notes on prototyping digital interactive stuff

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A prototype is “any representation of a design idea” that provide “the means for examining design problems and evaluating solutions.”

Houde and Hill 369, 368

Prototypes are "playable questions" that "turn ideas and concepts into something concrete that everyone on the team can evaluate" by "making ideas, motivations, and design values into tangible forms that can be played."

Macklin and Sharp, ch. 10

“How do I know what I think till I see what I [make]?”

–E.M. Forster, paraphrased

“Often the hands will solve a mystery that the intellect has struggled with in vain.”

–C. G. Jung

- Sometimes just sitting down with the *intention* to make a prototype is enough to solve a problem. As you're thinking through the steps needed to physicalize the problem, you'll often make a mental discovery that will obviate the prototype altogether.

- Prototypes help you figure out if you *like* the process of making the thing that you're setting out to make. They answer questions like, "Does this feel good? Do I want to keep working with these tools? Do I like investigating these ideas?" (This is especially important for Capstone students! You're going to be working hard on this, so you should *like* what you're doing!)

Macklin & Sharp's "iterative design process"

“[T]here is a difference between a game’s concept and a game’s design…. Turning an idea into a design requires that the designer structure the idea so that it can be used to produce prototypes, which are then playtested, the results of which are then evaluated to see what they say about the original idea...”

Macklin and Sharp, chapter 5

1. **Conceptualize**: Develop an idea for an interactive experience.

2. **Prototype**: Realize some aspect of the experience in a way that can be interacted with.

3. **Playtest** (or user test): Have people interact with the prototype and see what happens.

4. **Evaluate**: Review results and adjust concepts accordingly. Then return to step 1.

“The best way to figure out” how an interactive experience “will look, feel, and act is to **dive in and start making it.** The faster the [it] moves from the pure ether of ideas and into a prototype, the closer the [it] will get to showing the kind of play experiences it can generate. The key to prototyping is to turn the most promising ‘what if…’ question from the brainstorm, or a combination of ‘what ifs,’ into something tangible. That could be paper, quick and dirty code, even the designer’s own body…”

Macklin and Sharp, ch. 5

playtesting/user testing

- This will vary greatly depending on your project and on the prototype in question.

- The purpose is to see whether or not the approach in the prototype worked.

- Macklin and Sharp: “Playtesting is often the hardest and most revealing part of the iterative game design process. Often, what seems like a great idea that makes sense in a prototype falls apart when players get ahold of it. This might feel like a bad thing, but it’s really a blessing in disguise.”

- You might be your own playtester/user tester! Your project may not have “users” (or “players”), or you may at times need to short-circuit proper testing and just imagine yourself in the role of your audience.

evaluating the prototype

- Macklin and Sharp: Evaluation is “taking what playtesters did and said and determining if and how the feedback necessitates changes to the game’s design. […] It takes practice, kind of like a doctor hearing a patient talk about their symptoms and then from that, building up enough evidence to make a diagnosis. It involves not only listening to what the patient says, but observing them and including all of that into the evaluation.”

- This can be qualitative, quantitative, or totally subjective. If it’s an art project, your “evaluation” might just be making a determination for yourself about whether or not the prototype in question produces the experience you’re after.

prototype technique and process

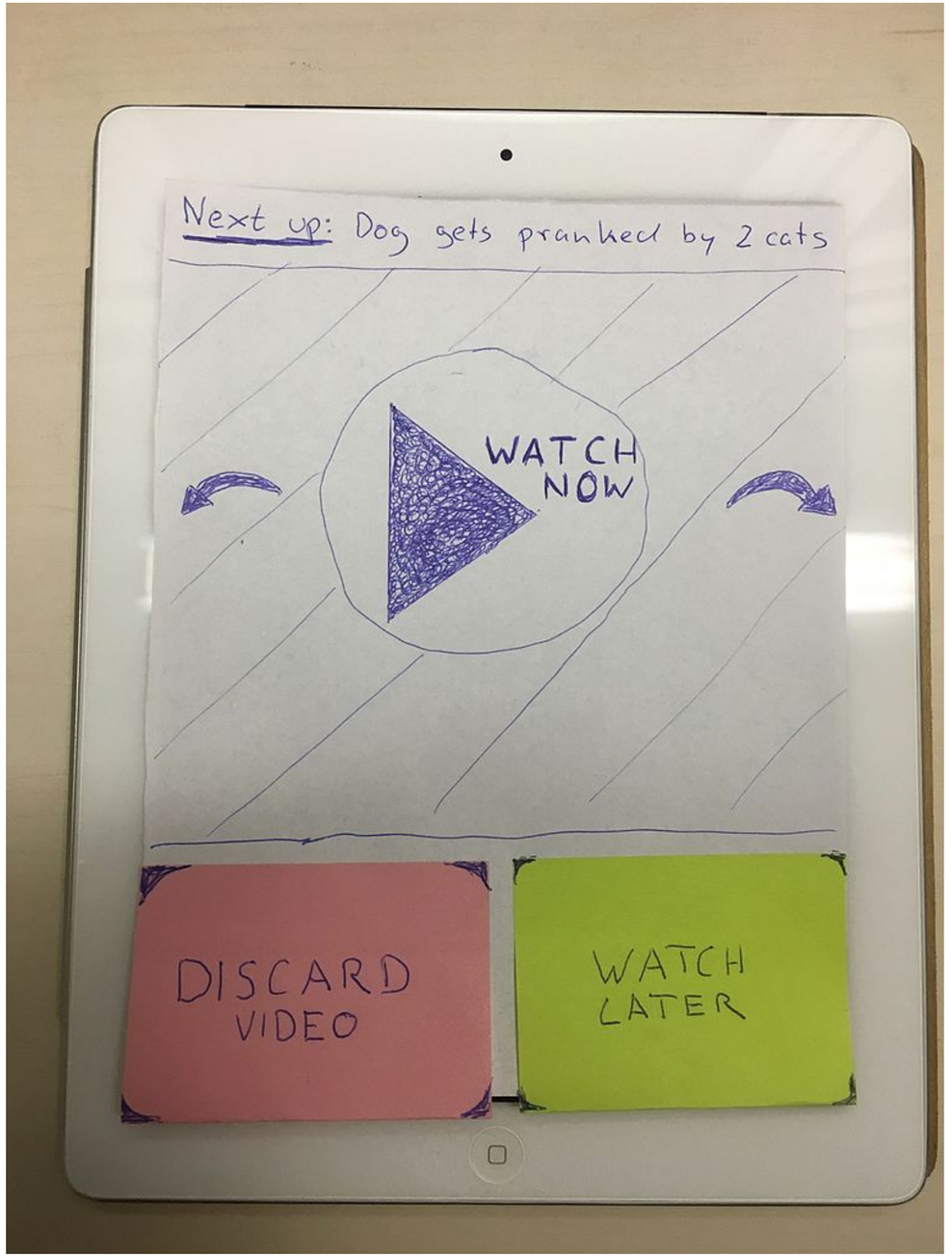
- Prototypes are *disposable*. They don't have to look "finished" (unless the "finish" is what you're prototyping). In fact, "finish" can sometimes communicate the wrong thing: "Finished-looking (or -behaving) prototypes are often thought to indicate that the design they represent is near completion" (Houde and Hill 368).

- The prototyping process is *partial*, *concurrent* and *iterative*. "No single prototype [can] represent the design of the future artifact" at early stages of development (Houde and Hill 371). Prototype different aspects of the project in different ways. Make new prototypes after evaluating prototypes in the previous iteration.

- Prototypes don't need to use the same materials or techniques that you envision for the final project. "What is significant is not what media or tools were used to create [prototypes], but how they are used by a designer to explore or demonstrate some aspect of the future artifact" (Houde and Hill 368).

paper prototypes

- Paper prototypes have a ton of advantages and are a good first step even (especially?) for digital systems.
- Low cost and low effort
- Can be modified easily
- Disposable
- Afford visual and spatial thinking (you can spread them out on the table)
- Afford easy (in-person) collaboration



https://commons.wikimedia.org/wiki/File:Paper_Prototype_on_iPad.jpg

fake it 'til you make it

- You don’t have to write the code behind some behavior in your project to see if the idea works. Play act and role play with non-code tools.

- One version of this: Wizard of Oz prototypes. "Wizard of Oz prototypes allow you to test functionalities that have not yet been implemented. The user only tests a simulation of the actual functionality. Instead of the real functionality, the "Wizard of Oz" pulls the strings in the background." https://www.designthinking-methods.com/en/5Testen/wizardofOzTE.html

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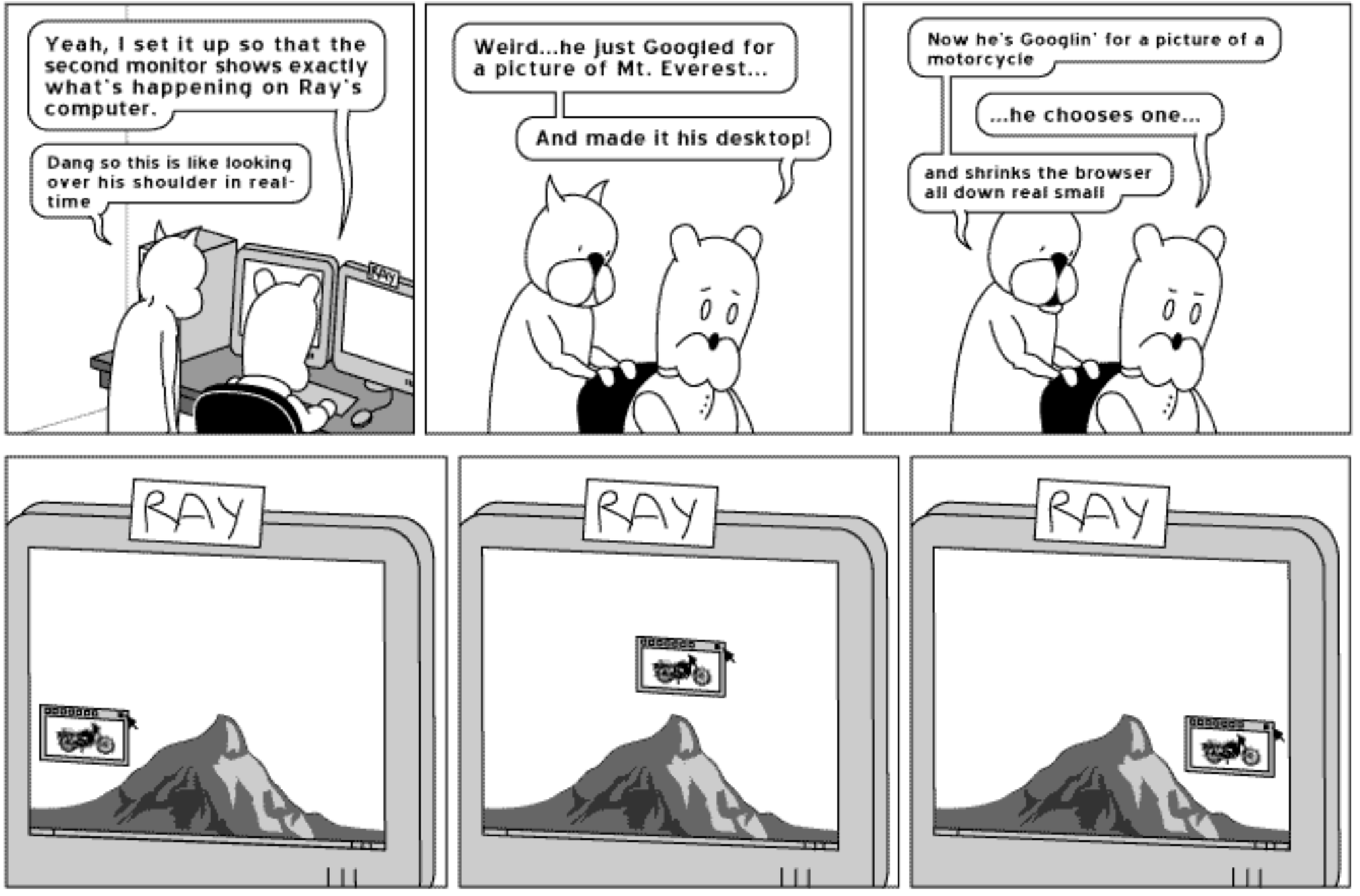


document your prototypes

- Document your prototypes, or else you won't learn from them.
- Keep a "lab notebook" (this can be written, video, photos; use a spreadsheet maybe?).
- "You want to make sure to document the questions your prototype is exploring. You also want to record what you are doing to answer those questions…. And you need to make sure you capture how you did it, so you can re-create the prototype if you need to" (Macklin and Sharp chapter 10).

RE•W•OR•D•A•BLE
THE UNIQUELY FRAGMENTED WORD GAME
FOR 2 TO 8 PLAYERS
RE•W•OR•D•A•BLE
RE WORD A BLE
8+ LETTER WORD
BLUE + PINK = YELLOW
BLE

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	
1	**Date**	**Cards**	**Players**	**Winner**	**Last**	**1**	**2**	**3**	**4**	**5**	**AVG**	**Total**	**1**	**2**	**3**	**4**	**Names**	**first**	**second**	**difference**	**aver**
2	6/6	40	2	2		30	40										Tim, Lauren	40	30	10	
3	6/9	45	3	1		35	19	28									Matt, Tim, Albert	35	28	7	
4	6/9	30	3	3		19	10	24									Tim, Albert, Matt	24	19	5	
5	6/16	30	2	2		23	26										Tim, Frank	26	23	3	
6	6/16	60	4	3		27	21	29	17		**24**						Jesse, Tim, Owen, Blake	29	27	2	
7	6/23	45	3	1		40	20	15									Tim, Allison, Mr. X	40	20	20	
8	6/23	75	5	2		32	36	22	7	26							Tim, Prescott, Allison, John, Avina	36	32	4	
9	6/27	60	2	1		60	33				**47**						Ian, Tim	60	33	27	
10	6/27	60	2	2		43	53				**48**						Tim, Ian	53	43	10	
11	6/27	60	2	1		54	45				**50**						Tim, Simon	54	45	9	
12	6/28	64	4	3		20	23	34	30		**27**						Tim, Jason, Andrea, Stella	34	30	4	
13	6/29	64	2	1		56	37				**47**						Tim, Ian	56	37	19	
14	6/29	64	2	2		38	50				**44**						Ian, Tim	50	38	12	
15	6/29	64	2	1		53	47				**50**						Tim, Ian	53	47	6	
16	6/30	64	2	1		58	39				**49**						Allison, Tim	58	39	19	
17	6/30	64	3	1		43	25	22			**30**						Allison, Adam, Tim	43	25	18	
18	6/30	64	2	1		60	43				**52**						Kevin, Claire D.	60	43	17	
19	7/2	64	4	3		20	16	32	19		**22**						Tim, Kathy, Marie, Dan	32	20	12	
20	7/2	64	3	1		41	9	30			**27**						Tim, Kathy, Dan	41	30	11	
21	7/2	64	3	1		42	34	18			**31**						Tim, Rachel, Dylan	42	34	8	
22	7/2	64	3	1		34	17	30			**27**						Tim, Rachel, Dylan	34	30	4	
23	7/5	60	2	1		53	35				**44**						Jesse, Tim	53	35	18	
24	7/7	60	3	2		12	38	35			**28**						Allison, Tim, Zach	38	35	3	
25	7/7	80	4	1		38	17	35	30								Allison, Tim, Zach, Greg	38	35	3	
26	7/8	60	2	2		47	49				**48**						Tim, Ian	49	47	2	

kinds of prototypes

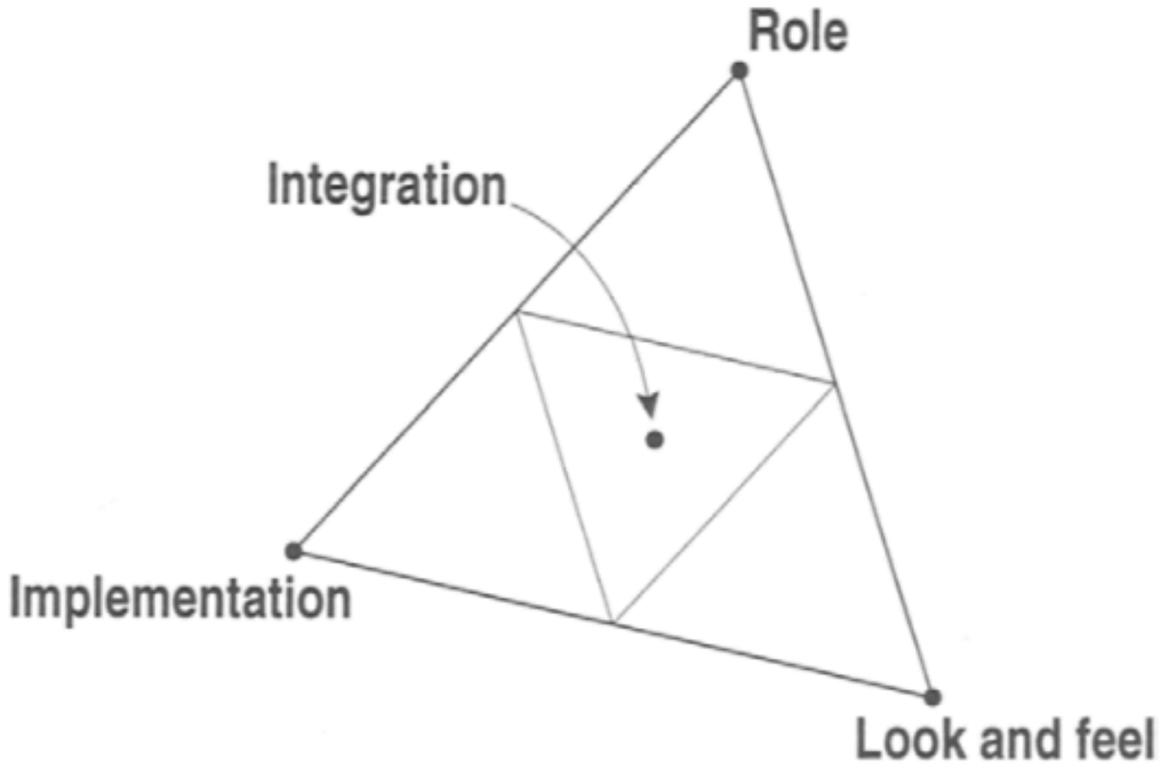
Houde and Hill's “dimensions” of prototypes

- Role: “the function that an artifact serves in a user’s life” and “what features are needed to support it.” Examples: Storyboards, journey maps, visual mockups.

- Look and feel: “the concrete sensory experience of using the artifact” when the goal is to “present its functionality in a novel way”. Examples: UX wireframes, implementations of interface elements, etc.

- Implementation: “techniques and components through which an artifact performs its function.” E.g., writing code to see if a computational technique is viable, or testing out pcomp components, etc.

- Integration: “represent the complete user experience of an artifact”; Such prototypes “verify that the design is complete and coherent.”

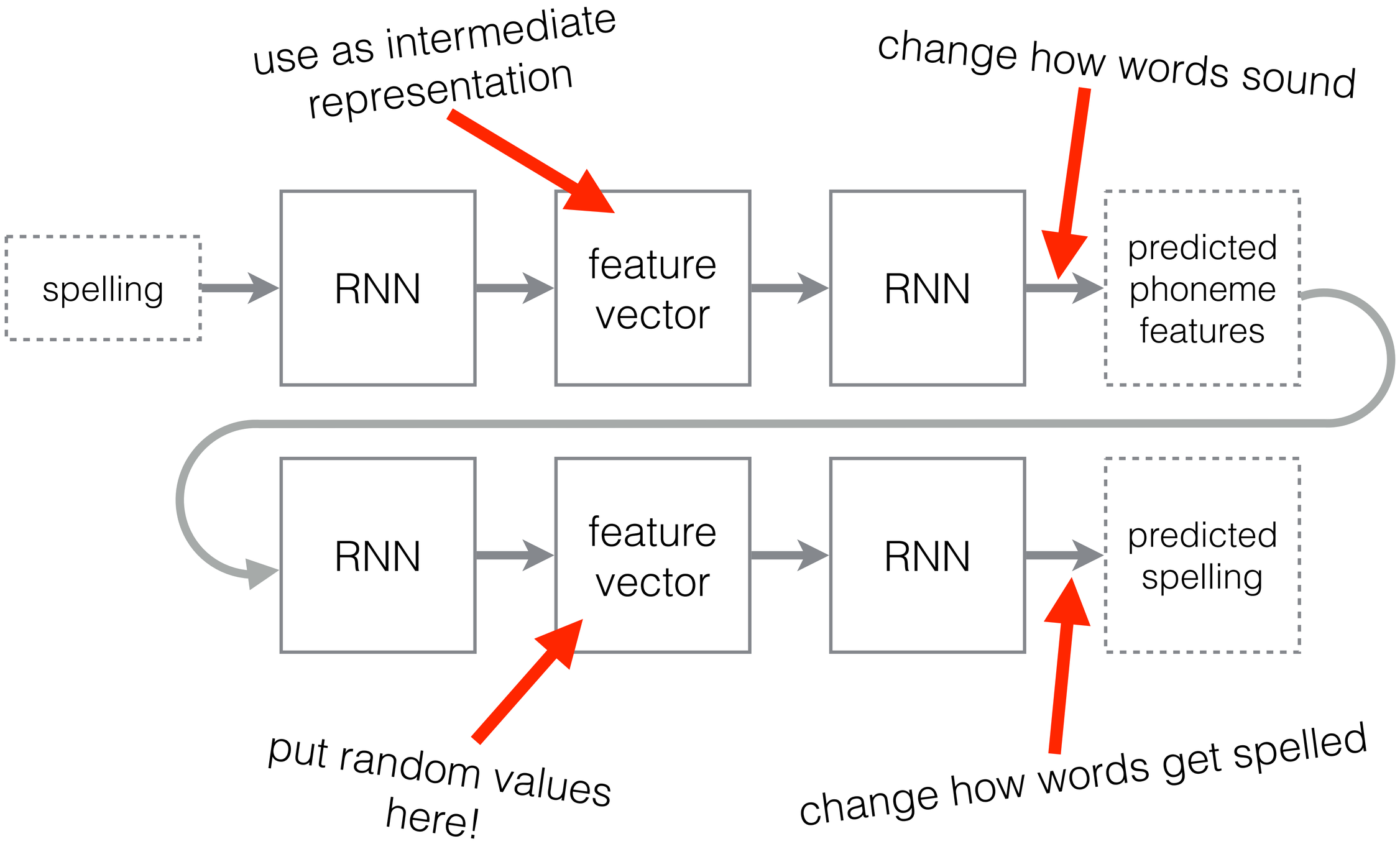


Macklin and Sharp's Prototype Categories

- **Paper**: Early stage for “making ideas concrete”
- **Physical**: “enacting aspects of the play experience in real life to help think through the play experience,” including role-playing
- **Playable**: “rough” prototypes, “often not including graphics, sound, or even goals” that investigate the “core actions,” implemented in such a way that the context of interaction is similar to that in the final project
- **Art and sound**: “exploring the visual and aural style, and sometimes, the production processes for creating these”
- **Interface**: “screen-based information and… feedback systems, but also the actual mechanism” that is used to interact with the project
- **Code/tech**: “technical aspects… like whether or not it will play smoothly on certain kinds of devices or computers”
- **Core game**: Like Houde and Hill’s “integration” prototype, these prototypes “move beyond the rougher playable prototype by including the full set of actions available” and perhaps “include basic art and sound” to evaluate their impact on the experience.

examples from Allison: Nonsense Laboratory

pincelate: a machine learning model for spelling and sounding out English words, plus a Python module that makes it super simple to do fun and useful things with the model


use as intermediate representation
change how words sound
spelling
RNN
feature vector
RNN
predicted phoneme features
RNN
feature vector
RNN
predicted spelling
put random values here!
change how words get spelled

predict phon feats w/"guided" probabilities

Normal

In the beginning God created the heaven and the earth.

And the earth was without form, and void; and darkness was upon the face of the deep. And the Spirit of God moved upon the face of the waters. [...]

And God saw the light, that it was good: and God divided the light from the darkness.

"With a cold" (-nasal, +stop, +vcd)

Ihd theed begiding Godde kreeded theed heave add theed earth.

Add theed earth was whithoud forbe, add void; ad darkeds was upowed theed face ough theed deepe. Add theed Spiret ough Godd moved upohed theed face ough theed waters. [...]

Add Godde sawe theed light, that id was good: add Godde divided theed light frob theed darchase.

add random noise to phoneme feature vector to create new magic words

3627	abbakaderbal	3640	abahakabad	3653	abrixadara
3628	obrobanaba	3641	ovrecatada	3654	arbocaba
3629	abrigabugia	3642	arrt-acaradaba	3655	armocada
3630	abrakababada	3643	abracadabra	3656	abrogadondal
3631	obrolagaba	3644	ewewecharadable	3657	abracabara
3632	abeabadabee	3645	abbakababababala	3658	ebrikada
3633	abhilopida	3646	arreamadable	3659	ab-hidachdar
3634	abrabaiblab	3647	ambradadava	3660	abbecanabia
3635	arrigamada	3648	obrodaclab	3661	abrr-barda
3636	arnokanabary	3649	artiradaba	3662	aqhaqadaza
3637	asricathiba	3650	mmpridagpada	3663	abrabandaya
3638	abriskabda	3651	abrcabacharx	3664	avretebedar
3639	abbrabadaba	3652	abquabazana	3665	abrodibada

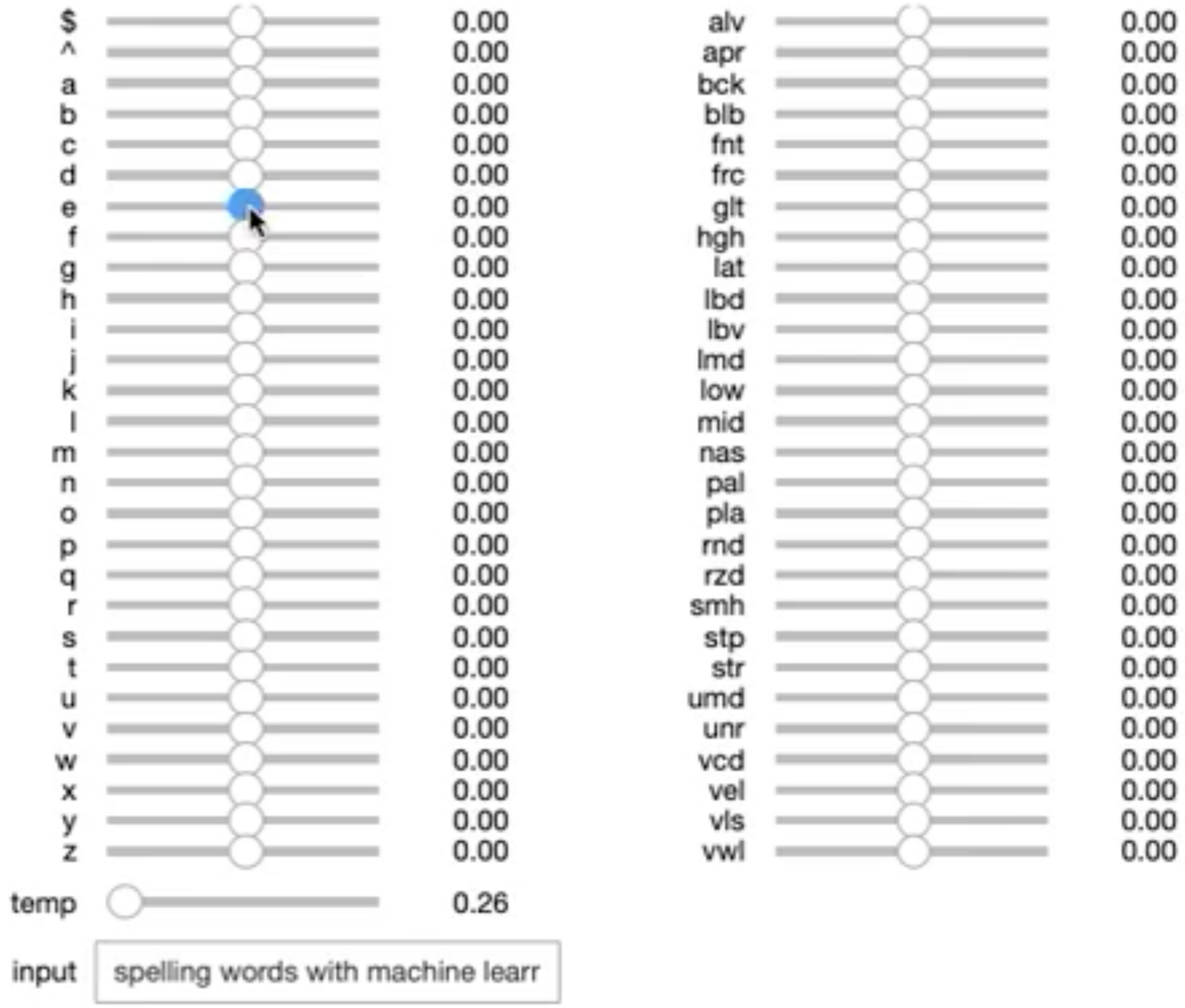
interpolating between words

paper → pacete → plastic

kitten → putpey → puppy

birthday → artherday → anniversary

artificial → intelificel → intelligence



spelling words with machine learning

code/tech, playable, implementation, integration

Phonetic editor

How doth the little croc-
odile improve his shining
tail, and pour the waters
of the Nile on every golden

include/exclude letters

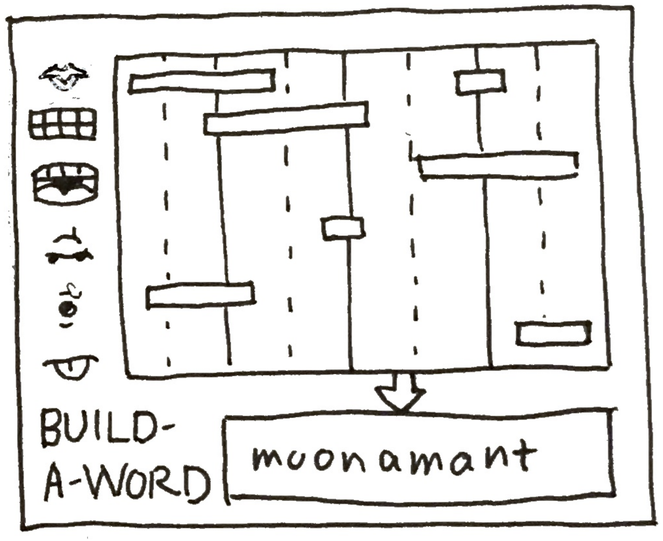
a b c d
e f g h
i j k l
m n o p
q r s t
u v w x
y z

adjust sounds

lips
teeth
nose
mouth
tongue
hum
noise
palate

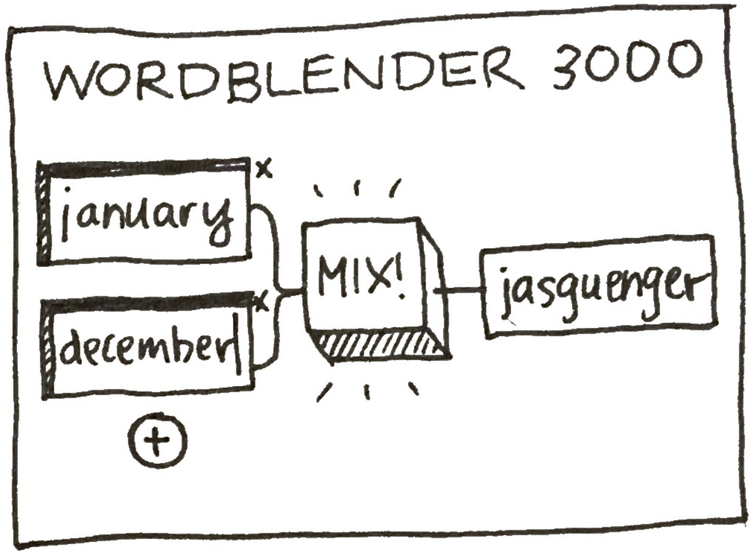
normal — weird

nouns adjectives verbs etc.

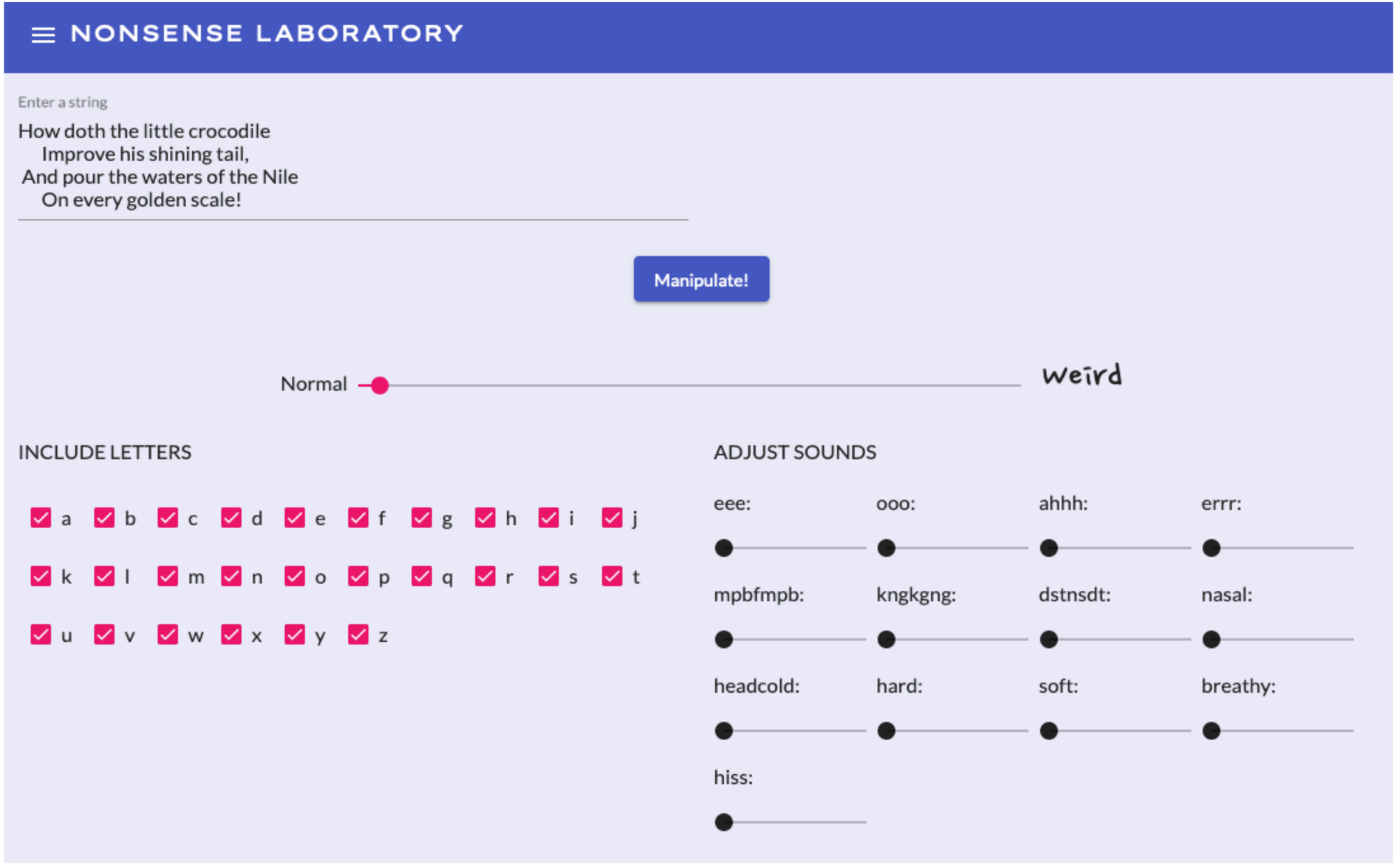


NONSENSE EXPLORER

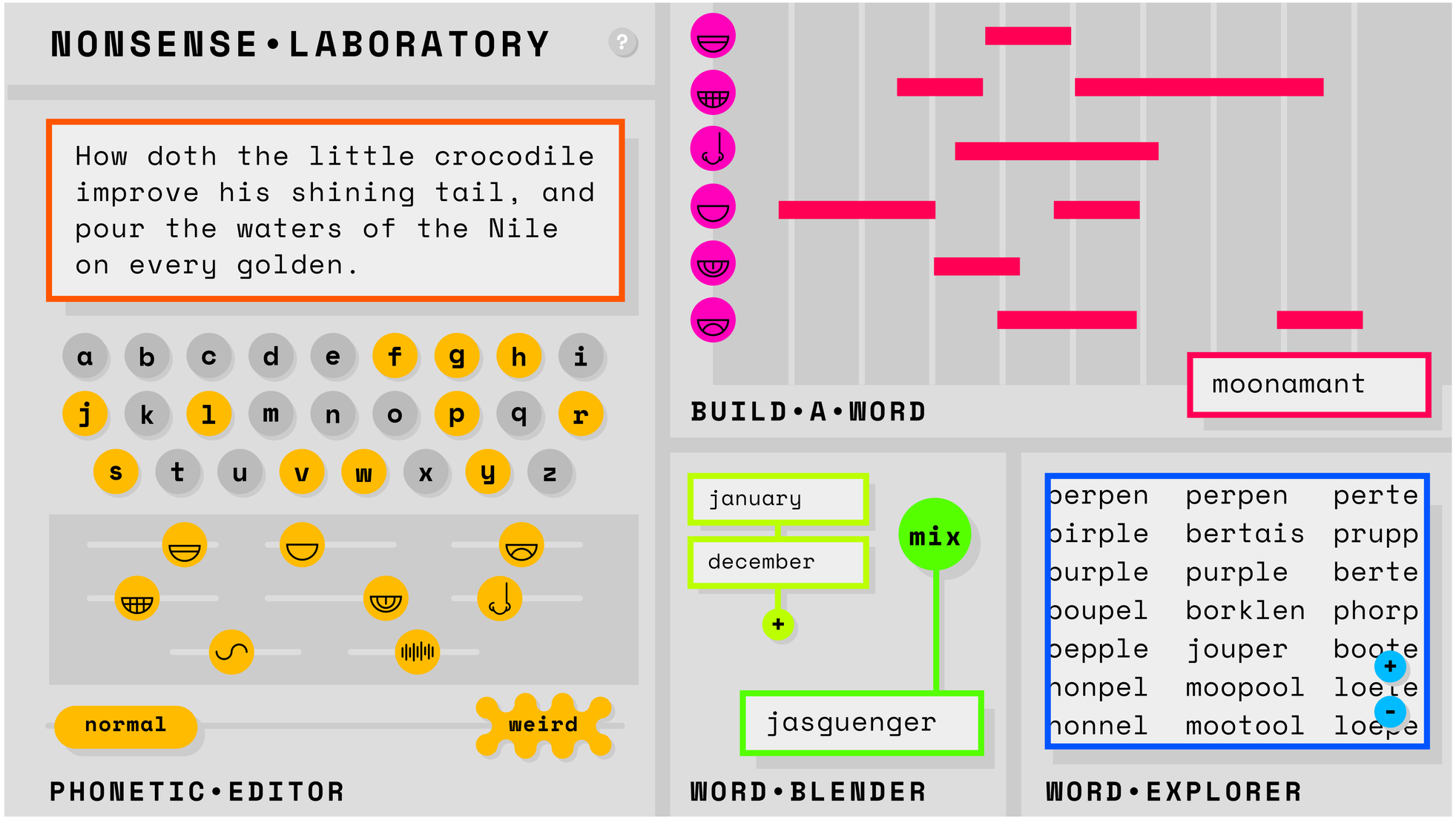
perpen	perpen	perté
pirple	bertais	prupp
purple	purple	berte
poupel	borklen	phorp
oepple	jouper	bo



paper, role

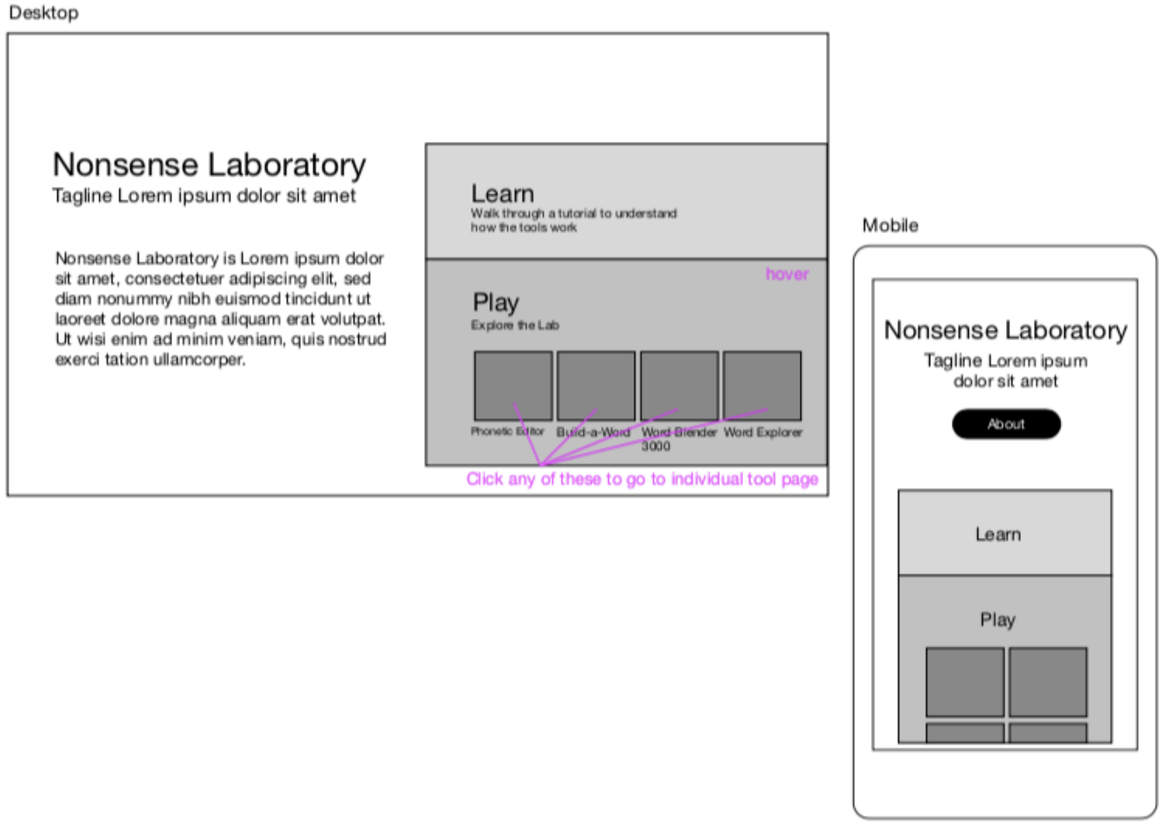


code/tech,
interface,
playable,
core game,
role, integration,
implementation

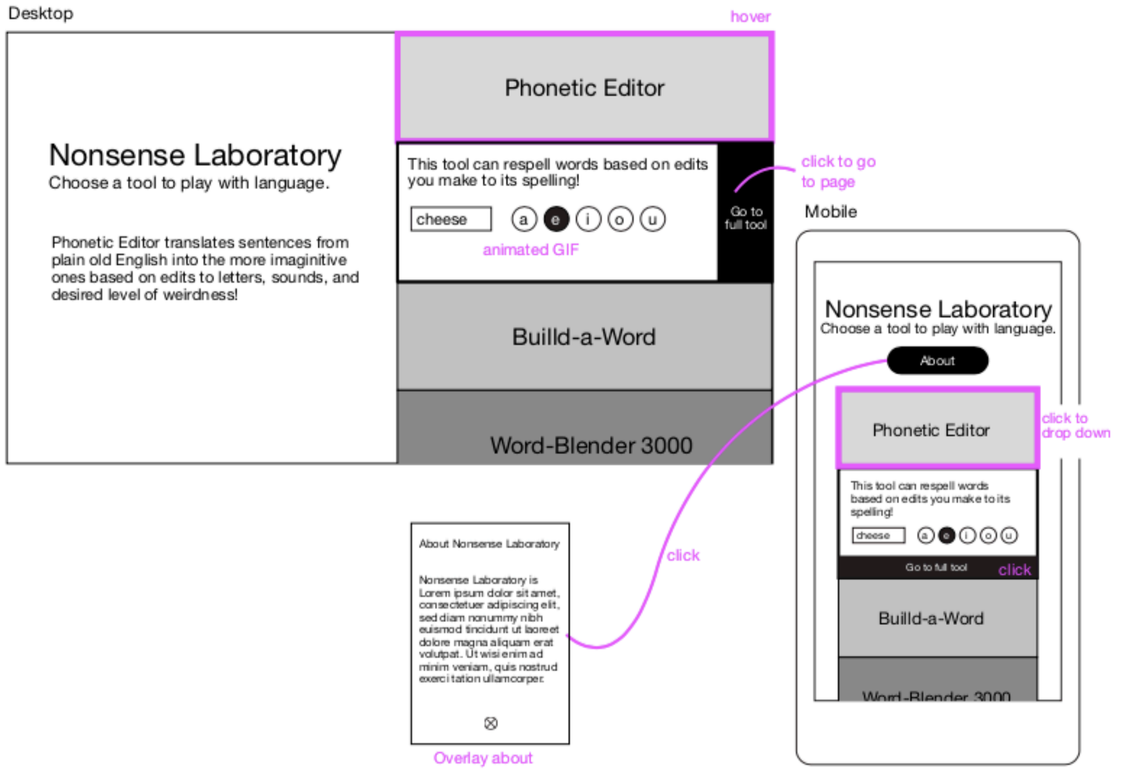


art and sound,
role, look and feel

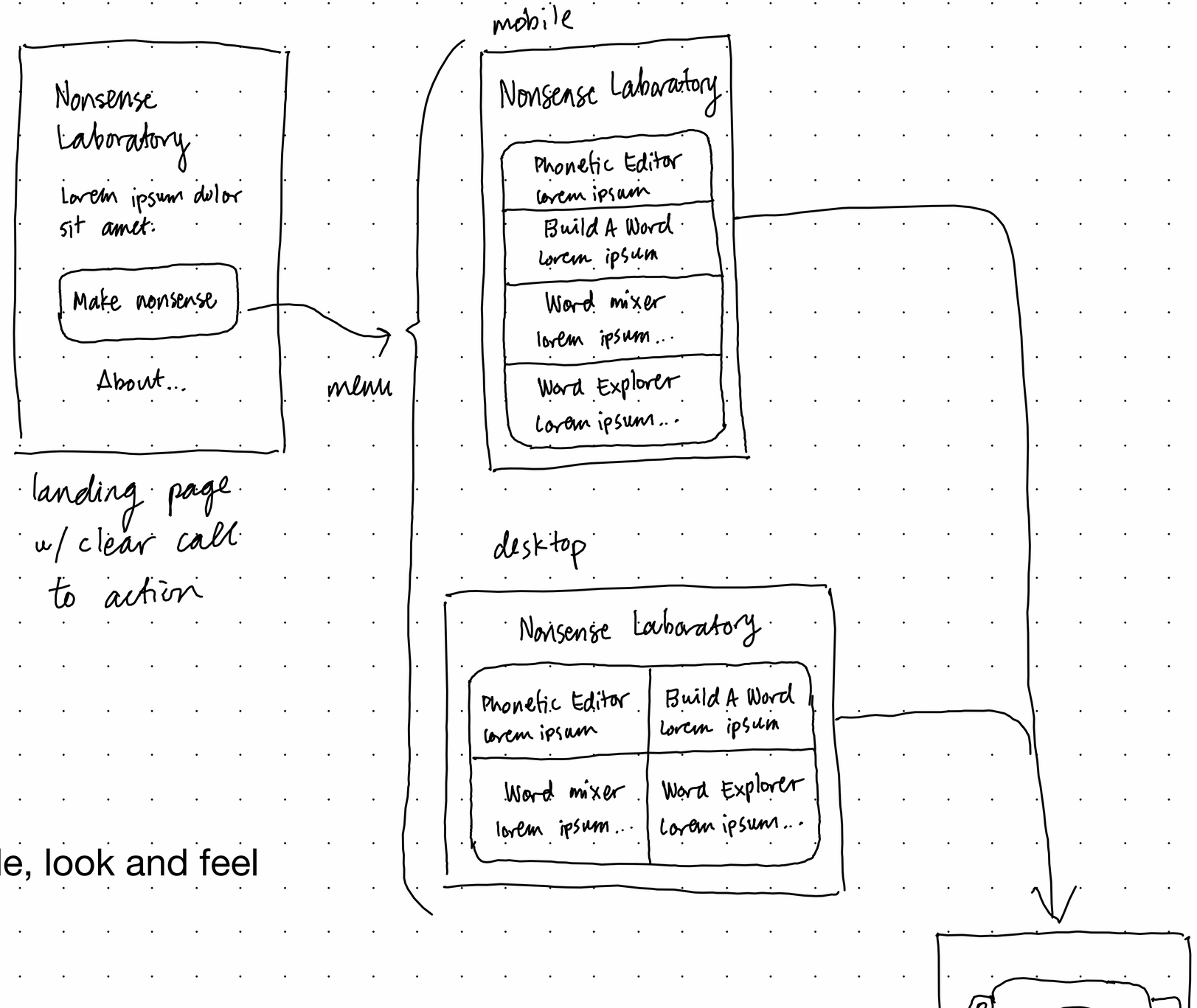
2: Hover State “Play”



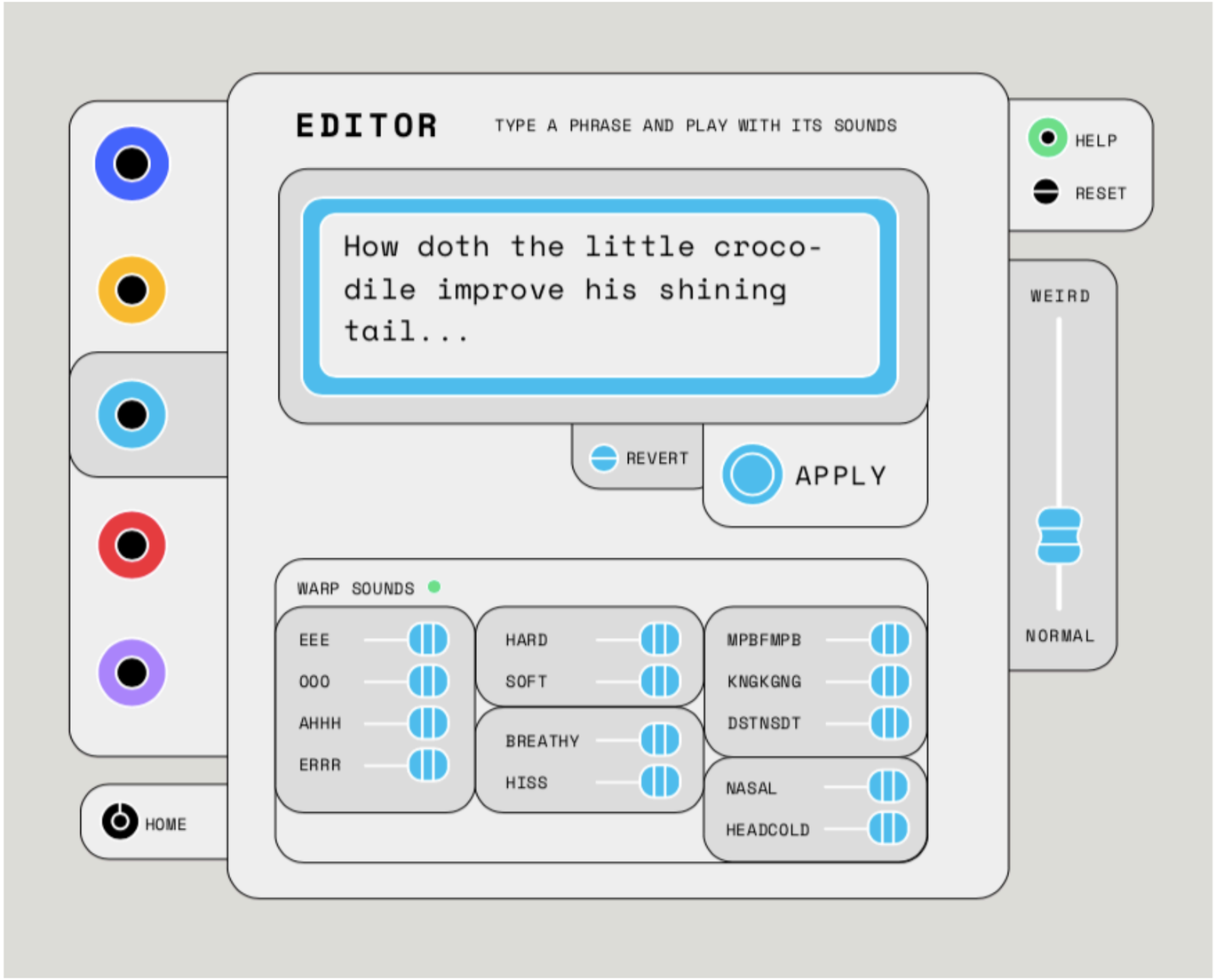
3: Hover State “Phonetic Editor”

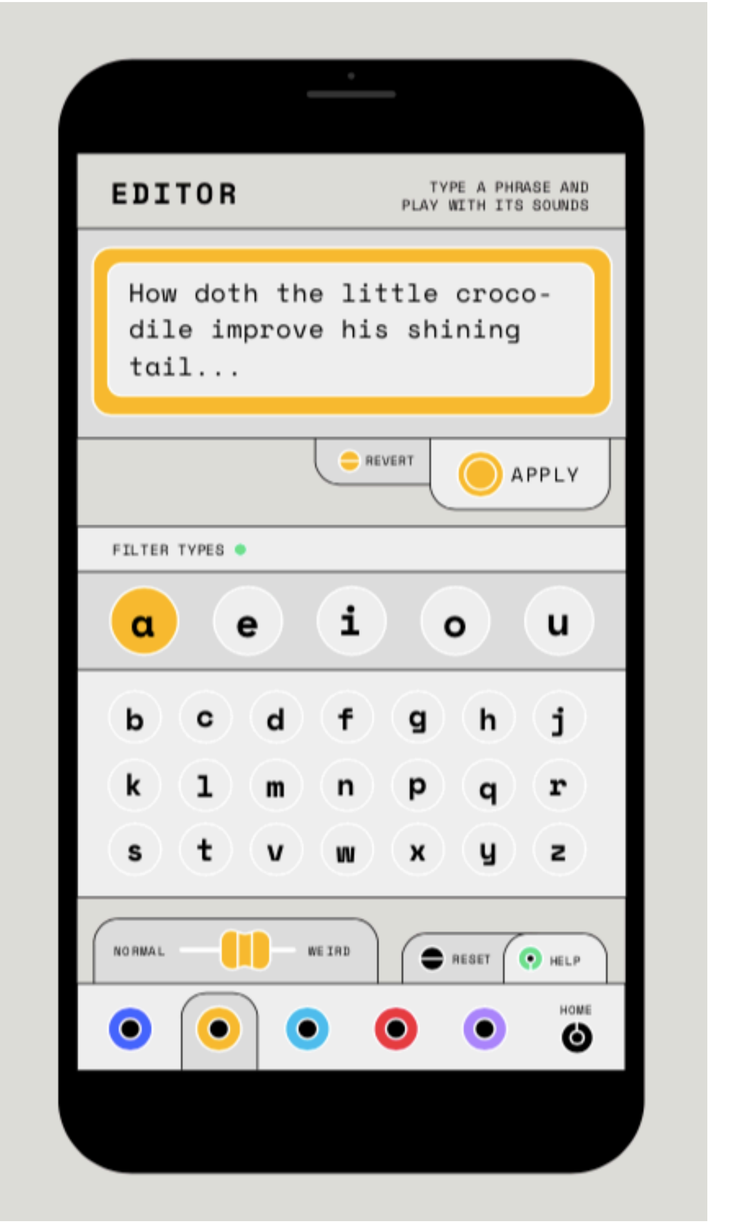


"paper," role, look and feel

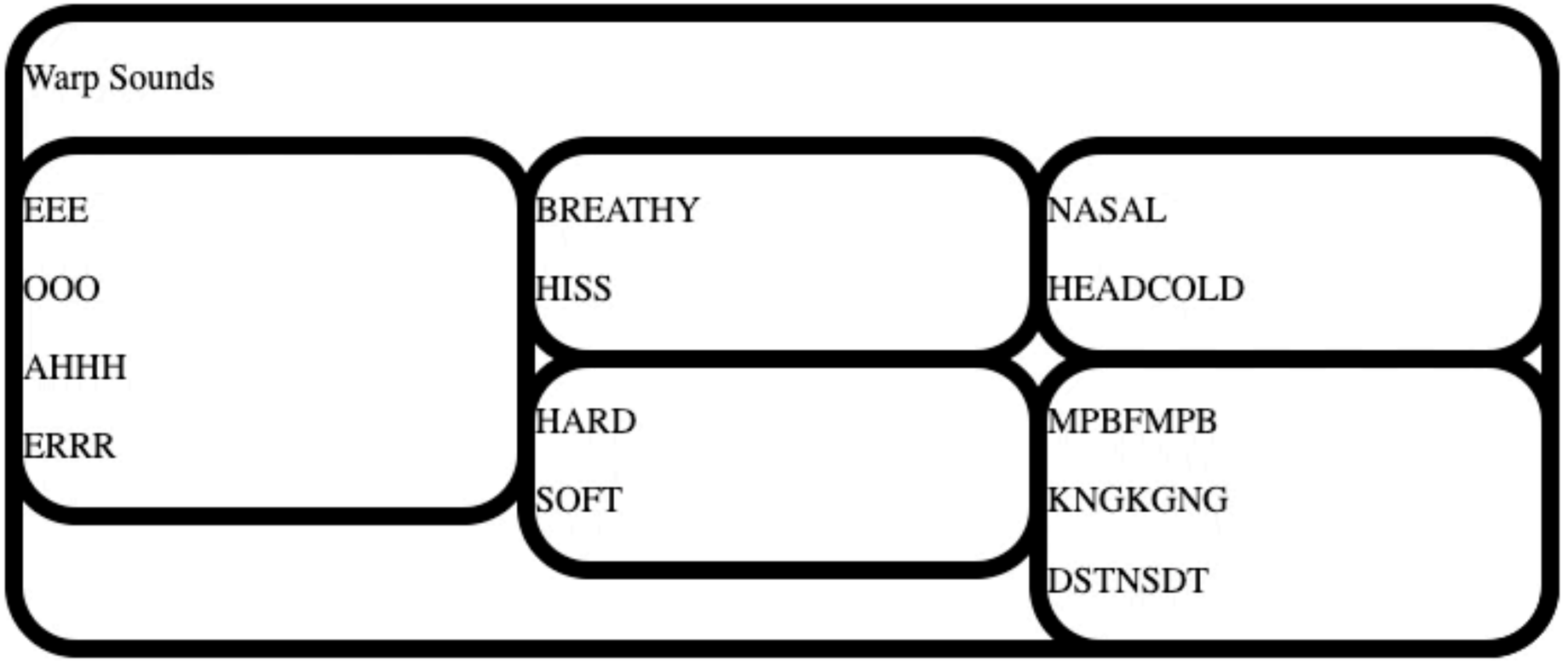


prototype:
"paper", role, look and feel

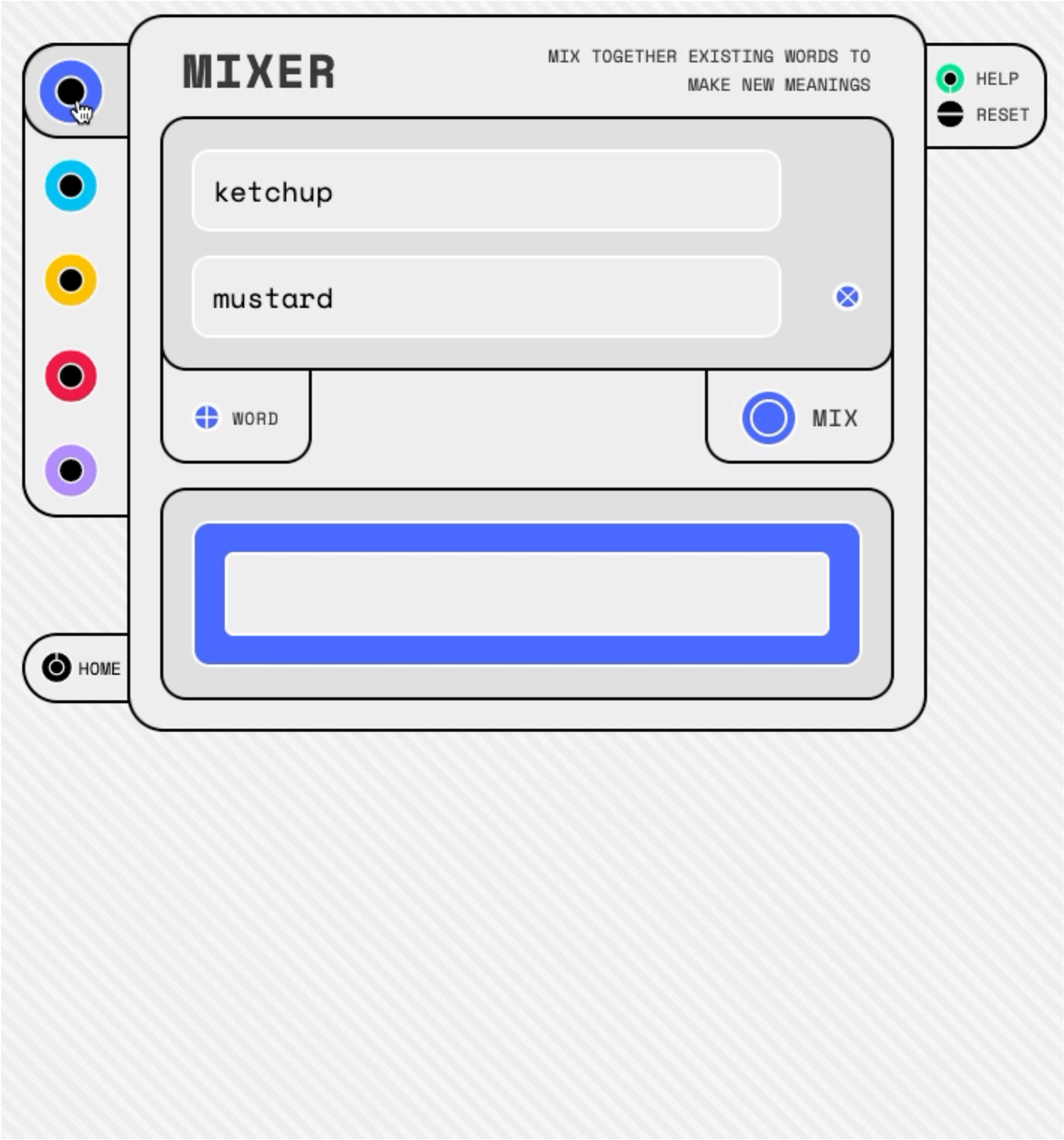




prototype:
art and sound, role, look and feel



prototype:
code/tech, implementation


MIXER
MIX TOGETHER EXISTING WORDS TO MAKE NEW MEANINGS
HELP
RESET
ketchup
mustard
WORD
MIX
HOME

Works cited

- Houde, Stephanie, and Charles Hill. “Chapter 16 - What Do Prototypes Prototype?” *Handbook of Human-Computer Interaction (Second Edition)*, edited by Marting G. Helander et al., North-Holland, 1997, pp. 367–81. ScienceDirect, doi:10.1016/B978-044481862-1.50082-0.

- Macklin, Colleen, and John Sharp. *Games, Design and Play: A Detailed Approach to Iterative Game Design*. First edition, Addison-Wesley, 2016.