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FROM TRANS-DISCIPLINARY TO "UNDISCIPLINED" DESIGN LEARNING: EDUCATING THROUGH/TO DISRUPTION[1]

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This document testifies the attempt at critically interpreting certain formative models of the designer from an evolutionary point of view. The criteria used to draw up a historical mapping and perform a reading of some interesting contemporary case histories concern the comparison between the subjective approach (the unveiling of the author's personality and different identity, considered as a subject under formation), on one hand, and the objective reproducibility of a process (project methodology), on the other.

We have offset this line of interpretation with the relationship between the concept of trans-disciplinary (an encoded approach of transferring methods and tools from other disciplines), and that of non-disciplinary or "undisciplined" (in the sense of transcending the disciplines and therefore looking for innovation "outside the rules").

This analysis comprises profiles resulted from specifically disciplinary educational traditions (artistic and polytechnic); however, a profile that is not formable within modern schools and which generates "out-of-context" designers also emerges. Lastly, a new profile is outlined that insists on learning rules and methodologies, but makes the disobedience of said rules and methods the margin of originality and distinction (which depends on the qualities of the designer and his/her subjective capacity and creativity).

The underlying assumption is that, through a shift towards the objective (therefore methodologically transmissible and encodable) and non-disciplinary dimensions, it is possible to educate highly "disruptive" profiles, inducing a certain attitude in students to tackling the design project through a method which can continually challenge its rules into

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[1] The paper is fruit of a coordinated work, however the author of paragraphs 1 and 4 is Flaviano Celaschi, the author of paragraph 2 is Elena Formia and the author of paragraphs 3 and 5 is Eleonora Lupo.

question, in order to innovate them.

The essay ends with a list of some contemporary challenges of education processes that seem to interpret surrounding conditions of profession and research in the sector and that, as a result, have still to determine changes in the official education models.

••• Subjectivity, objectivity, trans-disciplinary, undisciplined, disruptive designer •••

Within the theme of process innovation, a special chapter should be dedicated to the study of the change that involves educating human resources. Let's talk about the process closest related to design because it determines the characteristics we would like the designers we teach to have[2].

In this document, we are going to focus on the different techniques used to educate designers in an attempt to better understand which relationship exists, in the various models examined, between creativity, the method and the aim of educating designers with a strong capacity for innovation.

First and foremost we recognise the three traditional elements of cognitivist pedagogy as components of the educational process: knowing as the transmission of information and knowledge, know-how as training in acting independently, knowing-how to be as construction of the subject's personality.

The historical analysis then presents a parallel corridor of education: two educational traditions that have, over the years, created profiles of what we can call "designer", despite their substantially opposite approaches: schools focused on the fine arts and technical or polytechnical schools. These models are distinguished by the subjective or objective approach used. The former tradition has insisted greatly on the guided liberation of the characteristics of originality, diversity, uniqueness of the designer (creative-subjective approach to design). In the second, the focus has been put on learning a methodology and on the possibility to reiterate the process (scientific-objective approach to design).

Another area of analysis has led us to observe the inter and trans-disciplinary dimension of educational models, as present in the contemporary panorama, isolating some examples which shift the cross-fertilisation between skills towards a more fluid definition of the disciplinary statutes, up to a radicalisation that transcends the disciplines themselves, as an opportunity for educational innovation.

In the following paragraphs, we are going to develop these three points, presenting the knowledge basins of contemporary design and analysing the two axes of subjective-objective and interdisciplinary-non-disciplinary. The aim is to derive new possible and innovative trajectories for educating designers alongside existing educational models.

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[1] The centre of our current attention lies with design driven innovation processes in relation to this objective (the innovation of the processes that determine innovative products and services).

1. THE KNOWLEDGE BASINS OF CONTEMPORARY DESIGN

The debate that revolves around the know-how that forms the contemporary designer (Celaschi, 2008a; Celaschi, 2008b) is subject to different examinations: we adopt these studies as ground for our reflection and further development.

Breaking down into subcomponents the traditional and consolidated cognitivist categories (knowing, knowing-how to be, know-how,), we represent the elements that can be manipulated in order to develop different designer's profiles.
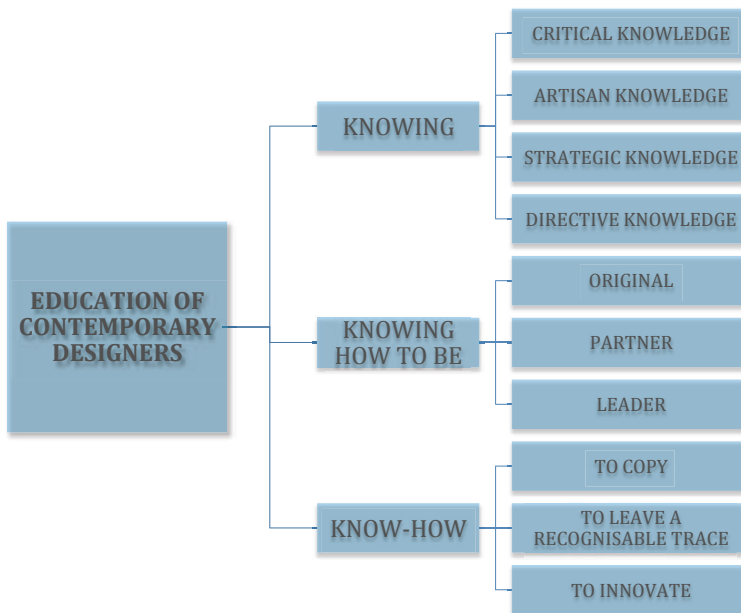

FIG. 1. THE ELEMENTS OF THE TRADITIONAL COGNITIVIST CATEGORIES THAT CAN BE MANIPULATED IN ORDER TO DEVELOP DIFFERENT DESIGNER PROFILES.

• In relation to knowing, the scheme positions and defines four different characteristics:
- the knowing how to criticise, typical of the intellectual designer and particularly of the critic, journalist or writer offering information on design;
- strategic knowledge which mainly identifies a managerial consultant-type figure, which is also developing in many Latin countries;
- the artisan knowledge typical of the designer who produces his/her own work and which is bordering more and more with the "maker" (Sennet, 2008), which doesn't necessarily

identify a professional manufacturer;

- the figure of a manager or entrepreneur who achieves success in his/her design-related profession on the basis of design thinking and placing design at the centre of his/her business, regardless of the fact that he/she is the designer of the product or the service provided and being more of the man behind the production chain (make or buy).

• As regards knowing-how to be, we are going to focus our attention on three problem categories:

- knowing how to be a leader (in synergy with the last of the knowing profiles outlined above);

- knowing how to be part of a design pair or of an operational micro-team, in which each member is an irreplaceable but insufficient part of the process;

- lastly, a creative subject par excellence who sees in the "free" expression of his/her own original personality the main contribution to the creation of professional value.

• In the know-how category, which is formed via the design action exercised in and out of school (in competitive or course-related activities), three main aims take up space:

- the ability to repeat the action of a subject taken as reference (like the master of the renaissance workshop) within an organisation which has, as its main activity, the reiteration of the design-related gesture of the demiurge;

- the ability to place oneself in the transformative action of the matter, leave a real trace in the product or in the service and know how to make the operator's imprint recognisable to the addressee;

- knowing how to innovate processes and products even at the cost of forgoing the recognisability of the author, his/her style or the possibility to be the only designer admitted to the value production process.

The analysis of the current educational panorama has led us to restrict the field observed with respect to the two traditional approaches: the method opposed to the development of the designer's personality. The roots of this dualism lie in the origins of the history of education to contemporary design, in which design occupied the middle of an "ideal" convergence of knowledge, following a process of study and assimilation of interpretative models, theoretical and methodological apparatus, and research tools.

2. INTERDISCIPLINARITY IN DESIGN TEACHING:
A HISTORICAL AND CLASSICAL APPROACH

A basic dualism exists in the history of industrial design schools and their pedagogical approaches. These are, on one hand, the permanence of the artistic tradition of teaching at the Academies of Fine Arts (Écoles des Beaux Artes) and the Arts and Crafts Schools and, on the other, the progressive need to link design to scientific knowledge, based on objectivity and rationality, which emerged in particular following the Second World War (Cross, 2001; Bertola, 2009; Margolin, 2010). The latter approach gave rise to a need for it to be effectively

recognised within the context of higher education.

This dualism is common to the pioneering institutions that embody the paradigmatic changes in design education during the past century: the Bauhaus, which was still focused on an "artistic" dimension of education (Stasny, 1996), and the Hochschule für Gestaltung of Ulm, which opened in the early 1950s in the trail of the Bauhaus, but was soon oriented towards a "scientise" of the curriculum. To explain the transition from Bauhaus (particularly the period under the direction of Walter Gropius) to the HfG Ulm, Tomás Maldonado writes: "Mutamento c'è stato, e importante, ma in un campo specifico: quello attinente alla dottrina educativa e al suo corrispondente espletamento didattico e organizzativo. Cambia sostanzialmente il piano di studi, che riflette l'importanza attribuita, nel nuovo concetto, alle discipline scientifiche e tecniche. Cambia l'impostazione didattica del corso fondamentale che cerca di ridurre al minimo la presenza di quegli elementi di attivismo, intuizionismo e formalismo ereditati dalla didattica propedeutica del Bauhaus. Cambia, infine, il programma della sezione di disegno industriale, che orienta allo studio e all'approfondimento della metodologia della progettazione" (Maldonado, 2008)[3]. Alain Findeli (2001) also gives an interpretation of this evolution in the model of the "archetypal structure of a design curriculum". According to the author, the ideal threefold articulation of art, science and technology as founding elements for the design curriculum, was never put into practice in the above mentioned schools. The weight of the scientific dimension was minimum in the Bauhaus, while, in the HfG, the same occurred for the aesthetical one.

Apart from these institutions that radically innovated the design discipline through a "disruptive" approach (Bonsiepe, 1995), the evolution of industrial design education in the 1950s and 1960s seems to follow, especially in Europe, a bipolar nature through the presence of two main traditions.

Despite its short life, the Design Institute at Ulm had a considerable influence on global teaching methods (Bürdek, 2008), especially in South America (Fernández & Bonsiepe, 2008) where the first design schools were opened earlier than in Europe (Leon, 2011). This let to the foundation of new centres for professional training that were strictly oriented towards a scientific approach to design, while, on the other hand, the so-called "art schools" progressively included design courses in their programs. This happened in the Academies of Art and in the professional schools, where there were technical training courses, starting from the tradition of arts and crafts (Germany, Switzerland, England, Italy and Holland). They were later to undergo a university "transformation" process in England in the 1960s

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[3] "There has been a change, and extensive too, but in a specific field: that relating to educational doctrine and its corresponding didactic and organisational pursuit. Substantially, what changes is the study plan, which reflects the importance assigned, in the new concept, to the scientific and technical disciplines. The didactic approach of the fundamental course changes and an effort is made to drastically reduce the presence of those elements of activism, intuitionalism and formalism inherited from the propaedeutic course of the Bauhaus. Lastly, the programme of the industrial design section changes, focusing on the study and analysis of the design methodology." (Translated by the author of the paragraph).

(Saikaly, 2005) and in Germany in the 1980s (Heiner, 2008). Indeed, this substantial division comprises different models of institutions that have historically taught proto-designers and designers: from the traditional Academies of Fine Arts to the French-style fashion and design schools, the applied arts laboratories, particularly widespread throughout Northern Europe, the Art and Design schools developed in the US and the Schools of Engineering and Architecture.

The Italian situation represents a paradigmatic example of the dualism in the education of "artistic" or "technical" designers[4].

Awareness of the designer's professional autonomy, which also means the interest in education opportunities, developed later, only after the middle of the mid-1900s (Argan, 2001). The country's pedagogical heritage consisted, on one hand, of the tradition of the Polytechnics (established in 1861 in Turin as Scuola di Applicazione per Ingegneri and in 1863 in Milan as Istituto Tecnico Superiore), and, on the other, of the institutes of art, the applied art schools and the schools of artistic disciplines for industry (Gregotti, 1986). Finally a third variable was introduced, the entry of design didactics in the Schools of Architecture (sometimes incorporated in the Polytechnics, but more often independent).

The culture of architects took on the task of highlighting, from the design viewpoint, the values of an industrial culture, which, until then, had been given little consideration. The first university design course was launched at the Faculty of Architecture in Florence, in 1955, by Leonardo Ricci (Nardi, 1990). In 1958, a similar project occurred in Naples under the guide of Roberto Mango (Guida, 2006); in Turin, the first professor was Achille Castiglioni in 1969 (Peruccio, 2010). The "hierarchical model of design disciplines" (Ancheschi & Botta, 2009) that witnessed the supremacy of architecture over other disciplines (Dorfles, 2007), previously theorised by Gropius in Weimar, subsequently underwent a progressive emancipation, until the effective recognition of an independent industrial design degree course at the Politecnico di Milano in 1994.

However, the old alternative between the art and science of designing (paraphrasing the title of a famous book by Pier Luigi Nervi)[5], which had historically influenced the debate on the birth of the first Schools of Architecture in Italy in the 1920s[6], was still reflected in the polarity

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[4] Technique in Greek is art, skill in certain crafts, the capacity to achieve a certain goal, the craftsman's ability to use certain tools. The Latin equivalent is ars. In the world of modern art, it is artistic experience in its aesthetic value. The word technique does not include the genius of the artist, but only his cognitive experience. In this, the concept of the technician is linked with the disciplinary heritage of a trade, of a group of specialised technicians. Consequently, it is necessary to legitimate it through a formative course.

[5] Nervi, P. L. (1945). Arte o scienza del costruire. Roma: Edizioni della Bussola.

[6] The problem of the formative curriculum of the architect before the creation of the Higher Schools of Architecture can be traced back to the didactic orders of the Polytechnics (particularly the Scuola di Applicazione per Ingegneri of Turin and the Istituto Tecnico Superiore of Milan) and of the Academies of Fine Arts. In the Academies, art was taught as liberal art (the only exception being the Roman Academy of San Luca which had included scientific subjects in its study programmes since 1818). In the Polytechnics, the diploma qualified its holder as an architect-technician, who had a very similar training to the civil engineer.

of the places devoted to educating designers that appeared from the 1960s onwards. Despite the entry of industrial design in the Schools of Architecture and in the Polytechnics and the progressive move towards scientific methodologies of designing, the first courses were called "Artistic design for industry".

On the other hand, the Schools of Art also followed a process of institutionalization. The Istituti Superiori di Industrie Artistiche (ISIA), the heirs of the applied art culture of the 1920s, were officially recognised in 1974. The first was opened in Rome and was followed by another in Florence. During the same period, design entered the Academies of Fine Art[7], such as the Accademia Ligustica of Genoa (1978-1979) or the Nuova Accademia di Belle Arti (Naba) of Milan, founded by Ausonio Zappa, Guido Ballo and Tito Varisco (1980). At the same time, further debate began on the educational opportunities of the professional designer, leading to the foundation of post-diploma schools (Gallico 2007). An avant-garde case was the Centro Studi Arte-Industria opened in 1954 by Nino Di Salvatore, who trained in the artistic environment of the MAC (Movimento di Arte Concreta)[8], later transformed into the Scuola Politecnica di Design, established in Milano in 1970. In the same years, the link between private schools, the art world, the Italian student protests and the post-modern militancy, became evident. To quote only a few examples, the Domus Academy (1982) involved Maria Grazia Mazzocchi, Alessandro Mendini, Valerio Castelli and Alessandro Guerriero; the latter, a leading exponent of the Alchimia group, established Futurarium, a "didactic workshop based on the merging of disciplines", in 1995. Remaining in the private schools, the country's educational culture had shown that it was particularly advanced in a specific sector, that of fashion. The Marangoni Institute in Milan was established in 1935 to train professionals in pattern-design and tailoring.

3. FROM TRANS-DISCIPLINARITY TO UNDISCIPLINED DESIGN TEACHING: EXISTING APPROACHES

The concepts of interdisciplinarity before presented is based on the fact that "higher education has organised itself vertically, and on disciplinary sub-divisions" (Foqué, 2010): all the disciplines in the historical models come together but often keep working in parallel or side by side each other.

In the contemporary system we assist to more integrated model even promoting a shift towards trans-disciplinarity.

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[7] In 1960-1961 an industrial design course of university level was opened at the Istituto d'Arte of Venice. Two years later a similar process happened at the institutes of Florence and Rome. However, this was a not finalized action because of the un-recognition of the courses by the Italian Ministry.

[8] Di Salvatore founded the Centro Studi Arte-Industria in Novara in 1954, which was an interesting case-study to demonstrate the growing interested of Italian culture in design education after the Second World War. This center followed the example of the Bauhaus and Di Salvatore was a great exponent of the diffusion of the Gestalt theories in the country. Di Salvatore, N. (1958). *Rapporti arte-industria*. Novara: Centro Studi Arte-Industria.

According to Jean Piaget (1972) in fact there are three levels of integration among disciplines:
- multidisciplinarity, where information from another discipline is used to solve a problem in one's own discipline (information is momentary and occasionally borrowed only in one direction, with no feedback to the lending discipline);
- interdisciplinarity, where there is collaboration and interaction of knowledge, with enrichment of the disciplines themselves;
- trans-disciplinarity, where several disciplines are not only interacting but are reintegrated in a whole where the traditional boundaries disappear.

"La transdisciplinarità è la capacità di traghettare da una disciplina all'altra frammenti di sapere, anche a costo di sperimentare una logica antidisciplinare. Dunque non si tratta solo di mettere in contatto due o più discipline, che si pensano come autonome e compatte, ma del reale spostamento di metodi e soggetti da un ambito all'altro. Al prefisso inter- che indica la transizione tra una disciplina e l'altra, sarebbe quindi opportuno sostituire trans- che richiama il carattere performativo di queste transizioni, poichè insiste non su una logica degli interstizi, ma proprio sul carattere pratico (cioè alla prassi) di questi spostamenti che vengono realizzati dai soggetti" (Cometa, 2010).

It is precisely this third concept that we want to focus on in approaches that are already existing even if not yet fully codified or acknowledged.

The "blurring of design boundaries" in fact has been analysed in the last years by different scholars and practitioners. In 2008, a symposium at Napier University in Edinburgh, called *Inter_multi_trans_actions* explored the emerging trends in creativity with a "post-disciplinary" approach: practitioners from the fields of art, architecture and design shared their creative practices. The results have been collected in a book titled *Digital blur*, in which its editor, professor Paul Rodgers writes: "Design now, perhaps necessarily, transcends many more disciplines. Design is being described as multidisciplinary, cross-disciplinary, interdisciplinary and trans-disciplinary (Brown et al., 2010; Turnbull Hocking, 2010) and designers no longer fit into orderly categories such as product, textile and graphic design: rather they are a mixture of artists, engineers, designers, entrepreneurs and anthropologists (West, 2007)" (Rodgers, n.d.).

The same questions of cross-disciplinary blur have been discussed too under the initiatives promoted by FastUK: in the exhibition called *Perimeters, boundaries and borders*, John Marshall, artist director and curator, stigmatizes the breakdown of boundaries between disciplines through the common toolset (often characterized by digital technology) that architects, artists, craft-makers, designers, engineers, and others are now using and make them a "community of interests" in investigating the processes involved in the conception, production and also the consumption of the objects, looking beyond standard means of production.

According to Tony Dunne, professor of Interaction Design at the Royal College of Art, today it is increasingly common to find new hybrids of designers working on creative projects. He states: "New hybrids of design are emerging. People don't fit in neat categories; they're

a mixture of artists, engineers, designers, thinkers. They're in that fuzzy space and might be finding it quite tough, but the results are really exciting." (West, 2007).

However this not completely new: already in 2006 Richard Seymour proposed that the world needs a different breed of designer in this modern, dynamic and highly competitive environment – the "hybrid" designer: the "polymath interpolator" uses his or her experience and "broad bandwidth" to define the area where the solution might lie and the "specialist executor" then implements it specifically within the format that is needed (Rodgers, 2007).

In relation to this blurring, Rodgers, in his *Designing the next generation of designers* sets some implications for design education: "excellence should be established for multi-disciplinary courses combining management studies, engineering and technology and the creative arts", and "the role of design as a bridge between technology and art, ideas and ends, culture and commerce is vital. Because design can be a major player in shaping a world where a value-enhanced user-perspective is developing, cross-functional, creative alliances must be formed" (Rodgers, 2007). More in detail he states (Rodgers, 2007):

- Design students should not attempt to develop deep expertise in any one field, but, rather, take in information from many sources. Far from being a weakness this represents real generalist strength;
- Designing is no longer a localised activity. Every individual designer and design practice competes and has access to every level of practice and expertise;
- Designers must be comfortable working with others, and being skilled in managing the dynamics of group activity;
- Designing is increasingly about intellectual capital and less about delivering a trade or craft ability.

John Marshall and Julian Bleecker argued that those experiences go beyond disciplinary practices and talk about undisciplinarity: "'Undisciplinarity' is as much a way of doing work as it is a departure from ways of doing work. It is a work habit and approach to creating and circulating culture that can go its own way, without worrying about working outside of what histories-of-disciplines say is 'proper' work. It's 'undisciplined' […] and it means new knowledge is created rather than incremental contributions to a body of existing knowledge"[9].

It is an epistemological shift from disciplinarity, to interdisciplinarity, via trans-disciplinarity, to undisciplinarity; forgetting about disciplines altogether being a more radical step than merely "transcending" the disciplines.

Undisciplinarity does not means that design is not a discipline, nor that it has no thematic focuses; it instead refers more to being "undisciplined", in the sense of questioning the "rigour in emerging design disciplines" as pointed out in the Design Research Society of 2008: a discussion has been arisen about the emerging kinds of design that were challenging the

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[9] http://nearfuturelaboratory.com/tag/undisciplinarity.

framework of specialisms and, therefore, reshaping the design field. In this frame, the forms of inquiry, the methods and the rules proper of design needed to be compared with the ones of other areas, to come to a "shared understanding of rigour" as is differently declined. According to Alan Blackwell, founder of Crucible Network for Research in Interdisciplinary Design, and reader of interdisciplinary design at the University of Cambridge, the practices and values of design have different attributes from the ones that constitute the academic rigour of other disciplines, "that address well-formulated problems, [...] that there are agreed methods for addressing the problem, and agreed criteria for what constitutes an answer" ('*on being undisciplined*', Blackwell, 2008). Steve Harfield too claims that "rather than being a knowledge-generating discipline, the field of design generally constitutes a practice-based knowledge-utilization discipline", and "that the above factors not only actively contribute to, but promote and prolong design's undisciplinarity" (Harfield, 2008).

So, given these existing approaches, we propose to cross the dimension of disciplinarity here explored in its opposites (trans-disciplinarity vs undisciplinarity) with the dimension of subjectivity-objectivity previously analysed in the historical approaches. From this comparison we will derive a four quadrants model where to argument the discourse of innovation of educational models for design.

4. A FOUR QUADRANT MODEL:
CROSSING CLASSICAL APPROACHES WITH CONTEMPORARY TRENDS

In the diagram of Fig. 2 we have shown, on a horizontal axis, the difference between art school and technical school, separated according to a subjective (and therefore individual) and objective (and therefore encodable and methodologically transferrable as a process) approach. We then interpreted these two approaches, interweaving them with the disciplinary issue, developed on the vertical axis, through the two extremes of consolidated disciplinary centrality (trans-disciplinary) and admitted or even encouraged transgression (non-disciplinary).

TRANS-DISCIPLINARITY

Self-taught designer | Designer as mediator

SUBJECTIVE ——————— OBJECTIVE

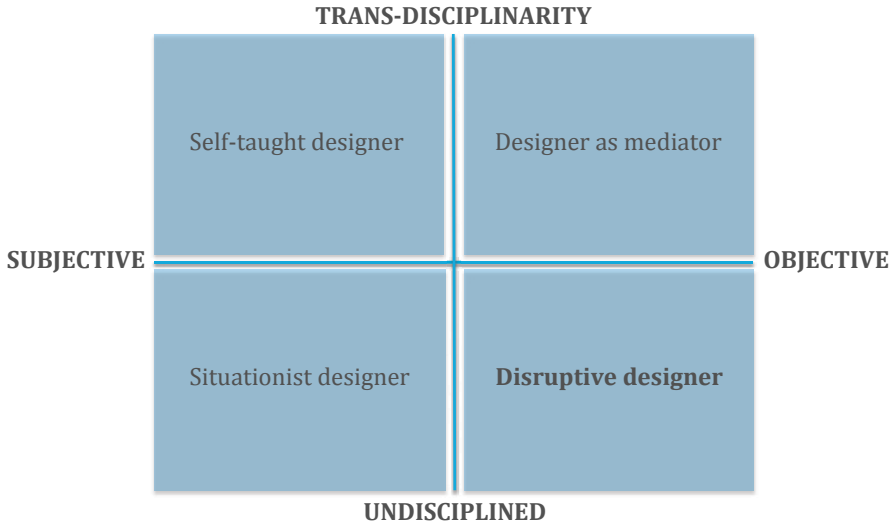Situationist designer | **Disruptive designer**

UNDISCIPLINED

FIG. 2. FOUR TARGET PROFILES OF DESIGNERS.

Within the summary that we have represented with a four-quadrant map, we have identified four target profiles. Four profiles of contemporary designer have emerged: the first two are educated using more or less traditional long-term academic processes (designer mediator, considered as an advanced point with respect to the polytechnical education courses; and "situationist" designers, considered as the outcome of the "bosartist" module evolved from the new traditions of the American-style schools of performing arts–acting or TV-oriented schools (like that portrayed in "Fame"). The other two are more interesting in terms of our studies: the non-educational figure of the intellectual designer and that of the designer that we define "disruptive" as achieved from subjects who are being educated or have already been educated according to different traditions, via shorter immersive courses.

1. The self-taught designer: that outlined in quadrant A (trans-disciplinary but subjective and individual approach). This is often a designer who has not been to design school. A person who, in most cases, has built up his own cultural profile and who, thanks to this absence of imprinting, is able to develop a "liberal" profession, outside the conventional profiles that operate inside or for a company. This profile is embodied by historical designers like Enzo Mari or contemporary designers like Giulio Iacchetti. Designers who can not be educated without standardising or ruining the authenticity of the figure.

What interests us about this figure, here, is the value of witness within traditional education processes (be they artistic or technical). Usually, when called upon to talk to the pupils of a school, this figure adopts a disruptive kind of behaviour, tending to mock every kind

of scholastic teaching offered, attacking students, trying to prove the presumed "sleepiness" that an excessively secularised process has generated in their minds, and develops a role of breakage that is evident in claims like: "*I never studied but….", "to be a designer all you need is to be curious and to open your eyes and ears to the world...", "forget about these projects are get out and see what the real world is made of, get your hands dirty…*". A fundamental task of this profile in education processes is to develop a displacement, determined by the breakage of the certainty that the completion of studies or the acquisition of educational qualifications is sufficient to generate a successful designer.

2. The "situationist" designer: the profile outlined in quadrant B (subjective and "undisciplined" approach) belongs to designers who have made the construction of their identity and of the relative narration the fulcrum of their design process. Heirs to Situationism, they apply their design technique to themselves, in order to build up a character like a product. These designers often create situationist happenings that use the designer's body and attitudes as ways of establishing themselves as brands. Examples of this profile are proto-designers such as Fortunato Depero and contemporary designers like Fabio Novembre. Within an educational process, these subjects usually show a considerable affinity with the school they attended and do not deny their teachers, tending, on the other hand, to celebrate them: "I was able to see so far ahead because I was seated on the shoulders of giants" (Novembre, 2010).

3. The designer mediator: the profile defined in quadrant C (trans-discipline as a method) is a designer who is not so easy to describe, because he/she escapes personalisms and authority on the product. His/her aim is to build or consolidate the team and the mediated integration between different types of knowledge and different specialisms. He/she is a discoverer of talents, someone who enhances chains of skills, and a builder of organisations. His/her education is one of the most important educational challenges that innovative and trans-disciplinary schools are pursuing in the name of the integration of the traditional profiles existing (Aalto University, MIT, Politecnico di Milano). This designer uses design tools not only to design objects and services but also to define strategies, study situations and analyse opportunities. At the same time, he/she tries to see the aesthetic and functional dimension of things everywhere, inside an organisation and in the construction of the documentation created to accompany a design. Knowledge related to economics and management converge within him/her, along with the humanistic knowledge of social sciences.

4. The disruptive designer: the profile of quadrant D (non-disciplinary design as a method) is, by definition, an experimenter who uses the logic of science and art together, integrating them and blending them, a professional of innovative processes that often start from the ability to disavow methods, bypass restrictions, constantly seeking radical innovation and avoiding becoming attached to a single method. This is not the fruit of a systematic course of education planned at the table, but could be proposed to profiles who are studying in traditional schools, attending particularly intense parallel or successive medium or short-term courses (i.e. summer schools, residential workshops, specialist masters). The discovery of

disruption and the consequent decision to transgress as a rule takes place incidentally, being flanked by a particularly innovative teacher with whom a close relationship is developed, or via an intense journey, a formative event or an experience that opens up a door left ajar in the mind through which the discomfort of dissatisfaction with the everyday way of working had already begun to filter.

These four profiles coexist in contemporary organisations and contemporary organisations have a parallel or a consequential need for each of these ways of a being a designer.

5. A PROPOSAL: DISRUPTION AS UNDISCIPLINED ATTITUDE IN EDUCATION

We intend to focus now on the fourth model, the disruptive designer, as one of the more interesting challenge for the innovation of the educational models of design.

First of all is important to clarify what it is intended for "disruption" in this context. The concept of disruption is still disputed within the design community: it comes from business ("open innovation", Chesbrough, 2003) and technology literature (from Christensen, 1997 to Williams, 2010) where is defined as "an innovation that creates a new market by applying a different set of values, which ultimately (and unexpectedly) overtakes an existing market" (Williams, 2010). Applying this concept to education implies promoting radical changes and discontinuity in the training of young designers. The paradigm of "disruption" becomes, at the same time, content and objective of the didactic of design: how to manage a "disruptive" educational process? How to obtain a "disruptive" result (namely a disruptive designer)? We hypothesize that an undisciplined approach trains a designer to be more disruptive and innovative, even if for their features a disruptive designer often is a result of a not traditional training and an undisciplined approach cannot literally be taught trough a discipline. Still there is a question: if we can lead students, stimulating an undisciplined attitude, to become disruptive, can an undisciplined attitude be induced in the students? Can it be codified (therefore made transmissible) in the design education processes? Or do we need to disrupt the teaching process itself? Is not a paradox to codify an undisciplined approach? To overcome these contradictions what we propose is to educate the designer towards an attitude in questioning rules, methods, procedures and boundaries and in deliberately controvert to explore them. In this frame we intend "disruption" as this capacity of innovation acting outside the rules. Our hypothesis is based on a set of possible "triggering actions" of the educational process, under the statement of "rules disobeying or discharging". We consider the opportunity of disobeying rules that are relevant of the quality of the design objects and processes:

⁃ technical-functional rules;
⁃ socio-economical rules;
⁃ aesthetical rules.

The following are some exemplifications that are already practiced in the phenomenology of contemporary didactic: through these cases and examples we intend underline all the signs,

still not systematic yet promising, that read as a whole can lead to confirm our hypothesis, even if they cannot yet be considered a systematic model. The idea is to apply consistently the only rule of "putting in question the rules of designing, while doing and teaching design" (Lupo, 2010).

Disobeying technical-functional rules

In this area we have i.e., relatively to the dimension of the object, the transgression of the ergonomic rules (design out of scale, change of proportion…), of the use of material (iper-materialization vs annulations of matter, sinesthesia…) or of the function (transforming, deleting or substituting components, working against gravity…). At the dimension of the process, i.e., we can fragment the process (an historical example is Cadavre exquis, a collective creative drawing technique used by Man Ray, Joan Miró, Max Morise and Yves Tanguy, where everybody makes his own piece attached to the others but seeing only the final portion of the previous work), or invert the linearity of the process itself (i.e starting from the end).

FIG. 3. DISOBEYING TECHNICAL-FUNCTIONAL RULES: FROM LEFT MATERIALS (GHOST ARMCHAIR BY CINI BOERI AND TOMU KATAYANAGI, PRODUCED BY FIAM ITALIA, 1987 AND FALKLAND LAMP BY BRUNO MUNARI, PRODUCED BY DANESE, 1964), GRAVITY (SKY PLANTER DESIGNED BY PATRICK MORRIS, PRODUCED BY BOSKKE, 2008), LINEARITY OF THE PROCESS ("*CADAVRE EXQUIS*" BY MAN RAY, JOAN MIRÓ, MAX MORISE AND YVES TANGUY).

Disobeying socio-economical rules

In this area we can have i.e., relatively to the product dimension, the transgression of the unicity of the work and of the contextualization (let's think Enzo Mari "autoprogettazione"- design by yourself - manual, and, in the contemporaneity, to the design of some components i.e. those handlers or taps that try to overcome bonds of a structured context-system). At the process scale we have the transgression of the authoriality of the work: the concepts of post-production, mixage,... etc. derived from arts and the 2.0 web, are the new metaphors for co-design, co-creation starting from existing objects and components.

FIG. 4. DISOBEYING SOCIO-ECONOMIC RULES: CONTEXT (ENZO MARI IS AUTHOR OF THE BOOK *AUTOPROGETTAZIONE?* PUBLISHED BY CORRAINI, MANTOVA, IN 2002).

Disobeying aesthetical rules

In this area, relative to the scale of object only, we can have, i.e., the transgression of common semantic values and used metaphors, of the temporal dimension, the transgression of perfection (giving to the unfinished, imperfect and incomplete the right of object).

FIG. 5. DISOBEYING AESTHETICAL RULES: SEMANTIC VALUES (MEZZADRO BY ACHILLE AND PIER GIACOMO CASTIGLIONI, DESIGNED IN 1957 AND PRODUCED BY ZANOTTA IN 1971), PERFECTION (COFFEE AND CIGARETTE BY JULIE KRAKOWSKI, AUTOPRODUCTION, 2006).

	technical-functional rules	socio-economical rules	aesthetical rules
Process dimension	Fragmenting the process Inverting the linearity of the process	transgression of the authoriality of the work	‐
Object dimension	transgression of : ‐ the ergonomic rules ‐ the use of material ‐ the function	transgression of: ‐ the uniqueness of the work ‐ the contextualization	transgression of: ‐ common semantic values ‐ perfection ‐ time

TAB. 1. POSSIBLE RULES DISOBEYING TO BE APPLIED IN THE DESIGN LEARNING PROCESS

CONCLUSIONS: NEW CHALLENGES OF FORMATIVE EXPERIMENTATION

Questioning the design rules in order to innovate them has been presented in this paper as an approach to disrupt the educational design process getting out innovation from an undisciplined attitude. We assumed this approach from actual trends in the re-interpretation of the value of trans-disciplinarity towards a radical shift transcending the disciplines themselves.

This approach anyway is just one of the multifaceted conditions of contemporary design, in which various conditions put in crisis the education process.

So, beside the search for disruption trough undisciplinarity, we can isolate al least other three phenomena that are challenging the innovation of training processes: for them we try to anticipate some indication and insights.

- The socialisation of design thinking, methods and skills: if everything is designable and everybody can be a designer (see for instance the project "Office+Retrofit" www.officeretrofit.com), how can be design passed trough formal and institutional education? Who owns the authoritativeness, the proper "design knowledge" (culture, tools of design) to teach design? In this case it could be more appropriate to use the concept of "school" (intended not as institution but as a group of people characterised by a common way of thinking and method of work) to reshape the education system in a more informal way.

- The spectacular quality of the designer: if the designer is more than being at the centre of the project with his subjectivity and personality, because he is literally the project and is communicated as a product, how can the designer "mediator" learn to became a direct protagonist (in fact he is part of a backstage process)? The educational process should be shaped for the creation of open networks and communication systems, on which rely for the public and social reliability of the star system designer.

- Collective co-design intelligence: if the agency is a community, a group of people and of interests, where co-creation and participation lead to a flexibility of procedures, what can be codified and taught about this? The educational model should point out on skills enabling decision making processes and negotiation dynamics.

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