



From ANT to Material agency: a design and science research workshop

Anne-Lyse Renon,
Adrien de Montbron, Annie Gentes, Julien Bobroff
Speaker: Anne-Lyse Renon

College of
Design, Architecture,
Art and Planning

University of
Cincinnati

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Literature Review

• Collaborative programs, interdisciplinarity

- Numerous collaborative programs between Science and Design (Cross, 1993, 2001; Bruffee, 1999; Stahl, 2006; Donnelly, 2006, Feinstein 2011, Renon 2015b, 2016).
- Investigation of fundamental physics problems by design (Kelly, 1959; Chi and Glaser, 1979; Chi and alii, 1981; Chii and alii, 1989).
- Still Institutional exploratory space for design education

• Our Focus

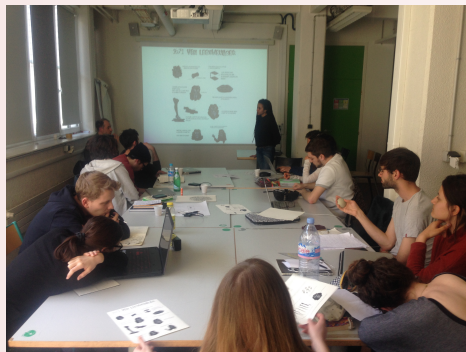
➤ many students who are introduced to design multidisciplinary are afraid of the vast array of disciplines that they should know and use

- How to train for an almost infinite set of knowledges?
- Is it even possible to do so or is it a myth?
- How are students prepared to raise up to the challenge of not understanding the depth of other disciplines that they must work with?



Fieldworks : Improbable introduction of quantum physics in a Design school (ENSCI-Les Ateliers)

- Workshops « Design and Research » supervised by two designers: François Azambourg and Batiste Viala
- Collaboration since 2011 with Julien Bobroff, a physics researcher
- How design uses interdisciplinarity in a designerly way to produce new objects (Gentes, 2015, Tovey, 2015)



2016: Five properties that framed the interdisciplinarity of design:

Affective

Cognitive

Reflexive learning

Economics

Political

2017: Understand interdisciplinarity in practice through the observation of material transformations during the design work



- **Research Methods :**

Actor-Network Theory (Latour, 1996; 2005)

-pay special attention to the non-human actors that structure the designers' work

- takes into account objects and discourses, and the set of relationships and mediations that connects them

-construe translation as a collaborative performance.

➤ potentials of an Actor-Network Theory (ANT) perspective to design (Law, 2009; Fenwick & Edwards, 2010; and Fenwick 2011; Danholt, 2012; Yaneva, 2015)

- **Ethnographic method**

- participative observation of the workshop and display moment of productions
- observation of artifacts and representation forms
- Photography
- Video
- Qualitative interviews with the actors of the collaboration (designer-teachers and physicist)



Case study: “Voir l’ invisible” (« Catching the invisible »)

- 13 projects
- 4 months (March to June 2016)
- 12 hours of video
- 562 pictures

➤ Selection of 2 works:

A proposed a game for children

B proposed a pastry cosmology

Inputs and transformations :

➤ looking at produced tangible objects while addressing fundamental physics, intangible by essence.

1. In a propaedeutic stage, students tackled the complexity of the paradox using different strategies and heterogeneous materials

Two main postures:

- they isolated and circumscribed an artefact or a theme from the scientific world.
- an artefact or a theme was the pretext to reach out to other worlds.

Student A: an occasion to identify tools and functions of microscopy

Student B: table of Mendeleev as the starting point about building a taxonomy of matters than working about an optical phenomenon

2. « Auto-Brainstorming » completed by another type of activities that starts from materials and gestures

Student B:

- pronounced taste for the manipulation of materials
- investigates even further the principles of combination, by imagining a moving plasticity of materials.
- wished to change both the relation to a cooking recipe and the symbolic representation of the periodic classification



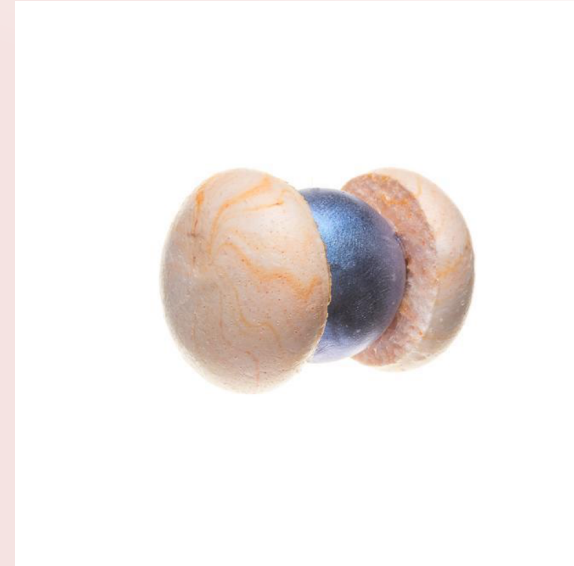
Student A:

- remembered treasure hunts, “hiding things” that she loved doing as a kid
- finds not only a tool but a good material to investigate: the project “Foldscope”.
- went straight to a game and emphasized her scenario of use: to provide a microscope that would be a game for kids.
- shaped its origin in the will of student A to lead the project to an economy of means

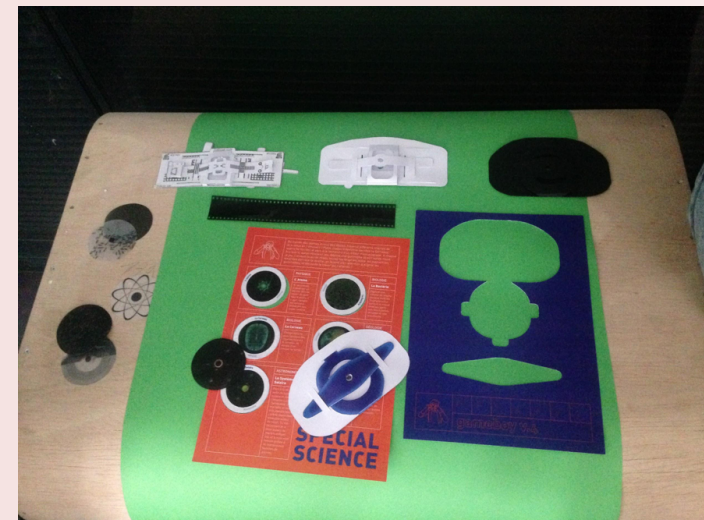


3. Stages of successive stabilization in the formation of composition:

- A first stabilization which is made by the choice of materials and their manipulation.
- Then from the relation between material properties and manipulation emerges an aesthetic stabilization, linked with the objective of a project rendering and the necessity of doing selections.
- And finally, the need for circulation leads to a final phase of stabilization which is a communication stabilization.



Detail of one of the combination for H₂O, using biscuit for Hydrogen, and chocolate for Oxygen



Detail of *Petitos* DIY optic game

Discussion

Two strategies emerged to tackle the paradox of « seeing the invisible »:

Student A:

- wanted to produce a popularization environment
- take the scientific technical instrument (the microscope) and explore the dimension of simulation, hence the tangible tool and the focus on its manipulation
- manipulation is made possible by the DIY construction process, which in turn simulates an appropriation of scientific and technical knowledge

Student B:

- intuitively sought-for analogy between concepts in physics, and their modalities of material transcription, proceeds from a symbolization
- relation to » the analogy of science to systems » (Renon, 2016), derived from « aesthetics of systems » (Burnham & Haacke, 1968)

> lookin at the dynamics of the design workshop, we observed “composites” and « aesthetical formations »

Conclusion: Aesthetical formations and material agency

1/ translating and networking operations.

This propaedeutic moment activated a network of knowledge pre-configuring how they were going to orient themselves.

> chains of transformations towards a project space + dynamic configuration where every element influences each other

2/ composing the "initial paradox" with tangible materials, as well as by gestures and the "manner" of each designer.

3/ stabilising formation by reintroducing the necessity of social circulation of the project, that was done both by the production of the object and the video that accompanied it during the final presentation.

> Design & Material Agency:

The material here is not simply tangible in the productions, nor a subject / object dichotomy. It is made of iconic, technical and semiotic dimensions, which constitute inseparably the material agency inherent in any process of design and the combination of material engagement and the continuous aesthetical dynamic formation process between abstraction, symbolization and shaping process (Renon, 2016)

Thank You !!

