

ROSITA FU

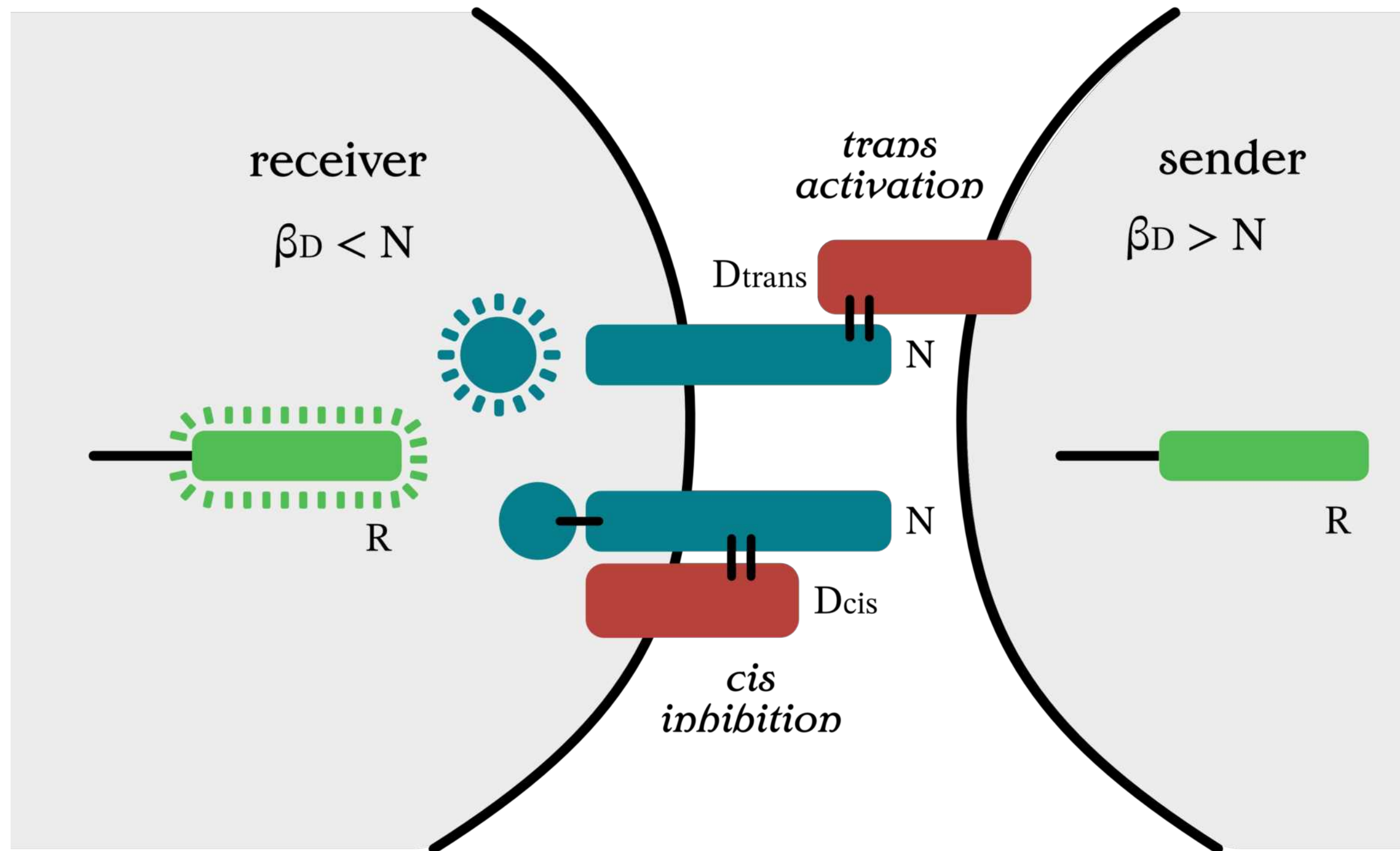
DESIGNS

 rosita.fu@outlook.com



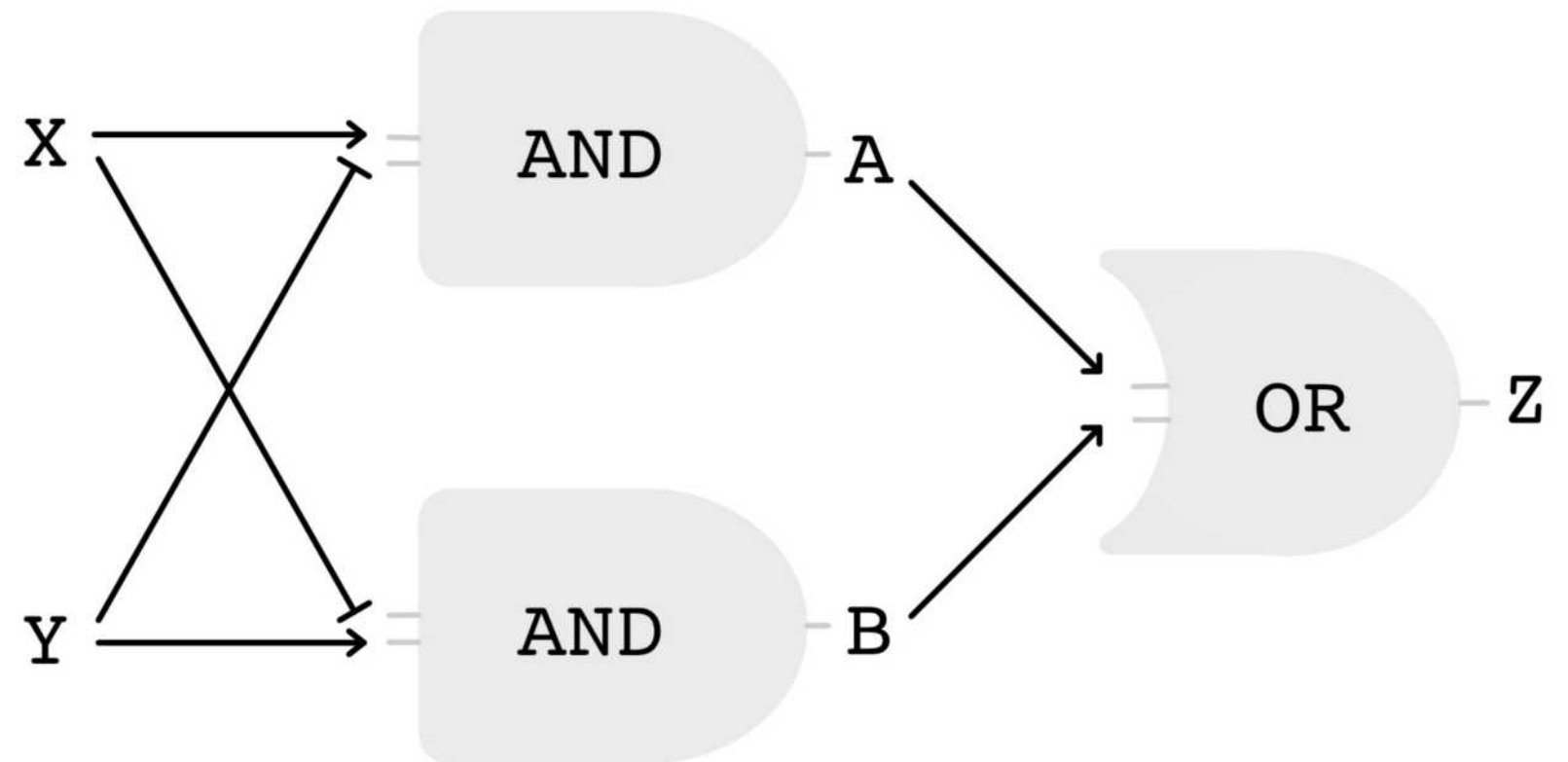
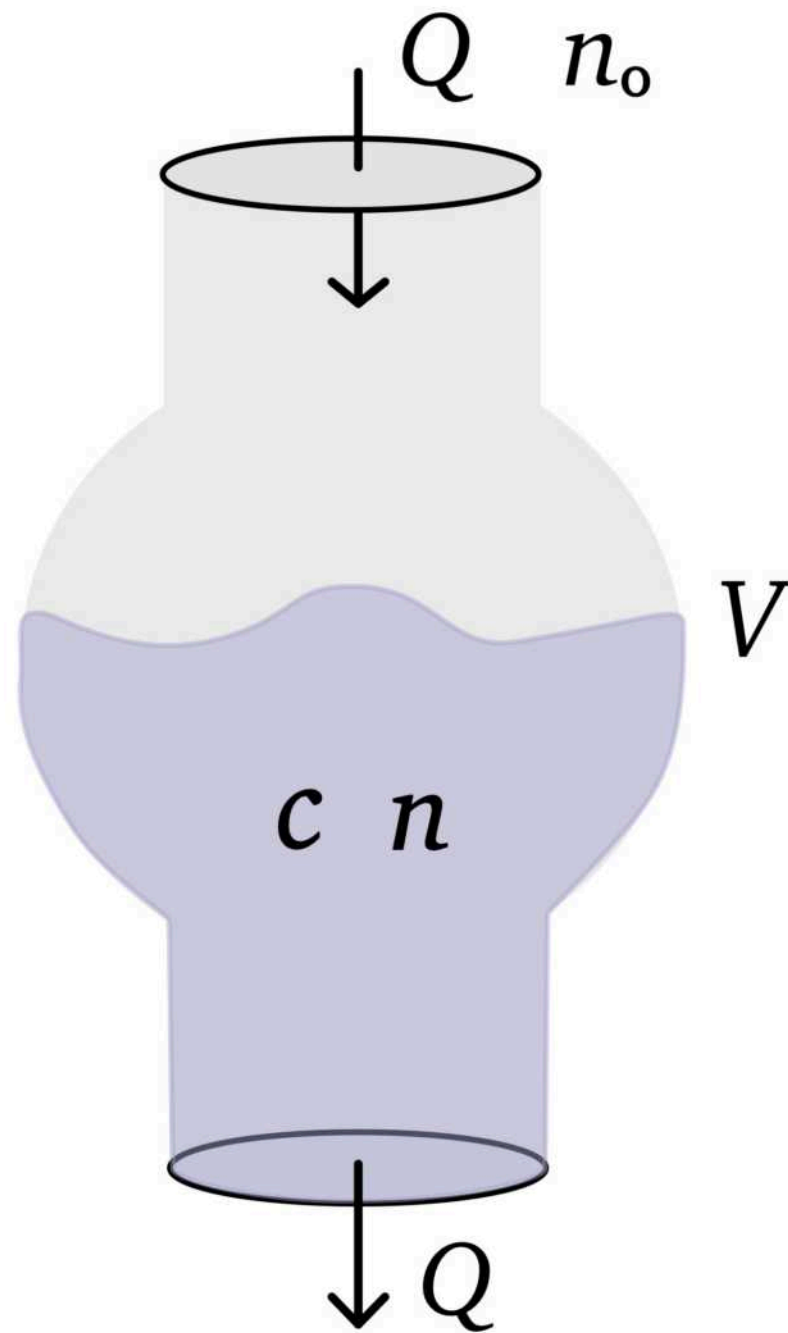
PORTFOLIO

SCIENTIFIC ILLUSTRATION



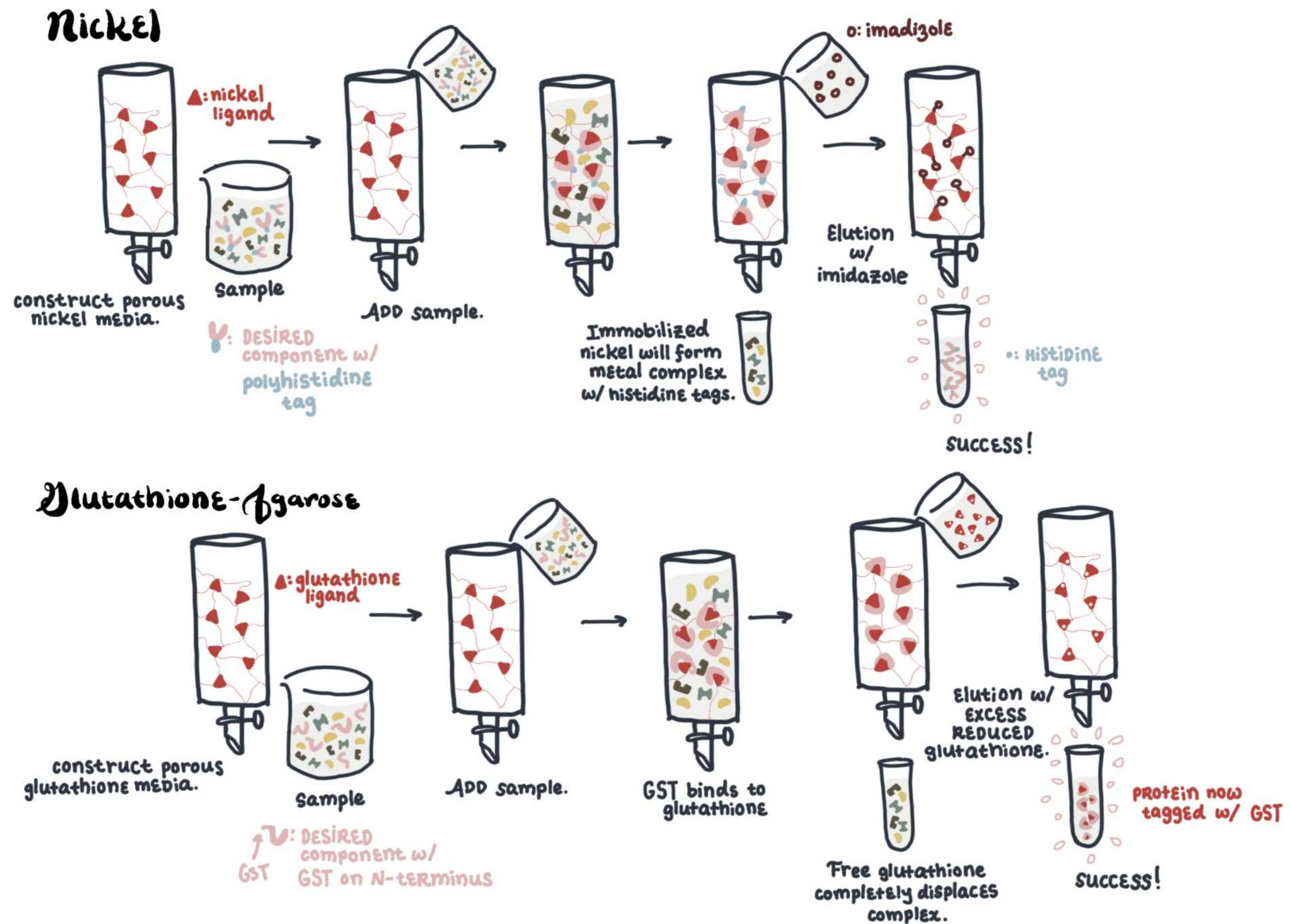
Delta - Notch Signaling

Schematic for trans-activation and cis-inhibition schemes of adjacent cells.
Used in class on biological circuits, BE150 at Caltech.



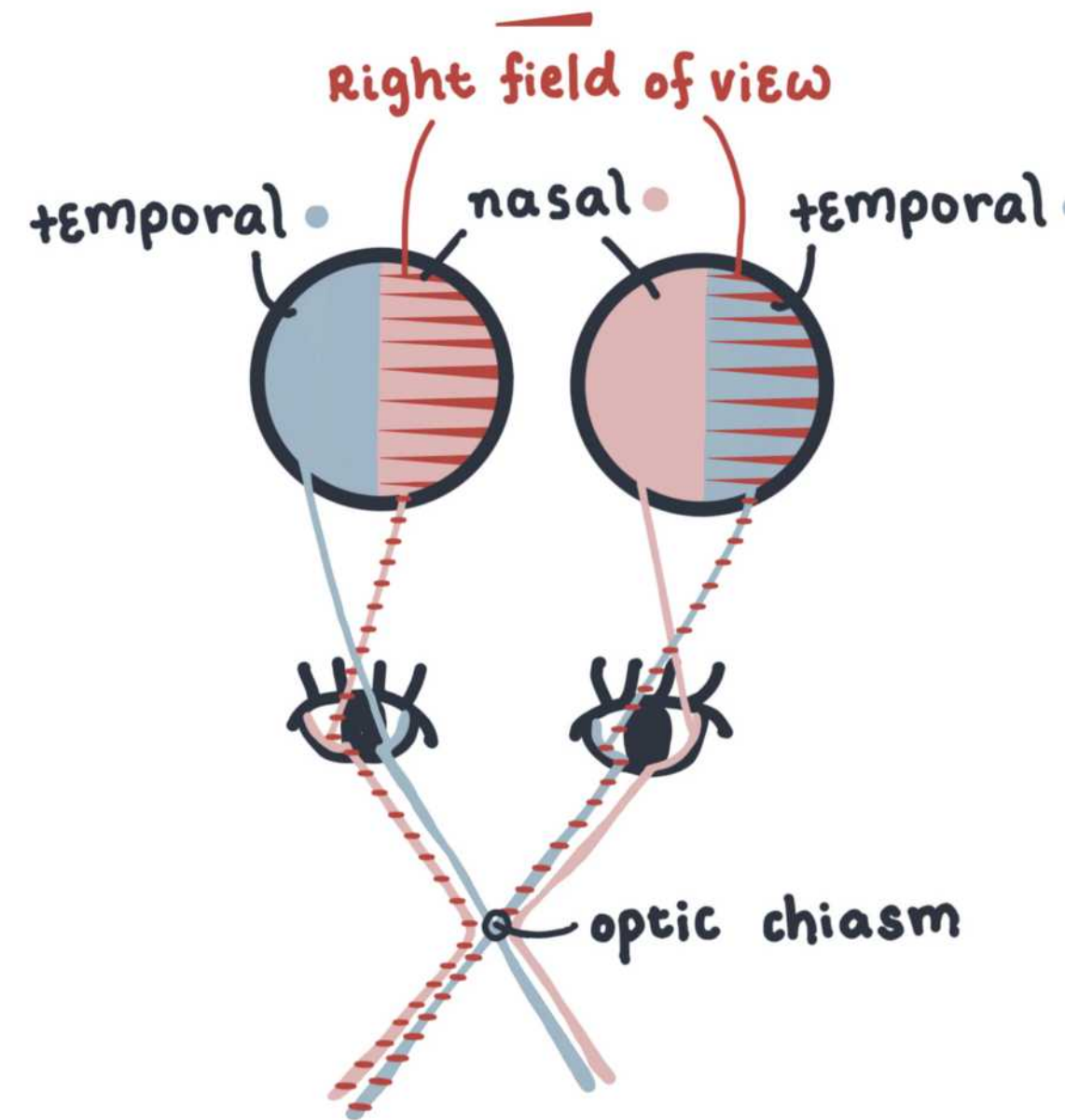
Flow Reactor Schematic

Schematic for chemical flow reactor (left) and XOR gates (right).
Used in class on biological circuits, BE150 at Caltech.

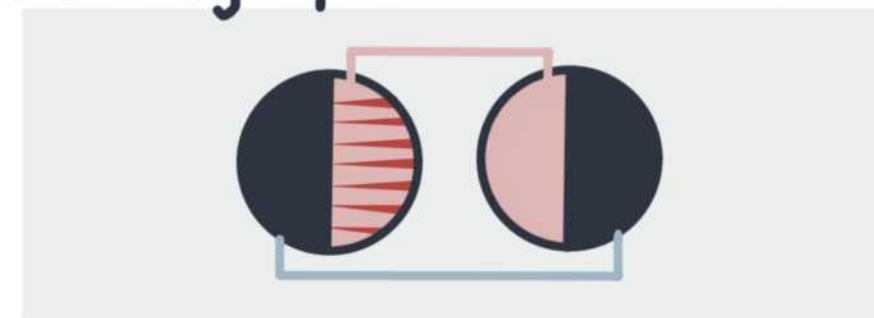


Chromatography Diagrams

Schematic for nickel chromatography and glutathione-agarose chromatography.
Used in biochemistry course, Bi/Ch110 at Caltech.



cutting optic chiasm means:



PREPRESVES nasal
loss of temporal

Neuroscience Graphic

Demonstration of cutting the optic chiasm.
Used in an introductory neuroscience course,
Bi150 at Caltech.



Terpsiphone viridis
African Flycatcher

Tangara parzudakii
Flame-faced Tanager



Tropical Birds:

Graphic for bird presentation



Ocyrceros griseus
Malabar Gray Hornbill



Medicinal Florals Series:
Alstonia Scholaris

Placard for medicinal plants studies.



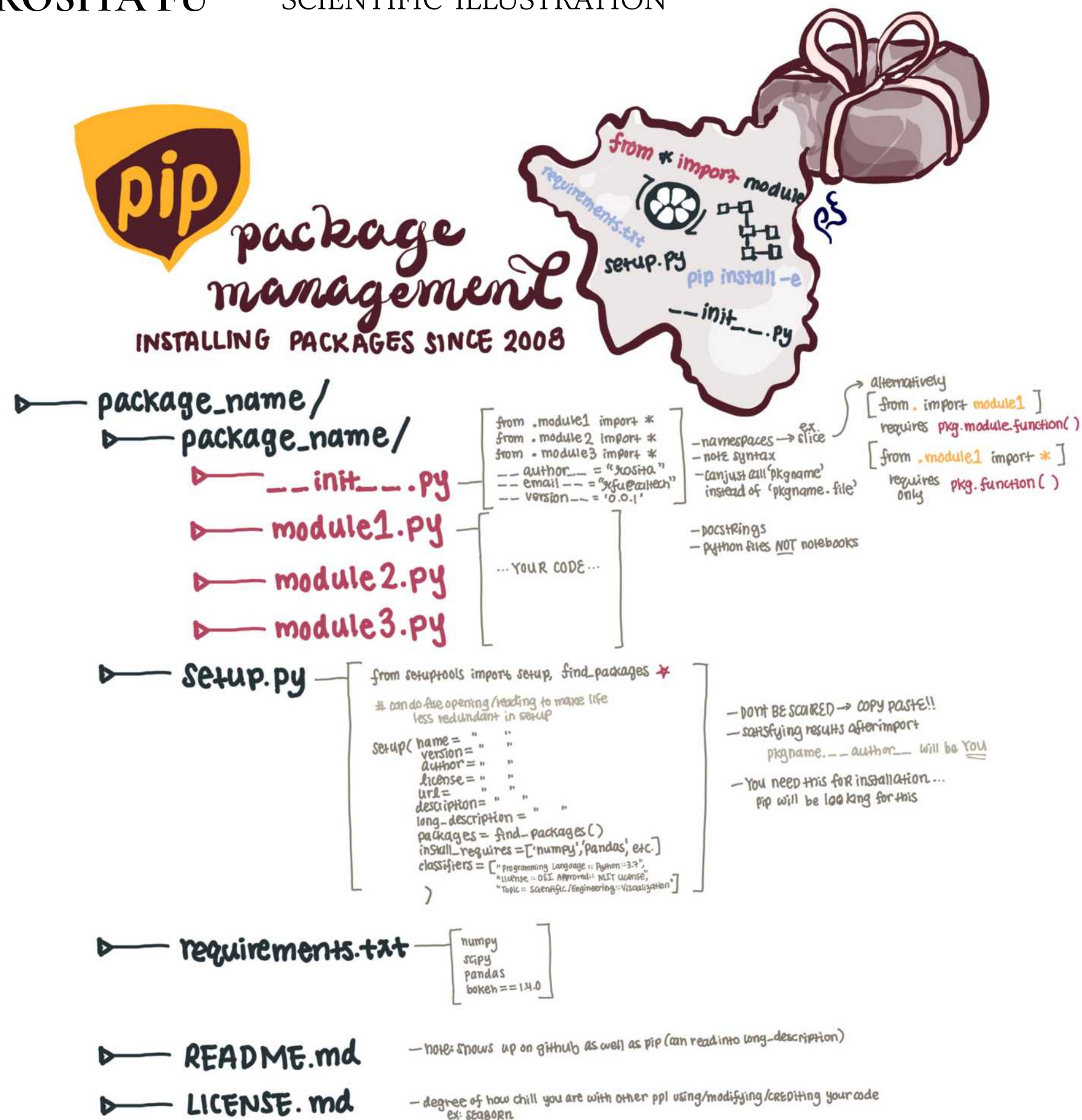
Medicinal Florals Series:
Rauvolfia tetraphylla

Placard for medicinal plants studies.



Medicinal Florals Series:
Rhazya Stricta

Placard for medicinal plants studies.



Coding Graphic

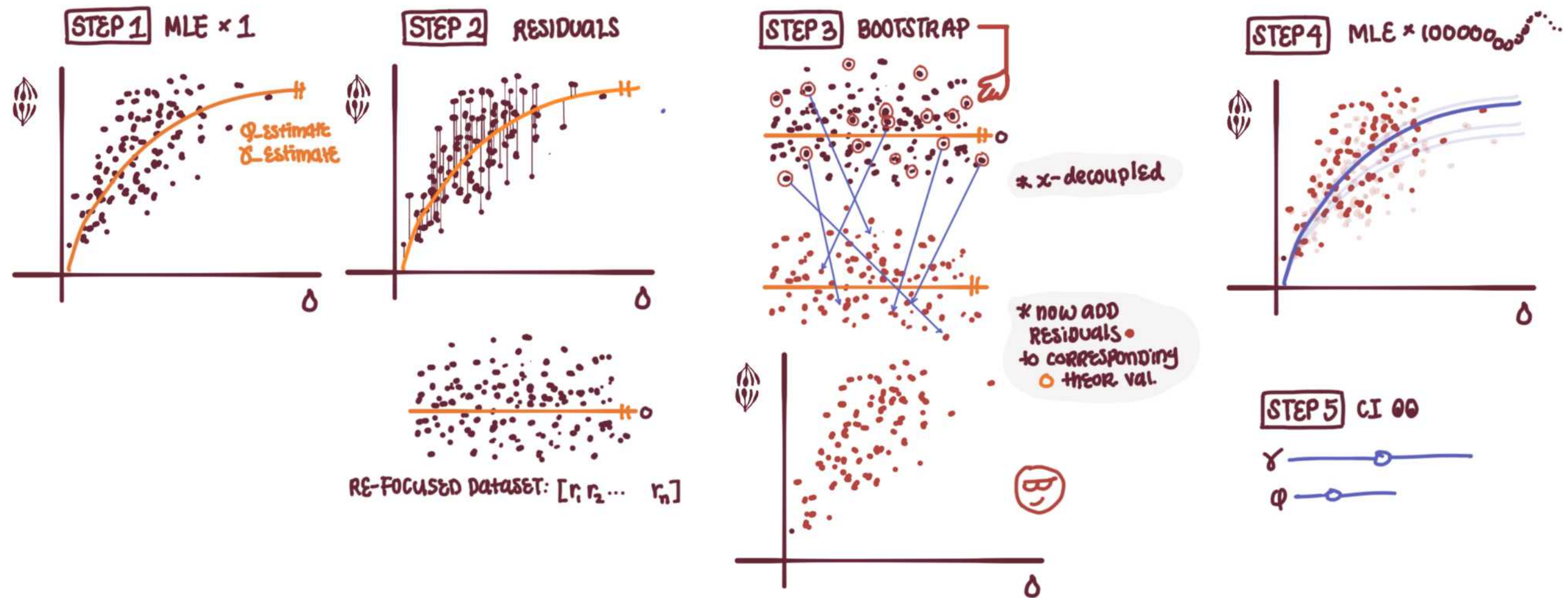
Outline for creating a Python package.
Used in an introductory coding course,
BE/Bi103 at Caltech.

Bootstrap Residuals

1. First perform MLE on original dataset once. GRAB initial φ -estimate \rightarrow ℓ -theor
2. COMPUTE RESIDUALS $r_i = \ell_i(d_i) - \ell_{\text{theor}}(d_i)$
3. BOOTSTRAP out of $[r_1 \dots r_n]$... ADD 'em BACK in! This is our BOOTSTRAPPED sample
4. PERFORM MLE's on BOOTSTRAPPED samples \hookrightarrow lots of φ & δ
5. RETRIEVE CI's

these ARE INTERMEDIATES, give us
 \uparrow
 φ -estimate \rightarrow ℓ -theor
 δ -estimate

* what ARE we assuming about how our ERROR BEHAVES ???

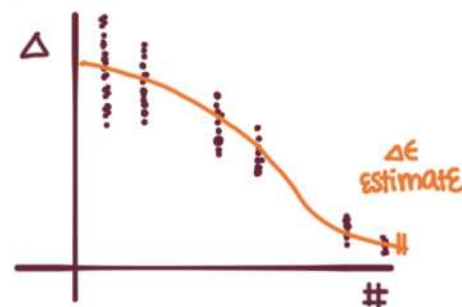


Statistical Methods Graphic

Constructing confidence intervals for dependent data.
 Used in an introductory data course, BE/Bi103 at Caltech.

Wild Bootstrap

1. First perform MLE on original dataset once. Get ΔE estimate $\rightarrow f_{C, \text{theor}}$
2. Compute residuals $r_i = f_{C_i}(R_i) - f_{C, \text{theor}}(R_i)$
3. Bootstrap by sampling points scaled by their own residual
4. Perform MLE's ∞ Lots of ΔE 's
5. Get confidence intervals.

STEP 1 MLE $\times 1$ 

STEP 2 RESIDUALS



xx scrambling assumes homoskedasticity!

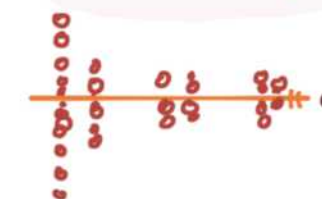
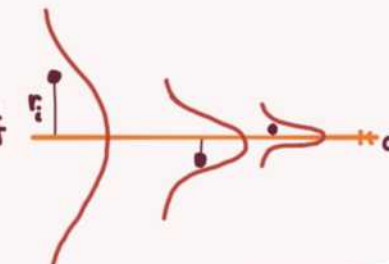
... so our bootstrap method needs to change

STEP 3 BOOTSTRAP: SCALE RESIDUALS

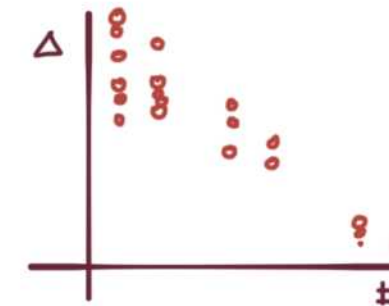
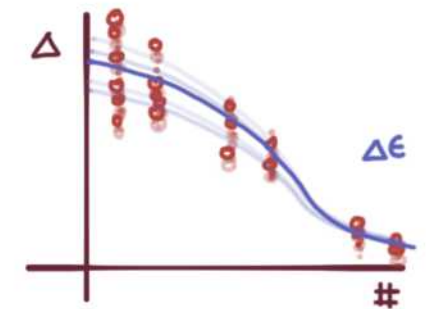
$[x_1, x_2, \dots, x_n] = [r_1, r_2, \dots, r_n] \cdot \text{NORM}(0,1)$
 BOOTSTRAPPED RESIDUALS
 ELEMENT-WISE MULTIPLICATION



EVERY RESIDUAL
 SCALED BY ITSELF



add them back in!

STEP 4 MLE $\times 1000000$ STEP 5 CI ∞ 

... how does this change the generative powers of our model???

NOTE that this approach simulates the σ heteroskedasticity BEFOREHAND in the bootstrap so our initial σ is meaningless (homoskedastic)

$$\text{so now, } f_{C_i} = \frac{1}{1 + \frac{2R}{N_{\text{res}}} e^{-\Delta E/k_B T}}$$

Statistical Methods Graphic

Constructing confidence intervals with assumptions about residual distribution.

Used in an introductory data course, BE/Bi103 at Caltech.

GRAPHIC ILLUSTRATION



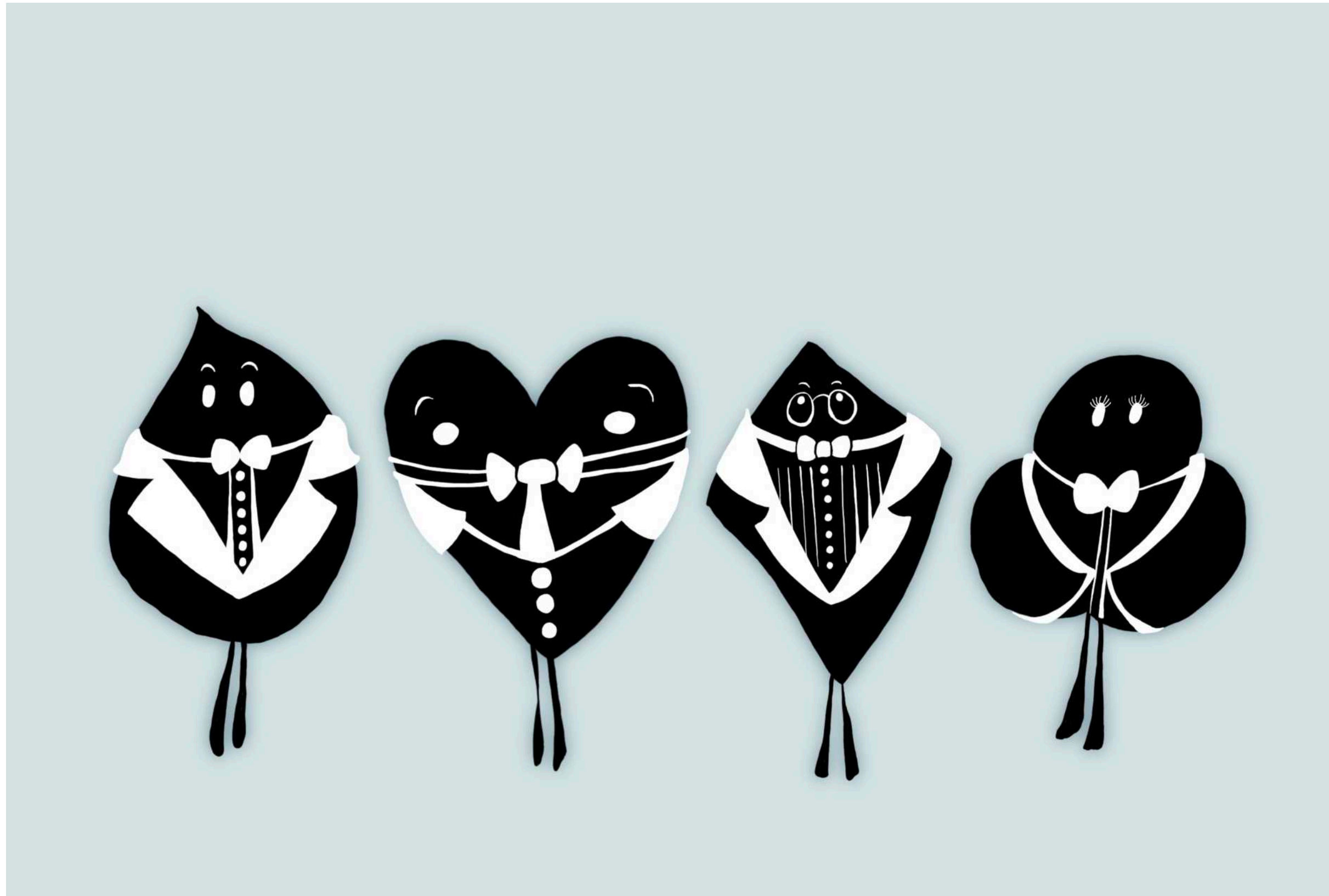
Portrait of Asima Chatterjee

Groundbreaking scientist Asima Chatterjee is an Indian organic chemist whose research in medicinal plant products aided in the development of anti-malarial drugs. This digital portrait served as the opening slide to a class project.



Poet Portraits

These digital portrait served as the opening slides at a poetry reading of Gwendolyn Brooks (left) and Joy Harjo (right), both renowned American Poet Laureates.



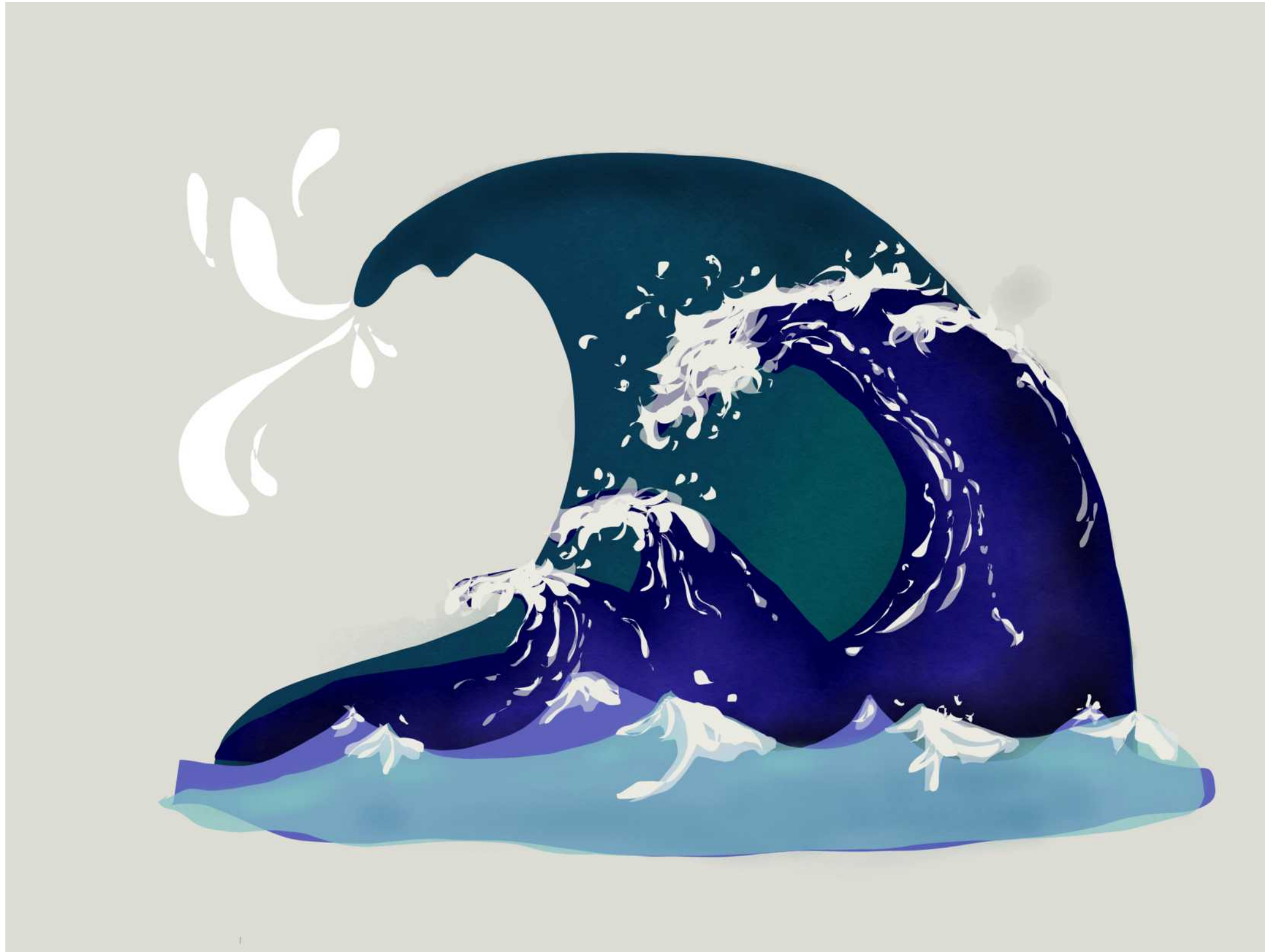
Suites in Suits

This was a design celebrating bridge (a card game) submitted to the College Bridge Organization CBO. Contest guidelines were card-related designs to be printed on tote bags.



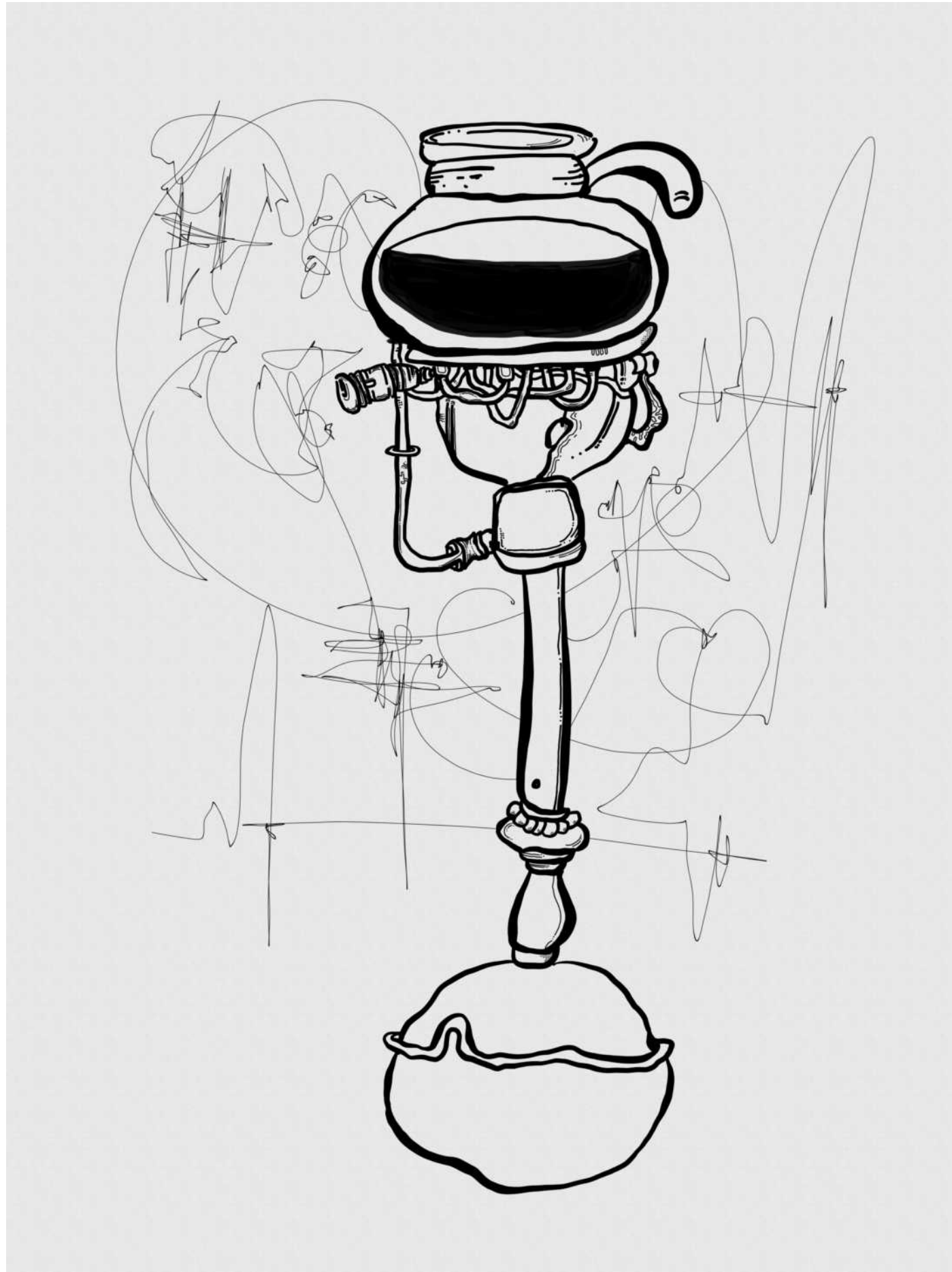
Necktie Queue

A practice in shading.



Doffing Waves

A practice in layers – concept for a theatre costume.



Signature Coffee

Linework practice.