search multiplier, because by joining the image

searches of millions of people around common themes, the chance to receive on a daily basis new, focused and updated content is exponentially increased.

Building such network of thematic convergence is indeed very easy. It is possible to start by pinning only one image on a new board sourced by a keyword search, and then to start following its trail, exploring the countless boards of other users worldwide where this image has been already pinned (rectangle C), where very likely new interesting images (and web links) on the same theme will be found. By exploring more thematic boards, following an increasing number of them and saving images on one's own boards, the social structure of the personal Pinterest microcosm will progressively take shape. The more this is done purposively (as it has been done by creating the dedicated 'PhD/GVA' Pinterest account strictly focused on the Lighting Wearables theme), the more Pinterest can become an invaluable source for obtaining visual content that is tailored to the visual themes of interest for specific projects.

4.3.3.2 - Familiarising with the data - (Pinterest issues and PC Folders)

If Pinterest has proved to be the ideal tool for improving the process of populating Visual Archives, it has presented strong disadvantages in relation to the immediacy and 'agility' for the direct use of these images in the process of sampling. This was a discovery made, again, at a later stage of GVA development, years after the initial Pinterest boards were created and fully populated. It derived directly by the necessity of using one of these Archives as a case-study for testing the new method. Had I not developed GVA, I would have kept on collecting images on Pinterest boards without realising the practical issues caused by the huge quantity of images stored on an online platform in relation to the need of summarising and making sense of them as a whole, before being able to select a sample from it.

As said in section 4.3.2, a Visual Archive in GVA serves only as an initial 'reference library', from which the images are sampled. In order to develop the right visual sensitivity to guide this selection, it is necessary to re-familiarise with the entire dataset and to get a deeper command of it. As Glaser says:

Professional experience, personal experience, and in depth knowledge of the data in the area understudy truly help in the substantive sensitivity necessary to generate categories and properties, provided the researcher has conceptual ability.(1992)

One matter, in fact, is to regularly search and add more images to a Visual Archive (operation that became exponentially fruitful since the switch to Pinterest); a whole different matter is to 'own' this Archive and to command its entire content, especially when this has been amassed over years and it comprises hundreds of images without any form of internal organisation or retrievability.

In qualitative emergent methods, "familiarising with the data" (Braun & Clarke, 2006) is a phase preparatory to the process of coding, or data analysis in general (Elo & Kingäs, 2008), and making sense of the data as a whole (Tesch, 1990) is obtained by reviewing the material several times, using practical methods such as transcription, in the case of text-based data, to get as close as possible to the entire content before starting to code (Riessman, 1993).

[…] it is vital that you immerse yourself in the data to the extent that you are familiar with the depth and breadth of the content. Immersion involves 'repeated reading' of the data and reading the data in an *active way* – searching for meanings, patterns and so on. It is ideal to read through the entire data set at least once before you begin your coding, as your ideas, identification of possible patterns will be shaped as you read through. (Braun & Clarke, 2006, p. 16)

Reading through the entire data set in GVA, means to review the Visual Archive in its entirety and to get familiar with its content before proceeding with the sampling phase (that, as explained, occurs alongside the coding process). Depending on the size of the Archive, it might be necessary to go through this process more than once.

This is where I faced the first occasion for regretting the abandonment of the 'old school' method of keeping my Visual Archives in print. It is intuitively understandable that a set of physical, printed images, even in the order of hundreds, can be treated like a deck of cards. They can be shuffled, grouped, rearranged and instantaneously spread on any surface (that can be virtually large as an entire room) in order to get an overall sense of them, to start to make connections, or to spot possible incongruences.

When images are digital files in a computer, or, even worse, files stored on a remote server and provided on request, as in the case of Pinterest, things become paradoxically more complex. For their visualisation, digital images depend on the size and resolution of a screen or, in luckier cases, on more than one screen. Compared to the potential spatial expansion of a 'card deck', computer screens constitute a very limited space: apprehension of a set of images at a glance, side by side, in order to make instant connections, rearrangements or comparisons, is limited to just a very few full size at a time; they have to be resized in thumbnail grids of variable size in order to visualise more of them and details get proportionally lost, while all these operations become increasingly time-consuming.

As shown, a Pinterest board displays only a limited number of previews of the images at the same time and, like many other online applications (such as Facebook, Twitter or Instagram, for example), it loads the content on the page according to an 'infinite-scrolling' design, so that new content is dynamically added at the bottom of the page when the scroll bar has reached its lower limit. The most recent content is shown at the top, and the oldest appears towards the bottom of the page. The infinite-scrolling design has the endemic problem of delay in the loading of additional content, especially when there is a considerable quantity of data[53].

In other words, when a Pinterest board contains more images than can be displayed and loaded within the range of the scrolling bar, there are waiting times for more content to be loaded, that are proportional to the quantity of data that are stored into the archive. This can be almost unnoticeable, in case of Pinterest boards containing only dozens of images, but it can take a long time overall, if a board contains hundreds of images, as the operation of scrolling and waiting for additional content to be loaded has to be repeated several times, until the very end of the board is reached.

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[53] There may be also other contributing factors such as the remote server's response, the internet connection speed and the configuration of the browser's cache memory.

When the GVA testing began (2013) the board on Lighting Wearables contained 784 images and, because of the infinite-scrolling issue, it took several minutes to scroll down the Archive to get to the very last image[54] (the first ever saved). This problem was substantially multiplied for all the images contained within the Archive, as it was necessary to wait for the content to be loaded for each operation necessary to switch from the general view of the board, to each single image's detailed view, and then back to the main board preview. I realised it would take me an impossible amount of time to re-visualise all these images and to re-familiarise myself with the entire content of the Archive, so I was compelled to devise an alternative solution.

Moreover, it is still currently impossible in Pinterest to rearrange the order of the images displayed on a board, as they remain in the same chronological order as they are 'pinned' to it. The only option for shuffling, rearranging, grouping or visually connecting them is to find a way around, and to move or copy them into new boards, by reinserting them in the desired order. This is anyway not easy to be done, and this 'desired order' should be known in advance, in order to pick up the right images, in the right succession, while scrolling up and down on a huge Archive with considerable loading times and whose entire content is yet to be mastered. Getting to this mastery was indeed the point from which I was trying to start.

In fact, the 784 images on the Lighting Wearables Pinterest board were collected over the span of years, in countless micro-sessions, where often only one or two images were added at a time. It was almost inevitable to lose command of the entire content of the Archive, or to remember each time exactly which image had already been saved over such a long period of time. When I

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[54] Between 2009 (when I started using Pinterest) and the date of completion of GVA testing (2014) all the technological 'actors and factors' involved in data exchange from and to the internet have strongly evolved, and so has Pinterest. Working with big boards has become more performant than it was two, three or five years ago. The issues about Pinterest responsiveness discussed here are to be framed within the temporal span of GVA development. The solutions devised in 2013 around these issues have since become part of the GVA routine, even though, at present, they might not serve anymore for bypassing performance problems. They still remain in GVA, as they represent methodological steps reinforcing the systematic and iterative routine of collecting and preparing data before the beginning of the analytical process.

completed the familiarisation phase of GVA later on, I realised, in fact, that many images in that Archive were actually duplicates, triplicates or even quadruplicates, and that some were just different views of the same artefact. It was because of the necessity of re-familiarising with the visual data and the Archive that I noticed these problems and I realised the impracticality of relying only on a huge Pinterest repository for directly sampling the images for the analysis performed with GVA.

As much as the method of working with physical copies of the images could have helped in solving this problem (as said before, shuffling, grouping, rearranging and comparing 'cards' is definitely more agile), it seemed unsustainable to go back to the origins and to print out hundreds of pictures of the entire Archive, so I opted for a compromise: maintaining Pinterest only as a 'scouting' platform, and then make a copy of the entire Archive on a local PC folder, where at least some of the visualisation, scrolling and loading issues could be bypassed.
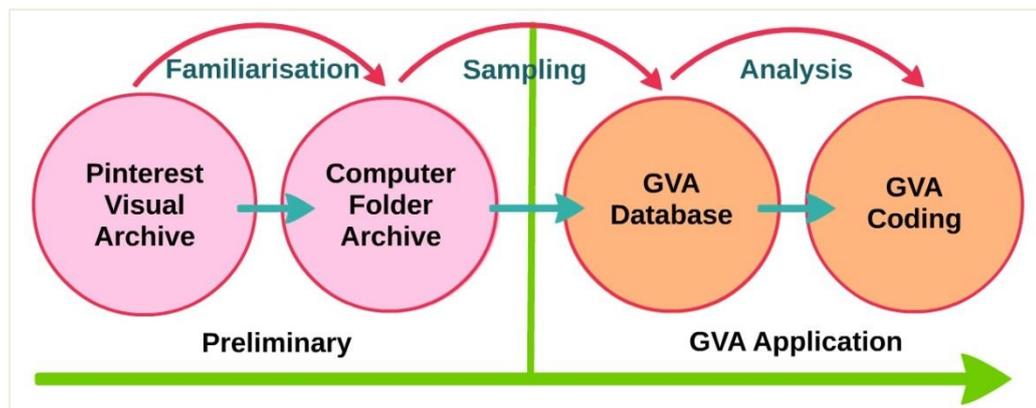
Figure 39 - Role and position in GVA of the Visual Archive and Computer Folder Archive

Figure 39 illustrates the position and role that the Pinterest boards and the copy of the Archive in a PC folder have in the GVA process. They both are preliminary to the GVA sampling and coding phases. Pinterest remains the main platform where the free-collection of images on a thematic and opportunistic basis occurs. When GVA has to be conducted on a desired theme, the content of the corresponding Pinterest board is copied in a local PC folder where, in the process, it is purged of repetitions and incongruences and re-familiarised with, before the core phases of sampling and coding begin.

Unfortunately, I faced another obstacle. In order to create a local copy of a Pinterest board on PC, it was not possible to select the entire board and to copy it in straight away, but this had to be done on the individual images, copying them one by one. This inevitably links back to the initial problem of Pinterest loading and response times. Each image to be copied has to be opened in detailed view on Pinterest, and unless this image appears towards the top of the page (meaning that the image is 'recent'), it is necessary to progressively wait for more previews to be loaded while reaching down the page, then to open the detailed view of the desired image, copy it and save it into the PC folder, return to the main 'previews', scrolling down the page, opening the next image in detailed view, copy and save, go back to the main previews, and so on. This, again, meant an impossible amount of time to be wasted, so I decided to tackle this operation by splitting it in three steps.

The first concentrated on streamlining the operational times for working with the main Archive, so I started to progressively 'depopulate it', by removing groups of images and transferring them into new boards, consisting of a maximum of 50 images each, so that they could be more responsive and instantaneously displayed without delays in scrolling times.
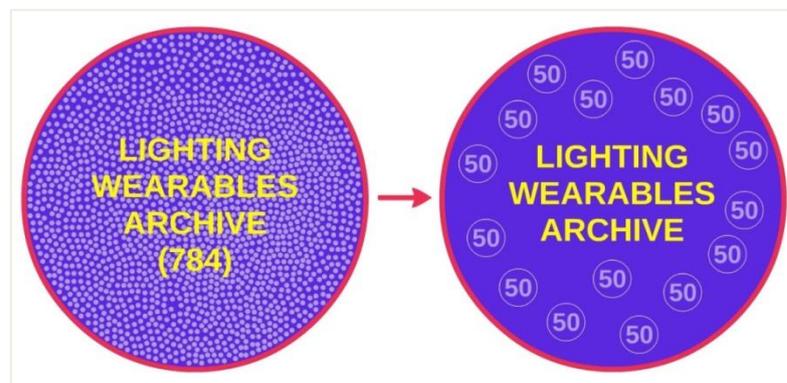
Figure 40 - Step 1 - Migration of images for limiting the size of the Pinterest Archive

This first step is schematised in Figure 40. The Visual Archive on Lighting Wearables was transformed in this way into a series of 16 Pinterest boards of smaller size. By doing this step alone, it was possible to contextually perform a first review of the entire content, and in doing so, to spot the first duplicates or repetitions, where the superfluous images were removed accordingly.

The second step, illustrated below in Figure 41, comprised of focusing on the content of each of the 16 smaller boards, and to check specifically across them for duplicates or repetitions by comparing iteratively the content of the boards two by two and deleting the superfluous images. This allowed me at the same time a second review of the entire Archive and a further round of familiarisation with the data.
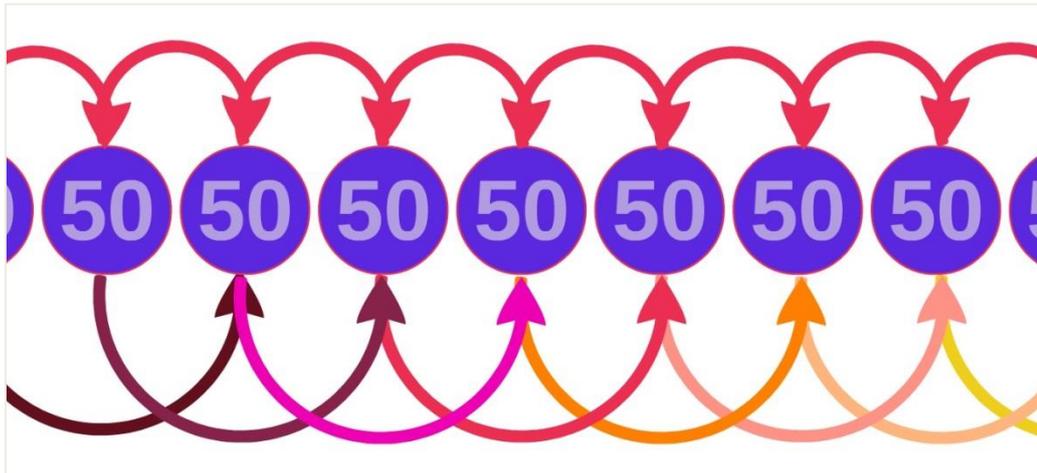
Figure 41 – Step 2 - Comparing board to board and purging from superfluous content.
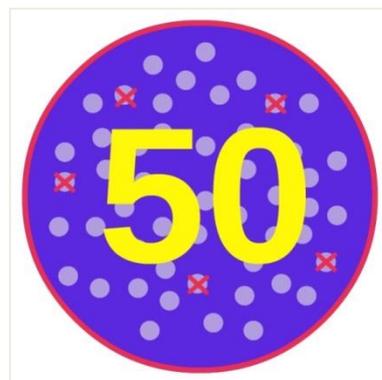
Figure 42 – Step 3 - Checking individual images for correct referencing and purging

The third step, schematised in Figure 42, focused on the individual images within each board, double-checking that the information about each artefact was correct, that the original links to the websites still worked, and making sure to search for alternative sources in case the links were broken (preferably primary sources like the designers' or the companies' websites) and to type this information in the comment box so that it would remain as a crystallised

reference for each artefact at the moment of retrieval (or of later review, in my case).

In many cases the original link and information was still available and correct, but in many others, especially for images saved into the board years before, the links were absent or referred to a different content, such that it was impossible to retrace information about the provenance or paternity of these artefacts.

In all these cases, being the underlying aim of Stage 2 to reach a higher level of academic rigor and transparency in preliminary visual research, I rejected the 'behind closed doors' mentality of the IA, where unknown, unreferenced or untraceable images would be kept and analysed anyway. I tried as much as possible to interpret and embrace the notion of 'fair dealing'[55] with regard to the use for research purposes of copyrighted material. Therefore, in order to avoid grey zones, I opted for removing from the Lighting Wearables archive all the images that could not be referenced or linked back to their original website or sufficiently acknowledged.

This third step, allowed me a closer inspection of each image and a deeper round of familiarisation with the entire Archive, so further purging was performed, spotting remaining duplicates, and removing the untraceable and

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[55] "Fair dealing is a legal term used to establish whether a use of copyright material is lawful or whether it infringes copyright. There is no statutory definition of fair dealing - it will always be a matter of fact, degree and impression in each case. The question to be asked is: how would a fair-minded and honest person have dealt with the work?". (Intellectual Property Office, 2014)

The UK IPO offers some examples falling under the 'fair use' definition: non-commercial research, private study, educational and academic research and criticism, data mining for eliciting patterns, trends and other information. All these cases closely relate to the role of images in this PhD.

However, it has been agreed with my supervisors that, given the conspicuous quantity of images involved in this research, and the freedom of circulation of electronic theses, it would be cautious to protect the database used in this PhD from the possibility of uncontrolled reproduction by third party. Therefore, the original files of the database and the images sampled for GVA have been shared only with supervisors, examiners and staff involved in the evaluation and processing of this PhD. In the versions of this thesis available publicly through the University's library (LMU, 2016) and online via EThOS (The British Library, 2016), the images sampled and analysed are acknowledged in the *Database Visiography* in Appendix B (B-1)*,* and only partially reproduced in thumbnail form, when not part of illustrative screenshots within the thesis, separately referenced in the List of Figures.

unreferenced images. By the time this entire three-steps process ended, the Lighting Wearables archive was reduced to 532 images or unique artefacts.

This three-steps solution is the contingent response to my issue of having accumulated very 'heavy' Pinterest boards without knowing this would later become a problem. It should be clear that this entire three-steps process could be avoided if the Pinterest archives are built at the outset according to these basic features: 1- Limiting the size of the Pinterest boards so they are manageable and, if necessary, create multiple boards on the same theme. (Step 1); 2- Purging the boards from duplicates or repetitions on each 'image hunting' session (Step 2); 3- Check the correct bibliographic reference and web link for each image and type it in the comment box at the moment of retrieval (Step 3).

My three-steps solution allowed me in any case to make a virtue of necessity, because in order to solve a problem I concurrently reviewed the entire archive three times. In fact, by the time I started to copy the images on my PC I had already a good command of the entire content. If the three requirements of manageability, purging and referencing are instead managed from the outset on a session-by-session basis during the preliminary collection stage, it will be necessary to re-familiarise with the data by reviewing the archive as a whole once it is reunited and copied into the computer's folder.

4.3.3.3 - Database (QSR Nvivo®)

Figure 43, shows a screenshot of part of the Lighting Wearables Visual Archive as it appeared once reunited into a Computer folder. It is noticeable that each image has been named with a unique alphanumerical ID, instead of the 'Author-Title' index appearing on Pinterest. This ID has been added in each image's comment box on Pinterest, in order to maintain a close correspondence between the local copy on the PC and the copy on the main Visual Archive online.
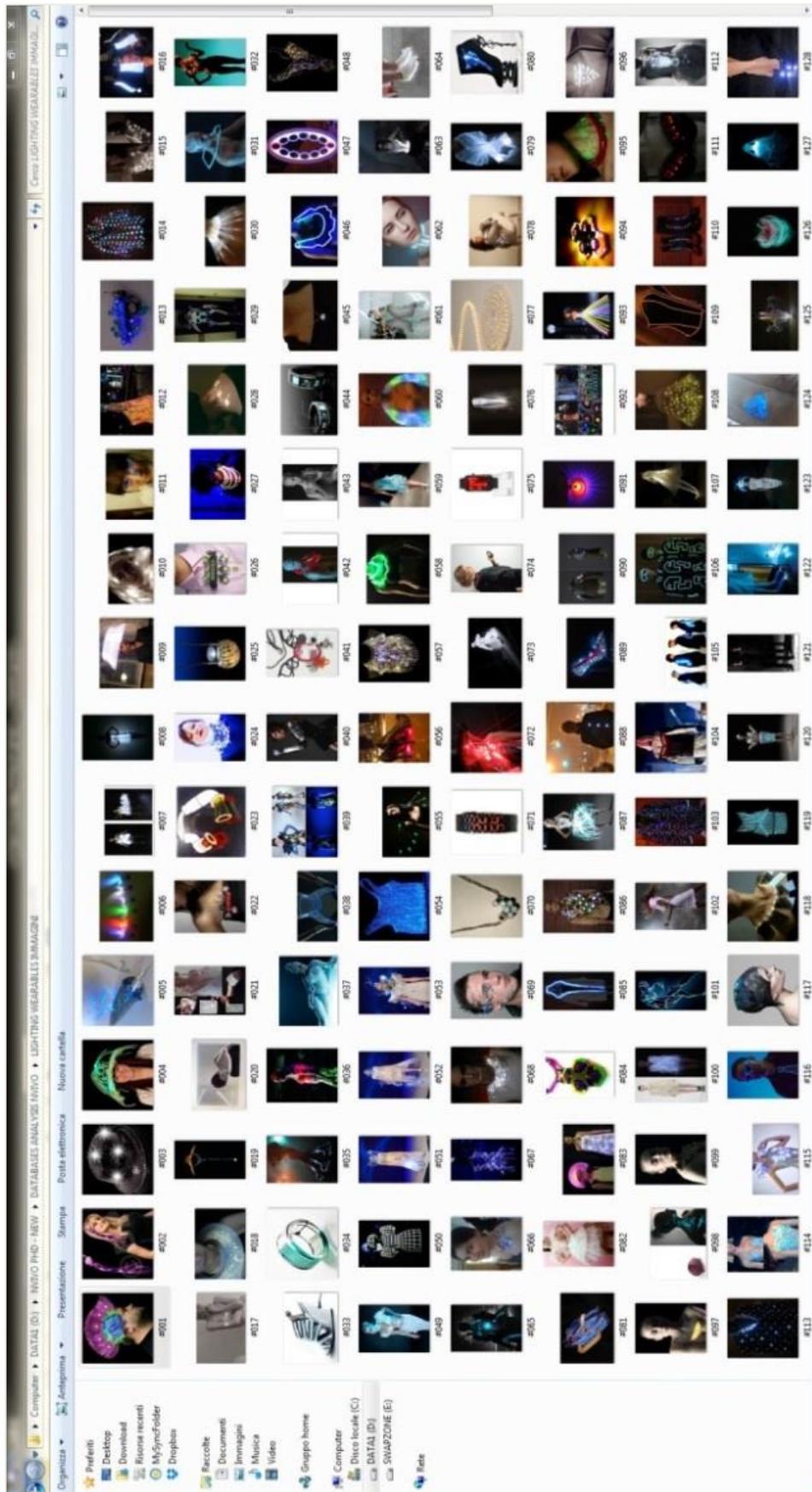
Figure 43 - Lighting Wearables Visual Archive in Computer Folder with #ID codes

The reason for the assignment of this identification code is that, once downloaded from Pinterest, images are named according to their Pinterest filenames that look like this: "3b459998de5ddb0658c9a42ad89adb33.jpg". These very complex names can certainly create problems in maintaining an immediate mental correspondence between the name, and the actual image or artefact depicted in the file. The first, instinctive solution would be to rename the file in the PC folder according to the name of the author and the title of the artwork, as one would do, for instance, for electronic articles.

In fact, I started with this method, but I soon realised that it was not quick and efficient and that, in the long run, I would risk ending up with a big confusion of long filenames, artists' surnames, company names and artworks titles. I had to consider the sheer quantity of images I had to process in the Visual Archive, the numerous iterations that each image would undertake before and during GVA (some of which already occurred during the refamiliarisation and streamlining of the Pinterest Visual Archive), and the fact that these operations would (and did) take months.

I also considered that it would be convenient to devise a system that could be applicable in all circumstances, especially when working on more than one Archive, as it often happens in a design situation, as in the case of Stage 1, where, in fact, the Visual Themes to be analysed were two, New Materials Jewellery, and Lighting Wearables.

The 'Author-Title' naming system is not ideal as it could generate cases of homonymy (for instance, more artefacts of the same author, originally named 'Untitled', as it is often the case). Also, the same artefact could be part of more than one archive (for example, a LED corset could be either stored in a 'Lighting Wearables' *and* in a 'Fashion' Archive) so it is useful to devise an alphanumerical system where each artefact is identified with a unique code, that will identify not only the artefact but also the board where it is saved, and this code will accompany each artefact through all GVA passages, from Pinterest, to the PC folder, to the Nvivo Database and through the numerous iterations of coding and analysis. I opted therefore to name each image/artefact such that, regardless of

how many passages, copies, locations or platforms each file would go through, it would always be clear to which artefact it related.

I have structured the ID codes, with a symbol (or a letter) identifying the archive (for the Lighting Wearable archive, I chose the symbol '#'), followed by a number of three digits identifying each artefact (#001 - #002 - #003 and so on), so that the images, when processed through a database software will maintain the same natural sorting[56] order that corresponds to their order on the Pinterest boards. I found also, as a side benefit of this naming system, that assigning a code to these artefacts has allowed me to further detach from the data, as it has worked as a form of 'anonymisation' of the artworks, that in a subtle way has helped me to refrain from 'self-bias' and to treat them *as if* I would know nothing about them. All this might seem very pedantic, but systematicity, routine and attention to details have been key aspects in the development of GVA, as the sheer quantity of data to be processed has contributed to make the ideation of every passage very complex.

This phase of copying the images from Pinterest to the PC folder and renaming the files substantially signals the threshold between the preparatory phases and the real beginning of GVA, as images from this moment onwards will be organised and treated as a set of data, organised in a *database*.

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[56] Natural sorting, is a form of ordering that is considered to be 'human friendly', where for example the number 2 is recognised as smaller than the number 11, and it will come before in a numerical progression (because humans read the number 11 as a single character, so as bigger number than 2). Computers and software, unless working on 'natural sorting' algorithms, tend to read numerical strings according to ASCII (American Standard Code for Information Interchange) tables, so number 11 will be read as '1 *and* 1', and it will be ordered before 2, because 1 is smaller than 2. This might create issues and confusion when trying to use software for managing big numbers of data as it is possible that they will be ordered in ways that might appear illogical in 'human' terms.
For example, natural sorting on the following numbers will look like: 1, 2, 3, 10, 15, 17, 25, 100, 125, 231, while according to ASCII tables the same numbers will be ordered like this : 1, 10, ,100, 125, 15, 17, 2, 231, 25, 3.
In order to keep a natural sorting order when working with software such as Nvivo (that, unfortunately, sorts numbers according to ASCII tables) it is necessary to 'trick' the software by naming the units of the database, in the case of numbers, with a constant amount of digits so that they will be automatically ordered in the 'right' way. We will use '001' instead of '1' if we plan to insert into the database no more than 999 units, or '0001' instead of '1', if the list might continue up to 9999. For more information about ASCII tables: (ASCII, 2016b) and (ASCII, 2016a)

A database, according to the Merriam-Webster dictionary is "a usually large collection of data organised especially for rapid search and retrieval (as by a computer)" (2016). The important distinction therefore between a collection of data and a database is that the database is an *organised* collection of data. While Visual Archives, Pinterest boards and even the PC folder are just ensembles of images thematically coherent, the images organised into a database allow a series of operations to be performed with them such as tagging, retrieval, focused searches and queries. The mention of computers, or the use of specific software, has to be seen as an advanced and sophisticated form of management of a database, that nevertheless remains *conceptually* an organised set of data, independently from the digital or analogue approach used for its processing.

For organising the large quantity of data present in the Lighting Wearables PC folder into a database, I have chosen Nvivo® (QSR International, 2016), a CAQDAS[57] software designed for supporting qualitative and mixed-methods research. Nvivo (originally called NUD*IST). is based on MySQL, the most popular open-source database management engine (Oracle, 2016), and has the advantage of supporting several formats of data, from text to multimedia files such as images, audio and video.

Nvivo is widely used within the Social Sciences for conducting qualitative analysis and it has been employed in code-based enquiry such as Content Analysis, Thematic Analysis and Grounded Theory studies (Bazeley, 2002; Bringer, Johnston, & Brackenridge, 2004; Crowley, Harre, & Tagg, 2002; Lu & Shulman, 2008; L. Richards, 1999; T. Richards, 2002; Tesch, 1990), and even applied to the use of visual data in Grounded Theory in ethnographic studies

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[57] CAQDAS (Computer-Assisted Qualitative Data Analysis Software) is a generic name for indicating software specifically designed for assisting researchers in the process of qualitative analysis of data. CAQDAS are generally based on RDBMS (Relational Database Management System) engines and are tailor-made for qualitative analysis. The aim of CAQDAS is to streamline the tasks associated with coding, transcribing, retrieving and analysis of data. They do not automatically analyse the data, but they are tools that mechanise the clerical operations that otherwise would be performed manually, and they allow advanced operational levels that would be impossible to perform manually. For more on CAQDAS see: (University of Surrey, 2016).

(Konecki, 2009, 2011), but it has been hardly ever used as an analytical tool for conducting visual research specifically in Art and Design.

The possibility that Nvivo offers to work with multimedia files is generally approached within the Social Sciences as a complementary support and illustration in studies that have textual analysis at their core (Tesch, 1990). Images are seen more as *signifiers* of concepts or behaviours that are represented through, by or in them. The design of the Nvivo workspace itself is clearly conceived around the development of various forms of textual commentary that can go along the images, but that remains the principal communicative and analytical instrument used by researchers.

The tools available within the Nvivo[58] interface for processing or visualising images are obviously minimal, since it is not a software conceived and developed for working with images or pictures, and in the case of the Social Sciences pictures tend to be treated similarly to text, i.e. analysed in portions, highlighted, evaluated and coded in regions (as in the 'line-by line' coding of a text), where significant concepts are seen as being expressed, illustrated or represented within or by the image, and eventually they are re-transformed into text by comments, codes, memos, annotations or observations, which constitute the actual data that are analysed by the researchers. In the case of this research, instead, pictures are not considered for their significance, but as mere depictions of artefacts, and they are apprehended, coded and analysed in their entirety, on the basis of the formal and visual characteristics that they *display* and not for what these characteristics might *mean*.

Nevertheless, the analytical and organisational potential of Nvivo to support image files, to 'tag' them partially or in their entirety, to assign codes

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[58] At the time GVA started to be developed the most updated version of the software was Nvivo 9. By the time GVA was developed and tested, the version used was Nvivo 10.

and to work with them, has brought me to consider a 'lateral'[59] way of adapting its use around the needs of my formal visual research. My approach to the use of this software, the procedure I devised for establishing a routine for the coding sessions and for adapting its functioning to an Art and Design design context will be commented along the practical testing of GVA in Chapter 5. My use of Nvivo has to be seen within the limits and merits that a creative stretch in its use and interpretation represents, and it is, together with the development of GVA, one of the most original aspects of this research.

4.3.4 - Data Coding

A 'code' in GVA corresponds to what in the IA was a *mental keyword*. It is a descriptive word, a label, or "a form of shorthand" (Birks & Mills, 2011, p. 93) that is assigned *in writing*, using a feature that in Nvivo is called a 'node' (essentially, 'a tag'), identifying a significant visual or contextual trait of the artefact, at the same time abstracting it. Even if it has been previously said that in GVA images are analysed in their entirety, and they are not sectioned to be coded in regions, this does not mean that one image will get only one code.

According to Strauss and Corbin, in the process of coding, data are "broken down into discrete parts, closely examined, compared for similarities and differences, and questions are asked about the phenomena as reflected in the data." (1990, p. 62) This, with regard to how images are treated in GVA, means that they are *ideally* broken down in parts, as in a form of 'zooming' onto particular characteristics or visual aspects of them, but they are considered anyway in their entirety.

For instance, 'a brooch' could be the basic GVA unit of analysis, the datum, and it will be evaluated by assigning descriptive 'tags' (e.g., codes) to a

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[59] 'Lateral' here makes reference to the concept of 'lateral thinking', coined and brought to popularity by Edward De Bono (De Bono, 1977) as an indirect and creative approach to problem solving, obtained by re-contextualising and analysing situations from non-conventional perspectives. A typical exercise in lateral thinking is to find alternative uses for objects that tend to be conventionally associated with precise tasks or contexts. A brick, for instance, is associated with construction work, but using it as a paperweight shifts the perspective and re-contextualises the object, so it can be seen as a 'lateral' solution.

series of visual characteristics, on the basis of a series of implicit, or explicit questions that, subjectively, the researcher will pose to him/herself when observing and analysing the brooch. For instance, questions about colour. If the brooch is blue, then the code 'blue' will be assigned to it, and a corresponding node named 'blue' will be created in Nvivo. If the brooch is partly red and partly blue, then the codes 'red' and 'blue' will be both assigned to the same brooch (and the corresponding nodes will be created in Nvivo).

It does not really matter whether it is more blue than red, or if red is just a detail and blue is the main colour. The codes always relate to the (very subjective) questions and answers that the researcher (artist/designer) is implicitly posing in order to describe the artefact, or specific aspects of it. In the example of the brooch, the question might have been: '*what is the colour of this brooch?*'. With this kind of question, the actual brooch might have even ten colours in it, with a different proportional distribution, but, since the underlying question is just: '*what is the colour of this brooch*?', then all ten colours will be equally coded, since they all contribute to describe the colour of the object.

If, instead, the question asked concerns how much each colour 'weights' in the overall colouring of the brooch, then a different question about the proportional value of each colour has to be asked, so that the appropriate codes answering it will be generated. The unit of analysis remains always 'the brooch', no matter what level of precision, generality, or focused detail the questions will tackle.

This example might raise a critique, owing to the fact that I introduced the *category* (colour) before eliciting the *codes* ('blue' and 'red'). According to a general principle in qualitative emergent methodologies, categories represent a higher level of abstraction than codes, so they should emerge in the coding process *after* the initial codes are developed and start to agglomerate. This is one of the aspects where different interpretations of Grounded Theory have caused the split between its founders and generated various undercurrents in its evolution (Kelle, 2005). The apparent contradiction and dichotomy between the real *emergence* of coding from the data and the influence of *theoretical*

sensitivity (pre-extant knowledge and assumptions) in *forcing* their interpretation has brought about different approaches to coding in the attempt to reconcile these diverging concepts (Glaser, 1992; Strauss & Corbin, 1990).

GVA, however, is not Grounded Theory, nor does it pretend to be, and as much as it borrows from it a level of wariness towards preconceived ideas about the data, —so that the real emergence of codes and categories is facilitated—it admits the existence and influence of experiential and tacit knowledge as factors working in the background, constantly influencing the apprehension of visual material. GVA, rather than disowning or working against these forms of extant knowledge and self-bias, encourages their acknowledgment and *explicitation* through reflection during coding and analysis.

The entire point of conducting visual analysis on a theme with GVA is to reveal the subjective apprehension that the researcher has about it, so that the level of awareness acquired about it might be cyclically poured back into the analysis, increasing the depth and richness of the results obtained.

The process of coding, in Grounded Theory, has two procedures at its core, the *making of comparisons* and the *asking of questions* (Strauss & Corbin, 1990, p. 62). This applies as well to GVA, since the questions initially asked drive the initial open coding, then, additional rounds of more focused coding are driven both by developing new questions and by the comparison between more data and their codes, cyclically. It is possible, given the visual nature of the data, that some form of preconceived knowledge about certain categories could be inescapable at the outset of the coding process (such as colour, indeed, a descriptive category applicable to practically any artefact) and that these categories result to be embedded in the same initial questions, as in the hypothetical case of the blue-red brooch.

In relation to this, and in order to illustrate how the 'subjective explicitness' of GVA takes effect even at this very basic level of initial coding, I will propose a comparison with the IA, using again the example of the imaginary red-blue brooch. In the IA, the brooch would be evaluated 'at a glance'; 'red' and 'blue' would be instantly recognised as keywords for describing the colour; a

mental note would be made in regards to these two colours; then the brooch would be dismissed. No further question or reflection would be spent on it. It would be through the accumulation and intuitive scoring of more mental notes about more colours in more artefacts, that a 'general sense' of the colouring within a thematic group or artefacts would be obtained. It is possible, or even likely, that this 'sense' may even be 'correct' (in relation to the hypothetical results of a systematic study about it); nevertheless, it will remain a tacit and vague 'sense', not clearly retraceable, not clearly communicable, without much depth or richness in its traits.

In GVA, codes are assigned *in writing*. This is because each code becomes in Nvivo a node, and each node has to be named. This creates the immediate necessity to select the most appropriate word for naming the node, and this trivial fact alone starts immediately a reflective chain reaction: an *idea* for a code/node is open and generic while finding a *word* for a code/node is sharp and specific. Searching for a word to name a node, springs automatic reflections on the hierarchical level that this node might have in relation to other nodes that will be generated when coding further artefacts. This means to choose which level of uniqueness or 'reusability' the word will have, when more artefacts will be compared and questioned against it.

For example, even simple words like 'blue' or 'red' in GVA will be questioned in terms of their level of specificity and inclusiveness. By looking at the red-blue brooch, in GVA one might question whether the word 'blue' is suitable as it is, or if it would be better to go deeper and choose more specific words such as 'Cerulean', instead. This is because the necessity to assign a specific word for naming a node could force a reflection on the fact that the brooch is not *just* blue, but actually Cerulean blue.

This might lead to further questioning on which coding strategy to adopt in this case: ignoring all subtleties and naming the node simply as 'blue' and then coding to the 'blue' node any other artefact being 'more or less' blue? Or creating both 'blue' and 'cerulean' nodes and immediately starting a parent/child node hierarchy? Or ditching altogether the 'blue' code as too generic and using

only various specifications at the same hierarchical level? These choices about a strategy for coding 'blue' will inevitably reflect on the subsequent coding for 'red' and for all the colours for the objects that will be analysed later. This way of reasoning will progressively stimulate to 'see' aspects that without being forced in choosing a precise and specific coding strategy would remain only 'vaguely' felt. The codes, their emergence and progression, in this way, could be seen as a crystallised and explicit trail of this growth in reasoning.

This process works in two ways, as GVA demands to pay closer attention to the analysis and being specific in assigning the codes, and this specificity, in turn, stimulates the development of visual sensitivity, which feeds back into a deeper and sharper capacity to observe, analyse and 'see' into the analysis itself. This will be clearly demonstrated in Chapter 5, where all the passages of the initial coding of the Visual Archive on Lighting Wearables will be openly disclosed and illustrated step by step, evidencing the contextual growth of my visual sensitivity, and the consequent emergence of a deeper level of insight, analysis and awareness about the implicit assumptions that would otherwise remain unknown.

4.4 - Conclusions

In this chapter I have illustrated the genesis of Grounded Visual Analysis (GVA), the method designed for tackling the problems which emerged in Stage 1 from the conduction of preliminary visual analysis using the IA.

Some of the procedures of Grounded Theory, as presented in Chapter 3, have been compared and contrasted to similar traits retraced in the procedures of the IA, and on the basis of their applicability, they have been translated, adapted and adjusted to suit the analysis of visual data, becoming the structural backbone of the new GVA method.

This chapter has presented these structural aspects from a theoretical perspective, discussing Visual Sensitivity, approaches to image collection, sampling and management of visual data and progressively moving towards

aspects more grounded in practice such as the migration of the Visual Archives in digital format, their reorganisation into databases and the implications of the choices in coding strategies for the development of hierarchical node structures and the possible results of data analysis.

As announced in the introduction to this chapter, Chapters 4 and 5 go hand in hand in presenting the new method, so the next chapter will continue the discussion by bringing it even closer to practice, illustrating the application and testing of the GVA method on a case-study. The procedural and theoretical aspects presented in this chapter will be discussed through a commentary that will follow step by step the reiteration of the analysis of the Visual Archive on Lighting Wearables using GVA. New aspects of the method will emerge, and more technical and theoretical considerations will be drawn from the close observation of the development of the analytical procedure.

STAGE 2 – GVA DEVELOPMENT

CHAPTER 5 - STAGE 2 – GVA APPLICATION

Introduction

This chapter will continue the illustration of GVA provided in Chapter 4, by moving the discussion into practice, the 'theoretical practice' of systematically applying the new GVA method for the visual analysis of a database, as opposed to the 'practical practice' of jewellery-making of Stage 1.

The Visual Archive on Lighting Wearables will be used as a case-study, and the analysis will be reiterated using GVA, in order to test the method, to comment and reflect on its application and to have a known term of comparison with regard to the results obtained with the IA, represented by the final criteria for the development of the design brief (Table 1 p.96).

The discussion will follow the dilemmas and decisions which unfolded in terms of data insertion into the database, strategies for sampling the images, practical procedures for creating a systematic routine for the repetition of the analytical passages, the generation of the initial codes, their hierarchical structuring and re-structuring, the emergence of categories, sub-categories and the retroactive effects of the iterative progression of the analysis, until the point of final saturation.

However, the discussion will not progress to evaluating how the results of the analysis performed with GVA might be interrogated, recombined or interpreted for the development of the subsequent stages of the design process (i.e.: developing new design briefs) as this, as previously stated, is outside the remit of this PhD, which is focused on the development and testing of a new method for conducting preliminary visual research. The chapter will offer however the suggestion that these results might become part of a more extended research project, and a possible avenue for further research (presented in section 6.3).

The chapter will demonstrate and offer insights on how a more systematic approach in conducting preliminary visual research has not only provided a wealth of analytical results that are grounded in the visual data and respond to the necessity of achieving a higher standard of academic rigor, but

has disclosed and tapped into the tacit dimension of implicit and subjective assumptions underlying visual analysis and to make them explicit. GVA has served to reveal unexplored depths in the visual data and to expand the possibilities that an enhanced Visual Sensitivity might reflect into the development of new design ideas and practice.

5.1 - The coding approach

Even though Nvivo is a software mainly used for qualitative analysis of text-based data, it offers sufficient tools and features that can be reinterpreted for conducting visual research in an Art and Design context. There are complex layers of depth in its use, certainly more than I have deployed for the development of GVA. Many features, especially in the analytical phase (such as the use of classification sheets for sources or nodes) have been tested initially in order to familiarise with the software, but not all of them have been implemented in the GVA procedure, because they proved to be problematic to adapt to the quality and quantity of my data. Others, that instead could have facilitated the processing of visual material (such as image visualisation tools, or multi-window features) were unfortunately missing in the software and required adaptive detours in order to reach the desired results, such as a combined use of Nvivo and manual datasheets for streamlining the advancement of the coding sessions, or the implementation of multiple screens for visualising the images in full-resolution and working with Nvivo at the same time.

The next sub-sections will briefly illustrate the initial attempts to approach the software, my dilemmas in developing an effective coding strategy and some reflections concerning the initial sample of data before launching into the practical coding with GVA.

5.1.1 - Experimenting with Nvivo

Different approaches to coding had to be tested in order to devise a solution that would fit the quality and quantity of the data contained in the Lighting Wearables Visual Archive. Nvivo offers a number of functionalities for

data coding that can be structured and organised in different ways. The examples that can be found in the literature illustrating its use on practical cases come, almost exclusively, from Social Science studies (Bazeley & Jackson, 2013; Beekhuyzen, Nielsen, & von Hellens, 2010; Gilbert, 2002; Hoover & Koerber, 2011; Ozkan, 2004; Rich & Patashnick, 2002; Wong, 2008), and it is extremely difficult to imagine a parallelism between the use of the software in studies based on textual data and visual data that would achieve a faithful application, or translation of each passage or element, in a visual context.

As much as I tried to use these studies as guidelines, it has been through 'tinkering' with the software and trying various approaches that I eventually came up with the GVA procedure. I experimented with different coding strategies using a test-sample of 20 images that I coded in different ways in separate mini-projects (coding by nodes, coding by attribute values, using classification sheets for sources, then for nodes, etc.), where I also tested different forms of hierarchical organisation of the codes, performed queries and tested the visualisation tools that Nvivo offers for evaluating the analytical results.
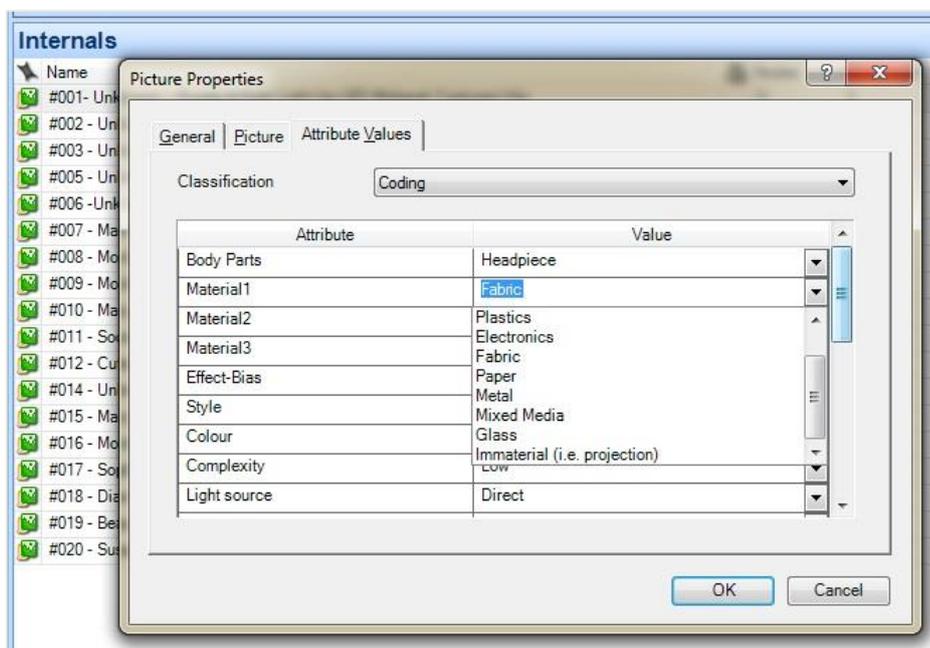
Figure 44 – Coding by attribute values - Mini-project

Figure 44 shows a screenshot of the Nvivo interface during one of the mini-projects, testing a *Coding by attribute values* approach, where I used the *Classification*s feature and I organised the different 'keywords/codes' of the main categories as *attributes*, and the descriptive codes as their *values*.

In this way, all the attributes and values are found directly in the 'Picture Properties' window for each *Internal* (each imported image, in my case) and it is possible to select the *value* corresponding to each *attribute* from a drop-down menu and very quickly assign the codes to the image.

However, this approach needed an immediate workaround because of the impossibility in Nvivo of performing multiple selections in the same drop-down menu and to assign more than one value per attribute. In my case, it was evident that categories such as *Materials* would need multiple codes/values for the same artefact. As it is shown in Figure 44, I attempted to bypass this issue by creating more than one attribute for the same category, naming them *Material 1*, *Material 2* and *Material 3* (implicitly deciding to limit the number of materials classified per each artefact), so that I could assign a different material (value) from each drop-down menu for the same artefact.

This solution seemed to resolve the problem, but when I attempted to obtain some statistical results from my analysis by performing queries or generating diagrams, I discovered that there were many incongruences, since Nvivo obviously considered each 'repetition' of the same attribute as a separate entity. I tried also to change the organisational strategy in the design of the Classification sheet, for example by reinterpreting each material as an *attribute*, with boolean *values* ('yes/no') in the drop-down menus. This approach proved to be even more convoluted, especially considering the predictable proliferation of codes (and the management of the hierarchical structure of parent/child nodes), so it was eventually abandoned.

In the context of this PhD, it is not relevant to perform such queries or to evaluate the *content* of the analytical results—being the focus of the enquiry the development and testing of the method—however, on the basis of such content, GVA can be used as a *design tool* in the wider perspective of the design process,

in order to develop new design briefs. It is thus important to devise an efficient coding strategy permitting the interrogation of results.

I eventually opted for a *Coding by nodes* approach, after testing it in a new mini-project on the same sample of 20 images. With this approach, for each new code elicited from the data analysed, a new node is generated in Nvivo. With the progression of coding, the nodes can be hierarchically organised in parent/child relationships and each time a new image is coded, the entire list of nodes previously generated can be browsed in order to code the image accordingly. Queries, matrix queries, tables and various forms of diagrams and visualisations can be produced for interrogating the data and the results are coherent with the effective distribution of the codes, categories and artefacts analysed (some tests and examples of diagrams and visualisations extracted from the analytical results of the entire database are available in Appendix B-8).

Figure 45 shows one screenshot of the Nvivo interface, where it is possible to notice that each node appears in relation to the hierarchical structure of the node-tree and in correspondence to its category. Each node has a tick box that can be checked separately, so that multiple selections can be performed. Each time an image has been coded, it is always possible to add, modify, or review the nodes assigned to it via a number of internal features in Nvivo. This is an iterative process that occurred hundreds of times during the analysis of the entire database. This method has proved to be particularly useful during the coding sessions, because it has allowed me to review the entire node structure every time a new image has been coded, thus reinforcing the iterative nature of the GVA process. Considering that the analysis of an entire database of hundreds of images can span over weeks or months, it is useful to maintain constant familiarity with the data and the codes already generated.
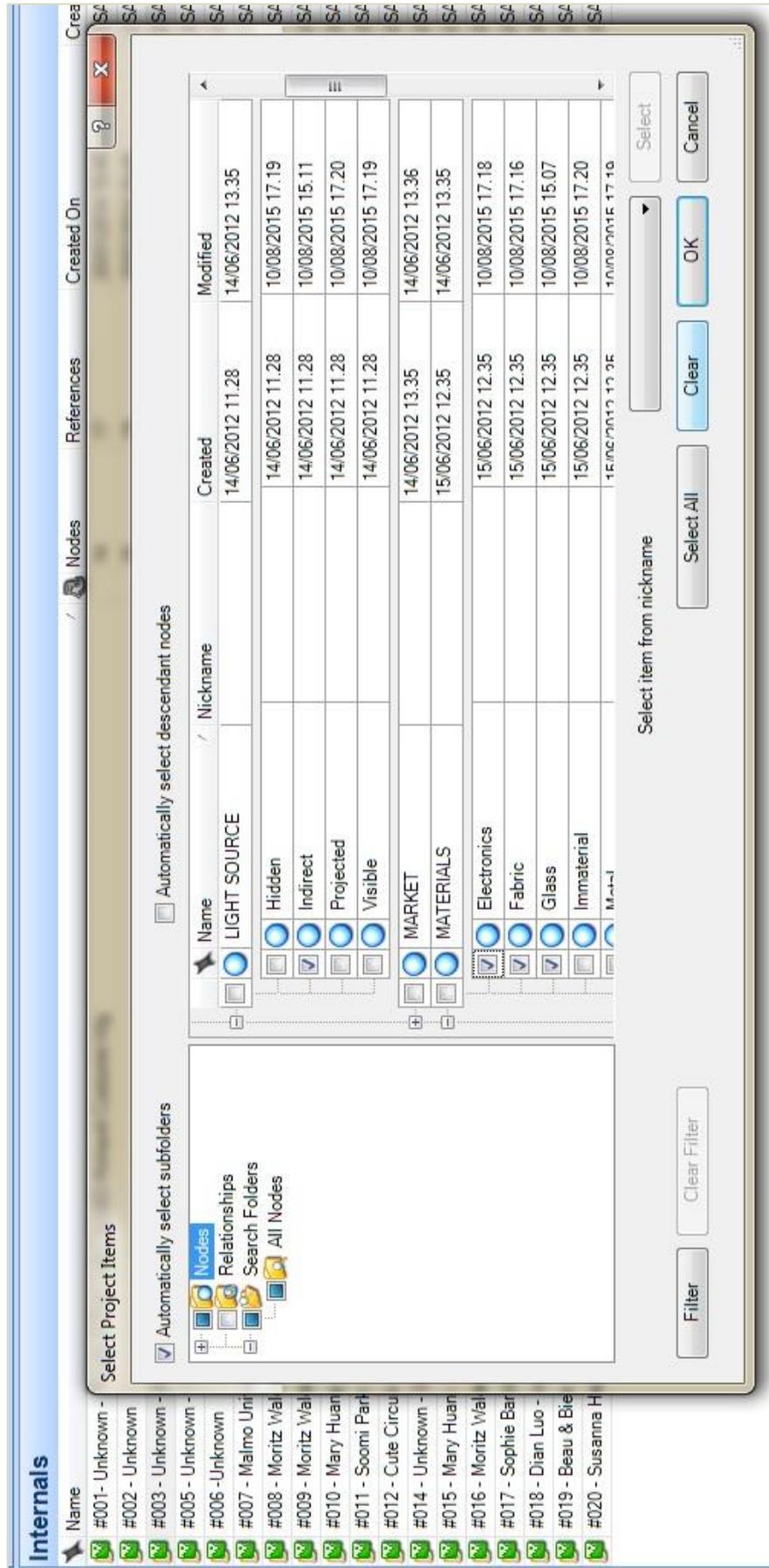
Figure 45 - Coding by nodes - Mini-project

5.1.2 - Sampling and coding strategies

The first aspect I considered before starting to import the images from the PC folder into the software was whether all the 536 images in the PC archive would be necessary to perform the analysis and get to a point of saturation in the distribution and depth of the emerging codes and categories.

After some initial experiments, I realised that I could not predict how many images would be needed for reaching a saturation of the codes and categories, and that inserting them all in Nvivo at the outset would not only be a very time-consuming operation, but it could confuse further the procedure, in the event that only a part of them would eventually be analysed.

Another question I posed myself immediately before starting to code concerned the size of the initial sample and whether it was to be coded *vertically*, (one artefact at a time and then moving onto the next) or *horizontally* (coding a group of images on different visual aspects across all of them and moving up in layers). In both cases the process would be cyclical, but the level of capillarity in the iterations and the focus on each artefact would be different. I had no experience in coding, except for the experiments with the mini-projects and a theoretical knowledge I gathered by studying qualitative analysis literature.

I realised that in Stage 1 the intuitive analysis of the Visual Archive consisted of a horizontal approach (schematised in Figure 46) in which I started with a tacit set of general criteria (Categories, in the Figure) and I 'interrogated' all the images in the Visual Archive in parallel, searching for correspondence to each criterion across the entire Archive, and keeping a mental score of how many images conformed to the criteria. Images were evaluated through a cumulative overview, as an ensemble.
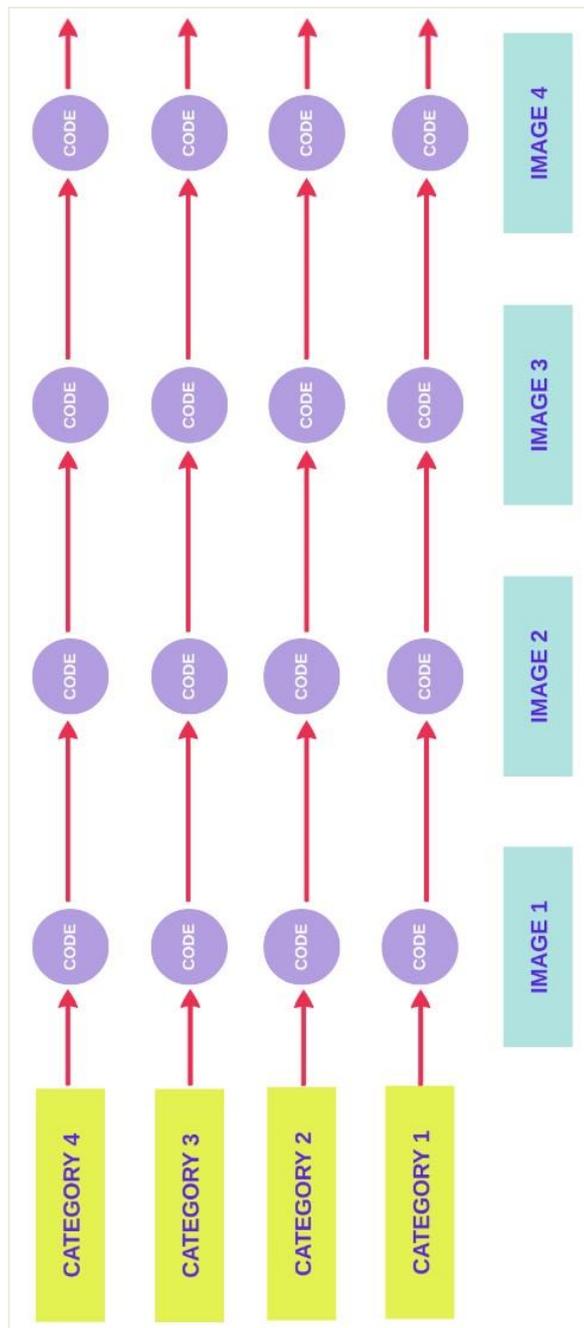
Figure 46 - Schematic of horizontal coding approach

The mini-projects experimenting with GVA and Nvivo, were instead approached vertically (schematised in Figure 47) since either the *coding by attribute values* and the *coding by nodes* implied an analytical process that 'interrogated' each image one by one, on the basis of extant categories (the Criteria derived from Stage 1 and the IA).
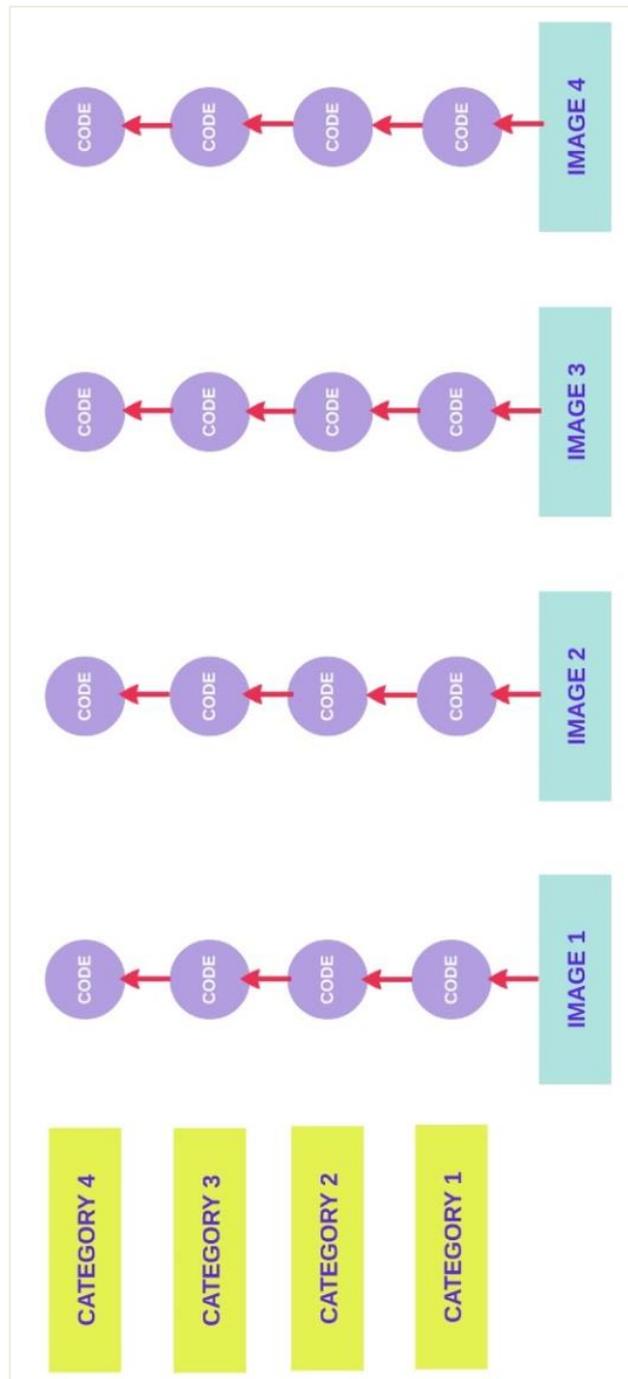
Figure 47 - Schematic of vertical coding approach

This vertical approach was 'felt' as a more advanced procedure because the codes were fixed in writing, and because the use of a software package gave me a sense of tidiness and structure, which was, though, only a 'nicer dress' on an approach to coding still strongly rooted on the implicit assumptions derived from the IA. Overall, it did not represent a real shift in the way the analysis was performed. Still, it was a small step forward, since it implied an attempt at systematising the coding passages, bringing closer attention to each of the

images, and making clearer decisions about the codes to be assigned, as they had to be verbalised and transformed into concrete Nvivo nodes.

By the time I finalised the theoretical structure of GVA, however, having deepened my understanding of the general approach to the process of coding of Grounded Theory, I understood that I could not start to test GVA using the criteria elicited in the IA, as it would be a contradiction to the principle of emergence of the codes.

I had to be wary of the risk of *implicitly* reassigning the same codes brought forward from the IA, so I decided to tackle GVA very slowly and reflectively, concentrating on the reasoning underlying each passage, rather than on the mere result of generating codes, or their content. As Lighting Wearables was the same visual theme analysed with the IA, I assumed that it would be inevitable to come up with a range of codes similar or, possibly, even identical to the criteria elicited with the IA, but I established for myself the rule of accepting these same codes, if they emerged, as long as they could be genuinely traced and linked back to the object/image analysed in the moment of the analysis, and not as a residuals brought forward from my extant knowledge.

I also determined to proceed *as if* I had never seen each image before, in order to maintain closeness to it by dedicating more time to its evaluation, as opposed to the 'quick glance' of the IA, but to distance myself from my own preconceptions by questioning every code elicited, and to remain "entirely open", as Glaser suggests (Glaser, 1992, p. 38).

I finally decided that, in order to apply the maximum attention to every analytical step, my initial sample would consist of only *one* image. I chose to start from the first image saved in the PC folder (image #001[1]), as a way to eliminate any doubt on possible hidden agendas in this selection, and then to proceed with further images in their order of insertion into the PC archive, until the

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[1] See the *Database Visiography* in Appendix B-1 for a quick reference of the images in thumbnail form (or the memory stick (for the examiners) for the original image files).

spontaneous emergence of codes would 'get into gear' and start driving the selection of new samples.
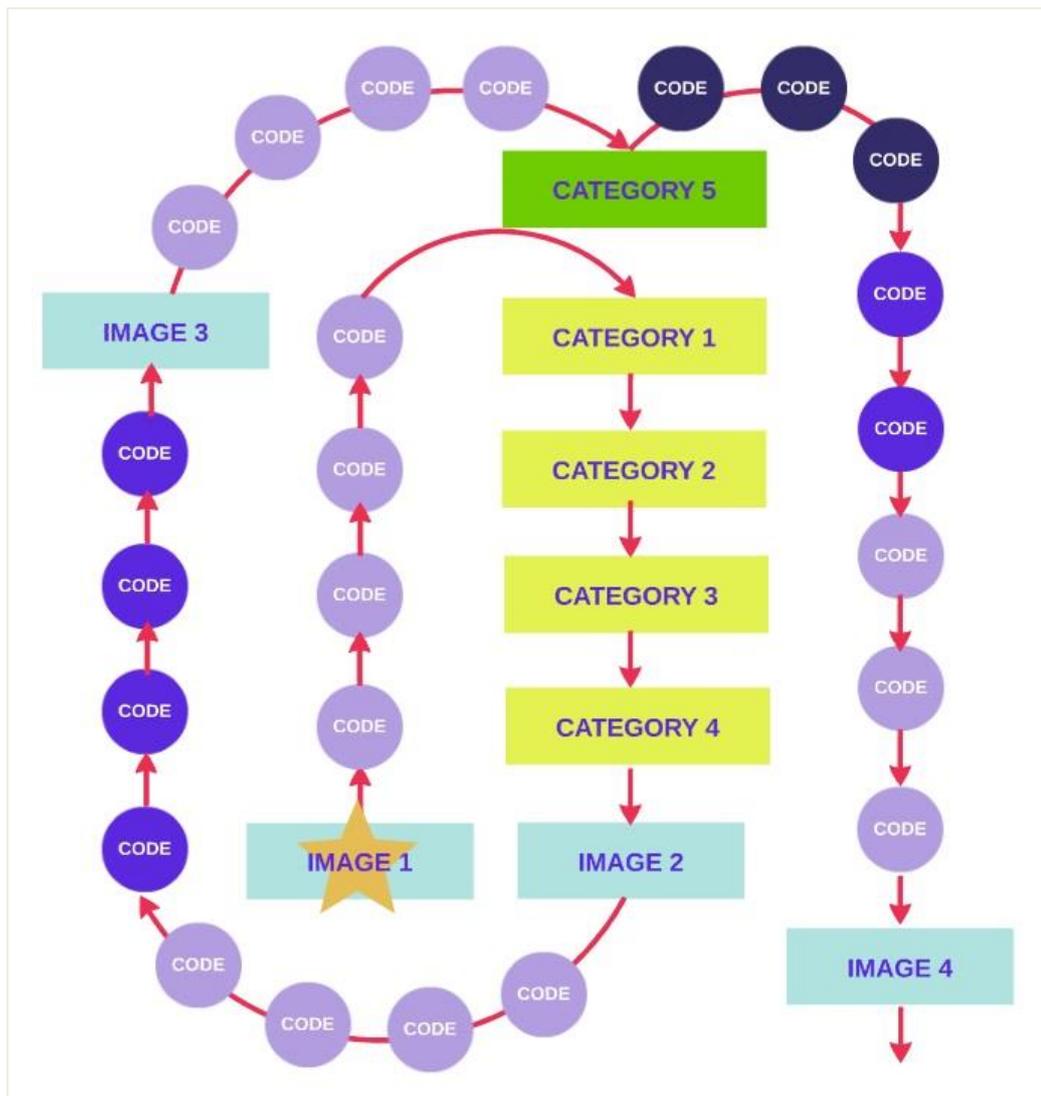
Figure 48 - Schematic of the GVA coding approach.

Figure 48 attempts to schematise the GVA approach by illustrating the spiral-like structure of the process. It is a vertical approach, since it proceeds from one image to the next, but it moves circularly and iteratively, and it expands by accumulating the effects of the various iterations. The analytical process starts ideally from the first image (marked with a star in Figure 48): initial codes are generated (lilac circles), and retroactively interrogated in order to discover the categories at their basis; then a second image is sourced and more codes are elicited, of which some pertain to the extant categories, and some new codes might emerge (cobalt blue in the Figure); than a third image is coded for existing

categories but a new category might emerge (category 5 in the Figure), which will cause the elicitation of new codes (dark blue circles in the Figure) and so on in an expanding coding process.

5.2 - Initial codes generation

I imported in Nvivo image #001 and, after completing the routine operations of compiling the Picture Properties box and compressing the image file, I observed the image in its full resolution (from the PC folder) keeping it opened on a second screen, with the Nvivo interface available on the main one. I immediately created an annotation window in Nvivo by selecting a random area on the image (a workaround to the Nvivo interface) and I started by asking myself the basic question '*how could I describe it?*'. I then wrote in the annotation space the descriptive keywords freely emerging, as if in a 'personal brainstorming' session, attempting to list all the visual aspects of the image that I perceived as relevant to the 'Lighting Wearables' theme.
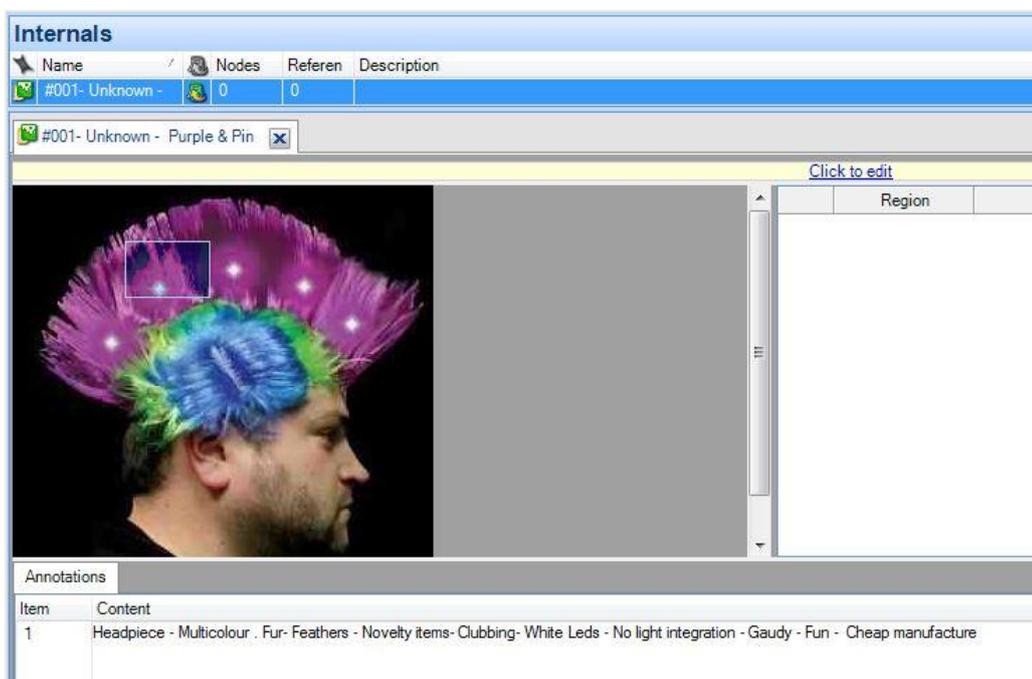
Figure 49 - Image #001 with initial codes

Figure 49 shows a screenshot of Image #001 with the annotation listing the initial descriptive keywords elicited from it. Considering the quantity of images in the Lighting Wearables archive—and the idea that whatever procedure

I would establish for the first image, it would be necessarily re-applied to all other images—I tried to be as synthetic as possible and to list only the terms that could quickly crystallise for me the most evident characteristics of the artefact.

The first codes I assigned were:

Headpiece – Multicolour – Fur – Feathers – Novelty Items – Clubbing – White LEDs – No light integration – Gaudy – Fun – Cheap Manufacture

I immediately generated a node in Nvivo for each code, and I also created a memo[2] for each of them, in order to crystallise at the moment of creation my thoughts about the idea behind each code, explaining what the chosen keyword/tag meant to include, as a future reference to myself in case I would need to be reminded of the meaning I wanted to confer to a particular label in the moment I created the node.

Figure 50 shows the initial 11 nodes generated in Nvivo, corresponding to the first coding session for image #001.

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[2] With the progression of the analysis and the exponential growth of the number of emerging codes, not each code has been associated with a memo, since this part of the procedure slowed the process significantly and most codes/nodes were self-explanatory to me only by the choice of their label. I generated memos for each code where it was necessary to clarify doubts, or to establish specific 'nuances' for the code meaning, Memos have also been used for keeping track of the coding progression and as an annotation tool for recording thoughts or issues about the development of the method itself (See Appendix B-3 for a transcription of the 'Coding Timeline' memo).

Figure 50 - Initial node structure after coding image #001

As soon as I started to compile the first memos describing the ideas behind the initial codes, I realised that these codes (as anticipated in Section 4.3.4, p.193, with the blue/red brooch example) were in reality the answers to a series of implicit questions, that were in fact one step more specific than the generic question: '*how could I describe it?*' that I thought I was answering when I created them.

To clarify this point, I will discuss individually these initial codes with regard to their underlying questions, by adding some observations deriving from the present awareness about them, *after* the entire GVA process has been completed. This should help to introduce the 'revealing' nature of GVA (that will become clearer throughout the chapter), illustrating how the process started from a total absence of awareness about many aspects underlying the codes and their implications (similarly to the IA), but it ended with a higher level of clarity and explicitness about them that I am now able to retrace, share and comment.

The code *Headpiece* answered a question about the place on the body where the artefact would be worn. It is interesting to notice that the object I called 'headpiece' is actually a wig. This means that I chose to generalise this code to the more abstract 'place on the body' (head), rather than choosing a specific code for it as a product (wig), to be worn on the head. At the time I obviously knew the object was a wig. Still, this choice in coding has implications that were not perceived at the moment. Had I chosen to code the artefact as

Wig, considering its product descriptor, I would have set a different coding strategy, attuned to this level of specificity, so that more objects analysed later, such as, for instance, tiaras, crowns or hats (all worn on the head), would have been necessarily coded to that same hierarchical level. The awareness about the possibility of choosing other coding strategies, leading to different levels of coding and their implications was absolutely not present when this keyword was assigned. In other words, I applied a precise coding strategy, without being aware of having done so.

The code *Multicolour* answered a generic question about the colouring of the artefact. Again, in the choice of this code it is possible to see another implicit choice between two different coding strategies: the wig has in reality three colours (blue, green and pink) but the *Multicolour* code groups them into a generic ensemble. I could have listed these colours individually as they are most evident for describing this artefact. Still, I did not create *Pink*, *Green* and *Blue* nodes. This means that not only did I chose to code for a non-specific hierarchical structure (like in the previous case of the wig/headpiece), but that I implicitly chose also not to give importance to the role of specific colours and to dismiss them by assigning a generic term. This choice is likely motivated by the fact that I am (now) aware that, at the time of coding, I knew that the colours of the artefact would be less important to me than other factors regarding the information I wanted to obtain on the use of Lighting from this analysis. This could also be seen as a residual influence brought forward from the previous analysis conducted with the IA, where the colouring of the artefact had been already implicitly evaluated as less relevant, that, regardless of my intentions and precautions, I could not escape

The codes *Fur* and *Feathers* answered questions about the constructive materials of the artefact. Other materials were indeed present, *structurally* constructing the artefact (such as fabric, in this case) but I coded only the ones that were *visually* evident. This distinction was not perceived as well, at the time, but it can be highlighted and commented upon now, because across the analysis of the   entire database I have faced more situations where the structural-

constructive materials came to the foreground and forced me to create a new specific category of codes, and as a consequence to go back and recode all the previous artefacts where the structural materials (visually less relevant) had been dismissed. So, in retrospect, the structural-constructive aspects became evident also for objects previously coded only for materials visually constructive.

The codes *Novelty Items* and *Clubbing* responded to a question about the context, or the hypothetical market of appurtenance of the artefact. I could not clearly define a threshold between the two markets, as they often overlap. Many artefacts analysed subsequently were indeed problematic to position in this respect, because I had no certain information about their real market or ambit. In these cases, I assigned a code corresponding to my perception of a probable market, on the basis of aesthetic similarities (quality of construction, design) with other artefacts already coded belonging to known markets. Still, there have been cases where this has been misleading (as, for instance, for artefact #011 that aesthetically and constructively was perceived to be a Novelty Item, but instead belonged to the Wearable Tech market, or for artefacts #056, #080 and #089, all again perceived as Novelty or Clubbing Items, but belonging to the market of Fashion). In these cases, the 'discovery' of the true market of appurtenance depended on the bibliographical retracing of each image, thus on factors depending on the context in which each object was displayed, more than on purely formal qualities of the object *per se* (and this refers back to a similar discourse about the 'Jewelleryworld' presented in Section 2.3.1, p.40). However, it is clear to me (now) that this category of market was, again, considered as less relevant in terms of the importance of the results I expected to obtain from the analysis, and for this reason I unconsciously dedicated a minor level of attention and precision in assigning to the codes within this category.

The codes *White LEDs* and *No light integration* were referred to the lighting element, even though they concerned two different aspects of light. The code *White LEDs*, in fact, encloses simultaneously the answers to two questions: one, about the source of lighting and the second, about the resulting light colour (not perceived at the time as distinct, so that a single code was assigned for

both). *No light integration* instead answers a question about how this light was included, design-wise, within the object. As it will be clearer through the further progression of the coding, a more complex network of codes, categories and sub-categories emerged around the lighting element, and this is one of the most evident demonstrations of the increased richness and depth that the application of GVA has provided as a result, compared to the very few categories (criteria) elicited for the lighting element in the IA.

The codes *Gaudy* and *Fun* answered questions about the 'taste' and the 'style' that the object was subjectively perceived to portray. I never clearly managed to separate these two concepts, as I felt them as merging and overlapping every time I had to code an artefact, so I eventually kept them together as a unique category. It became progressively evident that this category was more 'introspectively' relevant than 'design' relevant. It was more revealing in terms of my fluctuating apprehension of the artefacts, rather than telling something really significant on the Lighting Wearables theme.

In fact, it has been difficult to maintain uniformity in evaluating different images between the various coding sessions. Memos have helped in maintaining coherence of thought with regard to the specific nuances of meaning of specific codes. Also, the constant comparative process helped me to maintain consistency throughout the various coding sessions, by continuously correlating new images with previously coded ones. On several occasions I had to recalibrate my evaluations and levels of 'judgement' of given artefacts, in order to maintain a form of coherence in assigning codes, and this fact made me realise how the apprehension of 'new' images was retroactively impacting on the re-apprehension of 'old' ones.

In other words, I realised that I had no fixed scale of values in terms of taste and style (as I thought I had) for the evaluation of the artefacts. For instance, I could evaluate and code one artefact as *Subtle*, because I perceived it to be aesthetically refined, toned-down and elegant (in relation to the minor level of subtlety of the artefacts previously coded), but then I would encounter another artefact that, if coded as *Subtle*, would reveal a considerable difference

in 'subtlety', so that my same perception of the idea of 'subtle' would need to be reconsidered, by going back and re-examining all the artefacts previously coded under the *Subtle* code, comparing them, and eventually creating more codes for describing different nuances of subtlety, applicable to further artefacts to be coded. The process of comparing, recoding and discovering new and more refined levels between the genericity of certain codes, is a typical feature of GVA, as well as the principal factor contributing to the development of a deeper and richer sensitivity, leading to a more articulate set of results in visual analysis.

The code *Cheap Manufacturing* answered a question about how I perceived the technical making, the finishing and the production aspects of the object. This category, similarly to the previous one, required a level of clear 'internal agreement' in order to maintain coherence in its development. In fact, with 'cheap' I wanted to describe (initially) something relatively inexpensive and/or not particularly well made, but, on closer inspection this could open a series of other questions.

This code might, in fact, subtend several choices to be made in relation to what is intended for 'cheapness' (the cost of materials? The quality of finishing? A bad design? The presence of productive flaws? etc.) and, even in the case where this is clearly established at the outset (and in my case it was not, as shown in Figure 51, from the initial reflections about this code on the related memo), more 'cheap' objects analysed in further rounds, might reveal the fluctuating and relative nature of this code, and the necessity to go backwards, re-examine previously coded artefacts, compare them and recalibrate the coding every time.
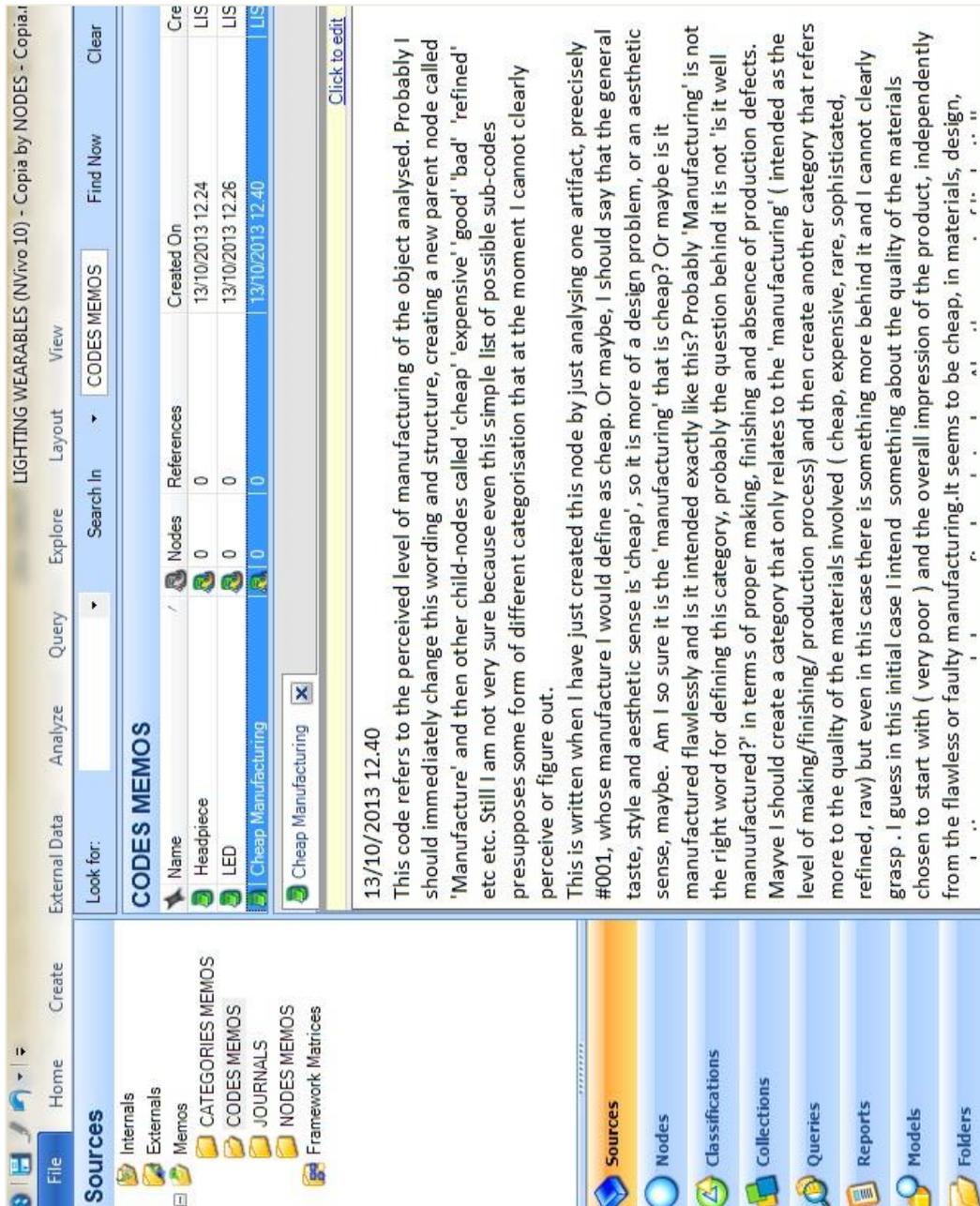
Figure 51 - Example of Memo with initial reflections on a code

In this case I realised since the beginning the vagueness of this choice of coding, and I deliberately left it at this generic level, in order to leave the development of the analysis to drive a further refinement and understanding of the complexities behind it.

5.3 - Emergence of Categories – First Iteration

Far from being exhaustive of all the aspects or questions underlying this initial coding, the previous considerations suggest that at the initial stage of GVA, code generation was still processed at a very basic and implicit level. Despite these codes emerging as synthetic descriptors of the visual properties of the artefact, it progressively became clear that they did not hold an equal relevance in terms of the design goal of the analysis (getting to a clear understanding of the Lighting Wearables theme). Some of these codes developed later a higher level of complexity, through a hierarchy of sub-codes, categories and sub-categories, while others remained at the same stage and were subsequently flanked by more codes of the same hierarchical level, as an additional number of internal descriptors. It is now evident, that this minor relevance was implicitly perceived even at the outset of the analysis, and this was reflected by a minor level of attention and subconscious questioning about the ambiguity of certain codes, as opposed to others.

However, the considerations previously made about the initial 11 codes, and the subsequent recognition of the questions standing at the root of them, brought me to generate a further, higher hierarchical level of codes for synthesising these questions. These 'superior' codes, constituted the conceptual families, or *Categories*, of which the initial 11 codes were specifications. I assigned a node to each new Category, contextually starting to restructure the extant nodes into a system of parent/child relationships. These Categories, would then work as the 'bullet-points' on an ideal checklist that I would use for systematically browsing, interrogating, comparing and assigning codes to new artefacts.

Figure 52 shows the initial tree structure of the nodes, with the Category nodes at a superior level, written in capital letters, and the corresponding child nodes (the Descriptors) at a subordinate level. It can be noted how, even from such an initial stage, the fact of generating this basic hierarchical structure started immediately to affect retroactively the initial codes themselves. In fact, that the initial code *White LEDs* was clearly perceived in its ambiguity (answering

indeed two distinct questions, pertaining to two Categories). Other than creating the new nodes for the two Categories, *LIGHT COLOUR* and *LIGHT SOURCE*, the code itself was reconsidered by splitting it into two distinct codes (and nodes): *White* (as a descriptor of *LIGHT COLOUR*) and *LEDs* (as a descriptor of LIGHT SOURCE), and artefact #001 was recoded accordingly.
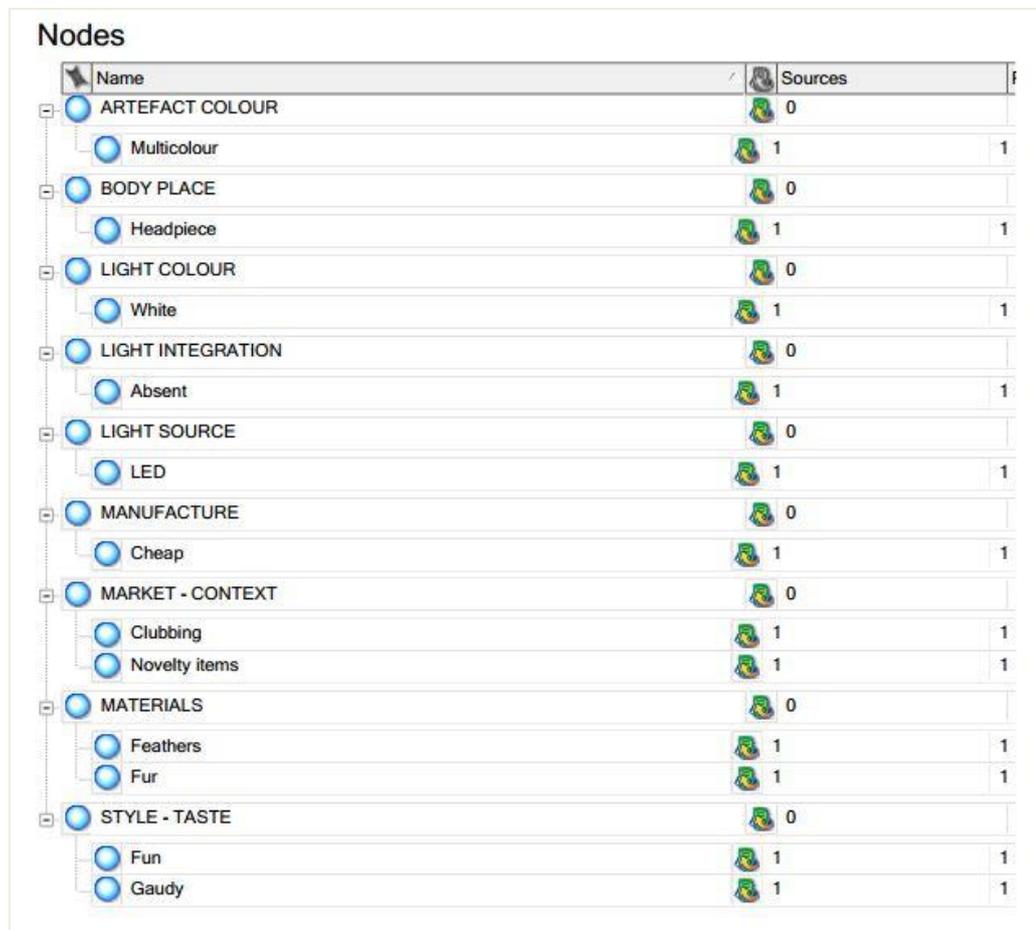
Figure 52 - Initial node tree, after one image analysed

I also derived the *LIGHT INTEGRATION* category directly from the initial code *No light integration* and, also in this case, I reconsidered the naming of the initial code and I changed into *Absent*, implicitly starting a series of potential parallel codes for expressing different levels of light integration within the artefacts, that might likely emerge later in the analysis. It is evident how, from these small initial choices and naming decisions, there are the germs of a form of foresight, in terms of the implications that certain choices in hierarchy and labelling of the code could have on the analysis of further artefacts.

I transformed in the same way the code *Cheap Manufacturing* into the category *MANUFACTURING*, and I renamed the child/descriptor code as *Cheap*, intending in the same way to develop a potential internal range of specifications regarding the quality of manufacturing of new artefacts. This came as a direct consequence of the reflective memo I wrote for the initial code (Figure 51, p.198) where I questioned at the outset the wording of the code in relation to the predictable emergence of new specifications for a similar concept, asking myself whether I should immediately create a parent node and a hierarchical structure, but withholding the decision to a later moment.

I called the entire operation of going back, reviewing previously assigned codes, recoding artefacts, renaming or 'splitting' and restructuring codes into parent/child hierarchies 'Iteration 1'. As it will be shown in the continuation of GVA testing, the emergence of new codes and categories, through the progression of the analysis, has determined a constant process of revision of the content previously coded, in the light of the new codes constantly emerging, and the consequent refinement of my Visual Sensitivity.

Even though this constant iterative process has occurred every time new images were coded, or new codes were generated (so literally hundreds of times, for hundreds of new codes, Categories and Sub-Categories emerging), it has not always determined the necessity to adjust the entire coding of the artefacts previously analysed, or the structure of the nodes previously assigned. Whenever this has occurred, I have highlighted these 'significant' iterations with a progressive number, e.g. *Iteration 2*, *Iteration 3*. Hence, only the iterations that have provoked alterations in the structure of the node-tree or in the coding of artefacts already analysed counted as significant. The process of coding of the entire Lighting Wearables database, the emergence of new codes and the 'significant' numbered Iterations have been progressively recorded on a specific memo (see Appendix B-3) for a transcription of the *Coding Timeline* memo) and they are visually illustrated in a synoptic table (Table 6, p. 216 and Appendix B-2).

5.4 - The Iterative process – Retroactive effects of emergent codes

As shown, the first effects of the emergence of new codes and of the iterative process appeared immediately from the first artefact analysed, by 'discovering' the superior Categories behind the initial 11 codes, and retroactively modifying some of the codes initially elicited and assigned. This process continued similarly through the coding of new artefacts.

I will discuss here how the progression of the coding developed during the various coding sessions using as examples the first seven artefacts, analysed individually and in succession (schematised in Table 4 p.203), to illustrate how the new codes emerging contributed to the progressive articulation of the tree-node structure in Nvivo. This led to the occurrence of more significant (numbered) Iterations, consisting of reviewing artefacts previously coded for reconsidering their analysis (either by changing the structure and assignment of existing codes, or by adding new codes that were not 'seen' in the preceding rounds of analysis). This will give a more detailed explanation of the circular and reciprocal interaction between the iterative process, the emergence of new codes, the growth of reflexivity, the refinement of Visual Sensitivity, and the further emergence of 'unseen' codes (Descriptors, Categories or Sub-Categories) in the analytical process.

On the next page, Table 4 offers a schematic representation of the coding progression for the first seven artefacts, coinciding also with the first seven coding sessions (one session per artefact). As previously said, I deliberately decided to conduct GVA analysing one artefact at a time, and to select the initial images simply following the same order in which they were presented in the Computer folder (mirroring the chronological order of their insertion into the online Visual Archive on Pinterest).

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Table 4 - Synopsis of initial coding and Iterations for images #001/#007

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Legend:
- Codes deleted after iteration
- Codes created or modified by iteration
- Codes triggering iteration
- Codes previously used
- New emerging codes

Only later on, when the codes and Categories started to emerge undoubtedly from the very analysis of the artefacts themselves (rather than from a form of tacit knowledge, or 'self-bias'), it has been possible to jump through the Visual Archive, and to purposely select the artefacts to be analysed on the basis of the necessity to integrate and to follow the true complexity in codes and categories emerging. In this way the progressive development of the node-tree in Nvivo, the different distribution and population of the various codes, Categories and Sub-Categories has spontaneously driven and conducted the selection of further artefacts to be analysed within the Computer Archive, until the achievement of a final level of coding saturation.

The coding sessions in Table 4 can be read horizontally through the rows corresponding to each artefact (indicated at the extreme left with their unique #ID). The column headings represent the Categories against which each artefact has been cross-referenced and questioned, in order to generate the emergent codes (that can be read in the vertical columns below each Category). The cells with a <u>yellow</u> background represent the 'new', or 'emergent' codes, in the corresponding session when they were elicited for the first time. The cells with a <u>white</u> background represent the codes already emerged and normally checked against an artefact during the coding session. The cells with a <u>blue</u> background and a star symbol represent new, emergent codes that have caused a 'significant' (numbered) iteration, a retroactive effect, that is, to return to previously coded artefacts and review their coding, or to add new Categories and related descriptor codes. As a consequence, all the cells in the table with a <u>green</u> background represent the results, the alterations that these 'significant' iterations have provoked to codes and Categories (<u>grey</u> background for the original codes/Categories, before the alteration). The flow of these iterations is evidenced by red arrows that follow a path, starting from the blue 'star' code, which triggered the retroactive iteration, and going backwards through all the artefacts previously coded, sometimes provoking changes in a sort of a domino-effect.

ID	ARTEFACT COLOUR	BODY-PLACE PLACE (Child)	BODY-PLACE SPEC. (Child)	LIGHT COLOUR SOURCE (Child)	LIGHT COLOUR RESULTING (Child)	INTEGRATION	LIGHT SOURCE	LIGHT EFFECTS	MANUFACTURE	MARKET	MATERIALS SOLID (child)	MATERIALS DIFFUSIVE (Child)	MATERIALS REFLECTIVE (Child)	MATERIALS REFRACTIVE (Child)	TASTE STYLE	LIGHT IMPACT	LIGHT SCOPE
#001	Multi colour	Head	Wig	White		Absent	LEDs	None	Industrial-Cheap	Clubbing, Novelty items	Fur, Feathers				Gaudy, Funny	Crude	Aesthetic
#002	Pink, Blue	Head	Hairpin	White		Slight	LEDs	Diffusion-Accidental	Industrial-Cheap	Clubbing, Novelty items	Ribbons, Feathers				Girly, Flashy	Medium	Aesthetic
#003	Black	Head	Hat	White		Absent	LEDs	None	INDUSTRIAL Average	Clubbing, Novelty items	Fabric				Flashy, Unisex	Crude	Aesthetic
#004	Green, Black	Head	Hat	White	Green	Medium	LEDs	Reflection Accidental	Industrial-Cheap	Clubbing, Novelty items	Fabric	Rubber Tube	Sequins		Gaudy, Funny, Unisex	Crude	Aesthetic
#005	Metallic (silver)	Neck piece	Collar	Blue		Good	LEDs	Cut-Outs, Containment, Reflection Accidental	Handmade Average	Jewellery	Metal Silver		Metal Silver		Organic, Feminine	Subtle	Aesthetic
#006	Metallic (silver), Clear Transparent	Earrings		Blue, Purple, Red, Pink, White, Green		Medium	LEDs	Refraction, None (source)	Industrial-Average	Clubbing, High Street Fashion, Novelty items	Metal Copper			Cubic Zirconia	Girly, Feminine, Flashy	Crude	Aesthetic
#007	White	Body	Dress	White		Medium	LEDs	Diffusion-intentional	Handmade Average	Wearable Tech	Fabric	Nylon			Girly, Ugly	Crude	Indicator

Figure 53 - Overview of 5 'significant' Iterations

In order for the discussion to proceed with more clarity, the main 5 'significant' Iterations presented in Table 4 have been highlighted in Figure 53, where the entire Table 4 has been scaled down and greyed-out in the background, with the 5 iterations evidenced by the coloured rectangles. The discussion will follow the first seven coding sessions, corresponding to the initial seven artefacts, concentrating individually on each of the 5 'significant' Iterations (illustrated in Figures 54, 55, 56, 57 and 58 as 'enlargements' of the coloured rectangles highlighted in Figure 53), in order to give an account and to exemplify how the actual GVA coding progression proceeded after the analysis of artefact #001.

The first 'significant' Iteration (Orange rectangle), as shown in the detail provided by Figure 54), occurred during the third coding session, while analysing artefact #003, a black sequined LED hat. The Iteration 1 was triggered by the emergence of the new code *Hat* for the Category *BODY PLACE*: the first two artefacts (#001 and #002) were both coded directly with regard to their position on the body with the code *Headpiece* (being respectively #001 a wig and #002 a hairpin). Artefact #003, a hat, caused me to question the suitability of maintaining this generic level of coding for an increasing number of artefacts of different nature, all being worn on the head.

Figure 54 - Detail of Iteration (enlargement of Figure 53, Orange rectangle)

As a consequence I went back to the main Category (*BODY PLACE*) and I generated a Sub-Category, called *Head,* specifying in this way the *place* on the body where the object would be worn and consequently transforming the extant

node *Headpiece*' and the new code *Hat* into child/descriptor nodes, specifying the kind of product (Hat, Wig, Hairpin) to be worn on the *Head*, corresponding to the category '*BODY PLACE*'. This created a three-level coding tree, *BODY PLACE* (Category), then *Head* (Sub-Category) and *Hat,* as the Descriptor.

The second 'significant' Iteration (Green rectangle), shown in Figure 55, involved the category *MANUFACTURE*, where artefact #003 was perceived to be of *Industrial* making, like the previous artefacts, but of a higher quality of finishing.

Figure 55 - Detail of Iteration (enlargement of Figure 53, Green rectangle)

This triggered the necessity to recalibrate the labelling of the descriptor nodes according to this observation (without really generating a three-level hierarchy as in the previous case, because the Category itself was felt as less relevant, so deserving a minor level of depth). In this case, a new node called *Industrial-Average* was created, indicating the *average* quality of manufacturing for artefact #003, while the extant code C*heap*, was altered according to this new criterion and renamed *Industrial-Cheap*, and artefacts #001 and #002 were re-coded under this descriptor node.

Following the red arrow in both the Orange and Green rectangle details in Figures 54 and 55 (and in the original visualisation in Table 4), it is possible to follow the path of the Iterations, starting from the blue-star code that triggered the retroactive effect, going back to the main code, Category or Sub-Category, causing the renaming of the nodes, and ending with the individual artefacts consequently re-coded.

The third Iteration (Blue rectangle), as shown in Figure 56, was triggered by the coding session related to artefact #004, another hat with white LEDs embedded in green silicone tubing, and it concerned the Category *LIGHT COLOUR*.

Figure 56 - Detail of Iteration (enlargement of Figure 53, Blue rectangle)

While all the previously coded artefacts presented white LEDs, and were coded for the Category *LIGHT COLOUR* with the descriptor code *White*, in this case, I started by coding them as *White* (as indeed the LEDs in the artefact are white), but I soon realised that the light resulting from these white LEDs inserted into the green translucent silicone tube was green. In other words, I realised that in this case there was a distinction between the colour of the light source and the colour of the light emission. This made me consider that I could not take for granted the fact that the colour of the light emission and the colour of the light source would be the same.

So I decided to set a further hierarchical level of distinction within the *LIGHT COLOUR* Category (intuitively knowing that it would be very significant in terms of my final understanding of the Lighting Wearables theme, consequently worthy of a more complex hierarchy) and I split it into two Sub-Categories, one named *SOURCE* (indicating the colour of the light as emitted by the source) and another named *RESULTING* (indicating the light colour resulting from the

interaction of the light source and other elements in the artefact). I went back and I recoded the previous artefacts along this new hierarchical structure. In Figure 56 it is possible to see the retroactive effect of this iteration. The new code *Green* (marked with the star in the Figure), related to the resulting light colour of artefact #004, pointed directly to the main category *LIGHT COLOUR*, where two new sub-categories were generated (*SOURCE – RESULTING*) and then, all the 4 artefacts previously coded were re-coded with the respective light colours placed in the corresponding child/descriptor position.

Figure 57 shows a more complex iteration (Pink rectangle), happened on more than one level at the same time with regard to the *MATERIALS* category. Starting again from artefact #004 (the green hat with the white LEDs embedded in the silicone tubing), the translucent silicone made me reflect on the need to distinguish it from the previous materials' codes, all 'solid' in nature (not allowing any light to pass through). As a consequence, I reconsidered the main Category of *MATERIALS* and I created two Sub-Categories to specify two 'families' of materials in terms of their interaction with light: *SOLID* and *DIFFUSIVE*, and then I placed the new node *Silicone Tubing* in the corresponding Sub-Category *DIFFUSIVE*, and I reviewed the coding of artefacts #001, #002 and #003 in order to move all the descriptor codes previously generated for the other materials (*Fur*, *Feathers*, *Ribbons* and *Fabric*) into the *SOLID* Sub-Category.

Figure 57 - Detail of Iteration (enlargement of Figure 53, Pink rectangle)

While doing this, I realised that I was not convinced about moving the code *Sequins* of artefact #003, into the Sub-Category of *SOLID* materials, since they worked as a reflective surface for amplifying the lighting effects of the LEDs. As a consequence I created an additional Sub-Category, named *REFLECTIVE*, where the *Sequins* code was moved.

Figure 57 shows this iteration with the addition of a further one for the same Category of *MATERIALS*, occurred during the coding of artefact #006, where the emergence of the new code *Cubic Zirconia* caused the addition of the Sub-Category *REFRACTIVE*, so a node was created, and the corresponding descriptor node moved.

Lastly, Figure 58 shows another double iteration (Pink rectangle), this time implying the creation of two new Categories, *LIGHT IMPACT* and *LIGHT SCOPE* (with the consequent generation of related child/descriptor codes, emerged respectively with artefact #005 and #007). Artefact #005 is a brooch where the lighting effect is conveyed through a series of cut-outs in the main

constructive material (new descriptor code generated *Metal – Silver'*). Coding this artefact made me realise the substantial difference in the overall effect that an intentional positioning of the lighting source was producing—hidden within the artefact and playing with the metal cut-outs—in comparison to the previously coded artefacts, where LEDs were crudely displayed in plain sight.

Figure 58 - Detail of Iteration (enlargement of Figure 53, Red rectangle)

This made me reflect on an additional aspect to be included in the coding of the element light that was exceeding the Categories so far covered by *COLOUR* and *SOURCE*. I created the new category *LIGHT IMPACT*, for defining what I perceived to be the overall 'volume' (or impact) of the lighting within the piece, and consequently all the previous artefacts had to be re-coded against this new Category. New descriptor codes emerged as a consequence, such as *Crude*

(meaning a very rough, direct and unfiltered use of lighting) and *Subtle* (meaning a more articulated and toned-down use of light) and all the previously coded artefacts, were adjusted according with these new nodes.

Artefact #007, in contrast to the previously coded objects, is an interactive dress, where lighting is used for performing a function, rather than being inserted as a merely decorative element. This observation triggered the emergence of a new Category, *LIGHT SCOPE*, specifying new possibly emergent descriptor codes for the various functions that the lighting element could perform into a wearable artefact. Consequently all previously coded artefacts had to be reassessed according to this new Category, and new child nodes such as *Aesthetic*'(for a merely ornamental use of light) and *Indicator* (when light was used for indicating statuses, such as 'on' or 'off') were created.

5.5 - Coding Progression

The process of coding unfolded through the analysis of additional images, by repeating the procedure previously shown for the first seven artefacts and progressing with Iterations of greater complexity. Given the incessant expansion of the number of codes, the practice of constant comparison and re-coding of previously coded images was gradually perfected and transformed into a routine I repeated for each new artefact imported into the software.

The initial coding sessions were intense because of the considerable amount of emergent codes, Categories and Sub-Categories, which meant that I had to reconsider some passages, as they seemed to excessively slow the progression of the work. Until that moment, the coding routine consisted of:

1. Importing an image into Nvivo;
2. Compiling the Picture Properties dialog box with the univocal #ID, name of the artefact and author's and bibliographical information stored in the Pinterest Visual Archive;
3. Resizing the image;
4. Selecting a portion of the image for generating an annotation;

5. Copying/pasting additional information about the image, where available;

6. Typing the open coding in the annotation window;

7. Annotating emerging codes/Categories on the *Coding Timeline* memo;

8. Creating new memos where necessary;

9. Creating new nodes (if emerged);

10. Coding the image at the existing nodes;

11. Review all the previously coded images for integration with new codes.

The use of the annotation feature in Nvivo for tracking the initial open coding (point n.6), was neat and tidy but problematic as it forced me to move back and forth between windows to annotate the new codes into the *Coding Timeline* memo, and for coding the artefact and generating new nodes for the emerging codes. In absence of a multi-window feature in Nvivo, I decided to streamline this operation by using an 'old school' approach (pen and paper, as shown in Figure 59).

Figure 59 shows the manual coding sheet for the first 6 artefacts (an extensive sample of coding sheets is available in Appendix B-4). The codes of the artefacts already processed were copied to the manual coding sheet from the Nvivo annotations. The codes circled in pink correspond to the 'new' descriptors and the codes circled in purple to new Categories or Sub-Categories. Each coding session (initially corresponding to one artefact per session) is separated horizontally by the blue/black lines and the codes circled in green correspond to codes triggering a 'significant' Iteration (re-coding and restructuring of previous images and codes). The arrows indicate where the retroactive effect of each Iteration has affected the extant codes and Categories.

Figure 59 - Manual coding sheet for the first six images.

The schematic illustration of the first 5 iterations previously shown in Table 4 (p.203 and detailed in Figures 54, 55, 56, 57 and 58, pp.206-210), is no other than a tidier version of the above manual coding sheet (with the addition of Artefact #007). A further re-elaboration of the coding recorded in the manual coding sheets (in combination with the notes kept in the *Coding Timeline* memo)

can be found in the next section, where I developed a summative table of the *Coding Emergence Progression* (Table 6, p.216) for the entire database. All the significant iterations have been listed in their order of occurrence, with the indication of the new codes, Categories and Sub-Categories, together with the artefacts and the codes retrospectively affected by the Iterations.

With the implementation of the manual coding sheets, I managed to streamline the coding routine and I started to observe how the emergence of new codes progressively directed the sampling process, which became increasingly purposive. I abandoned the initial sequential sampling and I started to search specifically for images that could expand and enrich the network of nodes growing with the analysis.

I started also to increase the number of images imported and coded during each analytical session, from one image at a time (until artefact #11), to two/three images (until image #025), to five images (from image #026 to image #050), ending with an average of eight/ten images per session. The growth of the size of the sample occurred spontaneously and was directed by the emergence of new Categories, Sub-Categories and their descriptor codes.

The perception of the approaching of a point of saturation grew gradually, with the first hints showing halfway through the analysis of the entire dataset (see the *Coding Timeline* memo in Appendix B-3 at artefact #115), when I realised that some Categories were not evolving and it was increasingly harder to sample images that contributed new codes or nuances to the codes already generated. However, I continued the analysis, observing the diminishing emergence of new codes and I understood that a point of saturation was finally reached when I could not find new artefacts within the Visual Archive that would add significant properties or attributes to the Categories already developed. The analysis of the database was concluded with the coding of artefact #211.

STAGE 2 – GVA APPLICATION

5.6 - Thoughts about results

The progressive emergence of codes, Categories and Sub-Categories during the analysis of the Lighting Wearables database caused the Nvivo node tree to develop into an increasingly complex network of nested relationships between codes, but also to reflect the growth of an enhanced level of my Visual Sensitivity which was reflected in my apprehension of the artefacts themselves.

The GVA process influenced my capacity to analyse images in greater detail, to evaluate explicitly my analytical reasoning and to 'see' new attributes in artefacts already analysed that I could not perceive during the original coding sessions. The circular layering of the analysis and the 'triggers' provided by the emergence of more refined codes, contributed to fine-tune my Visual Sensitivity, which I poured back iteratively into the analysis, increasing the refinement of the results I obtained from it.

This is clearly demonstrated by observing the outcomes of the process. For instance, the initial seven artefacts that have been presented in Section 5.4 through a detailed commentary on their coding sessions, showed a dramatic increase in the quantity of codes attributed to them at the end of the GVA process, after being repeatedly reassessed for each new code, Sub-Category or Category.

Table 5 - Comparison between initial and final coding of first seven images

Image #ID	CODES/NODES AT RESPECTIVE CODING SESSION	CODES/NODES AFTER ENTIRE DATABASE ANALYSIS
#001	11	22
#002	12	21
#003	13	22
#004	14	27
#005	16	25
#006	23	31
#007	16	21

Table 5 compares the quantity of codes assigned to these seven artefacts between their respective initial coding sessions and the quantity accumulated

once the analysis on the whole database was completed. It can be noted that each artefact ended up being coded at a higher number of nodes. This shows how the constant comparative process and the various Iterations increased my sensitivity, allowing me to elicit patterns unnoticed during the initial coding sessions. This is significant because the very first artefacts analysed were the ones most likely influenced by the residuals of the implicit assumptions carried forward form the analysis performed in Stage 1. It is evident how my ability to conduct a more detailed analysis has been stimulated by the change in method.

Table 6 is a summative illustration of the coding progression of the entire database and lists all the significant Iterations occurred and all the new codes and Categories emerged in correspondence to the coding sessions in which they were generated. The table is colour-coded in order to distinguish at a glance the different Categories. Each new descriptor code or Sub-Category code is coloured in the table with the corresponding Category colour. The left column indicates the #ID of the images triggering the emergence of new codes, the two central columns list the names and relationship in the node-tree of these new codes and the right indicates all the alterations provoked by of each significant Iteration, and lists the changes to the coding structure applied accordingly.

Table 6 - Summary of GVA Iterations and coding emergence for the entire database

ARTEFACT COLOUR		LIGHT IMPACT
BODY PLACE	MATERIALS	LIGHT SCOPE
MANUFACTURE	LIGHT COLOUR	LIGHT INTEGRATION
MARKET/CONTEXT	LIGHT COLOUR QUALITY	LIGHT SOURCE
TASTE/STYLE	ON/OFF	LIGHTING EFFECTS

Coding Emergence Progression

#ID	DESCRIPTOR CODES	CATEGORIES AND SUB-CATEGORIES	ITERATIONS AND RE-CODING
#001	Multicolour		
		ARTEFACT COLOUR	
	Headpiece		
		BODY PLACE	
	White		
		LIGHT COLOUR	
	Absent		
		LIGHT INTEGRATION	
	LEDs		
		LIGHT SOURCE	
	Cheap	LIGHTING EFFECTS	
		MANUFACTURE	First codes emerging and **Iteration 1** with consequent generation of initial categories
	Clubbing	LIGHT COLOUR QUALITY	
	Novelty Items		
		MARKET/ CONTEXT	
	Fur	ON/OFF	
	Feathers	LIGHT SCOPE	
		MATERIALS	
	Gaudy	LIGHT IMPACT	
	Funny		
		TASTE/STYLE	
#002	Pink (ARTEFACT COLOUR)		
	Blue (ARTEFACT COLOUR)		
		Headpiece (BODY PLACE)	
	Wig (Headpiece) (BODY PLACE)		
	Hairpin (Headpiece)(BODY PLACE)		**Iteration 2**- New sub-code Headpiece for BODY PLACE and New Category LIGHTING EFFECTS emerged - New sub-codes emerging and recoded #001 and #002 accordingly.
	Ribbons (MATERIALS)		
	Girly (TASTE/STYLE)		
	Flashy (TASTE/STYLE)		
	Slight (LIGHT INTEGRATION)		
		LIGHTING EFFECTS	
	None - Source visible (LIGHTING EFFECTS)		
	Diffusion - Slight/Accidental (LIGHTING EFFECTS)		

(continued) – Table 6 – Summary of GVA Iterations and coding emergence for the entre database

#			
#003	Black (ARTEFACT COLOUR)		
	Hat (Headpiece)(BODY PLACE)		
	Average (MANUFACTURE)		Iteration 3 - New codes under existing categories
	Fabric (MATERIALS)		
	Sequins (MATERIALS)		
	Unisex (TASTE/STYLE)		
	Reflection - Slight/Accidental (LIGHTING EFFECTS)		
#004	Green (ARTEFACT COLOUR)		
		Source (LIGHT COLOUR)	
		Resulting(LIGHT COLOUR)	Iteration 4 - Recoded all previous images at new new sub-codes Source, Resulting, and sub-sub code Interaction with Materials for LIGHT COLOUR and at new sub-codes Solid, Diffusive and Reflective for MATERIALS
		Interaction with Materials (Resulting) (LIGHT COLOUR)	
	Medium (LIGHT INTEGRATION)		
		Solid (MATERIALS)	
		Diffusive (MATERIALS)	
		Reflective (MAtERIALS)	
	Rubber Tube (Diffusive) (MATERIALS)		
	Diffusion - Intentional (LIGHTING EFFECTS)		
#005	Metallic - Silver (ARTEFACT COLOUR)		
		Neckpiece (BODY PLACE)	
	Collar (Neckpiece) (BODY PLACE)		
	Blue (Source) (LIGHT COLOUR)		
	Good (LIGHT INTEGRATION)		
	Good (MANUFACTURE)		
		Handmade-Average (MANUFACTURE)	
		Industrial - Cheap (MANUFACTURE)	Iteration 5 - Modified codes Good, Cheap and Average (Manufacture) in Handmade-Average, Industrial - Cheap and Industrial- Average. Recoded all content.
		Industrial - Average (MANUFACTURE)	
	Jewellery (MARKET/CONTEXT)		
	Silver (Solid) (MAtERIALS)		
	Silver (Reflective) (MATERIALS)		
	Organic (TASTE/STYLE)		
	Subtle (TASTE/STYLE)		
	Cut-Outs (LIGHTING EFFECTS)		
	Containment (LIGHTING EFFECTS)		
	Feminine (TASTE/STYLE)		

(continued) – Table 6 – Summary of GVA Iterations and coding emergence for the entre database

#006	Clear/Transparent (ARTEFACT COLOUR)		**Iteration 6 -** New codes and sub-codes under existing categories
	Earrings (BODY PLACE)		
	Purple (Source) (LIGHT COLOUR)		
	Red (Source) (LIGHT COLOUR)		
	Green (Source) (LIGHT COLOUR)		
	Pink (Source) (LIGHT COLOUR)		
	Refraction (LIGHTING EFFECTS)		
	High Street Fashion (MARKET/CONTEXT)		
	Metal-Copper (Solid) (MATERIALS)		
		Refractive (MATERIALS)	
	Cubic Zirconia (Refractive) (MATERIALS)		
#007	White (ARTEFACT COLOUR)		**Iteration 7** - New category emerged LIGHT SCOPE and sub-codes Indicator and Aesthetic . Recoded all content accordingly.
		Body (BODY PLACE)	
	Dress (Body) (BODY PLACE)		
	Wearable Tech (MARKET/CONTEXT)		
	Fabric (Diffusive) (MATERIALS)		
	Nylon (Diffusive) (MATERIALS)		
	Ugly (TASTE/STYLE)		
		LIGHT SCOPE	
	Indicator (LIGHT SCOPE)		
	Aesthetic (LIGHT SCOPE)		
#008	Changing (Source) (LIGHT COLOUR)		**Iteration 8** - New codes under existing categories.
	RGB LEDs (LIGHT SOURCE)		
	MIcroControlled (LIGHTING EFFECTS)		
	Pixel (LIGHTING EFFECTS)		
	Bespoke -Very High (MANUFACTURE)		
	Catwalk (MARKET/CONTEXT)		
	LED MATRIX (Solid) (MATERIALS)		
	Futuristic (TASTE/STYLE)		
#009	Total (LIGHT INTEGRATION)		**Itertion 9 -** New codes under existing categories.
	Projection (LIGHTING EFFECTS)		
	Metal-Steel (Solid) (MATERIALS)		
	Structural (LIGHT SCOPE)		

(continued) – Table 6 – Summary of GVA Iterations and coding emergence for the entre database

#010		Anywhere (BODY PLACE)	**Iteration 10** - New category LIGHT IMPACT and sub-codes Soft, Average, Crude and Harsh emerged by reviewing all content.
	Shawl (Anywhere) (BODY PLACE)		
	Very Good (LIGHT INTEGRATION)		
	Shading (LIGHTING EFFECTS)		
	Handmade - Good (MANUFACTURE)		
	Fashion/Textiles (MARKET/CONTEXT)		
	Yarn (Solid) (MATERIALS)		
		LIGHT IMPACT	
	Soft (LIGHT IMPACT)		
	Average (LIGHT IMPACT)		
	Crude (LIGHT IMPACT)		
	Harsh (LIGHT IMPACT)		
#011		Face (BODY PLACE)	**Iteration 11** - New codes and sub-codes under existing categories
	Eyes (Face) (BODY PLACE)		
	Flickering - Intermittence (LIGHTING EFFECTS)		
	Handmade -Poor (MANUFACTURE)		
	Plastics (Solid) (MATERIALS)		
#012	Crystals (Refactive) (MATERIALS)		**Iteration 12** - New code under existing categories
#013	Brooch (Anywhere) (BODY PLACE)		**Iteration 13** - Checked and recoded previous content for new codes.
	CJD (Jewellery) (MARKET/CONTEXT)		
	Plastics (Refractive) (MATERIALS)		
	Mechanical /Cold (TASTE/STYLE)		
	Agglomerate/Messy (TASTE/STYLE)		
#014	Coat (Body) (BODY PLACE)		**Iteration 14** - Recoded #001 and #004 for Ugly and Unisex in TASTE/STYLE
#017	Pendant (Neckpiece) (BODY PLACE)		**Iteration 15** - New sub-code and codes under existing categories.
		Arm (BODY PLACE)	
	Bangle (Arm) (BODY PLACE)		
	Gemstones (Refractive) (MATERIALS)		
	Sleek (TASTE/STYLE)		
#018	Texturing (LIGHTING EFFECTS)		New codes under existing categories.
	Reflection - Intentional (LIGHTING EFFECTS)		
	Paper (Diffusive) (MATERIALS)		
	Paper (Solid) (MATERIALS)		
	Mirror (Reflective) (MATERIALS)		

(continued) – Table 6 – Summary of GVA Iterations and coding emergence for the entre database

#			
#019	Lariat (Neckpiece) (BODY PLACE)		**Iteration 16** - New codes under existing categories.
	Industrial - Good (MANUFCTURE)		
	Silicone (Diffusive) (MATERIALS)		
#020	Mains Powered (LIGHT SOURCE)		**Iteration 17** - Recoded #011 - #013 for Conceptual and #016 - #009 for Pure Light
	Conceptual (TASTE/STYLE)		
	Pure Light (MATERIALS)		
#021	Lace (Solid) (MATERIALS)		**Iteration 18** - New codes under existing categories.
		Hand (BODY PLACES)	
	Medical (TASTE/STYLE)		
#022	Red (ARTEFACT COLOUR)		**Iteration 19** - Recoded #013 for Pixel (LIGHTING EFFECTS) and recoded #013-#012 for Indicator (LIGHT SCOPE)I
	Pink (Resulting)(Interaction w.m.)(LIGHT COLOUR)		
#023	Red (Fluo) - (ARTEFACT COLOUR)		**Iteration 20** -Confronted and modified all codes for LIGHT INTEGRATION and added a progressive value: 1 Absent - 2 Slight - 3 Medium - 4 Good - 5 Very Good - 6 Total.
	Yellow (Fluo) - (ARTEFACT COLOUR)		
		Photoreactivity (Resulting) (LIGHT COLOUR)	
	Red (Fluo) (Resulting) (LIGHT COLOUR)		
	Yellow (Fluo) (Resulting) (LIGHT COLOUR)		
	Fluorescence (LIGHTING EFFECTS)		
	Glass (Diffusive) (MATERIALS)		
	Porcelain (Solid) (MATERIALS)		
	Wood (Solid) (MATERIALS)		
#024	Fabric (Reflective) (MATERIALS)		**Iteration 21** - New code under existing categories
#025	Vegetable Ivory (Diffusive) (MATERIALS)		**Iteration 22** - New code under existing categories
#029	Suit (Body) (BODY PLACE)		**Iteration 23** - Recoded #011 for Cyber and #012 for Costume/Stage
	EL Wire (LIGHT SOURCE)		
	Stage/Costume (MARKET/CONTEXT)		
	Latex (Solid) (MATERIALS)		
	Cyber (TASTE/STYLE)		
#030	Necklace (Neckpiece) (BODY PLACE)		**Iteration 24** - Checked all sources and recoded for Transmission #023
	Neon (LIGHT SOURCE)		
	Transmission (LIGHTING EFFECTS)		
	Glass (Refractve) (MATERIALS)		

(continued) – Table 6 – Summary of GVA Iterations and coding emergence for the entre database

#031	Aqua (ARTEFACT COLOUR)		**Iteration 25** - Checked all sources and recoded #023 for Geometric
	Aqua (Resulting)(Interaction w.M.)(LIGHT COLOUR)		
	Geometric (TASTE/STYLE)		
#032	Top (Body) (BODY PLACE)		**Iteration 26** - Checked soruces and recoded at Colour Change (LIGHTING EFFECTS) #29 - #21 - #016 - #014 - #012- #009 - #008
	Colour Change (LIGHTING EFFECTS)		
#033		Feet (BODY PLACE)	**Iteration 27 -** New codes under existing categories.
	Shoes (Feet) (BODY PLACE		
	Aqua (Source) (LIGHT COLOUR)		
	Leather (Solid) (MATERIALS)		
#034	Circuitry (Solid) (MATERIALS)		**Iteration 28** - Checked and Recoded for Circuitry #013 - #022 - #026 - #032
#035	Skirt (Body) (BODY PLACE)		**Iteration 29** - Checked and Recoded for Pattern Change #007 - #008 - #009 - #012 - #016 - #021 - #023
	Pattern Change (LIGHTING EFFECTS)		
#036	Green (Phospho) (Resulting) (Photoreactivity)(LIGHT COLOUR)		**Iteration 30** - Checked and Recoded for Fluorescent (Light Source) #023
	Phosphorescent (LIGHT SOURCE))		
	PhoSphorescence (LIGHTING EFFECTS)		
	Plastics (Diffusive) (MATERIALS)		
	Fluorescent (LIGHT SOURCE)		
#037	White Fluo (Resulting)(Photoreactivity)(LIGHT COLOUR)		**Iteration 31** - Renamed Code 'Mains Powered' in 'External' (LIGHT SOURCE) - Changed coding for #031 (was: Aqua) in Aqua (Fluo)(Resulting) (Photoreactivity) (LIGHTI COLOUR)
	PVC (Reflective) (MATERIALS)		
	Fetish (TASTE/STYLE)		
	Aqua Fluo (Resulting) (Photoreactivity)(LIGHT COLOUR)		
#038	Corset (BODY PLACE)		**Iteration 32** - New Category emerged LIGHT COLOUR QUALITY and 2 sub categories PLAIN and MODULATED - Recoded everything accordingly
		LIGHT COLOUR QUALITY	
	Plain (LIGHT COLOUR QUALITY)		
	Modulated (LIGHT COLOUR QUALITY)		

(continued) – Table 6 – Summary of GVA Iterations and coding emergence for the entre database

#	Codes		Iteration Notes
#039	Multicolour Fluo(Resulting)(Photoreactivity)(LIGHT COLOUR)		**Iteration 33** - New Category ON/OFF and sub-categories RELATED and UNRELATED. Recoded everything accordingly. Recoded #018 - #025 -#030 -#031 for Cool
	Cool (TASTE/STYLE)		
		ON/OFF	
	Related (ON/OFF)		
	Unrelated (ON/OFF)		
#040	Armor (Arm) (BODY PLACE)		**Iteration 34** - Recoded #029 - #032 -#36 - #037 at Fantasy/Fiction
	Rubber (Solid) (MATERIALS)		
	Fantasy/Fiction (TASTE/STYLE))		
#041	Orange (ARTEFACT COLOUR)		**Iteration 35** - New codes under existing categories.
	Metallic - Oxydised (ARTEFACT COLOUR)		
	Enamel (Solid) (MATERIALS)		
#042	Metal -Generic (Solid) (MATERIALS)		**Iteration 36** - New code under existing categories.
#043	White (Resulting) (Interaction with Materials) (LIGHT COLOUR)		**Iteration 37** - New code under existing categories.
#044	Grey (ARTEFACT COLOUR)		**Iteration 38** - Checked previous artefacts for coding under Geek (TASTE/STYLE) - nothing recoded.
	Smart Band (Arm) (BODY PLACE)		
	LCD Screen (LIGHT SOURCE)		
	LCD Screen (Solid) (MATERIALS)		
	Geek (TASTE/STYLE)		
#047	Bracelet (Arm) (BODY PLACE)		**Iteration 39** - Checked and recoded #033 - #034 - #023 - #044 - #045 for Product Design and #045 - #044 - #006 for Industrial
	Object (Anywhere) (BODY PLACE)		
	Product Design (MARKET/CONTEXT)		
	Interior Design (MARKET/CONTEXT)		
	Industrial (TASTE/STYLE)		
#048	Metallic - Gold (ARTEFACT COLOUR)		**Iteration 40** - New codes under existing categories.
	Refraction - Accidental (LIGHTING EFFECTS)		
	Metal - Brass (solid) (MATERIALS)		
	Beads (MATERIALS)		
#049	Belt (Body) (BODY PLACE)		**Iteration 41** - New code under existing categories.
#051	Sculptural (Neckpiece) (BODY PLACE)		**Iteration 42** - New code under existing categories.

(continued) – Table 6 – Summary of GVA Iterations and coding emergence for the entre database

#052	Mouth (Face) (BODY PLACE)		**Iteration 43** - New code under existing categories.
#053	Lightbulbs (LIGHT SOURCE)		**Iteration 44** - New codes under existing categories.
	Glittering (ARTEFACT COLOUR)		
#054	Fibre Optics (LIGHT SOURCE)		**Iteration 45** - New code under existing categories.
#055		Shoulders (BODY PLACE)	**Iteration 46** - New sub-category and code under existing categories
	Sculptural (Shoulder) (BODY PLACE)		
#056	Sea Shells (Diffusive) (MATERIALS)		**Iteration 47** - New code under existing categories.
#059	Layering (LIGHTING EFFECTS)		**Iteration 48** - New code under existing categories
#060	Wrap (Shoulders) (BODY PLACE)		**Iteration 49** -New codes under existing categories
	Colouring (LIGHTING EFFECTS)		
#061	Sculptural (Headpiece) (BODY PLACE)		**Iteration 50** - Checked and recoded #017 and #045 for Minimal
	Minimal (TASTE/STYLE)		
#063	Drawing (LIGHTING EFFECTS)		**Iteration 51** - Checked and recoded #009 - #020 - #027 - #029 - #028 - #035 - #038 - #039 - #046 - #050 - #058 - #061 - #062 for Drawing
#065	EL Fabric (LIGHT SOURCES)		**Iteration 52** - New code under existing categories
#066	Tattoo (Anywhere)(BODY PLACE)		**Iteration 53** - Moved code 'Object' (and related artefacts) under sub-code Anywhere (BODY PLACE) - New codes under existing categories
	Yellow (Source) (LIGHT COLOUR)		
#069	All (Face) (BODY PLACE)		**Iteration 54** - New codes under existing categories
	Yellow (Source) (LIGHT COLOUR)		
#070	Polymer Clay (Solid) (MATERIALS)		**Iteration 55** - New code under existing categories
#071	Watch (Arm) (BODY PLACE)		**Iteration 56** - New codes under existing categories
	Watches (Jewellery) (MARKET/CONTEXT)		
	Orange (Source) (LIGHT COLOUR)		

(continued) – Table 6 – Summary of GVA Iterations and coding emergence for the entre database

#072	Lasers (LIGHT SOURCE)		**Iteration 57** - New codes under existing categories
	Beam (LIGHTING EFFECTS)		
#078	Beige (ARTEFACT COLOUR)		**Iteration 58** - New codes under existing categories
	JACKET (Body) (BODY PLACE)		
#084	Pink Fluo (ARTEFACT COLOUR)		**Iteration 59** - New codes under existing categories
	Green Fluo (ARTEFACT COLOUR)		
	Blue Fluo (ARTEFACT COLOUR)		
	Pink Fluo (Resulting)(Photoreactivity)(LIGHT COLOUR)		
	Green Fluo (Resulting)(Photoreactivity)(LIGHT COLOUR)		
	Blue Fluo (Resulting)(Photoreactivity)(LIGHT COLOUR)		
#086	Multicolour(Source) (LIGHT COLOUR)		**Iteration 60** - Checked and recoded for Multicolour in LIGHT COLOUR #008 - #012 - #014 - #032 - #036
#090	Sporty (TASTE/STYLE)		**Iteration 61** - Checked and recoded for Sporty #044 - #064 - #071 - #073 - #074 - #075 and for Masculine #075
	Masculine (TASTE/STYLE)		
#091	UV LEDs (LIGHT SOURCE)		**Iteration 62** - New codes under existing categories
	UV (Source) (LIGHT COLOUR)		
#095	Delicate (TASTE/STYLE)		**Iteration 63** - Checked and recoded for Delicate #008 - #015 - #028 - #068 - #074
#097	Yellow (Resulting)(Interaction with Materials)(LIGHT COLOUR)		**Iteration 64** - New code under existing categories
#103	Purple (ARTEFACT COLOUR)		**Iteration 65** - New code under existing categories
#104	Sports (MARKET/CONTEXT)		**Iteration 66** - Checked and recoded for Sports #044 - #064 - #071 - #073 - #074 - #075 - #090
	Nylon (Solid) (MATERIALS)		
#107	Installation - Art (MARKET/CONTEXT)		**Iteration 67** - Checked and recoded for Inatallation-Art #020 - #027 - #028 - #062 - #087 - #096 and for Magic-Fairy #087 - #082 - #079 - #076 - #067 - #068 - #065 - #066 - #030 - #028 - #015 - #010
	Magic - Fairy (TASTE/STYLE)		

(continued) – Table 6 – Summary of GVA Iterations and coding emergence for the entre database

#111	Bra (Body) (BODY PLACE)		Iteration 68 - New code under existing categories
#117	Iridescent(Resulting)(Interaction w.M.)(LIGHT COLOUR)		Iteration 69 - New codes under existing categories
	Iridescence (LIGHTING EFFECTS)		
	Iridescent (LIGHT SOURCE)		
	Crystals (Reflective) (MATERIALS)		
#122	Utilitarian (LIGHT SCOPE)		Iteration 70 - Checked all for Utilitarian - nothing recoded.
#131	OLED (LIGHT SOURCE)		Iteration 71 - New codes under existing categories
	Reflective (LIGHT SOURCE)		
#134	Multicolour(Resulting)(Interaction w.M.)(LIGHT COLOUR)		Iteration 72 - New codes under existing categories
	Slides (Diffusive) (MATERIALS)		
#142	Crown (Headpiece)(BODY PLACE)		Iteration 73 - New code under existing categories
#151	Ring (Hand) (BODY PLACE)		Iteration 74 - New code under existing categories
#153	Porcelain (Diffusive) (MATERIALS)		Iteration 75 - New code under existing categories
#162	Interference (LIGHTING EFFECTS)		Iteration 76 - Checked and recoded under Interference #142 - #141 - #143 - #077 - #057 - #045 - #156
#164	LED Strips (LIGHT SOURCE)		Iteration 77 - Checked all and recoded for LED Strips #011 - #012 - #051 - #052 - #053 - #060 - #064 - #073 - #077 - #104 - #138 - #140 - #149
#165	Resin (Diffusive) (MATERIALS)		Iteration 78 - New code under existing categories
#168	Metal - Gold (Solid) (MATERIALS)		Iteration 79 - New code under existing categories
#177	White - Retroreflective (Resulting)(Photoreactivity)(LIGHT COLOUR)		Iteration 80 - New code under existing categories
#180	Gemstones (Diffusive) (MATERIALS)		Iteration 81 - New code under existing categories

(continued) – Table 6 – Summary of GVA Iterations and coding emergence for the entre database

#185	Plastics (Reflective) (MATERIALS)		**Iteration 82** - New code under existing categories
#194	Iridescent (ARTEFACT COLOUR)		**Iteration 83** - Checked and recoded for Iridescent #117 - #141 - #145 - #185
#204	Colouring - See through (LIGHTING EFFECTS)		**Iteration 84** - New code under existing categories
#208	Orange (Resulting)(Interaction w.M.) (LIGHT COLOUR)		**Iteration 85** - New code under existing categories
#211	Aqua - Phospho (Resulting)(Photoreactivity) (LIGHT COLOUR)		**Iteration 86** - New code under existing categories

From the progression of the coding illustrated in Table 6, it is possible to see how the initial sessions were dense with new emerging codes, whilst with the advancement of the analysis, the emergence of new codes and Categories progressively decreased and the size of the sample of images analysed increased, whilst the interval between the significant Iterations became incremental. It is possible to observe this trend by cross-referencing Table 6 against the *Coding Timeline* memo (available in Appendix B-3).

The overall analytical process, from beginning until the final point of saturation brought me to analyse a total of 211 images, causing 86 rounds of significant Iterations (reviewing the entire database for re-coding previously coded data), of which 36 implying a restructuring of the node tree, with the final elicitation of 283 codes/nodes, comprising 249 descriptors, 14 Category, 17 Sub-Category and 2 Sub-Sub-Category codes (see Appendix B-2, B-3 and B-7 for more numerical and statistical details).

However, it is not the final aim of this PhD to investigate the implications of the analytical results of GVA for the understanding of the Lighting Wearables theme. This visual theme has been used as a case-study in order to illustrate the genesis and development of the method, to show its procedure and to test its functioning. It is undeniable that so many descriptive codes might provide a detailed perspective on the essence of the Lighting Wearables theme, especially if compared to the 11+9 criteria elicited from the IA. It is easy to imagine the multitude of possibilities that can derive by playing with the 'internal statistics' of

the analytical results in order to establish informed criteria for developing new design briefs and new jewellery practice.

As a matter of illustration and suggestion for possible further research[3], I will propose a brief digression by presenting few results.

LIGHT COLOUR QUALITY		
	Plain	170
	Modulated	41
LIGHT IMPACT		
	Soft	108
	Crude	66
	Harsh	23
	Average	14
LIGHT INTEGRATION		
	Absent - 1	61
	Slight - 2	48
	Medium - 3	40
	Total - 6	27
	Good - 4	19
	Very Good - 5	16
LIGHT SCOPE		
	Aesthetic	185
	Indicator	43
	Structural	21
	Utilitarian	3

Figure 60 - Extract from the Coding Chart (available in Appendix B-7)

Figure 60 shows a portion of the *Coding Chart* (available in Appendix B-7) summarising the numerical distribution of the codes for the various Categories, Sub-Categories and descriptor nodes emerged in the analysis of the 211 artefacts. As it is possible to see in this detail, under the *LIGHT COLOUR QUALITY* Category, 170 artefacts were coded for *Plain* and only 41 for *Modulated* (almost an 80%/20% proportion). This numerical result, even considering all the limitations of my personal biases or tendentious sampling strategies, confirmed a result intuitively grasped also during Stage 1 with the IA, that is the prevalence of 'crude LED colours' and the lack of modulation of the lighting emission in the majority of the artefacts reviewed. On the other hand, the analysis results brought surprising discoveries, such as the results of the *LIGHT IMPACT* Category

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[3] Most of this information, in the form of diagrams, queries, numerical results, charts etc., is available in Appendix B (and sections) and in the Nvivo database available for the examiners in the USB memory stick provided with this thesis.

(still in Figure 60), concerning the overall degree of 'roughness/softness' in the impact of light in the artefact, which showed an unexpected predominance of the *Soft* code, over the *Crude* and *Harsh* codes, even if combined, in total contrast with my preconceived idea of this code (notwithstanding the analysis performed).

A similar discourse can be made for the last two Categories in the Figure, where on the one hand the results of the *LIGHT INTEGRATION* Category confirmed the IA intuitive evaluation of 'Non-specific design', with a neat predominance of the *Absent* code (closely followed by *Slight* and then *Medium*), while, on the other hand, the results of the *LIGHT SCOPE* Category, surprised me with a staggering prevalence of an *Aesthetic* use of light, over the other codes, contradicting my instinctive (and rationalised idea of it)[4].

In a sense, by delving deeper and reasoning on these results, one might end up discovering—almost psychoanalytically—forms of cognitive dissonance by considering that the results of the analysis emerge from the evaluations of the same person that 'intuitively' might be apprehend the visual theme in the opposite direction. It seems like GVA, by forcing a very close focus on the details of the individual data, facilitates a progressive detachment from the pervasive influence of the 'overview', which is the typical trait of the evaluation 'at a glance' performed with the IA. This progressive distance allows to bring to the surface some of the hidden and implicit assumptions that were most likely working in the background, but were not recognised.

I will leave the continuation of these elucubrations to a possible future avenue for this research, delving deeper into the actual content and implications of the analytical results for the apprehension of a visual theme.

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[4] Please note that some of the Categories implied 'exclusive' coding (such as *LIGHT COLOUR QUALITY* – *LIGHT IMPACT* and *LIGHT INTEGRATION*, shown in Figure 60) meaning that one code *excludes* another. For instance, light integration cannot be *Absent* and *Slight* so it is either one, or the other. In fact, it is possible to derive small percentages from these codes, since the sum of all the descriptor codes equals 211, that is the total number of artefacts coded. Other Categories, such as *LIGHT SCOPE* can be coded 'inclusively', as, for instance the scope of light in an artefact can be *Aesthetic*, and also *Utilitarian*. In fact, the total sum of the descriptor codes of this Category exceeds the number of the artefacts coded, meaning that some images have required to code multiple times under the same Category.

The real conclusion on this PhD, and the core of Stage 2, has been the development and practical testing of a systematic method for performing preliminary visual analysis in the preparation stage of the design process. GVA represents the answer to the initial research problem and question and through this thesis I have demonstrated that it is a method that produces results and that it is worth further exploration in order to refine it and test it on a wider range of case-studies as it might become applicable on a range of design disciplines and not only.

I have demonstrated how the application of rigorous and systematic procedures has allowed me to bring to the open a wealth of taken for granted aspects of my subjective apprehension of a visual theme and to stimulate a higher level of Visual Sensitivity that can be reflected in a further refinement of the understanding of the implicit subjectivity itself. GVA draws from the original strength of Grounded Theory and can be used to enhance the reflective process, because of its intrinsic structure that forces the *explicitation* of every passage, and the consequent deepening of the subjective apprehension of many taken for granted aspects of the analytical process. This thesis has demonstrated how GVA can be used as a reflective method and a design tool in the broader context of the design process. It will be in the further development of this enquiry through post-doctoral research that this last aspect might be further investigated.

5.7 - Conclusions

In this Chapter I have illustrated the practical application and testing of GVA on a case-study, by reiterating the analysis on the Visual Archive on Lighting Wearables and following closely every step of the procedure.

The discussion has followed the initial strategic decisions in terms of sampling, the passages undertaken for the practical insertion of images into the database and the perfecting, through a process of trial and error, of a routine for the processing of each image to be analysed in Nvivo in order to be effectively repeated throughout the entire dataset. The chapter has proceeded by

illustrating, in great detail, the analysis of the first artefact, discussing the generation of the initial codes, and offering retrospective insights about how these codes were expressing specific analytical strategies of which I was unaware at the time of initial coding, but that became clearer after several iterations of GVA, thanks of the systematic and cyclical process intrinsic to the method.

The chapter has progressed in following similarly the coding process of more artefacts, until the coding progression took off and started to be driven by the emergence of the codes themselves. The retroactive aspect of the coding process has been evidenced, in terms of its influence on the generation of new codes, on the effects on the codes already assigned and on the deepening of personal Visual Sensitivity, allowing me to 'see' and to detect attributes in visual data that in previous rounds of coding were 'invisible', or implicitly taken for granted.

Through the repetition of the GVA procedure across the entire Visual Archive on Lighting Wearables, a point of saturation has been reached after the analysis of 211 artefacts, resulting in the elicitation of 249 descriptor codes, 14 Category codes, 17 Sub-Category codes and 2 Sub-Sub Category codes (more quantitative details are available in Appendix B and sections). These numbers alone are quite self-explanatory in demonstrating the depth and richness of analytical results provided by GVA, if compared to the 9 criteria for design and 11 for lighting effects obtained with the IA from the analysis of the same Visual Archive.

However, the real contribution of the testing of GVA has to be seen in the demonstration of the rigor, systematicity and explicitness in disclosing the analytical process and in the possibility to bring to the open a wealth of hidden and taken for granted aspects of the subjective apprehension around the analysis of a visual theme. The facilitation of a progressively higher level of Visual Sensitivity is inevitably poured back into the evaluation and apprehension of new data increasing the richness and refinement of the analytical results obtainable from it.

The chapter has concluded by briefly suggesting how the results (the codes, categories and sub-categories) deriving from PVR conducted using GVA could be interrogated, rearranged and combined to become the 'criteria' of new design briefs for the development of new design ideas and practice. However, this is not within the remit of this research, so it has been included and considered in Section 6.3 as a possible direction for future research.

This demonstrates, however, that GVA can be used either as a *reflective method*, to enhance and increase the levels of *subjective explicitness* on the processes and assumptions behind preliminary visual research and as a *design tool*, to facilitate the elicitation of a richer range of 'visual criteria' from the analysis of a visual theme, that can be subsequently re-elaborated through the development of new design briefs.

CHAPTER 6 - CONCLUSIONS

Introduction

This final chapter will give an account of the main conclusions, original contributions to knowledge, and avenues for future research deriving from this research.

Section 6.1 will retrace retrospectively the PhD journey, evidencing the fundamental passages in its evolution. It will consist of an evaluation, in hindsight, of how the initial project (Stage 1) — with different aims, context and methods — provided the core issues and dilemmas leading to the evolution of the research into a quest for a more systematic and rigorous method for conducting preliminary visual research (Stage 2), and ended with the adaptation of some of the procedures of Grounded Theory to form a new visual method, Grounded Visual Analysis (GVA).

Section 6.2 will list the most original aspects and contributions to knowledge that this research is offering, as discussed in deeper detail throughout the various chapters and sections of the thesis.

Section 6.3 will concentrate on what the outcomes of this research might suggest in terms of further research, exploring ways in which GVA might be developed and used in the future by myself and by other researchers and creative practitioners in a range of fields.

6.1 - A retrospective view of the journey

The initial aim of this research was to explore, by means of practice, the use of light as an innovative material in ways congruent with how other new materials had been used in Contemporary Jewellery design.

In Chapter 1, the original practice-based research remit was eventually renamed *Stage 1*, to distinguish it from *Stage 2*, where the enquiry took a practice-led turn (Candy, 2006; Creativity and Cognition Studios, 2016), in order to make explicit some of the aspects underlying the process of preliminary visual research. I provided an overview of the evolution between the two Stages,

framing both as stepping stones in a research continuum: Stage 1 providing the presupposition for the emergence of the core issues concerning the implicitness and lack of system in the method adopted in the preparation phase of the design process (IA), and Stage 2 appearing as a diversion for exploring alternative visual methods, progressively becoming the real core of the research, with the final ideation of a new visual method named Grounded Visual Analysis (GVA).

I have explained that this diversion, initially conceived as a temporary and instrumental detour for devising a better 'tool', with which to later resume the initial project, revealed a greater scope and potential for becoming a more significant and far-reaching contribution to knowledge, so that the focus of the whole research inevitably shifted to concentrate on it. This caused a change also in the research questions, context, and modality of research, moving from a practice-based exploration in the field of jewellery, to a practice-led interdisciplinary enquiry into methods for visual analysis.

I have characterised this thesis as a constant comparative discourse between Stage 1 and Stage 2, practice-based and practice-led research, crafts-based and methods-based enquiry, 'practical practice' and 'theoretical practice', the IA and GVA, mirroring with this dualistic structure the incessant dialogue and intimate questioning underpinning the development of the entire research process. I have stated my intention of discussing the progression of the enquiry following its true narrative, so that all the taken for granted passages, mistakes and naiveties belonging to Stage 1 (presented in Chapter 2 and discussed in Chapter 3) would be framed as an *overture*, preparing the grounds and sustaining the discussion about Stage 2, developed in the subsequent chapters.

I have argued my position with regard to the role of practice in research, proposing a distinction between 'practice as/in *studio* research' and 'practice as/in *academic* research' (Section 1.2), on the basis of different presuppositions and purposes between both ambits. As a consequence, I have asserted my position with regard to a different perspective, in terms of communication and levels of reflexivity, about corollary aspects of the processes occurring behind the creative process, with particular reference to the practice of preliminary visual

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research, where the core dilemmas leading to the development of GVA have been derived.

I have postulated that the difference between 'practice as/in *academic*' and 'practice as/in *studio*' research might be sought in different degrees of *explicitness* and *reflexivity* in the disclosure of aspects working in the background of the practice itself, and that for practice to be considered *per se* a form of academic research, these levels of explicitness and reflexivity might be extended, not only in regard to the illustration, evaluation and reflection *on* the practice, but also with regard to aspects *around* or *behind* that practice, such as the processes and assumptions underlying the so-called preliminary 'visual research'.

Chapter 2 has been entirely dedicated to the enquiry of Stage 1, ideally setting the scene and contextualising the rest of the thesis. The rationale for the practice-based research on the use of light as a new material in jewellery design stemmed from the observation of a remarkable lack of experimentation on the use and articulation of this element/material within the discipline, as opposed to the extensive body of work, practical exploration and research available on the use of almost any other, non-traditional jewellery material.

My long standing interest on lighting design and body adornment brought me to notice how the majority of examples of lighting jewellery I observed over time belonged mainly to non-specific jewellery disciplines and markets, such as Fashion, Textiles, Product and Industrial Design, novelty items, clubbing merchandise, and from the rapidly growing field of Wearable Technologies (or 'Wearables'). I have argued that these examples tend to be more *jewellery-like* objects, rather than precisely *jewellery,* as they remain somehow distant from the higher levels of refinement, subtlety and articulation in the design and use of materials that are typical of jewellery design. I pointed out also the scarce level of design integration between the two elements *light* and *jewellery*, since in the vast majority of cases I observed they had been treated as two distinct and independent entities, merely juxtaposed.

Within the Wearable Technologies landscape, given the necessity of making functional devices increasingly ubiquitous, by placing them on the

wearer's body, it is understandable the growth of a design trend aiming at creating a new form of hybrid products, aspiring to be technological devices *and* jewellery objects at the same time. Nevertheless, I have argued that the effective integration of the two entities *jewellery* and *technological device* has not been very successful yet, and that this attempt has been brought forward only from the technologists' perspective.

I have pointed out how the growth of the Wearables market — reaching its peak during the same years when this research developed — has added an extra layer of scope to the development of Stage 1's research: not only because of the under-exploration of light within the discipline of Jewellery Design, but also because of a lack of research in terms of aesthetic potential within the growing market of Wearables, where light has been utilised mainly as a functional feature.

I summarised the rationale underpinning Stage 1 in five points: *a)* the compatibility of light as a new decorative element for jewellery, for its aesthetic potential; *b)* the technological possibility, still to be explored, of introducing light features in small, jewellery-like, devices; *c)* the under-investigation of lighting in comparison to the over-exploration of other materials in jewellery design; *d)* the lack of research on light as an aesthetic feature in Wearables and *e)* the exploration of how to better integrate electronic devices with jewellery into new, hybrid artefacts, with a focus on aesthetics rather than functionality.

I identified, from the initial research question ('*How can light be used and articulated for designing Contemporary Jewellery*?*')* the two main Visual Themes to be explored: *New Materials Jewellery* (a contraction of 'Contemporary Jewellery' and 'New Materials in Jewellery') and *Lighting Wearables* (encompassing either the themes of 'Light as a material', and 'Wearable Light') and I discussed each of the four constitutive sub-themes in separate sub-sections, providing different perspectives to the context of Stage 1 research.

In sub-sections 2.3.1 to 2.3.4, I have presented the four sub-themes (A- '*Contemporary Jewellery Design*'; B- *'New Materials in Jewellery';* C - '*Light as a material*'; D- *'Wearable Light'*), pointing out a series of definitional issues related

to each of them, and concluding that, in absence of a an established set of rules or an extant theory defining and explaining the four visual themes, it might be possible to understand them inductively, attempting to grasp their essence by *ostensive definition* (Wittgenstein, 1967). That is, by pointing out at various examples of artefacts amassed thematically around these themes — already classified as such by authors, historians or gallerists — and attempting the elicitation of a set of recurring visual patterns, eventually forming a possible explanatory model.

From these presuppositions, I have presented in Section 2.4 the Intuitive Approach (IA), the method used for the development of the final practice in Stage 1. I have defined it as an empirical and non-institutionalised ensemble of unstructured procedures, relatively diffused in Jewellery, Fashion, Art and Design practice and education, consisting of a series of subsequent phases of image collection and extemporary, intuitive analysis.

In the IA, visual data around subjects or themes of choice, in the prevalent form of images depicting real objects, are collected and analysed on an opportunistic basis in progressive stages of refinement, allowing the emergence of intuitive categorisations. The elicitation of recurrent patterns, common denominators, or descriptive criteria linking the various images, is aimed at reaching a progressive clarification and subjective understanding of the most distinctive traits characterising the theme of interest. The criteria elicited from this form of analysis represent the backbone of an implicit and intuitive explanatory model for the visual theme, and they provide a set of references that can be re-contextualised and re-elaborated for generating new design ideas with attributes alluding to the subjects and themes these visual criteria were extracted from.

I have illustrated the use of the IA for eliciting the criteria underlying the main themes discussed in the contextual review: New Materials Jewellery and Lighting Wearables. My long standing interest in jewellery and lighting design did not allow me to start the IA process as a *tabula rasa*, as I had already amassed over the years several images into two separate Archives, one regarding

jewellery with non-traditional materials, and another containing images of lighting body adornment. I purposely selected from these Archives a sample of images for this research, on the basis of four criteria resulting from brainstorming sessions (Figure 28 p. 89): 1-Use of emitted lights; 2-Jewellery-like dimensions; 3-Wearable on the body and 4- Aesthetics over Functionality.

From the intuitive evaluation of the images amassed, I derived three recurrent patterns observable in the majority of the artefacts observed, representing, in my view, the main issues underpinning the evident 'primitiveness' in the integration between *light* and *jewellery*: 1- *Plain light emission-Crude LED colours; 2- Non-Specific design* and 3- *Invisibility in daylight.* (Section 2.4.3).

By reflecting on the issues embedded in these patterns, I established, by contrast, a series of rules underlying a new design brief for the development of new practice illustrated in Table 1 (p.101), consisting of a list of nine criteria for designing the new artefacts and twelve criteria for the exploration of lighting effects. After developing a custom-made power supply system for facilitating the studio testing and evaluation in real time of the different lighting effects in the model-making phase (Appendix A-2, *Master Control*), I developed an extensive range of experiments and test pieces, ending with 29 working jewellery artefacts representing different interpretations of the articulation of light, and providing a variety of responses to my initial research question. As previously mentioned, since the methodological shift of the research in Stage 2 has caused a detailed discourse on the jewellery practice to become peripheral, these final jewellery pieces have been only mentioned briefly in Section 2.5, whilst they are photographically documented in Appendix A.

Stage 2 began (Chapter 3) with the realisation that I had proceeded along my usual studio-practice routine, without questioning or reflecting enough on many aspects underpinning that same practice, that were far more relevant, in academic terms, than the jewellery practice itself, such as the documentation and communication of the design process, the explanation of the method, or an

explicit account on the passages I went through in order to formulate the design brief, or to elicit the final 'criteria' in Table 1 (p.101).

I realised that I could not, in fact, explain, justify, retrace and communicate any of these aspects, despite the fact that I produced 29 practical responses to my practice-based question. All I could say was that the IA had worked, as it always did. As for how it worked, to what form of knowledge or reasoning it was based on, I was at a loss.

In Chapter 3, I have presented the three main issues resulting from my reflection on Stage 1, the first being the evident lack of rigor, systematicity and explicitness in conducting the IA, particularly the stage of preliminary visual research (PVR) and the consequent inability of communicating or retracing exactly how I performed both image collection and analysis and how I came up with the final criteria for the design brief. The second issue was the sudden 'disappearance' of the 'New Materials Jewellery' Visual Theme and its automatic incorporation into the 'Lighting Wearable' theme. The third issue was the lack of awareness about a clear correspondence between the structure of the IA and the main models of the Design Process, which emerged later during the review of the methodological literature, that could have alerted me from the outset about the necessity of treating preliminary visual research as an integral part of the practice-based research I was about to perform, and not as a pre-conditional phase occurring 'outside' of the research remit.

In order to tackle the issues deriving from the reflections on the IA, I looked back at the work accomplished in Stage 1, in order to reconstruct the IA in its phases in search of alternative methods that could help me to refine the structure and rigor of my methodological approach.

I started by framing the IA within the design process, by searching the literature and comparing several models proposed by different authors, and by positioning preliminary visual research (PVR) along the first alternation of divergent and convergent thinking, according to the Double Diamond model of the design process (Design Council, 2015). I realised there was a structural similarity between the way in which I accumulated images in PVR, forming

progressively a sort of 'visiography' on a chosen theme, and the process of accumulation of written material to form a bibliography on subjects or themes of interest. The parallelism image/text accompanied my reasoning through the quest on methods for data analysis and I kept on using the text-based model as a guidance for reinterpreting and extracting more hidden aspects about my use of images. I followed the analogy between visual and textual data also in terms of the collection of material, reflecting on some organisational aspects of bibliographic archiving and referencing.

From these observations, I moved my reflections towards the search for an existing, established visual methodology that could resemble, or partially correspond, to the IA used in Stage 1. From a review on visual methodologies, I realised that I was moving into a completely different scenario since almost all the methods I explored did not consider or treat images in the same formal way as I did (as mere depictions of artefacts). I discovered also that the majority of these approaches were adaptations of methods borrowed from other disciplines, mainly from the Social Sciences.

This directed my search towards qualitative methods in the Social Sciences, where I saw interesting similarities between the IA and data-driven, emergent methods. In particular, I found the main source of inspiration in Grounded Theory, a method for emergent research that presented a very structured and elaborate set of procedures, which appeared to be suitable for attempting a translation into a visual context.

It is from reassessing the IA in the light of all the procedural and structural aspects of Grounded Theory, that a new method, Grounded Visual Analysis (GVA) has been progressively developed. I started from the presupposition that since the IA had proven on several occasions to be effective in terms of the results it produced, it needed to be re-structured and clarified, its passages to be retraced and solidified and the missing or weaker parts to be integrated and tidied.

I have presented this process in Chapter 4, where I analysed the main points of similarity between the IA and Grounded Theory, such as the iterative

nature of the process, the progressive refinement in the collection of data, the use of coding for eliciting patterns and categories and the constant comparative approach, and I also talked in detail about the points of difference.

The subsequent clarification and outlining of the GVA method in itself has been presented in both Chapters 4 and 5, where in Chapter 4 I have followed more theoretically the structural passages of Grounded Theory and discussed in detail how they have been adapted and translated to suit a visual context, becoming integral part of GVA, while in Chapter 5 the GVA method has been systematically applied and demonstrated in practice, using the 'Lighting Wearables' Archive as a case-study for better comparing the merits of the new method to what previously obtained with the IA.

Particularly relevant for this research is the parallelism between the analytical procedure applied to the images in the IA, the analytical procedure applied to textual data in Grounded Theory and how these two approaches are merged and treated in GVA.

I have illustrated, for instance, how the Visual Archives – that in the IA were simple thematic repositories of images without any established criterion for collection or internal organisation— in GVA have become the starting points for a deeper reflection on the concept of sampling and for the passage to a more systematic and organised system. I have explored different approaches to data sampling and I have questioned the criteria for the selection of the images in my Visual Archives (taken for granted and ignored in Stage 1) in order to establish a new level of awareness, therefore of 'explicitness', on the subjectivity and the limits of a new sample of images to be analysed with GVA. I have highlighted how the sample of the images specifically chosen for the analysis performed on Lighting Wearables could directly refer and expose my own subjective grasp and apprehension of that visual theme, and how it could provide additional clues for deepening reflective practice.

I have also discussed (section 4.3.3) the implications of the digital revolution on the content and management of my Visual Archives and how I have digitalised, purged and reorganised progressively the hundreds of images

populating the Lighting Wearables Archive through various sequential phases of image reassessment and reselection. This, in turn, has stimulated further reflections on how images had been collected and selected during Stage 1, as opposed to this phase of GVA, and how the simple process of re-evaluation of each individual image has brought to light a completely different level of awareness and mastery about them.

One of the turning points in this developmental process has certainly been the conceptual transformation of the Visual Archive into a Database. This shift, implying the introduction of a precise organisational structure for images to be retrievable, has automatically led to one of the most interesting aspects of this research: the 'lateral' reinterpretation of the use of QSR Nvivo®, a software designed for assisting researchers in the analysis of qualitative data, in this case to suit preliminary visual research in a design context.

Importing the images into Nvivo and devising a method for doing so has represented another crucial moment in the development of GVA, and in the progressive deepening of my awareness on the processes underpinning visual analysis. I had to consider, again, new dilemmas concerning data sampling, and to devise procedures for introducing each image into the software—as I would do with a bibliographic record within a referencing software—considering each entry with great rigor, precision and systematicity. This, multiplied by the hundreds of images in my Visual Archive, sparked the necessity of devising a strategy, and then a procedure, for optimising and reducing to a minimum the time that importing, inserting and 'bibliographically' identifying and tagging each image would require, even before the analytical process could start. This strategic decision led me to further reflect on more aspects of the sampling process, and to make a conscious decision about the selection and composition of my image groups.

At the same time, I tackled the approach on coding, one of the most interesting and innovative aspects of GVA, especially with regard to how to make it work in practice, how to manage and organise systematically the procedure of assigning *Codes* (*Nodes* in Nvivo), corresponding to the 'mental keywords'

vaguely assigned subconsciously in Stage 1, and transforming them into a hierarchical structure of Nodes, Categories and Sub-Categories.

I have discussed my approach to coding more theoretically in Chapter 4 (Section 4.3.4) and I have shown how this has been translated into practice in Chapter 5, working directly on the images taken from the Lighting Wearables database. This is where the real core of GVA can be found and where the *explicit subjectivity* of the method is fully expressed.

I have illustrated this process very closely, following it step by step, almost as if done in real time, starting from the first artefact (#001) (section 5.2) and I have discussed individually the initial codes emerged from the analysis, in the light of the 'revealing' nature of GVA, showing its effects right from the start.

I have retraced and made explicit also the reasoning behind the initial codes, deliberately retracing my naïve apprehension about them at the moment when they were generated (coming straight from the levels of total unawareness and implicitness of the IA) and adding more comments retrospectively, in the light of my conclusive, enhanced perception on the analytical process and on the results obtained from the entire image database. I commented on how even these initial, instinctive codes were concealing more complex and implicit assumptions about the apprehension of the image, of which I was completely unaware, that punctually were revealed by the application of the GVA process, bringing them out in the open, and giving me the chance to *actively* use them as new reflective stimuli and cues for progressing to a more refined and richer level of analysis.

I showed how the reflection upon the initial codes brought me to recognise a higher level of more generalised attributes, that allowed me to shape immediately a basic hierarchical structure, developing new 'parent' codes representing the Categories, intended as the 'conceptual families', of which the initial codes were the 'child' units, or Descriptors. At the same time, once the initial Categories were established, it was necessary to readjust some of the nomenclatures and hierarchical attributions of the initial codes, in a process that revealed the retroactive effect of coding.

This 'Iteration' consisted in routinely re-evaluating all the previously analysed images in the light of each new Code, Category or Sub-Category emerging from the analysis of further images. It might happen that, by re-examining all the previously coded images, no correspondence could be found to the new codes, but, more interestingly, it might happen that this correspondence would be found, thus revealing that each new code disclosed some visual aspect of the artefact that was present from the beginning, but that was not perceived (and coded accordingly) during the original round of analysis.

This means that by making explicit each step of the analytical process, and by circularly reflecting and re-evaluating the visual data, according to the emergence of new codes and categories, it is possible to develop a virtuous circle where the increasing depth and richness of the analytical process is mirrored by the parallel growth in depth and richness of the Visual Sensitivity (4.3.1) of the designer/researcher. In other words, the GVA process itself allows the user to progressively develop higher levels of awareness and explicit perception about increasingly subtler aspects of the visual data that, otherwise, would remain implicit, concealed and unavailable.

At the end of the first Iteration, I had elicited 12 descriptor codes and 9 Category codes for only *one* image analysed, whilst with the IA I obtained similar numbers (9 'criteria' for the artefact and 12 for the lighting effects) from the analysis of an entire Visual Archive.

I have furthermore demonstrated the functioning and impact of the repetition of more Iterations in the process of coding, through the detailed illustration of the coding process of the first seven artefacts (section 5.4), following step by step the spiral-like, retroactive and reflective path of the various Iterations sparked from the new codes emerging from these images, and discussing the cumulative effect of these continuous re-evaluations on my perception and interpretation of the visual data. At the conclusion of the coding of seven artefacts I had elicited 64 descriptor codes, 13 Sub-Category codes and 11 Category codes.

Another demonstration of how the application of GVA stimulated the growth of my Visual Sensitivity, can be found by comparing the quantity of codes elicited from the first 7 images at the moment of their effective analysis and the quantity of codes that these same images had acquired at the end of the analysis of the entire database (Table 5, section 5.6). This discrepancy is justified by my growing ability to 'see' attributes in these images that at the outset of the GVA process were invisible to me.

GVA has reinforced the progressive growth of my reflexivity and sensitivity with regard to the visual theme I chose to analyse, enabling me to reassess with increasing precision and detail aspects of the images that, with an implicit method such as the IA were, at best, only *felt*, and could never function *actively* as further stimuli for reinforcing the same reflexivity and sensitivity with regard to the analytical process and the visual theme itself. GVA has stimulated a self-developing and self-discovering process as well, thanks to the cumulative effect of the circular repetition of the coding iterations and the systematic application of the process.

The analysis of the rest of the images forming the database progressed by routinely applying the GVA procedures with rigor and systematicity, and repeating meticulously the same passages illustrated in detail for the initial images. Each round of analysis and coding has been documented through the digital trail provided by the software and by a combination of digital and manual tools for keeping track, organising and managing the exponential growth of the emerging codes against which each image had to be assessed and repeatedly re-assessed.

The overall analytical process, from beginning until the final point of saturation brought me to apply and repeat the GVA process on a total of 211 images, causing 86 rounds of Iterations throughout the entire database, with the final elicitation of 283 codes/nodes generated (corresponding to the 'Criteria' of the IA), of which 249 Descriptor codes, 14 Category codes, 17 Sub-Category codes and 2 Sub-Sub-Category codes (see also Appendix B for quantitative results).

The interest and logical conclusion of this PhD, though *is not* to be found in the results obtained from the GVA analysis *per se*, or in how such a quantity of Descriptors, Categories and Sub-Categories might provide a more detailed account, or a sharper picture, of the essence of the Lighting Wearables theme. It is undeniable that so many descriptive codes most likely do reveal what can be sufficient for developing a design brief and a series of jewellery artefacts successfully responding to the initial research question, similarly to what was obtained with the very few criteria resulting from the IA. In this sense, it is plausible to presuppose that so many more visual codes resulting from GVA, representing a superiorly fine-tuned analysis on the visual theme of Lighting Wearables, could be even more effective in multiplying the possibilities of their re-combination, re-elaboration and further development into new design ideas, briefs, and jewellery practice.

However, the real conclusion of this PhD has to be referred to the core of Stage 2, where the research problem focused on the development of a more rigorous and systematic method for conducting preliminary visual research, allowing me to stimulate and enhance my reflective process by rendering explicit and clearer many assumptions underpinning the practice of visual analysis in the preparation phase of the design process.

The real crux of the conclusion of this research, therefore, stands in having demonstrated how the rigor, systematicity and explicitness of each passage of GVA has allowed me to bring into the open a wealth of hidden and taken for granted aspects of my own subjective apprehension around the analysis of a visual theme, making explicit many assumptions underlying my approach to visual research and facilitating a progressively higher level of Visual Sensitivity and insight that, in turn, I could put back into the evaluation and apprehension of the visual theme itself, increasing the richness and refinement of the analytical results obtainable from it.

The passage from the 21 (9+12) 'visual criteria' catching the essence of Lighting Wearables in Stage 1, to the 282 (249+14+17+2) criteria describing the same visual theme in Stage 2, is practically self-explanatory in demonstrating the

shift in depth, breadth and analytical sensitivity occurred during the GVA process. However, the analytical richness that GVA facilitates 'numerically', as a *design tool*, depends and derives from its original strength as a *reflective method*, because of its intrinsic structure forcing the *explicitation* of every passage, and the consequent deepening of the practice of reflection about many taken for granted aspects of the analytical process.

The main merit of GVA as a *reflective* method is, therefore, to enhance and increase the levels of *subjective explicitness* on the processes and assumptions behind preliminary visual research, while the merit of GVA as a *design tool* is certainly to facilitate the elicitation of a richer range of 'visual criteria' from the visual analysis of a given theme, that can be subsequently re-elaborated into new design ideas.

6.2 - Original contribution to knowledge

The main original contribution to knowledge that this research proposes is the development of Grounded Visual Analysis (GVA), a new method for preliminary visual research, for the systematic collection and analysis of images, treated as visual data, and the inductive elicitation of recurrent descriptive and explanatory patterns underpinning the subjective apprehension of the visual themes of which the images are treated as instances. This method presents two principal aspects that have been discussed throughout the thesis, each reflecting a different application and claim of originality of this research: 1- GVA as a *reflective method*, to enhance subjective explicitness in visual research and to increase Visual Sensitivity in the apprehension of visual data; and 2- GVA as a *design tool*, for the elicitation of recurrent visual patterns in the preliminary phase of the design process and the subsequent development of new design briefs and ideas.

In terms of the first aspect, GVA as a *reflective method*, the application of GVA on a case-study—seen as the retracing, on a deeper level, of the same route travelled with the IA in Stage 1—offers an original contribution to knowledge in

the unravelling and explicitation of a wealth of submerged and tacit aspects behind the practice of preliminary visual research: implications of tacit knowledge; impact of visual sensitivity; problems with sampling, image collection and image analysis; dilemmas about coding; issues with managing and organising large quantity of visual data; questions about the role of images; choices about database management; choices in categorisation and organisation of the analytical process etc. The progressive revelation and reflection on these dilemmas, and implicit aspects, has sharpened my awareness with regard to some underlying assumptions behind my practice and it has allowed me to devise a series of solutions, eventually organised into a systematic method, tackling all these problematic aspects, that were present even in Stage 1, but that I had not consciously taken into account.

These problematic aspects, having been exposed (and tackled through GVA), do represent a series of factors that the community of peers should take into account when conducting 'visual research'. They might represent, as well, a stimulus for individual reflection on creative practice and for the possible development of alternative interpretations and new methodological solutions.

The reflection on all the passages conducted in Stage 1 has also allowed to retrace the original, unstructured IA method, and to schematise it. Being the IA, in its range of versions and variations, a widely utilised approach in studio, educational and professional creative practice, this schematization represents a corollary contribution to knowledge, useful for raising the awareness of researchers, designers and practitioners in all disciplines about the existence of many taken for granted assumptions and procedures underpinning so-called 'visual research'. This should promote the extension of the concept of practice in academic research to include also the explicit documentation and enquiry on the reflective processes and approaches related to the preliminary phase of the design process.

As for the second aspect, GVA as a _design tool_, this research has demonstrated that GVA is an applicable and working method that could also be used during the fact-finding, or preliminary phase of the design process. GVA

facilitates the elicitation of a variety of recurrent visual patterns in the analysis of images and artefacts, that can be re-used and re-elaborated at a later stage as visual references or design criteria for developing new briefs and ideas. The application of GVA has demonstrated that the method stimulates the emergence of a wider and richer set of visual patterns, if compared to the set obtained through the application of a more empirical, but implicit and unstructured method (IA), and that these patterns can work either as stimuli for deepening the reflective process (leading to the iterative elicitation of even more patterns) and as visual references for developing the subsequent phases of the design process.

There is also a variety of other original aspects of this research that have been interpreted in the context of jewellery design that, in the light of the interdisciplinary nature of this PhD, might have a reasonable chance to be seen as secondary contributions in a wider range of design-related disciplines (if proven by further application and testing).

For instance, this research offers a creative and 'lateral' reinterpretation of the use of QSR Nvivo®, a software package widely used in the Social Sciences, through a specific strategy and a set of procedures for the adaptation of its functionalities to the collection, coding and analysis of images, from an art and design perspective. This represents a contribution to visual methodologies in art and design and in the ambit of computer-assisted qualitative data analysis. The practical demonstration and application of GVA in the case-study on Lighting Wearables thoroughly illustrated in Chapter 5 works as an in depth instruction manual offered either for illustrating the step-by-step procedure of conducting GVA on a visual database, and for the practical use of QSR Nvivo® on visual data in a creative context

This research has also offered a series of practical examples and strategies for collecting and archiving visual material, in particular by showing the shift from keeping a physical Visual Archive to a fully digital and organised Database. It has also shown a creative approach on the use of Pinterest (2017) as a tool for facilitating the processes of image collection, sampling, archiving and database preparation.

Moreover, the specific codes, categories and sub-categories resulting from the practical application of GVA on the Lighting Wearables database, represent a subjective taxonomy on the phenomenon of Lighting Wearables that can be used and reinterpreted as a set of ready-made visual references and starting points for the development of new design ideas and briefs in the fields of Wearables, Lighting and Jewellery. The specific 'conceptual families' (categories and sub-categories) elicited from the GVA analysis on the Lighting Wearables database, cover a rather exhaustive range of visual traits applicable to jewellery design in general terms (even outside the specific ambit of Wearable Lighting) and they can be used as pre-set categories and sub-categories for rapidly guiding the initial coding of new samples of visual data related to Jewellery.

GVA derives from a reinterpretation of some procedures of Grounded Theory to suit a visual and creative context, so it contributes to the transfer of knowledge from the Social Sciences towards the creative fields of Art, Crafts and Design. It is a further example of a creative application of the original Grounded Theory method, that has inspired several interpretations throughout a range of fields of research. This research contributes to the interdisciplinary integration between methodologies in Art and Design and qualitative methodologies in the Social Sciences.

Finally, the practical production of jewellery models at the end of Stage 1 represents a contribution, by means of practice to the interpretation of the use of Light as a new material in ways consistent with the use of other innovative materials in jewellery design. The 29 jewellery artefacts produced represent a range of possible solutions for the design issue of the 'primitiveness' in the integration of the elements 'lighting' and 'jewellery' and can be considered secondary contributions to knowledge offered to the fields of jewellery design and Wearable technologies.

6.3 - Recommendations for further research

The developmental nature of this PhD has mirrored the evolution and progression of a personal and academic journey, expressed through the passages from a high-gear start, followed by a sudden crisis and loss into "the mess of research" (Cook, 2009) ended with a progressive clarification on my direction and methodological approach with the development and testing of GVA as my original contribution to knowledge.

It is almost inevitable that, during this complex experience, many aspects in the evolutionary process have been left behind, some passages have been possibly brushed *en passant*, and there are many possibilities for deepening or exploring tangent avenues, or for progressing further into the methodological direction initiated by this research. In an ideal Stage 3, I would definitely know where to go from the start and I would likely move along a straight line.

I will summarise below, in a list of bullet points the possibilities I envisage for developing further research and for possible corollary projects deriving from the work produced in this PhD.

- The next logical step, as discussed in the thesis, would be to 'spiral back' to the starting point, and to resume the initial practice-based objectives of Stage 1 in the light of the results obtained with the practical testing of GVA. Using the richer set of visual criteria obtained with GVA, it would be interesting to proceed in the next stages of the design process, to reformulate a new design brief, to develop new design ideas and to return in the studio for producing a new range of Lighting Jewellery artefacts. The richer and wider range of newly found codes, categories and sub-categories represents a more articulated set of design references, that can be used, as I did in Stage 1, for completing the design process during the next phases of *Idea* finding and *Solution* finding (Osborn, 2006). It would be interesting to examine how this increased richness in descriptive patterns might be reflected in the new practice, and to investigate how and if light could be modulated in ways even more complex and integral to the jewellery object.

- A new practical case-study on the application of GVA could be developed, similarly to how the method has been applied on the Lighting Wearables database, on the New Materials Visual Archive ('disappeared' from the reasoning in Stage 1). This is another aspect to be logically pursued for giving an ideal closure to the cycle Stage 1→Stage 2→ Stage 1 initiated with the IA in Stage 1. Having amassed thousands of images in the Visual Archive on New Materials in Jewellery, it will be interesting and useful to repeat the entire GVA process on it, in order to test the method a second time on a theme of similar nature. This will allow the analytical results to be poured back into the original practice-based investigation on 'Light as a New Material for Jewellery', and at the same time, it could be an occasion for reassessing the effectiveness of GVA, to fine-tune and possibly improve its procedures, and to test a second time its effects and merits either as a reflective method and as a design tool.

- Further research could subsequently be developed around the application of GVA on more—and progressively diverse—case-studies moving from the Jewellery context into new and neighbouring disciplines, such as fashion design or textile design, and shifting towards other design fields, such as architecture or industrial design. This will allow the further perfecting, and possibly streamlining, of the complexity and time requirements of certain passages of GVA, and the testing of its suitability and applicability in other design contexts, outside of the jewellery field. This could imply interesting collaborative projects where GVA could be approached by other designers and artists who could, in turn, contribute to the fine-tuning and inclusion of functionalities and procedural solutions that might be relevant to their discipline-specific needs and that I would possibly not imagine by working only on my own projects.

- Another interesting avenue to be explored concerns the improving and customisation of the software utilised for performing GVA, in order to implement new and suitable functionalities specific for the analysis and treatment of visual data within a creative context. This project could be

pursued in direct collaboration with QSR, the owner and developer of Nvivo, for the introduction of these specific features in future releases of the software, or in independent research projects funded separately, by developing a new, original database management software specifically designed for performing GVA.

- Another logical step for the further development of this research consists of sharing and communicating the results obtained so far by focusing on the dissemination through the re-elaboration of the content of this thesis in the form of academic articles and papers to be submitted for publication and for contribution to academic conferences, symposia and exhibitions

- More case-studies on GVA application could be developed and retrieved by disseminating the method in educational, academic, industrial and professional contexts through lectures, seminars, webinars and the development of specific courses, where the GVA could be illustrated and applied on a variety of design projects, and feedback could be obtained for further refining and streamlining its procedures.

- This research has highlighted along the entire discussion the constant parallelism and notable similarities between the treatment of visual and textual data from several points of view, and this intuition could be influential and useful to other researchers, especially within the Art and Design fields, where specific methodologies need to be developed, tested and researched, who might want to explore how other extant and established methodologies for textual data analysis could be translated and adapted to suit a visual and creative context.

- The practical results obtained by the testing of GVA on the Lighting Wearables database have provided a considerable body of field-specific knowledge and expertise with regard to the combination of electronic technologies applied to wearable artefacts. Given the exponential growth of the Wearable Technology market, the increasing need to merge this field with the more aesthetically appealing field of jewellery design, and the

recommendations by the market analysts, I envisage possible developments of this research through consultancy and collaboration with Wearable Technologies companies for the integration and improvement of the aesthetic and jewellery-like aspects of smart, technological devices.

- As a last recommendation, it would be interesting to reframe this PhD as a stage of a larger research project, where other aspects of the Intuitive Approach could be retraced and structured, not only through personal practice, but also through a wider investigation that could involve the practices 'behind the closed doors' of other artists, designers and practitioners. Similarly to how this PhD has been focusing on the preliminary stage of the design process, it would be interesting to attempt a translation into applicable methods of other intuitive and implicit practices that are known and common in everyday studio settings but that remain somehow distant from the rigorous outlook of academic research.

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APPENDIX A - MORE ON STAGE 1

Appendix A-1 - Development of Practice

The stage of practical experimentation resulted in the production of 29 working jewellery prototypes, demonstrating progressive degrees of development and inclusion of the design criteria elicited from the analysis of the Visual Archive (Table 1, p.96). These prototypes were exhibited internationally and presented in front of peers in the fields of Art, Architecture and Design in research conferences and seminars, where positive feedback was obtained on the successful integration of the element 'light' in ways consistent to the use of other innovative materials within the field of Jewellery. Suggestions were also received on the possibility to transform these models into large-scale artefacts for interior design and installation art. Considering the fact that I initially approached the field of Jewellery by recontextualising small-scale versions of larger objects conceived for installation art and interior design, I take those comments as a further proof of the liminal nature of Jewellery, or at least of my jewellery.

The final prototypes were the result of a series of iterative and progressive phases of design development, where each round of practice was built on the experience and knowledge derived from the outcomes of the experiments preceding it. The increasing level of refinement in the use and articulation of light is demonstrated by the progression of the artefacts here presented in their chronological sequence of development, through the passage between the initial tests, then the first models (the *Layers* series), progressing through the intermediate pieces (*Interference*, *Paper*, *Urchins* and *Transmission* series) until the final pieces (*Nebulae* series), where all the previously explored and 'discovered' lighting effects and materials' interactions were combined and deployed simultaneously.

The practice-based project was supposed to progress through a second round of practice, in order to develop even more complex work for the final submission, but, along the process, the dilemmas on the visual method adopted started to become predominant and the shift to Stage 2 slowly took place. These practical experiments remain as part of this research journey and will lead in the

future to additional projects where more advanced lighting effects will be applied ad tested in the design of jewellery.

Appendix A-2 - Master Control

In order to test the lighting effects with the correct light intensity, I needed a specific power supply that could be versatile enough to be used during the model-making phase of the design process and adaptable enough to suit almost all models, despite their final form. The solution was found in starting a separate side-project and to develop what has been nicknamed *Master Control*[1].

Master Control is a form of 'universal' rechargeable power supply with a circuit specifically designed for the type of LEDs and electronic components used for this project, functioning as a temporary replacement for the basic electronic circuitry that each test-piece would eventually enclose. It has been conceived for serving as a ready-made, adaptable power supply for studio testing and experimentation, allowing me to freely modify and assess on the go new lighting effects on jewellery models without the necessity to build a fully functioning customised circuit for each of them. In this way, each new model could only enclose the light sources (LEDs in this case) appropriately positioned, with cables and a simple connector, greatly simplifying some of the main technical issues related by the peculiar nature of light as a material (as illustrated in section 2.3.3).

This idea comes from the necessity of concentrating, in the initial stages of the experimentation, on the design of the artefact and on the lighting effects obtainable, and not on the complexity of integrating a final electronic circuit with a different design for each test piece. The necessity of evaluating with a reasonable degree of 'immediacy' the lighting effects on a mock-up model during the experimentation stage, made the resolution of this problem alone a fundamental step, despite a necessary incursion into the realm of electronics, a field very distant from the world of jewellery.

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[1] The name Master Control is an inside joke derived from MCP, Master Control Program, the main antagonist in the motion picture *Tron* (Lisberger, 1982).

The dependence of the element light on technical and electronic components makes the designing with this material extremely indirect and time consuming.

This complicates the creative process, whilst in the experimentation phase it calls for immediacy, impetus and instant satisfaction. There is no improvisation with light. A very high level of imagination is required in order to endure a creative process that literally remains a constant hypothesis until it can be practically tested, very often showing the real results (not rarely full of surprises) only during the final stages of design finalisation.

It is more likely that the object will be constructed and finalised, and the electronic parts designed, fitted and adapted, before the final effects might be fully examined in all their potentialities. Having the possibility of testing the light effects at the same time when the object is designed and built via a calibrated external power supply is a huge creative help. Master Control has been the indispensable tool allowing every phase of experimentation process to be checked and tested while working, allowing to test the light effects while creating them. It has been an integral part of the process of reflection in action.

The tests shown in the following figures the method I used for working and evaluating the lighting effects before designing and building the Master: one LED and one button battery, manually placed below or hehind thetest piece at hand, closing the circuit with my fingers, and quickly checking the lighting effects on any dark spot available,be it inside a cupboard, or underneath my desk The following figures show how the new tests have been approached with the use of Master Control.

Figure 61 - Nylon Stocking, LED, handheld battery

Figure 62 - Paper, acrylic, handheld battery

Figure 63 - Porcelain, LED, handheld battery
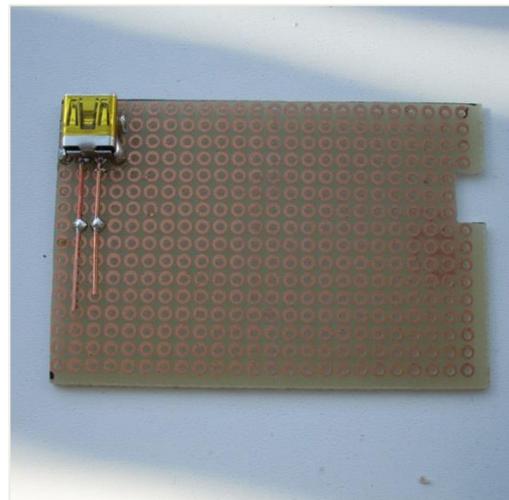
Figure 64 - Master Control building on PCB
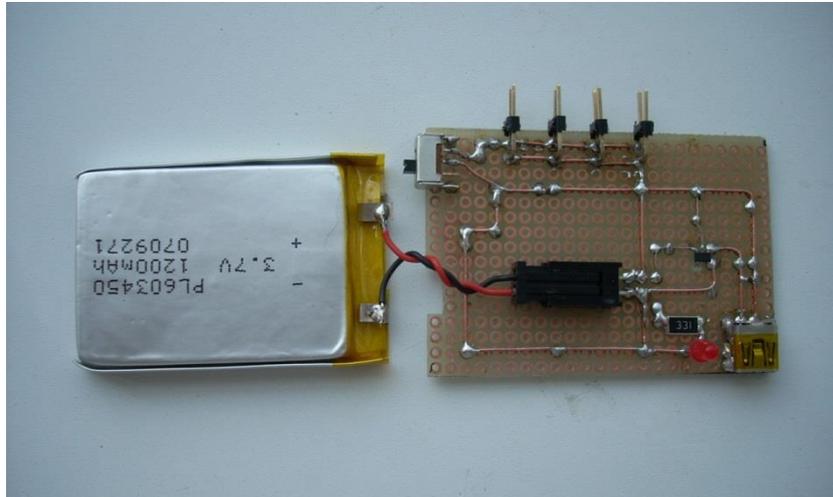
Figure 65 - Master Control finished and assembled
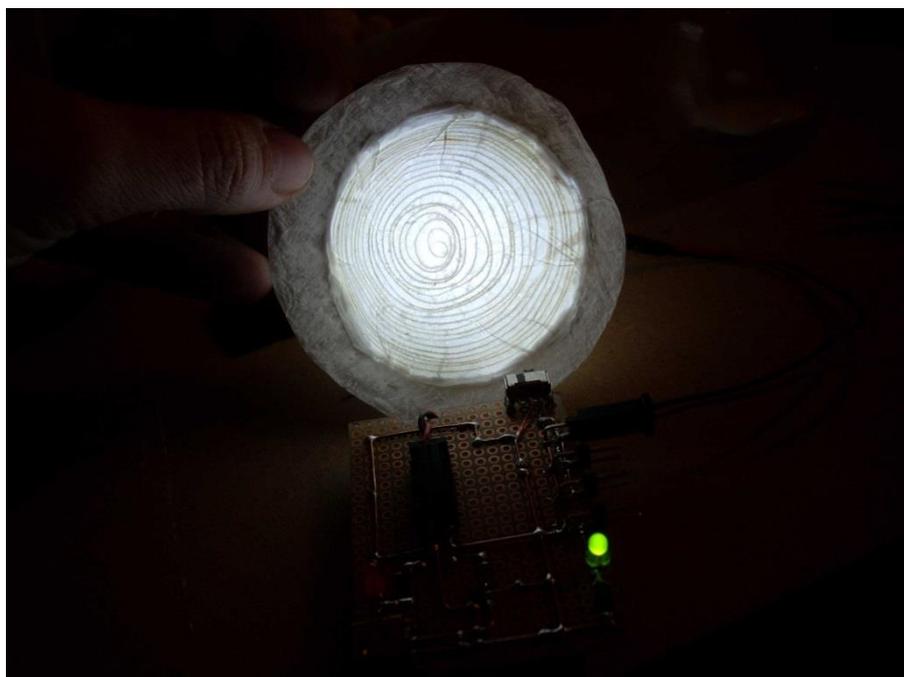
Figure 66 - Master Control in operation, connected to *Spidersilk* - Paper series.

Appendix A-3 - Initial Tests

Figure 67 – Mould making - porcelain slip casting

Figure 68 - Shaping paper cocoons

Figure 69 - UV testing invisible ink
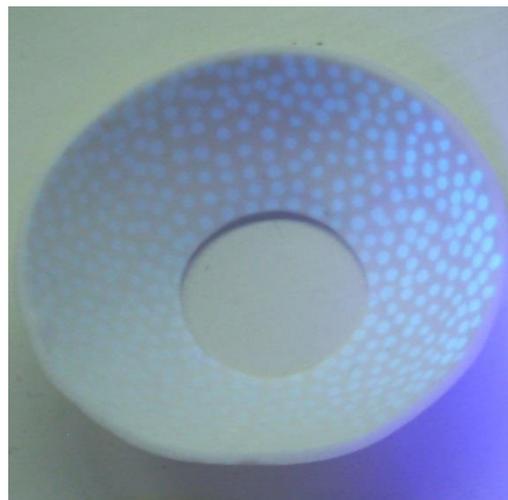
Figure 70 - UV testing invisible ink

Figure 71 - UV reactive invisible ink (no UV)
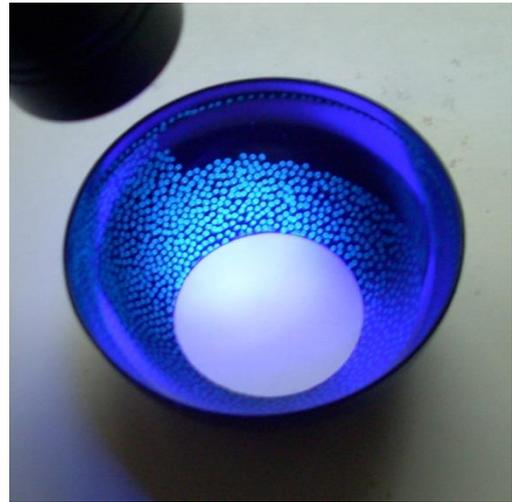
Figure 72 - UV reactive invisible ink (with UV)

Figure 73 - UV testing invisible ink

Figure 74 - UV testing invisible ink

Figure 75 - Porcelain, silver – *Disco Volante*
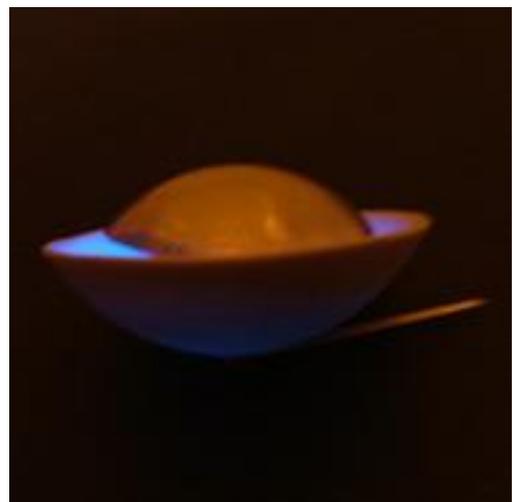
Figure 76 – *Disco Volante* - side view
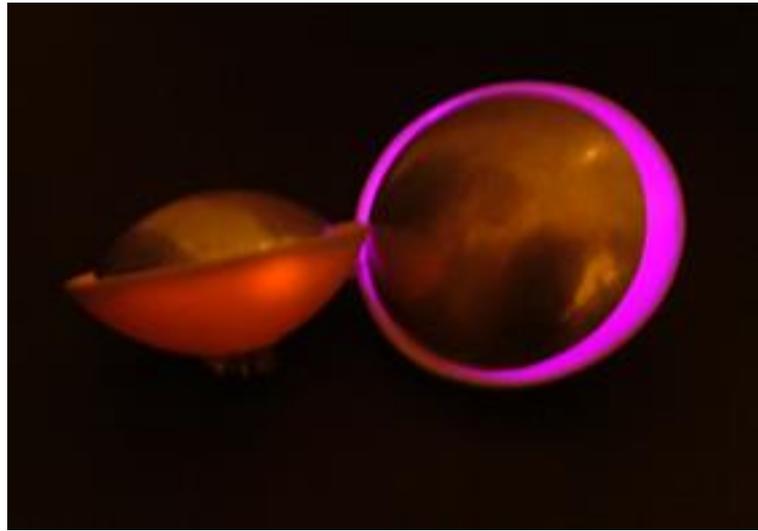
Figure 77 - Porcelain, silver – *Dischi Volanti* - brooches

Figure 78 - UV ink – light below
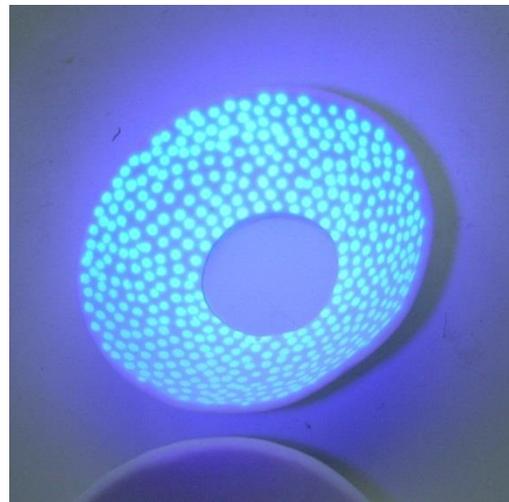
Figure 79 - UV ink - light above

Figure 80 - Indirect colouring test

Figure 81 - Indirect colouring test
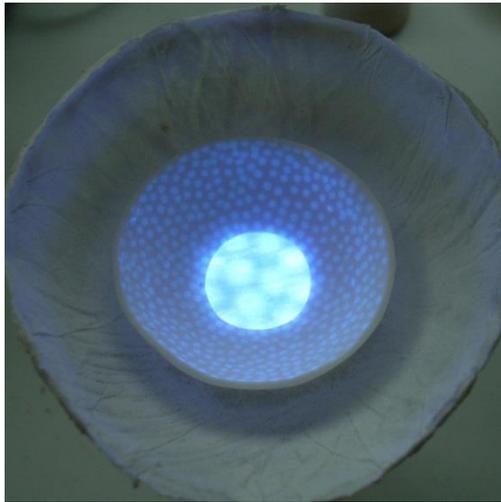
Figure 82 - Composition test
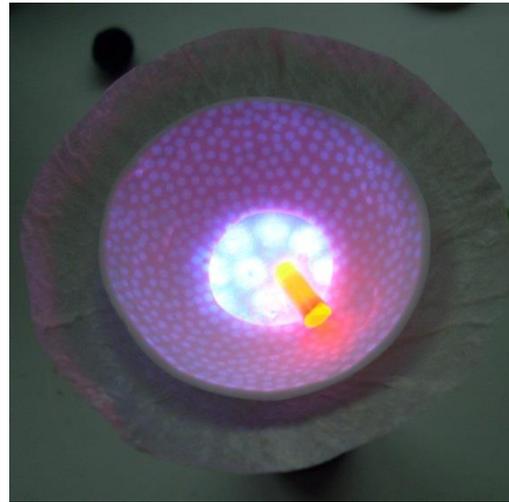
Figure 83 - Composition and indirect colouting
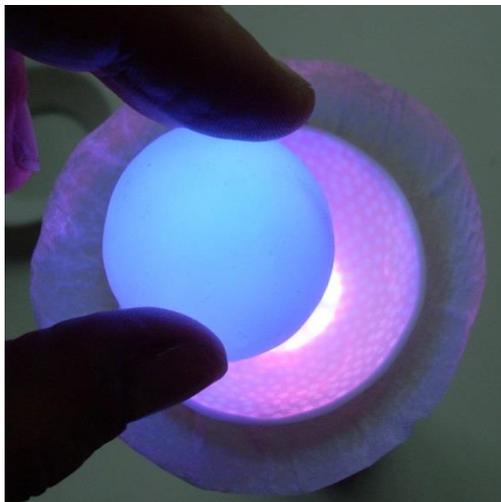
Figure 84 - Shielding and diffusing, indirect colouring
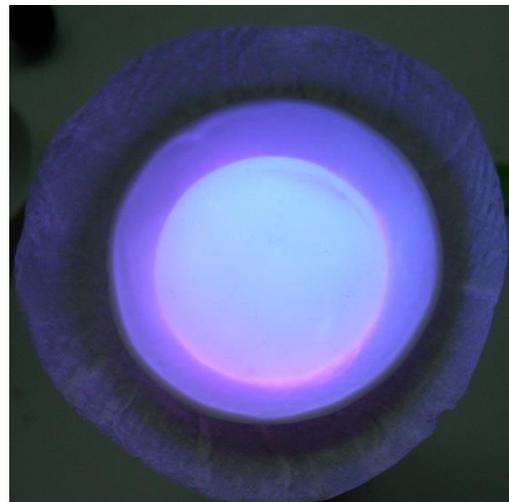
Figure 85 – Paper, porcelain, UV ink, polymer clay, acrylic, indirect colouring

Appendix A-4 - Layers

The first set of experiments aim to test the diffusive properties of lightweight materials such as paper and fabrics. The pieces have been designed around the idea of a single, white LED as a unique light source and a circular, symmetric structure layered on top of it for testing out the diffusive effects of various materials, in different combinations of layers and relative positions.

Figure 86 - Gauze layering and shaping

Figure 87 - Silk organza layering and shaping

The experiments have included several qualities of paper : tissue paper, kitchen paper, toilet paper, standard 60 grams paper, 90 grams paper, 120 grams paper, black cardboard and some qualities of fabric such as silk organza, cotton gauze, nylon microfiber and cotton jersey.

Each material has been shaped in domes or cocoons of different diameters, functioning as light diffusors or containers, placed directly or indirectly over a light source or on a point of light dispersion. The domes have been tested in several combinations of layers: single, double, triple, and so on, until the extreme case of twenty-four layers for the bigger domes of tissue and toilet paper, subsequently used as supports for some of the finished models.

The tests in Figures 88, 89 and 90 represent the same experiment on light diffusion, performed on three different models realised with silk organza, kitchen paper and cotton gauze. Each model has a single light source, a white LED set on

a lower concave dome, covered with a convex dome of the same material, diffusing the majority of the LED light. On top of it, two or three levels of smaller, convex domes in different combinations of layers have been placed on top of each other.


Figure 88 - Silk organza - Diffusion with various thicknesses and layers
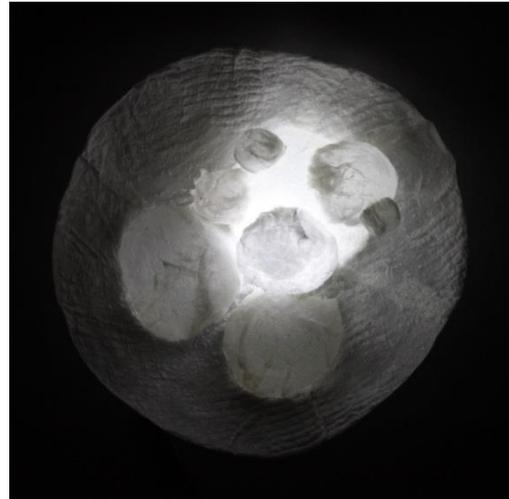

Figure 89 - kitchen paper - Diffusion and layering on multiple levels
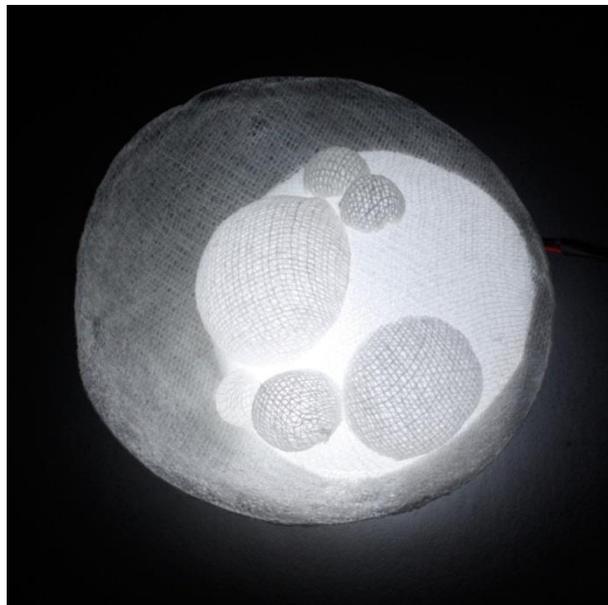

Figure 90 - Cotton gauze - Diffusion and layering on two levels

Appendix A-5 - Interference

These two experiments deal with the reflective properties of the glossy plastic domes surrounding the central convex domes diffusing light and the interference created by non-transparent materials placed in between layers of translucent or transparent materials. The concave domes shown are black and white PVC, while the convex domes diffusing lights are made out of PVA glue, intentionally kept bubbly for additional texturing with coloured cotton thread embedded in between as a decorative interference.


Figure 91 - PVA glue and cotton thread - Making

Figure 92 - PVC, PVA Glue, Cotton Thread, bubbles

Figure 93 - PVA glue and cotton thread - Making
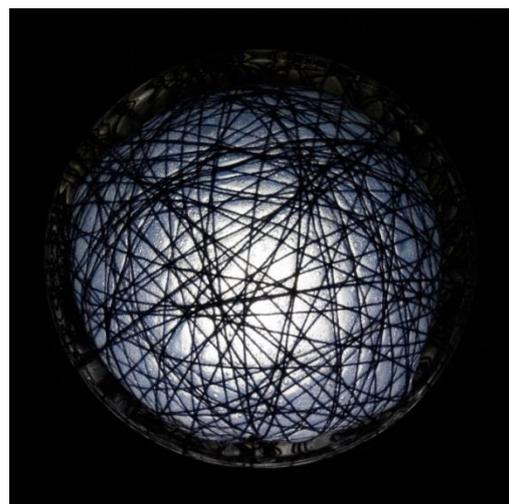
Figure 94 - PVC, PVA Glue, Cotton Thread, bubbles

Appendix A-6 - Paper

New effects have been tested using paper only in combination with other lightweight materials. Diffusion, colouring, interference and reflection have been obtained through indirect effects, always using a white LED source. The piece shown in Figures 95 and 96 is made out of several layers of tissue paper. The dark paper dome consists of fifteen layers of handmade dark paper, containing all the light and preventing any dispersion from below. The light LED is covered by a white tissue paper dome, whose internal surface has been layered with a decorative motif of coloured tissue paper. Several smaller convex paper domes have been internally painted with watercolours and placed on top of the main dome. When the piece is unlit it appears white (Fig. 95), but when it is turned on, it shows the colours resulting from the interaction between the white light source and colours trapped between the paper layers. This is a further development of the idea brought forward from the Interference series.

Figure 95 - Paper, watercolour, unlit
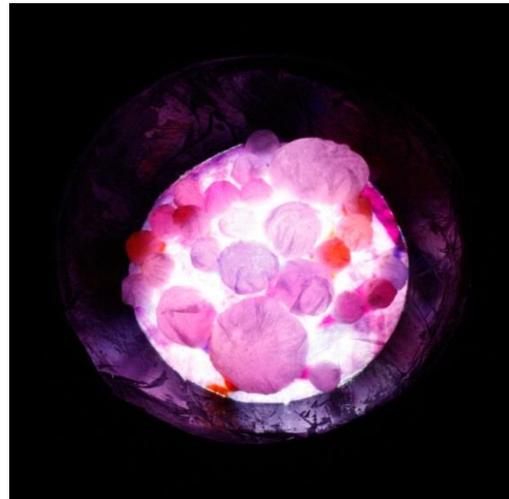
Figure 96 - Paper, watercolour, indirect colouring

Spidersilk (Fig.97) is a minimalist experiment of interference and diffusion. Inspired by Chinese lanterns and paper balloons, the test presents a delicate concave dome of white tissue paper (only two layers) and a single white LED covered by a simple convex dome of three layers of white tissue paper. A spiral motif of white cotton thread is embedded between the paper layers. The thread is invisible when the LED is not operating. When the light is on, the light is

evenly diffused by the convex dome, except where the thread interferes with the passage of light, creating a spiral-like motif.

Figure 97 - *Spidersilk* - Tissue paper, cotton thread

Istrice and *Ninfea* (Fig. 98 and Fig. 99) are two experiments performed subsequently, *Ninfea* being a more complex rendering of the principles applied in *Istrice*. A glossy, reflective PVC dome encloses a single, white LED, whose light is partially diffused along the dome and partially trapped and diffused through the cones of paper spreading on top of it. The cones operate as faders for the light, generating darker areas on their edges and lighter areas at their base. The light is channelled and effects of light and shadows are generated between the beams of light escaping through the cones, and the light trapped inside, also reflecting decorative patterns on the internal surface of the plastic dome. *Ninfea*, through a more complex design enhances the lighting effects along the cones and between the light trapped within them and the light escaping from the gaps. It presents also a colour correction filter right above the main white LED, conveying in the centre the warm white colour of incandescent bulbs, while on the sides the colour blends into the cooler white colour typical of LEDs.

Figure 98 - *Istrice* - PVC, paper

Figure 99 - *Ninfea* - PVC, paper, light filter

The next set of tests develops and builds on the principles applied for the previous experiments, focusing more on the element of "texturing": motifs are multiplied and repeated, creating a patterned, texturized surface, where emitted light interacts with the materials, creating subtle and more sophisticated patterns of shadows and lights. In *Alveare* (Fig 100) light is diffused, shielded between the curls of paper while shadow and light patterns are projected and reflected by the glossy PVC cocoon. In *Fiore di Vetro* (Fig 101) light is shaded and

interrupted by the copper wires layered between tissue paper, like a stained glass window effect, creating again a very textured effect of projection and reflection on the lit part and through the reflective glossy surface of the concave PVC dome.

Figure 100 - *Alveare* - PVC, paper

Figure 101 - *Fiore di Vetro* - PVC, copper, tissue paper

In *Anemone* (Fig. 102), light is contained within the paper spikes, fading around the open edges and producing a pattern of progressive darkening around the end bits of each cone, projected and reflected to and by the glossy PVC concave dome. Fiore Nero (Fig. 103) plays with the containment of light within 'petals' made out of thick black textured cardboard, that let it escape only between them and in the nylon fabric centre while reflecting it on the glossy black PVC concave dome.

Figure 102 – *Anemone – PVC, paper*
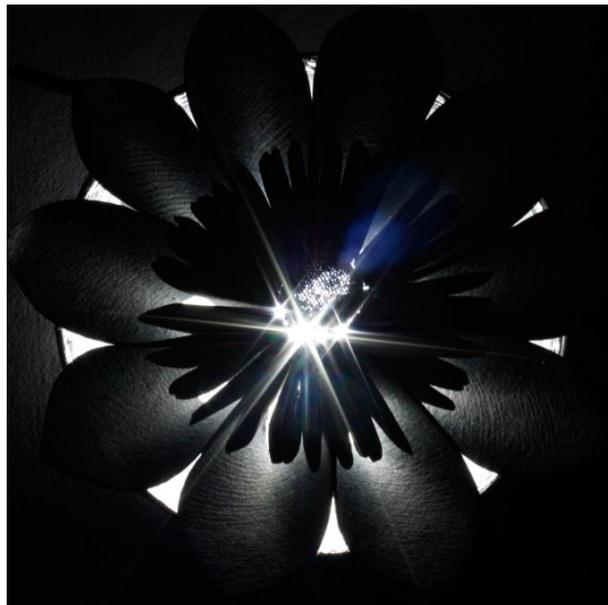
Figure 103 - *Fiore Nero* – PVC, nylon microfibre, black cardboard

Appendix A-7 - Transmission

The next tests play with the ides of light transmission and attempt to recreate the principle of light transported light along a thread, as in the case of fibre optics, using thin strips of paper or plastics. Through a progression of experiments, light is transmitted and transferred from one surface to the next.

Figure 104 - *Fili di Luce* - Paper

Figure 105 – *Pom Pom* – Coffee cup, paper
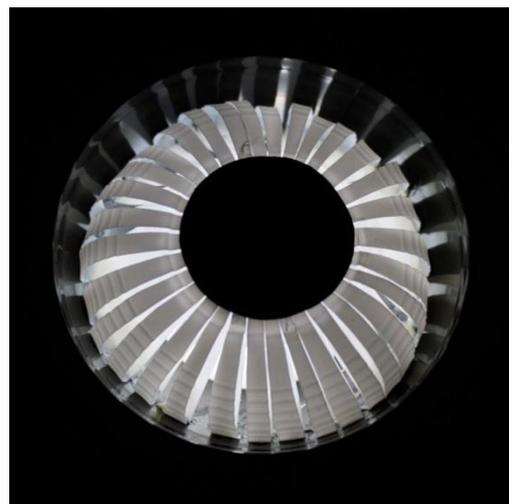
Figure 106 – *Lanterna* - Coffee cup, PVC
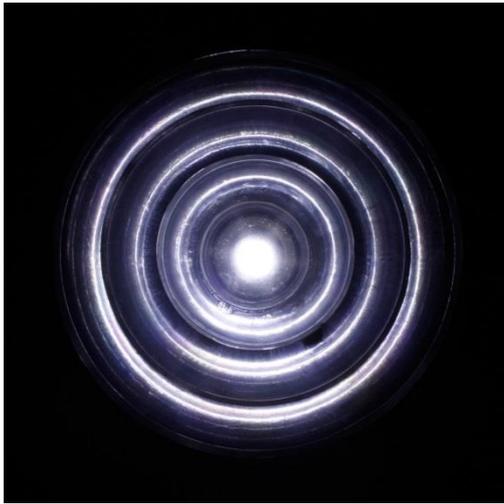
Figure 107 - *Specchio Riflesso* - PVC, acryluc

Figure 108 - *Halo* - PVC, acrylic
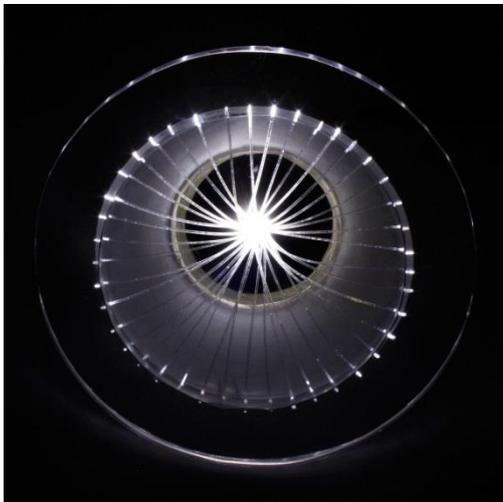
Figure 109 – *Alogena* – Acrylic, PVC, fibre optics

Figure 110 - *Alogena* – Acrylic, PVC, fibre optics
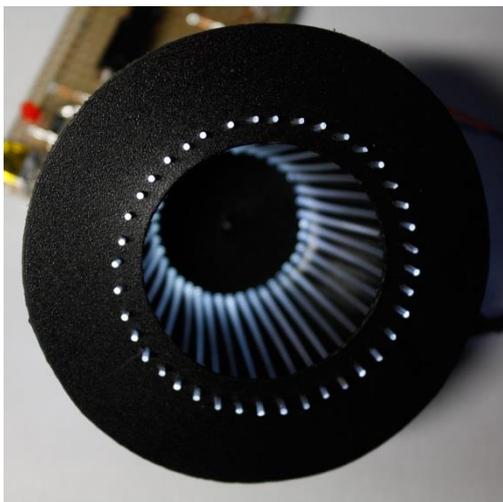
Figure 111 - *Tunnel* - daylight view
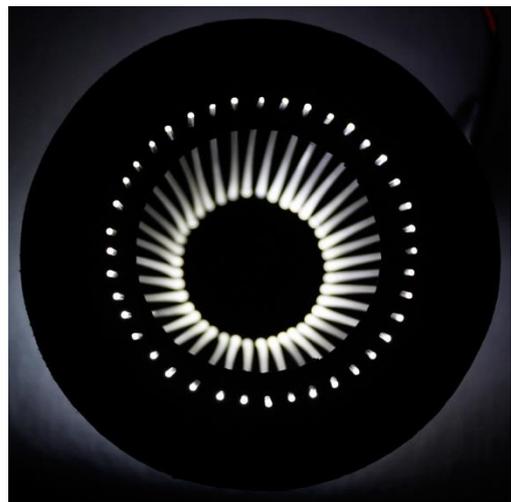

Figure 112 - *Tunnel* - PVC, fibre optics

Appendix A-8 - Urchins

This set of experiments developed from the texturing concept introduced by the Paper series, taking it to the next level by rendering the pattern repetition even more intricate while testing at the same time the diffusive properties of translucent rubber, silicone and polymer clay.

Fig. 112 and 113 show *Riccetto Soft*, a test made with a non-translucent concave dome made with 24 layers of tissue paper and a single white LED covered by a thin convex dome of tissue paper (2 layers), texturized with a spiky pattern of clear silicone.

Fig. 114 and 115 show a similar experiment, *Riccetto Soft (Colour),* made with totally different materials: a concave dome is of black PVC , a white LED and a non-translucent convex dome made out of of blue polymer clay, perforated and texturized over each hole with coloured silicone. The colour effect is created by the material through which the light is diffused and it is reflected and amplified by the glossy surface of the plastic dome.

Riccetto Vivo (Fig. 116 and 117) is an even more complex development of the previous texturing experiments, entirely made out of polymer clay. Each spike of the urchin (approximately 700) has been individually shaped and put in place. The diffusive properties of the material are particularly effective and the overall visual effect, between the very subtle game of fading, shadows, lights and textured reflections reminds of a living creature, making this piece one of the possible tests to be further developed in the second phase of practice and experimentation.
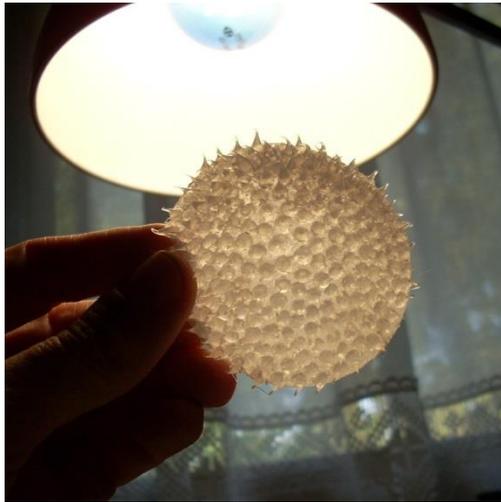
Figure 113 - *Riccetto Soft* - making
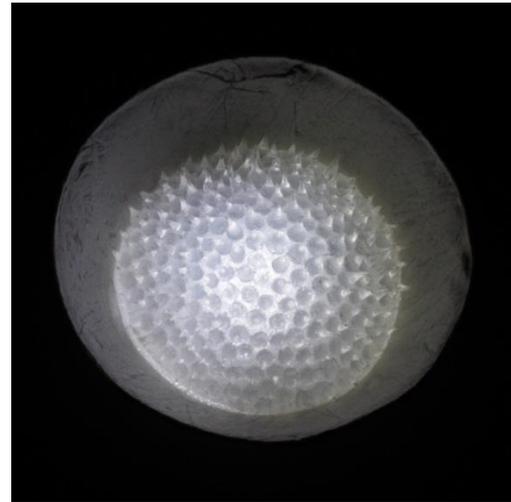
Figure 114 - *Riccetto Soft* - tissue paper, silicone
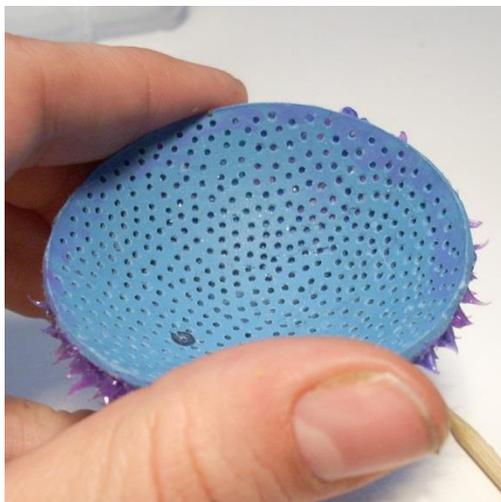
Figure 115 - *Riccetto soft (colour)* - making
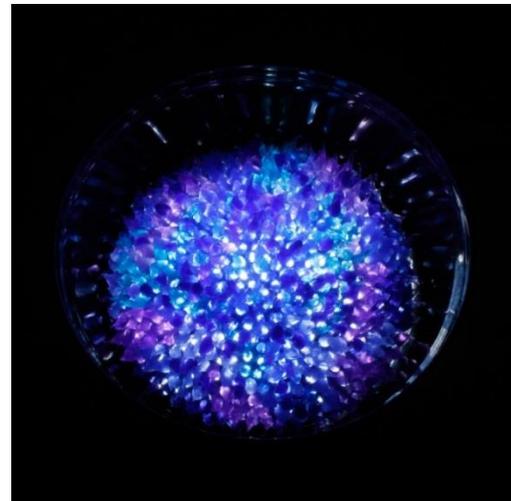
Figure 116 - *Riccetto Soft (Colour)* - PVC, silicone, pigments

Figure 117 - *Riccetto Vivo* - making
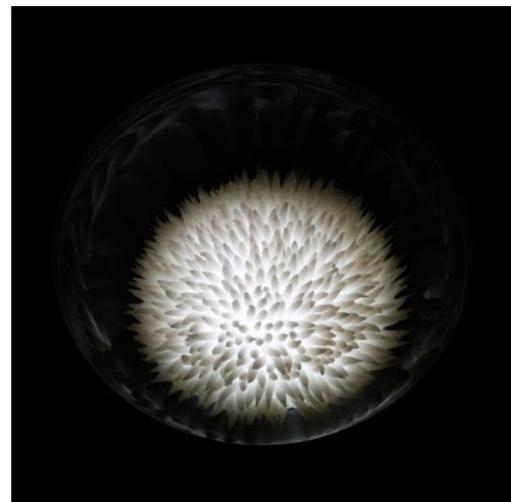
Figure 118 - *Riccetto Vivo* - PVC, polymer clay

Appendix A-9 - Nebulae

The *Neubulae* series concludes this first round of practice of Stage 1. The idea behind this group of prototypes and experiments is to combine all (or the most part of) the effects previously obtained. The first two pieces, *Proprio No* (Fig.118) and *Hybiscus* (Fig. 119) play with the traditional use of fibre optics for transmitting light from the source to the tips of the fibre strands, and a faceted crystal is positioned right where the light is transferred for testing whether it can be expanded, enhanced or magnified. *Proprio No* (Fig. 119) is made with very short and thick fibre optics and square crystals, with a result, in terms of aesthetics and lighting effects definitely below my expectations. *Hybiscus* (Fig. 120) displays longer fibres and crystals with a dodecahedron cut and an iridescent finishing where more interesting patterns of shadows and reflections are projected on the internal surface of the paper dome, conveying an interesting decorative accent to the piece. In terms of the enhancement of the lights on the tip of the fibres, the result is not particularly noticeable.

Figure 119 – *Proprio No* –Paper, polymer clay, fibre optics, Swarovski© crystals

Figure 120 - *Hybiscus* - Paper, acrylic, fibre optics, Swarovsky© crystals

Nebula III (Fig 121 and 121) is the next step in the experimental process of this idea: from crystals placed on the fibre optics' end bits, this piece deals with photo-reactive plastics enhancing their colour or reacting in particular ways because of a direct light source hitting them.
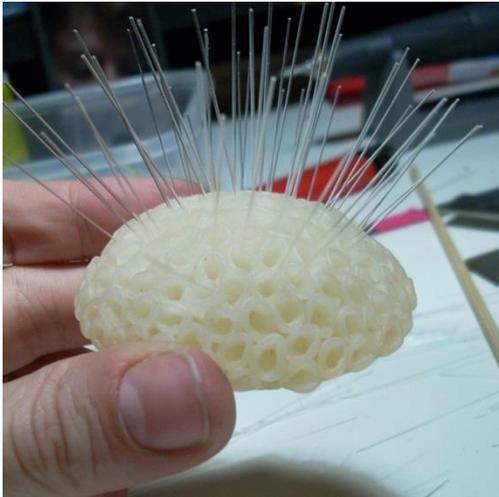
Figure 121 - *Nebula III* - making
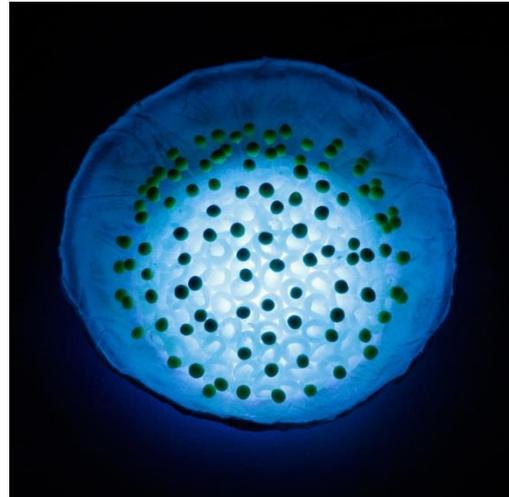
Figure 122 - *Nebula III* - Paper, polymer clay, fibre optics, pigments

This piece is realised with a non-translucent dome (24 layers of tissue paper) where four UV LEDs are mounted. They are covered by a translucent polymer clay convex dome, texturised with small concave domes made with polymer clay. Through each small dome a fibre optic strand sticks out with a small sphere made out of fluorescent and phosphorescent plastics at its tip. When the LEDs are active, the piece is evenly illuminated with a light that has a beautiful light blue shade in the centre, diffusing towards the surrounding paper in shades of violet, while the green spheres placed on the tip of each fibre optics are highlighted because of the UV light transmitted through the fibre, enhancing their fluorescence. Once the lights are turned off, all the green spheres glow in the dark as the plastics has been pigmented with a phosphorescent additive that allows them to glow even after the piece is turned off.

Nebula I (Fig. 123, 124, 125, 126) is a further development and a more complex application of the principles experimented with "Nebula III". Here the

fibre optics are thinner and traditionally conveyed into a main central group and all enclosed in a dark thermosetting tube, where also four white LEDs sources are set. The white spheres placed on the tip of each fibre optics are made out of polymer clay pigmented with a phosphorescent additive. The light absorbed during the On status of the object charges the phosphorescent spheres, that will glow in the dark after the piece will be turned off.

Figure 123 - *Nebula I* - making
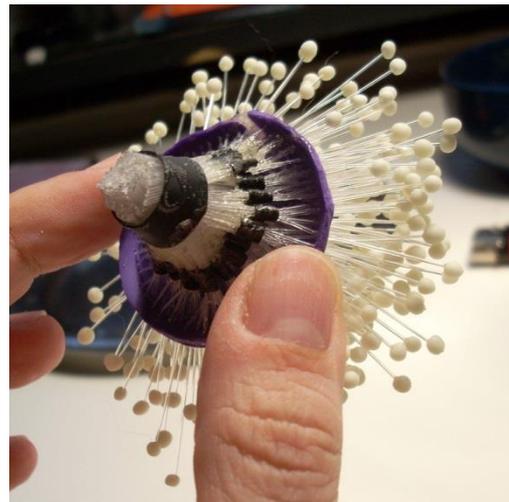
Figure 124 - *Nebula i* - making

Figure 125 - *Nebula I* - ON
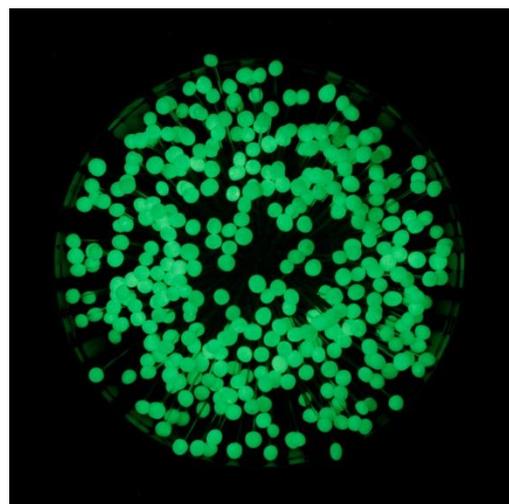
Figure 126 - *Nebula I* - OFF

Nebula II (Fig 127, 128, 129, 130) is the conclusive experiment of the first stage of practice and experimentation. It represents the application of almost every criterion partially tested and applied in the previous examples. The piece is built with several plastics, from acrylic, to PVC, to polymer clay to polyethylene. The light source is a single Ultraviolet LED, hidden below a phosphorescent convex dome from which fibre optics depart, transferring light into small fluorescent spheres. When the piece is lit, several effects occur at the same time, reflection, diffusion, texturing, transmission and fluorescence. When the piece is turned off, the phosphorescent core is instantaneously changing colour to green and its shade is reflected and diffused throughout the whole piece, thanks to the reflective, mirror-like effect of the concentric transparent dome .
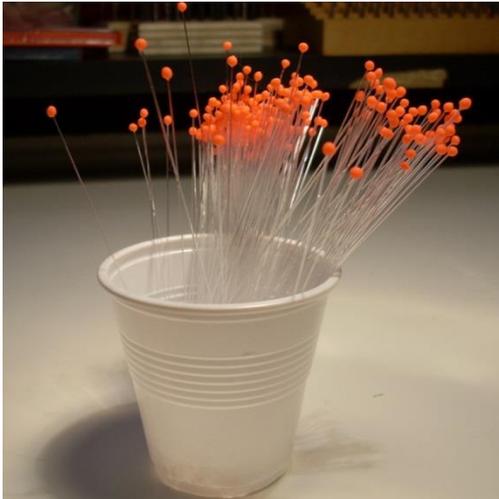
Figure 127 - *Nebula II* - making

Figure 128 - *Nebula II* - making
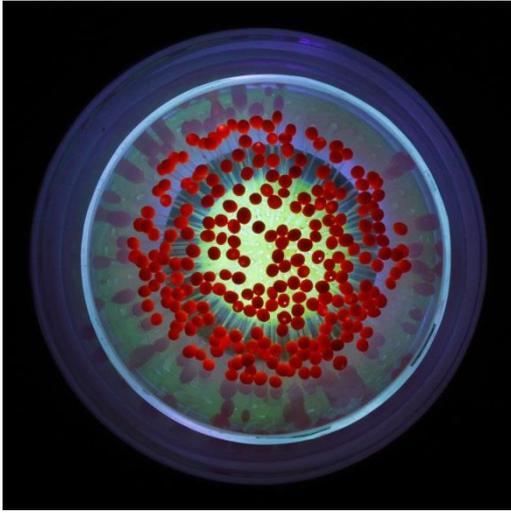
Figure 129 – *Nebula II* - ON
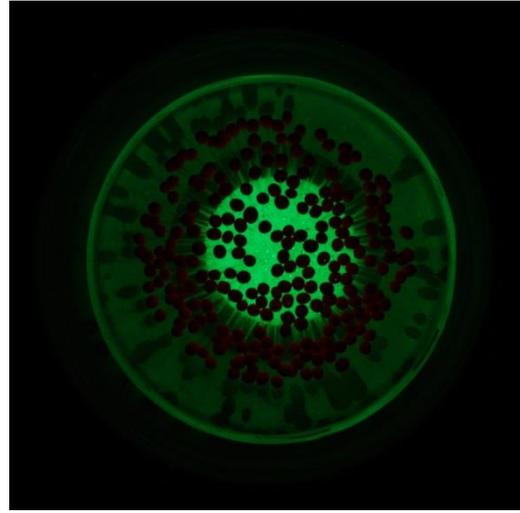
Figure 130 - *Nebula II* - OFF

APPENDIX B - MORE ON STAGE 2

Appendix B-1 - Database Visiography

#ID	Thumbnail	Source/Author	Artefact title/info	Nodes	URL	Link last checked on
#001		Promos4U	Purple & Pink Light Up LED Mohawk Costume Wig	22	http://promos4u.com/ProductDetails/?productId=6880117&tab=Tile&referrerPage=ProductResults&refPgId=510261172&referrerModule=PRDREB	13/10/2013
#002		Ad Print Solutions	Pink & Blue LED Light Up Ribbon Fascinator	21	http://adprintsolutions.espwebsite.com/ProductDetails/?productID=6329146&PCUrl=1	13/10/2013
#003		Promos4U	Black sequin LED light up costume Fedora	22	http://promos4u.com/ProductDetails/?productId=200229126&tab=Tile&referrerPage=ProductResults&refPgId=510261172&referrerModule=PRDREB	14/10/2013
#004		Windy City Novelties	Green LED show daddy noodle hat	27	http://www.windycitynovelties.com/green-l-e-d-show-daddy-noodle-hat.html	16/10/2013
#005		Angelo Lomuscio	Blue Datura necklace	25	http://www.gioiellocontemporaneo.it/2011/04/26/i-percorsi-della-luce/	16/10/2013
#006		Ali Express	Light Up LED Earrings Studs New	31	http://www.aliexpress.com/store/product/1-Pair-Light-Up-LED-Earrings-Studs-New-Green/704367_663442414.html	16/10/2013
#007		Malmo University Project Sweden	Beat Dress	21	http://www.ubergizmo.com/2007/09/beat-dress-grooves-onwards/	18/10/2013
#008		Hussein Chalayan	Airborne Video Dress	27	http://www.waldemeyer.com/hussein-chalayan-airborne-video-dresses	18/10/2013
#009		Philip Treacy	LED hat	26	http://www.ecouterre.com/philip-treacy-lights-up-spring-2013-london-fashion-week-with-wacky-led-hats/	18/10/2013

#010		Mary Huang	Title Unknown	22	http://www.fashion.rhymeandreasoncreative.com/	18/10/2013
#011		Soomi Park	LED eyelashes	26	http://www.toxel.com/tech/2009/10/25/led-eyelashes-from-korea/	18/10/2013
#012		Cute Circuit	Galaxy Dress	30	http://gadgether.com/led-galaxy-dress/	21/10/2013
#013		Lisa Juen	Don't Dream It, Wear It - Brooch	30	http://www.lisa-juen.com/#!__booming-blooming	21/10/2013
#014		Enlighted	Deluxe color changing coat	25	http://enlighted.com/pages/polka1.shtml	21/10/2013
#015		Mary Huang	Title Unknown	23	http://www.toxel.com/inspiration/2010/05/19/10-cool-and-unusual-dresses/	21/10/2013
#016		Moritz Waldemeyer for Philip Treacy	LED hat	24	http://www.dezeen.com/2012/09/26/led-hats-by-studi-waldemeyer-for-philip-treacy/	21/10/2013
#017		Sophie Barclay	Title Unknown	29	http://www.sophiebarclay.net/gallery.html	25/10/2013
#018		Dian Luo	Brighten	32	http://issuu.com/totoluo/docs/portfolio-dian_luo	25/10/2013
#019		Beau & Bien	Lighting Jewellery Snake	22	http://www.cosmoligne.com/bijou-lumineux-snake-p-148.html	25/10/2013
#020		Susanna Heron	Title Unknown	18	http://www.tattydevine.com/blog/2011/05/multiple-coincidences/	25/10/2013
#021		Zuzana Serbak	Title Unknown	30	http://fashioningtech.com/profiles/blog/list?tag=Craft+and+Technology	25/10/2013
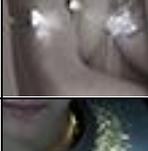
#022		Lisa Juen	I Make You Look Sexy - Brooch	36	http://klimt02.net/jewellers/lisa-juen	25/10/2013
#023		Lucile Burnier	Title Unknown	35	http://www.marzee.nl/galerie/marzee-international-graduate-show-2013/	30/10/2013
#024		Silvia Beccaria	Adamantina - Necklace	21	http://www.gioiellocontemporaneo.it/2011/04/26/i-percorsi-della-luce/	30/10/2013
#025		Nicolas Estrada	Tapunami's Secret	23	http://klimt02.net/jewellers/660 Tapunami's Secret 2003 Vegetable ivory, silver, electric components	30/10/2013
#026		Lisa Juen	I Make You Look Rich - Brooch	31	http://klimt02.net/jewellers/lisa-juen	30/10/2013
#027		Margarida Matos	Light jewels	18	http://bijoucontemporain.unblog.fr/category/createurs/margarida-matos-pt/	30/10/2013
#028		Monika Brugger	Jeuie – Game Me	22	http://www.monikabrugger.eu/parcours.htm	30/10/2013
#029		Jeffrey Michael	Stage costumes for Groove Armada	33	http://jeffreymichaeldesign.co.uk/home/celebrities/groove-armada	30/10/2013
#030		Nate Greene	Vitrium Lux	28	https://nategreenestudios.files.wordpress.com/2012/08/vitrum-lux-2.jpg?w=1000=	30/10/2013
#031		Yoolhee Ko	Reflection	25	http://www.trendhunter.com/trends/yoolhee-ko-jewelry-for-men	04/11/2013
#032		Philips	SKIN - Soft technology outfit	28	http://fashioningtech.com/photo/futuristic-fashion-3?context=featured	04/11/2013
#033		Edmundo Castillo	Homage to Tron Legacy	24	http://www.luxuo.com/fashion/tron-light-up-sandals-edmundo-castillo.html	04/11/2013

#034		Paola Mirai	Cirkuita	25	http://tomandlorenzo.com/2011/08/cirkuita-jewelry-collection-by-paola-mirai/	04/11/2013
#035		Rainbow Winters	Thunderstorm- Sound Reactive Dress	25	http://www.rainbowwinters.com/project2.html	06/11/2013
#036		Alexander McQueeen for Givenchy	Title Unknown	33	http://www.theguardian.com/fashion/gallery/2012/nov/29/alexander-mcqueen	06/11/2013
#037		Dame Fatale	Tron Legacy Siren Gem Bodysuit	28	http://damefatale.storenvy.com/collections/146525-all-products/products/800632-siren-gem-tron-legacy	06/11/2013
#038		Artifice Clothing	Glowing Trim Angled Corset Belt	26	http://www.artificeclothing.com/em/shop/scripts/prodList.asp?idCategory=17	06/11/2013
#039		Alina Ene	Title Unknown	25	https://alinaene.wordpress.com/	11/11/2013
#040		JP Rishea	Cyber Gladiator Armor	26	http://www.jprishea.com/jpr/frames/products/gladiatorarm.htm	11/11/2013
#041		Lisa Juen	Harmovaria (JAMES Loudlives)	32	http://klimt02.net/jewellers/lisa-juen	11/11/2013
#042		Yoolhee Ko	Reflection 2	27	http://www.trendhunter.com/trends/yoolhee-ko-jewelry-for-men	13/11/2013
#043		Yoolhee Ko	Reflection 4	26	http://www.trendhunter.com/trends/yoolhee-ko-jewelry-for-men	13/11/2013
#044		F.Bertrand	Watch the future	27	http://www.psfk.com/2012/03/touch-screen-bracelet-text.html	13/11/2013
#045		Adafruit	INecklace	28	http://www.adafruit.com/inecklace	14/11/2013
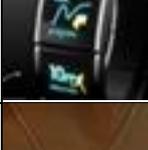
#046		Danielle James	Inert 2	22	http://d-j-metals.com/artwork/2748420_Inert_2.html	14/11/2013
#047		Daniel Ramos	BrazeLights	25	http://crafthaus.ning.com/profiles/blogs/daniel-ramos-bracelet-lights-stellar-display?xg_source=activity -	14/11/2013
#048		Hyangmi Kim	Whirlwind	27	http://www.hyangmikim.com/g_whirlwind.html	18/11/2013
#049		Artifice Clothing	Glowing trim Clear vinyl Angled Corset Belt	26	http://www.artificeclothing.com/em/shop/scripts/prodview.asp	18/11/2013
#050		Anrealage	GITD cage dresses RTW Spring 2013	23	http://www.anrealage.com/about.html	18/11/2013
#051		Furne One for Amato	SS 2012 - Dubai fashion Week	33	http://bestdress.com.ua/main/hc/3282-furne-one-of-amato-haute-couture-2012.html	25/11/2013
#052		Furne One for Amato	SS 2012 - Dubai fashion Week	31	http://bestdress.com.ua/main/hc/3282-furne-one-of-amato-haute-couture-2012.html	25/11/2013
#053		Furne One for Amato	SS 2012 - Dubai fashion Week	34	http://bestdress.com.ua/main/hc/3282-furne-one-of-amato-haute-couture-2012	25/11/2013
#054		Lumigram	LumiTop Karina	23	http://www.lumigram.com/catalog/P7_LUMINOUS_CLOTHING.php	25/11/2013
#055		JP Rishea	Cybertech Wings	27	http://www.jprishea.com/jpr/frames/products/wingsonefive.htm	27/11/2013
#056		Entourage Red	LED Stilettos	23	https://www.facebook.com/entourage.red	27/11/2013
#057		Hyangmi Kim	A Waterfall in the Moonlight	30	http://www.hyangmikim.com/g_waterfall.html	27/11/2013

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#058		Danielle James	Inert 1	25	http://d-j-metals.com/artwork/2748416_Inert_1_Glass_Tubing_Neon_gas.html	27/11/2013
#059		Diana Eng	EL dress	23	https://www.dianaeng.com/fairytale-fashion/	28/11/2013
#060		The Berry	LED scarf	29	http://theberry.com/2010/01/26/i-guess-if-you-feel-like-standing-out-maybe-25-photos-3/	15/01/2014
#061		Mint Designs	A-W collection 2011 Fashion Surgery (a new hope)	24	http://fashioningtech.com/profiles/blogs/mintdesigns-impressive-led and on their website http://mint-designs.com/	15/01/2014
#062		Jordan Hartley	Android	27	https://500px.com/photo/16657691/android-by-jordan-hartley	15/01/2014
#063		Flickr	White lace corset with EL wire	21	https://www.flickr.com/photos/abooth/6497033977/in/photostream/	15/01/2014
#064		Samuel Yang	Title unknown	25	http://1granary.com/central-saint-martins-fashion/ba-final-collections/central-saint-martins-ba-graduate-fashion-show-2013/	15/01/2014
#065		Vega Zaishi Wang	Alpha Lyrae special collection 2012	27	http://www.vegawang.com/ and here http://thecreatorsproject.vice.com/vega-zaishi-wang/vega-zaishi-wang	20/01/2014
#066		Unknown	LED tattoo	24	https://it.pinterest.com/pin/569775790328308158/	20/01/2014
#067		Pankaj and Nidhi	Geometrica SS2012	30	http://www.pankajnidhi.com/ss12-Geometrica.html	20/01/2014
#068		Tamar Areshidze	Title Unknown	27	http://api.ning.com/files/exsUbKo0WGf310gc5WFgXtrbjs2d*D5XlMJwxi3f5BLJBGM9tggzSKJy*1bkuj5OHZvOykTDUTLHgV1Mo8F-	20/01/2014
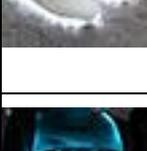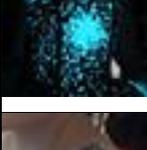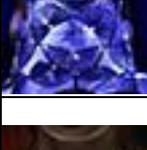
				8FKEByghKI2x/MAMIYA10246.jpg%3Fwidth=482&height=600	
#069	Dominic Elvin	G2 Bionic head system with side mounted LED	25	https://www.etsy.com/listing/94717777/g2-bionic-head-system-with-side-mounted	20/01/2014
#070	Diana Eng	Nightlife Necklace	22	https://blog.etsy.com/en/2009/how-tuesday-nightlife-necklace-with-diana-eng/	20/01/2014
#071	GGI International	Fashion New Red LED Digital Watch Lava Iron Mens Sports Samurai Metal	26	http://www.amazon.com/s/ref=bl_sl_wa_s_web_7141123011?ie=UTF8&node=7141123011&field-brandtextbin=GGI+INTERNATIONAL	20/01/2014
#072	Moritz Waldemeyer for Hussein Chalayan	Laser dress	28	http://urbansocialite.com/2010/05/07/disposable-couture-led-fashion-wrapping-up-the-week-urban-socialite-style/	21/01/2014
#073	John Spatcher for Jacob Sutton	LED studded snowsuit	26	http://www.ecouterre.com/william-hughess-led-snowboarding-suit-lights-up-the-nighttime-slopes/	21/01/2014
#074	Elizabeth Bigger	Lüme Collection	29	http://www.gizmag.com/lume-fashion-led-smartphone-programmable-wearable-electronics/29300/pictures#2	21/01/2014
#075	EDEALLINE	Men's Watches LED Fashion Steel Band Unisex	28	http://www.amazon.com/EDEALLINE-Watches-Fashion-Steel-Unisex/dp/B00ABT31Q0?SubscriptionId=AKIAJ3U4YRIBWCGGKZ2A&tag=frases365-20&linkCode=sp1&camp=2025&creative=165953&creativeASIN=B00ABT31Q0	21/01/2014
#076	Moon Berlin	Fibre optics dress	27	http://www.moonberlin.com/#!discover/c1tv6	24/01/2014
#077	Joanna Hyrkäs for IMU Design	Light carpet	20	http://www.imudesign.org/designs_large_lightcarpet_1.html	24/01/2014
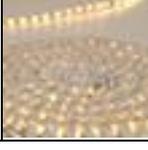
#078	Wendy Legro	Pleated LED coat	23	http://www.ecouterre.com/elegant-led-jacket-by-wendy-legro-lights-up-night-cycling/wendy-legro-led-jacket-1/	24/01/2014
#079	Lumigram	Lumishawl	24	http://www.lumigram.com/catalog/page0.php	24/01/2014
#080	Anastasia Radevich	Kinetic collection	24	http://anastasiaradevich.com/kinetik/	24/01/2014
#081	Luminight	Fibre optics purse	18	https://luminight.wordpress.com/	29/01/2014
#082	Cinzia Ruggeri	Evening dress 1980	19	http://irenebrination.typepad.com/irenebrination_notes_on_a/2013/05/cinzia-ruggeri-interview.html	29/01/2014
#083	Hussein Chalayan	07-08 high-tech collection	26	http://www.yankodesign.com/2007/03/02/chalayans-0708-high-tech-winter-collection/	29/01/2014
#084	Lili Colley	Geo Hexa neckpiece	33	http://showtime.arts.ac.uk/lili	29/01/2014
#085	Enlighted	Blue fur coat with LED trim	23	http://enlighted.com/pages/bluefurlong.shtml	29/01/2014
#086	Enlighted	Color-Changing Lighted Faux Fur Scarf	23	http://www.instructables.com/id/How-to-Make-a-Color-Changing-Lighted-Faux-Fur-Scar/	11/02/2014
#087	Atton Conrad	Light painted dress	22	http://thecreatorsproject.vice.com/blog/fashion-in-a-flash-light-painted-dresses	11/02/2014
#088	Adafruit	Neopixel coat buttons	23	https://learn.adafruit.com/neopixel-coat-buttons/	11/02/2014
#089	Cesare Paciotti	Light Bright pumps with light-up crystals	27	http://wwd.com/fashion-news/fashion-features/tech-to-wear-wearable-technology-on-the-rise-	11/02/2014
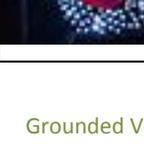
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#090		Wolfgang Langeder	Sporty Supaheroe cycling jacket	26	http://fashioningtech.com/profiles/blogs/sporty-supaheroe-an-intelligent-cycling-jacket	11/02/2014
#091		Lili Colley	-White Diffusion Neck piece	38	http://showtime.arts.ac.uk/lili	14/02/2014
#092		Janet Hansen	- Lite Brite creations	20	http://www.refinery29.com/illuminated-fashion-engineer-janet-hansen-makes-light-up-clothing	14/02/2014
#093		Franck Sorbier	A-W 2012-2013 catwalk	24	http://thecreatorsproject.vice.com/blog/designer-franck-sorbier-projects-an-haute-couture-fairy-tale	14/02/2014
#094		Lili Colley	Octo LED's Neckpiece (on)	37	https://popupuau.wordpress.com/2012/12/02/the-luminous-trend-translucend-geometries-in-sarah-angold-lili-colley-yoolhee-koo-and-lisa-watson/	14/02/2014
#095		Kyeok Kim	Aurora - necklace (Second Skin by Lighting)	26	http://www.kyeokkim.com/project?cid=body&sid=jewellery&uid=17	14/02/2014
#096		Margarida Matos	Diamante-Peito	22	http://bijoucontemporain.unblog.fr/2010/03/22/lumiere-ou-la-fin-du-bijou/	20/02/2014
#097		Dian Luo	Brighten collection	34	http://issuu.com/totoluo/docs/portfolio-dian_luo	20/02/2014
#098		Kyeok Kim	Aurora - brooch (Second Skin by Lighting)	26	http://www.kyeokkim.com/project?cid=body&sid=jewellery&uid=16	20/02/2014
#099		Dian Luo	Brighten Collection	31	http://issuu.com/totoluo/docs/portfolio-dian_luo	20/02/2014
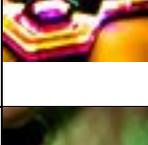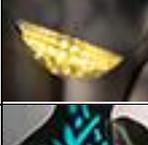
#100		Ying Gao	(NO)WHERE (NOW)HERE - Robe Interactive	29	http://yinggao.ca/interactifs/nowhere-nowhere/	20/02/2014
#101		Visual Drugstore	The light Muses - EL costume	23	http://visualdrugstore.com/portfolio/the-light-muses/	25/02/2014
#102		Sensoree	Ger Mood sweater	22	http://sensoree.com/artifacts/ger-mood-sweater/	25/02/2014
#103		Enlighted	Purple velvet jacket with EL wire and LEDs	20	http://enlighted.com/pages/eljackets.shtml	25/02/2014
#104		Willy Bogner	solar powered Ski suit	26	http://www.dezeen.com/2007/11/28/ski-suits-with-solar-powered-lights-by-willy-bogner/	25/02/2014
#105		Moritz Waldemeyer	OK Go - LED jackets	24	http://www.waldemeyer.com/ok-go-led-jackets	04/03/2014
#106		Enlighted	EL wire suits with geometric outlines	22	http://enlighted.com/pages/eljuggle.shtml	04/03/2014
#107		Unknown	Unknonw title - FIber optics dress	25	https://www.flickr.com/photos/thalamus/2069479457/in/photostream/	04/03/2014
#108		Enlighted	Wedding dress with candlelight effect	25	http://enlighted.com/pages/bridal.shtml	04/03/2014
#109		Enlighted	EL Wire corset	21	http://enlighted.com/pages/elcorset.shtml	04/03/2014
#110		Enlighted	Lighted wrestling boots	22	http://enlighted.com/pages/shoes.shtml	04/03/2014
#111		Enlighted	Black bra with ruffles and red LEDs	21	http://enlighted.com/pages/bras6.shtml	13/03/2014

#112		Synne Geirsdatter Frydenberg	Pneuma Dress	35	https://pneumadress.wordpress.com/contact/	13/03/2014
#113		Enlighted	deluxe tuxedo jacket	22	http://enlighted.com/pages/btux.shtml	13/03/2014
#114		Alexander McQueen for Givenchy	Video stills from Givenchy, F-W 1999	27	http://khymeira.tumblr.com/post/58374029728/ejakulation-video-stills-from-givenchy-fw	13/03/2014
#115		Anouk Wipprecht.	Synapse Dress	30	http://www.cnet.com/news/3d-printed-dress-lets-you-wear-your-heartbeat-on-your-sleeve/	13/03/2014
#116		- Neon Nancy	Rave glow sunglasses	19	https://www.etsy.com/listing/157409161/light-up-glasses-rave-glow-sunglasses-w	21/03/2014
#117		Lauren Bowker (The Unseen) and Swarovsky -	Vicenza headpiece	33	http://www.dezeen.com/2014/07/31/the-unseen-colour-changing-gemstones-headdress/	21/03/2014
#118		Mae Yokoyama	solar panel LED necklace	23	http://www.ecouterre.com/couture-solar-panel-necklace-lights-up-any-outfit/	21/03/2014
#119		Kei Kagami	Title unknown	24	http://www.chipchick.com/2011/01/kei-kagami.html	21/03/2014
#120		Vega Zaishi Wang	bioluminescent dress	29	http://fashioningtech.com/photo/vega-wang-bioluminescent-1?context=featured	21/03/2014
#121		Wolfgang Langeder & Stretchable Circuits	Cybernomade suit	21	http://www.talk2myshirt.com/blog/archives/4885	02/04/2014
#122		Brightfeetslippers Uk	Bright feet slippers	21	http://www.brightfeetslippers.co.uk/	02/04/2014
#123		Suzi Webster	Electric Dreams	42	http://www.suziwebster.org/electricdreams.html	02/04/2014

#124		Quasiben	Proximity-Sensing Pocket Squares /	21	http://www.instructables.com/id/Proximity-Sensing-Pocket-Squares/	02/04/2014
#125		Natalie Walsh	FIbre Optic Dress	25	http://www.instructables.com/id/Fiber-Optic-Dress/	02/04/2014
#126		Mikaela Holmes	El Wire and Leather Necklace	25	http://www.instructables.com/id/El-Wire-and-Leather-Necklace/	02/04/2014
#127		Taegon Kim	Title unknown	28	http://www.taegonkim.com/ also on original link http://cartwheelgalaxy.tumblr.com/post/3990101800/dress-fiber-optic-by-taegon-kim	02/04/2014
#128		Karl Lagerfeld for Chanel	Led shoes - 2011	22	http://luxurylaunches.com/fashion/karl_lagerfeld_displays_led_shoes_for_chanel.php	02/04/2014
#129		Ying Gao	(NO)WHERE (NOW)HERE	30	http://design-milk.com/nowhere-nowhere-interactive-dresses-by-ying-gao/	02/04/2014
#130		Diana Eng	LED moustaches	21	http://www.dianaeng.com/2012/10/pretty-hacks-backstage-styling-the-makeys/	02/04/2014
#131		Gareth Pugh	OLED Dress	24	http://fashioningtech.com/profiles/blogs/gareth-pughs-unwearable-oled	24/04/2014
#132		Don O'Neill	Theia couture platinum ball gown	31	http://www.dailymail.co.uk/tvshowbiz/article-2276817/Carrie-Underwoods-dress-lights-Grammy-Awards-2013.html	24/04/2014
#133		Cute Circuit	K-Dress	23	http://shop.cutecircuit.com/collections/womenswear/products/k-dress-1	24/04/2014
#134		Emily Steel	The Little Slide Dress	29	http://www.lomography.com/magazine/180935-film-and-fashion-match-in-the-little-slide-dress	24/04/2014

#		Author	Title		Link	Date
#135		Paul&Rudi	Embrace+	27	https://www.kickstarter.com/projects/embraceplus/embrace-a-smart-piece-of-wearable-technology	24/04/2014
#136		Unknown	VisiJax	25	http://www.smartwardrobes.com/sports-wearable-tech/cyclists-turn-signal-jacket/ also on their website https://www.visijax.com/	24/04/2014
#137		Various (see annotation)	Pollution sensoring and visualizing garment (CO2-dress)	26	http://fashioningtech.com/photo/rodarteilluminated-heels-1/next?context=featured	24/04/2014
#138		Cute Circuit	Twitter Dress	31	http://www.bigodino.it/tecnologia/twitter-dress.html	24/04/2014
#139		Moritz Waldemeyer	Costumes for Olympic closing ceremony Brazil	29	http://mydisguises.com/2012/08/23/led-lights-added-to-brazilian-carnival-costumes/	24/04/2014
#140		LightFashion	Pink LED light choker	22	https://www.etsy.com/listing/95648510/pink-led-light-choker?ref=usr_faveitems&atr_uid=5489948	24/04/2014
#141		LoveChildBoudoir	PVC Light Up LED Shrug Cybergoth	26	https://www.etsy.com/listing/102032010/pvc-light-up-led-shrug-cybergoth	15/05/2014
#142		LaLaNala	Rainbow Daises Light Up LED Flower Crown	22	https://www.etsy.com/listing/162467748/sale-rainbow-daises-light-up-led-flower	15/05/2014
#143		Philips	- The Skin Probe project SKIN 2006 - Bubelle Blush Dress	31	http://blog.naver.com/PostView.nhn?blogId=l0m0&logNo=150009287296&redirect=Dlog&widgetTypeCall=true	15/05/2014
#144		Unknown	T-Qualizer Shirt	31	http://www.thinkgeek.com/product/8a5b/?pfm=8e31_1_8a5b - now available here http://www.miniinthebox.com/it/magliette-led_c3173/Tutti-3?currency=EUR&litb_from=paid_adwords_search&adword_mt=e&adword_ct=97585536329&adwor	15/05/2014
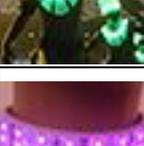
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#145	RadicatRelics	LED Amulets	27	https://www.etsy.com/listing/239059235/led-amulet-aether?ref=shop_home_active_9	15/05/2014
#146	Electric Candy Couture	The Paleotrin Tail	25	https://www.etsy.com/listing/165379373/the-paleotron-tali-a-black-light	15/05/2014
#147	Unknown	Flashing LED Light Up Rave Tongue Barbell	25	http://www.amazon.com/Flashing-Light-Rave-Tongue-Barbell/dp/B002AQ3K36	15/05/2014
#148	Mikhalchuk	Magic Locket	25	http://www.instructables.com/id/Magic-Locket/	15/05/2014
#149	Robert Tu	MeU project	29	http://www.ippinka.com/blog/meu-wearable-display/	15/05/2014
#150	Marc Mann	JeweLights	27	http://popgloss.com/necklaces/e6deaa6e1ea3fcfb1ebf226a2333380d&pageoffset=0 - more pieces here http://hilde-leiss.de/artist/products/mann-marc	15/05/2014
#151	Ben Kokes	Induction-powered LED engagement ring	21	http://www.kokes.net/projectlonghaul/projectlonghaul.htm also more info on the whole project here: http://www.kokes.net/projectlonghaul/projectlonghaul.htm	15/09/2014
#152	Beau & Bien	Smoon Bijou	28	http://www.beauetbien.fr/boutique/index.php/night-bijou-collection.html	15/09/2014
#153	Beau & Bien	Smoon Bijou Bird	24	http://www.beauetbien.fr/boutique/index.php/night-bijou-collection/smoon-bijou-bird-68.html	15/09/2014

#154		Unknown	LED flashing bumpy rings	22	http://www.oneway novelties.com/en/le d-flashing-bumpy-ring-r1-glbumri?cc=light%20 up%20novelties	15/09/2014
#155		Carmen Colley	LED earrings made with swiss electronics	21	https://www.etsy.co m/listing/164227304 /led-earrings-made-with-swiss-electronics	15/09/2014
#156		Yosyam	Birdcage necklace	23	http://www.instruct ables.com/id/Birdca ge-Necklace/	15/09/2014
#157		Marc Mann	untitled necklace	23	http://hilde-leiss.com/product/1 32/halskette_	15/09/2014
#158		Kabapu	LED circuit pendant	19	http://www.instruct ables.com/id/LED-Circuit-Pendant/	15/09/2014
#159		Jocelyn Kolb	Infiorillumini	26	http://www.madmu seum.org/exhibition /wear-it-or-not#	15/09/2014
#160		unknown	LED spike choker necklace Pink	22	http://coolglow.com /LED-Spike-Choker-Necklace-Pink~5538/c0/?cust om_ref=b1429P	15/09/2014
#161		Unknown	Fashion Faux Leather Band Unisex Led Digital Wristwatch	24	http://www.terapea k.com/worth/fashio n-faux-leather-band-unisex-led-digital-wristwatch-men-lady-watch-gift/290764906485/	25/09/2014
#162		Unknown	Christmas lights garland baroque Necklace	20	Original link removed 2015 - found an alternative one here http://www.anangel atmytable.com/pearl -lights-sale-20-off-5228-p.asp	25/09/2014
#163		Yanli Duan	To Tibet series	27	http://klimt02.net/e vents/exhibitions/39 563	25/09/2014
#164		Bori Gyorok	Polar collection	23	http://saltandvinega rmag.com/polar-collection-by-bori-gyorok-2/	25/09/2014
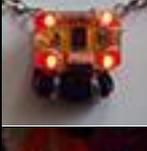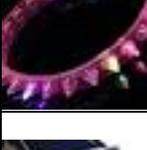
#165		Karen McCreary	Quadrant A	35	http://www.modern silver.com/Karen%2 0McCreary.htm - more details of the pieces here : http://www.karenm ccreary.com/mccrea ry/unecklaces.asp	25/09/2014
#166		Unknown (OCAD University project)	Bubble Pop Electric Necklace	32	http://crafthaus.ning .com/group/vote/pa ge/project-8-human	25/09/2014
#167		Melissa Saelzer	Light up dress	24	http://www.bizjourn als.com/orlando/gall ery/159551?r=http:/ /www.bizjournals.co m/orlando/blog/201 5/02/how-this-orlando-woman-is-engineering-light-up.html	25/09/2014
#168		Lisa Cerutti	Shooting Star	28	http://www.lisacerut ti.com	25/09/2014
#169		Lisa Cerutti	Firequeen	32	http://www.lisacerut ti.com/	25/09/2014
#170		Lisa Cerutti	Skyflame	28	http://www.lisacerut ti.com/	25/09/2014
#171		Xu Jiaying	untitled	24	https://gioielloconte mporaneo.wordpres s.com/tag/shannon-guo/	25/11/2014
#172		Elemoon	smart accessory	30	https://www.kicksta rter.com/projects/el emoon/elemoon-wearable-tech-that-expresses-your-unique-s-0?ref=discovery	25/11/2014
#173		Kayla's Bridal	Annabelle fibre Oprtic wedding dress	24	original link removed to google images, video about the dress available here https://www.youtub e.com/watch?v=tLgZ m094q4A	25/11/2014
#174		Barbara Laybe, Janis Jeffries	prototype smart garments	30	http://optimistworld .com/Articles.aspx?i d=1aff591d-601e-4b59-91bf-9982bba1b81b&styl e=news	25/11/2014

#175		No Folk Studio	Orphe smart shoes	31	http://www.designboom.com/design/orphe-smart-sneakers-light-painting-03-26-2015/?utm_campaign=daily&utm_medium=e-mail&utm_source=subscribers	25/11/2014
#176		HyunJin Yun	Sculptural knit fabric	34	http://flexiblefashion1.blogspot.it/2013/05/knitwear-design-from-aucklandnew_6.html	25/11/2014
#177		Alexander McQueen	AW 2004 Paris Fashion Week	29	http://www.livingly.com/runway/Alexander+McQueen/Paris+Fashion+Week+Fall+2004/uLrcd6WQJ-C	25/11/2014
#178		Bang&Lee, Cres E Dim	Dress it up	31	http://www.cresedim.com/board/gallery/read.html?no=927&board_no=8&page=	25/11/2014
#179		Carmelo Anthony	3D printed LED sneakers	32	http://hypebeast.com/2015/4/carmelo-anthony-and-others-invest-11-million-usd-towards-3d-printed-led-sneakers	25/11/2014
#180		Nicolas Estrada	Kap Arkona - brooch	28	http://klimt02.net/jewellers/660	10/12/2014
#181		Anouk Wipprecht	Open Source Element Dress	29	http://thecreatorsproject.vice.com/blog/a-fashion-designer-is-creating-the-worlds-first-open-sourced-3d-printed-dress	10/12/2014
#182		Kaspar Bänziger	fibre optics evening purse	21	https://www.pinterest.com/pin/569775790334656042/	16/12/2014
#183		Nicolas Estrada	Dornbusch brooch	26	http://klimt02.net/jewellers/660	16/12/2014
#184		Nicolas Estrada	A Clear Midnight	30	http://klimt02.net/jewellers/660	16/12/2014
#185		Lisa Juen	Hua Deng	30	http://klimt02.net/jewellers/lisa-juen	16/12/2014
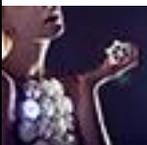
#186		Tiro Burch for Fitbit	Fitbit collection 2014	28	http://blog.atmel.com/2014/07/16/fashion-meets-fitness-with-new-tory-burch-fitbit-collection/	16/12/2014
#187		Swarovski for Misfit	SWAROVSKI SHINE COLLECTION	27	https://store.misfit.com/collections/swarovski-shine	16/12/2014
#188		Artefactgroup - Purple	smart necklace	31	http://www.wired.com/2014/09/smart-necklace-thats-like-locket-21st-century/	16/12/2014
#189		Looksee	Eyecatcher bracelet	26	http://www.lookseelabs.com/gallery/	16/12/2014
#190		Bytten for Fitbit	Title unknown	25	http://www.bytten.com/	16/12/2014
#191		Cute Circuit	Sparkle Booties	28	http://shop.cutecircuit.com/collections/womenswear/products/sparkle-booties	16/12/2014
#192		Firbit, Jawbone, Misfit, Fuelband	Smart bands	25	http://www.govtech.com/health/Could-Better-Health-Be-all-in-the-Wrist.html	19/12/2014
#193		Pankaj and Nidhi	Wills Lifestyle India Fashion Week SS12	30	http://exshoesme.com/2011/10/25/diwali-delights/	19/12/2014
#194		Sarah Angold	Kingle Neckpiece	27	https://popupuau.wordpress.com/2012/12/02/the-luminous-trend-translucend-geometries-in-sarah-angold-lili-colley-yoolhee-koo-and-lisa-watson/	19/12/2014
#195		ColeBrook Company	Hand stitched leather Fitbit Flex band bracelet	19	https://www.etsy.com/uk/listing/238771035/hand-stitched-leather-fitbit-flex-band?ga_order=most_relevant&ga_search_type=all&ga_view_type=gallery&ga_search_query=fitbit&ref=sr_gallery_2	19/12/2014

#196		Mighty Cast	Nex - smart bracelet	29	http://www.mightycast.com/	19/12/2014
#197		Misfit	Bloom for Misfit Shine	22	http://www.ubergizmo.com/2014/04/bloom-necklace-forshine-activity-tracker/	19/12/2014
#198		Ulrike Oberlack	Light Wrap	25	http://ultraindigo.com/portfolio/wearable-light	19/12/2014
#199		Agatha Lee	Smart Upcycled Necklace	24	http://greenissuessingapore.blogspot.sg/2014/03/smart-upcycled-bib-necklace.html	19/12/2014
#200		Blue Moon Designs	Aqua blue steampunk LED brooch	29	https://www.etsy.com/listing/181169000/aqua-blue-steampunk-led-brooch-glow-in?ref=related-1	19/12/2014
#201		Studio 5050 (Despina Papadopoulos)	MOI	21	http://principleddesign.org/project/moi/	20/12/2014
#202		Karen Mccreary	Light Points	28	http://www.karenmccreary.com/mccreary/lightpn.asp	20/12/2014
#203		Ulrike Oberlack	Untitled	32	http://ultraindigo.com/portfolio/wearable-light	20/12/2014
#204		Karen McCreary	Chiaroscuro Cone Drop Earrings	24	http://www.karenmccreary.com/mccreary/ce-2004.asp	20/12/2014
#205		Karen McCreary	Radial Pulse Emitter	31	http://www.karenmccreary.com/mccreary/radialb.asp	20/12/2014
#206		Karen mcCreary	Pulse Quadrant	26	http://www.karenmccreary.com/mccreary/PulseQuadrant.asp	20/12/2014
#207		Karen McCreary	Reflection Point A	26	http://www.karenmccreary.com/mccreary/refleca.asp	22/12/2014
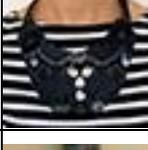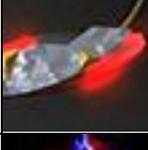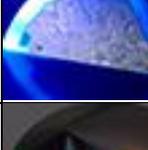
#208		Karen McCreary	Pulse Vector	36	http://www.karenmccreary.com/mccreary/pulsevector.asp	22/12/2014
#209		Karen McCreary	Chiton Brooch	32	http://www.karenmccreary.com/mccreary/Chiton_BroochPR.asp	22/12/2014
#210		Steuart Bremner	Light Ring	21	http://www.thecarrotbox.com/news/1005.asp also available on author's website http://www.steuartbremner.com/LightRing.php	22/12/2014
#211		Unknown	Luminous Stone Necklace Hollow Out Love Pendants	29	http://www.bygoods.com/luminous-stone-necklace-hollow-out-love-pendants.html	22/12/2014

Appendix B-2 - Coding Emergence Progression

▇ ARTEFACT COLOUR		▇ LIGHT IMPACT
▇ BODY PLACE	▇ MATERIALS	▇ LIGHT SCOPE
▇ MANUFACTURE	▇ LIGHT COLOUR	▇ LIGHT INTEGRATION
▇ MARKET/CONTEXT	▇ LIGHT COLOUR QUALITY	▇ LIGHT SOURCE
▇ TASTE/STYLE	▇ ON/OFF	▇ LIGHTING EFFECTS

#ID	EMERGING CODES	EMERGING CATEGORIES AND SUB-CATEGORIES
#001	Multicolour	
		ARTEFACT COLOUR
	Headpiece	
		BODY PLACE
	White	
		LIGHT COLOUR
	Absent	
		LIGHT INTEGRATION
	LEDs	
		LIGHT SOURCE
	Cheap	
		MANUFACTURE
	Clubbing	
	Novelty Items	
		MARKET/CONTEXT
	Fur	
	Feathers	
		MATERIALS
	Gaudy	
	Funny	
		TASTE/STYLE
#002	Pink (ARTEFACT COLOUR)	
	Blue (ARTEFACT COLOUR)	
		Headpiece (BODY PLACE)
	Wig (Headpiece) (BODY PLACE)	
	Hairpin (Headpiece)(BODY PLACE)	
	Ribbons (MATERIALS)	

	Girly (TASTE/STYLE)	
	Flashy (TASTE/STYLE)	
	Slight (LIGHT INTEGRATION)	
		LIGHTING EFFECTS
	None - Source visible (LIGHTING EFFECTS)	
	Diffusion - Slight/Accidental (LIGHTING EFFECTS)	
#003	Black (ARTEFACT COLOUR)	
	Hat (Headpiece)(BODY PLACE)	
	Average (MANUFACTURE)	
	Fabric (MATERIALS)	
	Sequins (MATERIALS)	
	Unisex (TASTE/STYLE)	
	Reflection - Slight/Accidental (LIGHTING EFFECTS)	
#004	Green (ARTEFACT COLOUR)	
		Source (LIGHT COLOUR)
		Resulting (LIGHT COLOUR)
		Interaction with Materials (Resulting) (LIGHT COLOUR)
	Medium (LIGHT INTEGRATION)	
		Solid (MATERIALS)
		Diffusive (MATERIALS)
		Reflective (MATERIALS)
	Rubber Tube (Diffusive) (MATERIALS)	
	Diffusion - Intentional (LIGHTING EFFECTS)	
#005	Metallic - Silver (ARTEFACT COLOUR)	
		Neckpiece (BODY PLACE)
	Collar (Neckpiece) (BODY PLACE)	
	Blue (Source) (LIGHT COLOUR)	
	Good (LIGHT INTEGRATION)	
	Good (MANUFACTURE)	
		Handmade-Average (MANUFACTURE)
		Industrial - Cheap (MANUFACTURE)
		Industrial - Average (MANUFACTURE)
	Jewellery (MARKET/CONTEXT)	
	Silver (Solid) (MATERIALS)	
	Silver (Reflective) (MATERIALS)	
	Organic (TASTE/STYLE)	
	Subtle (TASTE/STYLE)	
	Cut-Outs (LIGHTING EFFECTS)	
	Containment (LIGHTING EFFECTS)	
	Feminine (TASTE/STYLE)	
#006	Clear/Transparent (ARTEFACT	

COLOUR)	
Earrings (BODY PLACE)	
Purple (Source) (LIGHT COLOUR)	
Red (Source) (LIGHT COLOUR)	
Green (Source) (LIGHT COLOUR)	
Pink (Source) (LIGHT COLOUR)	
Refraction (LIGHTING EFFECTS)	
High Street - Fashion (MARKET/CONTEXT)	
Metal-Copper (Solid) (MATERIALS)	
	Refractive (MATERIALS)
Cubic Zirconia (Refractive) (MATERIALS)	
#007 White (ARTEFACT COLOUR)	
	Body (BODY PLACE)
Dress (Body) (BODY PLACE)	
Wearable Tech (MARKET/CONTEXT)	
Fabric (Diffusive) (MATERIALS)	
Nylon (Diffusive) (MATERIALS)	
Ugly (TASTE/STYLE)	
	LIGHT SCOPE
Indicator (LIGHT SCOPE)	
Aesthetic (LIGHT SCOPE)	
#008 Changing (Source) (LIGHT COLOUR)	
RGB LEDs (LIGHT SOURCE)	
MIcroControlled (LIGHTING EFFECTS)	
Pixel (LIGHTING EFFECTS)	
Bespoke -Very High (MANUFACTURE)	
Catwalk (MARKET/CONTEXT)	
LED MATRIX (Solid) (MATERIALS)	
Futuristic (TASTE/STYLE)	
#009 Total (LIGHT INTEGRATION)	
Projection (LIGHTING EFFECTS)	
Metal-Steel (Solid) (MATERIALS)	
Structural (LIGHT SCOPE)	
#010	Anywhere (BODY PLACE)
Shawl (Anywhere) (BODY PLACE)	
Very Good (LIGHT INTEGRATION)	
Shading (LIGHTING EFFECTS)	
Handmade - Good (MANUFACTURE)	
Fashion/Textiles (MARKET/CONTEXT)	
Yarn (Solid) (MATERIALS)	
	LIGHT IMPACT
Soft (LIGHT IMPACT)	
Average (LIGHT IMPACT)	

Crude (LIGHT IMPACT)	
Harsh (LIGHT IMPACT)	
#011	Face (BODY PLACE)
Eyes (Face) (BODY PLACE)	
Flickering - Intermittence (LIGHTING EFFECTS)	
Handmade -Poor (MANUFACTURE)	
Plastics (Solid) (MATERIALS)	
#012 Crystals (Refractive) (MATERIALS)	
#013 Brooch (Anywhere) (BODY PLACE)	
CJD (Jewellery) (MARKET/CONTEXT)	
Plastics (Refractive) (MATERIALS)	
Mechanical /Cold (TASTE/STYLE)	
Agglomerate/Messy (TASTE/STYLE)	
#014 Coat (Body) (BODY PLACE)	
#017 Pendant (Neckpiece) (BODY PLACE)	
	Arm (BODY PLACE)
Bangle (Arm) (BODY PLACE)	
Gemstones (Refractive) (MATERIALS)	
Sleek (TASTE/STYLE)	
#018 Texturing (LIGHTING EFFECTS)	
Reflection - Intentional (LIGHTING EFFECTS)	
Paper (Diffusive) (MATERIALS)	
Paper (Solid) (MATERIALS)	
Mirror (Reflective) (MATERIALS)	
#019 Lariat (Neckpiece) (BODY PLACE)	
Industrial - Good (MANUFCTURE)	
Silicone (Diffusive) (MATERIALS)	
#020 Mains Powered (LIGHT SOURCE)	
Conceptual (TASTE/STYLE)	
Pure Light (MATERIALS)	
#021 Lace (Solid) (MATERIALS)	
	Hand (BODY PLACES)
Medical (TASTE/STYLE)	
#022 Red (ARTEFACT COLOUR)	
Pink (Resulting)(Interaction w.m.)(LIGHT COLOUR)	
#023 Red (Fluo) - (ARTEFACT COLOUR)	
Yellow (Fluo) - (ARTEFACT COLOUR)	
	Photo reactivity (Resulting) (LIGHT COLOUR)

	Red (Fluo) (Resulting) (LIGHT COLOUR)	
	Yellow (Fluo) (Resulting) (LIGHT COLOUR)	
	Fluorescence (LIGHTING EFFECTS)	
	Glass (Diffusive) (MATERIALS)	
	Porcelain (Solid) (MATERIALS)	
	Wood (Solid) (MATERIALS)	
#024	Fabric (Reflective) (MATERIALS)	
#025	Vegetable Ivory (Diffusive) (MATERIALS)	
#029	Suit (Body) (BODY PLACE)	
	EL Wire (LIGHT SOURCE)	
	Stage/Costume (MARKET/CONTEXT)	
	Latex (Solid) (MATERIALS)	
	Cyber (TASTE/STYLE)	
#030	Necklace (Neckpiece) (BODY PLACE)	
	Neon (LIGHT SOURCE)	
	Transmission (LIGHTING EFFECTS)	
	Glass (Refractve) (MATERIALS)	
#031	Aqua (ARTEFACT COLOUR)	
	Aqua (Resulting)(Interaction w.m.)(LIGHT COLOUR)	
	Geometric (TASTE/STYLE)	
#032	Top (Body) (BODY PLACE)	
	Colour Change (LIGHTING EFFECTS)	
#033		Feet (BODY PLACE)
	Shoes (Feet) (BODY PLACE)	
	Aqua (Source) (LIGHT COLOUR)	
	Leather (Solid) (MATERIALS)	
#034	Circuitry (Solid) (MATERIALS)	
#35	Skirt (Body) (BODY PLACE)	
	Pattern Change (LIGHTING EFFECTS)	
#036	Green (Phospho) (Resulting) (Photoreactivity)(LIGHT COLOUR)	
	Phosphorescent (LIGHT SOURCE))	
	Phosphorescence (LIGHTING EFFECTS)	
	Plastics (Diffusive) (MATERIALS)	
	Fluorescent (LIGHT SOURCE)	

#037	White Fluo (Resulting)(Photoreactivity)(LIGHT COLOUR)	
	PVC (Reflective) (MATERIALS)	
	Fetish (TASTE/STYLE)	
	Aqua Fluo (Resulting) (Photoreactivity)(LIGHT COLOUR)	
#038	Corset (BODY PLACE)	
		LIGHT COLOUR QUALITY
	Plain (LIGHT COLOUR QUALITY)	
	Modulated (LIGHT COLOUR QUALITY)	
#039	Multicolour Fluo(Resulting)(Photoreactivity)(LIGHT COLOUR)	
	Cool (TASTE/STYLE)	
		ON/OFF
	Related (ON/OFF)	
	Unrelated (ON/OFF)	
#040	Armor (Arm) (BODY PLACE)	
	Rubber (Solid) (MATERIALS)	
	Fantasy/Fiction (TASTE/STYLE))	
#041	Orange (ARTEFACT COLOUR)	
	Metallic - Oxidised (ARTEFACT COLOUR)	
	Enamel (Solid) (MATERIALS)	
#042	Metal -Generic (Solid) (MATERIALS)	
#043	White (Resulting) (Interaction with Materials) (LIGHT COLOUR)	
#044	Grey (ARTEFACT COLOUR)	
	Smart Band (Arm) (BODY PLACE)	
	LCD Screen (LIGHT SOURCE)	
	LCD Screen (Solid) (MATERIALS)	
	Geek (TASTE/STYLE)	
#047	Bracelet (Arm) (BODY PLACE)	
	Object (Anywhere) (BODY PLACE)	
	Product Design (MARKET/CONTEXT)	
	Interior Design (MARKET/CONTEXT)	
	Industrial (TASTE/STYLE)	
#048	Metallic - Gold (ARTEFACT COLOUR)	
	Refraction - Accidental (LIGHTING EFFECTS)	
	Metal - Brass (solid) (MATERIALS)	
	Beads (MATERIALS)	
#049	Belt (Body) (BODY PLACE)	

#051	Sculptural (Neckpiece) (BODY PLACE)	
#052	Mouth (Face) (BODY PLACE)	
#053	Lightbulbs (LIGHT SOURCE)	
	Glittering (ARTEFACT COLOUR)	
#054	Fibre Optics (LIGHT SOURCE)	
#055		Shoulders (BODY PLACE)
	Sculptural (Shoulder) (BODY PLACE)	
#056	Sea Shells (Diffusive) (MATERIALS)	
#059	Layering (LIGHTING EFFECTS)	
#060	Wrap (Shoulders) (BODY PLACE)	
	Colouring (LIGHTING EFFECTS)	
#061	Sculptural (Headpiece) (BODY PLACE)	
	Minimal (TASTE/STYLE)	
#063	Drawing (LIGHTING EFFECTS)	
#065	EL Fabric (LIGHT SOURCES)	
#066	Tattoo (Anywhere)(BODY PLACE)	
	Yellow (Source) (LIGHT COLOUR)	
#069	All (Face) (BODY PLACE)	
	Yellow (Source) (LIGHT COLOUR)	
#070	Polymer Clay (Solid) (MATERIALS)	
#071	Watch (Arm) (BODY PLACE)	
	Watches (Jewellery) (MARKET/CONTEXT)	
	Orange (Source) (LIGHT COLOUR)	
#072	Lasers (LIGHT SOURCE)	
	Beam (LIGHTING EFFECTS)	
#078	Beige (ARTEFACT COLOUR)	
	JACKET (Body) (BODY PLACE)	
#084	Pink Fluo (ARTEFACT COLOUR)	
	Green Fluo (ARTEFACT COLOUR)	
	Blue Fluo (ARTEFACT COLOUR)	
	Pink Fluo (Resulting)(Photoreactivity)(LIGHT COLOUR)	
	Green Fluo (Resulting)(Photoreactivity)(LIGHT COLOUR)	
	Blue Fluo (Resulting)(Photoreactivity)(LIGHT	

	COLOUR)	
#086	Multicolour(Source) (LIGHT COLOUR)	
#090	Sporty (TASTE/STYLE)	
	Masculine (TASTE/STYLE)	
#091	UV LEDs (LIGHT SOURCE)	
	UV (Source) (LIGHT COLOUR)	
#095	Delicate (TASTE/STYLE)	
#097	Yellow (Resulting)(Interaction with Materials)(LIGHT COLOUR)	
#103	Purple (ARTEFACT COLOUR)	
#104	Sports (MARKET/CONTEXT)	
	Nylon (Solid) (MATERIALS)	
#107	Installation - Art (MARKET/CONTEXT)	
	Magic - Fairy (TASTE/STYLE)	
#111	Bra (Body) (BODY PLACE)	
#117	Iridescent(Resulting)(Interaction w.m.)(LIGHT COLOUR)	
	Iridescence (LIGHTING EFFECTS)	
	Iridescent (LIGHT SOURCE)	
	Crystals (Reflective) (MATERIALS)	
#122	Utilitarian (LIGHT SCOPE)	
#131	OLED (LIGHT SOURCE)	
	Reflective (LIGHT SOURCE)	
#134	Multicolour(Resulting)(Interaction w.m.)(LIGHT COLOUR)	
	Slides (Diffusive) (MATERIALS)	
#142	Crown (Headpiece)(BODY PLACE)	
#151	Ring (Hand) (BODY PLACE)	
#153	Porcelain (Diffusive) (MATERIALS)	
#162	Interference (LIGHTING EFFECTS)	
#164	LED Strips (LIGHT SOURCE)	

#165	Resin (Diffusive) (MATERIALS)	
#168	Metal - Gold (Solid) (MATERIALS)	
#177	White - Retroreflective (Resulting)(Photoreactivity)(LIGHT COLOUR)	
#180	Gemstones (Diffusive) (MATERIALS)	
#185	Plastics (Reflective) (MATERIALS)	
#194	Iridescent (ARTEFACT COLOUR)	
#204	Colouring - See through (LIGHTING EFFECTS)	
#208	Orange (Resulting)(Interaction w.m.) (LIGHT COLOUR)	
#211	Aqua - Phospho (Resulting)(Photoreactivity) (LIGHT COLOUR)	

Appendix B-3 - Coding Timeline (memo)

Name: Memos\\GENERAL\\Coding Timeline

Description: I will note here the coding progression with the various sessions so I will be able to track back and recode items, in case I will discover new codes emerging at a later stage.

Created On: 14/10/2013 10:17:55

Created By: LISA CERUTTI

Last Modified On: 14/01/2015 13:19:19

Modified By: LISA CERUTTI

Size: 14 KB

COLOUR CODE FOR THIS MEMO:

RED are new nodes generated (new additions to categories that already exist and that do not need to go back and recode the previous entries).

BLUE are new nodes or categories that require to go back and recode everything in the light of this new code.

The normal rest of the text is black.

Each coding session is timestamped.

13/10/2013 12.52
Artefact #001
Multicolour (ARTEFACT COLOUR) - - Headpiece (BODY PLACE)- White (LIGHT COLOUR) - Absent (LIGHT INTEGRATION) - LEDs (LIGHT SOURCE) Cheap (MANUFACTURE) - Clubbing - Novelty Items (-MARKET/CONTEXT) - Fur - Feathers (MATERIALS)- Gaudy-Funny(TASTE/STYLE)
13/10/2013 19.49
Artefact #002
Pink - Blue (ARTEFACT COLOUR) - Hairpin - Wig (recoded artefact #001 on this) - Ribbons (MATERIALS) - Girly - Flashy (TASTE/STYLE)
Then, reflecting I added Slight (LIGHT INTEGRATION) and also a new category LIGHTING EFFECTS with the sub-codes 'None (source visible) - Diffusion (slight - accidental) and recoded both artefacts to them

15/10/2013 20.28
Artefact #003
Black - (ARTEFACT COLOUR)- Hat (HEADPIECE) - Average(MANUFACTURE) - Fabric- Sequins (MATERIALS) Unisex - (TASTE/STYLE) - and also Reflection (slight-accidental) in Lighting effects.

16/10/2013 11.46
Artefact #004
Green (Artifact colour) - New sub-categories of LIGHT COLOUR - SOURCE and RESULTING - and Sub-code of Resulting ' Interaction with Materials colour - Green (go back and recode previous internals - Medium (light integration) - Rubber tube (Materials) - Diffusion (Intenriional) in lighting Effects.
After creating the new nodes and writing memos on the category 'Resulting' (LIGHT COLOUR) in particular referring to the new Rubber (MATERIAL) and how the white light would become Green as a resultant effect of its passage through the rubber, I realised that the point was the Translucency of rubber, therefore I created 2 new codes for Materials - SOLID (no light passage) and TRANSLUCENT-DIFFUSIVE (medium light passage) and also REFLECTIVE (no light passage but polished to the point of creating a light effect) (go back and recode everything on this)

Artefact#005
Metallic - Silver (Artefact colour) - Neckpiece - Collar (body place) - Blue (light colour -source) - Good (light integration) - Good (manufacture) - Jewellery (Market) - Silver (materials - solid) - Silver (materials - reflective) - Organic - subtle (taste/stye) - Cut-outs - Containment (lighting effects).
After reflection, the code Good (manufacture) has been modified into 'Handmade - Average' and the codes Cheap and Average previously existing have been modified into 'Industrial - Cheap' and 'Industrial - Average'.
Changed new code for Materials 'Silver' into 'Metal - Silver' in both instances in 'Reflective' and in 'Solid' nodes.
Added node 'Feminine' in Taste, style, for indicating the fact that the artefact is clearly for women.

17/10/2013 15.05
Artefact#006
Clear - Transparent (artefact colour)Earrings (body place) - Purple, red, green, pink, (source) - Refraction (lighting effects)- - High Street fashion (market) Metal (copper) (solid) - cubic zirconia (transparent) - Refractive -

22/10/2013 12.44
Artefact #007
White (art.colour) - Body and Dress (Body Place) - Wearable Tech (Market) - Fabric(diffusing) and Nylon (Diffusive) in Materials - Ugly (Style taste) - New Category 'Light Scope' and 2 sub-codes 'Indicator' and 'Aesthetic' (go back and recode everything on this.)

Artefact #008
Changing (light colour - source) - RGB Leds (Change name of other node 'LEDs' into' LEDs (monochrome) - Micro-Controlled and Pixel (Lighting Effects) - Bespoke (very high) in Manufacture - Catwalk (context market) - LED Matrix (materials- solid) - Futuristic (style taste)

23/10/2013 13.23
Artefact#009
Total (integration) - Projection (lighting effects) - Metal - Steel (solid) in Materials - Structural (light scope)

Artefact #010
Anywhere and Shawl (Body Place - Very Good (integration) - Shading (lighting effects) - Handmade (good) in manufacture - Fashion/Textiles (market) - Yarn (Solid) in Materials - New Category 'Light Impact' and 'Soft' as a sub code (go and recode everything else)
In recoding, new nodes under 'light impact' have been generated 'Crude', 'Harsh' and 'Average'

26/10/2013 14.12
Artefact #011
Face - Eyes (Body Place) - Intermittence (lighting effects) - Handmade-Poor (Manufacture) - Plastics(solid) in Materials -

Artefact #012
Crystals (refractive) in Materials.

Artefact #013
Brooch in Anywhere (body place) - CJD as subcategory of Jewellery (context market) - Plastics(transparent) – Mechanical (Cold) and Agglomerate (messy) in Style, Taste (go back and check for recoding other internals)

27/10/2013 14.52
Artefact #014
Coat in Body (body Place) Checked old coding and added coding for Ugly and Unisex in artefact #001 and #004

28/10/2013 15.01
Artefact #015
Coded at existing nodes

Artefact#016
Coded at existing nodes

Artefact #0017
Pendant, Arm and Bangle in Body Place - Gemstones (refractive) in Materials - Sleek in Style-Taste

Artefact #018
Texturing and Reflection (intentional) in (lighting effects) Paper (diffusive) - Paper (solid) - Mirror (reflective) in Materials -

Artefact #019
Lariat (neckpiece) in Body Places - Industrial - Good in Manufacture - Silicone(diffusive) in Materials

Artefact #020
Mains Powered in (light source) - Conceptual in Style taste. (go back ad compare/recode) - Added conceptual code in #011 - #013
Added new Sub-category for Materials 'Pure Light ' - go back and recode other internals
recoded under 'Pure Light ' #016 - #009

Artefact #021
Hand in (body places) - Lace (solid) in Materials - Medical in Style taste.

Artefact #022
 Red in Artefact Colour - Pink (resulting) in light colour - Recoded with 'Pixel' in Lighting effects #013 and recoded with 'Indicator' (Light scope) #013 - #012

30/10/2013 17.45
Modified labels of all the nods for the 'Light Integration' category, adding a number for expressing the levels of integration so they are in a scale from 1 to 6, where 1 is Absent, 2 is Slight, 3 is Medium 4 is Good, 5 is Very Good and 6 is Total.
Established also a couple of artefacts as references for this scale in order to make it easier to assign a level to the next artefacts and avoid inconsistency in coding. (see in memos for each level of light integration).

02/11/2013 19.07
After analysing artefacts #027 and #028 and having reflected on the scale of value as expressed in the memos, I recoded the work of Susanna Heron #020 accordingly with 'TOTAL - 6 ' under 'Light Integration'.

Artefact#023
Red(Fluo) and Yellow(Fluo) in (artefact colour) - Red (fluo) and Yellow(fluo) and 'Photoreactivity' in (resulting - Light colour) - Fluorescence in Lighting Effects - Glass (diffusive), Porcelain(solid), Wood(solid) in Materials

Artefact #024
Fabric (reflective) in Materials

Artefact #025
Vegetable Ivory (diffusive) in Materials

Artefact #026
Coded at existing nodes

Artefact #027
Coded at existing nodes

Artefact #028
Coded at existing nodes

Artefact #029
Costume (Body) in Body Place - EL Wire in Light Source - Stage/Costume in Market - Latex(solid) in Materials - Cyber in Taste-Style (go back and check possible recoding.
Added code Soomi Park #011 for Cyber
Added 'Costume/stage ' to Cute-Circuit dress #012

Artefact #030
Necklace (Neckpiece) in Body place - Neon in Light Source - Transmission in Lighting Effects- Glass (refractive) in Materials
Check for recoding in Transmission.
Recoded to Transmission - #023

04/11/2013 13.07
Artefact #031
Aqua (artefact colour) - Aqua (light colour - resulting in Interaction with Materials) - Geometric in (style taste) - Go back and check possible recoding of previous artefacts-
recoded #023 under Geometric

Artefact #032
Top (Body) in Body Place - Colour Change in Lighting effects - go back and check recoding of previous items
recoded #029 - #021 - #016 -#014 - #012 - #009 - #008 at Colour Change

Artefact #033
Feet (shoes) in Body Place - Aqua (source) in Light colour - Leather (solid) in Materials

Artefact #034
Circuitry (solid) in Materials - Go back and recode previous artefacts
Recoded for Circuitry #013 - #022 -#026 - 032

06/11/2013 20.47
Artefact #035
Skirt (Body) in Body Places - Pattern Change (Lighting effects)
go back and recode everything for Pattern Change
recoded #007 - #008 - #009 -#012 - #016 - #021 -- #023

Artefact #036
Green (Phospho) (resulting - photoreactivity) - Phosphorescent (Light Source) - Phosphorescence (lighting effects) - Plastics /diffusive (Materials) .
Added new node Fluorescent (light source) _ go back and recode
Recoded #023

Artefact #037
White (Fluo)(resulting - (photoreactivity) in (Light colour) - PVC (reflective in Materials - Fetish in Taste/style.
Renamed code 'Mains Powered' in External
Changed coding for #031 Aqua (resulting -interaction with material) in Aqua (fluo) i resulting photoreactivity.

Artefact #038
Corset (Body) in BODY PLACE
New Category 'LIGHT COLOUR QUALITY' - and 2 sub categories PLAIN - and MODULATED
GO back and recode everything with these-

18/11/2013 13.10
Artefact #039
Multicolour(Fluo)(resulting - photoreactivity) in Light colour - Cool in taste/style - New Category ON/OFF and sub codes Unrelated /related - Go back and recode other content
Recoded #018 - #025 -#030 -#031at Cool
Recoded all previous sources at new category ON-OFF

Artefact #040
Armor (Arm) in Body Place - Rubber (Solid) in Materials - Fantasy/Fiction in Style taste
recoded #029 - #032 -#36 - #037 at Fantasy fiction.

Artefact #041
Orange and Metallic - Oxidised in Artefact colour - Enamel(solid) in Materials

Artefact #042
Metal - Generic (solid) in Materials

Artefact #043
White (resulting - Interaction with materials) in Light colour

Artefact #044
Grey in Artefact colour - Smart Band (Arm(in Body Place - LCD Screen in Light Source - LCD Screen in Materials (solid) - Geek in taste style check previous for Geek

Artefact #045
Coded at existing nodes

Artefact #046
Coded at existing nodes

20/11/2013 17.05
Artefact #047
Bracelet and Object in Body place - Product design and Interior design in Market
Context - Industrial in taste/style
GO back and recode previous
recoded #033- #034 -#023 - #044 - #045 at Product design
Recoded #045 #044 #006 ad Industrial

Artefact #048
Metallic (gold) in Artefact colour - Refraction (accidental) in Lighting effects -
Metal-Brass (solid) and Beads in Materials

Artefact #049
Belt (Body) in body places

Artefact #050
Coded at existing nodes

25/11/2013 12.51
Artefact #051
Sculptural (Neckpiece) - in Body Place

Artefact #052
Mouth(face) in Body Places

Artefact #053
Lightbulbs in Light source - Glittering in Artefact Colour

Artefact#054
Fibre Optics (Light source)

Artefact #055
Shoulder - Sculptural in Body Places

Artefact #056
Sea Shells (diffusive) in Materials

Artefact #057
Coded at existing nodes

Artefact #058
Coded at existing nodes

Artefact #046
Coded at existing nodes

20/11/2013 17.05
Artefact #047
Bracelet and Object in Body place - Product design and Interior design in Market Context - Industrial in taste/style
GO back and recode previous
recoded #033- #034 -#023 - #044 - #045 at Product design
Recoded #045 #044 #006 ad Industrial

Artefact #048
Metallic (gold) in Artefact colour - Refraction (accidental) in Lighting effects - Metal-Brass (solid) and Beads in Materials

Artefact #049
Belt (Body) in body places

Artefact #050
Coded at existing nodes

25/11/2013 12.51
Artefact #051
Sculptural (Neckpiece) - in Body Place

Artefact #052
Mouth(face) in Body Places

Artefact #053
Lightbulbs in Light source - Glittering in Artefact Colour

Artefact#054
Fibre Optics (Light source)

Artefact #055
Shoulder - Sculptural in Body Places

Artefact #056
Sea Shells (diffusive) in Materials

Artefact #057
Coded at existing nodes

Artefact #058
Coded at existing nodes

Artefact #059
Layering in Lighting Effects

16/01/2014 15.38
Artefact #060
Wrap (Shoulders) in Body Places - Colouring in Lighting effects.

Artefact#061
Sculptural (Headpiece) - in Body Places - Minimal in Taste/style - Recoded where necessary to Minimal recoded #017 #045

Artefact #062
Coded at existing nodes

Artefact #063
Drawing in Lighting effects recode previous ones on this #009 - #020 - #027 -#029 - #028 #035 - #038 - #039 - #046 - #050 -#058 - #061 - #062

Artefact #064
Coded at existing nodes

21/01/2014 15.38
Artefact #065
EL fabric in Light sources

Artefact #066
Tattoo (Anywhere) in Body Places - Yellow (source) in Light Colour

Artefact #067
Coded at existing nodes

Artefact #068
Coded at existing nodes

Artefact #069
All(face) in Body Place

Artefact #070
Polymer clay (solid) in Materials

Artefact #071
Watch (Arm) in Body Places - Watches (jewellery) in Market Orange (Source) in Light Colour

22/01/2014 15.38
Artefact #072
Lasers in Light Source
Beam in Lighting effects

Artefact #073
Coded at existing nodes

Artefact #074
Coded at existing nodes

Artefact #075
Coded at existing nodes

25/01/2014 17.59
Artefact #076
Coded at existing nodes

Artefact #077
Coded at existing nodes

Artefact #078
Beige in Artefact colour - Jacket (body) in Body places

Artefact #079
Coded at existing nodes

Artefact #080
Coded at existing nodes

30/01/2014 17.59
Artefact #081
Coded at existing nodes

Artefact #082
Coded at existing nodes

Artefact #083
Coded at existing nodes

Artefact #084
Pink (Fluo) - Green (Fluo) - Blue (Fluo) in Artefact Colour - Pink (Fluo) - Green (Fluo) and Blue (Fluo) in Light Colour (resulting - potoreactivity)

Artefact #085
Coded at existing nodes

11/02/2014 18.41
Artefact #086
Multicolour (source) in Light colour

Artefact #087
Coded at existing nodes

Artefact #088
Coded at existing nodes

Artefact #089
Coded at existing nodes

Artefact #090
Sporty - Masculine in Style Taste - Go back and recode for all
Multicolour recoded #008 - #012 - #014 - #032 - #036 -
Sporty #044 - #064 - #071 - #073 - #074 - #075
Masculine #075

14/02/2014 19.25
Artefact #091
UV LEDs in Light Source - UV (source) in Light Colour

Artefact #092
Coded at existing nodes

Artefact #093
Coded at existing nodes

Artefact #094
Coded at existing nodes

Artefact #095
Delicate in Style - Taste recoded previous ones to this.
#008 - #015 - #028 - #068 -#074

21/02/2014 20.12
Artefact #096
Coded at existing nodes

Artefact #097
Yellow (resulting - interaction w-m-) - In Light Colour

Artefact #098
Coded at existing nodes

Artefact #099
Coded at existing nodes

Artefact #100
Coded at existing nodes

<u>26/02/2014 13.57</u>
Artefact #101
Coded at existing nodes

Artefact #102
Coded at existing nodes

Artefact #103
Purple in Artefact colour

Artefact #104
Sports in Market (Go back and recode previous)
#044 - #064 #071-#073 - #074 - #075 #090
Nylon (Solid) in Materials

<u>06/03/2014 14.54</u>
Artefact #105
Coded at existing nodes

Artefact #106
Coded at existing nodes

Artefact #107
Installation - Art in Market go back and recode all
 #020 - #027 - #028 #062 - #087 - #096
Magic /Fairy in taste /style go back and recode.
#087 - #082 - #079 - #076 - #067 - #068 - #065 - #066 - #030 - #028 - #015 - #010

Artefact #108
Coded at existing nodes

Artefact #109
Coded at existing nodes

Artefact #110
Coded at existing nodes

<u>14/03/2014 14.54</u>
Artefact #111
Bra (Body) in Body Place

Artefact #112
Coded at existing nodes

Artefact #113
Coded at existing nodes

Artefact #114
Coded at existing nodes

Artefact #115
Coded at existing nodes

<u>21/03/2014 15.18</u>
Theoretical Saturation suspected for Novelty items or all artefacts that are simply accented with lights that have the same characteristics : no light integration - Plain light effects - On/Off unrelated - Crude effect - and same market and flashy/gaudy style.

Artefact #116
Coded at existing nodes

Artefact #117
Iridescent (Resulting - Interaction with Materials) in Light Colour
Iridescence in Lighting Effects
Iridescent (Light source)
Crystals (Reflective) in Materials

Artefact #118
Coded at existing nodes

Artefact #119
Coded at existing nodes

Artefact #120
Coded at existing nodes

<u>02/04/2014 15.51</u>
Artefact #121
Coded at existing nodes

Artefact #122
Utilitarian in Light Scope - go back and recode where necessary
nothing recoded

Artefact #123
Coded at existing nodes

Artefact #124
Coded at existing nodes

Artefact #125
Coded at existing nodes

Artefact #126
Coded at existing nodes

Artefact #127
Coded at existing nodes

Artefact #128
Coded at existing nodes

Artefact #129
Coded at existing nodes

Artefact #130
Coded at existing nodes

<u>24/04/2014 16.41</u>
Suspect approaching of theoretical saturation. The coding sessions with new emerging codes are getting rarer.
Artefact #131
OLED in Light Sources
Reflective in Light Sources

Artefact #132
Coded at existing nodes

Artefact #133
Coded at existing nodes

Artefact #134
Multicolour (Resulting - Interaction w.m.) in Light Colour
Slides (diffusive) - Materials

Artefact #135
Coded at existing nodes

Artefact #136
Coded at existing nodes

Artefact #137
Coded at existing nodes

Artefact #138
Coded at existing nodes

Artefact #139
Coded at existing nodes

Artefact #140
Coded at existing nodes

16/05/2014 17.29
Saturation almost reached? I will give another try. If nothing new emerges from the next group one I might stop.
Artefact #141
Coded at existing nodes

Artefact #142
Crown (Headpiece) in Body Place

Artefact #143
Coded at existing nodes

Artefact #144
Coded at existing nodes

Artefact #145
Coded at existing nodes

Artefact #146
Coded at existing nodes

Artefact #147
Coded at existing nodes

Artefact #148
Coded at existing nodes

Artefact #149
Coded at existing nodes

Artefact #150
Coded at existing nodes

15/09/2014 18.47
Focused sampling for checking the possible saturation.
Artefact #151
Ring (Hand) in Body Places)

Artefact #152
Coded at existing nodes

Artefact #153
Porcelain (Diffusive) in Materials

Artefact #154
Coded at existing nodes

Artefact #155
Coded at existing nodes

Artefact #156
Coded at existing nodes

Artefact #157
Coded at existing nodes

Artefact #158
Coded at existing nodes

Artefact #159
Coded at existing nodes

Artefact #160
Coded at existing nodes

25/09/2014 19.28
More purposive sampling
Artefact #161
Coded at existing nodes

Artefact #162
Interference in Lighting Effects go back and check if present in the previous ones.
#142 -#141 - #143 - #077 - #057 - #045 - #156

Artefact #163
Coded at existing nodes

Artefact #164
LED Strips in Light sources - Go back and recode where necessary
#011 - #012 - #051 - #052 - #053 - #060 - #064 - #073 - #077 - #104 - #138 - #140
- #149

Artefact #165
Resin (Diffusive) in Materials

Artefact #166
Coded at existing nodes

Artefact #167
Metal - Gold (Solid) in Materials

Artefact #168
Coded at existing nodes

Artefact #169
Coded at existing nodes

Artefact #170
Coded at existing nodes

<u>26/11/2014 20.49</u>
It is not the moment to stop. More focused sampling has produced new codes.
Artefact #171
Coded at existing nodes

Artefact #172
Coded at existing nodes

Artefact #173
Coded at existing nodes

Artefact #174
Coded at existing nodes

Artefact #175
Coded at existing nodes

Artefact #176
Coded at existing nodes

Artefact #177
White (retroreflective) in Light Colour (resulting - photoreactivity)

Artefact #178
Coded at existing nodes

Artefact #179
Coded at existing nodes

<u>10/12/2014 20.49</u>
Artefact #180
Gemstones (Diffusive) in Materials

Artefact #181
Coded at existing nodes

<u>16/12/2014 11.41</u>
Artefact #182
Coded at existing nodes

Artefact #183
Coded at existing nodes

Artefact #184
Coded at existing nodes

Artefact #185
Plastics (Reflective) - in Materials

Artefact #186
Coded at existing nodes

Artefact #187
Coded at existing nodes

Artefact #188
Coded at existing nodes

Artefact #189
Coded at existing nodes

Artefact #190
Coded at existing nodes

Artefact #191
Coded at existing nodes

19/12/2014 12.31
Artefact #192
Coded at existing nodes

Artefact #193
Coded at existing nodes

Artefact #194
Iridescent in Artefact Colour go back and check recoding
#117 - #141 - #145 - #185

Artefact #195
Coded at existing nodes

Artefact #196
Coded at existing nodes

Artefact #197
Coded at existing nodes

Artefact #198
Coded at existing nodes

Artefact #199
Coded at existing nodes

Artefact #200
Coded at existing nodes

<u>20/12/2014 13.24</u>
Artefact #201
Coded at existing nodes

Artefact #202
Coded at existing nodes

Artefact #203
Coded at existing nodes

Artefact #204
Colouring (See-Through) in Lighting Effects

Artefact #205
Coded at existing nodes

Artefact #206
Coded at existing nodes

<u>22/12/2014 13.24</u>
Artefact #207
Coded at existing nodes

Artefact #208
Orange (Resulting- Interaction with Materials) in Light Colour

Artefact #209
Coded at existing nodes

Artefact #210
Coded at existing nodes

Artefact #211
Aqua (Phospho) - (Resulting-Photoreactivity) in Light Colour

More data are simply repeating the same coding, with just slight additions in nuances, which could go on forever, but the emergence of new 'colour' codes do not represent a substantive emergence of new attributes or categories. Saturation reached.

Appendix B-4 - Manual coding sheets (Ex.)

ART. COLOUR	BODY PLACE	LIGHT COLOUR	INTEGRATION	LIGHT SOURCE	LIGHT EFFECTS	MANUFACTURE	MARKET	MATERIALS	STYLE
#029 Black & white	Body (costume)	• Blue (source) • Pink (cover) • Pan (cover)	• Absent	El wire	Noise (source) (vibe) • Intermittent • Micro • controlled	Handmade / Average	Stage Costume Clubbing / Wearable	Fabric (solid) Plastics (solid) (L.B.) (solid)	• Aesthetic • Futuristic, indicator CRUDE • Cyber • Unisex • Flashy
#030 Clear white Victorian transp. suit	Necklace	White (source)	PARTIAL	Neon	• Transmission • Diffusion • Refraction	Bespoke / high	Jewellery (CJD)	Glass (Refractive)	• Feminine • Aesthetic • Geek • Subtle • structural • Ethnic Soft
#031 AQUA clear transp.	Neckpiece (Necklace)	Aqua colour	Medium	Mains powered	Translucent Projection	Handmade / good	Jewellery CJD	Plastics (transparent)	Futuristic aesthetic • structural • Unisex • geometric Soft
#032 Metallic clear / translucent	Body / TOP	changing	Absent	RGB LEDs	• Microcontroller • interactive • colors / changing	Bespoke / mentation	Wearable tech • controlled	Plastics (solid) • Fibre light	• Cyber • Futuristic • Unisex • Mechanical coil Crude
#033 Metallic silver wire	Feet / shoes	aqua (source)	Absent	EL wire	None (source) source visible	Industrial / good	Fashion textiles clubbing prototype	Leather (solid)	• Futuristic • Aesthetic • cyber • Futuristic • Flashy Crude
#034 Clear transp. Electric metallic silver	Arm / Bangle	aqua (servicing)	slight	Mains powered	Transmission • Projection	Industrial / Average	Jewellery	Plastics (solid) Metallic (solid) Crude	• Futuristic • Aesthetic • sleek • Mechanical Soft
#035 Black Transp. Clear skirt	Body / skirt	changing	good	EL wire	None (source) visible • interactive • colour change Pattern change	Bespoke / Rehynced	Fashion textiles • Wearable tech.	Fabric (solid) Leather (solid)	• Feminine • Aesthetic • Futuristic • Indicator Crude

Appendix B-5 - Memos - (examples)

Name: Memos\\GENERAL\\GVA method development

Description: All about GVA, mistakes, issues, reflections, ideas, until the method will be tested and working.

Created On: 20/09/2013 10:25:09
Created By: LISA CERUTTI
Modified On: 12/02/2015 13:48:15
Modified By: LISA CERUTTI
Size: 9 KB

Reflections on GVA development

04/10/2013 13.48

I am evaluating if it is going to be easier to assign a memo linked to each source
(image) or if it is better to assign directly a node, given the fact that I want to keep this analysis very simple and similar to a 'real studio' situation, with the added factors of rigor and systematicity, while repeating a structured process. Images analysed with the IA were processed very quickly, often by a simple glance. If I choose to start coding directly, reducing each image to a set of few keywords represented by the nodes, it will be easier to see them side by side by using the coding stripes. This could also be done at a subsequent stage, with a further refinement of codes when the categories will start to emerge.

I could create annotations so they will appear below or on the side of the image in the same window so that they will be visualised together in a single screen rather than in two separate windows, one for the image and one for the annotation.

It is important to create the best possible visual display, as all text always refers to the description of the image, as a sort of textual 'translation' of an intuitive visual apprehension. I need to be creative in reinterpreting the tools that Nvivo offers, even though they might have been designed or intended for different purposes and it is also beneficial that I started to use it without a previous knowledge so that I don't have limits or preconceived ideas and I am free to tinker with its features.

06/10/2013 13.57

I have decided that for the time being I will start by creating one memo and one annotation for each image. Then I will make some experiments with the coding and I will choose which

method is going to be better/quicker/more effective for my purposes. I suspect that the annotations might suit better an immediate coding of the image as they are visualised right below it, so they are physically 'closer' to it in the Nvivo interface, rather than in a separate window as it happens with memos. The memo tool might be useful for other types of studies, possibly for text-based analysis, where the memos themselves can be used and coded as data, but for my 'lateral' use of Nvivo I don't really see the point in this functionality as an aid to coding. One could easily write annotations in a paper notebook and keep this at hand at all times. Possibly, it could be even more effective, as one could keep the annotations always at hand, regardless of which image or window is open in any given moment within the software. Annotations have an interface more versatile than memos, so they resemble to the notebook idea. I think a mixed-method approach could be more suitable and flexible. Since the images imported will be probably in the order of hundreds, I am afraid I could get very confused with an excessive proliferation of codes. I need to keep the process tidy and straightforward, maintaining the focus on rigor so I need to avoid too many complications in the use of the software. Nvivo is a tool, and since it has not been designed for this kind of analysis, I need to remain open and creative in adapting its use.

08/10/2013 20.08

I will assign to all images imported an univocal ID code, like #001, #002 etc. since it seems that Nvivo orders internals alphanumerically. This code will be the same for the original image stored externally in the 'Images' folder on my PC and it will follow the 'internal' file everywhere. The details about author, title of work, original link to where the image has been found etc. will remain as part of the 'description' box in the properties of the image, or they will be stored in the annotations window or in the memos related to the images. Have to decide after making tests where is the best place to store this information. In fact, in real studio situations, many images are gathered, visualised, used, copied, archived and collected without even spending time tracing back the author or the photographer or all the bibliographic information that, for obvious reasons I need to keep for this research. So it is important anyway to create a system where the univocal ID of the image is the main identifying factor following the source, regardless the fact that I know the origins of the image itself.

12/10/2013 14.12

Total confusion. There are so many options I don't know where to start from. I was so sure about the idea of using the annotations instead of the separate memos for keeping track of the thoughts and analysis of the internals, but today I am full of doubts. I am afraid that if I do not set up the right procedure from the beginning it will be a disaster to amend it afterwards if I discover that the method is wrong and it needs corrections. I don't want to keep on wasting work and time as I have already done in taking a direction that turns out to

be inefficient with the accumulation of data. If I start with the coding and then I find myself lost within hundreds of nodes I am not sure I will find my way back. I guess the real problem is to be consistent in assigning the codes and to keep track of the criteria with which previous images have been coded.

13/10/2013 15.35

I have decided for the time being to do both things (memos and annotations and keeping both for different purposes) and I am sure I will discover along the way which method is going to be the best. In order to start I have decided to keep the most complete and even repetitive track for each of the internals, either in the memos and in the annotations. I trust that I will discover the best option once the procedure will start to become automated and repetitive. Also, an important point to remember is that this method is supposed to be systematic and rigorous but I need to remain realistic in its possibility to be effectively used also in everyday studio practice. It cannot become too complex, time consuming and dispersive. There are certain aspects that need to be included that were missing in the Intuitive Approach, but the balance between speed, simplicity, rigor and effectiveness needs to be constantly kept in mind and possibly be pushed in favour of the method I am trying to test here.

14/10/2013 13.25

I have finally opted for the annotation method. Using the memos is forcing me to constantly jump from one window to another when I need to check or write the coding. It is unpractical and it sets up for mistakes. I have already generated lots of memos for each code and category and since it is not allowed by Nvivo to link an annotation to a node, I am forced to keep all notes and reflections on separate documents linked to the node.

This is the first modification I would suggest for the software: to allow memos to appear in the same window as the source they are linked to. Anyway, for the images I have decided to use annotations. I will leave the original link to the image in the description box (in the 'picture properties' window) and if there is any additional information I might gather from the web about the artefact, such as technical notes about the manufacture, materials, author, narrative etc. that can help the analysis I will copy them into an annotation box that will appear below the image. Then, I will create another annotation, for the keywords and the coding.

16/10/2013 12.17

ON NEW CODES GENERATION - While new artefacts inspire the creation of new codes that describe them it is obvious that these new codes will influence or inspire other codes that relate to them but not to the artefact where they came from. For Example, the new code 'Unisex' from internal #003 together with the presence of the code 'Girly' previously derived

from artefact #002, logically made me think about generating in advance new codes such as 'Feminine' and 'Masculine' for establishing a range of possibility in a form of 'gendered' attribution, for the analysis of the next artefacts. Another example, the new codes 'Diffusion (accidental)' and ' Reflection (accidental) ' derived respectively from #002 and #003, brought me to think about creating in advance new codes such as 'Diffusion - intentional' and 'Reflection - intentional'.

I decided after some more reflection NOT TO do this in advance. in other words, to refrain from creating codes in advance, even if it is logical to think or to imagine they will be soon used or come handy. Even though the generation of new codes can inspire by association, contrast or logical reasoning to assume that other codes might be necessary soon, I have decided to remain as close as possible to the artefacts analysed and to generate new codes and categories ON THE GO, instance by instance, in the order they will present themselves.

I will annotate anyway these inspirations and considerations in the Project journal, so they will not be lost anyway.

ON AGGREGATING ON NOT AGGREGATING THE CODING OF PARENT AND CHILD NODES - I noticed that if I aggregate the coding for parent nodes (to inherit the coding of child nodes) the number of references doubles and I don't want to have inconsistent results at the end of the analysis. Even though this analysis is qualitative, I want to maintain open the possibility to perform also some small statistical analysis, just in case. For this reason, I have decided to distinguish the Parent nodes that I want to code anyway (even though the children are coded too) and the ones that I don't want to be coded separately. So, I will write IN CAPITALS the main categories that do not need any separate coding because they belong to every artefact (so assigning a separate code will double the final results, altering the balance of the quantitative data), while the parent codes written in lower case, deserve individual and separate coding, because they refer only to certain artefacts and not to others and they won't distort the possible quantitative results.

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19/10/2013 14.53

ON SPEED -The initial rhythm of the analysis has been scarily slow, because of all the systems, techniques, tools and possible methods and shortcuts I tried and eventually abandoned. But, the positive side is that method starts to become automated and every aspect has been tailor-made around the best options for each passage, so things are speeding up. The codes are inversely proportional to the progression of the artefacts analysed. The more artefacts, the less new codes are found, so all the pedantic process of recording everything, memoing everything, annotating and journaling is speeding up and the amount of work is decreasing. Also, once one analysis like this one is performed and finished, I will have so many categories already established and available for any possible new project of similar nature, or at least related to jewellery, in my case, so I will be able to start directly with a set of nodes established in advance, speeding up exponentially the process of coding,.

I am thinking about doing it now. For the moment I am keeping track of the progression of the coding, and all the changes in these memos, but I believe an integration between paper and digital form is ideal for the problem of the multiple-screen vision that would be necessary for keeping track simultaneously of everything, if done only in digital format.

I have developed a simple excel spreadsheet to be printed and filled with the initial keywords, in order to evidence quickly the new insertions and then to optimise the speed of their insertion into Nvivo.

30/10/2013 17.56

After coding the first 20 artefacts one by one, I have started to develop a routine and the speed of the work has further increased. Now the passages are the following:

1-Open the internal, read the annotation taken from the web (where available) in order to get some additional insight on materials, making processes and the function/market or other characteristics of the object.

2-Create a new annotation, in a section of the image in order to have the annotation window right at the bottom of the picture once in visualisation mode, and start coding according to the nodes already present. (keep the entire list of nodes in the side view for constant reference). I have created a blank spreadsheet in Excel and I have printed several copies to be used as a manual coding sheet, where I can scribble quickly the initial codes so I can avoid to jump back and forth from/to the annotation window and having the codes always at hand. This is much quicker and it saves a very time-consuming passage. The annotation window will serve from now on for storing all the extra information about the artefact that does not fit into the Picture Properties window.

3- On the Coding Timeline memo, annotate all the new codes emerging from the new image. Red for the new nodes under existing categories or sub-categories and Blue for new categories or nodes that need a comparison with previously coded artefacts, where it is necessary to go back and restructure completely all the previous coding because of them.

4- Insert the new nodes on the Nodes tree in Nvivo

5- Link the memos to the nodes that for some reason need to be distinguished or specified from other nodes already existing.

5- Code the Internal at existing nodes

6- Go back to previously coded internals check each of them, and add the new coding to the manual coding sheet and to the Nvivo nodes.

7-In case of doubt, check the coding stripes.

03/11/2013 18.03

Now I will try coding in cohorts. There are already many codes generated. So can insert 10 new images and try to code them manually on the spreadsheet and then repeat the process in Nvivo for increasing the speed.

04/11/2013 18.51

I need to remember to check, while coding and also at the very end of the process, that all nodes refer to artefacts consistent with the node, category or sub-category. This needs to be checked in particular for nodes of difficult definition such as 'light integration' or 'style' and 'taste'. It is necessary to increase the clarity around these codes and to move around the coding in order to achieve consistency. I can see how this method is really helping me in clarifying the vagueness of some preconceived ideas and this is evident by the inconsistency of the coding as it is initially generated. If when coding on a one-by- one basis each artefact one keeps the same preconceived idea about a given category, it is when comparing artefacts already coded that this idea becomes extremely clear. For example, I just checked the coding already done under the different degrees of the 'light integration' category and I have noticed that there are artefacts that need to be moved around and assigned to a different degree of light integration. By only checking this, I have realised that the grouping of artefacts is helping me to clarify my same idea of what I consider a level of 'slight' or 'medium' or 'good' or 'very good' integration. While initially I was assigning these codes without considering the artefacts in comparison with others, I can see now that by placing them visually side by side with others already coded I can get a clearer picture of what artefacts have been assigned to the code itself and I clarify to myself the criteria for the definition of the code (or category itself). This is making it clearer and easier to be understand these categories and to make them explicit even for others to see.

05/05/2013 11.21

ABOUT 'BIBLIOGRAPHIC' REFERENCING OF THE IMAGES

Many images have been found online, without an original link to an author, or a specific title. Where possible I tried to go backwards and investigate in order to retrace the original link or the authorship to a given unknown artefact. I have encountered several cases of false attributions for artefacts that are found on some websites as if they were made by 'X Author' and on others as if they were made by 'Y Author', for instance. The point is that, apart from the necessity of being rigorous for academic research or for respecting the image copyright, there is still the everyday studio where one would use such images without investigating further, just for inspiration or reference. So if this work aims at reproducing, in a more systematic fashion, the everyday model of closed-door studio procedures for image sourcing and collection, I should probably not be so concerned about unknown images. The truth is that an image, once seen, cannot really be unseen. So the influence, the inspiration or the visual associations that it can provoke, are going to be triggered independently from the fact that the author or the real provenance of the image is known or certain. I should discuss this point with supervisors, and in case, include this in the thesis.

Appendix B-6 - Nodes hierarchical structure

Nodes

Name	Sources	Reference
ARTEFACT COLOUR	0	0
Aqua	4	4
Beige	5	5
Black	62	62
Blue	6	6
Blue (Fluo)	3	3
Clear -Transparent	42	42
Glittering	8	8
Green	4	4
Green (Fluo)	4	4
Grey	13	13
Iridescent	5	5
Metallic - Gold	17	17
Metallic - Oxydised	7	7
Metallic - Silver	42	42
Multcolour	10	10
Orange	1	1
Pink	6	6
Pink (Fluo)	3	3
Purple	3	3
Red	8	8
Red (Fluo)	2	2
White	68	68
Yellow (Fluo)	6	6
BODY PLACE	0	0
Anywhere	19	19
Brooch	15	15
Shawl	2	2
Tattoo	1	1
Arm	19	19
Armor	1	1
Bangle	3	3
Bracelet	2	2
Smart Band	10	10
Watch	3	3
Body	70	70
Belt	1	1
Bra	1	1
Coat	6	6
Corset	4	4
Dress	36	36
Jacket	6	6
Skirt	1	1

Nodes

Name	Sources	Reference
Suit	9	9
Top	6	6
Earrings	2	2
Face	6	6
All	1	1
Eyes	2	2
Mouth	3	3
Feet	12	12
Shoes	12	12
Hand	6	6
Ring	5	5
Headpiece	13	13
Crown	1	1
Hairpin	1	1
Hat	7	7
Sculptural	3	3
Wig	1	1
Neckpiece	61	61
Collar	9	9
Lariat	1	1
Necklace	25	25
Pendant	17	17
Sculptural	7	7
Object	5	5
Shoulders	6	6
Sculptural	1	1
Wrap	5	5
LIGHT COLOUR	0	0
Resulting	37	37
Interaction with Material Colour	16	16
Aqua	3	3
Green	5	5
Iridescent	2	2
Multicolour	1	1
Orange	1	1
Pink	5	5
White	1	1
Yellow	3	3
Photoreactivity	20	20
Aqua (Fluo)	2	2

Nodes

Name	Sources	References
Aqua (Phospho)	1	1
Blue (Fluo)	3	3
Green (Fluo)	4	4
Green (Phospho)	1	1
Multicolour (Fluo)	2	2
Pink (Fluo)	3	3
Red (Fluo)	2	2
White (Fluo)	6	6
White (Retroreflective)	2	2
Yellow (Fluo)	4	4
Source	189	189
Aqua	9	9
Blue	22	22
Changing	29	29
Green	9	9
Multicolour	21	21
Orange	2	2
Pink	5	5
Purple	1	1
Red	25	25
UV	2	2
White	86	86
Yellow	6	6
LIGHT COLOUR QUALITY	0	0
Modulated	42	42
Plain	169	169
LIGHT IMPACT	0	0
Average	15	15
Crude	65	65
Harsh	23	23
Soft	108	108
LIGHT INTEGRATION	0	0
Absent - 1	61	61
Good - 4	19	19
Medium - 3	41	41
Slight - 2	48	48
Total - 6	26	26
Very Good - 5	16	16
LIGHT SCOPE	0	0
Aesthetic	184	184
Indicator	43	43
Structural	20	20

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Nodes

Name		Sources	Reference
Utilitarian		3	3
LIGHT SOURCE		0	0
EL fabric		3	3
EL Wire		15	15
External		30	30
Fibre Optics		13	13
Fluorescent		11	11
Iridescent		2	2
Lasers		1	1
LCD Screen		3	3
LED Strip		17	17
LEDs (Monochrome)		121	121
Lightbulbs		1	1
Neon		4	4
OLEDs		1	1
Phosphorescent		2	2
Reflective		2	2
RGB LEDs		23	23
UV		4	4
LIGHTING EFFECTS		0	0
Beam		1	1
Colour Change		28	28
Colouring		13	13
Colouring (See-Through)		3	3
Containment		9	9
Cut-Outs		23	23
Diffusion (Intentional)		89	89
Diffusion (slight - accidental)		17	17
Drawing		26	26
Fluorescence		16	16
Interference		14	14
Intermittence		16	16
Iridescence		2	2
Layering		2	2
Micro Controlled		29	29
None (source visible)		87	87
Pattern Change		18	18
Phosphorescence		2	2
Pixel		12	12
Projection		28	28
Reflection - Intentional		13	13
Reflection (slight-accidental)		10	10
Refraction		21	21
Refraction - Accidental		2	2

Nodes

Name	Sources	References
Shading	27	27
Texturing	13	13
Transmission	33	33
MANUFACTURE	0	0
Bespoke - Very High	69	69
Handmade - Average	13	13
Handmade - Good	52	52
Handmade - Poor	14	14
Industrial - Average	15	15
Industrial - Cheap	13	13
Industrial - Good	28	28
MARKET - CONTEXT	0	0
Catwalk	40	40
Clubbing	43	43
Fashion - Textiles	60	60
High Street Fashion	2	2
Installation	8	8
Interior Design	2	2
Jewellery	87	87
CJD	30	30
Watches	3	3
Novelty Items	24	24
Product Design	6	6
Sports	11	11
Stage - Costume	29	29
Wearable tech	61	61
MATERIALS	0	0
Diffusive	84	84
Fabric	37	37
Gemstones	3	3
Glass	7	7
Nylon	7	7
Paper	3	3
Plastics	19	19
Porcelain	1	1
Resin	3	3
Rubber tube	4	4
Sea Shells	1	1
Silicone	7	7
Slides	1	1
Vegetable Ivory	0	0
Pure Light	20	20

Nodes

Name		Sources	Reference
Reflective		15	15
	Crystals	2	2
	Fabric	6	6
	Metal - Silver	1	1
	Mirror	3	3
	Plastics	1	1
	PVC	5	5
	Sequins	2	2
Refractive		35	35
	Crystals	8	8
	Cubic Zirconia	5	5
	Gemstones	4	4
	Glass	7	7
	Plastics - transparent	24	24
Solid		175	175
	Circuitry	11	11
	Enamel	7	7
	Fabric	68	68
	Feathers	3	3
	Fur	8	8
	Gold-Plated Beads	1	1
	Lace	3	3
	Latex	3	3
	LCD Screen	3	3
	Leather	18	18
	LED Matrix	4	4
	Metal - Brass	10	10
	Metal - Copper	1	1
	Metal - Generic	30	30
	Metal - Gold	6	6
	Metal - Silver	11	11
	Metal - Steel	17	17
	Nylon	3	3
	Paper	2	2
	Plastics	36	36
	Polymer Clay	1	1
	Porcelain	1	1
	Ribbons	1	1
	Rubber	8	8
	Wood	3	3
	Yarn	11	11
ON - OFF		0	0
Related		104	104

Nodes

Name	Sources	Reference
Unrelated	106	106
TASTE - STYLE	0	0
Agglomerate - Messy	9	9
Conceptual	15	15
Cool	63	63
Cyber	26	26
Delicate	44	44
Fantasy - Fiction	17	17
Feminine	117	117
Fetish	15	15
Flashy	51	51
Funny	5	5
Futuristic	99	99
Gaudy	13	13
Geek	18	18
Geometric	46	46
Girly	7	7
Industrial	27	27
Magic - Fairy	39	39
Masculine	7	7
Mechanical-Cold	43	43
Medical	7	7
Minimal	23	23
Organic	28	28
Sleek	71	71
Sporty	15	15
Subtle	60	60
Ugly	29	29
Unisex	61	61

Appendix B-7 - Coding Chart

Category/Sub-Category	Descriptor codes	Images coded
ARTEFACT COLOUR		
	White	68
	Black	62
	Clear -Transparent	42
	Metallic - Silver	42
	Metallic - Gold	17
	Grey	13
	Multcolour	11
	Glittering	8
	Red	8
	Metallic - Oxydised	7
	Blue	6
	Pink	6
	Yellow (Fluo)	6
	Beige	5
	Iridescent	5
	Aqua	4
	Green	4
	Green (Fluo)	4
	Blue (Fluo)	3
	Pink (Fluo)	3
	Purple	3
	Red (Fluo)	2
	Orange	1
BODY PLACE		
Anywhere		**23**
	Brooch	15
	Object	5
	Shawl	2
	Tattoo	1
Arm		**19**
	Smart Band	10
	Bangle	3
	Watch	3
	Bracelet	2
	Armor	1
Body		**73**

	Dress	37
	Suit	9
	Coat	6
	Jacket	6
	Top	6
	Corset	4
	Belt	1
	Bra	1
	Skirt	1
Earrings		**2**
Face		**6**
	Mouth	3
	Eyes	2
	All	1
Feet		**12**
	Shoes	12
Hand		**5**
	Ring	5
Headpiece		**13**
	Hat	7
	Sculptural	3
	Crown	1
	Hairpin	1
	Wig	1
Neckpiece		**61**
	Necklace	25
	Pendant	17
	Collar	9
	Sculptural	9
	Lariat	1
Shoulders		**6**
	Wrap	5
	Sculptural	1
LIGHT COLOUR		
Resulting		**51**
Interaction with Material Colour		**21**
	Green	5
	Pink	5
	Aqua	3
	Yellow	3
	Iridescent	2
	Multicolour	1

	Orange	1
	White	1
Photoreactivity		**30**
	White (Fluo)	6
	Green (Fluo)	4
	Yellow (Fluo)	4
	Blue (Fluo)	3
	Pink (Fluo)	3
	Aqua (Fluo)	2
	Multicolour (Fluo)	2
	Red (Fluo)	2
	White (Retroreflective)	2
	Aqua (Phospho)	1
	Green (Phospho)	1
Source		**218**
	White	86
	Changing	29
	Red	25
	Blue	22
	Multicolour	22
	Aqua	9
	Green	9
	Yellow	6
	Pink	5
	Orange	2
	UV	2
	Purple	1
LIGHT COLOUR QUALITY		
	Plain	170
	Modulated	41
LIGHT IMPACT		
	Soft	108
	Crude	66
	Harsh	23
	Average	14
LIGHT INTEGRATION		
	Absent - 1	61
	Slight - 2	48
	Medium - 3	40
	Total - 6	27
	Good - 4	19
	Very Good - 5	16
LIGHT SCOPE		

	Aesthetic	185
	Indicator	43
	Structural	21
	Utilitarian	3
LIGHT SOURCE		
	LEDs (Monochrome)	121
	External	30
	RGB LEDs	23
	LED Strip	17
	EL Wire	15
	Fibre Optics	14
	Fluorescent	11
	Neon	4
	UV	4
	EL fabric	3
	LCD Screen	3
	Iridescent	2
	Phosphorescent	2
	Reflective	2
	Lasers	1
	Lightbulbs	1
	OLEDs	1
LiGHTING EFFECTS		
	Diffusion (Intentional)	90
	None (source visible)	87
	Transmission	34
	Micro Controlled	30
	Colour Change	28
	Projection	28
	Shading	27
	Drawing	26
	Cut-Outs	23
	Refraction	21
	Pattern Change	18
	Diffusion (slight - accidental)	17
	Fluorescence	16
	Intermittence	16
	Colouring	14
	Interference	14
	Reflection - Intentional	13
	Texturing	13
	Pixel	12
	Reflection (slight-accidental)	10

	Containment	9
	Colouring (See-Through)	3
	Iridescence	2
	Layering	2
	Phosphorescence	2
	Refraction - Accidental	2
	Beam	1
MANUFACTURE		
	Bespoke - Very High	69
	Handmade - Good	53
	Industrial - Good	28
	Industrial - Average	15
	Handmade - Poor	14
	Handmade - Average	13
	Industrial - Cheap	13
MARKET - CONTEXT		
	Jewellery	87
	Fashion - Textiles	61
	Wearable tech	61
	Clubbing	43
	Catwalk	41
	Stage - Costume	30
	Novelty Items	24
	Sports	11
	Installation - Art	8
	Product Design	6
	High Street Fashion	2
	Interior Design	2
MATERIALS		
DIffusive		**96**
	Fabric	38
	Plastics	19
	Nylon	8
	Glass	7
	Silicone	7
	Rubber tube	4
	Gemstones	3
	Paper	3
	Resin	3
	Porcelain	1
	Sea Shells	1
	Slides	1
	Vegetable Ivory	1

Pure Light		**20**
Reflective		**20**
	Fabric	6
	PVC	5
	Mirror	3
	Crystals	2
	Sequins	2
	Metal - Silver	1
	Plastics	1
Refractive		**48**
	Plastics - transparent	24
	Crystals	8
	Glass	7
	Cubic Zirconia	5
	Gemstones	4
Solid		**270**
	Fabric	68
	Plastics	36
	Metal - Generic	30
	Leather	18
	Metal - Steel	17
	Circuitry	11
	Metal - Silver	11
	Yarn	11
	Metal - Brass	10
	Fur	8
	Rubber	8
	Enamel	7
	Metal - Gold	6
	LED Matrix	4
	Feathers	3
	Lace	3
	Latex	3
	LCD Screen	3
	Nylon	3
	Wood	3
	Paper	2
	Beads	1
	Metal - Copper	1
	Polymer Clay	1
	Porcelain	1
	Ribbons	1
ON - OFF		

	Unrelated	106
	Related	105
TASTE - STYLE		
	Feminine	117
	Futuristic	100
	Sleek	71
	Cool	63
	Unisex	61
	Subtle	60
	Flashy	51
	Geometric	46
	Delicate	44
	Mechanical-Cold	43
	Magic - Fairy	39
	Ugly	29
	Organic	28
	Industrial	27
	Cyber	26
	Minimal	23
	Fantasy - Fiction	18
	Geek	18
	Conceptual	15
	Fetish	15
	Sporty	15
	Gaudy	13
	Agglomerate - Messy	9
	Girly	7
	Masculine	7
	Medical	7
	Funny	5

Appendix B-8 – Queries and Matrix Queries

Lighting effects - Results Preview

Lighting Effects vs Light Source - Results Preview

Market vs Manufacture - Results Preview

Artefact Colour - Results Preview

Body Place - Results Preview

Matrix Coding Query - Results Preview