



## **CONJUNCTIVE SYNTHESIS AS AN INTERDISCIPLINARY PEDAGOGICAL METHOD FOR ART AND DESIGN - A CUBE**

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The paper looks at Brian Massumi's concept of conjunctive synthesis as a pedagogical method for art and design interdisciplinary projects. It focuses on UK based HE Institutions with a particular curriculum related to Interior or Product Design and Architectural Technology and proposes a shift of the agenda from thinking the disciplines as distinct areas of study towards mapping their shared vocabulary as practices that can be creative and critical yet abstract and conceptual. It suggests a vertical model of collaborative engagement among students of different stages of undergraduate studies within a Design related course. The paper presents a comparative study drawn from a short 3-week project of transforming a platonic solid –cube- into a design object following conjunctive synthesis in the studio. The project formed an introductory exercise for BA (Hons) Interior Design, BSc (Hons) Product Design and BSc (Hons) Architectural Technology Level 4, 5 and 6 for the Autumn Term of Academic Year 13/14 at the Architecture and 3D Design Department of the School of the Arts (3D SoTA) University of Northampton, UK.

**Keywords:** Art, Design, Pedagogy, Synthesis, Studio, Vertical, Cube.

### **Introduction**

This paper explores a post-structuralism highly theoretical concept and its potential value as an instrumental element of pedagogy as inserted in studio teaching and especially brief assignments for art and design. The rationale of this exploration is more philosophical rather than epistemological and uses three indicative samples of student work as case studies for the application of the concept of Brian Massumi's conjunctive synthesis. The literature review of the investigation follows a vector of philosophical approaches on the arts and education, considering Julia Kristeva's notion of the threshold in interdisciplinary studies, Brian Massumi's synthetic triplet and Hernan Casakin's visual analogy. However, it would be fundamental to provide the reader with the general context for the application of the above by defining key terms such as studio, brief and synthesis when related to art and design education.

The studio has been the heart of teaching and learning activities within the Schools of the Arts, Design or Architecture in Higher Education internationally, for decades of subject specific educational practice. More or less every art and design student has at some point utilized the space of the studio as a hub of creative engagement and on-going development throughout the academic year. We may argue that a certain level of studio culture is generated via the already established as well as the experimental methods of teaching design related subjects. The studio is according to Nick Dunn 'an environment that affords the students the opportunity to generate and represent ideas in response to project briefs set by the studio tutors' (2010: 39). The studio and the brief then become a manifold of pedagogical establishment,

secretly agreed among students and tutors by the inauguration of the first term at Level 4 (Year 1). Rather than the presumption that a design question is set by a document identified as the brief in the industry world, it is the instrumentality of the studio tutor to create a document that would clearly set objectives, anticipate results but overall is constitutional of a culture different to that of an amphitheatre or a classroom. The order and calibration of space of the studio implies also a deconstruction of the hierarchical model that demands the hegemony of the teacher towards a collaborative model of practice. In the studio, the educator becomes a simulated employer, client, supervisor or colleague. It is no coincidence that peer review is a strong tool for studio teaching delivery and assessment as well as a quality assurance method that allows reflection via feedback, dialogue and constructive criticism.

Studio-based pedagogy promotes critique, a term frequently used to describe a situation of visual presentation and review of a certain body of student work in front of an audience (“The Crit”). Dunn refers to methodologies of architecture education, which is perhaps one of the creative disciplines that established the studio culture and the critique quite early, to note that the pedagogical environment (of the studio) is characterized by ‘learning-in-action and reflective practice... with both analytic and synthetic modes of enquiry in a constant flux between the experience of practice and the production of knowledge’ (2010: 41). Dunn agrees that this creative cycle of practice, reflection and production is defined by the ‘legacy of perceived values and normative criteria that surrounds the design studio’ (2010: 44). He refers to this set of criteria as ‘agency’ that if creatively and directionally infused within the loop of critique moments, research of precedents, theoretical analysis and actual making of a project, can be instrumental. It facilitates a healthy openness to the broader social context that surrounds the discipline(s) and profession(s) and allows contingency (2010: 40). Beyond the conventionality of allowing individuals or establishments outside the teaching team to enhance the moments of critique within the studio, ‘agency’ and openness can be maintained as well following more original methods and techniques; such as the verticality.

The vertical studio is an expression often used in the context of the design pedagogy to define the collapsing of the institutional barriers within specific levels of study, mixing different –usually undergraduate- year groups of students whilst working on specific projects or teaching and learning activities. Garry Layden, Academic Director of Art and Design Field at the University of Bedfordshire, UK performs a three-phase exploratory evaluation of the strengths and weaknesses of the ‘vertical’ studio when applied as a teaching method of Interior Architecture and Interior Design Courses; what he refers collectively in his paper as the ‘Spatial Design Degrees’, in 2004 (2010: 1). Layden’s expectations concentrated on creating a greater sense of community –what Dunn refers to as studio culture- and a process of learning via observation, advice and competition (2010: 4); in other words studio generated agency. Converging from what Layden was expecting, the vertical studio experiment as teaching, learning and assessment process appeared to have enhanced only the learning experience of the students at a lower level of study (Level 4 or Year One) and did not significantly establish competition as a learning vehicle, which was somehow disappointing. The sensitive and aspirational conclusion of Nick Dunn who acts as a vertical studio visionary in this instance, brings to light another set of positive parameters; ‘with the making of new networks, visualizations and mappings to describe and explain our design ideas and processes, the potential to remap the design studio... is greater than ever’ (2010: 45) he notes. With this statement, the agenda shifts to rethinking and remapping the studio as a primary aim of design education innovation, with the potential of enhancing the teaching and learning experience, instead of concentrating on the direct individual responses from the studio-participants regarding the degree and norms of knowledge exchange. It is necessary that a new method such as the vertical studio is examined throughout the time lapse of a whole loop of a design project as described above, to be tested through theoretical research as well as practical experimentation and making.

The nature of the design brief as an element within the context of the studio environment is encouraging the loop of research, precedents, concept and design development, which subsequently becomes a standardized routine of design problem solving. The rationale of this routine may be identified as synthetic. Practically, the term synthesis has been widely used to identify the process of dealing with a design issue in terms of responding to a project brief or sometimes would correspond to the overall notion

of the design practice itself. Deriving from the Greek term σύνθεσις (sýnthesis, a complex composition) it constitutes the third element of the Hegelian Dialectic of thesis, antithesis and synthesis (Mueller, 1958: 411). There is extensive bibliography on the philosophical definition of synthesis and its theoretical opposite –analysis- however this paper will refer only to the use of synthesis in design terminology. Synthesis can be seen as part of a complex and empirical system of thinking defined as dialectic and introduced by Hegel, which –although theoretically born- is only fully defined in practice (Spencer, 2006). Christopher Alexander in his *Notes on the Synthesis of Forms* is perhaps one of the first to approach synthesis as a design methodology for architects (1964). Unfolding a complex matrix of mathematical sets, functionalities and logic, Alexander explores the design process as a system that is purely synthetic with two elements interacting ‘if and only the designer can find some reason (or conceptual model) which makes sense’ (1964: 109). At the same time he is polemic about the independent study of specific design methods as ‘it is absurd to separate the study of designing from the practice of design’. As Michael Speak suggests in *After Theory*, theory would only lead design innovation after major restructuring (2005: 72-75).

Potentially influenced by Alexander’s definition of synthesis and in consensus with Hegel’s Dialectic, the iconic School of Architecture at the National Technical University of Athens uses the term Synthesis in its formal documents, including the student guide, to describe the Design Studio modules at all levels of study of the 5-year combined MArch program. As such, synthesis has become part of the studio culture as a constitutional term, a word often heard within the studio and thus embedded in the mind-sets of the architects-to-be as a fundamental process of design. It is questionable whether the importance and value of the term –and therefore the process- is analogous to its institutionalization and its becoming of a constant instead of a variable. The system of the design process itself –as introduced by Alexander- would have potentially rejected the term in this instance. Synthesis I (Design Studio 1), principal module of the equivalent of Level 4 at the School of Architecture of NTUA introduced as a first assignment during the Autumn Term of 2001/2002 the transformation of a platonic solid into a complex form. In this context, synthetic is a process of accumulation as well as critical decisions, composition, rearrangement and removal, where the outcome is of heightened complexity in relation to the primary component. The agents that define the above are not pre-set and participants are encouraged to approach disciplines other than design in order to synthesize. The final forms produced by the cohort varied significantly regarding the level of abstraction, function specificity, scale and detailing with their presentation methods following the pattern. Synthesis in this instance became a powerful interdisciplinary pedagogical and methodological tool, when applied in design practice.

## Literature Review

We live in the ‘post-era’ according to Don Ihde (1993). We are bombarded with a frenzy of visual information of unidentified origin. Technology –as digital communication- has been massively infused in education, entertainment, art and design practice as well as our everyday habitual activities. It is therefore difficult to refer to absolute discipline-specific practices, even in terms of the UK Higher Education academic curriculum. This does not necessarily apply to the names that the courses, modules or schools are presented with, as the former may often respond to an intention of establishing the desired institutional gravitas. In their core, one may argue, Higher Education design-related courses in the UK can be seen as interdisciplinary. The question of inter-disciplinarity is discussed by psychoanalyst Julia Kristeva in *Institutional Interdisciplinarity in Theory and Practice: an Interview* (1998). Kristeva makes a distinction between the inter-disciplinary the interdisciplinary and the cross-disciplinary or multi-disciplinary, by establishing a topological model. She proposes that a study becomes inter-disciplinary by the time it follows a cross-diagonal axis that cuts through two areas of interest (the primary disciplines). Kristeva notes a ‘clear necessity to work disciplines differently but in parallel’ and agrees that interdisciplinarity demands openness beyond specialization suggesting an interaction between fields previously unrelated (1998: 5-6). As such, an inter-disciplinary act is fundamentally synthetic. Kristeva’s

theories of inter-disciplinarity approach the concept of synthesis even closer, when extensively analyzed by S. K. Keltner (2011b). In *Kristeva-Thresholds*, Keltner presents Kristeva's concept of 'threshold' as a methodological criticality, a questionably conscious decision during a process that 'is able to render not only temporal connection or a spatial point of contact, ... but also a mental plasticity' (2011a: 8) The threshold becomes here an agent that allows the interdisciplinary to approach the synthetic.

Brian Massumi approaches synthesis as a knowledge apparatus in the Chapter *Habit of A User's Guide to Capitalism and Schizophrenia: deviations from Deleuze and Guattari* (1992) and identifies an ontological triptych of synthetic typologies, almost creating an ecology of syntheses; 'connective', 'disjunctive' and 'conjunctive' synthesis. According to Massumi, connective or molecular synthesis is the process of 'statistical accumulation of particles and their folding and condensation... a "production of production", a creation of an individual as if from scratch' (1992: 49). Connective synthesis, however passive it is presented by Massumi, may result in outcomes of high complexity and faint association to the primary "seed". Connective synthesis is often characterized by the application of a code, which is for Massumi a pattern of repeated acts that forms a 'milieu' and a relatively stable, often statistical mixing of elements (1992: 51). As opposed to connective synthesis, disjunctive synthesis 'divides but only quarries some. It employs a classification system of mutually exclusive identifications, -nominal identities- and chooses only the ones judges suitable' (Massumi, 1992: 50). For Massumi therefore, disjunctive is associated to a selection process within a binary system rationale of suitable and non-suitable actions/results.

'The collective consumption of intangible excess and the consummation of a punctual process of transformation are the two aspects of the conjunctive synthesis: evaporative excess effect and the crossing of a threshold' (Massumi, 1992: 50).

Conjunctive synthesis is for Massumi a process of conditional transitions with unforeseen outcomes. The crossings of thresholds are in this case translated into moments within the process of design when a method or a concept is introduced from an unrelated field, for instance one of the creative arts or science. Conjunctive synthesis thus becomes a potential agent between restructured theory and practice as well as a force for critical evaluation and inter-disciplinary thinking. The ontological properties of Massumi's syntheses are presented on the table below:

**Table 1.** Massumi's Typology of Synthesis (1992)- Extracted Characteristics.

Synthesis Type	Extracted Characteristics
<b>Connective (1)</b>	Accumulative (a), Statistic (b), Passive (c), Code (d)
<b>Disjunctive (2)</b>	Binary (e), Exclusive (f), Classification (g), Selection (h)
<b>Conjunctive (3)</b>	Excessive (i), Transformative (j), Punctual (k), Threshold (l)

The way conjunctive synthesis is applied through the design problem solving is highly complex and very difficult to pattern or monitor. This is due to the nature of design practice itself, which is multiple, open and constantly evolving as well as a number of variables such as the cultural background of the designer, the empathy within the studio culture (agency) and the intimacy between the designer and the creation (ownership, intellectual property et. al.). If we accept that design process is a cognitive process – in contrast with art process that demands a level of intuitive decisions often preconscious-, then it is interesting to examine the strategies employed. Hernan Casakin monitors the differences between architects and students in design problem solving when dealing with familiar structures and provides empirical evidence that visual analogy is extensively used as a cognitive strategy in the design process (2004). The experiments studied by Casakin showed that using visual analogies the 'novices did not add

constraints to the design problem, but produced a large number of solutions' (2004: 1), which makes them more inclined to apply conjunctive synthesis as a design methodology. The analogical reasoning according to Casakin consists of (i) identification and retrieval and (ii) mapping and transfer of elements with the first mostly depending on the instrumental provision of hints as indicative factors that could lead to the crossing of a disciplinary threshold or a critical selection between two potential outcomes. It is noted however that practically there are moments of inconsistency within the design process where the creator is 'not satisfied' with an intermediate production and decides to not further develop.

In Casakin's experiment a student is asked to solve a "Dwellings" problem and is provided with visual reference of (a) plan of a church; (b) atom and electrons; (c) tree; (d) plan of a bus; (e) textile fabric; (f) typewriter and (g) line of bottles. Casakin notes that after reproducing the plan of the church and being dissatisfied, the student studied the visual reference and created a between domain source (crossing of a threshold) exploring the structural characteristics of the atom and the tree, in the end a successful design solution as a deep analogy (synthesis) was never established (2004: 9-10) due to lack of expertise. The hypothesis however that students 'in contrast to experts will not be able to establish successful analogies from the provided visual sources was not confirmed' (2004: 15). If novices applied conjunctive synthesis within the design problem solving, the 'evaporative excess effect' that Massumi describes (1992: 50) would become constrained by the given precedents, however abstract or varied they may be. In other words, if we agree that design students synthesize conjunctively, it is important that a certain level of excess and openness to empathy is sustained by the brief and the studio culture (agency).

This paper examines in practice the potential of students at Level 4, 5 and 6 applying conjunctive synthesis within the design process of a project with an elemental brief focusing on three out of 64 samples examined to have used conjunctive synthesis as by all four of its core ontological characteristics: excess, transformation, punctuality and the existence of a threshold.

## Methodology

Alain Findelli unfolds the legacy of design education according to its different archetypes and shifts that are observed during the past two centuries. From a design curriculum that followed the Bauhaus 'threefold articulation of art, science and technology' several twists and deviations have followed and 'the artistic dimension of the original curriculum became less and less important, whereas the scientific content was increased and emphasized' (2001: 7). The Architecture and 3D Design Department of the School of the Arts (3D SoTA) University of Northampton UK, where the main case study of this paper was conducted, presents four undergraduate programs: BSc (Hons) Architectural Technology, BA (Hons) Interior Design, BA (Hons) Games Art and BSc (Hons) Product Design. This paper presents as a case study, samples of a studio-based experiment that involved BSc (Hons) Architectural Technology, BA (Hons) Interior Design and BSc (Hons) Product Design students of Levels 4-6 (1st, 2nd and 3rd year). These programs run in parallel with modules bringing together students from different courses at the same level of study and the members of 3D SoTA Team teach across the programs according to specialism and research interests, to preserve internal agency and an open studio culture. Most of the modules are studio-based with the exception of modules that are highly theoretical or attached to scientific and professional processes.

For the Autumn Term of academic year 2013-2014, a cohort of 137 undergraduate students at Level 4, 5 and 6, responded to an elemental brief of a 3-week introductory project. The brief instructed them to imagine and make a cube of 300mmx300mmx300mm in size. No limitation was set regarding the material of the actual cube or if this was to be seen as scale model instead of a full size object. During the second phase of the project the students were given a set of three gestures to apply on the cube in order to change it, following a narrative of actions; again no limitation was given regarding the nature or the scale of the change and gesture or the result. In phase three (final week) the cube would have to transform into a design form with the potential of being an object or a space or any variation between the two. The final

outcome would be presented in the studio with a physical model and digitally as one-page presentation of the concept of narrative, the gestures and the final outcome. The assignment was linked to different curriculum activities and the students were guided through the process by the team regardless the program they were on. Three weeks of studio-based one-to-one tutorials and group meetings preserved the smooth development of the project and injected the process of individual work with moments of peer assessment and constructive feedback. As the project was inter-modular, no set assessment criteria and learning outcomes were determined on the brief, yet the students were encouraged to refer to specific unit guides to ensure fairness and justice during assessment as well as appropriate curriculum links, where the assignment would contribute to different modules according to internal needs of the program. The assignment would link to Design Projects were applicable or other studio based units, covering all teaching sessions. All submissions were delivered through the University of Northampton's digital platform with all three Programs and Levels having the same deadline for uploading their presentation files. The assignment concluded with a celebratory showcase of all participants' physical models in the studio and assessment followed photographic documentation by technical staff.

## **Analysis**

The electronic submitted presentations were paired with the photographic documentation of the physical models and each submission was given a serial number for reference. Each submission was individually evaluated regarding the synthetic properties of Table 1, for the purpose of this research. Each submission would be associated with a minimum of one to a maximum of five synthetic properties and would be then classified accordingly as a sample of connective, disjunctive or conjunctive synthesis with all submissions on record considered synthetic, given the elemental brief. As seen on Table 1, twelve synthetic properties are extracted from Brian Massumi's ecology and are associated with three typologies of synthesis respectively. Following and extending Massumi's model, connective synthesis involves accumulation, is statistic and passive and involves the application of a repetitive pattern; a code. In our vertical studio experiment, these characteristics are examined in relation to the geometry and volume as well as the physicality of the manipulated elements. A passive synthetic gesture for instance, would maintain the footing or volume of the initial cube, being reluctant to change its overall geometrical shape, whilst an accumulative would take the initial cube as a monad and combine multiples by Boolean logic. A statistic synthetic gesture would precisely and intentionally combine volumes and shapes applying canonical orders, such as the golden ratio. The canonical and the coded are characteristics of disjunctive synthesis as well. The classification of the elements inserted in disjunctive synthesis is critical for the outcome, so is the selection of the elements inserted, which may result in a limited and very specific variation of color, material and source of data. Disjunctive synthesis follows by nature a binary system of decisions at all stages, making the process exclusive, with very little porosity to allow new unrelated data.

Conjunctive synthesis is ontologically related to a process of becoming. An object or a space that is synthesized conjunctively has been born out of an excessive transformation of volumes, shapes, voids and solids, concentrations and transparencies. Such a process, involves a certain level of abstraction and openness to multiples, yet at the same time has moments of clear decisions. Conjunctive synthesis is a rather punctual process however complex and on-linear it may appear and can be mapped via thresholds, points of critical decisions that invite external data or make specific exclusions. The complex topology of the conjunctive synthesis makes it difficult to fully define unless practiced. The following statistical analysis will reveal the inclination of undergraduate design students to apply conjunctive synthesis as a studio-practice methodology, responding to a synthetic and elemental brief, according to their level and discipline. Table 2 (above) shows the input of submissions by program and year of study and Tables 3, 4 and 5 indicate the input related to the three different synthetic methodologies by program and year of study, in absolute values. In Table 6 and 7 a comparative taxonomy of synthetic methodologies is presented according to year of study and program, in relative proportions.

**Table 2.** Input Analysis by Course and Year of Study.

Program	Input	Level 4	Level 5	Level 6
Architectural Tech. (AT)	54	20	14	20
Interior Des. (ID)	45	12	13	17
Product Des. (PD)	38	16	09	13
All	137	48	36	50

**Table 3.** Conjunctive Synthesis Input by Course and Year of Study.

Program	Input	Level 4	Level 5	Level 6
AT	20	09	02	09
ID	24	08	07	09
PD	20	07	07	06
ALL	64	24	16	24

**Table 4.** Connective Synthesis Input by Course and Year of Study.

Program	Input	Level 4	Level 5	Level 6
AT	16	05	05	06
ID	06	01	02	03
PD	04	01	--	03
ALL	26	07	07	12

**Table 5.** Disjunctive Synthesis Input by Course and Year of Study.

Program	Input	Level 4	Level 5	Level 6
AT	18	06	07	05
ID	15	03	04	08
PD	14	08	02	04
ALL	47	17	13	17

**Table 6.** Comparative Synthesis Taxonomy by Year of Study.

Synthesis	Overall	Level 4	Level 5	Level 6
Conjunctive	46.7 %	50.0 %	44.4 %	48.0 %
Connective	19.0 %	14.6 %	19.4 %	24.0 %
Disjunctive	34.3 %	35.4 %	36.1 %	34.0 %

**Table 7.** Comparative Synthesis Taxonomy by Program of Study.

Synthesis	Overall	AT	ID	PD
Conjunctive	46.7 %	37 %	53.3 %	52.6 %
Connective	19.0 %	29.6 %	13.3 %	10.5 %
Disjunctive	34.3 %	33.3 %	33.3 %	36.8 %

When studying the data of this vertical studio synthetic experiment, it is important that the input is provided in absolute values. This will enable reflecting on extreme value results and odd patterns. According to Table 6, the cohort presents a patterned along the years of study inclination towards using conjunctive synthesis as their core design method (46.7 %), with disjunctive synthesis following (34.3 %) and connective synthesis being less popular (19.0 %). There are no significant differentiations between the figure patterns that each program presents with 53.3 % of Interior Design students (all years) applying conjunctive synthesis and only 10.5 % of Product Design students (all years) preferring connective synthesis (Table 7). It is indicative that very low figures are presented in favor of connective synthesis of Interior Design and Product Design students at Level 5. This may be interpreted in various ways. As seen at Table 2, Level 5 represents the smaller group within the experiment. With that in mind and noting that Interior and Product Design students at Level 5 share studio space and parallel modules, it is therefore obvious that the studio culture of this close-knit group has influenced the preferred design methodology applied. Agency and openness in design groups of less than 10 students becomes critical, if not endangered, regardless the external tuition input. This is due to the peer assessment and crossover of ideas between the members of the group itself, which almost becomes then independent but limited to specific self-generated systems of thinking. One may also argue that Level 5 by nature is expected to present the maximum of resistance to newly introduced methods of production, yet this is subject to further research.

Alongside the odd high and low limits resulting from the relatively small input at certain levels of study and program, the experiment carries various limitations. The familiarity of the students with the primary object and the applied techniques of making are subject to prior knowledge and background as well as a number of external factors such as access to resources and availability. In further stages of this study, it would be insightful to map how synthetic methods are patterned along different nationalities and backgrounds as well as age groups and genders, whilst ensuring that all students are using set methods of materialization. The above parameters, for economy, are not further examined in this particular paper, yet outcomes that used extreme or advanced methods of fabrication have been excluded for equality reasons. An interesting mapped parameter for the experiment –not visible on Tables 2-7- has to do with how immaculately the synthetic methodologies have been used by students in relation to all twelve synthetic properties. A submission could be classified as Conjunctive not only when embedding exclusively properties I, J, K, and L (as Table 1 indicates) but any of them, as long as the latter outnumber properties of another field. A submission then could be classified as fairly conjunctive with elements of connective or disjunctive and vice versa, but it has been agreed that all input would be regarded as synthetic and if no evidence of synthesis is presented, the sample is excluded.

For the purpose of this research, the pattern of fully conjunctive submissions has been recorded and mapped against criteria of Level and Program. Samples of submissions that include all four ontological characteristics of Massumi's Conjunctive Synthesis: excess, transformation, punctuality and threshold have been classified as fully conjunctive and will be presented as case studies. An interesting irregularity observed is that Conjunctive Synthesis is the only Methodology that appears to have at least one sample in every group (Level and Program) that embeds all ontological characteristics. The case studies selected, therefore cover the whole spectrum of Programs and Levels of Study giving an overview of Conjunctive Synthesis as applied in a vertical studio interdisciplinary design assignment.



## Samples

The first sample of the case study (A1 submission with Ref. No. 35/173 AT/6) represents Level 6 (Year 3) and BSc (Hons) Architectural Technology. Although the processes and techniques used at the final year of undergraduate study are generally expected to be complex and advanced in relation to those employed by students of earlier years, this student embarks on the project using a material as simple as sugar to imagine and create the platonic solid. Although the student builds up a cube out of modular smaller sugar cubes, the process is seen as neither accumulative nor passive. An inverted process of excessive esoteric accumulation and a self-transformation of the shape are critically selected as synthetic gestures. The space-object calibration is punctual and the threshold is crossed by the intuitively driven decision of deforming the absolute geometrical harmony using the physical properties of the material itself. As the sugar cubes melt, the synthesis becomes un-patterned and non-preconscious however employs technical knowledge as well as creative challenge. The student makes remarks about the new form and color of the object as it transforms, during documentation and finishes the presentation with an abstract moment of the solid captured via photography (Images 1a, 1b and 1c).



Image 1. a,b,c: Case Study A1: Photographic documentation of 35/173 AT/6.

In conjunction with this sample, it would be worth referring to another submission of the same Level and Program of study (A2 submission with Ref. No. 48/173 AT/6). The student's submission is a link to a stop-motion video created to capture the melting of an out-of-scale specially made ice-cube that contains a geometrical design object. The object reveals itself as the ice melts over time, placed in the uncanny scenery of a garden during night. The video submission was made available and may be accessed online via the student's YouTube Channel (Rebecca Dyer AT Yr3 The Cube Stop Motion: <https://www.youtube.com/watch?v=1AvTKzO-Sko&feature=youtu.be>)

Interior Design Level 5 sample (A3 submission with Ref. No. 73/173 ID/5) demonstrates a more spatially oriented design process and outcome. Using a geometrically complex logic (excess and punctuality), the student transforms the cube into an abstract space that operates as a temporal mechanism and crosses the threshold of scale to position the final form in context. The representation media employed include physical model making, 3D CAD modeling and photorealistic postproduction with the project being conceptual and aesthetically resolved (Image 2).

The sample to represent Product Design students and Level 5 of study (A4 submission with Ref. No. 110/173 PD/4) uses a set of cross-domain visual reference and an abstract sketching process to conclude to the design of a Sci-Fi Space Station. The project demonstrates extensive experimentation and crossing of multiple thresholds before the final form takes shape. It clearly illustrates a cross-disciplinary interest that leads to conceptually and aesthetically intriguing design outcomes. As all of the samples analyzed before, it involves the punctuality this time in the form of a complex 4-axis symmetry, excess and transformation illustrated on the multiple attempts of physical model making (Image 3).

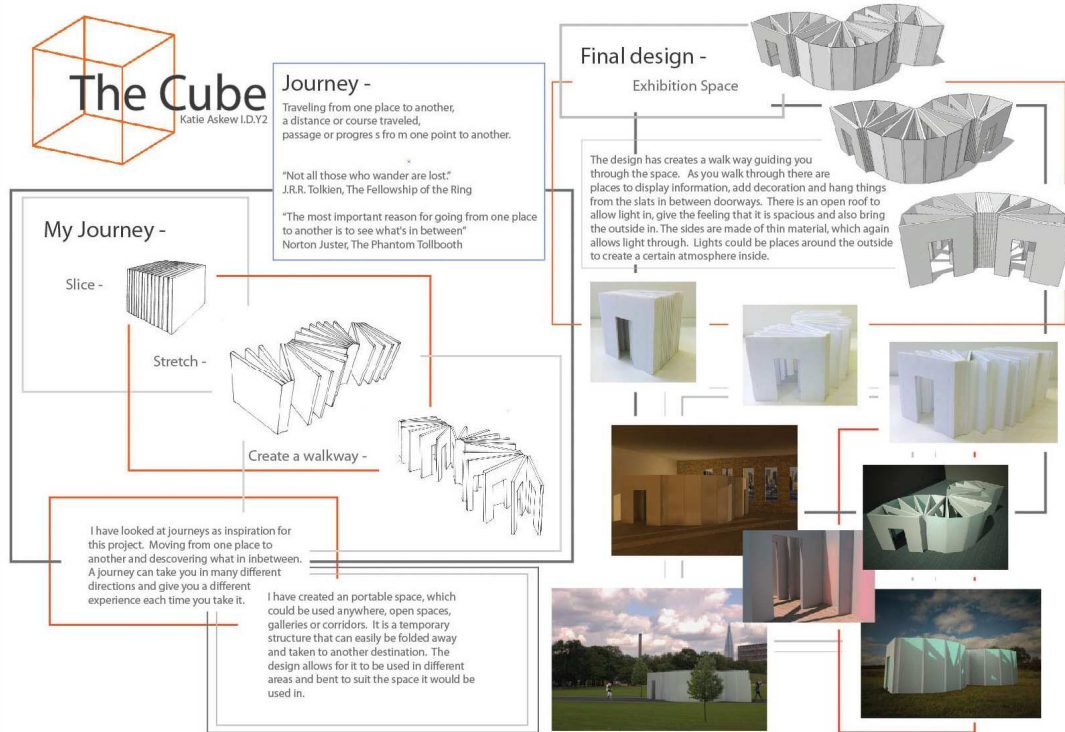


Image 2. Presentation of 73/173 ID/5.

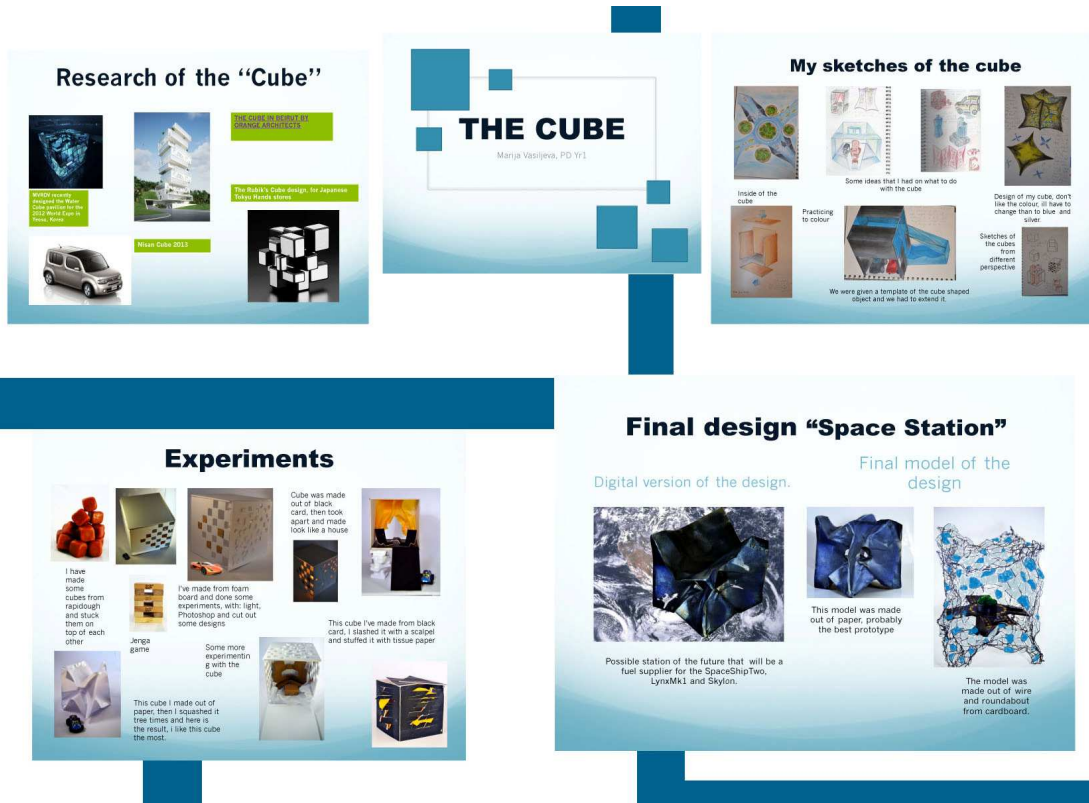


Image 3. Presentation of 110/173 PD/4.

Regardless of their discipline and level of study all samples demonstrate original and intimate at the same time scientifically and technologically loaded employment of methods that is only afforded by conjunctive syntheses. Very distinct regarding their intentions of the final design outcome both in terms of scale and nature, the designers become artists, become technologists, become architects in an attempt (i) to relate to an already familiar primary shape and (ii) drastically change it (iii) responding to an elemental design brief. Taking into consideration that neither the students nor the teaching team were directly introduced to the principles of the synthesis ecology articulated by Brian Massumi but were only following the elemental brief set by the author, it becomes evident that synthetic processes may be initiated un-preconsciously and infused pedagogically within the agenda of the studio teaching.

## Reflection

Brian Massumi's Conjunctive Synthesis as a knowledge apparatus is presented in this paper in the form of a pedagogical inter-disciplinary method of studio teaching in the context of design undergraduate HE studies in the UK. Parameters such as the studio agency and culture as well as the design brief and its delivery were considered when conducting a vertical studio experiment from which three samples were extracted and analyzed to reflect on the use of conjunctive synthesis as a design process in all levels and programs involved. Through the experiment, it became evident that conjunctive synthesis can be seen as a complex practice-based design methodology -with specific ontological characteristics- preferred and performed by students in all undergraduate levels of study of every examined program. Regardless the specific media employed, projects that apply un-preconsciously conjunctive synthesis are distinguished for their complexity and originality as well as the intellectual basis on which they develop. As an open-to-disciplines process, fully conjunctive synthesis combines excess and transformation, punctuality and the crossing of thresholds and carries the potential of being successfully infused within the studio culture of design studies without being directly taught in theory.

The experiment conducted was subject to various limitations, the suspension of which may unfold additional intriguing observations regarding the studio pedagogy and its interdisciplinarity in relation to the input background, the various methods and media employed and the further analysis of data regarding the fusion of synthetic ontologies.

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