

Session A/B: A4778/A4808 – Metatool: Seeing Spaces

Instructor: Dan Taeyoung

Tuesday 5-7pm, 300 Buell South



Metatool is a philosophical + technological course about creating experimental design tools using **Rhino/Grasshopper** as a metatool: a tool that enables the forging of other tools.

Read and discuss the philosophy/theory of pedagogy, prostheses, tools, and play.  
Assemble your own experimental toolkit.  
Create playful spaces to experiment with your tools.

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Tuesdays 5pm - 7pm  
300 Buell South  
Columbia GSAPP*

## *Preamble*

We are aliens from another solar system, observing a group of architects.

These architects seem to be thinking about a location in space that they call a *site*. Armed with an arsenal of tools, they visit the location, talk to people, take photographs, sketch, model, look at the computer. They look at pieces of paper on tablets and walls, point at computer screens, hold physical objects. When they spend time on their screens, they manipulate maps, models, diagrams, spreadsheets, images, photographs, photorealistic renderings.

They also talk to each other a great deal.

It seems that what these architects are trying to create or change is a complex system, a field of possibilities in terms of space, event, and movement.

To us aliens, the architects' tools seem akin to bodily prostheses: new augmentations that not only alter what can be done, but what can be represented and thus what can be conceptualized. The architects seem indelibly influenced by the logic and agency of those tools – what they create seems to be influenced by what they use to create.

Let us ask: Where do their tools come from? What do they want to do with the tool, and what does the tool want them to do? How do their tools change how they think? What new tools could they create?

## *Description* or how we will play

The core thesis of Metatool is: to design critically, intentionally, intelligently, and playfully, **designers must have the ability to design new critical / experimental / playful design tools.**

Metatool is a critical + technological course. This means:

**Technological:** Metatool is a prototyping & experimentation course. We will use Grasshopper as a metatool: a tool that enables the forging of other tools. With Grasshopper (and other tools), we will prototype experimental design tools and discuss how they change our design process. In Session B, we will create tangible user interfaces, bringing Grasshopper outside of the screen and onto the table.

**Critical:** We will often have theory or philosophy readings that touch on the nature of tools through a pedagogy/cognitive science/philosophy lens. Texts we will discuss include essays by Bret Victor, Bruno Latour, Donna Haraway, Seymour Papert, Alva Noe, and Marshall McLuhan. See the bibliography for further references.

## Prerequisites / Structure

The class is designed to work with people at multiple levels of familiarity with Grasshopper and computation. If you are new to Grasshopper, you are very welcome! If you are familiar with Grasshopper and interested in other programming/computation knowledge (Python, C#, Processing, Node, etc), you are also very welcome.

The course is structured along the lines of the ‘flipped classroom’: in which lectures, workshops, discussions, and peer critiques happen during class. Outside of class, video tutorials for Metatool will be made available, as well as the Skill Tree, an archive of general Grasshopper videos, developed in conjunction with the ADR curriculum.

## Schedule

### Session A: Grasshopper as a Metatool

In Session A, Grasshopper will be used to create tools in Rhino that construct playful spaces for computational design: new interfaces, ways of working with data and representation. To use a playground metaphor, we will be creating the sandboxes, shovels, and sand -- environments in which designers can interact and play. How do you affect your architectural design process by shaping your environment? How do you balance intent with play, data with inspiration?

Session A is oriented around learning Grasshopper and using it as an environment to create new tools. We will create two or three experimental tools that are aimed at altering our own design processes. Session A’s focus is on balancing a deep understanding on how Grasshopper and computation works, with the conceptual question of how computation incorporates itself into your design.

### Session B: Seeing Spaces

In Session B, we will create tools within a *tangible user interface* – a Grasshopper-driven ‘smart table’ that lets us treat a physical table as a computational environment. Using a

ceiling-mounted projector and camera, we will create a tool environment, outside of the screen, onto the table.

Inspired by Dynamicland and the Tangible Media Group at MIT Media Lab, our tools will be about thinking collectively and spatially. We will experiment and prototype ways to understand, share, and design with a table-based interface. The goal is to experiment with spatial tools for spatial design – and, as architects, to prototype a spatial tool that changes the way we design and work with each other.

## *Code of Intention*

Every social environment, including a university or a class setting, has a culture and a series of social norms, whether created consciously or unconsciously. As the instructor, one of my goals is to set the boundaries and tone of the class, and to actively create a space that is supportive, safe, respectful, experimental and playful.

I strongly believe in a culture of experimentation, play and risk-taking, and experience has taught me that true learning only happens in a supportive environment. In the class, we will prioritize learning over performance, and experimentation over success.

Together, Metatool is a space where we can be:

- free of any form of harassment
- respectful, positive, and thoughtful
- supportive and generous
- actively listening, and creating space for others to speak
- comfortable with silence
- grateful about valuable mistakes
- excited about risky ideas.

I am always available to talk and to provide help, and take your thoughts seriously. I can best be reached at: [dan.taeyoung@columbia.edu](mailto:dan.taeyoung@columbia.edu).

## *Grading*

All courses that are part of Columbia GSAPP's curriculum have HP/P/LP grades.

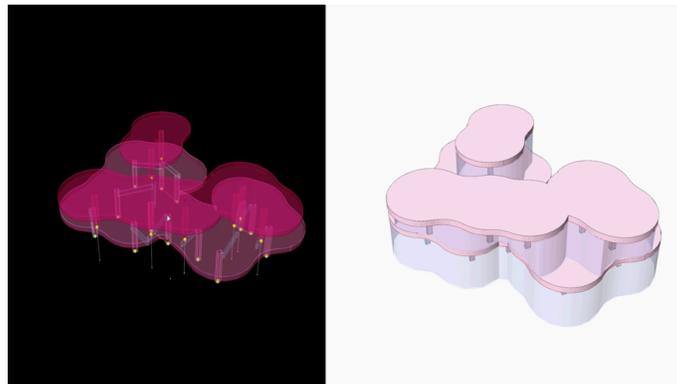
In my belief, at their best, grades offer a mildly helpful metric to each student for how much change and progress they have achieved in a semester. At their worst, grades help generate a risk-averse system where exploration and curiosity are left unrewarded or punished.

As a result, in Metatool, I place a strong focus on taking risks and being curious (relative to each student), in addition to project depth and class participation. A risky project through which we learn is more valuable than a perfectly-executed project that is very familiar to the student.

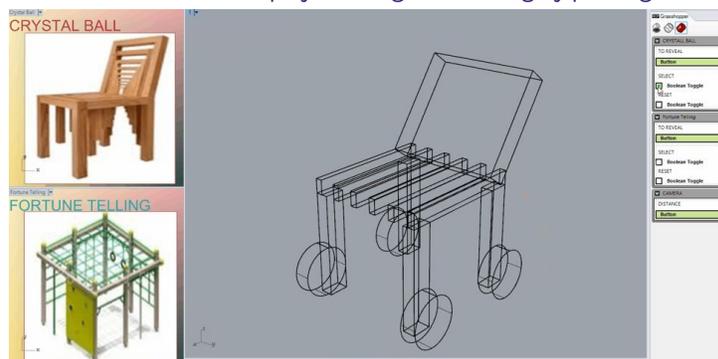
In the interest of transparency: grading is done by these four factors:

1) class listening & participation 2) project execution 3) amount of learning growth 4) amount of risk taken. Each of those factors are equally weighted to each other. The factors are designed so that the way to get an 'ideal grade' is simply to be share and listen, be curious, and learn from working on a project that you find fascinating and interesting.

### *Examples / past work*



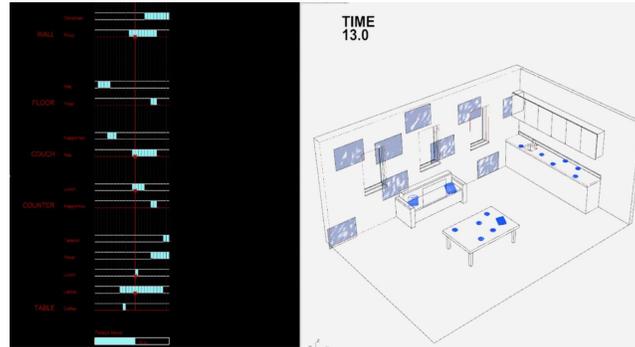
Jasmine Ho: A tool that helps you design a building by placing columns



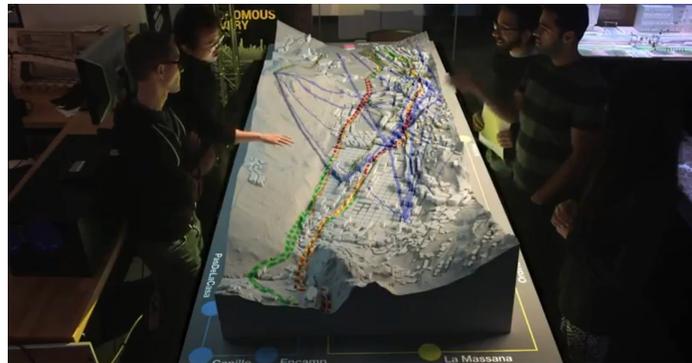
Yang Qi: A tool that attempts to inspire you by showing you relevant imagery



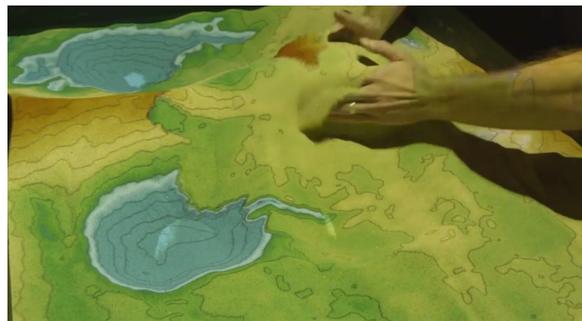
Shuo Yang: A tool that deletes your work when you are upset



Valerie Lechene, Jasmine Ho: a tool that designs temporal activity, not space



MIT Media Lab City Science Lab, CityScope: Andorra



Augmented Reality Sandbox, UCLA



Dynamicland, Bret Victor

## Bibliography

This is a partial list of texts that are relevant to Metatool.

- Ian Bogost, *Alien Phenomenology, or What It's Like to Be a Thing*
- Donna Haraway, "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century"
- Ivan Illich, *Tools for Conviviality*
- Bruno Latour, "A Cautious Prometheus? A Few Steps Toward a Philosophy of Design"
- Marshall McLuhan, *The Medium is the Message*
- Alva Noe, *Action in Perception*
- Abigail J. Sellen and Richard H. R. Harper, *The Myth of the Paperless Office*.
- Seymour Papert, *Mindstorms: Children, Computers, and Powerful Ideas*
- Gordon Pask, "The Architectural Relevance of Cybernetics"
- George Polya, *How To Solve It*
- Bret Victor, "Seeing Spaces"
- Alejandro Zaero-Polo, *The Politics of the Envelope*